BRUGG
Pipes

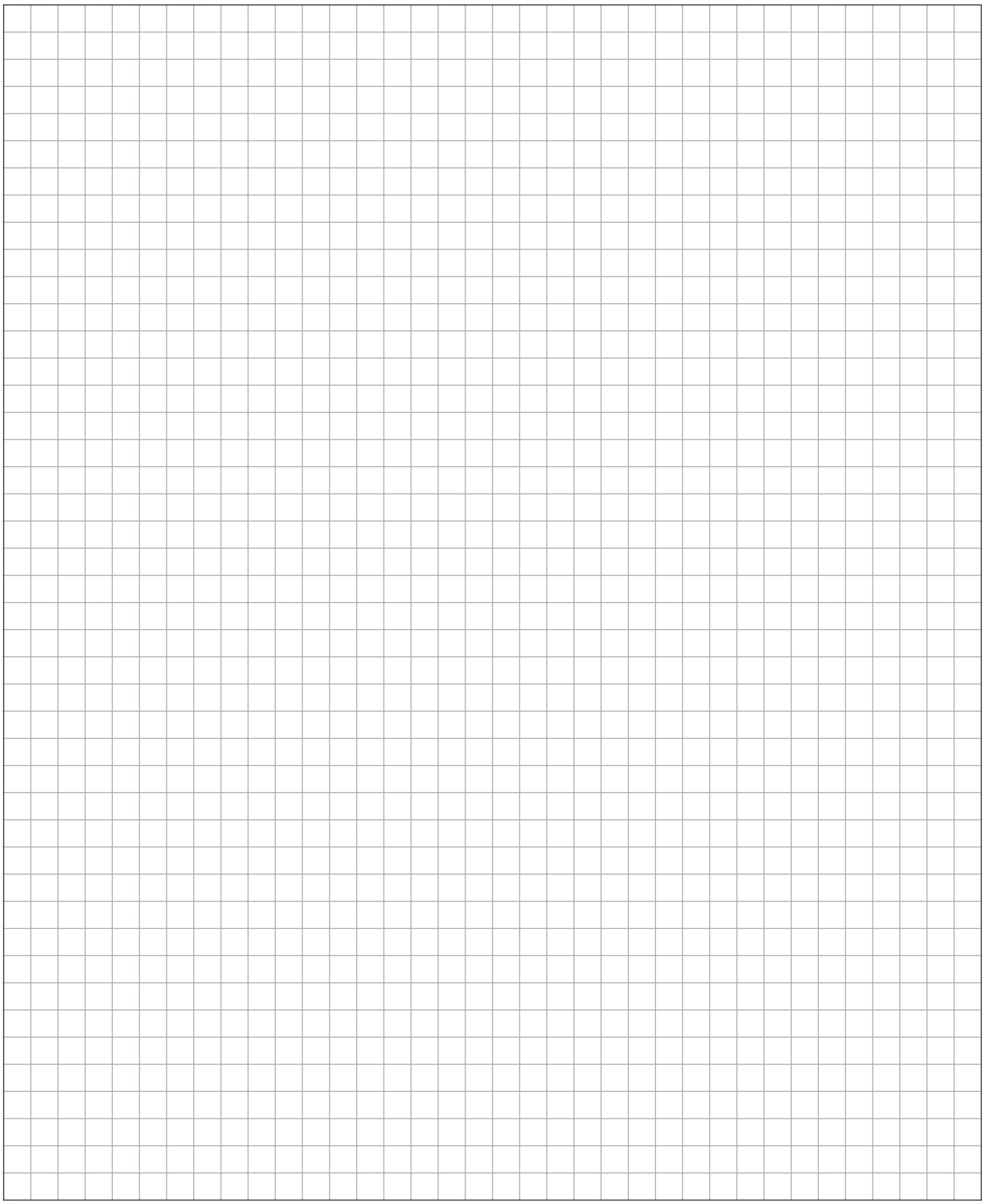
SECON®-X

Pipe systems for petrol stations
Technical details

PIONEERS IN INFRASTRUCTURE

SECON®-X Pipe systems for petrol stations

Notes



BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Contents

SEC 1.0 **Contents**

SEC 1.10 **System description**
SEC 1.100 System description SECON®-X

SEC 1.11 **Product overview**
SEC 1.11.01 Piping, Connections, Fittings

SEC 1.20 **Pipe**
SEC 1.20.01 Product construction – dimensions, bending radii, weights, volumes

SEC 5.0 **Connections**
SEC 5.01.15 Connection fitting with profile and O ring seal, screwed
SEC 5.01.25 Collar and split loose flange for SECON®-X connection fitting

Fittings
SEC 5.02.04 Through-connection double-walled GRAPA compression/screwed
SEC 5.05.01 Manhole and pipe sleeve entry

SEC 5.52 **Fluid mechanics**
SEC 5.52.01 Pressure loss diagram for petrol normal and high-octane (Normal and Super)
SEC 5.52.02 Pressure loss diagram for heating oil (EL) and diesel fuel

SEC 5.55 **Tips for laying**
SEC 5.55.01 for positive pressure-/suction pipes SECON®-X

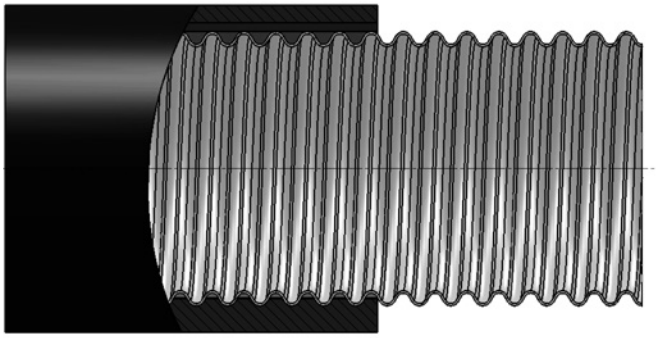
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

System description

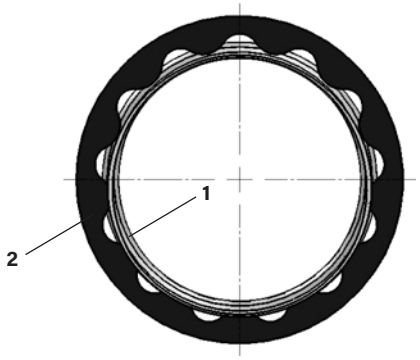
SECON®-X is a flexible, double-walled and bendable composite piping system with an inner pipe made of stainless steel and an encasing mantle pipe made of PE separated by struts. This pipe system was specially developed as a fuel carrier pipe for petrol stations.

