

SIMONA



Piping systems for drinking water supply
Safe and efficient solutions in plastics

GLOBAL THERMOPLASTIC SOLUTIONS

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System meets safety – Plastic solutions from SIMONA for drinking water supply

SIMONA is acknowledged as one of the leading producers and development partners in the field of thermoplastics. We are able to offer you best-in-class solutions tailored to your applications: in the chemical processing industry, in the water, energy and commodities supply sector as well as in the field of mobility, construction and environmental technology. In our capacity as professional consultants, we also provide full technical support.

Drawing on our extensive technical, ecological and commercial expertise, we produce reliable plastic piping systems for the utilities sector and are committed to meeting the highest possible quality standards. After all, our health and well-being depend on the quality of our drinking water, and supplying the population with the world's no. 1 foodstuff is considered one of the most essential tasks for the future. SIMONA offers premium-quality piping systems for the safe and leak-free supply of drinking water. Whether for water catchment, water treatment, elevated tank lining or drinking water supply,

whether by means of open or trenchless installation – the materials used by SIMONA can be optimally tailored to the specific application and are designed for maximum efficiency and load-bearing capacity in all situations.

The perfect choice

Thanks to their outstanding material properties, SIMONA® polyethylene (PE) pressure pipes are particularly suitable for utility applications. They are the perfect choice for conventional open-trench construction as well as for trenchless pipe-laying. As trenchless pipe-laying methods are associated with higher demands and stresses on plastic materials, particular attention must be paid to the optimum selection of pipes. Our experts are here to advise you during all stages of your project.

Comprehensive product range

Alongside an extensive range of versatile pipes, SIMONA's end-to-end portfolio of products used in the field of drinking water supply includes fittings, electrofusion sockets, sheets and customised components. Whatever your project involves, you can rely on SIMONA to provide one-stop solutions.

Advantages of PE-based piping systems

- Easy handling due to low weight, even with long pipe lengths
- No breakage of the pipe in the event of pressure surges or ground settlement thanks to high flexibility
- Long-term cost savings, as excellent internal and external corrosion resistance eliminates the need for subsequent rehabilitation
- Safe operation due to absolutely leak-proof and permanently integral systems by means of welding
- Particularly resistant in the case of trenchless laying methods due to high notch and crack resistance
- Simple, fast and therefore cost-effective installation
- Favourable hydraulic conditions and lower maintenance costs due to smooth inner pipe surfaces
- Good storage properties due to insensitivity to weathering
- UV resistance
- Physiological safety and excellent suitability for drinking water
- Good chemical resistance
- Recyclable and thus resource-friendly
- Very good abrasion resistance

PAS 1075 – Acknowledged quality standard for PE 100 RC pipes in trenchless pipe-laying

PAS 1075 (= Publicly Available Specification) is a consultative document that outlines requirements applicable to PE pipes that are installed by means of alternative pipe laying methods and whose service life spans a period of at least 100 years.

PAS defines a transparent quality standard that complements the proven standards outlined in DIN and DVGW. It determines which PE 100 materials meet the specific requirements and can thus be classified as PE 100 RC.

PAS 1075 categorises pipes into three types regardless of manufacturer, thus enabling users to select pipe types according to practical requirements.

Type 1:

Solid-wall pipes made of PE 100 RC (single skin)

Type 2:

Pipes with dimensionally integrated layers of PE 100 RC (two or three skins)

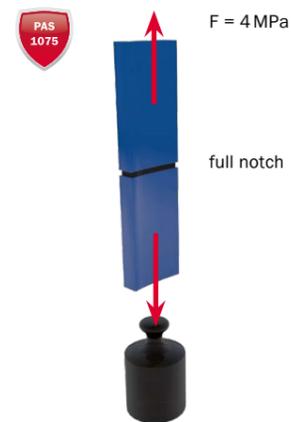
Type 3:

Pipes in PE 100 RC with an additional outer protective jacket (one or two skins)



All SIMONA® PE 100 RC-Line pipes meet the requirements of PAS 1075 and are independently tested by TÜV Süddeutschland.

Material tests for high-quality PE 100 RC:

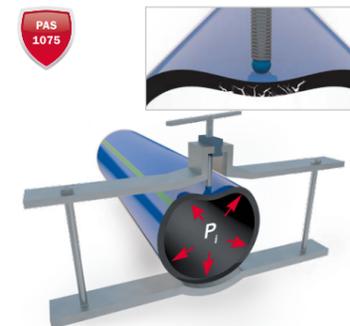


FNCT (Full Notch Creep Test)

This test examines the resistance of the pipe to slow crack growth. The test is performed on the input material as well as on the actual pipe itself. The test specimen, with a full notch (crack initiation), is exposed to a constant load at an elevated temperature and while under the influence of a wetting agent solution. The time is measured until the test specimen ruptures.

8,760 hrs at 80°C (on the input material)
3,300 hrs at 80°C (on the extruded pipe)
4 N/mm²
2% Arkopal N-100

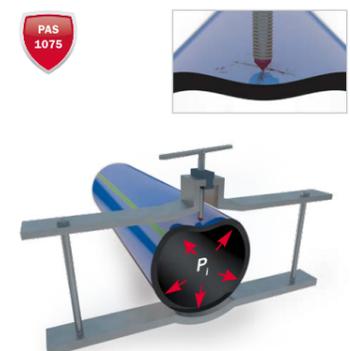
Comparison: Requirement for standard PE 100 (as per DVS 2205-1 BB1) = 300 hrs



Point load test on solid-wall pipe

Round stones can produce concentrated loads on the interior of the pipe. This causes stress that may eventually lead to cracking. The concentrated load is simulated by using a round stamping device, which allows testing of the outer fibre strain on the interior pipe wall.

8,760 hrs at 80°C
4 N/mm²
2% Arkopal N-100



Penetration test on solid-wall pipe

Penetration of sharp objects through the pipe wall (e.g. shards during pipe bursting) can be simulated by using a cylindrical stamp device. The pipe wall must remain intact for a specified period of operation.

Residual wall thickness after 9,000 hrs
> 50% of original wall thickness

Coextrusion method – Added layers, added value

The coextrusion method of production offers several advantages with regard to standard PE 100 and PE 100 RC-Line multilayer pipes (Type 2) as well as PE 100 SPC RC-Line multilayer pipes with protective jacket (Type 3).

Pipes classified as Type 3 include an additional highly abrasion-resistant jacket made of modified polypropylene, which protects them against damage in the form of grooves and notches. Thanks to the coloured functional outer skin featured on PE 100 and PE 100 RC-Line multilayer pipes (Type 2), the overall condition and quality of the pipe can be assessed during construction work. Damages to the exterior that constitute more than 10% of the standard wall thickness can thus be determined by means of visual inspection.

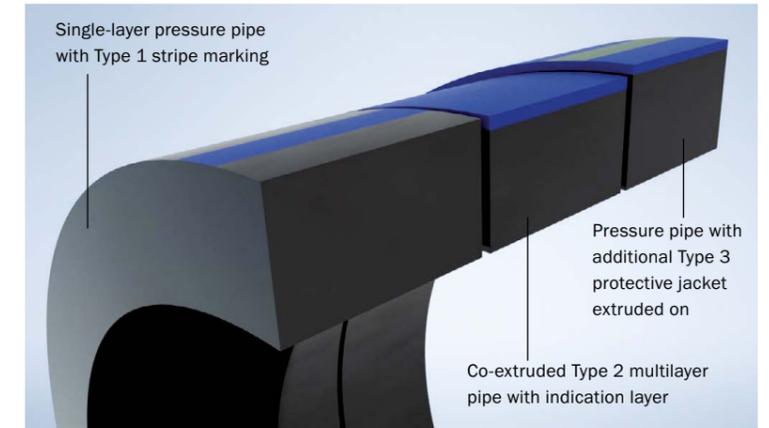
SIMONA® multilayer pipes with dimensionally integrated protective and functional layers allow the operator full-scale quality monitoring by means of visual inspection – from the day of manufacture and throughout the pipeline's entire service life.

Type 2:

SIMONA® multilayer pipe 2S (two skins)

Type 3:

SIMONA® multilayer pressure pipe with protective jacket 2S (two skins with additional protective jacket)



Multilayer pipes

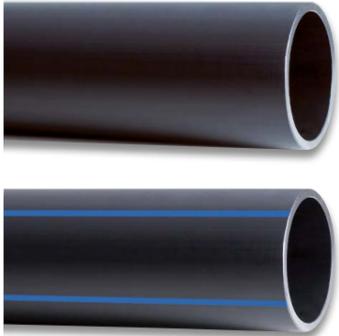
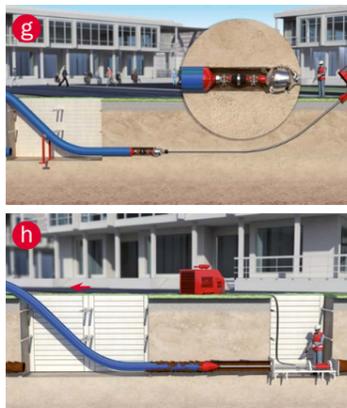
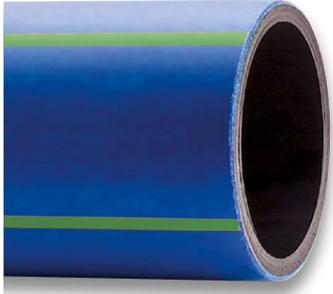
SIMONA® Type 2 multilayer pipes are manufactured by means of coextrusion; the two layers are connected to one another to create an inseparable, homogeneous joint. SIMONA® SPC Type 3 protective-jacket pipes additionally have a protective jacket that has been extruded onto the inner pipe (PAS 1075 Type 3). It can be peeled off from the inner pipe for processing with electrofusion fittings.



Damaged pipe

Example of improper handling at the construction site: damage to a Type 2 multilayer pipe caused by an excavator bucket.

