SECON®-X
Pipe systems for petrol stations
Technical details

The new Connection Fitting: small – smart – safe!
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SECON®-X Pipe systems for petrol stations

System description

SECON®-X is a flexible, double-walled and bendable composite piping system with an inner pipe made of stainless steel and an encasing mantle pipe made of PE separated by struts. This pipe system was specially developed as a fuel carrier pipe for petrol stations.

SECON®-X is:
- flexible, double-walled
- diffusion resistant and corrosion-proof
- fast and easy to lay

Construction of the pipe

The flexible composite piping has a corrugated inner pipe made of stainless steel, Material No. 1.4404 (equivalent to US Standard AISI TP 316 L). It is encased by a PE mantle separated by struts which are offset with the corrugations of the inner pipe. The geometry of the helically corrugated inner pipe creates an annular, unobstructed canal in the gap between the pipes which prevents the prohibited spillage of the medium in the event of a leak and thus of contamination. In addition, this monitoring space can be used for a pressure test or for leak monitoring. SECON®-X is also suitable for fuels of the next generation with a high admixture of methanol and other additives. Since SECON®-X is made of corrosion-proof material, no additional cathodic corrosion-proofing is necessary.

Applications

- supply lines as positive pressure pipe
- supply lines as suction pipe
- fill pipes
- ventilation, vapour recovery and vapour displacement pipes

Sizes and pressure ratings

SECON®-X is available in the nominal bores DN 25, DN 40, DN 50 and DN 100. The maximum permissible operating pressure is 10 bar. As a suction pipe, any vacuum desired can be used.

Connection methods

Installation of the connection fittings at the ends of the SECON®-X piping is carried out on site. It is non-welded, so there is no open flame. Using simple tools, the appropriate connecting piece is pressed onto the end of the corrugated pipe.

Accessory equipment

The following accessory equipment is available:
- manhole ducts
- through-connections
- leak detectors

Laying the pipe

SECON®-X pipes are manufactured in series production in lengths of 500 m up to over 1000 m in one piece. The lengths required for individual projects are delivered coiled on drums or in rings. They can be directly pulled into the pipe trench and laid. They can be directly cut to length on site and where needed, laid through narrow bending radii. This enables very simple and fast laying.

Type tests, Approvals

Approval acc. to IP Specification and European Standard EN 14125 “Piping for Petrol Stations laid in the ground” as well as ERA Technology and KIWA has been obtained.
## Product overview

### Piping/Connections/Fittings

<table>
<thead>
<tr>
<th>Version</th>
<th>Type</th>
<th>Nominal bore/Pressure</th>
<th>Joint</th>
<th>Types of connection inner/outer</th>
<th>Material No.</th>
<th>Worksheet</th>
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<tbody>
<tr>
<td>Pipe</td>
<td>SEC</td>
<td>30/ 44</td>
<td>25</td>
<td>corrugated inner pipe</td>
<td>1.4404</td>
<td>SEC 1.20.01</td>
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<tr>
<td></td>
<td></td>
<td>48/ 63</td>
<td>40</td>
<td>PE-LD outer casing</td>
<td>1.4301</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60/ 75</td>
<td>50</td>
<td>Internal struts</td>
<td>1.4301</td>
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</tr>
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<td></td>
<td></td>
<td>98/120</td>
<td>100</td>
<td></td>
<td>ECO 51P 6030</td>
<td></td>
</tr>
<tr>
<td>Connection fitting with O ring seal</td>
<td></td>
<td>30/ 44</td>
<td>25</td>
<td>internal/external thread</td>
<td>1.4404/</td>
<td>SEC 5.01.15</td>
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<tr>
<td></td>
<td></td>
<td>48/ 63</td>
<td>40</td>
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<td>1.4571/</td>
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<td></td>
<td></td>
<td>60/ 75</td>
<td>50</td>
<td></td>
<td>1.4301/</td>
<td></td>
</tr>
<tr>
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<td>98/120</td>
<td>100</td>
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<td>ECO 51P 6030</td>
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<td>Through-connection</td>
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<td>1.4404/</td>
<td>SEC 5.02.04</td>
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<td>48/ 63</td>
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<td></td>
<td></td>
<td>60/ 75</td>
<td>50</td>
<td></td>
<td>1.4301/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>98/120</td>
<td>100</td>
<td></td>
<td>ECO 51P 6030</td>
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<tr>
<td>Manhole entry</td>
<td>SEC</td>
<td>30/ 44</td>
<td>88.9 x 3.2 mm</td>
<td>pipe sleeve (contractor)</td>
<td>1.4404/</td>
<td>SEC 5.05.01</td>
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<tr>
<td></td>
<td></td>
<td>48/ 63</td>
<td>114.3 x 3.6 mm</td>
<td></td>
<td>1.4571/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>60/ 75</td>
<td>139.7 x 4.0 mm</td>
<td></td>
<td>1.4301/</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>98/120</td>
<td>168.3 x 4.5 mm</td>
<td></td>
<td>ECO 51P 6030</td>
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</tbody>
</table>