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.



1 Corrugated inner pipe made of stainless steel
2 PE mantle separated by struts

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

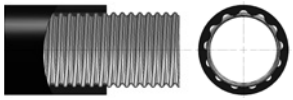
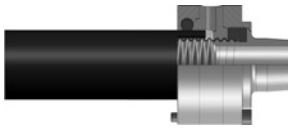
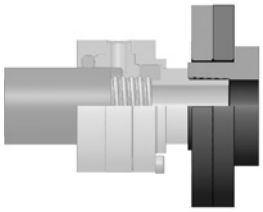
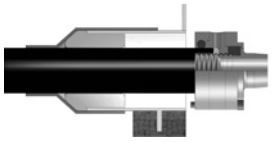
Approval acc. to IP Specification and European Standard EN 14125 "Piping for Petrol Stations laid in the ground" as well as ERA Technology and KIWA has been obtained.

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Product overview

Piping/Connections/Fittings

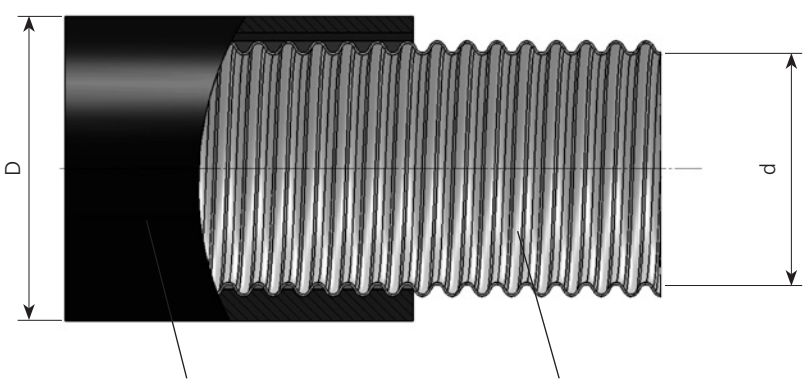
Version	Type SEC	Nominal bore/ Joint	Pressure PN	Joint Types of connection inner/outer	Material No.	Worksheet
Pipe 	30/ 44 48/ 63 60/ 75 98/120	25 40 50 100		corrugated inner pipe PE-LD outer casing with Internal struts	1.4404	SEC 1.20.01
Connection fitting with O ring seal 	30/ 44 48/ 63 60/ 75 98/120	25 40 50 100	10	internal/external thread	1.4404/ 1.4301	SEC 5.01.15
Collar and split loose flange for connection fitting 	30/ 44 48/ 63 60/ 75 98/120	25 40 50 100	10	split loose flange	1.4404/ Steel	SEC 5.01.25
Through-connection	30/ 44 48/ 63 60/ 75 98/120	25 40 50 100			1.4404/ 1.4571/ 1.4301/ ECO 51P 6030	SEC 5.02.04
Manhole entry 	30/ 44 48/ 63 60/ 75 98/120	88.9 x 3.2 mm 114.3 x 3.6 mm 139.7 x 4.0 mm 168.3 x 4.5 mm		pipe sleeve (contractor)		SEC 5.05.01

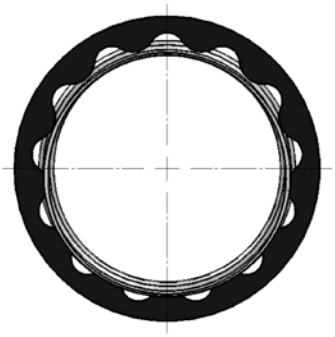
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Product construction

Dimensions, bending radii, weights, volumes





PE casing mantle
with struts

corrugated inner pipe
made of stainless steel
Material No. 1.4404/1.4571
US standard AISI TP 316L/316Ti

This table contains all geometrical data.

Type	DN	Dimensions d mm	D mm	Bending-radius* cm	Weight kg/m	Volume dm^3/m or l/m	Article No.
SEC 25	25	30	44	30	0.87	0.8	1014275
SEC 40	40	48	65	36	1.70	2.0	1014276
SEC 50	50	60	77	40	2.10	3.0	1014277
SEC 100	100	98	124	80	4.50	8.4	1014278