SIMONA® PE 100 RC-Line pipe types and laying methods

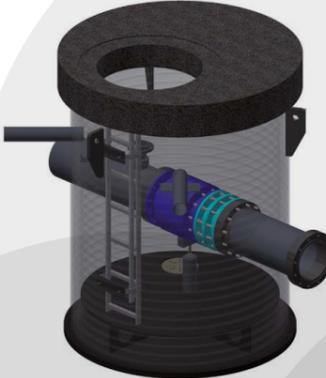
Type of pipe	Benefits	Installation method	Standards and approvals
Protection Level PE 100: + good, Protection Level PE 100 RC: ++ very good			
<p>PE 100-Line/PE 100 RC-Line Standard single-skin pressure pipes made of extruded polyethylene in PE 100 or PE 100 RC.</p> 	<p>PE 100:</p> <ul style="list-style-type: none"> Low weight High flexibility No corrosion Greater cost-effectiveness by processing long single pipes up to 30 m in length <p>PE 100 RC: Additionally</p> <ul style="list-style-type: none"> Superior stress crack resistance High resistance to point loads Superior resistance to slow crack growth 	 <p>PE 100:</p> <p>Open-trench method</p> <p>a With sand bed up to 0/8 With twice-crushed and screened chipping</p> <p>Trenchless pipe laying</p> <p>b Swagelining (reduction method) c Horizontal directional drilling (HDD)</p> <p>PE 100 RC:</p> <p>Open-trench method</p> <p>d Without sand bed (laying with prepared excavated material)</p> <p>Trenchless pipe laying</p> <p>e Pipe lining with annular space depending on the old pipe condition f Milling f Ploughing g Horizontal directional drilling (HDD)</p>	<p>PE 100:</p> <ul style="list-style-type: none"> DIN 8074/8075 DIN EN 12201 TÜV Süddeutschland certified DIBt approval Z-40.23.311 for liquids hazardous to water <p>PE 100 RC:</p> <ul style="list-style-type: none"> DIN 8074/8075 DIN EN 12201 TÜV Süddeutschland certified PAS 1075, Types 1 + 2
Protection Level PE 100: + good, Protection Level PE 100 RC: ++ very good			
<p>PE 100-Line 2S PE 100 RC-Line 2S Double-skin pipes made of PE 100 or PE 100 RC with functional layers for full-scale quality monitoring.</p> 	<p>PE 100 RC Type 2: Additionally</p> <ul style="list-style-type: none"> 10% identification layer for visual inspection of the pipes during the construction phase 	 <p>PE 100 SPC RC:</p> <p>Trenchless pipe laying</p> <p>g Pipe lining with annular space h Horizontal directional drilling (HDD) h Burst lining</p>	<p>PE 100 SPC RC:</p> <ul style="list-style-type: none"> DIN 8074/8075 DIN EN 12201 TÜV Süddeutschland certified PAS 1075, Type 3
Protection Level PE 100 SPC RC: +++ excellent			
<p>PE 100 SPC RC-Line/ PE 100 SPC RC-Line 2S The additional exterior protective jacket made of modified polypropylene (SIMONA® PP Protect) protects the inner pipe against damage during trenchless installation. The inner pipe has the full quality of a new pipe subsequent to installation.</p> 	<p>PE 100 SPC RC: Additionally</p> <ul style="list-style-type: none"> Excellent bonding and shear strength between inner pipe and protective jacket High abrasion resistance of PP protective jacket No crack propagation from protective jacket to inner pipe High resistance of inner pipe (PE 100 RC) to slow crack growth Extreme protection against physical damage such as notches, abrasion, wear (PE 100 SPC) 	<p>A detailed explanation of the installation methods can be found on page 28 ff.</p>	<p>PE 100 SPC RC:</p> <ul style="list-style-type: none"> DIN 8074/8075 DIN EN 12201 TÜV Süddeutschland certified PAS 1075, Type 3

System solutions from SIMONA

Pipes, injection moulded fittings, customised components and shafts made of PE 100/PE 100 RC: SIMONA offers a comprehensive product portfolio for reliable supply lines in the field of infrastructure applications.

SIMONA plastics workshop
Fittings up to d 1,200 mm

Thanks to its in-house plastics workshop, SIMONA is able to offer customised designs and supply pre-assembled components. This significantly reduces the time needed for on-site installation.



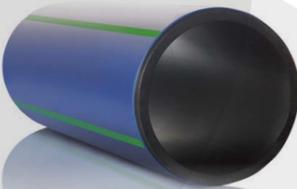
SIMONA injection moulding
production up to d 900 mm

Our range of large injection moulded fittings covers products in various pressure classes – in dimensions up to d 900 mm. We produce both PE 100 as well as PP fittings with short and elongated spigots. Frequent technical audits provide essential data used for the continuous improvement of our products. This provides the basis for consistently high quality standards and ensures that you have an excellent range of products at your disposal.



SIMONA pipe extrusion
up to d 1,200 mm

The standard versions of single-layer and multilayer SIMONA® pipes made of PE 100/PE 100 RC are available in lengths of 6 m and 12 m. Non-standard lengths in > 12 m are project-specific one-off products. SIMONA pressure pipes are available in various SDR classes (SDR 41 – SDR 7.4).



Extensive product range for infrastructure applications

Approvals/standards

SIMONA products comply with the most important guidelines and standards. We subject our products to regular inspections and long-term tests: internally, at our in-house laboratory, and externally, by independent testing institutes.

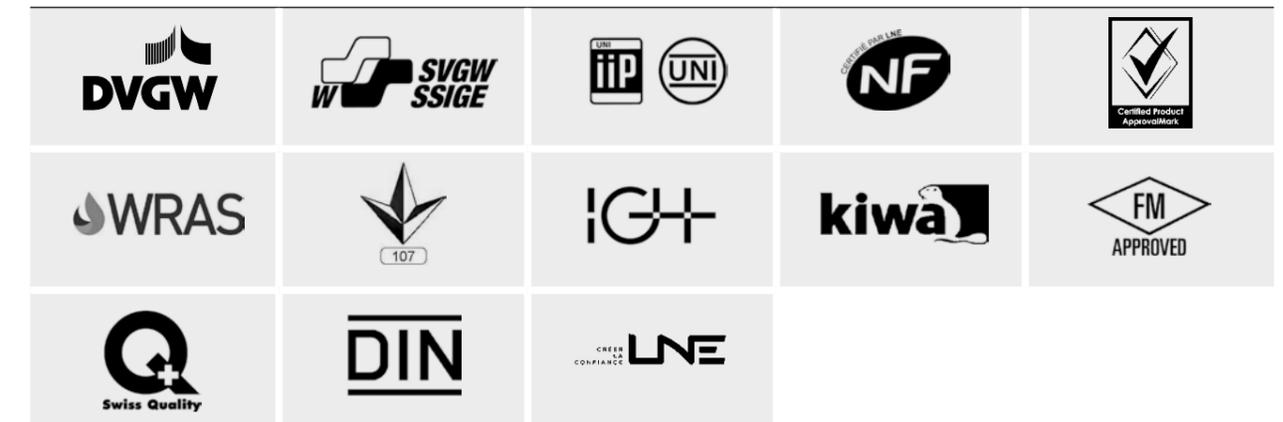
Approvals/standards*

	Dimensions, general quality requirements and inspections	Other standards and guidelines that also apply	Certification
Pipes			
PE 100 pressure pipes	DIN 8074/8075	DIN EN ISO 15494	DIBt: Z-40.23-311, NF 114-Gr.4
PE 100 drinking water pipes	DIN EN 12201, DVGW GW 335 – Part A2	DIN 8074/8075	DVGW, WRAS, NF 114-Gr. 2, DIBt
PE 100 RC pressure pipes	DIN EN 12201	DIN 8074/8075	DIBt, DVGW, PAS 1075 Type 1/2
PE 100 SPC pipes PE 100 SPC RC pipes	Inner pipe based on DIN 8074/8075 DIN EN 12201	Protective jacket to DIN 4033 (DIN EN ISO 1610)	PAS 1075 Type 3 DVGW
Fittings			
PE 100 injection moulded fittings	DIN EN 12201	DIN EN ISO 15494	DIBt: Z-40.23-322 (for water-endangering liquids, Section 19 WHG)
PE 100 injection moulded fittings for drinking water	DIN EN 12201	DVGW GW 335 – Part B2	DVGW, WRAS, PIIP, KIWA, GOST (FOCT)

Regular external monitoring audits are conducted by the following testing institutions: TÜV Süddeutschland, SKZ, MPA Darmstadt, KIWA Netherlands, IIP Italy, FM Global, LNE France.