Subject to technical changes.

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Subject to technical changes.
### Product construction

Dimensions, bending radii, weights, volumes

<table>
<thead>
<tr>
<th>Type</th>
<th>DN</th>
<th>Dimensions</th>
<th>Bending-radius*</th>
<th>Weight</th>
<th>Volume</th>
<th>Article No.</th>
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<td>SEG 25</td>
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<td>44</td>
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<td>98</td>
<td>124</td>
<td>4.50</td>
<td>8.4</td>
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</tbody>
</table>

* Only bend the pipe using a bending jig or bending machine.

This table contains all geometrical data.

- PE casing mantle with struts
- Corrugated inner pipe made of stainless steel
  - Material No. 1.4404/1.4571
  - US standard AISI TP 316L/316Ti
- D corrugated inner pipe made of stainless steel

Subject to technical changes.
Connection fitting
with profile and O ring seal, screwed

Material:
- Connector with male thread: Material No. 1.4404
- Connector with female thread: Material No. 1.4404
- Inner pipe seal: corrugated pipe seal made of ECO
- Outer pipe seal: O ring made of ECO*
- All other components: Material No. 1.4301

* on request NBR

<table>
<thead>
<tr>
<th>Type</th>
<th>DN</th>
<th>Version</th>
<th>Joint</th>
<th>d1 (mm)</th>
<th>L overall (mm)</th>
<th>Article No.</th>
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<td>SEC 100 100</td>
<td>male thread</td>
<td>R 3&quot;</td>
<td>158.0</td>
<td>147.4</td>
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</tbody>
</table>
Through-connection double-walled GRAPA
Compression/screwed

Material:
Fuel-carrying components
Other components
Inner pipe seals
Outer pipe seals
* on request NBR

This fitting is non-detachable after installation.

<table>
<thead>
<tr>
<th>Type</th>
<th>DN</th>
<th>D</th>
<th>D1</th>
<th>L overall</th>
<th>Article No.</th>
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Material:
Material No. 1.4404/1.4571
Material No. 1.4301
graphite
O-ring made of ECO*

* on request NBR

Insulate afterwards using suitable material (DIN 30762)

Subject to technical changes.
Manhole and pipe sleeve entry

**General information**

Die SECON®-X Manhole entry Type SSE is designed for use with standard-sized pipe sleeves. The pipe sleeves must be provided by the building contractor.

<table>
<thead>
<tr>
<th>Type SSE</th>
<th>pipe sleeve (contractor)</th>
<th>d1</th>
<th>L min.</th>
<th>Article No.</th>
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<td>SEC 50</td>
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<td>SEC 100</td>
<td>168.3 x 4.5</td>
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<td>160</td>
<td>1014347</td>
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</table>

Material delivered by BRUGG: two-part spacer and shrink sleeve.
Fluid mechanics
Pressure loss diagram for normal and high-octane petrol

Temperature: 15 °C
Specific density: 735 kg/m³
Kinematic viscosity: $5.5 \cdot 10^{-7} \text{ m}^2/\text{s}$

Example:
Pipe DN 50
Pressure loss with a flow rate of 80 l/min
at a speed of c. 0.4 m/s is 0.6 mbar/m
Fluid mechanics

