

FLEXWELL®-HL

Marinas – Generators – Industrial

Installation Instructions



Installation instructions

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Important informations



IMPORTANT INFORMATION – FOLLOW ALL INSTRUCTIONS



SAFETY

This safety alert symbol indicates an important safety message. When this symbol appears, be alert to the possibility of personal injury.

CAUTION

This pipe may carry hazardous material and/or operate at a hazardous pressure level; therefore, it is imperative that the instructions in this manual are followed to avoid serious personal injury or property damage. In any event, improper installation can cause injury or damage. Installers should read and follow all cautions and warnings to avoid personal injury. Also, observe general safety practices with all saws, tools, etc. to avoid personal injury. Wear protective clothing when necessary. Make sure work surfaces are clean and stable. BRUGG Pipesystems reserves the right to make changes in descriptions, specifications or illustrations at any time. Always compare the date of this document with the most current one on www.pipesystems.com



Pipe and End fittings

Use only OEM fittings, follow installation and assembly instructions.



Safety Precautions

FLEXWELL®-HL Pipe Systems shall not be liable under any warranty, contract, or in tort, for any damage to equipment, pipe, or other personal property due to failure to follow the procedures or comply with the precautions set forth.

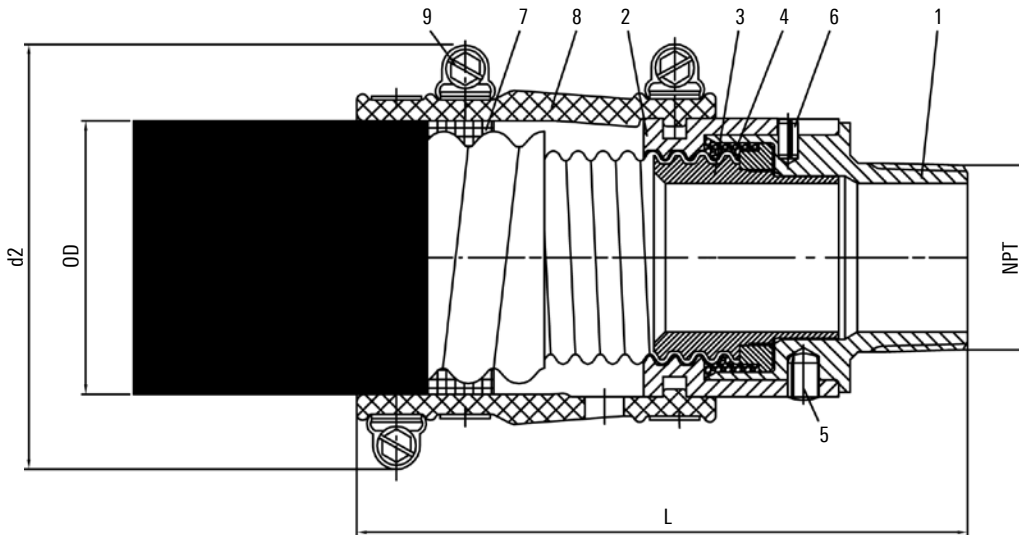
End fitting with male thread

Open Secondary Containment Piping System



Loading, unloading and storing:

Protect pipe and fittings from point-loading or impact damage at all times. Keep fittings dry.



After transport:

Check pipe and fittings for damage. Do not use damaged units.



Installation:

Assemble end fittings only in visible areas.

Pos.	Qty.	Specification	Material
1	1	Threaded connector	316L or 316Ti
2	1	Thrust collar, single-wall	316L or 316Ti
3	1	Core piece	316L or 316Ti
4	1	Graphite seal	F05010CTF, Graphite-PTFE-Composite foil
5	4	Grooved pin	316L or 316Ti
6	1	Positioning pin	316L or 316Ti
7	1	Support ring	NBR, Hardness 60 ± 5 Shore
		Filling material (type FSR-HL 98/134 only)	Butyl rubber tape (not supplied)
8	1	Test boot	ECO, Hardness 60 ± 5 Shore
9	3	Clamp	Stainless steel