National and international approvals*

PE



PE, PP, PVDF

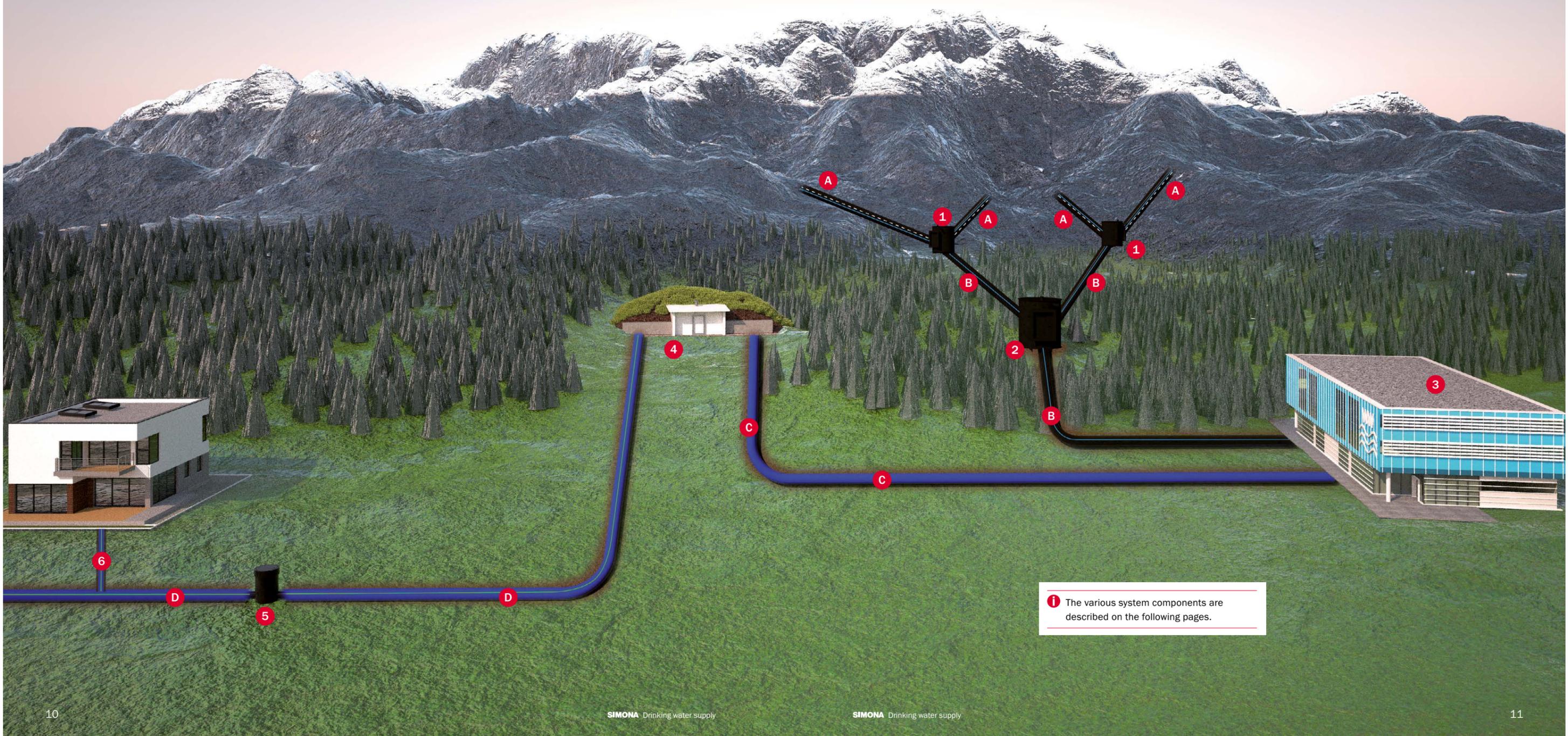


* Subject to change without notice

SIMONA® pipes and fittings: comprehensive system solution for drinking water supply

From a drop of rain to drinking water for final consumption

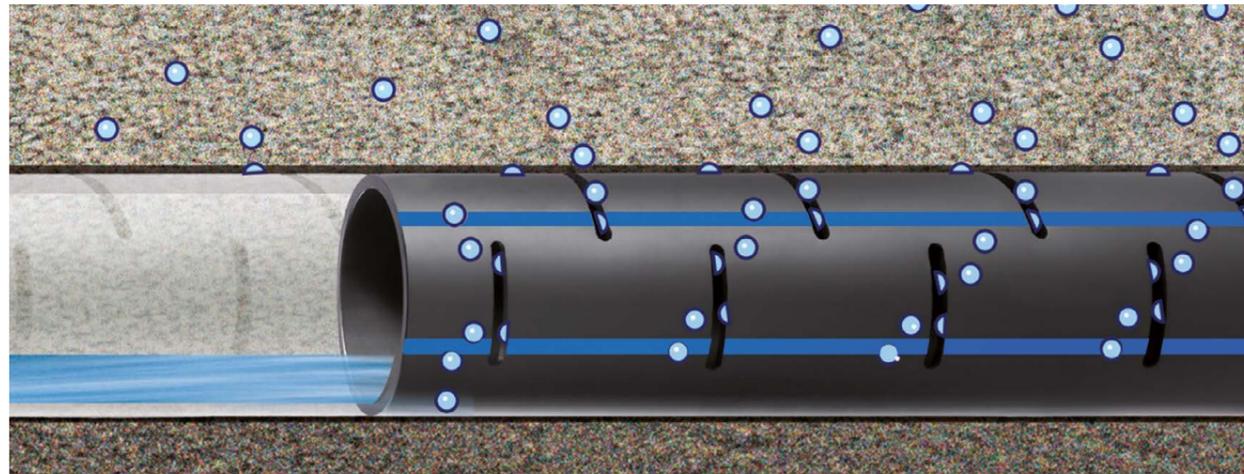
- 1 Spring catchment (p. 14)
- 2 Spring water shaft (p. 14)
- 3 Waterworks (p. 22)
- 4 Elevated tank (lined internally with SIMONA® PE Blue 340 sheets) (p. 16)
- 5 Functional shaft (p. 36)
- 6 SIMONA® PE 100 building supply pipe (p. 24)
- A SIMODRAIN® PE 100 spring catchment pipes (p. 12)
- B SIMOFUSE® PE 100 Line / SIMOFUSE® PE 100 RC-Line raw water pipe (p. 18)
- C SIMONA® PE 100 Line 2S or SIMONA® PE 100 RC-Line 2S (p. 25)
- D SIMONA® PE 100 SPC RC-Line protective-jacket pipes (p. 26)



i The various system components are described on the following pages.

SIMODRAIN® pipes for water catchment

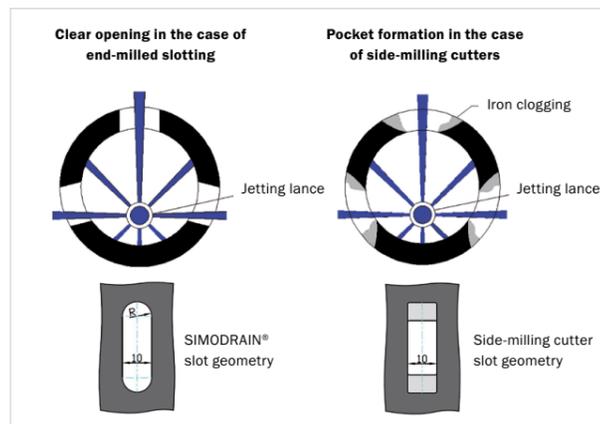
Perforated or slotted SIMODRAIN® pipes are used for the long-term catchment of water from groundwater or springs. They drain away water in the soil through leachate pipes and convey it to spring water shafts. SIMONA uses quality-assured original raw materials that have been approved for drinking water applications.



Principle of the absorption and discharge of leachate in the ground

Tasks of perforated and slotted pipes

- Fast interception, collection and discharge of inflowing water
- Absorption and discharge of unbound gravitational water



Benefits of PE piping systems in water catchment

- Excellent hydraulics due to smooth internal pipe surfaces ($k \leq 0.01 \text{ mm}$)
- UV stability and frost resistance enable trouble-free storage
- Fast laying due to socket connection (WIMU) or double socket
- Can be jetted at high pressure in accordance with DIN 19523, method 1
- Fracture-resistant pipe due to a high level of flexibility
- Suitable for very high static and dynamic loads
- Slot patterns based on DIN 4266 and 4262; DBS 918 064
- Ring stiffness in accordance with DIN EN ISO 9969 and DIN EN 12666
- Resistance to all substances normally contained in the ground

Types supplied

	Multi-purpose pipe (UP)	Multi-purpose pipe (MP)	Partial leachate pipe (LP)	Full leachate pipe (TP)
	unslotted	1/3 slotted	2/3 slotted	3/3 slotted
d mm	10-1,200	110-630	110-630	110-630

Joining methods

- Integral socket connection (WIMU)
- Double sockets
- Electrofusion sockets
- Butt welding



Reference

- Project name/ designation:** Spring water catchment, Freiburg/Switzerland
- Description:** Laying of a municipality's PE 100 spring water leachate pipe
- Products used:** SIMONA® PE 100 slotted drainage pipes MP d 125 SDR 17



Further information on SIMODRAIN® can be found here.

Spring water shaft and elevated drinking water tank

SIMONA's spring water shaft is a PE shaft for conveying and collecting spring water for water supply.

In addition, it can be used for desanding, sampling and spring discharge measurement.



In a spring water shaft the sand in the flow of spring water and any other solids are separated from the spring water by settlement. As a result, the drinking water is subjected to coarse cleaning and the downstream piping system is protected against contamination. Once the drinking water has undergone coarse cleaning it passes through a pipe to the drinking water tank. After treatment, the water is admitted to the supply network for delivery to the consumer.

Spring water shafts can also be used for taking samples of water and they help to ensure drinking water quality. Therefore, as part of the production process only materials are used that have been approved for drinking water in compliance with KTW/DVGW. The pipe for taking samples of water is fitted above the sand settlement zone and provided with a sampling strainer. That prevents any large objects from entering the sampling pipe.

An attachable overflow protects the dry zone subject to foot traffic against overflowing spring water. By removing the overflow piece the settling tank can be drained for cleaning purposes or the relevant source of inflow can be discarded.

On request, SIMONA can also make customised versions of shafts at its in-house plastics workshop. We look forward to assisting you.

Benefits at a glance

- Spring water remains pure, safe and unpolluted owing to an excellent level of corrosion resistance
- Lower maintenance costs due to sturdy design and long service life
- Reduced cost of transport and assembly thanks to lightweight products
- Unlimited flexibility to cater for specific customer requirements



Reference

- **Project name/ designation:**
Spring water shaft for the Amalgamated District of Kirchberg/Hunsrück
- **Products used:**
SIMONA® spring water shaft DN 2000
- **Size of project:**
Multiple spring water shafts incl. piping

Product range

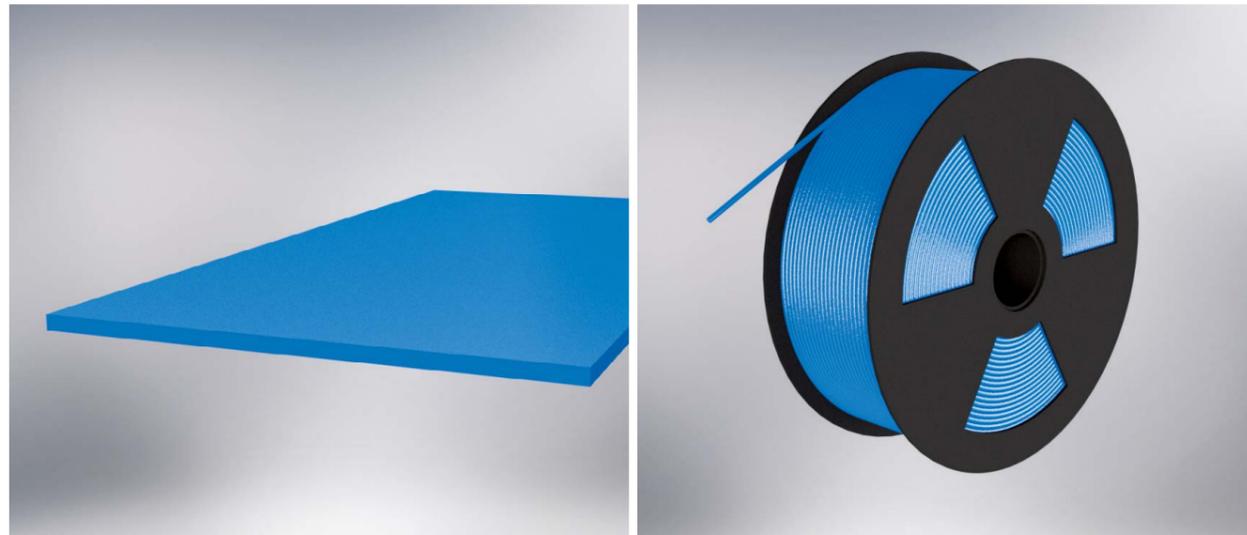
Owing to the diversity of products, SIMONA can take advantage of a very wide range of in-house solutions. This makes it possible for us to meet specific client requirements and thereby provide our customers with the very best in SIMONA quality.



