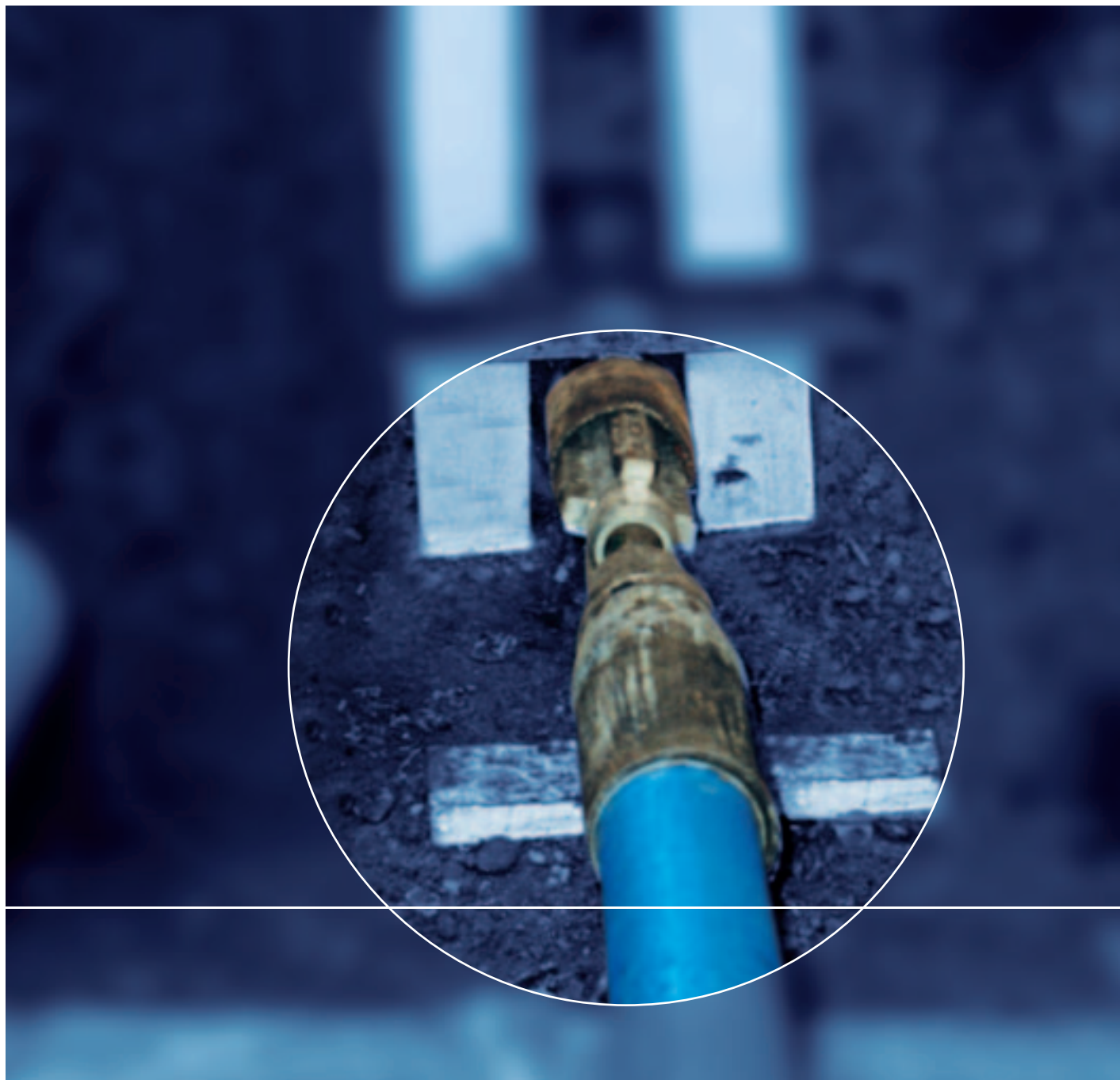


Project Report 13



Renovation of a drinking water pipe system
using SIMONA® SPC protective-jacket pipes