Type	Pipe size	Thread	OD	d2	L	max. fitting torque	Article No.
	inch	NPT inch	mm inch	mm inch	mm inch	lb ft	
FSR-HL 48/ 71	1 ½"	1 ½"	70.0	112.0	157.0	33	82935800
			2.8	4.5	6.2		
FSR-HL 60/ 83	2"	2"	83.0	125.0	164.0	37	82935900
			3.3	5.0	6.5		
FSR-HL 98/134	3"	3"	134.0	174.0	221.0	60	82936000
			5.3	6.9	8.7		
FSR-HL 98/134	3"	4"	134.0	174.0	221.0	60	on request
			5.3	6.9	8.7		

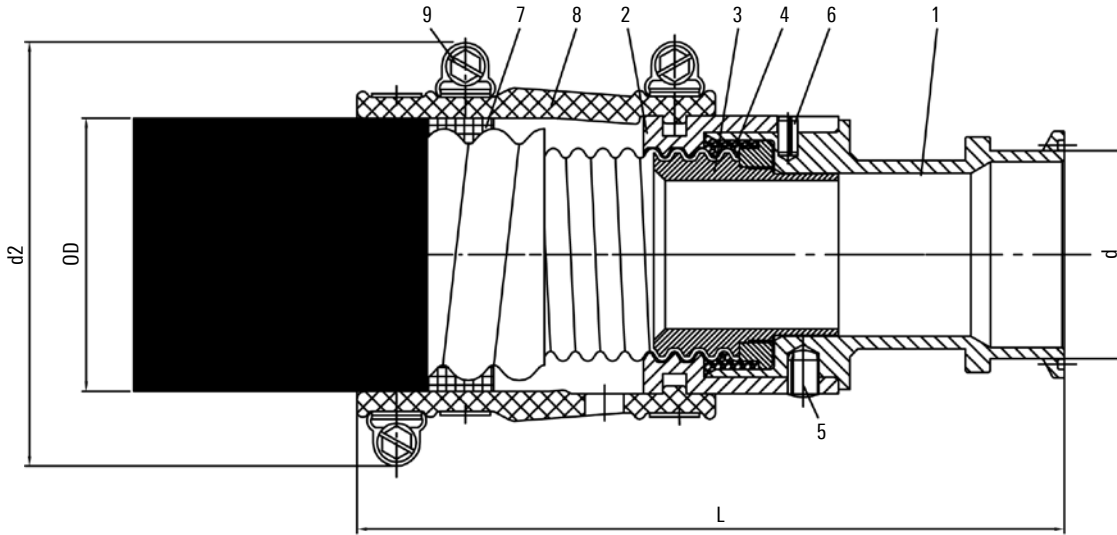
End fitting with EZ-Fit

Open Secondary Containment Piping System



Loading, unloading and storing:

Protect pipe and fittings from point-loading or impact damage at all times. Keep fittings dry.



After transport:

Check pipe and fittings for damage. Do not use damaged units.



Installation:

Assemble end fittings only in visible areas.

Pos.	Qty.	Specification	Material
1	1	EZ-Fit connector	316L or 316Ti
2	1	Thrust collar, single-wall	316L or 316Ti
3	1	Core piece	316L or 316Ti
4	1	Graphite seal	F05010CTF, Graphite-PTFE-Composite foil
5	4	Grooved pin	316L or 316Ti
6	1	Positioning pin	316L or 316Ti
7	1	Support ring	NBR, Hardness 60 ± 5 Shore
		Filling material (type FSR-HL 98/134 only)	Butyl rubber tape (not supplied)
8	1	Test boot	ECO, Hardness 60 ± 5 Shore
9	3	Clamp	Stainless steel

Type	Pipe size inch	EZ-Fit Connector inch	d	OD	d2	L	max. fitting torque lb ft	Article No.
			mm inch	mm inch	mm inch	mm inch		
FSR-HL 48/ 71	1 ½"	2"	53.3	70.0	112.0	182.0	33	82935810
			2.1	2.8	4.5	7.2		
FSR-HL 60/ 83	2"	2"	53.3	83.0	125.0	169.0	37	82935910
			2.1	3.3	5.0	6.7		
FSR-HL 98/134	3"	3"	78.7	134.0	174.0	227.0	60	82936020
			3.1	5.3	6.9	9.0		

