

# FLEXWELL® safety pipe

## Systems description



Industry

**BRUGG**  
Rohrsysteme

### FLEXWELL Safety Pipe

FLEXWELL Safety Pipe is a coaxial double-walled, flexible and endless piping system supplied ex works coiled on reels. It is designed for permanent leak monitoring and approved for the transport of water pollutant, hazardous and flammable products. It is available in sizes from DN 15 to DN 150 with pressure ratings up to PN 25.

#### Leak monitoring

The annular gap between the primary and outer containment pipes forms a surveillance space which enables permanent leak monitoring by approved leak detectors working on the vacuum or positive pressure principle.

#### Type approval

FLEXWELL Safety Pipe with leak monitoring is a recognized leak detection system within German regulations.

There a leak detection system is defined as all the equipment necessary for the detection of leaks (the monitoring space, the leak alarm, double-walled piping system, leak detection medium)

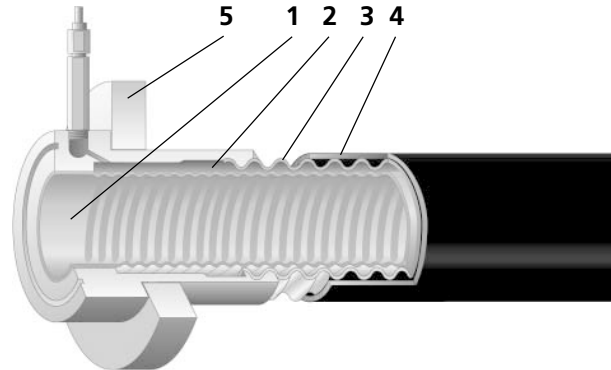
#### Legal basis

- environmental legislation and water protection requirements
- European standards for leak detection systems
- Product is in compliance with all German environmental and water purity legislation as well as
- constructional regulations and industrial safety acts in respect of fire and explosion prevention.

The operation of this system complies with the highest European safety level. Systems of this class show a leak either above or below the fluid surface in double-walled safety systems. They are constructed for safety and ensure that no leaking product can escape into the environment.

#### Laying and installation

- above and below ground
- can be laid as a continuous length direct from the drum/coil into the trench or onto the pipework trestles
- fast and simple to lay from A to B
- short installation times
- no welding necessary along pipe route
- during laying no construction or pressure tests needed
- no field joints needed, bendable



#### Construction of FLEXWELL Safety Pipe

- 1 primary pipe (copper, stainless steel, thermo plastics)
- 2 surveillance space
- 3 outer containment pipe
- 4 corrosion-proofing
- 5 connecting joint

- changes of direction are taken up by the flexible pipe system
- highly effective corrosion-proofing along the entire length
- high degree of corrosion safety
- acceptance test only after complete laying/ installation by function testing of the leak detection system
- installation/laying carried out by trained and licensed contractors
- support from BRUGG installation and service organization

#### Advantages of the system

- planning security through type-approved system
- lengths up to 500m available
- clearly defined procedures for approval, acceptance and operational readiness of
- your installation
- ex works system with all necessary expertises, test and quality control documentation



Quality, process, pressure and material testing are carried out by qualified independent test institutes and our internal quality control department as required by the compliance certification.

The FLEXWELL Safety Pipe System is a family of pipework assemblies supplied in "endless" lengths, capable of leak-monitoring and suitable for the transport of water pollutant, flammable/non-

flammable or otherwise hazardous fluids and gases. The system is supplied with all components for installation of the piping and a complete range of leak detection equipment.



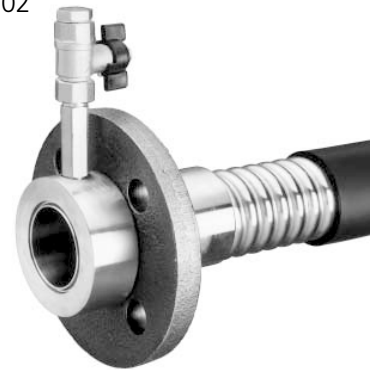
**FLEXWELL Safety Pipe**  
DN-15 with **smooth-bore copper primary pipe** and corrugated copper outer containment pipe  
Worksheet FSR 1.03.01



**FLEXWELL Safety Pipe**  
DN 25 - DN 100, except DN 40 with **corrugated stainless steel primary pipe** and corrugated steel outer containment pipe  
Worksheet FSR 1.03.02



**FLEXWELL Safety Pipe**  
DN 20 - DN 150 with **thermoplastic primary pipe** and corrugated steel outer containment pipe (only on request)  
Consisting of a primary pipe, reinforcing bands, a corrugated outer containment pipe, a surveillance space, a double layer of BRUGG bitumen and a polyethylene jacket as external corrosion-proofing. Refer to the separate and special documentation covering technical details of this variant !



**FLEXWELL Safety Pipe Components**  
**f. i.: Connecting joints**  
Worksheet FSR 5.01.01-5-01-11



**FLEXWELL Safety Pipe**  
DN 25 - DN 80 with **corrugated copper primary pipe** and corrugated steel outer containment pipe  
Worksheet FSR 1.03.01

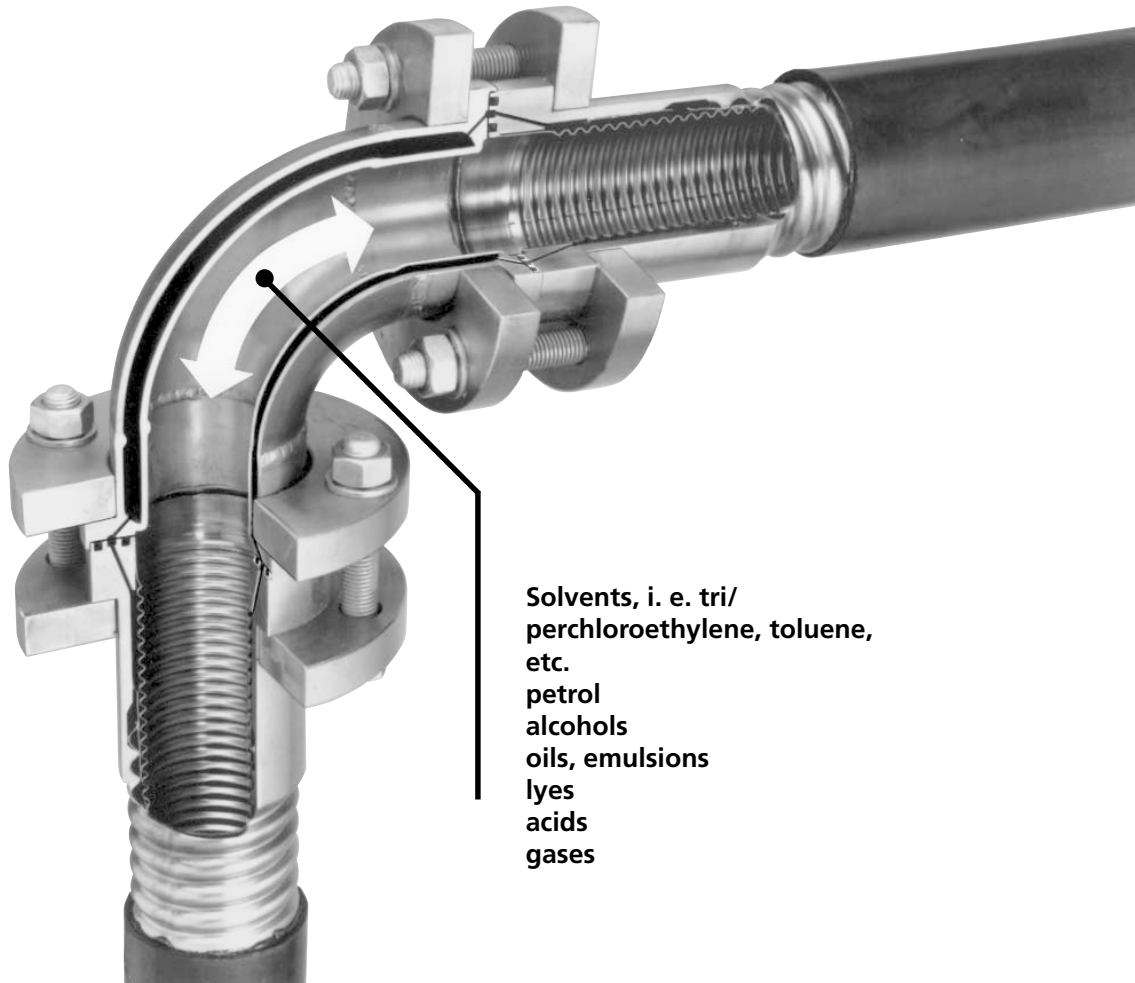
Important data sheets for FLEXWELL Safety Pipes:

- head loss diagrams:  
Worksheets FSR 4.01.01 - 4.02.04
- Details for underground installation:  
Worksheet FSR 7.02.01
- Wall and manhole entry:  
Worksheets FSR 7.03.02 - 7.04.01



**Leak monitoring for FLEXWELL Safety Pipe**  
Worksheets LDS 6.01.01 - 6.11.04

**Flanged pipe fitting with monitored gasket seals**  
**for the transport of hazardous substances**



The safe transport of hazardous substances makes continually growing demands on the constructors of fuel depots and industrial plants. In order to optimize the use of FLEXWELL safety piping, which already offers a high level of safety anyway due to its double-walled construction, special flanged pipe connections, elbows, T-pieces and through-connections with monitored gasket seals are available. They can be integrated into the leak monitoring system so that permanent, uninterrupted monitoring of the entire pipe system from the tank to the user becomes possible.

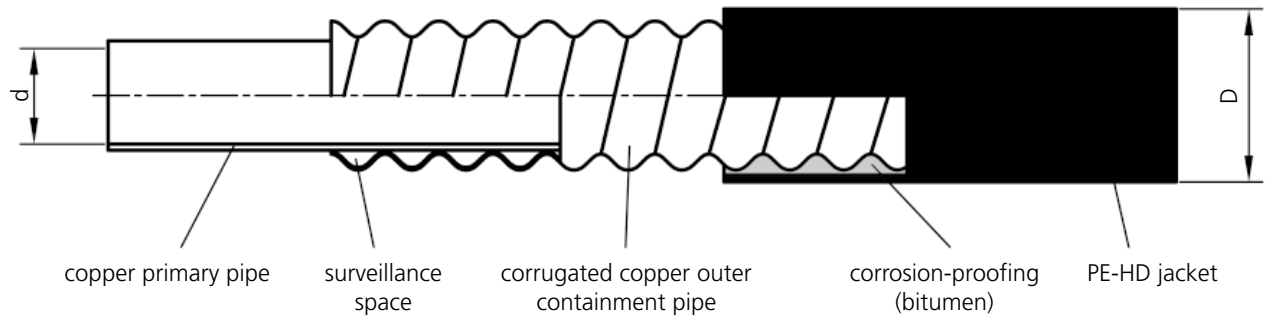
These double-walled and monitored fittings must be located where they are clearly visible. It is not permitted to install flanged fittings below ground.

The principle of monitoring gasket seals consists in having a radial groove extending full circle over the sealing surface of the flanged fitting that connects via a drilled port hole to the surveillance space of the safety pipe.

