

BRUGG

Pipes

BRUGG-STAMANT® Safety Pipe

System Description

General type approval
Z-38.4-207



**PIONEERS IN
INFRASTRUCTURE**

BRUGG-STAMANT® Safety Pipe

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BRUGG-STAMANT® Safety Pipe

System description

Monitorable BRUGG-STAMANT® Safety Piping

BRUGG-STAMANT® Safety Piping is a prefabricated double-walled piping system delivered in construction elements, in the dimensions **DN 15/32 to DN 800/900**, which is particularly suitable for the transport of flammable and non-flammable water hazardous substances.

The installation and laying of the construction elements is done by specialist firms certified acc. to § 62 I WHG who can prove their qualifications in process and welding techniques.

The annular gap between the inner and secondary containment pipes is used as a surveillance space for a leak detector, which carries out permanent and complete leak monitoring. In the event of a spillage an optical and acoustic alarm is given and, where required, further transport of the medium is interrupted.

The leak detector regulates the monitoring pressure in the surveillance space of the safety piping and registers any changes in pressure, even in the case of minimal spillages, both in the inner and secondary containment pipes.

Additional functions when an alarm is given, such as passing on the alarm signal, switching off pumps or closing down magnetic valves, bring additional operational safety.

There are two monitoring systems:

- Leak monitoring on the
1. Vacuum principle
 2. Positive pressure principle

Besides increasing operating safety, the use of a leak detector brings considerable economic advantages:

1. The entire system can be checked simply at any time without interrupting operations.
2. Requirements such as pressure-/volume measurements, pressure tests or inspections of the piping route become unnecessary.

The construction elements, which are assembled at our works, include all necessary fittings for the project (such as elbow, T-piece, wall through-connection etc.), including the complete outer corrosion proofing for underground piping according to the requirements of DIN 30672. The type of material used for the outer pipe and for the inner medium pipe depends on the expected mechanical, thermal, and chemical stress levels as well as on the currently valid building regulations. Conventional project planning for double-walled piping systems, especially with large pipe dimensions for the transport of flammable, environmentally hazardous media makes stringent demands on the technical standards of a design, as well as on the manufacturer's know-how in fire and explosion prevention and the protection of bodies of water.

Years of experience in planning and implementing projects using steel-cased piping in the field of district heating systems and FLEXWELL® safety piping in industrial plants, the petrochemical sector and fuel depot construction mean that we are perfectly capable of meeting these requirements



Structure of the BRUGG-STAMANT® safety pipe

- 1 Inner pipe
- 2 Surveillance space
- 3 Secondary containment pipe
- 4 Corrosion proofing

BRUGG-STAMANT® Safety Pipe

General type approval Z-38.4-207

The construction design of BRUGG-STAMANT® Safety Piping with leak monitoring is manufactured and used in projects according to the description in the general type approval and according to the pressure device regulations 2014/68/EU, as well as according to the construction regulations. The system is subject to the requirements of 11.GSGV, § 62 g WHG, § 7 BetrSichV (Operating Safety Ordinance) and the requirements of the various German federal states under the AwSV.

Principles of testing and evaluation used in the leak detector

(Definition of the surveillance space, the leak detector with connecting cables and the leak detection medium)

- BetrSichV
- Technical rules for flammable liquids
 - Piping on the factory premises
 - EN 13160 Guideline/Construction and testing principles for leak detectors for double-walled piping
- Water conservation law – WHG
- Regulations concerning installations handling water hazardous substances – AwSV and their appropriate regulations

Tests

According to the general type approval, the pressure device regulations 2014/68/EU, as well as according to the construction and testing regulations.

Material, construction and pressure tests

We carry out the necessary material, construction, and pressure tests together with the competent official experts during manufacturing in our factory. The final tests of the piping connections on site are also done by the official expert supported by the internal expert from the specialist firm.

Acceptance test

The function test and operational start-up of the leak monitoring system is carried out according to the description in the approval documents of the specific leak detector used.

Proof of qualifications

Besides our experience, the following proof of qualifications guarantees that your orders will be carried out professionally and to high quality standards:

- Specialist firm acc. to § 62 WHG
- Procedures test acc. to AD - Data sheet HP 2/1 / acc. to DIN EN ISO 15614-1
- Welder test acc. to AD - Data sheet HP 3 / DIN EN ISO 9606-1
- Specialist firm for the manufacture and installation of piping
- Acceptance is monitored according to the pressure device regulations 2014/68/EU
- Class EXC2 acc. to DIN EN 1090-2

BRUGG-STAMANT® Safety Pipe

Technical project description leak detector**Leak detector**

(Safety piping and leak monitoring)
approved for the transport of water-hazardous (flammable and non-flammable) media acc. to VbF iVm. of the 11. GSGV, WHG, AwSV

Safety piping

as a double-walled steel piping construction with surveillance space as part of a leak detection system.
Type: BRUGG-STAMANT® safety piping

Leak monitoring

Positive pressure leak detector
Vacuum leak detector

Manufacturer

BRUGG Rohrsysteme GmbH

Installation / laying

by authorized specialist firms certified acc. to WHG

Applications

Underground or above-ground piping

Transport medium

Water-hazardous [flammable and non-flammable] media

Dimensions

Outer pipe	DN 32 to DN 900
Inner pipe	DN 15 to DN 800

Operating conditions:

Operating pressure in inner pipe:
– up to max. 16 bar positive pressure leak monitoring
– up to max. 20 bar vacuum leak monitoring
Calculated pressure, monitoring pressure: according to the description in the approval documents

Testing pressure according to General Type Approval and/or Pressure Equipment Directive PED.