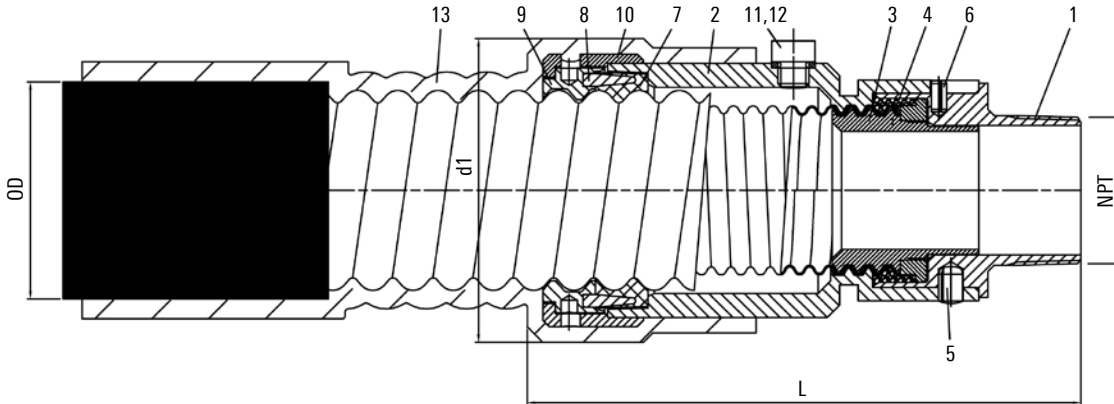
End fitting with male thread

Closed Secondary Containment Piping System



Loading, unloading and storing:

Protect pipe and fittings from point-loading or impact damage at all times. Keep fittings dry.



After transport:

Check pipe and fittings for damage. Do not use damaged units.



Installation:

Assemble end fittings only in visible areas.

Pos.	Qty.	Specification	Material
1	1	Threaded connector	316L or 316Ti
2	1	Thrust collar	316L or 316Ti
3	1	Core piece	316L or 316Ti
4	1	Graphite seal	F05010CTF, Graphite-PTFE-Composite foil
5	4	Grooved pin	316L or 316Ti
6	1	Positioning pin	316L or 316Ti
7	1	Secondary seal	NBR, Hardness 60 ± 5 Shore
8	1	Expansion ring	316L or 316Ti
9	1	Clamping nut	316L or 316Ti
10	1	Lock nut	316L or 316Ti
11	1	Test port plug G 1/8	316L or 316Ti
12	1	Washer	NBR
13	1	Wrapping tape or Shrink sleeve (optional)	

Type	Pipe size	Thread NPT	d1	OD	L	max. fitting torque	Article No.
			mm	mm			
	inch	inch	inch	inch	inch	lb ft	
FSR-HL 30/48	1"	1"	80.0	47.3	159.0	22	82935699
			3.2	1.9	6.3		
FSR-HL 48/71	1 ½"	1 ½"	100.0	70.0	176.0	33	82935799
			4.0	2.8	6.9		
FSR-HL 60/83	2"	2"	117.0	83.0	193.0	37	82935899
			4.6	3.3	7.6		

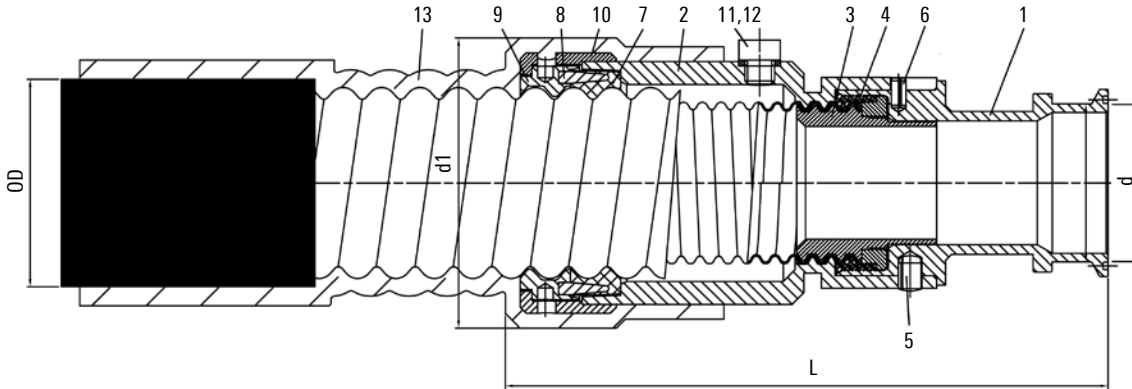
End fitting with EZ-Fit

Closed Secondary Containment Piping System – Data sheet 1



Loading, unloading and storing:

Protect pipe and fittings from point-loading or impact damage at all times. Keep fittings dry.