The complete system comprises the double-walled, flexible FLEXWELL Safety Pipe, the monitored pipe fittings and the leak monitoring system.

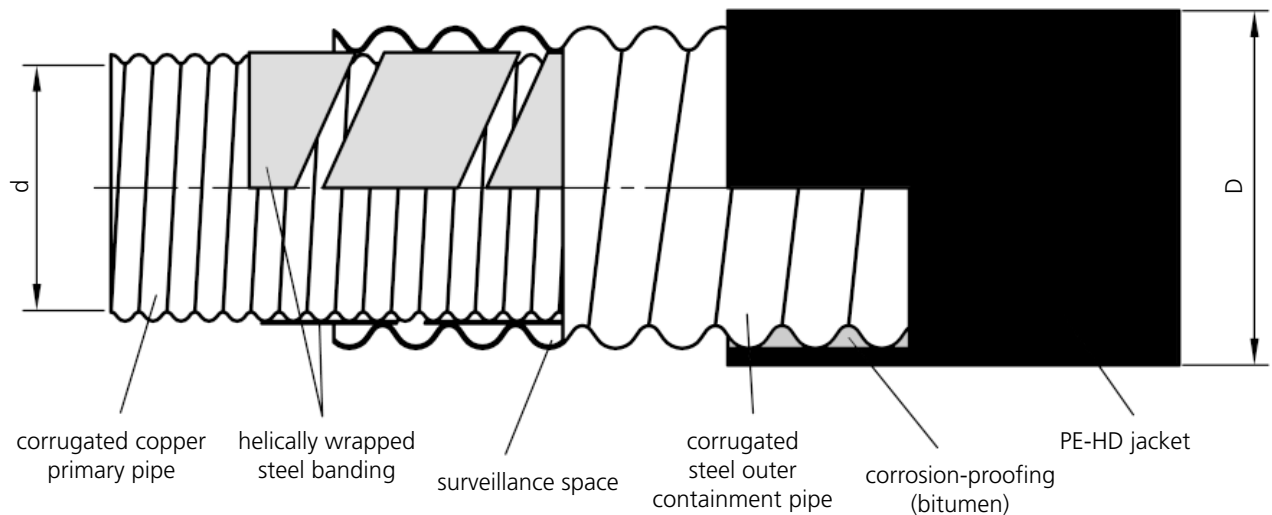
Due to the flexibility of the pipe, the use of elbow fittings is unnecessary within certain bending radii, and the entire pipe length can be laid in one piece.

### 1. FLEXWELL Safety Pipe with smooth-bore copper primary pipe



type	DN	PN	d mm	D mm	wall of PE-HD jacket mm	internal volume primary pipe l/m	surveillance space l/m	weight kg/m	bending radius cm	article No.
<b>FSR 16/30</b>	15	25	16	30	1.5	0.2	0.12	1.0	30	821 003 90

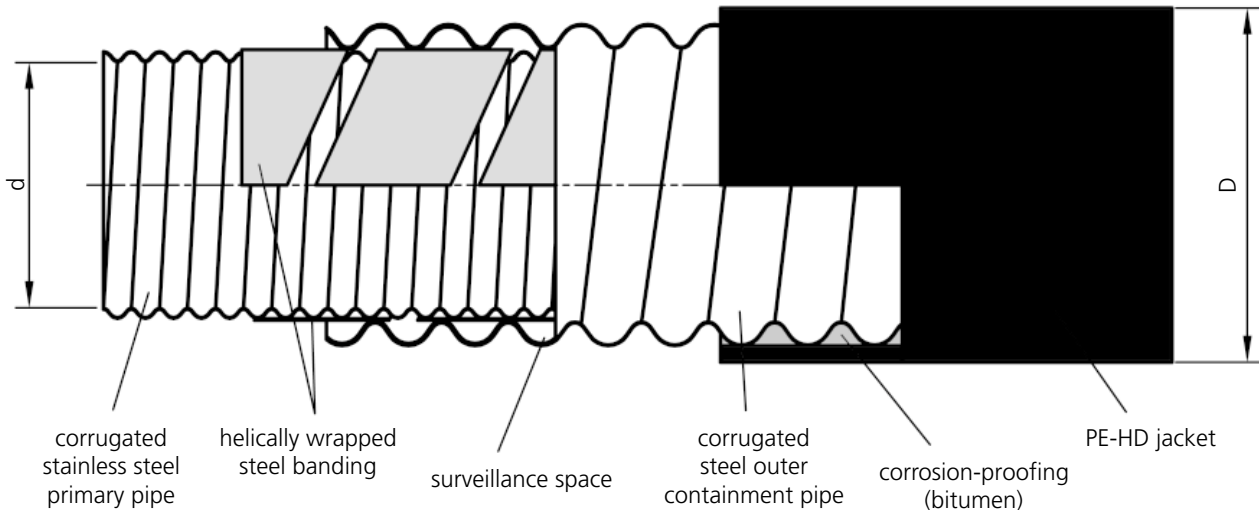
### 2. FLEXWELL Safety Pipe with corrugated copper primary pipe



type	DN	PN	d mm	D mm	wall of PE-HD jacket mm	internal volume primary pipe l/m	surveillance space l/m	weight kg/m	bending radius cm	article No.
<b>FSR 30/48</b>	25	25	30	48	2	0.8	0,38	1.9	50	821 005 90
<b>FSR 39/60</b>	32	25	39	60	2	1.3	0.41	2.3	60	821 006 90
<b>FSR 48/71</b>	40	25	48	71	2	2	0.65	3.8	60	821 004 90
<b>FSR 60/83</b>	50	25	60	83	2.5	3	0.73	4.8	70	821 007 90
<b>FSR 83/120</b>	80	16	83	120	3	6	2	9.2	100	821 009 90



**3. FLEXWELL Safety Pipe with corrugated stainless steel primary pipe**  
**Material No. 1.4571 and 1.4539**



**Primary pipe: Material No. 1.4571**

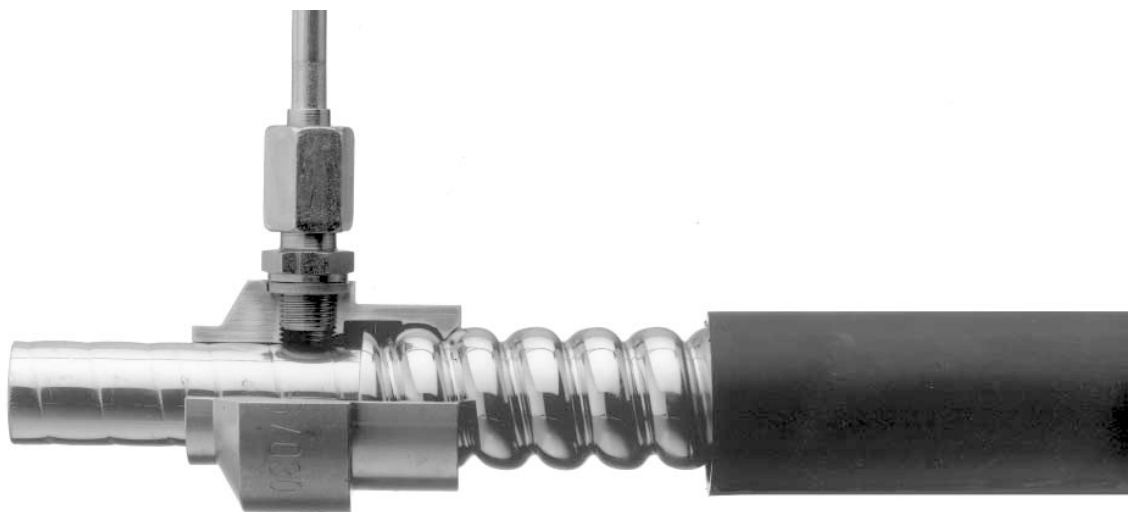
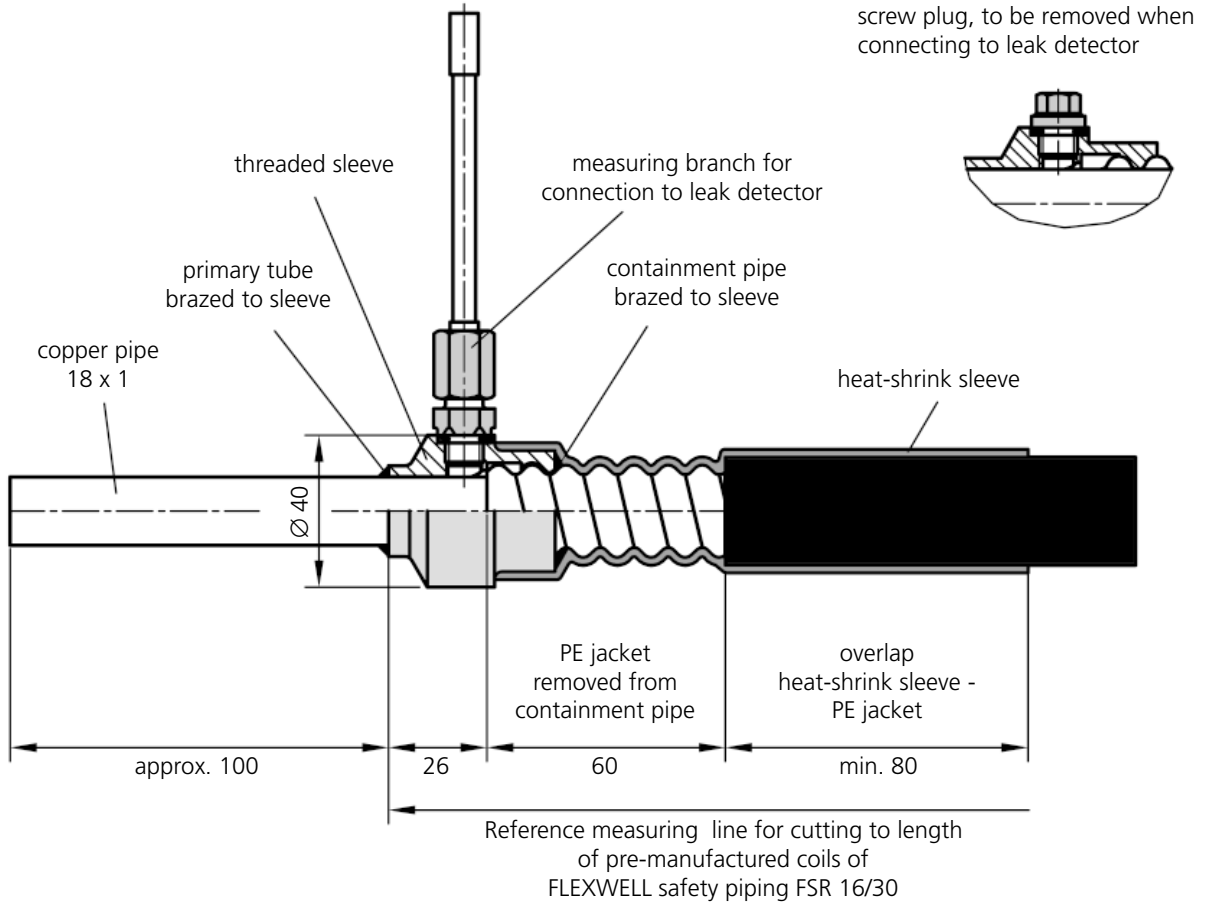
type	DN	PN	d	D	wall of PE-HD jacket mm	internal volume		weight kg/m	bending radius cm	article No.
			mm	mm		primary pipe l/m	surveillance space l/m			
FSR 30/48	25	25	30	48	2	0,8	0,38	1,8	50	821 105 91
FSR 39/60	32	25	39	60	2	1,3	0,41	2,4	60	821 106 91
FSR 60/83	50	25	60	83	2,5	3	0,73	4,8	70	821 107 91
FSR 83/120	80	25	83	120	3	6	2	9,2	100	821 109 91
FSR 127/175	100	25	127	175	4	14	4	18,4	150	821 110 91

**Primary pipe: Material No. 1.4539**

type	DN	PN	d	D	wall of PE-HD jacket mm	internal volume		weight kg/m	bending radius cm	article No.
			mm	mm		primary pipe l/m	surveillance space l/m			
FSR 30/48	25	25	30	48	2	0,8	0,38	1,8	50	821 105 95
FSR 39/60	32	25	39	60	2	1,3	0,41	2,4	60	821 106 95
FSR 60/83	50	25	60	83	2,5	3	0,73	4,8	70	821 107 95

Other materials for primary and outer containment pipe available on request.