Further information
on spring water shafts and elevated drinking water tanks can be found here.

Internal lining of drinking water tanks – SIMONA® PE Blue 340 sheets

The internal lining of drinking water tanks with safe materials is a key element of drinking water supply. In the drinking water supply sector, SIMONA offers not only the appropriate pipes, fittings and shafts but also the suitable internal lining for drinking water tanks.



Reference

- **Project name/ designation:**
Elisabethen-Stollen
Bad Homburg
- **Products used:**
Drinking water tank
(12 mm + 20 mm) up
to a single length of 5 m
per sheet
- **Size of project:**
2 x 2,000 m³
(2 x 2,000,000 l water)

As system providers, our experts are available for consultation at an early stage and during the entire planning phase of your projects, in addition to developing the most economical solution in partnership with your team. SIMONA® PE Blue 340 sheets are the perfect choice when it comes to the internal lining of raw water tanks, purified water tanks and drinking water tanks.

Lining technology allows complete rehabilitation of virtually any shape of tank. Any butt joints or weld seams necessary are always smoothed close to the surface. This helps to overcome even the most difficult installation situations and achieves a permanently homogeneous surface texture for the finished lining. In operation, it makes cleaning and disinfection easy and very fast, and hence far less expensive compared to conventional methods of rehabilitation.

SIMONA® PE sheets and welding rods are specially designed for the rehabilitation of elevated drinking water tanks.

Benefits at a glance

- Long-term stability due to solid material design
- Long service life due to high chemical resistance
- Time saved in assembly due to excellent processing capability
- Certified in accordance with DVGW Code of Practice, Worksheet W 270, not to provide a breeding ground for microorganisms
- Absolutely hygienic state due to the elimination of contamination risk
- Minimised cost of cleaning and disinfection
- All the PE pipes meet the drinking-water contact recommendations for organic materials (plastics) in contact with drinking water, issued by the German Federal Institute for Risk Assessment (BfR)

Product range

SIMONA® PE Blue 340 sheets, extruded

	Formats (mm)	Thicknesses (mm)
	2,000 x 1,000	3-20
	3,000 x 1,500	3-20
	4,000 x 2,000	3-20

SIMONA® PE Blue 340 welding rods

	OD (mm)	Form
	3.0	Roll 3.5 kg
d	4.0	Roll 3.5 kg
	4.0	Spool 2.0 kg



Further information

on the internal lining of drinking water tanks can be found here.

Raw water pipe

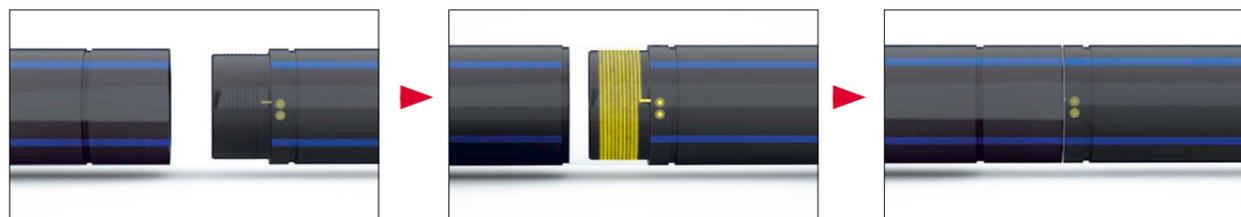
Thanks to SIMONA® raw water pipes, untreated raw water is conveyed safely to a water treatment plant for the production of drinking water.



In addition to standard PE 100 RC pipes that are laid by heated-tool butt welding and electrofusion welding in pressure ratings PN 10/16, SIMONA offers SIMOFUSE® pipes for applications in low-pressure sections up to 8 bar. This joining method combines the fast assembly of a push-on connection with the safety of a welded, integral joint obtained by electrofusion welding and combines state-of-the-art welding with compact design.

Joining pipes and fittings in confined spaces is one of the major challenges encountered in the laying of piping systems. SIMOFUSE® ensures easy, fast and economical laying, especially in pipelines with poor accessibility. The result is an integral, weldable, push-on connection without the need for any elastomeric sealants. The installation procedure is time-saving and uncomplicated: only two steps are required to create an absolutely watertight welded joint – insertion of pipe modules into one another and welding with a commercial welding set.

How the SIMOFUSE® joining method works



Simply insert:
Pipe modules featuring factory-made socket and spigot ends with high level of precision fit

Weld immediately:
Use of commercial 40 V welding sets

Result:
High-strength, watertight welded joint

Reduction of processing time

Pipes with SIMOFUSE® joining technology are delivered as one component. There is no need for time-consuming welding preparations, such as the peeling of pipe ends. No recesses are required in the pipe support because the socket connection does not bring any additional load to bear. As a result of streamlined welding preparations and shorter warming time, the overall processing time can be significantly reduced with the help of SIMOFUSE®. The pipe modules are delivered to the construction site, they are ready for installation. The joining method thus provides increased efficiency when laying piping systems and ensures both absolute watertightness and total protection against root intrusion.

SIMOFUSE® – Approved for pressure applications and monitored externally by MPA Darmstadt

The requirements in respect of pressure pipes for water supply applications and their installation are outlined in DIN EN 12201. The corresponding testing programme was developed on the basis of this standard. In its capacity as an independent inspection body, Staatliche Materialprüfungsanstalt (MPA) Darmstadt was responsible for monitoring product tests and certifying that the products are fit for purpose on the basis of their assessments. Based on extensive testing, the maximum pressure level was approved for the relevant applications.

Scope of the testing programme:

- Type testing (TT)
- Audit testing (AT)
- Batch release testing (BRT)

SIMOFUSE® welded joints generally undergo type testing and batch release testing with regard to the welded component.

The three principal tests conducted within the programme are:

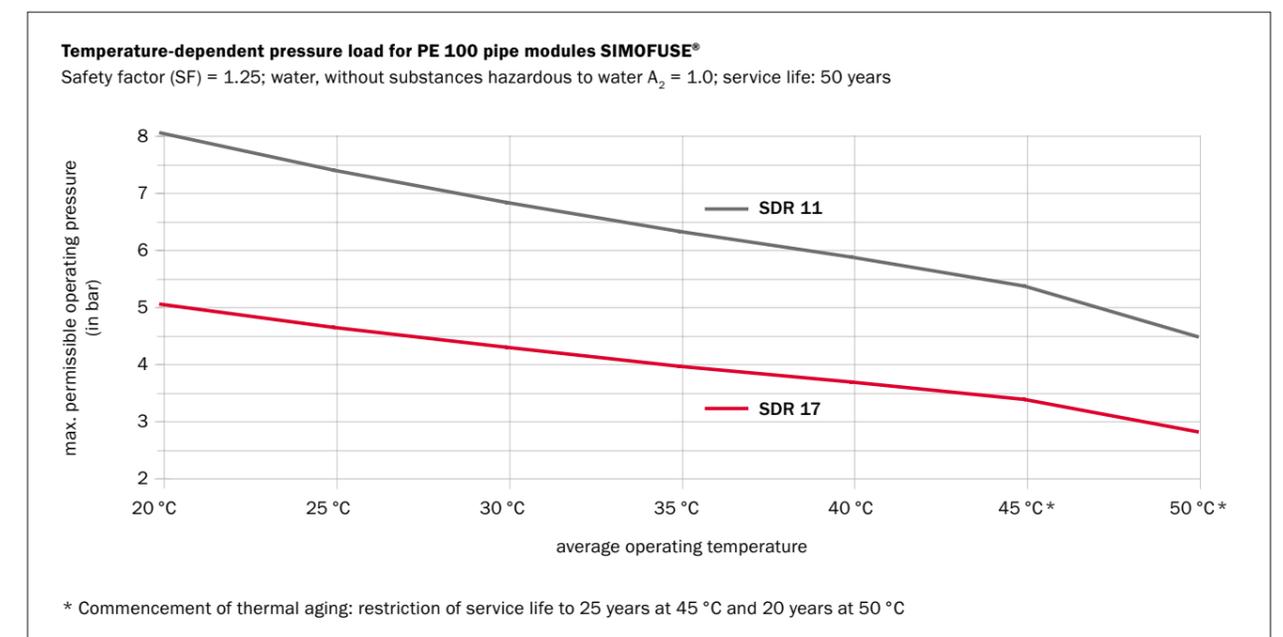
1. Shear and peeling tests according to DVS 22036 BB1
2. Tensile creep test according to DVS 2203-4 BB1
3. Internal pressure creep rupture test according to DIN EN ISO 1167 1/2

Within this context, the focus is on the functional test of the component as a whole (test no. 3) as well as on the assessment of the weld seam itself (tests no. 1 and 2).

The two key factors to be assessed as part of these tests for the purpose of providing details concerning the weld joint quality are:

1. Strength under internal pressure
2. Behaviour of welded joint when exposed to sustained loading

SIMOFUSE® pipes in SDR 17 can withstand operating pressures of 5 bar; SDR 11 pipe modules can even be operated at 8 bar.



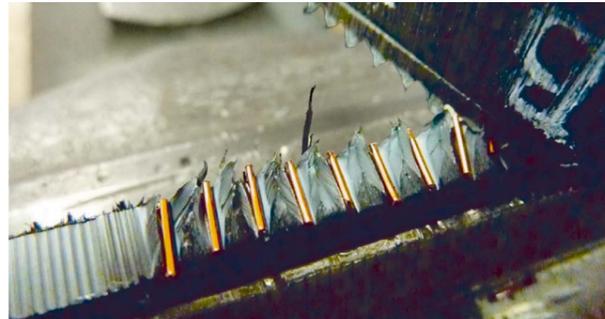
In this context, the temperature-dependent properties of the material have to be taken into account. In order to arrive at conclusive results, so-called destructive material testing is performed in the form of accelerated and

extended tests. The tests are conducted and assessed on the basis of the provisions set out in the DVS Guideline for welded joints relating to thermoplastics. A total of three fit-for-purpose tests of SIMOFUSE® welded joints were investigated.