After transport:

Check pipe and fittings for damage. Do not use damaged units.



Installation:

Assemble end fittings only in visible areas.

Pos.	Qty.	Specification	Material
1	1	EZ-Fit connector	316L or 316Ti
2	1	Thrust collar	316L or 316Ti
3	1	Support ring	316L or 316Ti
4	1	Graphite seal	F05010CTF, Graphite-PTFE-Composite foil
5	4	Grooved pin	316L or 316Ti
6	1	Positioning pin	316L or 316Ti
7	1	Secondary seal	NBR, Hardness 60 ± 5 Shore
8	1	Expansion ring	316L or 316Ti
9	1	Clamping nut	316L or 316Ti
10	1	Lock nut	316L or 316Ti
11	1	Test port plug G 1/8	316L or 316Ti
12	1	Washer	NBR
13	1	Wrapping tape or Shrink sleeve (optional)	

Type	Pipe size	EZ-Fit Connector	d	OD	d2	L	max. fitting torque	Article No.
	inch	inch	mm	mm	mm	mm	lb ft	
FSR-HL 30/48	1"	1"	43.6	80.0	47.3	161.0	22	82935720
			1.7	3.2	1.9	6.3		
FSR-HL 48/71	1 ½"	2"	53.3	71.0	100.0	202.0	33	82935820
			2.1	2.8	4.0	8.0		
FSR-HL 60/83	2"	2"	53.3	83.0	117.0	198.0	37	82935920
			2.1	3.3	4.6	7.8		

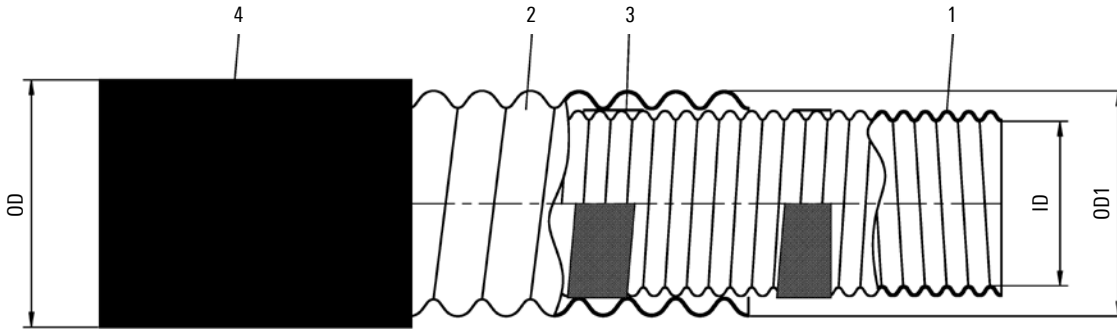
Secondary Containment Piping System

Data sheet



Loading, unloading and storing:

Protect pipe and fittings from point-loading or impact damage at all times. Keep fittings dry.



Nominal operating pressure for primary pipe: 145 PSI



After transport:

Check pipe and fittings for damage. Do not use damaged units.



Installation:

Assemble end fittings only in visible areas.

Pos.	Qty.	Specification	Material
1	1	Primary Pipe	316L or 316Ti
2	1	Secondary Pipe	316L or 316Ti
3	1	Flat Steel Armoring Tape	304
4	1	PE-Coating	LDPE

Type	Pipe size	ID	OD	OD1	Article No.
	inch	mm	mm	mm	
FSR-HL 30/ 48	1"	30.0	47.3	42.0	82111381
		1.2	1.9	1.7	
FSR-HL 48/ 71	1 ½"	48.5	70.0	64.5	82111481
		1.9	2.7	2.5	
FSR-HL 60/ 83	2"	60.0	83.0	76.5	82111781
		2.4	3.2	3.0	
FSR-HL 98/134	3"	98.0	134.0	125.0	82112181
		3.9	4.9	5.3	