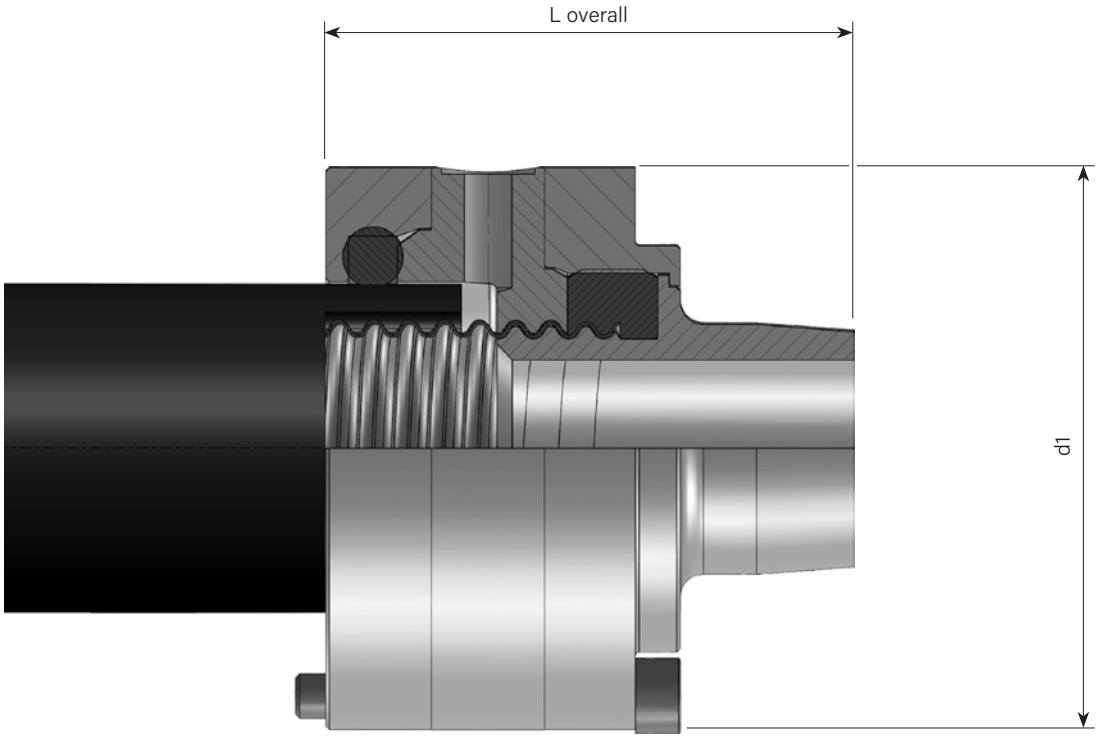
* Only bend the pipe using a bending jig or bending machine.

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Connection fitting

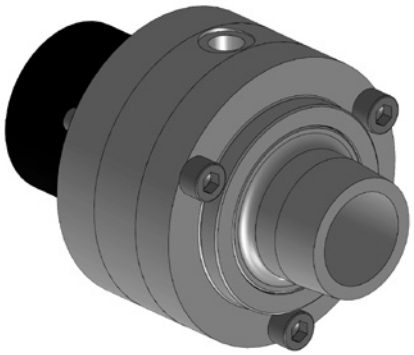
with profile and O ring seal, screwed



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



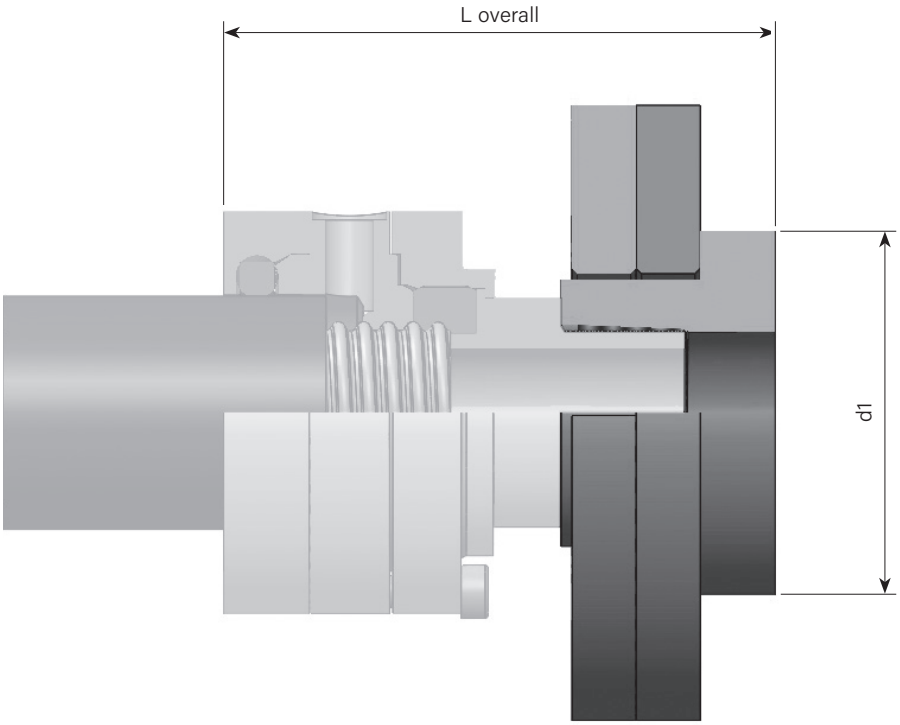
Type	DN	Version	Joint	d1 mm	L overall mm	Article No.
SEC 25	25	male thread	R 1"	75.0	82.8	1014285
SEC 25	25	female thread	G 1"	75.0	73.4	on request
SEC 40	40	male thread	R 1 ½"	105.0	93.7	1014294
SEC 50	50	male thread	R 2"	115.0	105.7	1014309
SEC 100	100	male thread	R 3"	158.0	147.4	1014317
SEC 100	100	male thread	R 4"	158.0	147.4	1088194

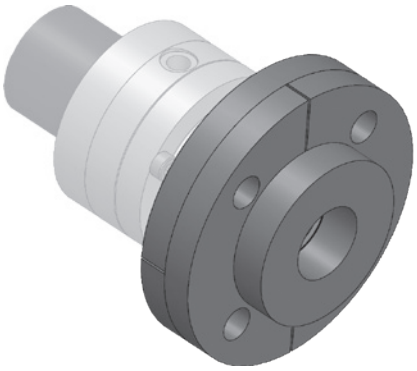
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Collar and split loose flange

for SECON®-X connection fitting





Material:

Collar	Material No. 1.4404
Split loose flange	Steel

Type	DN mm	d1 mm	L overall	Article No.
SEC 25	25	68	103	1092121
SEC 40	40	88	113	1092122
SEC 50	50	102	120	1092123
SEC 100	100	158	162	1092124