A testable static strength calculation acc. to BAZ is made for every BRUGG-STAMANT® pipe system.

BRUGG-STAMANT® Safety Pipe

Technical project description materials specification**Inner pipe**

Dimensions seamless and welded pipes acc. to EN 10220
Technical conditions of delivery acc. to EN 10216-2, 10217-1, 10217-2, 10208-2
Acceptance test certificate acc. to DIN EN 10204 – “3.1” or “3.2”

Outer pipe

Dimensions seamless and welded pipes acc. to EN 10220
Technical conditions of delivery acc. to EN 10216-2, 10217-1, 10217-2, 10208-2
With external PE corrosion-proofing jacket acc. to DIN 30670 or DIN 30671.
Acceptance test certificate acc. to DIN EN 10204 – “3.1” or “3.2”

IP elbow

Pipe elbow DIN EN 10253-2 or -4
Works certificate acc. to DIN EN 10204 – “3.1” or “3.2”
as per description in the approval documents (see also worksheet SSI 5.03.01/02)

OP elbow

Pipe elbow, radius according to the inner pipe curvature with appropriate material specification outer pipe
DIN EN 10253-2 and/or DIN EN 10253-4 or in segments
PE corrosion-proofing jacket in three layer polyethylene coating (N or V) acc. to DIN 30672 or DIN 30670
as per description in the approval documents (see also worksheet SSI 5.03.01)

T-branch

Consisting of: outer pipe and inner pipe branch, T-branch
acc. to DIN EN 10253-2 or DIN EN 10253-4 or Weldolet
as per description in the approval documents (see also worksheets SSI 5.04.01 - 5.04.05)

End seal

Provides a pressure and vacuum-tight seal of the annular gap between outer and inner pipe, frictionally welded with simultaneous lead-through of the inner pipe, incl. the connection for the leak detector as per description in the approval documents (see also worksheet SSI 5.14.01).

Bearings

Spacers
The inner pipe is carried on axial bearings which guarantees the openness of the surveillance space. As per description in the approval documents (see also worksheet SSI 5.10.01/5.11.01/5.12.01)

Leak monitoring

The annular gap, annular volume max. 10 m³, between the inner and outer pipe serves as a surveillance space.
Monitoring of the pipe is done either on the positive pressure or vacuum principle, adapted to the actual operating pressure of the inner pipe, by means of an approved leak detector.