Installation instructions

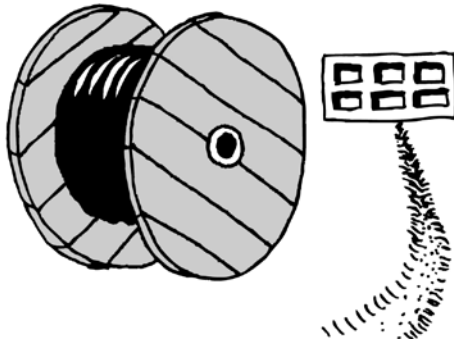
Installing FLEXWELL®-HL Pipe

Unreeling the pipe



The piping shall only be installed by qualified personnel (certified by the manufacturer). The use of non-qualified personnel or any deviations from these recommended procedures could result in damage or leakage of the system.

1

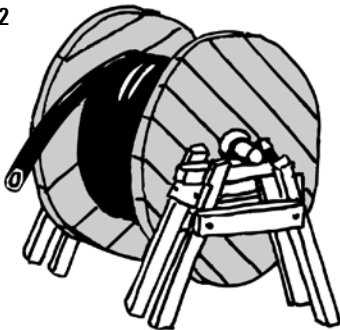


You will have received our FLEXWELL®-HL Pipe in a coil or on a cable reel. Ideally, you should position the drum in such a way that the pipe can be unreeled directly from the drum.



Secure reel from falling or rolling.
Storage temperature ≤ 120 deg F.

2



Use a reel stand to unreele the pipe.

Use a 3 inch steel pipe as axle (see figure 3).

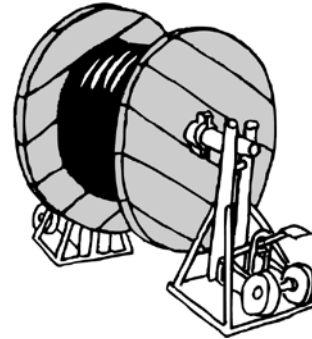


The shrink cap at the end of the pipe should not be removed in order to prevent dirt or moisture from entering the primary or the secondary pipe when laying pipe.



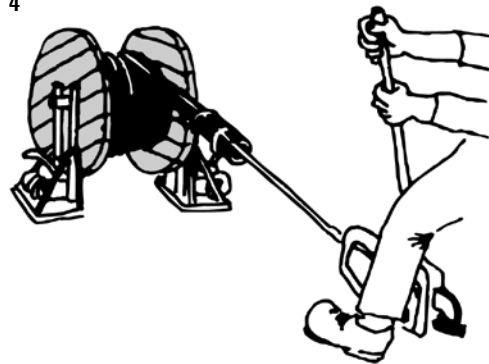
While handling the pipe, always make sure to use appropriate safety shoes and gloves.

3



Hydraulic jacks simplify the work. These are worth purchasing if you are frequently involved in laying FLEXWELL®-HL Pipes.

4



For large diameters or longer pipes, it may be necessary to use a simple hand-jack. If necessary, a deflection pulley can also be used. If you are using a motorized jack or tractor, ensure that the pulling speed does not exceed 1 ft/s.



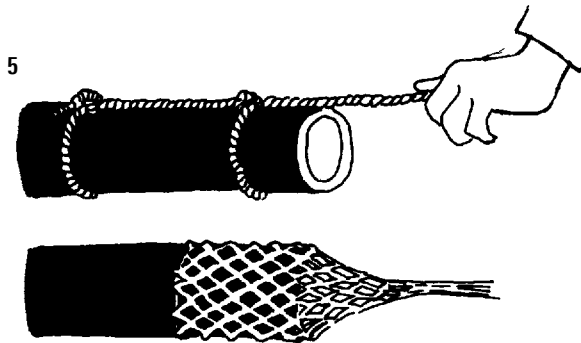
Caution: When untying the end of the pipe from the reel or ring. The pipe is under considerable natural tension.




When unreeing pipe maintain the reel under tension. If the reel is allowed to turn freely the pipe may jump from the reel in loops and buckle. Secure reel after removing a section of pipe.