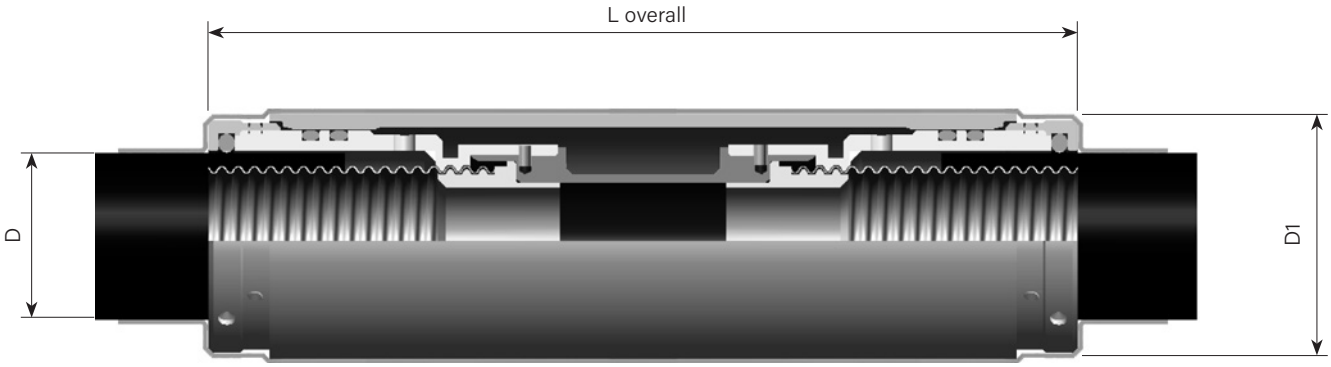
Please use suitable sealant to screw on the collar!

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Through-connection double-walled GRAPA

Compression/screwed

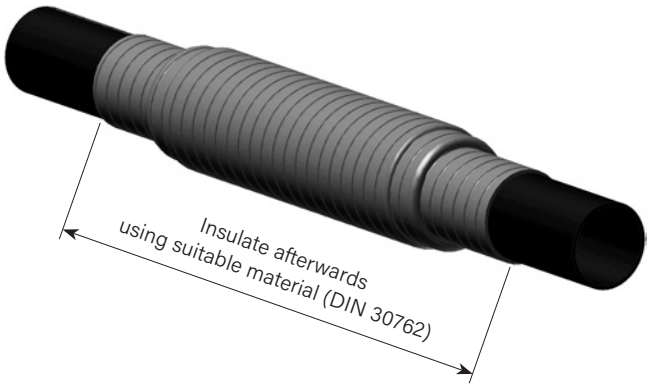


Material:

Fuel-carrying components	Material No. 1.4404/1.4571
Other components	Material No. 1.4301
Inner pipe seals	graphite
Outer pipe seals	O-ring made of ECO*

* on request NBR

This fitting is non-detachable after installation.



Type	DN	D	D1	L overall	Article No.
		mm	mm	mm	
SEC 25	25	44	76.1	299	1014337
SEC 40	40	65	95.0	339	1014338
SEC 50	50	77	114.3	357	1014339
SEC 100	100	124	157.0	404	1014340

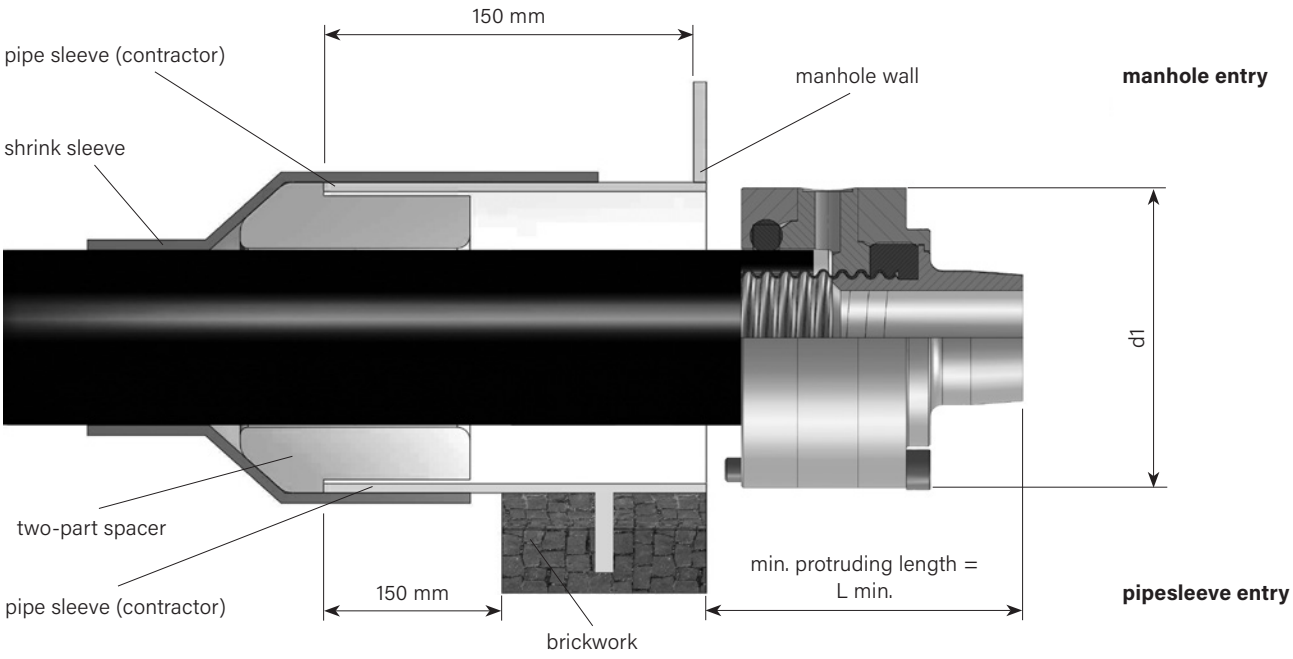
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Manhole and pipe sleeve entry

General information

The 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.



