

SIMOFUSE®

## SIMOFUSE® approved for pressurised applications relating to wastewater pressure pipes and industrial systems



**SIMOFUSE® combines the benefits of rapid installation known from conventional socket connection methods with those of permanent and integral joining achieved by means of electrofusion welding. Thus, SIMOFUSE® brings together state-of-the-art joining techniques and compact design. The result is a socket connection featuring an integral electrofusion joining system – without the need for elastomer-based sealants. This highly successful system is now entering a new era.**

After a proven track record of more than six years within the field of sewer rehabilitation and new-build projects, the SIMOFUSE® system has been further refined and granted

official approval as a joining method suitable for pressurised applications. As a result, these specialist products can now also be used in projects involving underground wastewater pressure pipes as well as over-ground pressure piping systems.

The requirements in respect of pressure pipes and their installation are outlined in DIN EN 12201 [Plastic piping systems for water supply, and for drainage and sewerage under pressure – Polyethylene (PE)]. 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.

### Scope of the testing programme:

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

### The three principal tests conducted within the programme are:

- Internal pressure creep rupture test according to DIN EN ISO 1167 1/2
- Tensile creep test according to DVS 2203-4 BB1
- Shear and peeling tests according to DVS 2203-6 BB1

For further information relating to these tests, please refer to “Plastics Expertise” on page 4.

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

Based on extensive testing, the maximum pressure level was approved for the relevant

### Contact



Clemens Timm  
Product Manager Fittings

Having completed his degree in Business Administration at the Berufsakademie Ravensburg, Clemens Timm joined SIMONA AG in 2007. Initially, he held the position of Marketing Consultant, as part of which he provided sales support within the area of pipes and fittings. In 2009, Mr. Timm was appointed Product Manager for Fittings within the Piping Systems business unit. In this role, he is responsible for the company's global fittings portfolio (PE, PP and PVDF fittings) as well as the full range of system components. The portfolio includes mass-produced injection-moulded fittings as well as large fittings and customised components made to order. Additionally, his responsibilities include the strategic development and refinement of the product range as well as the analysis and assessment of new fields of application.

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applications. As SIMOFUSE® produces an overlapping joint, the nominal pressure has to be adjusted accordingly. This is generally done by applying the nominal pressure with a minimum safety factor of 1.25, based on water as the substance to be conveyed and a service life of 50 years.



Third-party monitoring (audit testing) by MPA Darmstadt provides assurance of consistent quality.

### SIMOFUSE® Pressure Product Range

#### PE 100 Pipe Modules SIMOFUSE® Pressure

SDR 17		SDR 11	
OD mm	Wall thickness mm	OD mm	Wall thickness mm
		225	20.5
		250	22.7
		280	25.4
		315	28.6
		355	32.2
400	23.7	400	36.3
450	26.7	450	40.9
500	29.7	500	45.4
560	33.2	560	50.8
630	37.4	630	57.2
710	42.1	710	64.5

#### Available as

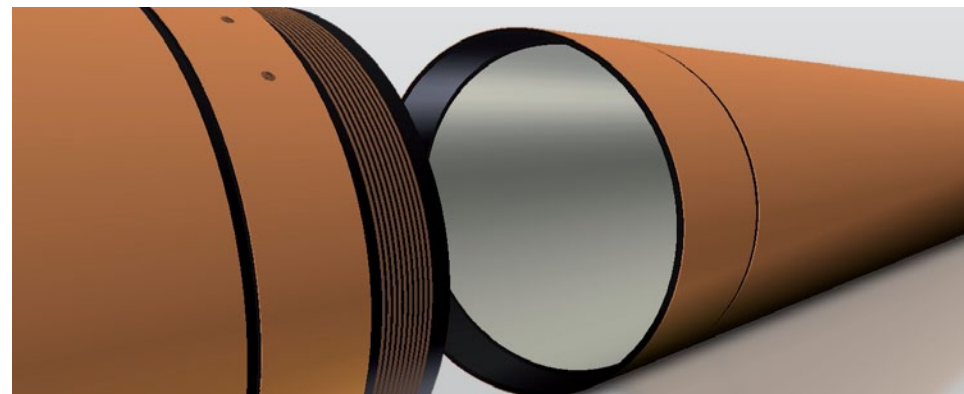
- PE 100 Pressure Pipes
- PE 100 CoEx Pipes
- PE 100 RC-Line Wastewater Pipes
- PE 100 SPC RC-Line Pipes
- PE 100 Double-Containment Pipes

#### Available pipe lengths:

OD 225 mm to 630 mm: 700 mm to 12,000 mm  
 OD 710 mm: 700 mm to 6,000 mm  
 Other lengths on request.