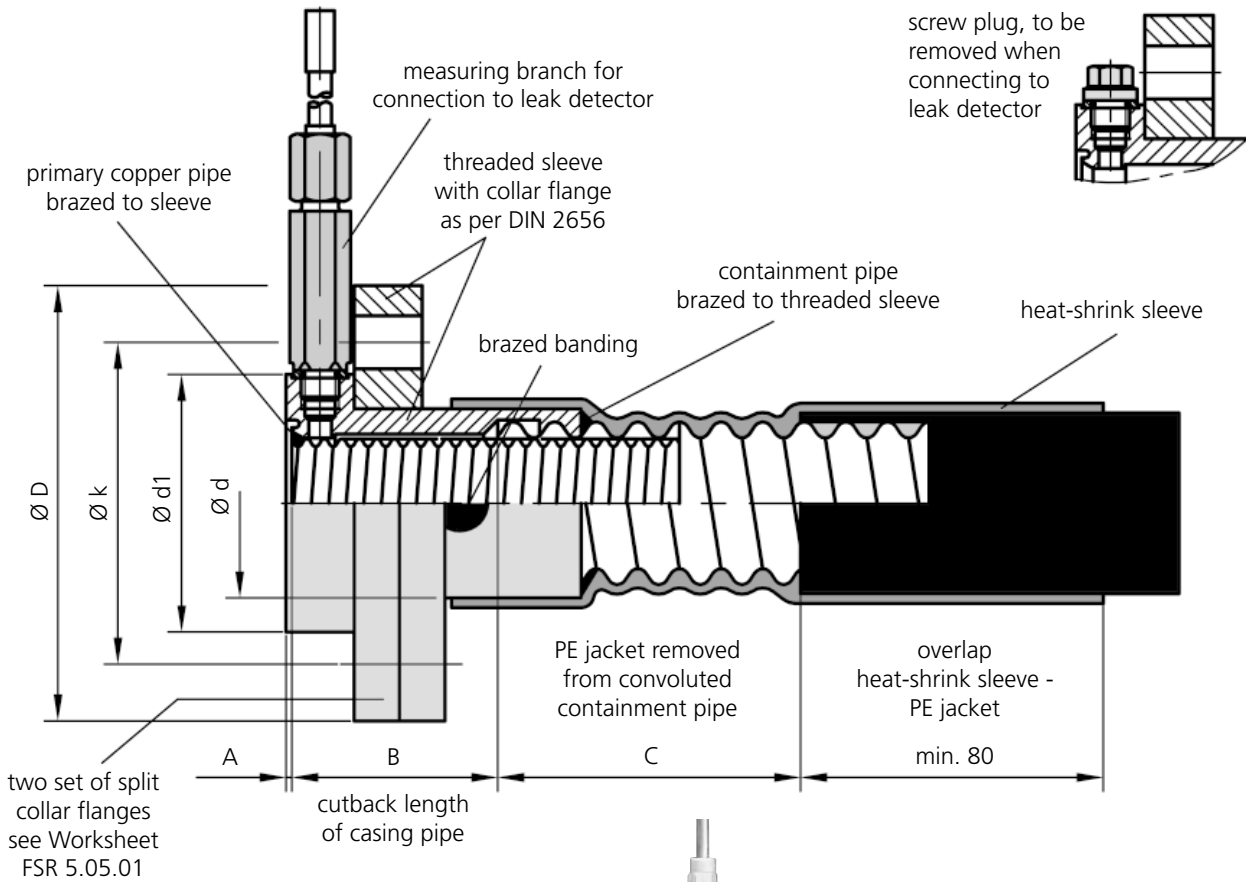
**FSR 16/30**



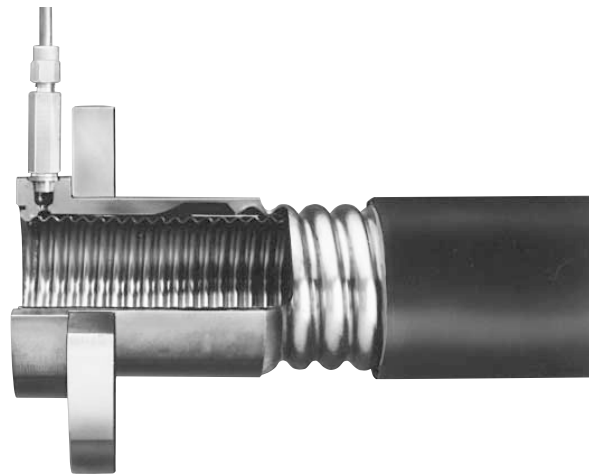
**Material: threaded sleeve made of brass**

**Warning: Only brazing materials approved by BRUGG may be used.**

For installing the connection: see Installation Instructions FSR 8.03.01 - FSR 8.03.02



**Material:**  
**Threaded sleeve made of steel R-St 37.0 acc. DIN 1629**  
**Collar flange and split collar flanges made of steel USt 37-2acc. DIN 17100, hot-dipped galvanized**

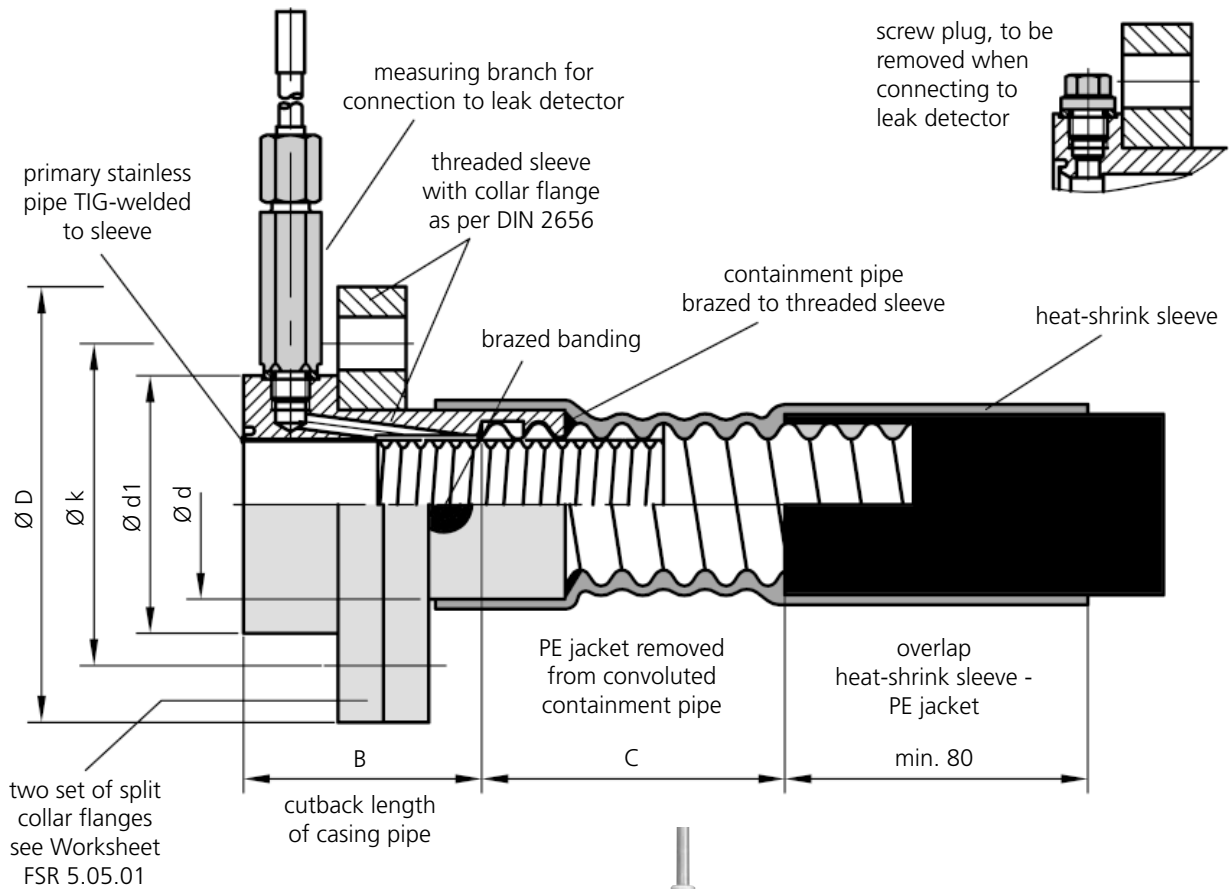
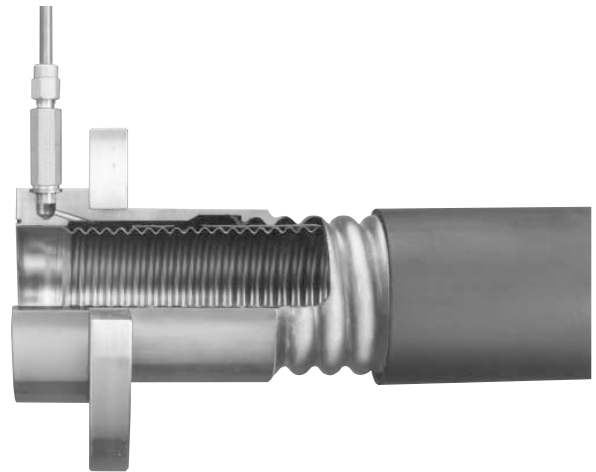


type	DN	d mm	d1 mm	flange acc. DIN 2656				A mm	B mm	C mm	article No. collar flange	article No. split collar flange	
				DN	D mm	ø k mm	bolts* No. off						
<b>FSR 30/48</b>	25	50	68	25	115	85	M12 x 75	4	1.5	55	80	829 355 90	829 355 50
<b>FSR 39/60</b>	32	60	78	32	140	100	M16 x 80	4	1.5	54	80	829 356 90	829 356 50
<b>FSR 48/71</b>	40	70	88	40	150	110	M16 x 80	4	1.5	51	80	829 354 90	829 354 50
<b>FSR 60/83</b>	50	84	102	50	165	125	M16 x 85	4	1.5	49	100	829 357 90	829 357 50
<b>FSR 83/120</b>	80	120	138	80	200	160	M16 x 90	8	1.5	54	100	829 359 90	829 359 50

\* The lengths of bolts shown in table above are intended for bolting to a standard welding neck flange acc. to DIN 2635. For the double set of split flanges use bolts 10 mm longer. Bolts and nuts are not included in the set supplied.