Pressure loss diagram for heating oil (EL) and diesel fuel

Temperature: 15 °C
Specific density: 860 kg/m³
Kinematic viscosity: $7 \cdot 10^{-6}$ m²/s

Example:

Pipe DN 50
Pressure loss at a mass throughput 7000 kg/h
at a speed of c. 0.8 m/s is 2.5 mbar/m
Tips for laying
for positive pressure/suction pipes SECON®-X

Thorough preparations

The following preparations should be completed before laying commences:
- Install fuel dispenser lift hole with installation mounting to fix and restrain the piping
- Install the switching duct with mounting for the piping to be led into it
- Install the remote feed tank with fill nozzle and counter flange for installing the remote fill pipe
- Prepare the dome cover with counter flange for the piping (aligned according to the pipework drawings)
- Prepare the steel manhole with the correct pipe sleeve dimensions for leading in the piping

Preparing and levelling the soil

The SECON®-X Pipe systems for petrol stations must be laid on a layer of sand bedding at least 10 cm thick. The depth of the trench bottom can be calculated by adding the height of the sand bedding to the laying depth of the suction piping. Use sand with a grain size of < 2 mm and level the sand bedding afterwards. Finally tamp down the sand to compact it.

The careful preparation of the trench bottom is essential for the fast and efficient laying of the piping.

Laying the suction pipes

The SECON®-X pipe system for petrol stations is a bendable pipe system, in contrast to conventional piping. It is manufactured in one piece and wound on cable drums. The piping is laid direct from the drum into the trench on site and cut to the length needed.

Important points which must under all circumstances be observed when laying the sand bed:
- In order to guarantee the safe functioning of the pipe on the inherently safe suction principle, the piping must have a continuous downward gradient to the tank.
- When choosing the downward gradient, take care to consider any crossing pipes on your routing. The minimum gradient must be maintained under all circumstances along the entire line.
- You must make up the sand bedding in such a way that the suction piping lies directly on it all the way along when it laid later. This will prevent the pipe from sagging and forming bulges. Under no circumstances is it permissible to let the piping lie on the bedding only at certain points.
- The laying of the sand bedding must be completed before pulling in of the piping commences.

Laying the feed pipes

Unlike conventional piping, the leak-monitorable feed pipes are a bendable pipe system. They are manufactured in one continuous piece and wound on cable drums. The pipes are laid direct into the trench off the drum on site and cut to whatever length is needed. Due to its flexibility the pipe can be laid in one piece over great lengths.

Manual installation of pipe connections on site is only necessary at the ends of the pipe lines.

Expansion takeup

Longitudinal expansion due to temperature rise is taken up in positive pressure piping by the geometrical variation of the corrugated pipe, rather like a compensator. No action therefore needs to be taken to compensate expansion. Expansion bends as in conventional piping are not needed.

Anchor points

Anchor points are not needed when piping is laid in the ground. That means that routing can be freely chosen in this respect so that no extra work is needed.

Volume increase in fluid transport media due to temperature rise and resulting higher pressures can only be elastically compensated to a limited extent when piping is laid above ground.

Safety equipment

Positive pressure pipes must comply with TRbF 40/50. Additional approvals are in preparation here.
SECON®-X Pipe systems for petrol stations

Double-walled pipe system in a water protection area

SECON®-X Petrol station piping for the newbuilding of a motorway service area in Bremerhaven-Wulsdorf

“The endless, flexible SECON®-X pipe system from BRUGG can be laid easily and incredibly fast. We laid the piping for this motorway service area in a water reserve with more than five hundred metres of SECON®-X in almost no time at all – and complied with all the quality requirements.”

Following the decision of the investor, work began on erecting a new motorway service area next to the Autobahn A 27 at the exit Bremerhaven-Wulsdorf. The planning for this project was done in close cooperation with Shell Deutschland Oil GmbH. They set the quality standards for the realization of the plant.

The new building is in a designated water protection reserve, so that it was compulsory to use double-walled and leak-monitored piping for carrying the fuel. The Office of Environmental Protection in the port of Bremerhaven was particularly concerned that double-walled petrol station piping should be used on the premises of the service area. BRUGG cooperated with the professional planners and the architects’ office to draw up a project design for a double-walled piping network. All the requirements according to water Law and Environmental Protection Law needed to be complied with in this.