Type SSE	pipe sleeve (contractor) mm	d1 mm	L min. mm	Article No.
SEC 25	88.9 x 3.2	75.0	100	1069888
SEC 40	114.3 x 3.6	105.0	120	1014345
SEC 50	139.7 x 4.0	115.0	140	1014419
SEC 100	168.3 x 4.5	158.0	160	1014347

Material delivered by BRUGG: two-part spacer and shrink sleeve

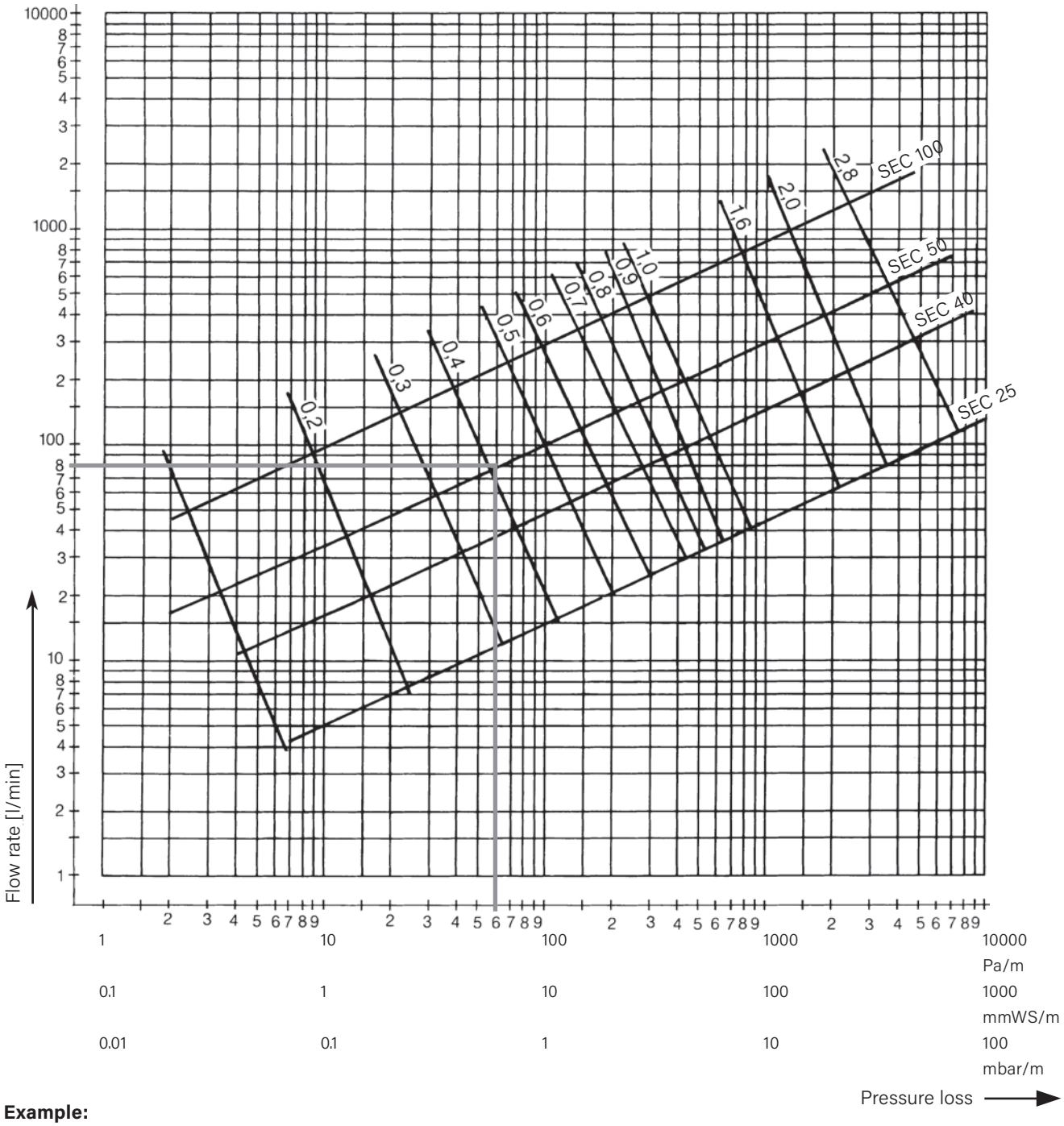
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Fluid mechanics

Pressure loss diagram for normal and high-octane petrol

Temperature:	15 °C
Specific density:	735 kg/m³
Kinematic viscosity:	5.5 · 10⁻⁷ m²/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