Project data

Location	Krasnoyarsk (Siberia), Russia
Planning	Dipl.-Ing. Thomas Aufdermauer Planung und Beratung im Hoch-, Tief- und Wasserbau Josefshöhe 1 53894 Mechernich-Satzvey, Germany
Technical and commercial consultants	Produkt Management Relining SIMONA AG Project Group Piping Systems SIMONA AG SIMONA AG 55606 Kirn
Client	Mupp. "Wodokanal", Krasnoyarsk
Pipe supplier	SIMONA AG Plant III Gewerbestraße 77975 Ringsheim, Germany
Construction period	November/December 2001
Relining pipe Diameter DIN Quality assurance	SIMONA® PE 100 SPC drinking water pipes d 160 x 14.6 mm, SDR 11 d 250 x 22.7 mm, SDR 11 based on DIN 8074/75 Test report 2.2
Welding of PE pipes	Heating element butt welding, electro fusion welding, acc. to DVS 2207, Part 1
Pipe connections in the receiving shafts	Connection to available steel pipes by means of flange connections

Project description



Prepared launch and working shaft



Bursting head with cutting and displacement unit being placed in the old steel pipe



Pulling the protective jacket pipe into the old steel pipe

Renewal of the drinking water supply network

Due to continuous heavy water loss through old, defective water pipes in the drinking water supply of the Siberian town of Krasnoyarsk, a long-term solution was required for the water pipeline system. Coordinated by B & Q Omni Trade GmbH, Domburg and the planning services of Aufdermauer consultants, Krasnoyarsk officials opted for a modern PE pipeline system of PE 100 protective-jacket pipes.

SIMONA® PE 100 SPC drinking water pipes were used. During the first construction phase pipes with the dimensions $d = 160 \times 14.6 \text{ mm}$ (SDR 11) and $d = 250 \times 22.7 \text{ mm}$ (SDR 11) were employed. Appropriate fittings such as stub flanges, loose flanges, bends of various angles, tees, and reducers were also used.

The decision for

SIMONA® SPC protective-jacket pipes

The SIMONA® SPC protective-jacket pipe consists of a standardised PE 80/PE 100 inner pipe with a continuous protective jacket of modified PP, which is applied to the inner pipe in a continuous co-extrusion process. The pipes comply to all current quality requirements and must be handled as stipulated by the relevant processing regulations. Investigations of the bonding and shear strength demonstrated excellent axial strength between the inner pipe and the protective jacket; an important basic condition for the use of these pipes using relining methods.

The protective jacket must be removed from the welding zone when welding SPC pipes. SIMONA is able to provide appropriate stripping tools for this purpose. Using these tools, the protective jacket is only removed as far as necessary to ensure continuous protection after welding the inner pipe (see drawing on page 6).