Flammable liquids Classes AI, AII, AIII and B, as well as WGK 1 to 3

Flammable liquids (AIII) and non-flammable liquids

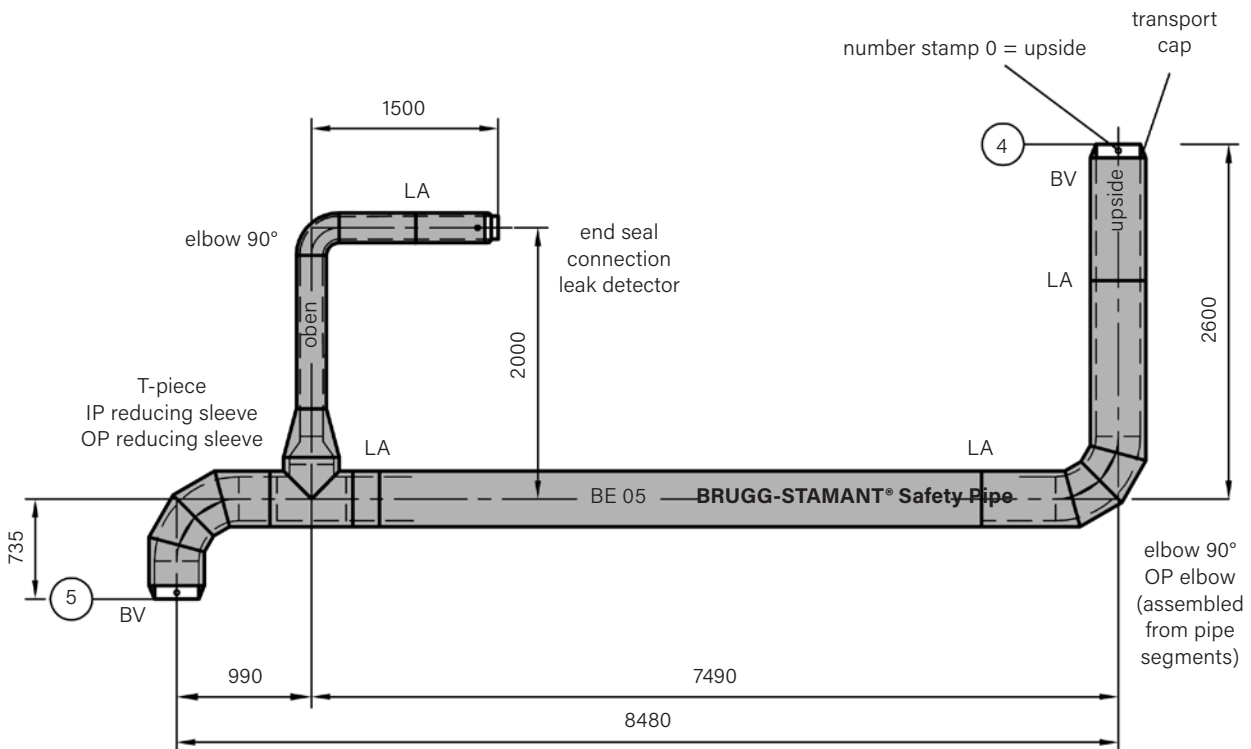
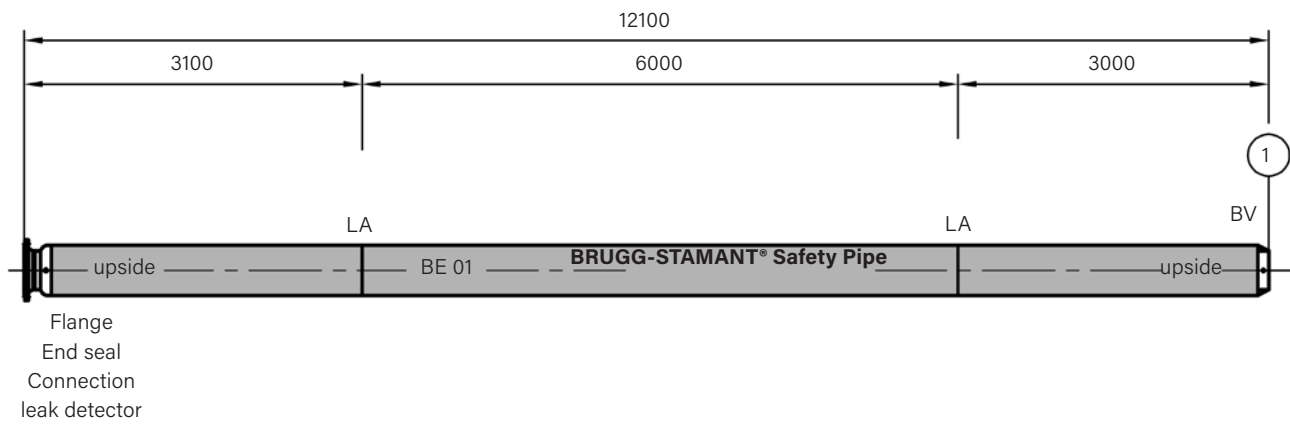
As per description in the approval documents

BRUGG-STAMANT® Safety Pipe

BRUGG-STAMANT® construction elements

BRUGG-STAMANT® safety piping construction elements already include all necessary fittings such as elbows, T-branches, reducing sleeves and end seals. The standard length of the construction elements is 12.0 metres. Longer elements can be delivered after consultation. The maximum length of the elements is only limited by the availability of suitable transport.

Construction elements in a completed installation



All dimensions in mm

BRUGG-STAMANT® Safety Pipe

Leak monitoring

BRUGG-STAMANT® safety piping is permanently monitored using pneumatic leak detection equipment/leak detectors. These regulate the monitoring pressure in the surveillance space and register any changes of pressure which may occur.

The surveillance space is filled with the leak detection medium (an inert gas) and prevents uncontrolled spillages of the transport medium when leaks occur. The surveillance space must be so constructed that the functioning and operative security of the leak detection system (the leak detector) is assured at all times when the leak monitoring system is connected.

If the pipe is damaged the alarm is given by acoustic and optical signals.

Definition of leak detection equipment/leak detector

«Leak detection equipment/leak detector» according to the currently valid regulations refers to a device which automatically and under all operating conditions gives warning of leaks in the walls of double-walled piping in which water-hazardous (flammable and non-flammable) fluids are transported. The term «leak detection equipment/leak detector» includes all the equipment necessary for the detection of leaks.

The main components are:

- the leak detector/leak detection equipment (LAZ)
- the connection between the surveillance space (ÜR) and leak detector (LAZ)
- double-walled piping
- the surveillance space (ÜR)
- a leak detection medium

The use of this system complies with the most stringent European safety standards (Class 1). Systems of this class give warning of a leak above or below the fluid level in a double-walled protective system. They are constructed on the principles of absolute safety and ensure that spillages of products into the environment cannot occur.

Leak detection equipment/leak detector (LAZ)

We distinguish two types of differential pressure leak detection equipment: Leak surveillance to detect leaks in double-walled piping on the vacuum principle and on the positive pressure principle (using an inert gas).