Fit-for-purpose testing

1. Accelerated test of weld seam by means of shear and peeling tests according to DVS 2203-6 BB1 with assessment of fracture surfaces according to DVS 2203-1 BB4.

Objective: Ductile fractures as a result of tough material properties in the weld seam, as illustrated by plastic deformation.



Fracture properties of SIMOFUSE® weld sample using torsion shear test.

2. Extended test of weld seam by means of tensile creep test according to DVS 2203-4 BB1.

Objective: Achievement of minimum service lives at 80 °C and alternatively 95 °C.

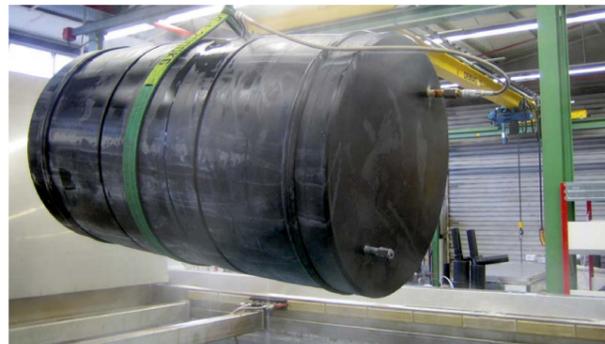


Test piece after creep fracture in weld area.

3. Extended test of entire component by means of internal pressure creep rupture test according to DIN EN ISO 1167 with assessment of tightness.

Objective: Achievement of minimum service lives without fracture or leakage:

20 °C	100 h	12.0 MPA
80 °C	1,000 h	5.0 MPA
80 °C	165 h	5.4 MPA



Test piece PE 100, d 710, SDR 17 from SIMONA creep testing machine.

Your benefits at a glance

- Significant time saving due to delivery ready for installation/laying
- Very high efficiency due to reduced welding times
- Smooth flow thanks to lack of weld bead (neither on the inside nor on the exterior)
- Highly efficient and cost-saving way of laying
- Integral, permanently tight connection eliminates risk of root penetration
- Minimal space requirement, therefore ideal for confined spaces and relining
- Absolutely tight, axial-restraint pipe connection
- No protruding socket structure
- Consistently high quality assured by external monitoring by the material testing institute MPA Darmstadt

Product range

SIMONA® PE 100 pipe modules SIMOFUSE® pressure

SDR	Pipe diameter d mm
17	400-710
11	225-710

Pipe modules up to d 710 mm are available in the MPA test scope; pipe modules up to d 1,200 mm are available on request



Reference

- **Project name/ designation:**
Raw water pipeline
- **Products used:**
PE 100 RC, d 560, SDR 17 PAS Type 1 with SIMOFUSE®
- **Size of project:**
800 m



Further information
about SIMOFUSE® can be found here.

Water treatment

Whether it is water treatment plants for the food industry, the semiconductor industry, the pharmaceutical sector or facilities for the treatment of industrial water and effluent – the pipe material used is exposed to different stresses, depending on the field of application. Apart from the metering of concentrated chemicals, e.g. high-percentage sulphuric acid, drinking water approvals and food conformities are also crucial when making a selection.



In many cases, the use of appropriate chemicals is necessary for the operation of water treatment plants. Our intelligent end-to-end piping systems made of PE, PP, PVDF and ECTFE are engineered to resist highly corrosive liquids such as acids or alkalis, in addition to being approved for use in drinking water applications. Furthermore, they are maintenance-free throughout the entire period of use (at least 25 years). Unnecessary risks are avoided and the need for repairs, plus the associated costs, are reduced substantially.

Areas of use

- Municipal water treatment plants for filtration and dealkalisation with SIMONA® PP-H AlphaPlus® pipes and fittings
- Reverse osmosis plants with SIMONA® PP-H AlphaPlus® pipes and fittings for the treatment of process effluent in the semiconductor industry
- Deionisation systems for use in the pharmaceutical sector with SIMONA® PVDF pipes and fittings



Reference

- **Project name/ designation:**
Water treatment plant
Trollmühle Windesheim
- **Products used:**
SIMONA® PP-H Alpha Plus®
pipes/fittings/flanges
- **Size of project:**
approx. 1 km of piping and
nearly 4,000 fittings



Further information

on the topic of water treatment and what added value our piping systems have to offer can be found in our brochure "SIMONA Water Treatment Systems" or on our website.

Drinking water supply

100% corrosion resistance coupled with outstanding material-specific properties such as very high abrasion resistance, notch resistance and crack resistance as well as excellent hydraulic specifications make SIMONA® pressure pipe systems ideal for future-proof solutions in the supply sector.



No matter whether they are used in drinking water supply, piping for waterworks and elevated tanks or for trenchless laying, the materials used at SIMONA can be optimally matched to the particular field of application and are designed for maximum efficiency and load capacity in all installation situations.

Our SIMONA® PE 100-Line, SIMONA® PE 100 RC-Line and SIMONA® PE 100 SPC RC-Line drinking water pipes come with SVGW and DVGW approvals, among others. Their special properties provide the necessary safety in different methods of pipelaying. Our reliable piping systems have a service life of 100 years at 20 °C, as required by the relevant standard. They are easy to maintain and allow trouble-free sustainment of network operation. In ecological terms, too, they deliver genuine benefits, as the high-strength and absolutely water-tight welded joints prevent water losses.



Benefits of PE 100 at a glance

- Excellent cost-effectiveness due to long service life
- Long-term cost saving due to very good hydraulic properties attributable to smooth internal pipe surfaces, hence reduction of pressure losses over the entire service life
- Easy handling and increased safety in assembly due to light weight, even if the design is complex
- Long maintenance intervals due to permanent corrosion resistance
- Excellent stability ensures the highest safety standards
- Outstanding UV resistance and weatherability enable outdoor use
- Exceptional ageing resistance
- No adverse effect on taste
- All the products are food-approved and ensure absolute physiological safety
- No release of plastic particles into the drinking water

PE 100 RC in addition

- High stress crack resistance in sand-bed-free laying
- Tough pipes on account of high resistance to point loads (e.g. stones, fragments)
- In open laying the prepared excavated soil is used as backfill material
- Increased resistance to slow crack growth
- Certified to PAS 1075, Types 1 + 2

PE 100 SPC RC in addition

- Excellent bonding and shear strength between inner pipe and protective jacket
- High abrasion resistance of PP Protect protective jacket
- No crack propagation from the protective jacket into the inner pipe
- High inner pipe resistance to slow crack growth (PE 100 RC)

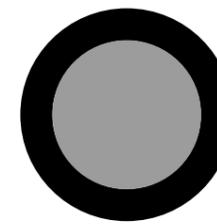
- Extremely effective protection against major physical damage such as notches, abrasion and wear (PE 100 SPC)
- Certified to PAS 1075, Type 3

Product range

SIMONA® PE 100-Line and PE 100 RC-Line

SDR	Pipe diameter d mm
PE 100 / PE 100 RC, single skin (with stripes)	
26	40 - 1,200
17	32 - 1,200
11	10 - 1,000
PE 100 / PE 100 RC or 2S	
17	90 - 630
11	90 - 630

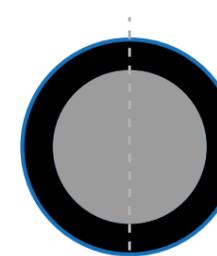
1 SIMONA® PE 100-Line/PE 100 RC-Line



Type 1:
SIMONA® pressure pipe,
single-layer



2 SIMONA® PE 100-Line/PE 100 RC-Line 2S



Type 2:
SIMONA® multilayer
pressure pipe

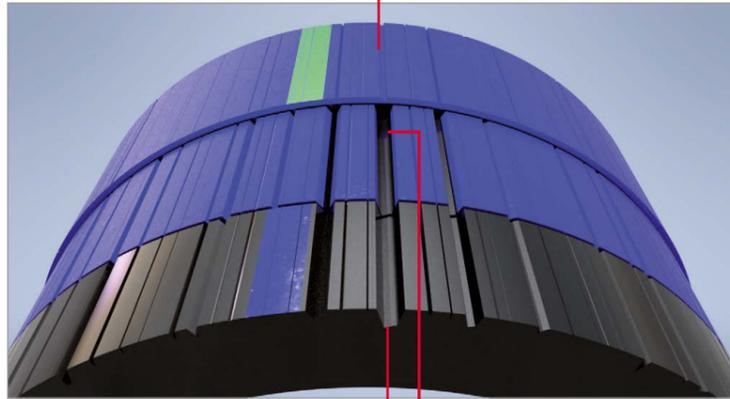


Types	<ul style="list-style-type: none"> ▪ PE 100 drinking-water pressure pipes ▪ PE 100 RC drinking-water pressure pipes
Material	PE 100, PE 100 RC
Colour	<ul style="list-style-type: none"> ▪ PE 100/PE 100 RC (single skin): black/black with blue stripes ▪ PE 100/PE 100 RC, 2S (two skins): black with functional, blue outer layer
Dimensions	<ul style="list-style-type: none"> ▪ Standard lengths: 6 m to 12 m ▪ Up to 30 m on request
Connection technology	<ul style="list-style-type: none"> ▪ Heated-tool butt welding ▪ Electrofusion socket welding ▪ SIMOFUSE®
Standards and guidelines	<ul style="list-style-type: none"> ▪ DIN 8074/8075 ▪ DIN EN 12201 ▪ DIBt approval Z-40.23.311 ▪ PAS 1075 Type 1 (PE 100 RC single skin) ▪ PAS 1075 Type 2 (PE 100 RC multilayer) ▪ TÜV Süddeutschland certified
Suitable laying methods	See page 7

3 SIMONA® PE 100 SPC RC-Line

PE 100 SPC RC-Line pipe as per PAS 1075 Type 3:

100% protection of the inner pipe against the introduction of scores and notches. The **additional** polypropylene protective jacket extruded onto the pipe (cf. page 5) permanently protects the inner pipe against external damage. Since PP is much harder than PE, the introduction of notches to the protective jacket is minimised.