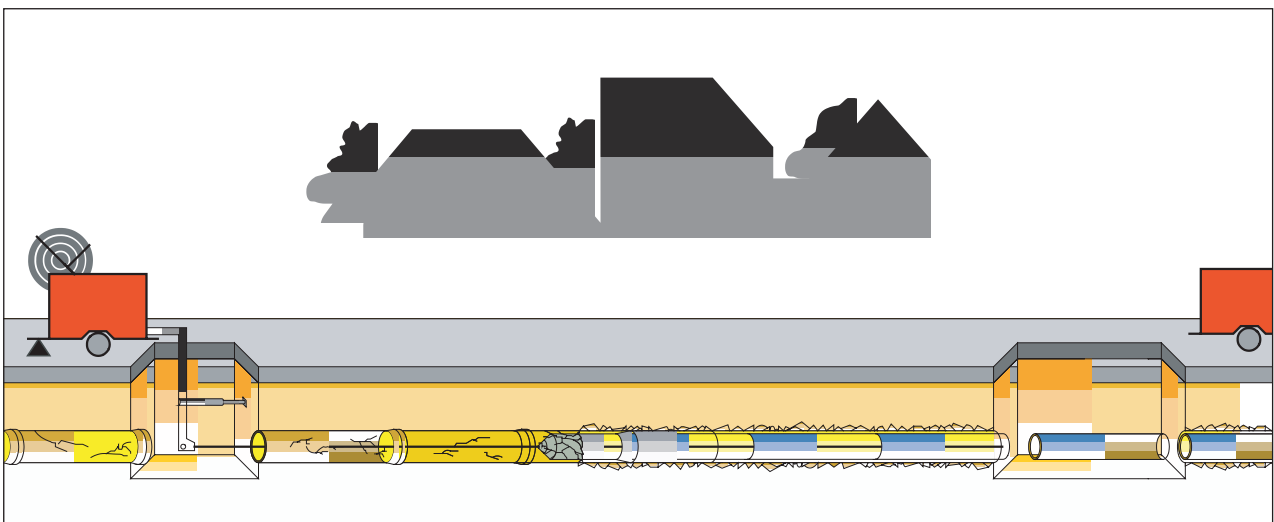
Pipe laying with pipe bursting methods

The pipes were laid using the pipe bursting method. Pipe bursting methods are generally employed where renewal of damaged pipes must be carried out by means of trench-free technology, and the hydraulic cross section of the pipes must be either retained or enlarged.

There are two forms of pipe bursting: static and dynamic. The measures described here were carried out using the static pipe bursting method. Using this method, the old, damaged pipes were burst by means of a conical steel body. Depending on the old pipe materials, it is necessary to fit a cutting tool in front of the bursting tool in order to open the old pipes prior to the displacement process. Upon bursting, the shards and fragments of the old pipe are displaced into the surrounding soil. The waste material compacted into the surrounding soil forms an annulus together with the natural soil, into which the new pipe, attached to the bursting unit, is pulled.

This procedure makes it possible to minimise the skin friction between the burst channel and the new pipe. However, because it is impossible to guarantee that the waste material will not fall back into the space surrounding the pipe and thus damage the new pipe surface, a protective jacket is essential. This is why SIMONA offers the SPC protective jacket pipe to ensure the inner pipe is protected from dents and grooves.

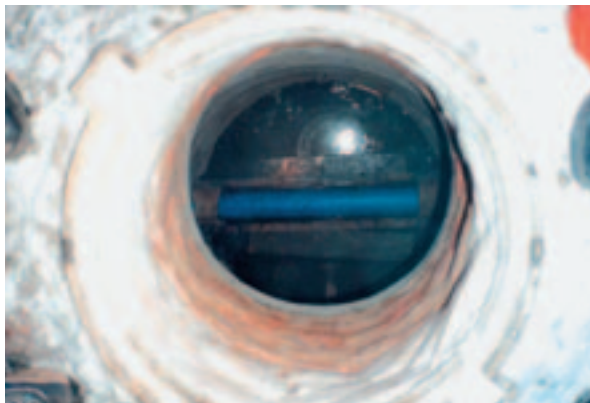
Using the measures described here, the old pipes were cut and burst by means of a bursting system, consisting of a cutting tool and displacement unit, and the attached SIMONA® SPC protective jacket pipes pulled in behind.



Schematic of the pipe bursting method



Welding d 160 x 14.6 mm, SDR 11 pipes by means of heating element butt welding. The protective jacket is removed from the welding zone with the help of a SIMONA stripping tool



Optical monitoring in an intermediate shaft in the pipe to be replaced



Arrival of the pipe in the reception shaft

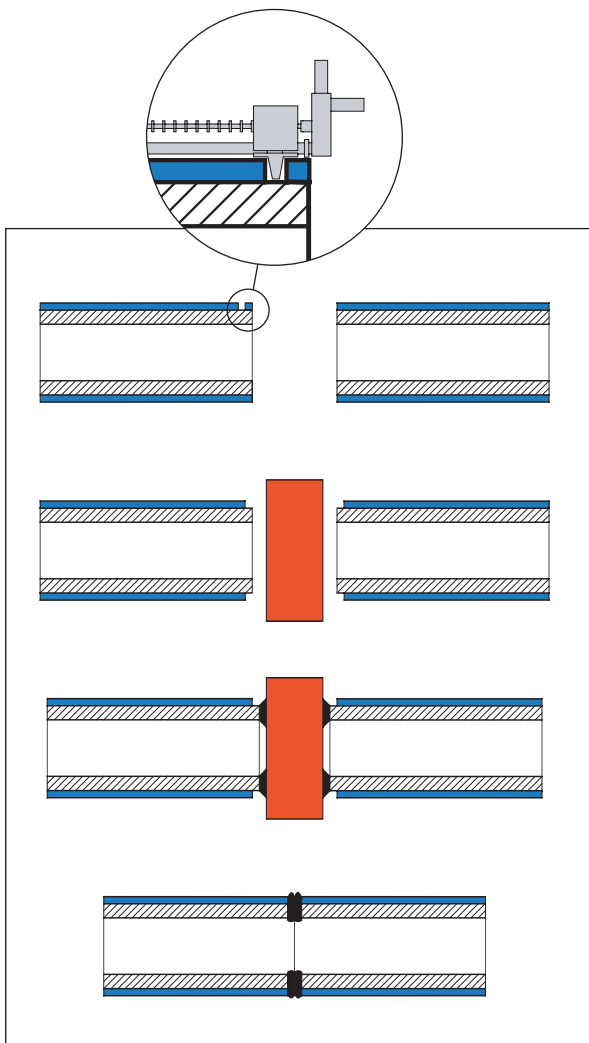
Covering the approach trench to protect against cold