SIMOFUSE®

## SIMOFUSE® – Key Advantages



SIMONA® SPC RC-Line Pipes made of PE 100-RC with a protective jacket made of PP and a light-coloured, inspection-friendly interior.

**SIMOFUSE® combines the benefits of rapid installation known from conventional socket connection methods with those of permanent and integral joining achieved by means of electrofusion welding.**

During the manufacturing process, the pipe modules are equipped with a machined socket and spigot end. This ensures a perfect fit without the need for time-consuming geometric adjustments.

The electrofusion filaments are then integrated within the spigot end of the pipe module. The filaments are incorporated fully within the polyethylene, which provides suitable protection during transportation and installation.

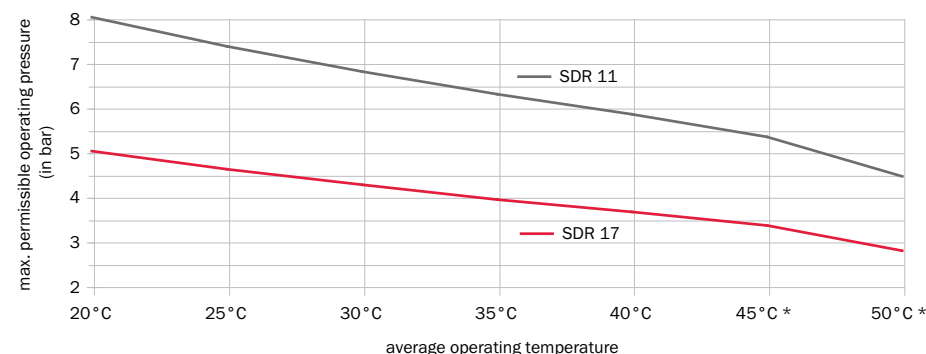
Thanks to the large weld zone, together with the precision fit and optimised weld parameters, SIMOFUSE® creates a high-quality joint in accordance with DVS Guideline 2207.

### Advantages

- Ready to install without the need for on-site welding preparations (simple installation and no peeling of pipe ends)
- Greater efficiency during pipe installation due to optimised joining cycles with reduced weld and cooling times
- Perfect for relining or confined spaces, with no need to increase outer pipeline circumference (as in the case of external electrofusion sockets)
- No weld bead, either on the inside or on the exterior (as in the case of heated-tool butt welding)
- Minimal space requirements, as no cumbersome butt welding machine is needed
- No hollow or cavity required in sand bed as in the case of electrofusion socket welding
- Absolutely tight, axial-restraint pipe connection

#### Temperature-dependent pressure load for PE 100 pipe modules SIMOFUSE®

Safety factor (SF) = 1.25; water, without substances hazardous to water  $A_2 = 1.0$ ; service life: 50 years



\* Commencement of thermal aging: restriction of service life to 25 years at 45°C and 20 years at 50°C



SIMOFUSE®

## Possible fields of application

**SIMOFUSE® can generally be used in applications with low pressure potential:**

### Wastewater piping systems

- Backpressure-protected sewer pipe systems up to 50/80 m water column
- Non-pressurised wastewater pipes with increased safety potential (e.g. in drinking-water protection areas with test pressure of 5 bar)
- Wastewater pumping systems in sewage treatment plants
- Culvert pumping systems
- Wastewater pumping systems in industrial sewage treatment plants
- Industrial cooling water systems with flow and return pipes
- Sea water pumping systems for desalination plants
- Suction and extraction systems for lowering of ground-water levels

### Double-containment pipes

- Connection of media and outer pipe by means of cascade welding

### More efficient installation of component groups

- Pre-fabricated large-scale fittings with SIMOFUSE® connection for faster installation at construction site

### Flange connections with integral electrofusion filaments

- Compact full-face flange for tank connections
- Stub flanges for increased internal operating pressure



1 New-build projects: use of SIMOFUSE® in municipal sewage treatment plants

2 Shaft connection with SIMOFUSE® pipe joining

3 SIMOFUSE® in a double-containment pipe

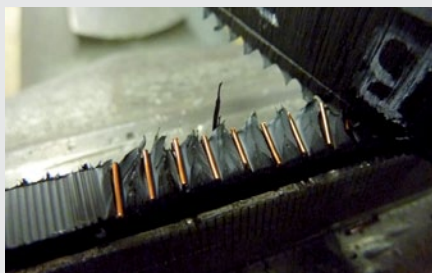
4 Insertion of SIMOFUSE® module for pipe rehabilitation

## Plastics Expertise

## Fit-for-purpose testing of welded joints

SIMOFUSE® welded joints generally undergo type testing and batch release testing with regard to the welded component. 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). Additionally, the time- and pressure-dependent behaviour of polyethylene has to be taken into account. In order to arrive at conclusive results, 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.