PE 100 RC-Line pipe as per PAS 1075 Type 1:

No visual identification of score depth possible.

PE 100 RC-Line pipe as per PAS 1075 Type 2:

Easy visual inspection of the pipe surface due to 10% blue identification layer.

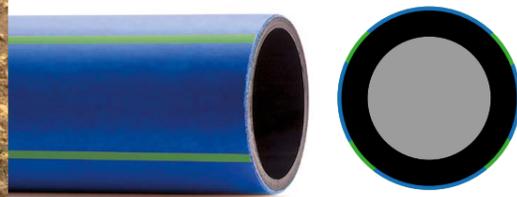


The pipe jacket made of SIMONA® PP Protect provides extremely high protection against serious mechanical damage such as notching and abrasion and prevents crack propagation from the protective jacket into the inner pipe.

Types	PE 100 SPC RC-Line drinking-water pressure pipes
Material	PE 100 RC, PP Protect (modified)
Colour	<ul style="list-style-type: none"> Single-layer: black with coloured protective jacket with green stripes
Dimensions	<ul style="list-style-type: none"> Standard lengths: 6 m to 12 m Up to 30 m on request
Connection technology	<ul style="list-style-type: none"> Heated-tool butt welding Electrofusion socket welding SIMOFUSE®
Standards and guidelines	<ul style="list-style-type: none"> DIN 8074/8075 DIN EN 12201 DIN 53769-1 $\geq 5\text{N/mm}^2$ PAS 1075 Type 3 (protective-jacket pipe) TÜV Süddeutschland certified
Suitable laying methods	Unlimited approval for laying in all soil types and soil classes approved for structural purposes
Notes	Available as a variant without jacket cut-back, with jacket cut-back for heated-tool butt welding or with jacket cut-back for electrofusion socket welding.
	Discover SIMONA® SIMOTOOLS – the professional stripping tool – on p. 41.

Product range

SIMONA® PE 100 SPC RC-Line	
SDR	Pipe diameter d mm
17	32-1,000
11	32-1,000



Type 3:
SIMONA® SPC RC-Line pressure pipe with protective jacket



On the construction site the pipes are moved a number of times during the joining phase and the ensuing installation. This can cause damage to conventional pipes.

SIMONA® protective-jacket pipes, in which the protective jacket has a high level of adhesion, provide additional protection during all trenchless methods of laying – even before installation.



Reference

- Project name/ designation:**
Lake water energy in Horw Kriens
- Products used:**
SIMONA® PE 100 SPC RC-Line pipes d 90-560 mm
- Size of project:**
approx. 10 km



Further information
on the topic of drinking water supply can be found here.

Unlimited potential applications of SIMONA® PE pressure pipes – in open or trenchless pipe-laying

Owing to their considerable flexibility, the use of plastic pipes in civil engineering is virtually unlimited. In all fields of application our standard pipe-laying portfolio includes not only conventional open laying but also trenchless laying methods.

The polyethylene pipes used for these methods have proved ideal due to their excellent material properties. On account of their easy handling and the option of continuous pipe insertion, PE pipes are superb for sand-bed-free, trenchless pipe-laying methods.

Open laying

The open method is characterised by the excavation of a trench, laying of the pipe protected by a slope or sheeting, and finally the filling of the trench.

With sand bed – PE 100 / PE 100 RC

Pipes are laid in a bed of sand in order to protect them against mechanical loads emanating from external influences or pressure changes. To fill the pipe zone, granular unbound or hydraulically bound construction materials may be used. The fill material must be compactable and must not contain any constituents that would damage the pipe.

According to DIN EN 1610, construction materials for the bedding should not contain any constituents that are larger than 22 mm (DN ≤ 200) or 40 mm (DN > 200 to DN ≤ 600). According to DVGW W400-2, construction materials must not have any detrimental effect on the pipe material or the groundwater. DVGW Guideline W400-2 specifies that the pipe must be embedded in sand or fine gravel.

Without sand bed – PE 100 RC / SPC RC

Dispensing with sand bedding can cause the surface of the newly laid pipeline to be scratched (10% max. of wall thickness is acceptable according to normative references). Moreover,

stones can exert point loads or linear loads on the outer wall of the pipe – in addition to the service loads such as internal pressure, soil loads or live loads – and thus cause damage. To avoid stress cracks, the pipe must be able to withstand surface damage due to scratches, point loads and linear loads if protection of the pipe by sand bedding is dispensed with.

Advantages

- Excavated soil can be reused if it is compactable
- Cost streamlining due to material saving
- **SIMONA® PE 100 RC-Line / PE 100 SPC RC-Line pipes** are resistant to point loads and linear loads

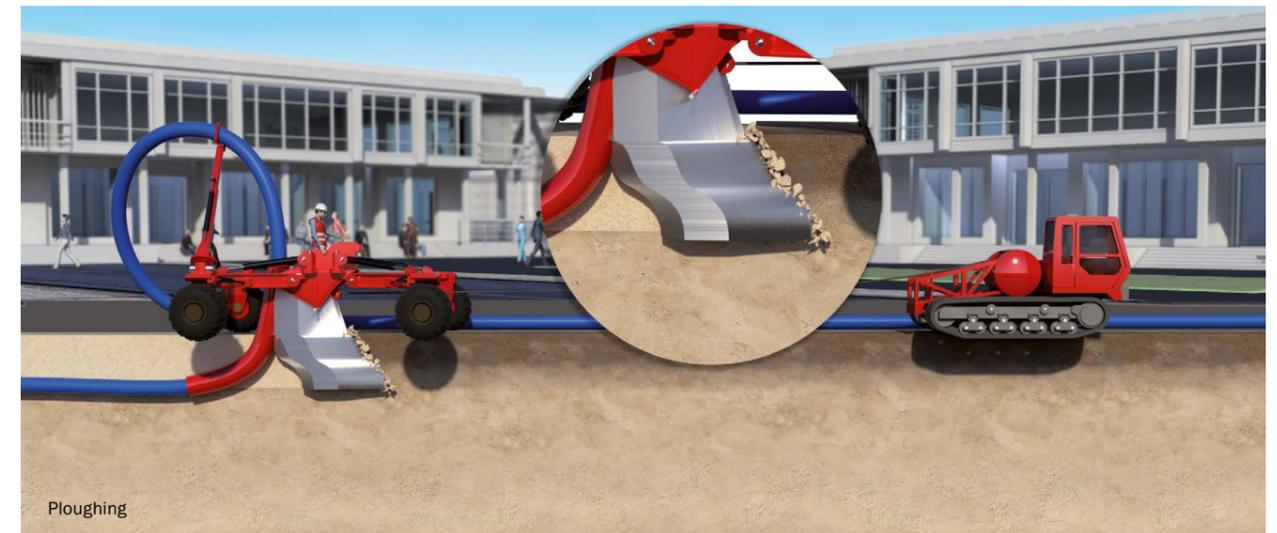
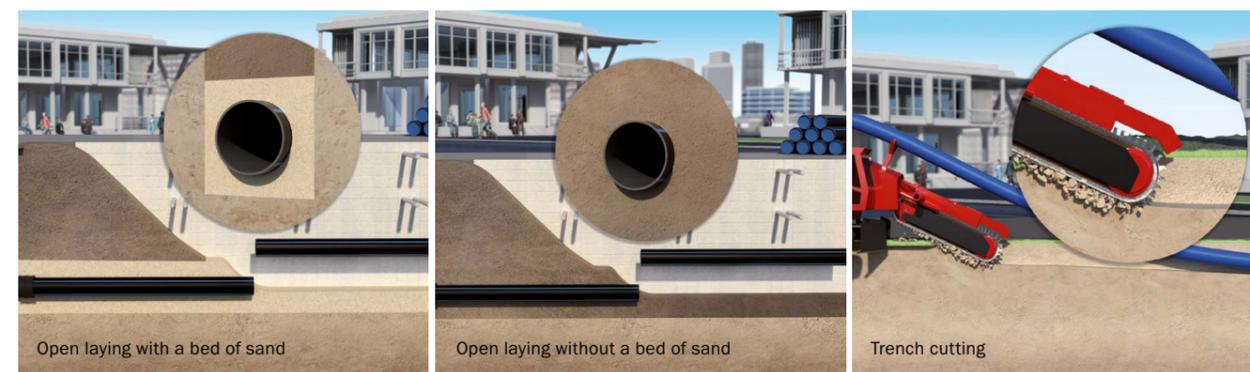
Trench cutting (for laying new pipes) – PE 100 RC / SPC RC

Open laying with or without a bed of sand

The soil is loosened, crushed and conveyed by a trench cutter (tracked, wheeled). It is deposited along the side of the trench or driven away. The pipe train is usually assembled outside the trench and placed on the resulting trench floor. Filling and compaction can be handled by a second machine unit. The pipe trench is usually backfilled with the excavated soil.

Advantages

- Method suitable for all soil classes/homogeneous areas
- Excavated soil can be reused
- Fast method of laying new pipes



Trenchless laying

Laying plastic pipelines by the trenchless method provides financial and ecological benefits:

- Minimal detrimental effect on developed and paved surfaces
- Potential use of existing pipeline routes
- Reduction in civil engineering and re-cultivation costs
- Pipelines can be laid under rivers, lakes or traffic routes
- Reduction in CO₂ emissions due to the elimination of having to transport road surfacing, excavated soil and fill material
- Minimal nuisance to residents
- Reduction in traffic obstructions and avoidance of traffic congestion

Ploughing (for laying new pipes)

Ploughing is the quickest method of pipelaying and probably the most economical method of laying new plastic pipes. The method causes virtually no interference with the ground, making it very environmentally friendly. The soil is displaced statically or dynamically by a plough blade. There are self-propelled ploughs and cable-drawn ploughs. The pipe train is assembled outside the trench and either drawn into the cavity, which is widened by a displacer, or guided via an installation box to the bottom of the opened slot, where it is then deposited. With this method even parallel insertion of multiple pipelines is possible. In ploughing, the excavated soil is reused without any treatment. Therefore, it is essential to use pipes with very good protection against point loads.