- BRUGG-STAMANT® safety piping with a vacuum leak detector
- BRUGG-STAMANT® safety piping with a positive-pressure leak detector

Approval/suitability

All leak detection equipment/leak detectors in use must comply with the basic criteria laid down for construction and testing standards. All such preconditions which could have a bearing on the functional and operative safety of the system must therefore be observed. It therefore goes without saying that the conditions for operative use have been tested by the competent authorities and clearly defined and set down in the documents of approval issued by them.

BRUGG-STAMANT® safety piping with leak monitoring is an approved leak detection equipment/leak detector system.

The advantages of the system

Using double-walled BRUGG-STAMANT® safety piping with leak monitoring offers, besides a high degree of operative safety, substantial economic advantages:

- the entire system can be easily and simply monitored at any time without interrupting operations
- requirements such as e.g. pressure/volume measurements, pressure tests or route surveys can be dispensed with.

BRUGG-STAMANT® Safety Pipe

Leak detection on the vacuum principle

The leak detector on the vacuum principle is suitable and approved for monitoring BRUGG-STAMANT® Safety Piping for the transport of:

- flammable water-hazardous substances with an ignition point $\leq 55\text{ °C}$ only in the Ex version
- non-flammable water-hazardous substances.

Principles of functioning

The vacuum pump installed in the leak detector creates a partial vacuum inside the surveillance space. By monitoring this partial vacuum, leaks in the walls of the piping are automatically detected.

In the event of a drop in the partial vacuum (a rise in pressure) due to a leak below the lower value of the monitoring level of partial vacuum, an optical and acoustic alarm is triggered.

Minimal, unavoidable permeability (not leaks) are regulated automatically by the leak detector without triggering the alarm if they lie between the upper and lower values of the monitoring partial vacuum. Evacuation to compensate is carried out by the vacuum pump in the leak detector.

In every case in which the alarm is triggered, the vacuum pump is automatically switched off. It can only be switched on again by throwing the toggle switch installed for this purpose on the outside of the leak detector.

Technical basis

The scope of application of the leak detection device must be limited to fixed maximum pipe lengths due to the laws of physics. These depend on the high and low points of the BRUGG-STAMANT® safety pipe used and the type of laying.