Thanks to SECON®-X’s “General technical approval”, all legal requirements for underground piping for the transport of environmentally hazardous substances were complied with one hundred percent. The system is double-walled and can be permanently monitored. Double-walled safety piping is compulsory not only for automotive fuels such as diesel and high-octane petrol, but also for the underground transport of carbamide in solution (AdBlue). Modern fuels such as E10 or biodiesel can be optimally transported in the chemically resistant stainless steel inner pipe too.

Laying the filling pipes directly off the drum

Bending the pipe
SECON®-X Petrol station piping for the newbuilding of a motorway service area in Bremerhaven-Wulsdorf

We score by the rapidly laying of SECON®-X. This convinced Inspectors of government on site.

It is possible in case of allowance of using the SECON®-X as single walled pipe system.

Optional – if necessary later – it’s the possibility to integrate the pipe system in leak detection. This will be a very interesting detail for fill pipes, suction pipes and as well for vapor recovering lines stage I and stage II.

**Double walled SECON®-X Tee piece**

To contact us and for further information, please fill in the following details and send them by fax to +49 (0)5031 170-170.

- Please send me detailed information material
- I have a project I am currently working on and would like to speak to you personally

**Sender**

Company:

Contact person:

Telephone:

eMail:

Street/No.:

Postcode/Town:

**BRUGG Rohrsysteme GmbH**
Adolf-Oesterheld-Straße 31
D-31515 Wunstorf
phone +49 (0)5031 170-0
fax +49 (0)5031 170-170
info.brg@brugg.com
www.brugg.de
The endlessly connected BRUGG piping was a godsend to us on these huge installations. Building them on greenfield sites allowed us to lay SECON®-X in almost no time at all.”

Kai Jordan, Market Manager DACH, ARTELIA GmbH

Whether you are on the way to a seaside holiday or on a business trip – since the end of 2013 you can fill your tank or take a break on the A 20, the quickest east-west link between Bad Segeberg and the Kreuz Uckermark. In both directions.

A stretch of 240 km on the A 20, AKA the “Baltic Autobahn”, was opened for traffic in December 2009. A few questions also remained open, too, however: Where can I get petrol or something to eat, or just take a short break? As it turned out, the best place for all these things is the beautiful countryside of the Schönberger Land between Lübeck and Rostock.

And of course, choosing such an idyllic location has its price. Anyone who wants to build one or two petrol stations here is faced with the most stringent environmental protection requirements anywhere. In the knowledge that all these environmental requirements must be complied with and planned in with state-of-the-art technology, one of the major petrol companies won the contract for equipping the two modern motorway petrol stations at Schönberger Land.

Initial discussions on the scheduling took place between BRUGG and ARTELIA in February 2013. BRUGG played a supporting role in drawing up the piping plan for the northern side. The planned piping for all fuel products was to be double-walled SECON®-X. BRUGG first received the order to supply the material for the north side. The installation of the piping for its mirror-image twin on the south side, here also SECON®-X, was staggered with a time lag.
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**Sender**

Company: 

Contact person: 

Telephone: 

eMail: 

Street/No.: 

Postcode/Town: 

**BRUGG Rohrsysteme GmbH**
Adolf-Oesterheld-Straße 31
D-31515 Wunstorf
phone +49 (0)5031 170-0
fax +49 (0)5031 170-170
info.brg@brugg.com
www.brugg.de
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District heating – Industry – Petrol stations – System packages

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Give us a call!
Our engineers would be pleased to advise you and find a made-to-measure solution.

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BRUGG Rohrsysteme GmbH
Adolf-Oesterheld-Straße 31
D-31515 Wunstorf
phone +49 (0)5031 170-0
fax +49 (0)5031 170-170
info.brg@brugg.com
www.brugg.de

Brugg Rohrsystem AG
Industriestrasse 39
CH-5314 Kleindöttingen
phone +41 (0)56 268 78 78
fax +41 (0)56 268 78 79
pipesystems@brugg.com
www.pipesystems.com

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