Installation instructions

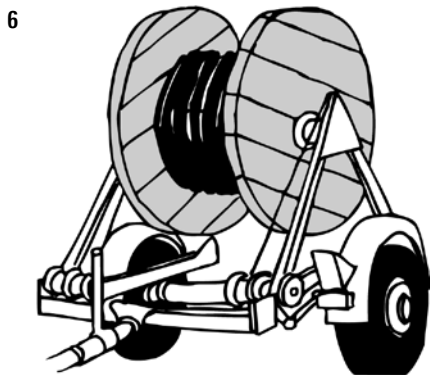
Installing FLEXWELL®-HL Pipe



If you are working with a steel traction cable, use an end-piece made of hemp or nylon and tie an offset double knot. If there is a risk of the tied end to jam, use a cable stocking. These can be purchased from Brugg Pipesystems.

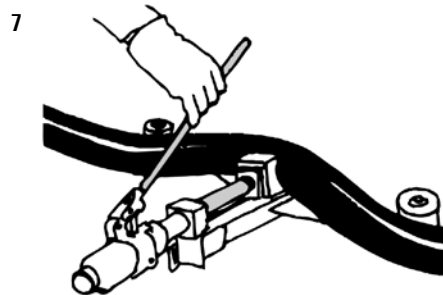
 At all times during laying, the pipe ends must be protected in such a way that dirt and moisture are unable to penetrate. Beware of sharpe edges.

 Pipe cutting operations can generate dust or cutting chips that irritate skin and eyes. Operators should wear heavy clothing, including long-sleeve shirts, that protect the skin. Eye protection is also required. Use working gloves to protect skin from sharpe edges (burrs).

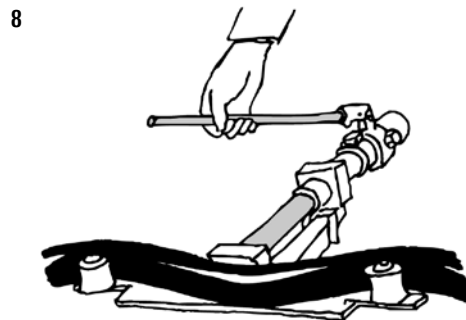



For large pipe diameters or longer sections of pipe, it is best to use a cable-laying trailer. We recommend to contact an electric cable laying company in your area.

Bending the FLEXWELL®-HL Pipe



Pipes sizes up to 48/71 (1 1/2") can be bent by hand. When laying FLEXWELL®-HL Pipes 60/83 (2") and bigger, it is advisable to use a bending machine, particularly if the pipes are to be laid in a building, channel or conduit.



 If possible, narrow bending radii should be avoided. Radii which are too narrow make your work more difficult and, at worst, may damage the pipe. The following guidelines should be observed:


 When pre-installing the end fittings do not use the end fitting as leverage for bending the pipe as this can result in secondary containment leaks. Whether with a pipe bender or by hand always use the pipe as leverage.

Table 1 Bending radius

Type	Pipe size	Minimum bending radius in the ground	Recommended bending radius when laying
FSR-HL 30/ 48	1"	20	40
FSR-HL 48/ 71	1 1/2"	24	47
FSR-HL 60/ 83	2"	28	59
FSR-HL 98/134	3"	40	80

All dimensions in inch

Operating temperature

FLEXWELL®-HL Pipe is rated for – 13 °F to + 122 °F

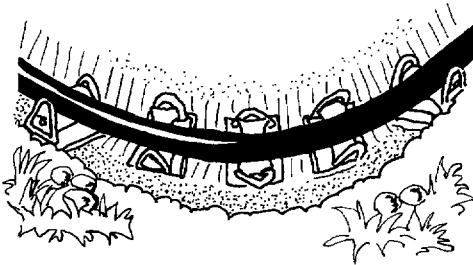
Installation instructions

Installing FLEXWELL®-HL Pipe

Installing the FLEXWELL®-HL Pipe underground

Install all pipe with a continuous slope of at least 1/8" per foot toward the tank or the sump. Support pipe sufficiently to avoid low points.

9



Cable rollers reduce friction and protect the pipe if it has to be laid around sharp corners. It makes work easier, particularly on stretches with a large number of curves.