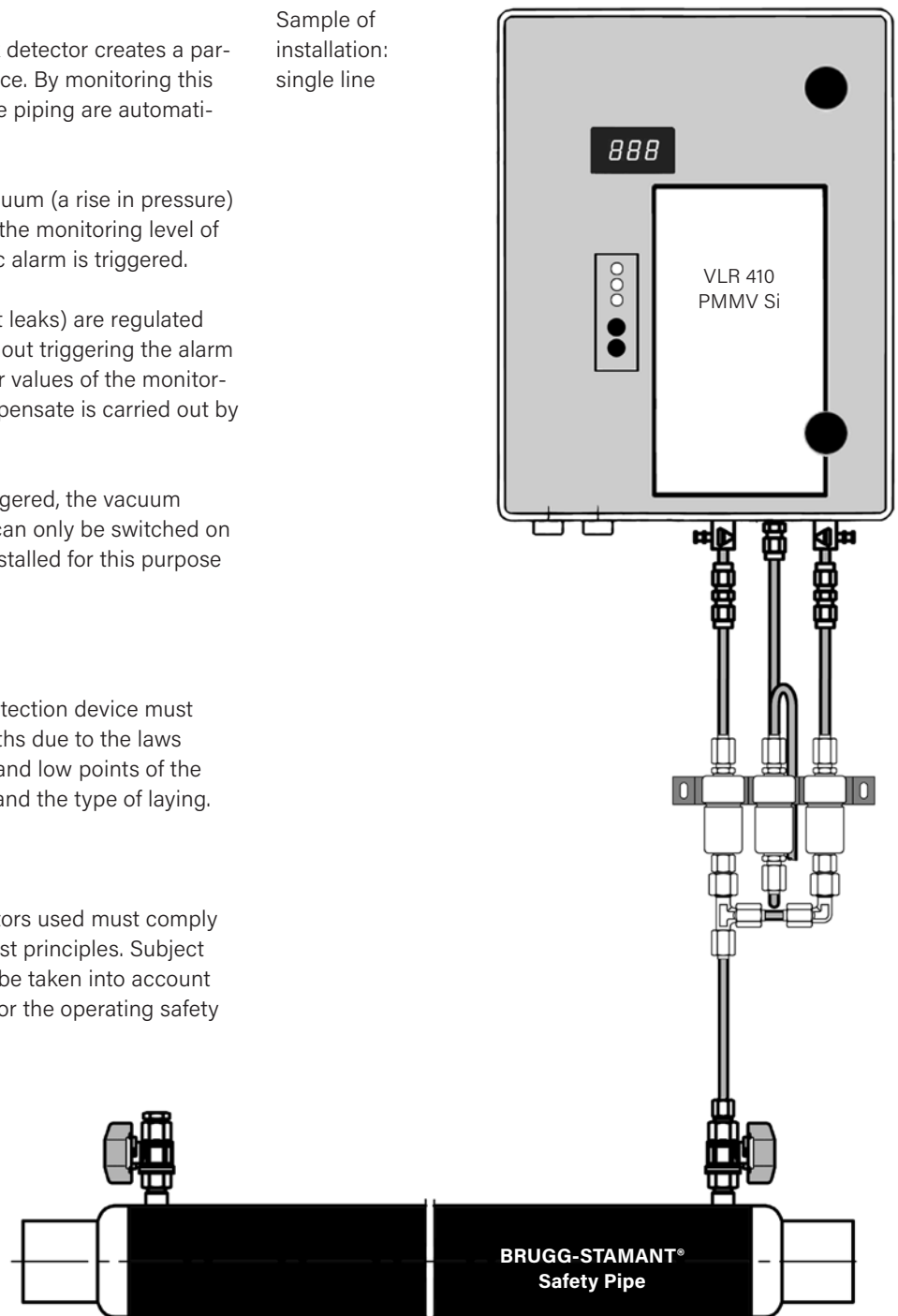
Approval / suitability

All leak detection systems/ leak detectors used must comply with the stipulated construction and test principles. Subject to these, all conditions must therefore be taken into account which could influence the functioning or the operating safety of the system.

For this reason the conditions under which the devices can be used are tested by the official testing offices and clearly defined and laid down in the approval documents issued by them.

BRUGG-STAMANT® Safety Piping with leak detection is an approved leak detection system/leak detector

Sample of installation:
single line



BRUGG-STAMANT® Safety Pipe

Leak detection on the positive pressure principle

The leak detector on the positive pressure principle is suitable and approved for monitoring BRUGG-STAMANT® Safety Piping for the transport of:

- flammable water-hazardous substances
- non-flammable water-hazardous substances.

Principles of functioning

The operating pressure necessary in the surveillance space of the BRUGG-STAMANT® Safety Piping is regulated by the actual pressure in the operating pipe (inner transport pipe) and is

- generated by topping up, regulated by pressure changes, from a stationary nitrogen pressure reservoir which is connected to the surveillance space **operating mode**

Stationary (S)

- or from a mobile pressure reservoir which is only connected when the line is put into operation or during a function test **operating mode Mobile (M)**

The leak detectors can be set to operating mode S or M by means of a switch for the two operating modes installed on the outside of the leak detector.

The surveillance space is connected to the leak detector by means of the connecting cables. The positive pressure which is generated is measured by the pressure sensor. When there is a drop in pressure to the predetermined ALARM ON setting due to a leak, an optical and acoustic alarm is triggered.

In operating mode S, the monitoring pressure, after switching on, is regulated by pressure changes which are compensated by topping up from a stationary nitrogen pressure reservoir which is permanently connected to the surveillance space and fitted with a reducing regulator.

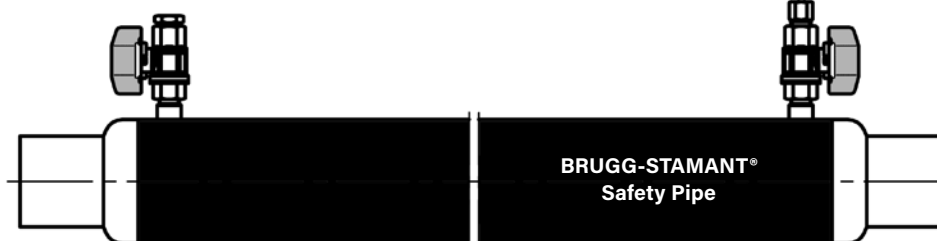
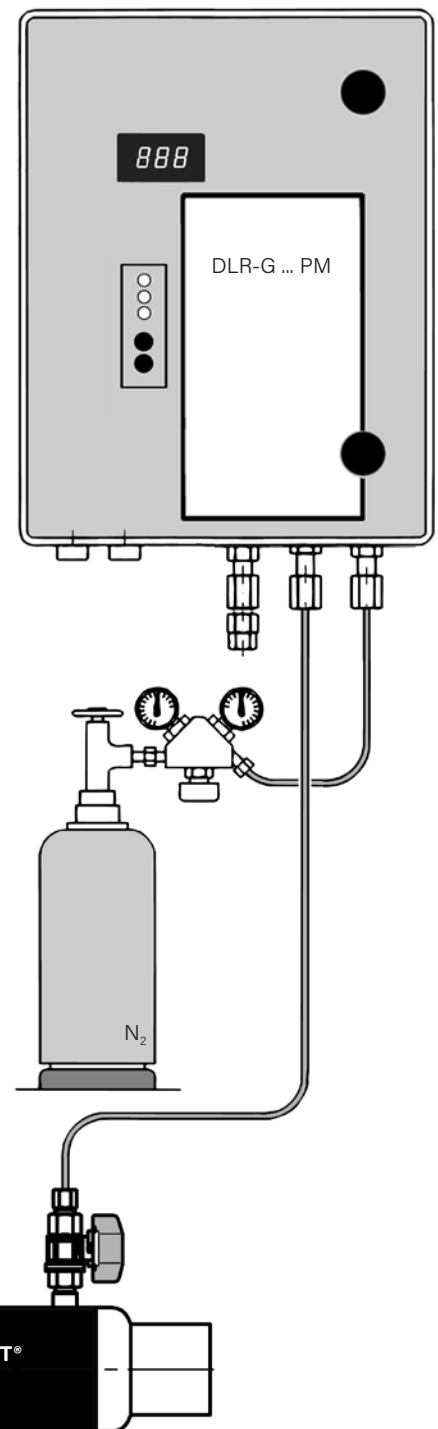
In operating mode M, the monitoring pressure (SET PRESSURE) is generated when the system is switched on just once at the outset by a pressure reservoir connected for the purpose. There is no further pressure-regulated topping up during subsequent operations. A drop in pressure to the predetermined ALARM ON setting due to a leak which triggers the alarm must therefore be compensated by connecting the pressure reservoir until the pressure again reached the SET PRESSURE.