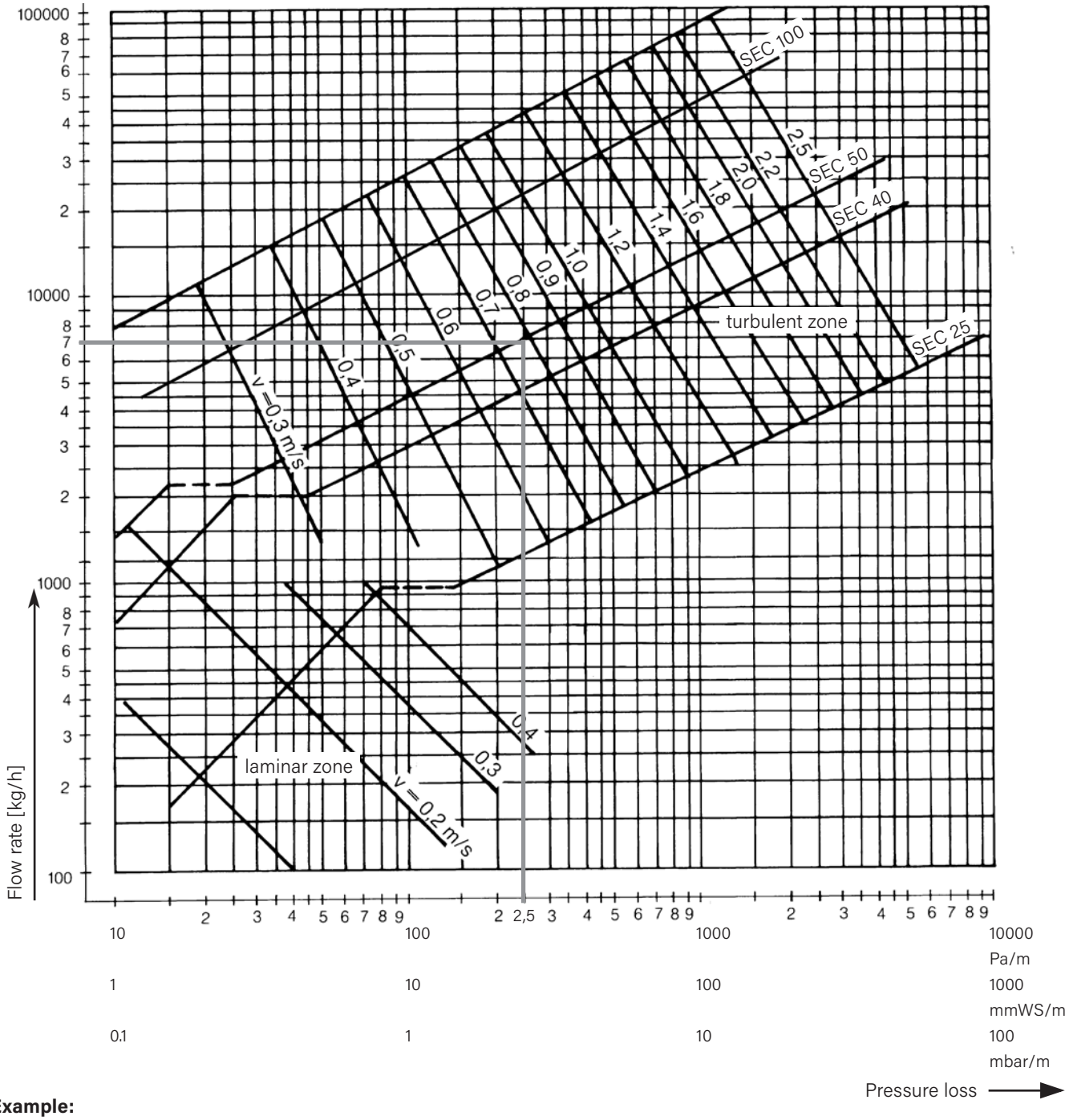
BRUGG Pipes

SECON®-X Pipe systems for petrol stations

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

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

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 reconstruction 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."

Henry Reepschläger, TIN GmbH, Weyhe

Laying the filling pipes directly off the drum

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

Bending the pipe

BRUGG Pipes

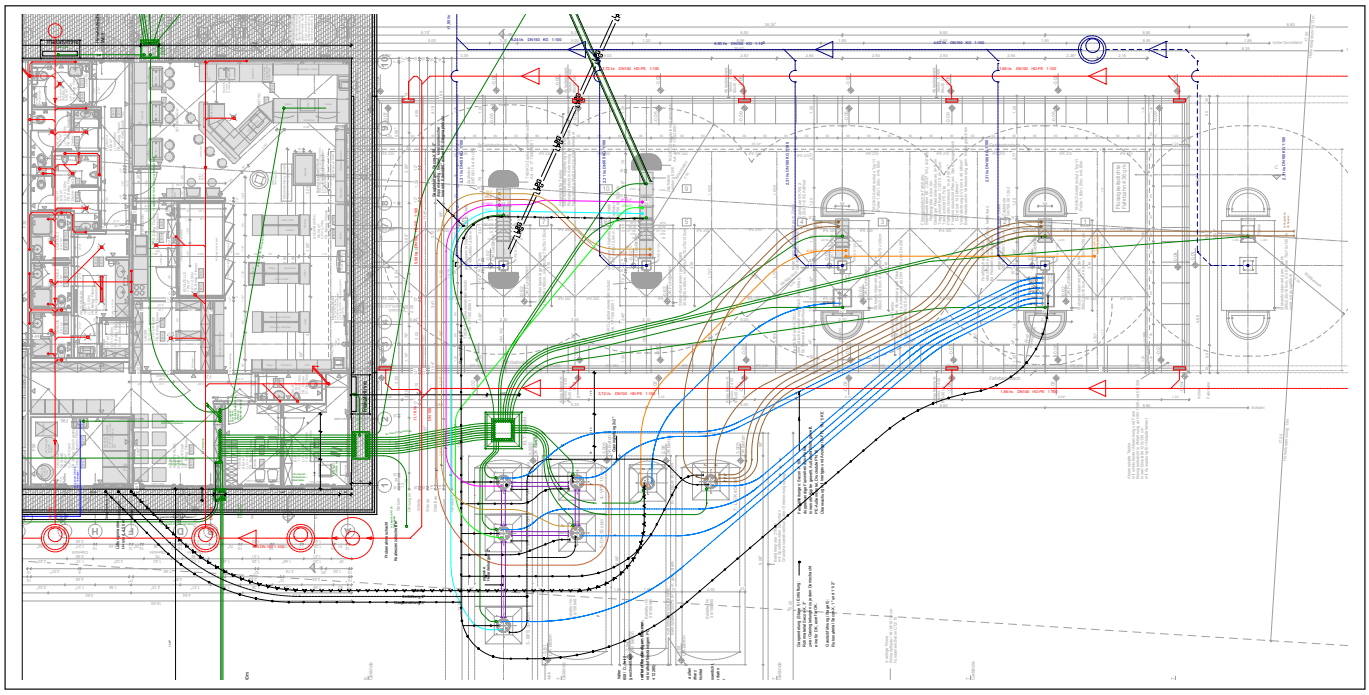
SECON®-X Pipe systems for petrol stations

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

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.