**Warning: Only brazing materials approved by BRUGG may be used.**  
 For installing the connection: see Installation Instructions FSR 8.04.01 - FSR 8.04.05



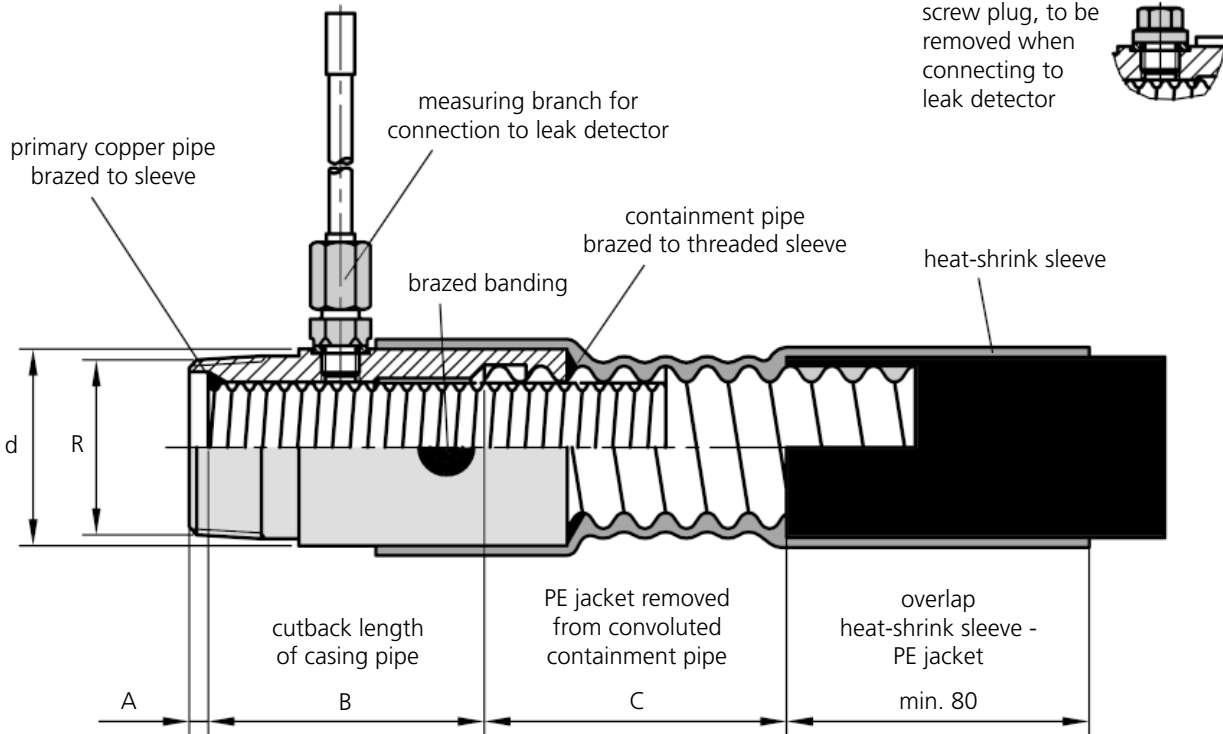

**Material:**
**DN 25, DN 32 and DN 50: Threaded sleeve**
**made of Mat. No. 1.4571, 1.4539 acc. to DIN 17440.**
**DN 80 and DN 100: Threaded sleeve of**
**Mat. No. R-St 37.0 + 1.4571.**
**Choice of material acc. to primary pipe material of the FLEXWELL Safety Pipe.**
**Collar flange and split collar flanges made of steel USt 37-2 acc. DIN 17100, hot-dipped galvanized.**


Type	DN	d	d1	Flange acc. DIN 2656				B	C	Article No. 1.4571	Article No. 1.4571	Article No. 1.4539	Article No. 1.4539	
				DN	D	ø k	screws* no.							slide-on flange
FSR 30/48	25	50	68	25	115	85	M12 x 85	4	63	80	829 355 91	829 355 51	829 345 91	829 345 51
FSR 39/60	32	60	78	32	140	100	M16 x 90	4	62	80	829 356 91	829 356 51	829 346 91	829 346 51
FSR 60/83	50	84	102	50	165	125	M16 x 95	4	62	100	829 357 91	829 357 51	829 347 91	829 347 51
FSR 83/120	80	120	138	80	200	160	M16 x 110	8	72	100	829 359 91	829 359 51	-	-
FSR 127/175	100	172	190	125	270	220	M24 x 120	8	74	130	829 360 91	829 360 51	-	-

\* The lengths of bolts shown in table above are intended for bolting to a standard welding neck flange acc. to DIN 2635. For the double set of split flanges use bolts 10 mm longer. Bolts and nuts are not included in the set supplied.

**Warning: Only brazing materials approved by BRUGG may be used.**

For installing the connection: see Installation Instructions FSR 8.05.01 - FSR 8.05.06



**Material:**  
Threaded sleeve made of steel R-St 37.0 acc. DIN 1629

type	DN	Connection		d mm	A mm	B mm	C mm	article No.
		Whitworth - pipe thread	DN					
FSR 30/48	25	R 1 1/2	40	52	5	73	80	829 353 93
FSR 39/60	32	R 2	50	65	5	72	80	829 354 93
FSR 48/71	40	R 2 1/2	65	76	5	79	80	829 355 93
FSR 60/83	50	R 2 1/2	65	85	5	87	100	829 356 93

**Warning: Only brazing materials approved by BRUGG may be used.**  
For installing the connection: see Installation Instructions FSR 8.04.01 - FSR 8.04.05

### Leak monitoring

FLEXWELL 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 transported product 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 emitted by acoustic and optical signals.

#### Definition of leak detection equipment/ leak detector

“Leak detection equipment/leak detector” according to the currently valid German 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 pollutant, 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 (UR) and leak detector (LAZ)  
 double-walled piping  
 the surveillance space (UR)  
 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.

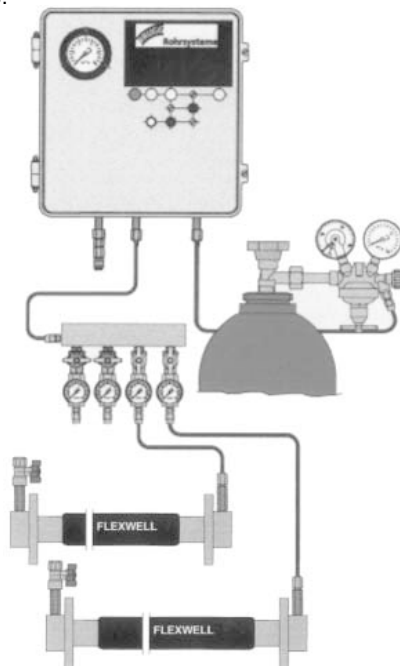
#### Leak detection equipment/leak detector (LAZ)

There are two types of differential pressure leak detection equipment to detect leaks in double-walled piping:

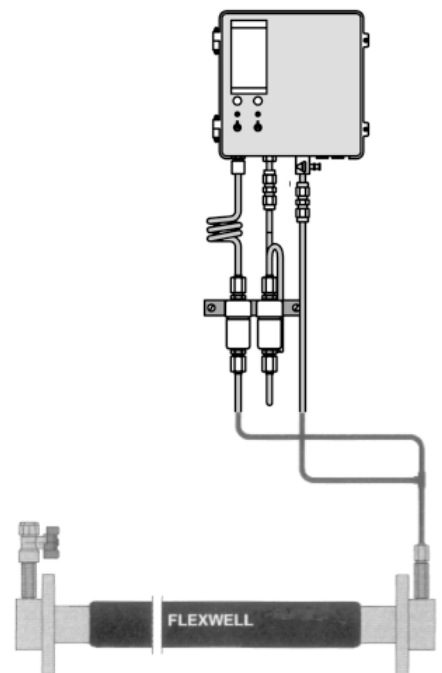
- Leak detection by vacuum
- Leak detection by pressurized inert gas

FLEXWELL Safety Pipe with a vacuum leak detector:  
Worksheets LDS 6.03.01 – 6.03...

FLEXWELL Safety Pipe with a positive-pressure leak detector: Worksheet LDS 6.07.01 - 6.07....  
LDS 6.14.01 - 6.14...  
LDS 6.15.01 - 6.15....



FLEXWELL  
Safety Pipe with  
pressurized gas  
leak monitoring



FLEXWELL  
Safety Pipe with  
vacuum leak  
monitoring

**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.

FLEXWELL Safety Pipe with leak monitoring is an approved leak detection equipment/leak detector system.

**The advantages of the system**

Using double-walled FLEXWELL Safety Pipe 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.

### Vacuum leak detection

The leak detector Type VL-HFw2 working on the vacuum principle is suitable for monitoring FLEXWELL Safety Pipes for the transport of:

- flammable, water pollutant substances of the Class AIII ( e.g. heating oil, diesel fuel)
- non-flammable, water pollutant substances.



Vacuum leak detection, horizontal pipe installation, single-line system see LDS 6.03.11

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

#### Technical basis

Due to the laws of physics the use of the leak detection device is limited to defined maximum lengths of pipe. These depend on the diameter of the FLEXWELL Safety Pipe used and the type of installation.

Types of installations and maximum lengths of pipes are set out in Worksheets LDS 6.03.11 - 6.03.16

Devices approved for use up to a max. operating pressure in the operating pipe of :

Type VL-HFw2 up to max. 4 bar\*

Worksheets LDS 6.03. ...

Type VL-HFw2/20 up to max. 20 bar\*

Worksheets LDS 6.03 ...

\* above atmospheric pressure

### Principles of functioning

The vacuum pump installed inside the leak detector lowers the air pressure within the surveillance space a set value below atmospheric pressure. 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, the optical and acoustic alarm is triggered.

Minimal, unavoidable pressure decay (not real leaks) is regulated automatically without triggering an alarm if pressure fluctuates between the set upper and lower limits of the monitoring vacuum pressure. Eventually necessary evacuation is carried out by the vacuum pump inside the leak detector subsequently.

Switching values of the leak detector  
 pump „off“:  $520 \pm 20$  mbar\*  
 pump „on“:  $460 \pm 20$  mbar\*  
 alarm „on“:  $420 \pm 10$  mbar\*  
 \* below atmospheric pressure

Leak detector in protective housing



### Notes on the installation of the leak detector

The leak detector may not be installed in hazardous areas.

Wherever possible, the leak detector should be installed in an enclosed, dry space.

If it is installed outside, the leak detector should be enclosed in a weatherproof protective housing.

### Installation/Commencement of operations/ Operation/Function testing

Detailed descriptions are documented in the approval certification of the leak detector Type VL-HFw2 and the worksheets for FLEXWELL Safety Piping.