The SIMONA® SPC protective jacket pipes are connected in individual lengths of 6 m by means of heating element butt welding in prepared launch shafts. The on-site temperatures, which were as low as -20°C to -30°C , were particularly problematic, as they made unprotected welding impossible. In order to enable welding to DVS (German Welding Association) regulations, the working shafts had to be covered and heated.



SIMONA® SPC protective jacket pipe in the reception shaft

The stub flange and loose flange connections were manufactured with electrofusion sockets. The connection to the existing steel pipes was by means of flanges. The depth was between approx. 4.0 m to 5.0 m. In order to adhere to the DVS 2207, Part 1, welding and laying regulations, the working shafts were covered and heated.



Heating element butt welding: Procedure for SIMONA® SPC protective jacket pipe with protective jacket stripped in the welding zone



Preparation of fittings for the house connections by means of heating element butt welding



Preparation of flange connections by means of electrofusion welding

SIMONA® SPC Protective-Jacket Pipes – the reliable choice for state-of-the-art pipelaying

SIMONA® SPC pipes

SPC Protective-Jacket Pipes are a multi-layer solution manufactured by means of co-extrusion. They consist of a standardised inner pipe featuring a protective jacket made of modified polypropylene (SIMONA PP Protect).

Inner pipe

The inner pipe can be made of the PE 100 or PE 80. These two bimodal materials fulfil all the requirements with regard to slow crack growth and crack resistance, as certified by notch tests (ISO DIS 13479) and FNCTs (Full Notch Creep Tests). The inner pipe is made of materials that fulfil the quality standards promulgated by the German Plastic Pipes Association (KRV). These materials also conform to the requirements of European product standards and to the relevant codes of DVGW, WRAS and DIN CERTCO.

Protective jacket

The jacket is made of a specially modified polypropylene (SIMONA PP Protect), which is capable of protecting the surface of the inner pipe against potential notches and cracks generally associated with demanding installation methods such as pipe bursting or wash-boring. Even extremely deep scores in the protective jacket will not be transferred to the inner pipe when it is eventually exposed to service-related stresses.



PE 80 SPC-Waste Water Pipe: light grey PE inner pipe, brown PP protective jacket; PE 100 SPC-Drinking Water Pipe: black PE inner pipe, blue PP protective jacket

Standardisation

The inner pipe is manufactured in accordance with all standards, approvals and guidelines currently applicable:

- DIN 8074/8075
- DIN 19537
- DIN 19533
- DVGW GW 335 T A2
- TÜV Süddeutschland certified
- DIN EN 12201
- DIN EN 13244

Processing and laying of the pipes is conducted in accordance with DVS guidelines DVS 2207 Part 1, DVS 2208 Part 1, DVS 2212 and the full range of associated standards such as DIN EN 1610.



¹ DVGW approval currently relates to the inner pipe. An application has been filed for system approval.

Benefits at a glance

- The PP protective jacket provides the inner pipe with reliable protection against external damage
- High resistance to crack propagation
- High abrasion resistance
- No need for subsequent sealing of welded seam
- Light grey interior surface of the waste-water pipe is particularly conducive to internal camera inspection
- Permanent protection against extreme stresses during installation and in service
- No risk of cracking or fracturing
- Reliable quality due to the use of high-grade raw materials
- Guaranteed processing capability in accordance with all relevant pipeline construction guidelines, without any additional cost
- State-of-the-art solution for environment/infrastructure-friendly and cost-effective trenchless methods



SIMONA PP Protect:

The PP protective jacket, specially adjusted with additives, provides the entire inner pipe with protection against notches, abrasion and wear.