Approval/suitability

All leak detection systems/leak detectors used must comply with the stipulated construction and test principles. Subject to these, all conditions must therefore be taken into account which could influence the functioning or the operating safety of the system.

For this reason the conditions under which the devices can be used are tested by the official testing offices and clearly defined and laid down in the approval documents issued by them.

BRUGG-STAMANT® Safety Piping with leak detection is an approved leak detection system/leak detector.



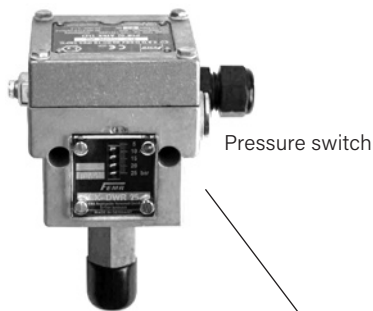
BRUGG-STAMANT® Safety Pipe

Leak detection – special design high pressure

BRUGG-STAMANT® Safety Pipe is a product custom-made for every single project. Consequently also the associated leak detection systems are planned individually and in an economic way for any application.

By use of the vacuum leak detection system a working pressure up to 25 bars with and without explosion protection can be realized.

A positive pressure leak detection system enables pipe systems with feed pressure up to 300 bars to be monitored. These systems are equipped with high-pressure fittings and safety components (spring-loaded valves, blow-out discs, digital pressure switches etc.).



Pressure switch



Leak detector



Spring-loaded valve



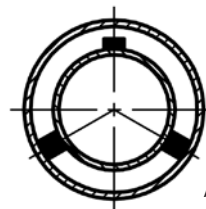
Blow-out disc

BRUGG-STAMANT® Safety Pipe

Excerpt from components list for standard product range

Spacers

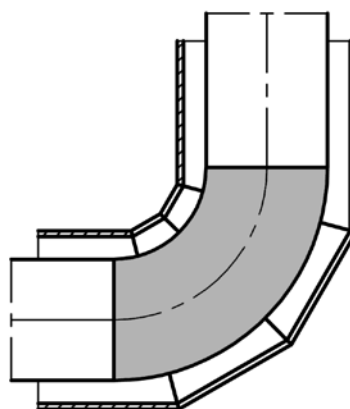
- Axial bearings Acc. to Worksheet SSI 5.10.01
- Guide rails Acc. to Worksheet SSI 5.11.01
- Base plate Acc. to Worksheet SSI 5.12.01



Acc. to Worksheet SSI 4.610

Double-walled elbow

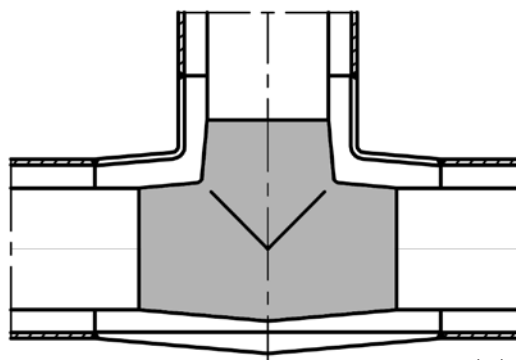
- Concentric curve Acc. to Worksheet SSI 5.03.01
- Outer pipe curve assembled from pipe segments Acc. to Worksheet SSI 5.03.01



Acc. to Worksheet SSI 4.603

Double-walled T-piece

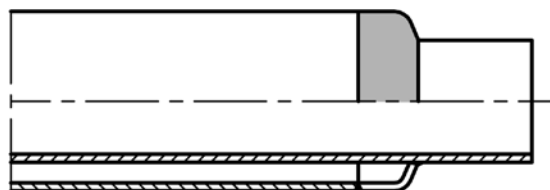
- T-piece acc. to DIN EN 10253 Acc. to Worksheet SSI 5.04.01
- T-piece with saddle connection Acc. to Worksheet SSI 5.04.01
- T-piece with Weldolet Acc. to Worksheet SSI 5.04.01



Acc. to Worksheet SSI 4.604

End seal

- End seal Acc. to Worksheet SSI 5.14.01
- Axial compensator seal Acc. to Worksheet SSI 5.14.01
- Lentiform compensator seal Acc. to Worksheet SSI 5.14.01