The conditions set out in the approval certification for FLEXWELL Safety Piping and the leak detector Type VL-HFw2 must be complied with.



The pneumatic suction and measuring lines (copper tubing 6 x 1 mm) of the leak detector are joined by means of a lap solder T-fitting and connected to the collar sleeve of the FLEXWELL connection AV by a

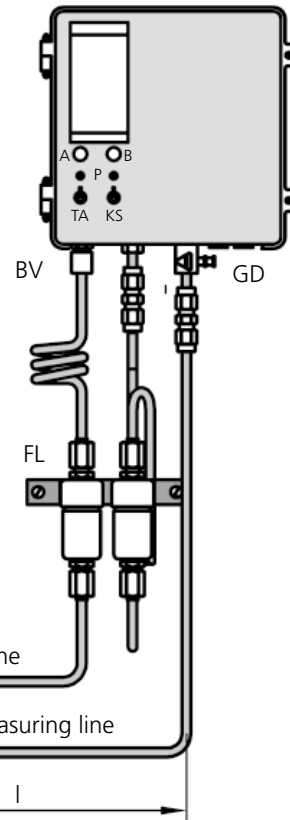
measuring branch MA. The test valve PV must be installed at the far end of the pipe similarly.

**length of pipe L max**

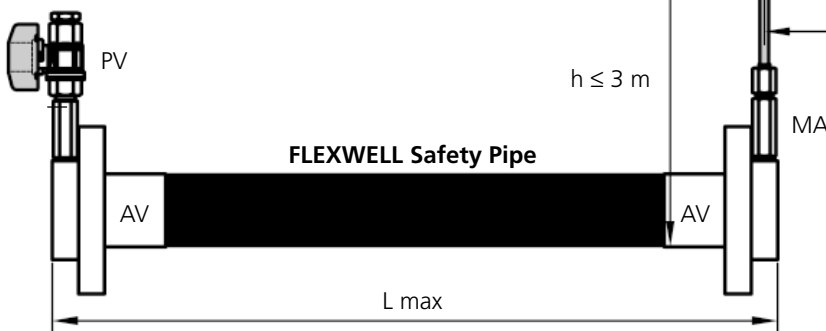
that can be monitored in single-pipe system

DN	L max
15	20 m
25	40 m
32	50 m
40	60 m
50	65 m
80	150 m
100	180 m

**Vacuum leak detector  
Type VL-HFw2  
08 PTB Nr. III B/S 1237**



- BV vent valve
- GD three-way valve
- FL fluid trap valve
- MA measuring branch
- AV connecting joint
- PV test valve
- A "Alarm" lamp
- B "In operation" lamp
- TA toggle switch (sound off)
- KS toggle switch (vacuum pump)
- P screws wired with seal tag



**Warning!**

At least 50 % of the total length of the pipework must be horizontally positioned. The value of (h) shown above, as the geodetic gradient between the

lowest point of the pipework and the T-piece of the monitoring system, must not be exceeded.

Here a typical BOQ for an example order:

- 1 off FLEXWELL Safety Pipe, size: ..... lin. m .....
- 2 off AV, size: .....
- 1 off MA
- 1 off PV

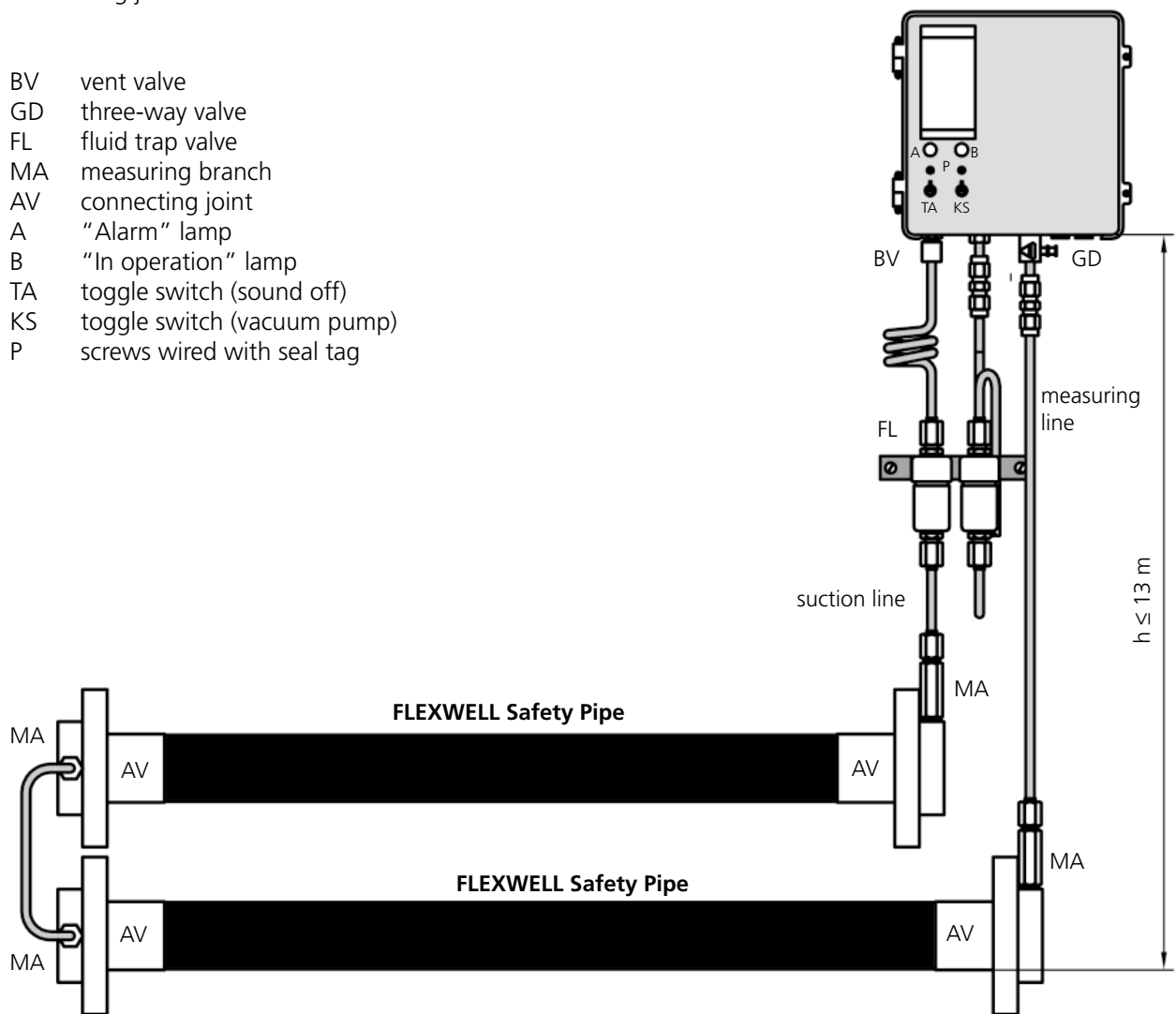
- 1 off VL-HFw2 incl. 1 pair of FI
- 1 off copper-T-piece 6 mm
- copper tubing 6 x 1 mm, lin. m .....

The surveillance spaces of the FLEXWELL Safety Pipes are switched in series. The suction line is installed at the beginning and the measuring line at the end of the sequence. The two surveillance spaces of the pipes are connected. All the pneumatic connection lines are made of 6 x 1 mm copper tubing and are connected via the measuring branches MA with the connecting joints AV.

Max. length of pipe that can be monitored:  
L max. = the sum of both lengths of pipe in series  
may not exceed 500 m.

- BV vent valve
- GD three-way valve
- FL fluid trap valve
- MA measuring branch
- AV connecting joint
- A "Alarm" lamp
- B "In operation" lamp
- TA toggle switch (sound off)
- KS toggle switch (vacuum pump)
- P screws wired with seal tag

**Vacuum leak detector  
Type VL-HFw2  
08 PTB Nr. III B/S 1237**



### Warning!

The value of (h) shown above, as the geodetic gradient between the lowest point of the pipework

and the leak detector housing, must not be exceeded.

Here a typical BOQ for an example order:

- |   |              |                                      |
|---|--------------|--------------------------------------|
| 1 off FLEXWELL Safety Pipe, size: ..... | lin. m ..... | 1 off MA                             |
| 1 off FLEXWELL Safety Pipe, size: ..... | lin. m ..... | 1 off VL-HFw2 incl. 1 pair of Fl     |
| 2 off AV,                               | size: .....  | 1 off copper-T-piece 6 mm            |
| 2 off AV,                               | size: .....  | copper tubing 6 x 1 mm, lin. m ..... |

### Pressurized gas leak detection

The pressurized gas leak detector Type D-FFL 10/... is approved as a leak detection device suitable for monitoring FLEXWELL Safety Pipes for the transport of :

- water pollutant, hazardous flammable liquids of the Classes AI, AII, AIII and B.
- water pollutant, hazardous non-flammable liquids.

#### Principles of functioning

The necessary pressure in the surveillance space of the FLEXWELL Safety Pipe depends on the actual operating pressure within the primary pipe. It is set and maintained:

- by topping up from a stationary nitrogen pressure reservoir which is permanently connected with the surveillance space

This mode is hereafter referred to as

#### Operating mode S

- from a mobile pressure reservoir which is only connected when the line is put into operation or during a function test.

This mode is hereafter referred to as

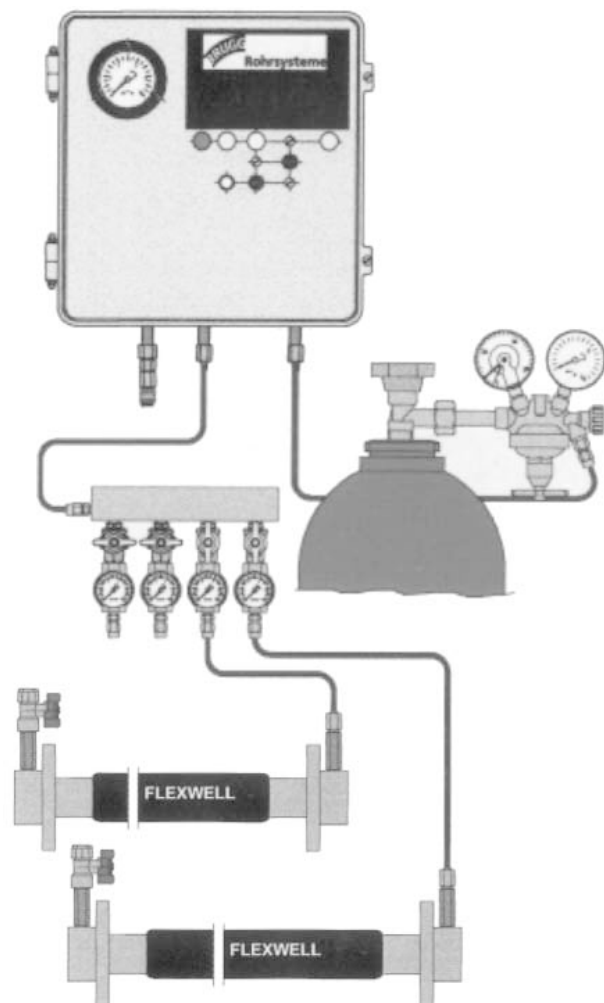
#### Operating mode M

Operating mode S or M may be selected by an operating mode switch installed on the outside of the leak detector.