**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**



Fracture properties of SIMOFUSE® weld sample using torsion shear test. Objective: Ductile fractures as a result of tough material properties in the weld seam, as illustrated by plastic deformation.

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



Test piece after creep fracture in weld area. Objective: Achievement of minimum service lives at 80 °C and alternatively 95 °C.

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



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

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

## Sustainability:

## SIMONA introduces Energy Management System

**SIMONA introduced an Energy Management System in accordance with DIN EN ISO 50001, thus achieving another milestone when it comes to the responsible use of energy resources.**

The objective is to ensure reliable energy supply at cost-effective prices as well as the provision of sufficient volumes in accordance with requirements. Higher energy efficiency levels provide a solid foundation for the reduction of manufacturing costs, as well as promoting innovation within the company and extending the life cycles of operating systems.

Lasting energy savings can only be secured by means of consistent energy management. On the one hand, this is a matter of regular monitoring, analysis and targeted efforts to adjust energy consumption. Above all, consumption monitoring allows technical faults to be identified in good time and preventive measures initiated. On the other hand, a comparison of consumption KPIs and production figures reveals the potential that can be exploited step by step by means of organisational and/or technical measures and with the participation of all divisions of SIMONA AG.

The Energy Management System is supported through its integration into the SIMONA Management System. The integrat-

ed quality, environmental and energy management system is the basis for ongoing improvement in the quality of our products and processes, the sustainability of our environmental protection efforts and the improvement of our energy balance and reduction of CO<sub>2</sub> emissions.

Lasting cost savings can be achieved by implementing DIN EN ISO 50001. An intelligent and effective energy management system reduces energy costs, while preventive measures are designed to mitigate the risk of costly errors. The associated improvement in quality as well as the cost streamlining thus achieved can give SIMONA AG and its customers the edge over the competition.



Klaus Gerspacher  
Energy Management Officer



Always up to date:

## SIMONA® SIMCHEM ONLINE to be launched at the ACHEMA

**A new chapter in the key reference work relating to chemical resistance will unfold on 18 June 2012 when SIMCHEM goes online.**

When selecting a suitable material for a specific area of application, chemical resistance is often one of the most important criteria. The level of chemical resistance will depend on the applicable substance, as well as its temperature and concentration. In addition, manufacturing conditions of the specific product and its degree of usage must be taken into consideration. Thanks to its long-standing know-how in handling thermoplastic materials, SIMONA offers expert technical advice on products and their adaptability to specific areas of use. This expertise has been pooled in our SIMCHEM application: a comprehensive reference work on the chemical resistance of SIMONA materials in comparison with more than 4000 media and commercial products.

SIMCHEM provides important guidelines for your day-to-day work and forthcoming projects, with the database furnishing a general evaluation of the suitability of the material for a specific application or general information on the processability of the materials for a special processing method. Readers should bear in mind that the data provided by the system is not binding but is to be regarded as preliminary information for planning purposes that still has to be verified in a specific case to ensure the safety of the processor.

### Always up to date – the new online version of SIMCHEM

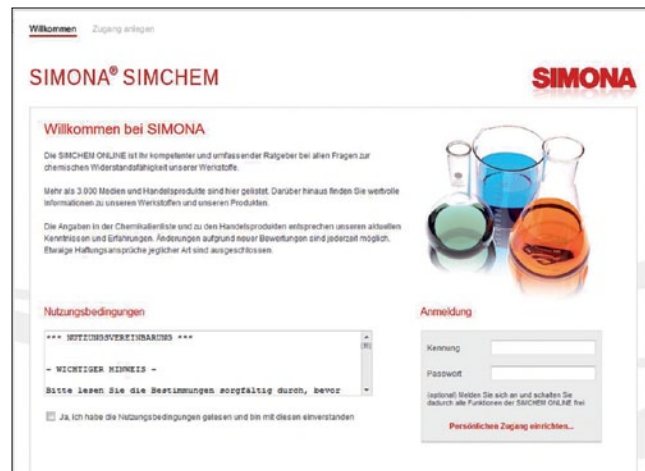
Following six CD ROM versions, the completely revised SIMCHEM will now be available for the first time as an online tool and will be launched to coincide with the ACHEMA trade fair in June 2012.

All the information that could previously be retrieved from the installed CD will from now on be conveniently accessible to all users online at any time. In addition, registered users have access to extended functionality, such as the generation of query results as a PDF. For those who prefer to install an offline version, there will be a download of the revised application, which can also be updated online using an update check.

The free online version of SIMCHEM and further information will be available from the opening of the ACHEMA on 18 June 2012 at **[www.simchem.de](http://www.simchem.de)**.