Fields of application

SIMONA® SPC pipes are deployed within the area of drinking-water and gas supply as well as waste-water disposal. These fields of application are often associated with extreme demands on material.

- Laying in open trenches. Increased efficiency and potential savings with the possible use of excavated material and not the usual special bedding and sidefill materials.
- SIMONA® SPC pipes can be used in conjunction with virtually all trenchless installation technologies.
- Tailor-made for sewer repairs based on slip lining and pipe bursting methods.
- Tapping tees can be welded onto the inner pipe for service connections to buildings.

If extreme stresses are expected during the insertion procedure, for example on account of indefinable, unstable or rocky soils, we recommend involving our Applications Technology Department.

PE 100 SPC- Drinking Water Pressure Pipes

Material

Inner pipe PE 100 with drinking water approval and protective jacket made of modified PP Protect

Dimensions

DIN 8074, DIN 19533
Standard length 12 m;
other lengths on request

Colour

Inner pipe: black
Jacket pipe: blue

Product code

PE 100 TRST-SPC R0



WRAS
Water Regulations Advisory Scheme



Inner pipe SDR 17			Inner pipe	Jacket thickness	Inner pipe + protective jacket			SPC pipe
d	e		weight	approx. dimensions	d ₂	e ₂		weight
mm			kg/m	mm	mm			≈ kg/m
90	x	5.4	1.47	1.5	93.0	x	6.9	1.90
110	x	6.6	2.18	1.5	113.0	x	8.1	2.72
125	x	7.4	2.78	1.5	128.0	x	8.9	3.37
140	x	8.3	3.49	1.5	143.0	x	9.8	4.15
160	x	9.5	4.56	2.0	164.0	x	11.5	5.57
180	x	10.7	5.76	2.0	184.0	x	12.7	6.90
200	x	11.9	7.11	2.0	204.0	x	13.9	8.38
225	x	13.4	9.01	2.3	229.6	x	15.7	10.70
250	x	14.8	11.00	2.3	254.6	x	17.1	12.90
280	x	16.6	13.90	2.3	284.6	x	18.9	15.90
315	x	18.7	17.60	2.7	320.4	x	21.4	20.30
355	x	21.1	22.30	2.7	360.4	x	23.8	25.40
400	x	23.7	28.20	2.7	405.4	x	26.4	31.70
450	x	26.7	34.70	3.0	456.0	x	29.7	40.00
500	x	29.7	44.20	3.0	506.0	x	32.7	48.90
560	x	33.2	55.30	3.0	566.0	x	36.2	60.60
630	x	37.4	70.00	3.0	636.0	x	40.4	76.00

Inner pipe SDR 11			Inner pipe	Jacket thickness	Inner pipe + protective jacket			SPC pipe
d	e		weight	approx. dimensions	d ₂	e ₂		weight
mm			kg/m	mm	mm			≈ kg/m
90	x	8.2	2.14	1.5	93.0	x	9.7	2.56
110	x	10.0	3.17	1.5	113.0	x	11.5	3.70
125	x	11.4	4.11	1.5	128.0	x	12.9	4.70
140	x	12.7	5.12	1.5	143.0	x	14.2	5.80
160	x	14.6	6.72	2.0	164.0	x	16.6	7.74
180	x	16.4	8.49	2.0	184.0	x	18.4	9.63
200	x	18.2	10.50	2.0	204.0	x	20.2	11.70
225	x	20.5	13.30	2.3	229.6	x	22.8	14.90
250	x	22.7	16.30	2.3	254.6	x	25.0	18.10
280	x	25.4	20.40	2.3	284.6	x	27.7	22.50
315	x	28.6	25.90	2.7	320.4	x	31.3	28.60
355	x	32.2	32.80	2.7	360.4	x	34.9	35.90
400	x	36.3	41.60	2.7	405.4	x	39.0	45.10
450	x	40.9	52.70	3.0	456.0	x	43.9	57.00
500	x	45.4	65.10	3.0	506.0	x	48.4	69.80
560	x	50.8	81.50	3.0	566.0	x	53.8	86.80
630	x	57.2	103.20	3.0	636.0	x	60.2	109.20