In both operating modes the surveillance space is connected with the leak detector by copper tubing leads. Surveillance pressure built up is measured by a pressure sensor. If due to a leak the pressure drops to the value set for ALARM ON, an optical and acoustic alarm will be triggered

While in operating mode S the monitoring pressure is regulated and maintained after putting the system into operation by topping up from a stationary nitrogen pressure tank which is permanently connected with the surveillance space and equipped with a pressure reducing valve, operation in mode M differs.

In operating mode M the monitoring pressure (TOP-UP OFF) is set just once when the system is put into operation by a pressure tank which is not permanently connected. No further pressure-regulated topping up is used. Any drop in pressure to the point at which the ALARM is triggered, must therefore be remedied by manually connecting the pressure tank again until the value set as TOP-UP OFF has been reached ( for switching values see Table 1).



Pressurized gas leak monitoring for horizontal and vertical installation of and double and multiple-pipe systems

#### Technical basis

The scope of application of the leak detection device is limited to defined maximum pipe lengths. The leak detector gives the alarm at the latest when the surveillance pressure decays to a pressure differential of less than 1.0 bar above the maximum operating pressure of the supply line (primary pipe).

The differing types of installation are set out in Worksheets LDS 6.07.11 - 6.07.13

#### Installation of the leak detector

The leak detector may not be installed in hazardous areas where there is a danger of explosions. Wherever possible, the leak detector shall be installed in an enclosed, dry space. If it is installed outside, the leak detector shall be enclosed in a weatherproof protective housing

#### Installation/Start up of operations/ Operation/Function testing

Detailed descriptions can be seen from the approval documentation of the leak detector Type D-FFL-10/... and the worksheets for FLEXWELL safety piping.

The conditions set out in the approval for FLEXWELL safety piping and the leak detector Type D-FFL-10/... must be complied with.

**Table 1**

**Surveillance pressure settings (bar\*) relative to the operating pressure of the supply line.**

operating pressure of supply line	pressure in surveillance space				supply pressure at reducing valve**
	alarm		topping up		
	„on“	„off“	„on“	„off“	
≤ 1	2.2	2.6	2.6	3.0	3.5
≤ 3	4.2	4.7	4.7	5.2	5.7
≤ 5	6.2	6.7	6.7	7.2	7.7
≤ 7	8.2	8.7	8.7	9.2	9.7
≤ 10	11.0	12.0	12.0	13.0	14.0
≤ 13	14.0	15.0	15.0	16.0	17.0
≤ 16	17.0	18.0	18.0	19.0	20.0

\* All pressure values in the table below refer to pressures above atmospheric pressure.

\*\* Only pressure reducing valves Type DM (BRUGG Rohrsysteme GmbH) may be used (they are specified in the approval certificates).

The necessary working pressure in the surveillance space is set and maintained by pressure regulation from a stationary pressurized nitrogen tank connected to the surveillance space (operating mode S) or by a mobile pressurized tank which is only connected once when the system is put into operation or when function tests are carried out (operating mode M). All permanently installed pneumatic connecting lines are made using 6 x 1mm copper tubing with flared union connections. A test valve must be installed at one end of the single pipe system.

The leak detector settings are preset at our factory for modes S and M, as well as for the varying operating pressures of the supply lines.

**Max. length of pipe** that can be monitored:  
**L max. = 2000 m** for all sizes

**Operating mode S**

VN flared union top-up lead

**Operating mode M**

KN coupling to top-up lead

VV screwed union

DM pressure reducing valve

FAV tank valve

DS pressure tank

AV connection joint

MA measuring branch

PV test valve

B "in operation" lamp, green

F "fill" lamp, yellow

A "alarm" lamp, red

N "automatic top-up" lamp, yellow

PS screws wired with seal mark

BS operating mode switch

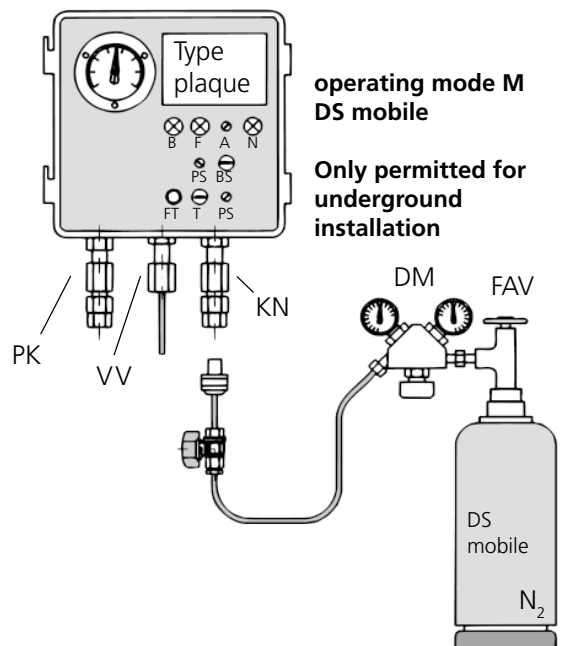
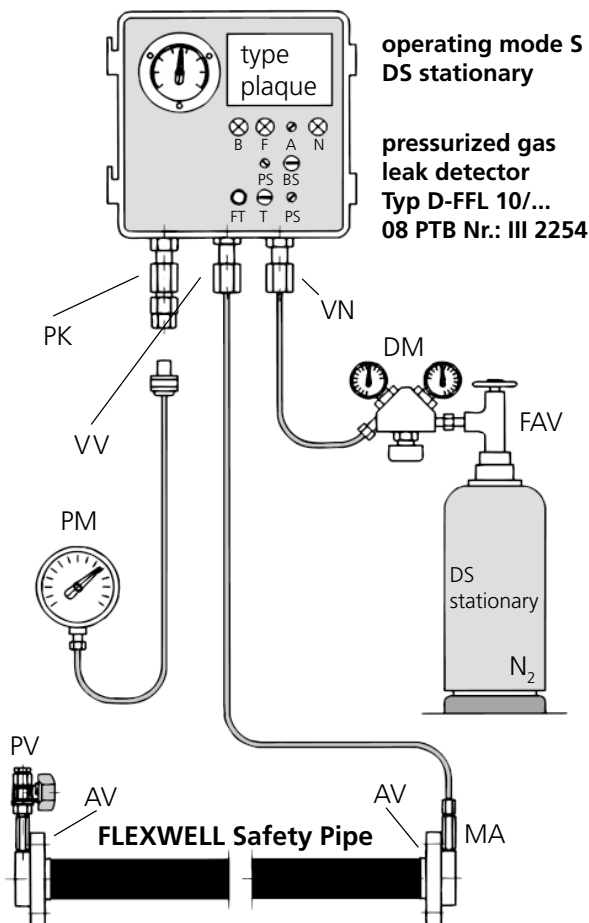
FT "filling" key

T toggle switch (sound off)

PK test coupling

PM test pressure gauge

operating pressure of supply line	type D-FFL
≤ 1 bar	10/1
≤ 3 bar	10/3
≤ 5 bar	10/5
≤ 7 bar	10/7
≤ 10 bar	10/10
≤ 13 bar	10/13
≤ 16 bar	10/16





The functioning principle of the system is essentially the same as for the single-pipe system in Worksheet LDS 6.07.01. The connecting leads made of 6 x 1mm copper tubing are laid from the leak detector to the FLEXWELL Safety Pipes with soldered T-fittings or alternatively via a manifold, Worksheet LDS 6.11.03. The manifold has one entry port and 2 - 8 exit ports. The exit ports can be closed with a ball valve. When set at open, the ball valve must be wired and tagged with a lead seal before commencing operations. One pressure gauge per outgoing port shows the pressure in the FLEXWELL Safety Pipe (ball valve closed) or of the system (ball valve open). A test valve must be installed at the far end of the parallel pipes.

**Max. length of pipe** that can be monitored:  
**L max. = 2000 m** for all sizes

**Operating mode S**

VN flared union top-up lead

**Operating mode M**

KN coupling to top-up lead

VV screwed union

DM pressure reducing valve

FAV tank valve

DS pressure tank

AV connecting joint

MA measuring branch

PV test valve

B "in operation" lamp, green

F "fill" lamp, yellow

A "alarm" lamp, red

N "automatic top-up" lamp, yellow

PS screws wired with seal mark

BS operating mode switch

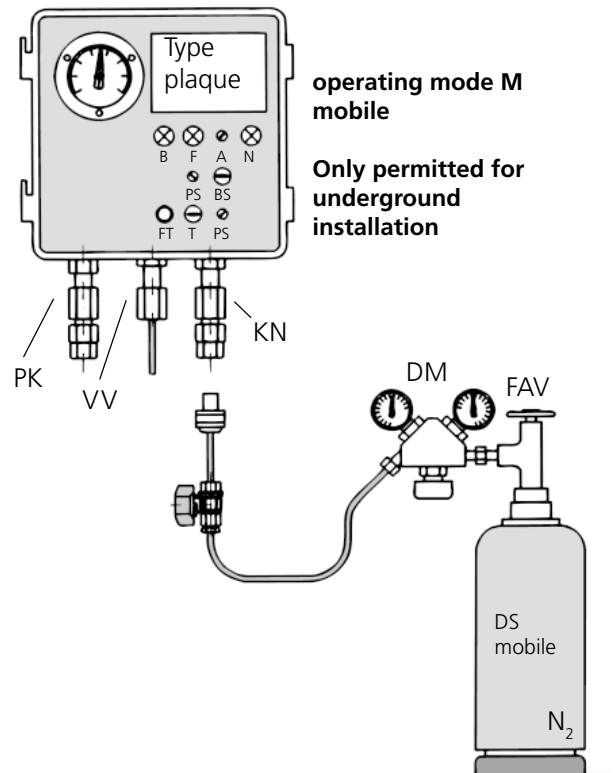
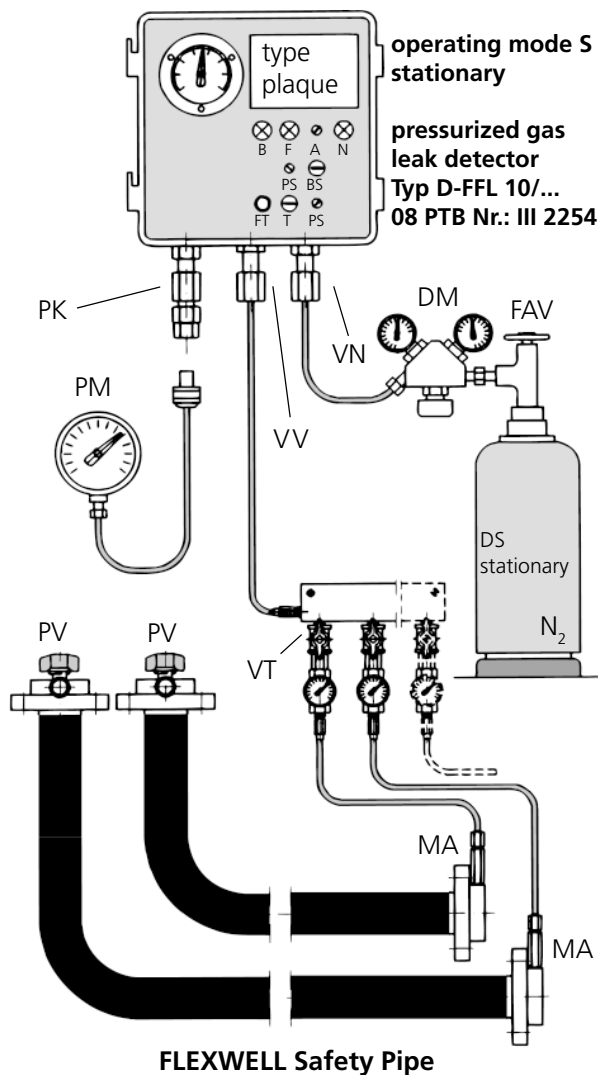
FT "filling" key

T toggle switch (sound off)

PK test coupling

PM test pressure gauge

VT manifold



### Pressurized gas leak detection

In accordance with the approval certification, the pressurized gas leak detectors are suitable for the monitoring of FLEXWELL-Safety Pipes carrying flammable liquids of hazard categories A I, II, III and B. When monitoring with pressurized gas the leak detector is charged with an inert gas, normally nitrogen.