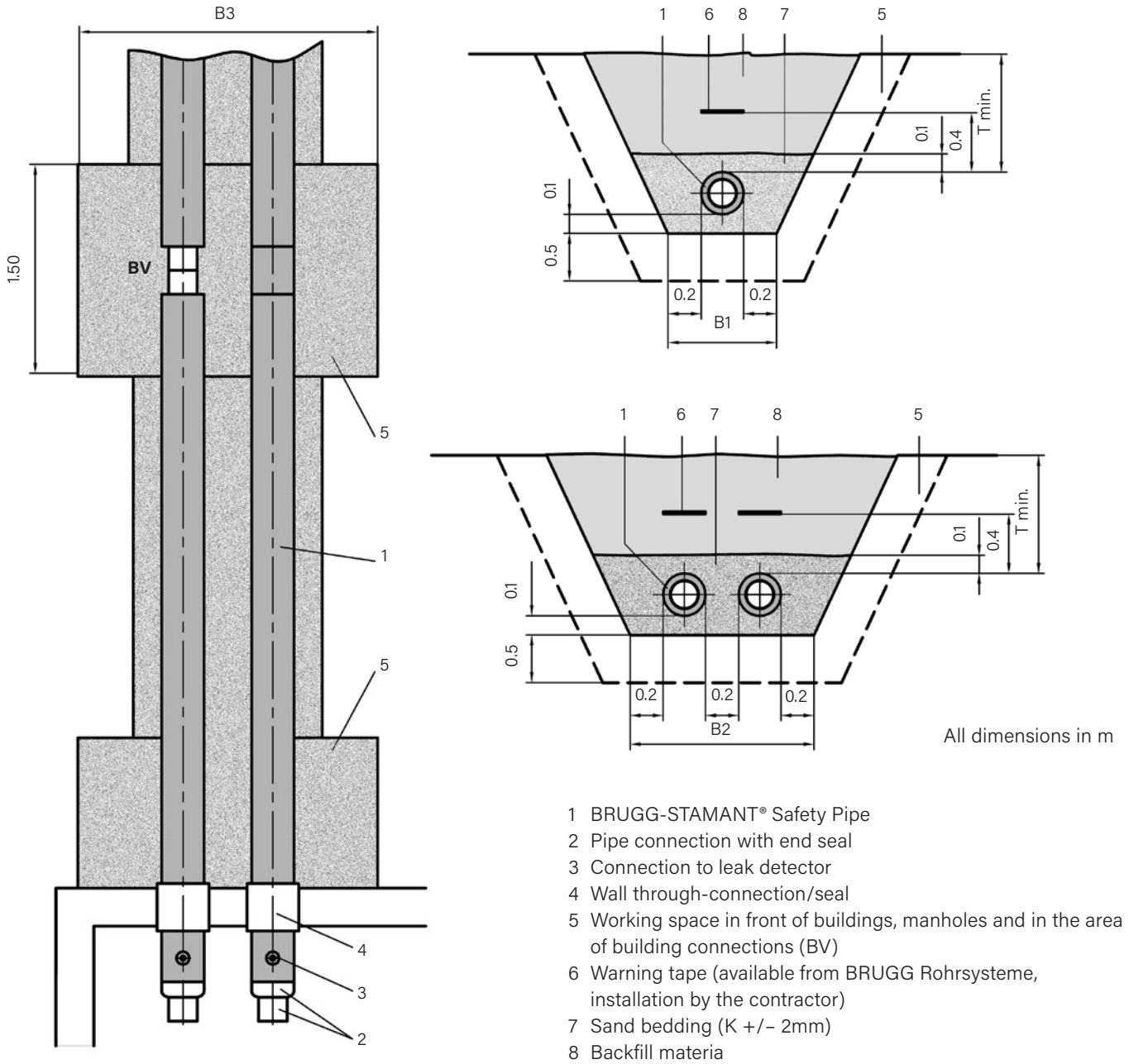


Acc. to Worksheet SSI 4.602

BRUGG-STAMANT® Safety Pipe

Details for underground works

Trench cross-section



The trench width «B» is a recommended value. Please observe all valid technical regulations, guidelines and accident prevention rules.

BRUGG-STAMANT® Safety Pipe	(outer pipe)	DN 65	DN 80	DN 100	DN 150	DN 200	DN 300	DN 400	DN 500	DN 600	
min. outer diameter	d (mm)	77.9	90.7	116.3	170.3	221.1	326.1	408.6	510.5	612.1	
min. cover t at SLW 60	(m)	min. 0.90									
min. cover t at SLW 30	(m)	min. 0.75									
trench width	B1 (m)	0.48	0.49	0.52	0.57	0.62	0.73	0.81	0.91	1.02	
trench width	B2 (m)	0.76	0.78	0.84	0.94	1.04	1.25	1.42	1.62	1.83	
front trench width	B3 (m)	1.56	1.58	1.64	1.74	1.84	2.05	2.22	2.42	2.63	

BRUGG-STAMANT® Safety Pipe

40 years of know-how

BRUGG-STAMANT® safety piping as a connection line from the SLOVNAFT refinery to the Horny Hricov Terminal, Slovakia



“We got the contract for the SLOVNAFT project because of already existing know-how and it was an important reference in the Slovak Republic. Thanks to this reference our companies delivered a further 811 m of BRUGG-STAMANT® safety piping in 2010 for the project “Port on the Danube” in Bratislava. With the need for retrofitting equipment, two more projects are expected on top of this within the next three years.”