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.



Plan view fuelling station SHELL motorway service area

To contact us and for further information, please fill in the following details and send them by fax to +49 (0)5031 170-170 or by e-mail to info.brg@brugg.com

Company:

Contact person:

Telephone:

E-mail:

Street/No.:

Postcode/Town:

❑ Please send me detailed information material.

❑ I have a project I am currently working on and would like to speak to you personally.

Company stamp

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

A petrol station with built-in top-level environmental protection

SECON®-X Pipe systems for petrol stations for the motorway A 20 in north-eastern Germany

"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

Laying the piping to the future petrol pumps

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

Overview of the site

Laying the filling line

Bending the piping

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

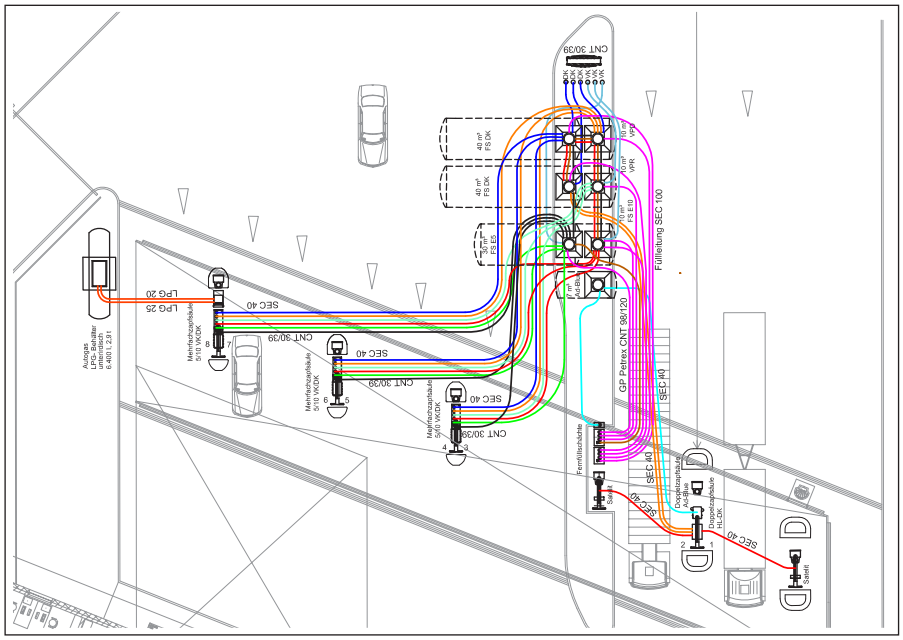
SECON®-X Pipe systems for petrol stations for the motorway A 20 in north-eastern Germany

piping for its mirror-image twin on the south side, here also SECON®-X, was staggered with a time lag.

BRUGG was always there on site during installation work to provide comprehensive and intensive support and was able to assure themselves that well-trained operatives are the precondition for high-quality pipe laying and installation.

In all,
- 900 m SEC DN 40 for the suction lines
- 400 m SEC DN 100 for the fill lines
- 100 m CNT 30/39 for vapour recovery
- 20 m LPG DN 20 und DN 25 for LPG

were built in, including all ancillary equipment.



Routing plan for the Schönberger Land

The fully installed connection fitting

To contact us and for further information, please fill in the following details and send them by fax to +49 (0)5031 170-170 or by e-mail to info.brg@brugg.com

Company:

Contact person:

Telephone:

E-mail:

Street/No.:

Postcode/Town:

❑ Please send me detailed information material.

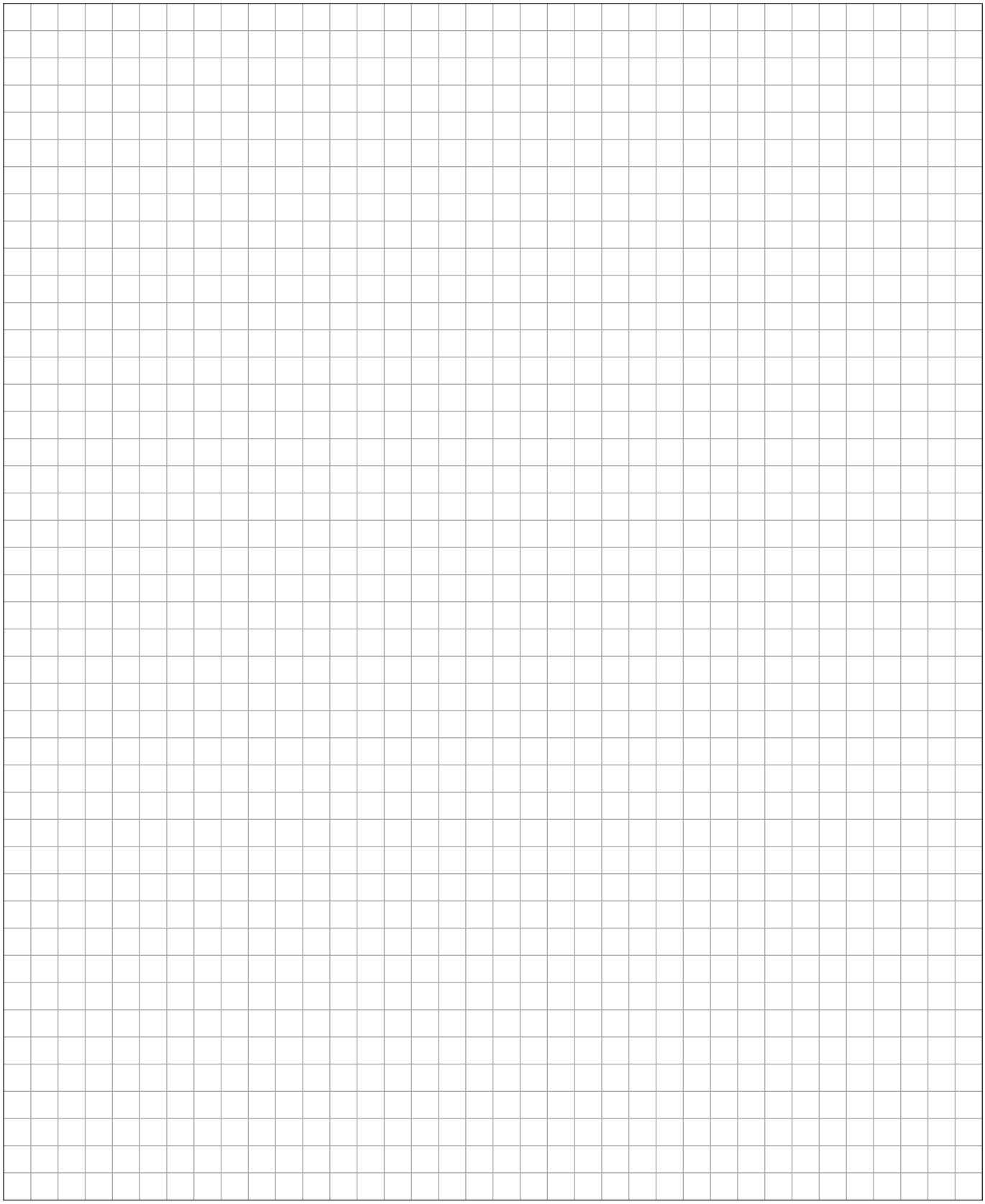
❑ I have a project I am currently working on and would like to speak to you personally.