The monitoring pressure in the leak detector must always exceed the maximum operating pressure of the safety pipes. In the event of damage, the pressurized gas either escapes into the carrier pipe or through the casing pipe, depending on which pipe is damaged.

#### Pressurized leak detector type D 11

With the leak detector type D 11 the monitoring pressure in the leak detector must be 4 bar above the operating pressure of the pipe, but in any case minimally 10 bar.

Alarm is given when the monitoring pressure has dropped a level less than 2 bar above the max. operating pressure of the pipe.

Factory settings

Alarm on: 8 bar

Alarm off: 10 bar

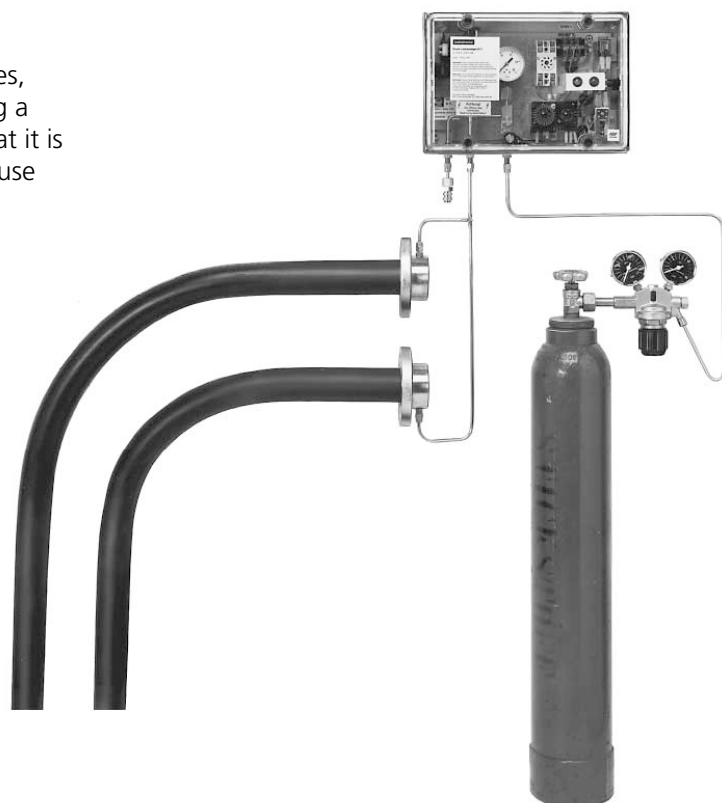
When the pressure switch is set to these values, FLEXWELL Safety Pipe can be monitored using a pressure of up to 6 bar. Experience shows that it is only in exceptional cases that piping systems use higher pressures. In these cases the monitoring pressures must be accordingly given a higher setting. Using the pressure monitoring gauge integrated into the D11, settings up to 22 bar can be made.

The surveillance space of the FLEXWELL Safety Pipe is connected via the leak detector with a pressure reservoir (nitrogen cylinder) equipped with a pressure reducing valve Type 71701516 and filled with gas under pressure.

The surveillance space is checked in defined periodic intervals depending on the sizes and length of the piping. The set periodic interval between the checks allows conclusions to be drawn about the tightness of the surveillance space. If the pressure in the surveillance space drops to a level below that permitted between two checks, the alarm is given by the detector. Minimal leakages of nitrogen, which have no significant effect on the operation of the FLEXWELL pipe, but are virtually impossible to avoid, are compensated from the pressure reservoir during the checking interval.

The leak detector allows additional functions to be triggered via an extra alarm contact. In case of alarm, a potential-free relay allows the closing of valves and shutting down of pumps.

Typical connection of leak detector to pipes are shown on work sheet Nos. LDS 6.14.01 - 6.14.04 For testing of leak detection installations refer to Worksheets STT 9.14.01 - 9.14.02



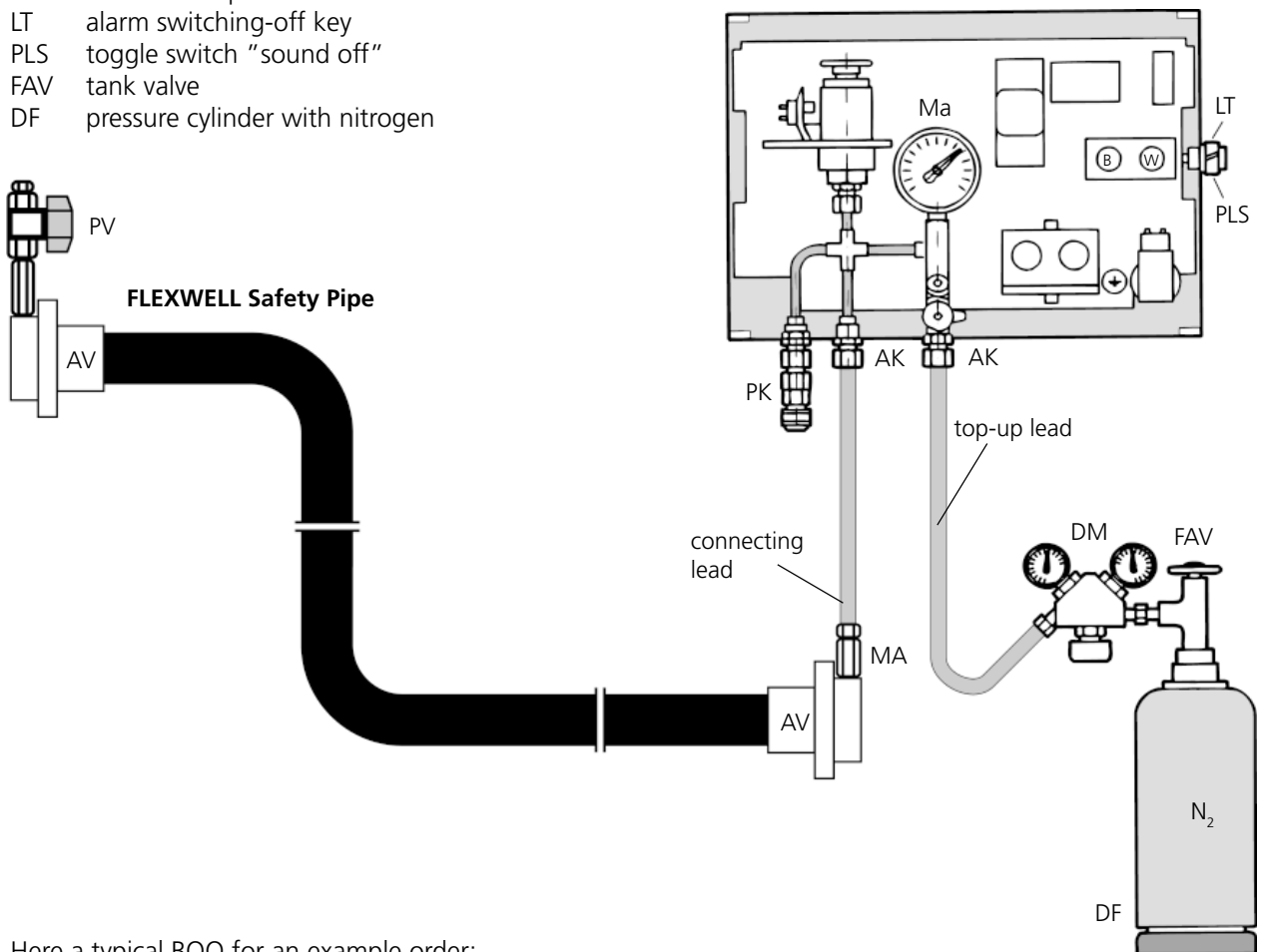
To generate the pressure required a nitrogen cylinder is connected to the leak detector by means of a pressure-reducing valve. A pneumatic lead is laid from the leak detector to the connection of the FLEXWELL Safety Pipe. A test valve is installed at the far end of the FLEXWELL Safety Pipe. All pneumatic leads are made of 6 x 1 mm copper tubing, the connection to the connection assembly AV is made via the measuring branch MA.

The appropriate monitoring pressure to set the pressure reducing valve and the positive pressure leak detector at are shown on Worksheet LDS 6.04.

**Max. length of pipe** that can be monitored:  
**L max. = 2000 m** for all sizes

- DM pressure reducing valve Type 717 015 16
- AK connection coupling
- PK test coupling
- MA measuring branch
- AV connecting joint
- PV test valve
- Ma pressure gauge
- B "in operation" lamp
- W "alarm" lamp
- LT alarm switching-off key
- PLS toggle switch "sound off"
- FAV tank valve
- DF pressure cylinder with nitrogen

**pressurized gas leak detector  
Type D 11  
02 PTB Nr. III B/S 1238**



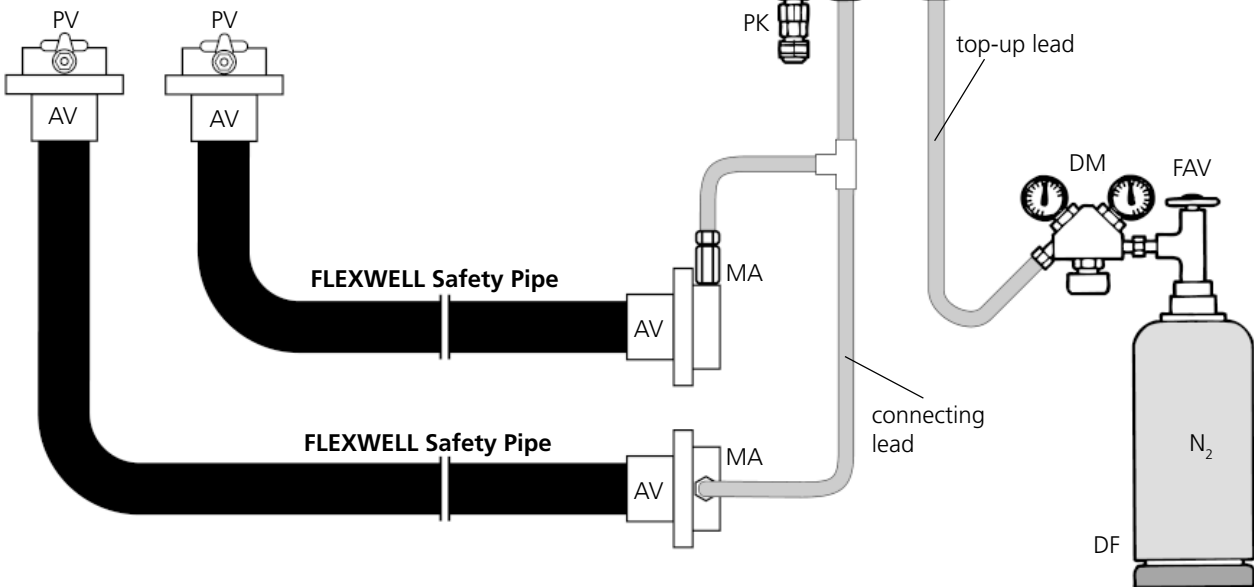
Here a typical BOQ for an example order:

- |  |                                      |
|--|--------------------------------------|
| 1 off FLEXWELL Safety Pipe, size: ..... lin. m ..... | 1 off D11                            |
| 2 off AV, size: .....                                | 1 off DM                             |
| 1 off MA   | copper tubing 6 x 1 mm, lin. m ..... |
| 1 off PV   |                                      |

This system functions on the same principles as the single-pipe system described on Worksheet LDS 6.04.01. The pressure lead is connected to two or more FLEXWELL Safety Pipes by means of soldered T-fittings.

**Max. length of pipe** that can be monitored:  
**L max. = 2000 m** with all lengths of pipe in series added up and for all sizes

- DM pressure reducing valve Type 717 015 16
- AK connection coupling
- PK test coupling
- MA measuring branch
- AV connecting joint
- PV test valve
- Ma pressure gauge
- B "in operation" lamp
- W "alarm" lamp
- LT alarm switching-off key
- PLS toggle switch "sound off"
- FAV tank valve
- DF pressure cylinder with nitrogen



Here a typical BOQ for an example order:

- |   |              |                                      |
|---|--------------|--------------------------------------|
| 1 off FLEXWELL Safety Pipe, size: ..... | lin. m ..... | 1 off MA                             |
| 1 off FLEXWELL Safety Pipe, size: ..... | lin. m ..... | 1 off D11                            |
| 2 off AV,                               | size: .....  | 1 off DM                             |
| 2 off AV,                               | size: .....  | copper tubing 6 x 1 mm, lin. m ..... |

#### General

Wall entry seals for FLEXWELL Safety Pipe are to be cast in concrete by the client. With correct installation, the tightness between concrete and the wall

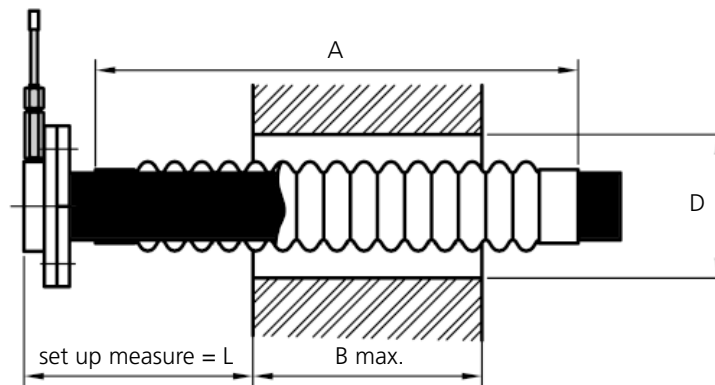
duct as well as between the wall duct and the FSR is 0.2 bar against water, 0.1 bar against gas pressure.

#### Wall entry seals type MD for FSR 16/30 - FSR 60/83

The sealing element consists of a cross linked polyolefin heat-shrink sleeve, buttressed internally by a galvanized steel spiral. The outside of the convoluted surface has a special coating, which forms a longitudinally watertight bond with wet concrete or mortar. Both ends are coated inside with a plastic sealing compound. When heated using a gas flame the ends shrink and the sealing compound melts and is pressed into any grooves or irregularities.

MD for type FSR	L mm	A mm	B max* mm	D1 mm	article No.
FSR 16/30	150	700	450	67	829 393 90
FSR 30/48	200	700	450	67	829 393 90
FSR 39/60	200	750	450	71	829 394 90
FSR 48/71	200	750	450	71	829 394 90
FSR 60/83	200	750	450	71	829 394 90

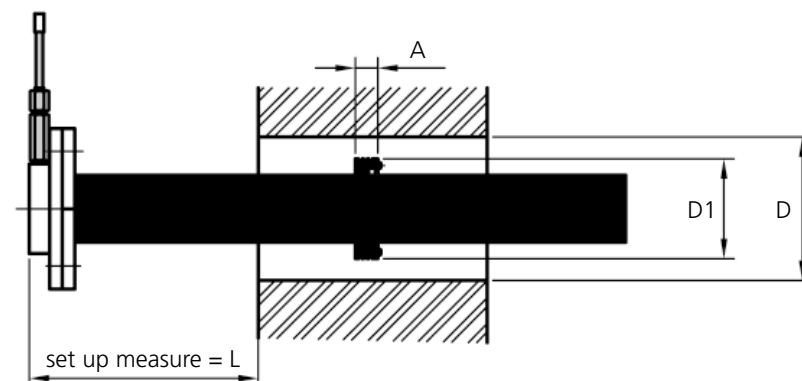
\* With thicker walls, two wall sleeves can be pushed into each other to make up the extra length required.



#### Wall entry seals type MD for FSR 83/120 and FSR 127/175

The sealing element consists of a cast iron sleeve, a sealing ring and a collar flange. The sleeve is fitted with radial grooves which effect the longitudinal water tightness in the concrete or mortar in similar fashion to a labyrinth gland. The FLEXWELL Safety Pipe is sealed with a sealing packing, which is pressed into the sleeve upon tightening of the bolts of the collar flange.

MD for type FSR	L mm	A mm	D mm	D1 mm	article No.
FSR 83/120	250	45	300	186	829 395 90
FSR 127/175	250	45	350	243	829 396 90



**Warning!**  
Slide wall sleeves over the pipe before assembling the connecting joint.

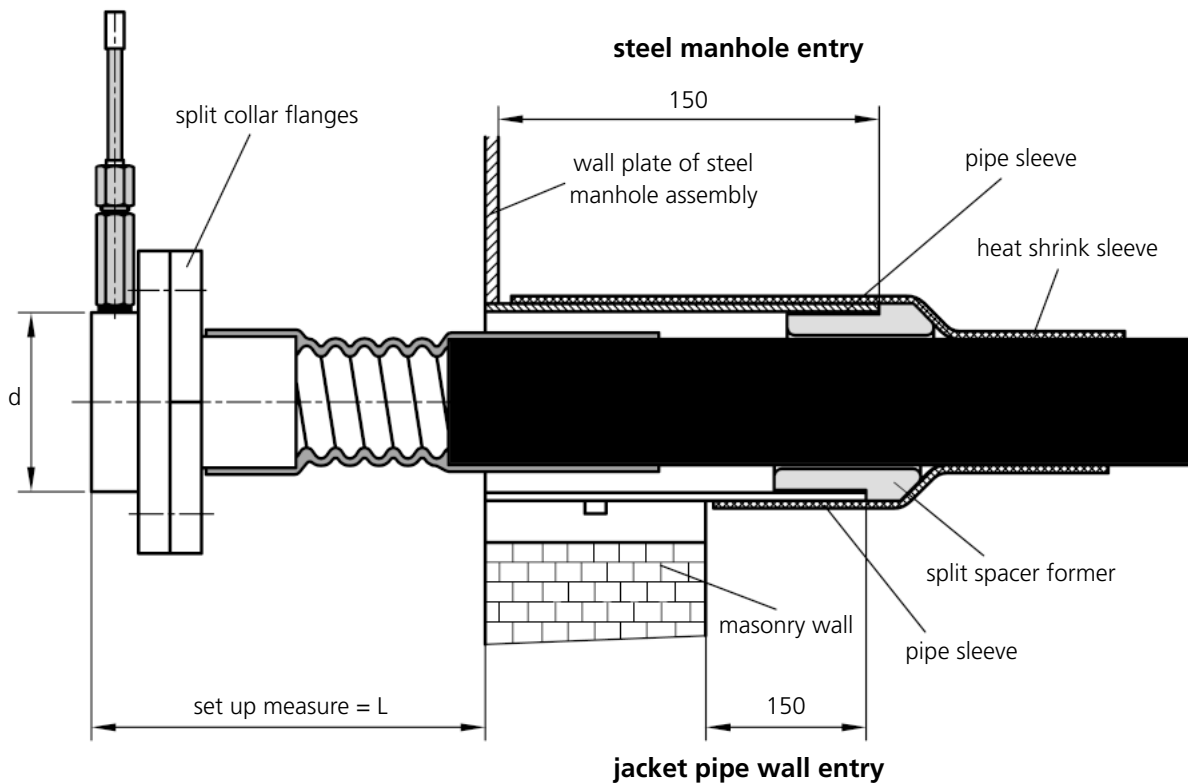


**General note:**

The steel manhole and jacket pipe wall entries Type SSE for FLEXWELL Safety Pipe are designed to fit sleeves made from standard steel pipe. For standard sizes refer to table below. The pipe sleeves must be supplied, set and sealed into the steel manhole or masonry wall by the client.

**Warning !**

If FLEXWELL Safety Pipe connecting joints are to be fitted later, use split collar flanges. Standard collar flanges are larger in diameter than the pipe sleeves and won't fit.



SSE for FSR type	pipe sleeve (building contractor) o. D. x wall mm	d mm	set up measure L mm	article No.
FSR 16/30	48,3 x 2,6	40	150	829 313 90
FSR 30/48	76,1 x 2,9	68	200	829 315 90
FSR 39/60	88,9 x 3,2	78	200	829 316 90
FSR 48/71	114,3 x 3,6	88	200	829 314 90
FSR 60/83	114,3 x 3,6	102	200	829 317 90
FSR 83/120	168,3 x 4,5	138	250	829 319 90
FSR 127/175	219,1 x 5,9	190	250	829 320 90

For installation of FSR connecting joints see respective installation instructions.

BRUGG Rohrsysteme GmbH  
Adolf-Oesterheld-Str. 31  
D-31515 Wunstorf  
Telephone +49 (50 31) 170-0  
Telefax +49 (50 31) 170-170  
[www.brugg.de](http://www.brugg.de)  
[info@brugg.de](mailto:info@brugg.de)

BRUGG Rohrsystem AG  
Industriestrasse 39  
CH-5314 Kleindöttingen  
Telephone +41 56 268 78 78  
Telefax +41 56 268 78 79  
[www.pipesystem.com](http://www.pipesystem.com)  
[pipesystem@kwbrugg.ch](mailto:pipesystem@kwbrugg.ch)



A company of the BRUGG Group

**Efficient Transportation of Fluids**