Jörg Römer

Marketing & Communication



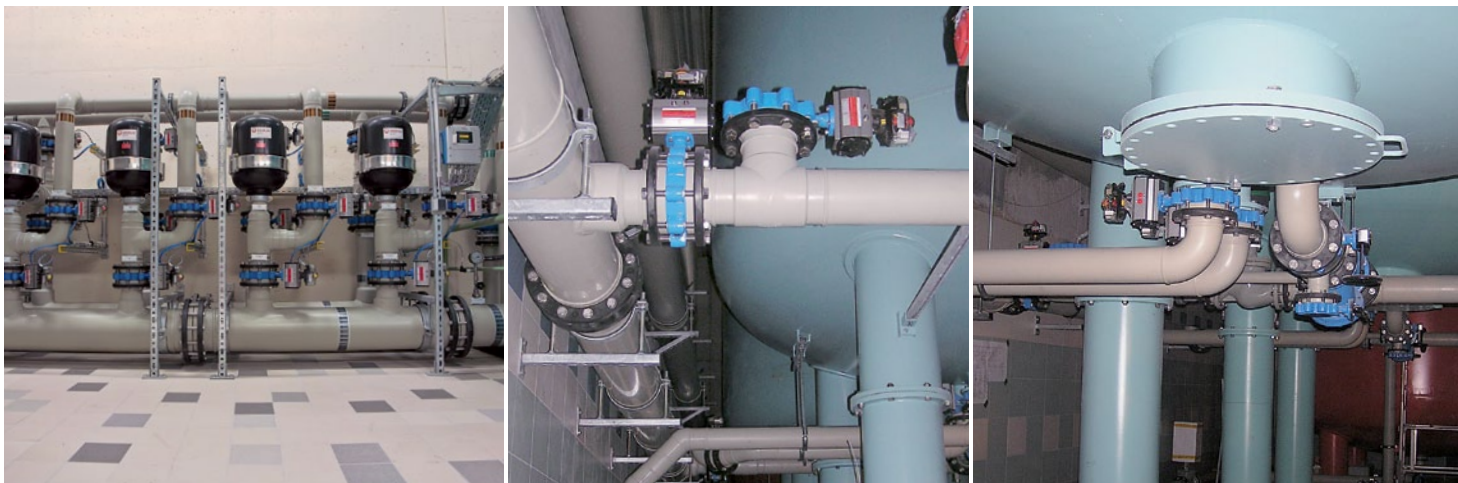
*SIMCHEM ONLINE is your comprehensive guide to every issue concerning the chemical resistance of SIMONA materials.*

*It lists more than 4000 media and commercial products.*



Case Study:

## SIMONA® PP-H AlphaPlus® pipes for uranium removal and partial desalination



F.l.t.r. raw water filter system; branch bypass; outlet and regeneration line

**The largest Uranex plant to date for the removal of uranium and one of the largest Carix plants for partial desalination was put into operation by Trollmühle Municipal Water Board in Windesheim at the end of 2011. SIMONA supplied PP-H AlphaPlus® pipes for the water treatment plant.**

### Initial situation

A series of tests conducted by the state authorities indicated that the geologically related level of uranium in the water provided by Trollmühle Municipal Water Board had to be reduced because uranium in relatively large quantities has a toxic effect. Additionally, the local body had to ensure compliance with the revised drinking water directive, with an upper uranium limit of 10 µg/l (as specified by the Federal Environment Agency).

### Task

In the first stage the level of uranium in the drinking water was to be reduced by the treatment plant and in the second stage a partial desalination process was to be performed in order to reduce the levels of nitrates and sulphates. For this purpose the pipe material had to have the following properties:

- High chemical resistance
- Maximum stress crack resistance
- Reliable protection against corrosion
- Good hydraulic properties due to smooth pipe interior

### Solution

The properties of SIMONA® PP-H AlphaPlus® pipes, such as high chemical resistance and reliable corrosion resistance, provided cru-

cial benefits for use in the water treatment plant. The Trollmühle Municipal Water Board facility was able to comply with the provisions specifying soft, uranium-free water and a reduction in the levels of nitrates and sulphates. Additionally, the facility managed to stay well below the upper limit specified for uranium.

In addition to a desired improvement in the quality of water the plant also provides tangible benefits for the 42,000 local inhabitants in terms of its overall environmental impact. By reducing the hardness of the water, it was possible to substantially reduce the use of environmentally harmful detergents, cleaning agents and deliming agents.

### SIMONA® PP-H AlphaPlus®

#### Properties

- High chemical resistance
- Maximum stress crack resistance
- High impact resistance
- Reliable protection against corrosion
- Fine and stable crystalline structure
- Good hydraulic properties due to smooth pipe interior

#### Product range

- Pipes
- Fittings
- Electrofusion welding fittings

### Imprint

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