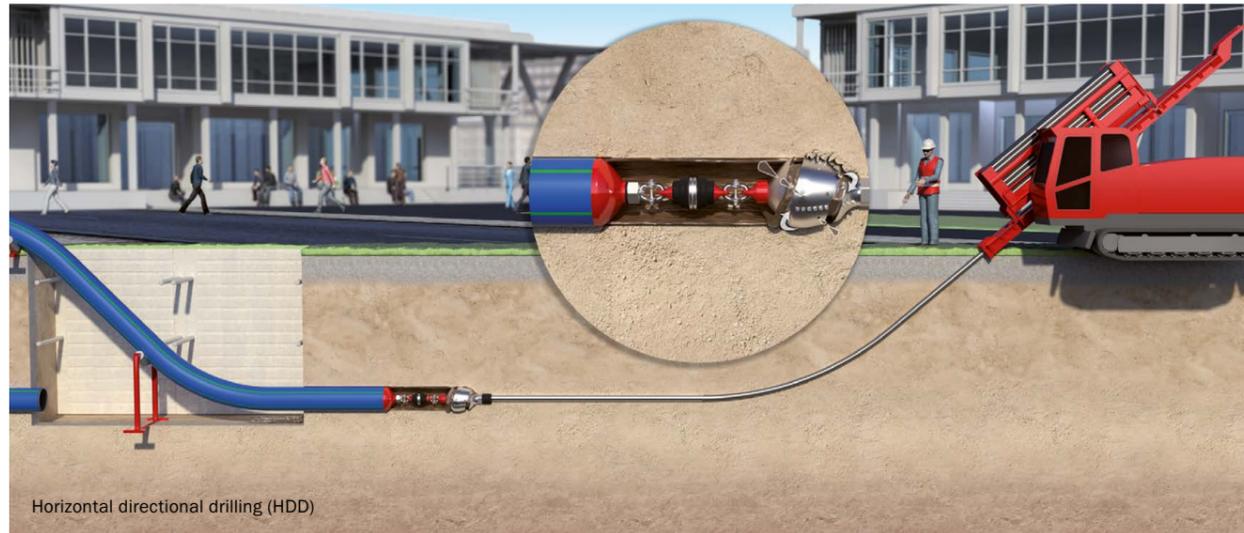
SIMONA® PE 100 RC-Line pipes ensure a long service life on account of their proven high level of stress crack resistance.

Advantages

- Influence on the ground is relatively low
- Can be used up to soil class 5/homogeneous area B
- No groundwater lowering required
- Most economical method of laying new pipes



Further information
on the topics of infrastructure and pipe rehabilitation can be found here.



Horizontal directional drilling (HDD)

Horizontal directional drilling (HDD) (for laying new pipes)

Using a horizontal directional drilling rig, an underground duct is drilled, into which one or more conduits are drawn. A pit is usually excavated both at the beginning and at the end of the required route. The first step is to create a so-called pilot hole pointing towards the destination pit using a controllable boring head. Then, in further steps the final pipe duct is widened with a so-called back reamer and the pipe is introduced by an insertion device. As a result, the bored duct is widened to the required diameter.

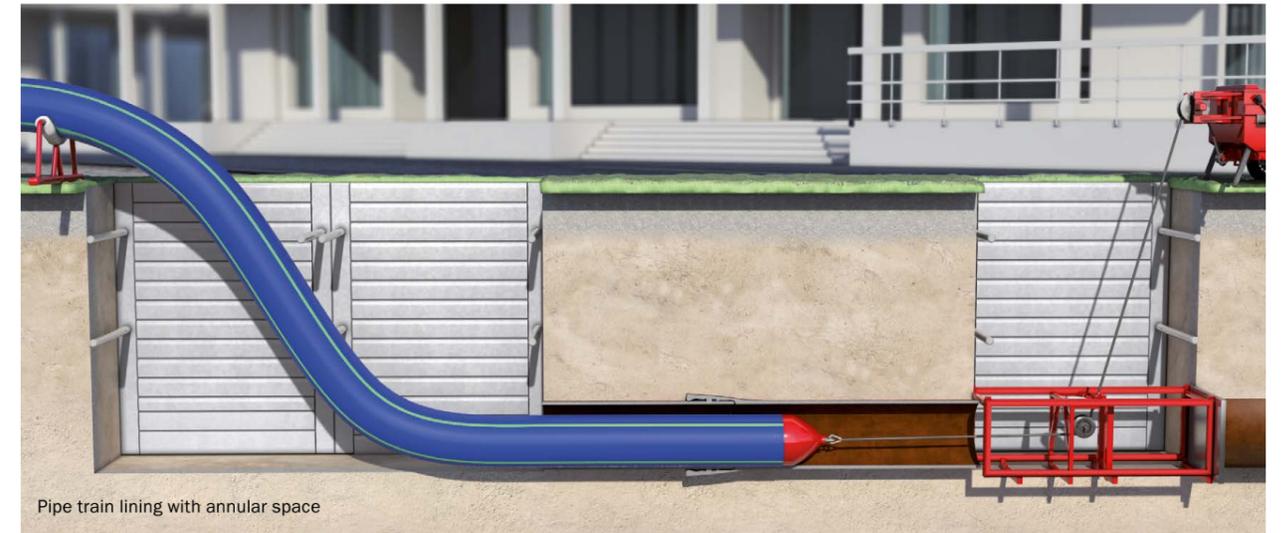
Advantages

- Method suitable for all soil classes/homogeneous areas
- **SIMONA® PE 100 SPC RC-Line pipes** completely satisfy the requirements for laying by the HDD method – irrespective of soil structure
- In particular, boring is possible under roads, rivers, developed areas or areas subject to continuous use



i Further information

on the topics of infrastructure and pipe rehabilitation can be found here.



Pipe train lining with annular space

Pipe train lining with annular space

In pipe train lining with annular space, factory-produced pressure pipes made of **PE 100 RC** or **PE 100 SPC RC** are welded together on the construction site to make up a pipe train with permanently tight joints. These are new, statically self-supporting lining pressure pipes.

The pipe train is connected up to a traction head and drawn into the old pipe via a site launch pit taking the bending radius of the new pipe into account. The resulting annular space between the old pipe and the new pipe is either grouted or not grouted, depending on the condition of the old pipe. In this method the original cross section of the pipeline is reduced by the annular space and pipe wall thickness.

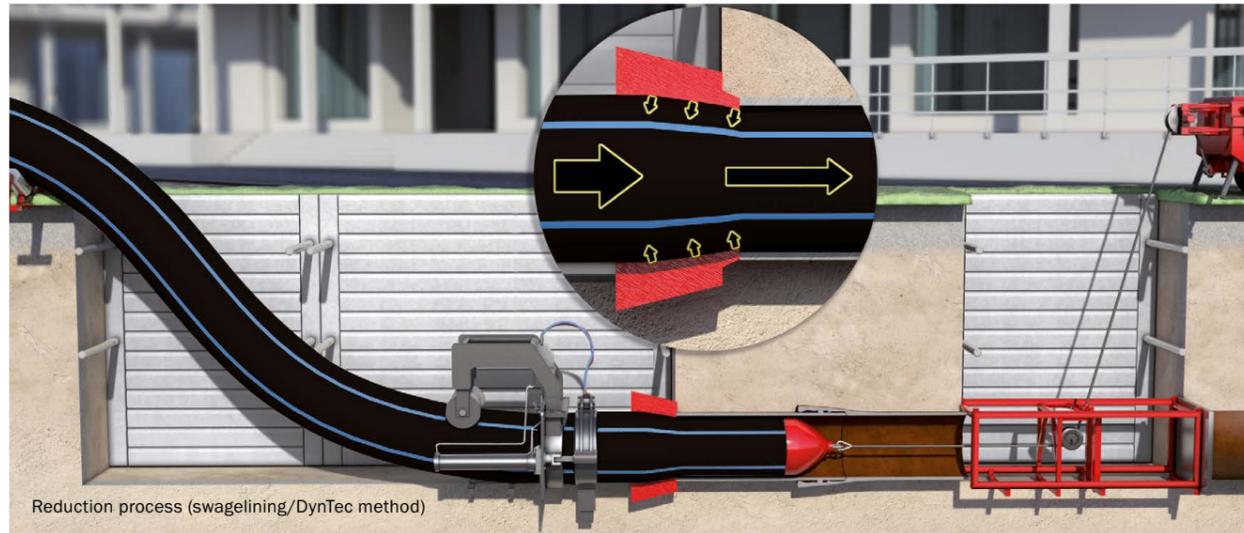
Advantages

- Scarcely any excavated soil
- Little use of machinery
- Fast method of installation/rehabilitation
- Nuisance to residents and traffic is minimal



i Further information

on the topics of infrastructure, pipe rehabilitation and pipe train lining for pressure pipelines with annular space can be found here.



Reduction process (swagelining/DynTec method)

Reduction process (swagelining/DynTec method)

As part of the reduction process, a PE pipe train is drawn through a die that elastically deforms the PE liner pipe under a continuous axial tensile load and briefly reduces the cross section by up to 10%. The pipe train with its reduced cross section is then drawn into the old pipe. After insertion and the elimination of tensile stress, the PE pipe returns to its original outside diameter and clings to the inside wall of the old pipe to create a close fit. The outcome is a new, independently load-bearing liner pipe that merely reduces the original hydraulic capacity of the pipeline by the wall thickness of the PE liner.