Tender documents for SIMONA® SPC Drinking Water Pressure Pipes

PE 100 SPC-Drinking Water Pressure Pipe

PE 100 SPC drinking water pressure pipes consisting of an inner pipe as per DIN 8074/8075, including an additional continuous protective jacket made of modified PP (SIMONA PP Protect), and perform laying of pipe as per DIN EN 1610 and in accordance with the supplier's specifications. Pipe manufacture with proof of quality assurance in accordance with DIN EN ISO 9001 and external certification by TÜV Süddeutschland.

The protective jacket shall be removed from the joint area on-site, if necessary, before the pipe ends are welded.

There is no need to seal SIMONA® SPC pipes after removal of the protective jacket in the welding area using SIMONA peeling devices. Please refer to the separate handling instructions for accessories.

Product:

SIMONA® PE 100 SPC-Drinking Water Pressure Pipe, article code: PE 100 TRST-SPC RO

Supplier:

SIMONA AG
Teichweg 16
55606 Kirn
Germany
Phone +49 (0) 67 52 14-0
Fax +49 (0) 67 52 14-211
e-mail pmrelining@simona.de

Description of supply:

- inner pipe dimension
- jacket pipe wall thickness
- SDR, PN
- colour of inner pipe
- colour of jacket pipe
- total quantity
- pipe length

Example of a tender document for SIMONA® PE 100 SPC Drinking Water Pressure Pipes

Item No. 01	100m €/quantity Total price in €
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Product code: PE 100 TRST-SPC RO

PE 100 SPC Drinking Water Pressure Pipe

Supply PE 100 SPC drinking water pressure pipe consisting of a black drinking water inner pipe based on GKR Guideline R 14.3.1, DVGW GW 335 AZ and DIN 8074/8075, including an additional continuous protective jacket made of blue modified PP (PP Protect), and perform laying of pipe as per DIN EN 1610 (formerly: DIN 4033) and in accordance with the supplier's specifications. Pipe manufacture with proof of quality assurance in accordance with DIN EN ISO 9001 and external certification by TÜV Süddeutschland. The protective jacket shall be removed from the joint area on-site, if necessary, before the pipe ends are welded. There is no need to seal SIMONA® SPC pipes after removal of the protective jacket in the welding area using SIMONA peeling devices. Please refer to the handling instructions regarding SIMONA peeling devices.

Quality, service, innovation

SIMONA AG is one of the leading manufacturers of semi-finished plastics. Our portfolio of products covers a wide range of applications:

- Sheets in thicknesses from 0.5 to 200 mm
- Pipes in diameters from 10 to 1.000 mm
- Fittings in diameters from 16 to 1.000 mm
- Solid rods in diameters from 6 to 800 mm
- Hollow rods in diameters from 125 to 450 mm
- Profiles and welding rods
- Electrofusion fittings
- Valves

The materials used are PE, PP, PVC-U, foam PVC-U, PETG, PVDF and E-CTFE as well as special materials, i.e. for applications in the orthopaedic sector.



The quality and environmental management system at SIMONA AG is certified to DIN EN ISO 9001 : 2000 and DIN EN ISO 14001 : 1996.

SIMONA AG with its head office in the Rhineland-Palatine Kirn (Germany) produces sheets, rods, profiles and welding rods in works I and II. Using technologically advanced equipment and machinery the pipes and fittings production is situated in works III in Ringsheim in Baden-Württemberg. To complement this, our worldwide distribution network with subsidiaries and sales partners guarantees a service close to the customer on all continents.

The quality of our products and services is one of our utmost priorities. We, therefore, critically audit and improve our quality management on a continual basis. To us this is a never ending process.

The high demands that we set are not limited to our own organisation but extend to the needs and requirements of our customers. The quality standard of our services is the decisive factor within our product range.

Our sense of quality combines the project development, the purchase of raw materials, the production, the dispatch, the advice given during projecting on the spot and the cooperation with our customers.

So, we are proud to state that we have achieved the DIN EN ISO 9001 certification as the first enterprise of our kind and that our quality management will be constantly optimized by external and internal audits.

SIMONA worldwide

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