Miroslav Tomsik
CHEMPROCES GmbH

The rebuilding of the Horny Hricov Terminal has been under discussion since 1997, when the first studies on re-routing the piping from the upper to the lower plant of SLOVNAFT were carried out. The lower SLOVNAFT plant in the Horny Hricov Terminal served as a distribution centre for petrol stations in Central and Eastern Slovakia, while the upper plant was used as the state material reserve. Following a number of changes in the SLOVNAFT refinery, the

Fitting the external protective sheathing to the BRUGG-STAMANT® safety piping



Horny Hricov Terminal was re-evaluated as the storage facility of the state material reserves of the Slovak Republic. The necessity to re-route the piping between the two plants resulted from the extension of the motorway from Bratislava in the West to Kosice in the East. This motorway ran over the piping connecting the two plants. In order not to hinder operations it was necessary to re-route the piping so that the motorway routing would not have to be taken into consideration in the event of reconstruction work being needed.

This project was supposed to have been realized in 1989, but due to political changes and the current financial structures the building of the motorway was delayed. The project was postponed and the contract between the general contractor DOPRASTAV AG (one of the three biggest construction companies in Slovakia) and CHEMPROCES GmbH was only signed in May 2006.

Even before the contract was concluded CHEMPROCES had already solved all the technical and commercial is-

The pipe routing with fixed anchor point



Laying the piping using heavy machinery



BRUGG-STAMANT® Safety Pipe

sues connected with the project together with BRUGG Rohrsysteme. Consultations were also held in Wunstorf with the general project leader. Double-walled BRUGG-STAMANT® safety piping including leak detection monitoring as well as single-walled steel piping was chosen for use in this project.

The project for the piping connecting SLOVNAFT with the Horny Hricov Terminal consists of 13 lines of BRUGG-STAMANT® double-walled safety piping laid below the surface. The investor made it a condition that all the piping

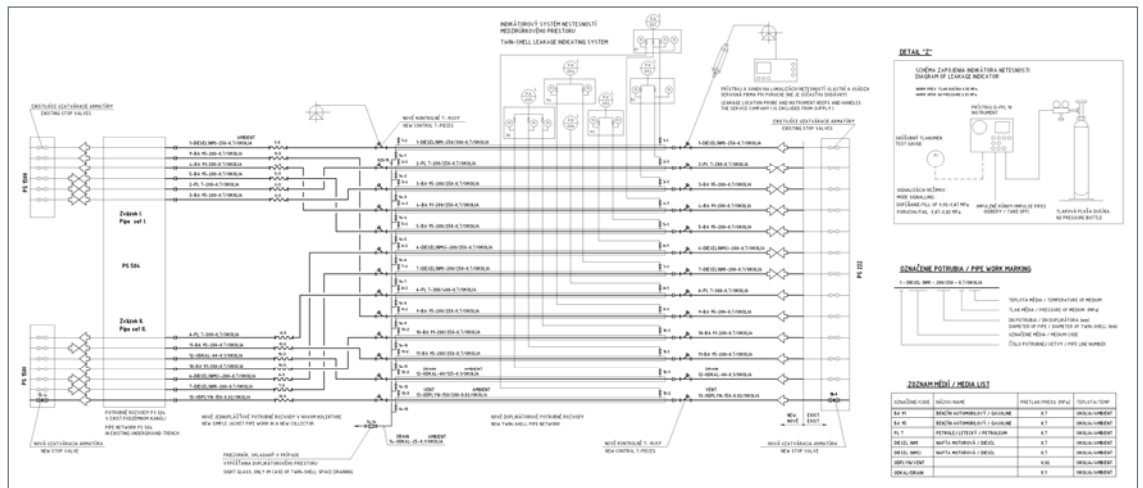
should be delivered by a single supplier. That is why BRUGG also supplied the single-walled pipes which were fitted on the consoles in the concrete collector. 4,446 m of double-walled piping and 1,611 m of single-walled piping were supplied, with dimensions ranging from DN 80 to DN 300. Transport media are petrol, crude oil and gas. DLR-G 8 S positive pressure leak detectors are used.

The bedding of the piping proved a rather complicated affair. The pipes had to be laid on a steeply sloping bed with a

high ground water level. To secure the pipes, two massive concrete foundations were therefore constructed as anchor points to prevent any slippage of the piping.

Installation work started in September 2006 and was successfully completed in May 2007. Presently the piping has been in service for over three years.

Laying plan with leak detection system



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

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

Company: _____

Contact person: _____

Telephone: _____

E-mail: _____

Street/No.: _____

Postcode/Town: _____

Company stamp



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