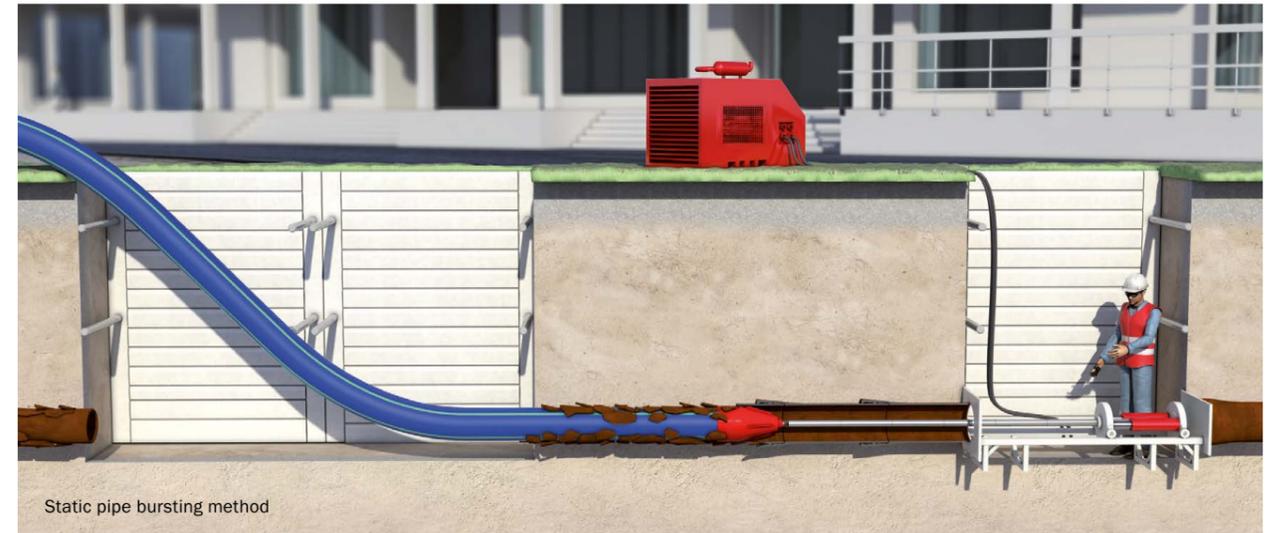
Advantages

- Minimal annular space loss
- Ground-friendly
- Soil excavation only in the pit area



Further information

on the topics of infrastructure, pipe rehabilitation, pressure pipes and the reduction process can be found here.



Static pipe bursting method

Static pipe bursting method

The pipe bursting method involves trenchless renewal along the same route. With the aid of a conical bursting head the old pipe material is broken or cut up and radially displaced into the surrounding soil. The new pipe with the same or a larger nominal diameter is introduced in the same operation. As part of the static pipe bursting method, the old pipe is destroyed or displaced by tensile/shear forces that are transferred to the bursting cone via a traction medium (steel cable or rod) and/or the pipe itself.

Advantages

- No annular space loss
- Increase in pipe cross section by up to two nominal diameters
- Optimal insertion due to **SIMONA® SPC RC-Line pipes**
- Safe application of the pipe bursting method due to the use of **SIMONA® PE 100 SPC RC-Line pressure pipes**



Further information

on the topics of infrastructure, trenchless rehabilitation of pressure pipes and the pipe bursting method can be found here.

SIMONA® injection moulded fittings

Boasting a wide range of tools and moulds as well as decades of experience in injection moulding, SIMONA offers a high degree of technical know-how and exceptional process expertise. We are committed to expanding our production capabilities and extending our range of large injection moulded fittings. As a result, we are able to supply you with fittings designed for exposure to full pressure loads – perfect for high flow rates.



Our latest product extensions include:

Stub flanges		Loose flanges		Tees		Bends	
NEW		NEW		NEW		NEW	
Our stub flanges with long and short spigots are now available as injection moulded items in the following configurations:		Our loose flanges supplement the portfolio of stub flanges to create the perfect joining system.		The new tees no longer require heavy-duty welding machines: we produce even the large sizes with long spigots for the efficient use of electrofusion sockets.		The economical bends without any reduction factor are a good choice because of their compact design ($r = 1d$) despite large diameters.	
d 710/800/900 mm	d 450-710 mm	d 630-1,000 mm		d 500-630 mm		d 355-500 mm	
SDR 33/26/17	SDR 17/11	PN 6/10/16		SDR 17/11		SDR 17/11	
Short spigots	Long spigots			Long spigots		Short and long spigots	
PE 100 and PP	PE 100 and PP			PE 100 and PP		PE 100 and PP	
On request: machined stub flanges, also with chamfer				On request: welded tees up to d 1,000 mm			

You will find an extensive overview on page 37.

Customising – SIMONA plastics workshop

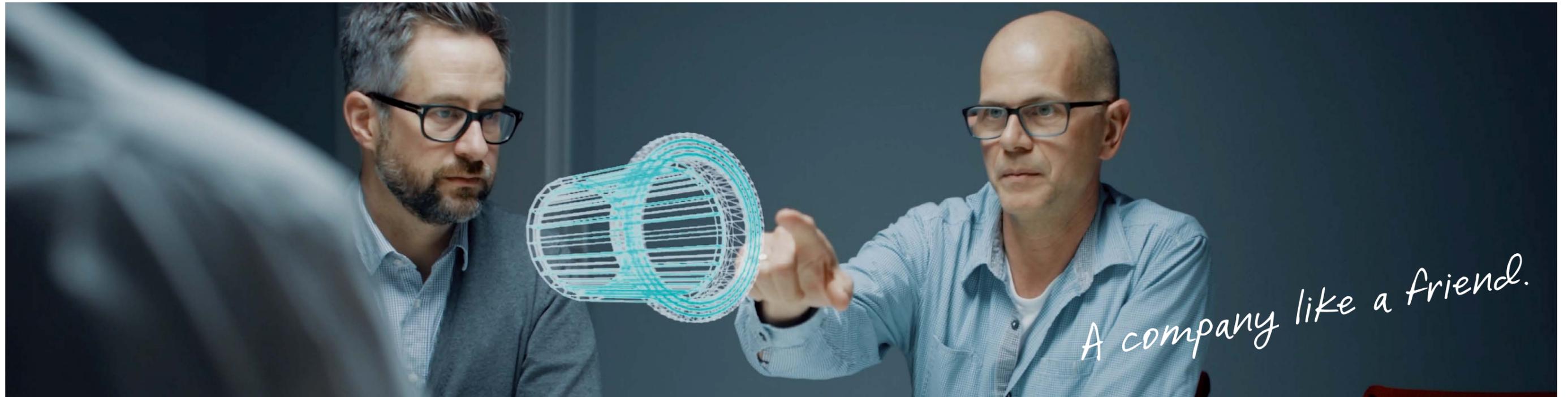
At SIMONA's in-house plastics workshop customisation enjoys top priority. With over 30 years' experience, our staff are committed to delivering solutions specially tailored to meet your requirements. We deliver pre-welded components directly to the construction site. This speeds up assembly and reduces your installation costs.



We offer you an end-to-end applications technology advisory service, including calculations, structural analyses and custom drawings that you prepare for us with drafts and which we implement graphically, or which we create for you according to your requirements and specifications – through to the finished product.

In addition to entire component assemblies, we also manufacture one-off products such as special flanged joints for drinking water applications, special elbows or elaborate shaft fittings. The scope of potential customisation is demonstrated by our "Minotaur", which is a composition of various SIMONA® products welded together, serving as quite an impressive trade fair exhibit.





Comprehensive project support: from the idea and planning to commissioning

Consulting service

We have channelled considerable resources into technical consulting and would be delighted to share our know-how with you. We offer global consulting services, headed by highly qualified staff at our Technical Sales Support unit and within our field sales organisation – from project planning and product selection to on-site assistance tailored to your applications.

Customised pipes and fittings

Alongside our standard product range, we offer a premium-class package of specialist solutions:

- Pipes in various lengths for a range of joining methods
- Special pipe sizes adapted to the standard nominal diameters of other materials
- Pipes with non-standard properties such as electrical conductivity or low flammability
- Customised fittings as system components for your applications

Project planning

We advise project planners and contractors on the selection of suitable materials and products as well as on the most efficient methods of installation. It would be a great pleasure for us to assist you in addressing all technical issues related to your specific project, e.g. pipe laying methods, structural calculations or joining technology.

Structural analysis

We carry out structural analyses for

- Underground pipes
- Landfill and traffic route drainage pipes
- Shafts
- Rectangular and cylindrical tanks
- Ventilation systems

On-site consulting

We are happy to provide active support at all stages of your project. Our qualified engineers will assist you on site throughout your construction project and also advise you on technical matters subsequent to completion.

Training

We also offer a range of training courses and seminars for customer personnel – organised at your premises or at our Technology Centre in Kirn.



SIMONA accessories

SIMONA offers a comprehensive range of equipment and accessories for professional processing and welding of piping systems.

Drawing on many years of experience and first-class technical expertise, our highly qualified team looks forward to advising you. The joining technology on offer within this area is available for hire or sale.

Rental welding machines

- Workshop machines
- Socket welding machines
- Butt welding machines
(depending on size also available with CNC technology)

Accessories for heated-tool butt welding

- Logging unit to record welding data
- Internal pipe debreader 90-500 mm

Accessories for electrofusion socket welding

- Rotary peeling devices (d 32-1,000 mm)

Equipment for electrofusion welding

Various types of lightweight 40V all-purpose machines available:

- With logging and barcode input
- With additional manual input option
- With barcode input, manual input and GEO data collection

SIMOFUSE® (integral electrofusion welding)

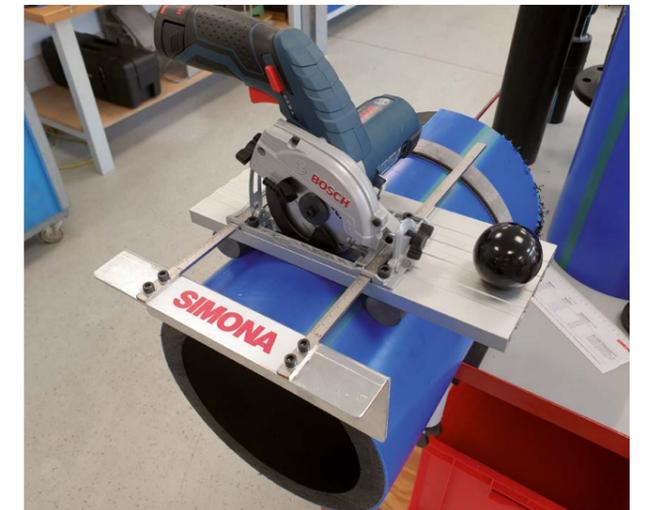
- Clamping tools
- Hydraulic devices

Stripping tools for SPC RC-Line pipes

With SIMONA® stripping tools, which have been specially developed for use on construction sites, the protective jacket is easily removed from the welding zone before the pipes undergo further processing. That makes it possible to perform welding in accordance with DVS welding guidelines.

SIMONA® SIMOTOOLS – the professional tools for stripping SPC protective-jacket pipes

The exclusive stripping tool for SIMONA® SPC pipes. This stripping kit is completed with a manual protective-jacket cutter so that you always have the ideal tool on hand no matter what the situation. That makes the stripping procedure quicker and easier than ever before.



For SIMONA welding videos:
www.youtube.com/simonakunststoffe



Further information
on the topics of service and accessories service can be found here.

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