Company stamp

BRUGG Pipes

SECON®-X Pipe systems for petrol stations

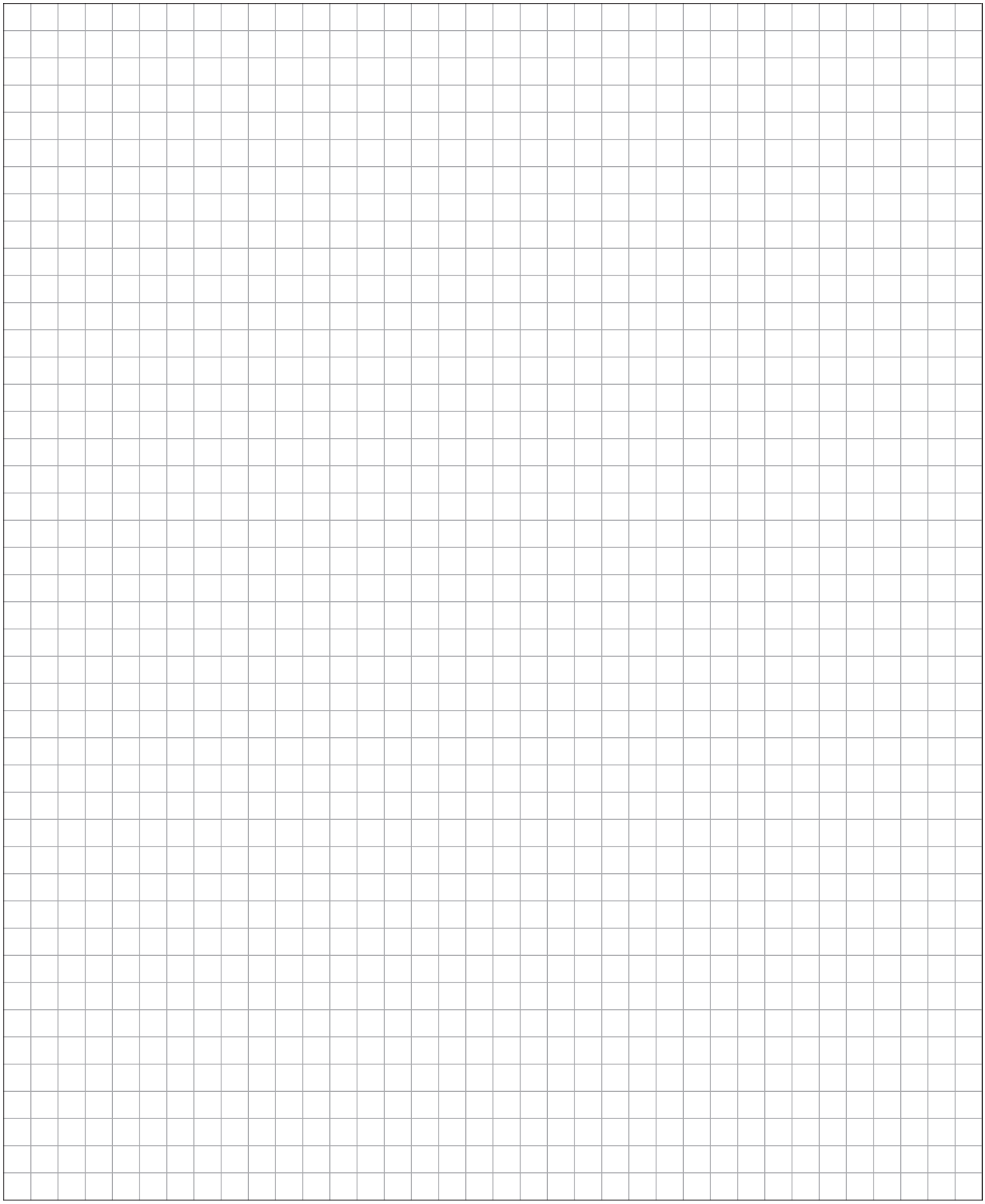
Notes



BRUGG Pipes

SECON®-X Pipe systems for petrol stations

Notes



BRUGG Pipes

A BRUGG GROUP COMPANY

EN 05/21 / xxx ex. / 1016490

BRUGG Rohrsysteme GmbH · Adolf-Oesterheld-Straße 31 · 31515 Wunstorf · Germany · brugg.de