In general, cable rollers are used by cable laying companies, and can be rented from them.

When installing FLEXWELL®-HL Pipe in a trench, make sure that the pipe is at sufficient depth to protect it from surface traffic or other loads. At a minimum a layer of sand or pea gravel of 4 inch below the pipe and 6 inch above the pipe should be maintained.

Decking slabs may be laid on top of the sand or gravel layer over the pipe to protect it from penetration from above.

The installation of a warning strip above the pipe is advisable.

Above ground installation

When installed above ground FLEXWELL®-HL Pipe must be protected from any damage due to traffic, pedestrian traffic, construction activity or any other activity that could impact, scrape, puncture or crush the pipe.

This is particularly true in public areas, where also intentional damage is possible.

Securing the FLEXWELL®-HL Pipe

The FLEXWELL®-HL Pipe can be installed and secured directly onto a flat surface of concrete, wood or other suitable material or by using Unistrut profiles. In either case it is recommended to use Unistrut "Cush-a-Clamp" clamps. See Table 3 for clamping distances.

Table 3 Clamping distance

Type	Pipe size	horizontal	vertical
FSR-HL 30/ 48	1"	47	55
FSR-HL 48/ 71	1 1/2"	60	70
FSR-HL 60/ 83	2"	65	70
FSR-HL 98/134	3"	70	80

All dimensions in inch



Installation instructions

Installing FLEXWELL®-HL Pipe

Marking

To identify abbreviations used for pipe markings, consult table 4.

**Pipe No. BRUGG FLEXWELL®-HL Pipe, PS, 1 ½", 50 psig, MV-CT-HB-A&M-fuels
"Underground Use Only", "Use Only OEM Fittings – Follow Installation Instructions"**

Table 4

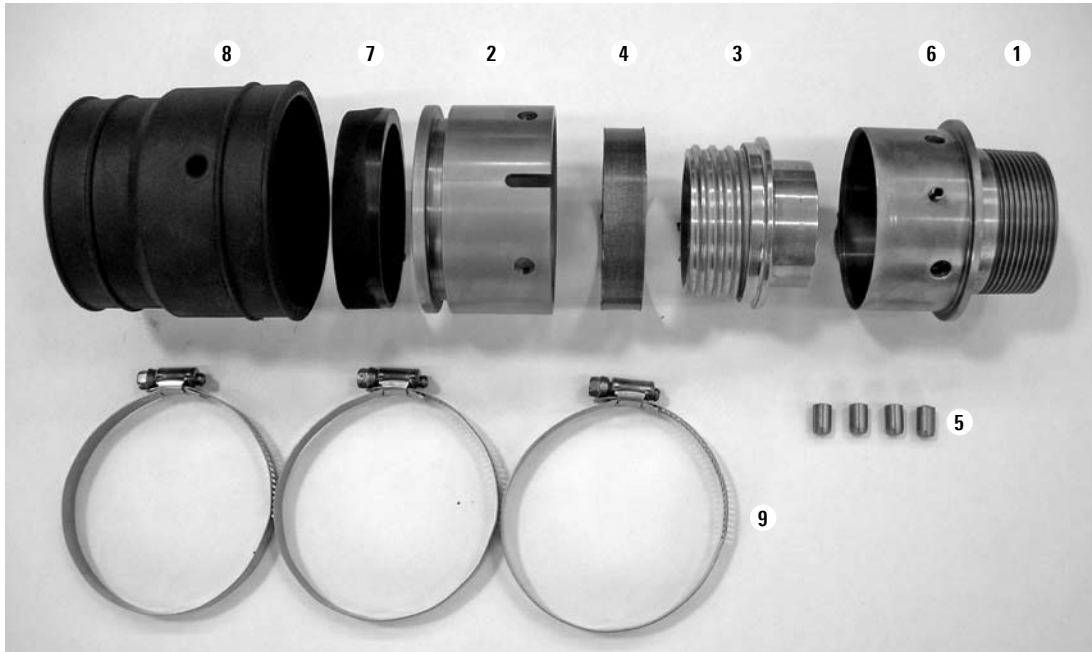
Description	Marking
Pipe classification with date code	Pipe no. ¹ (e.g. 12345)
Manufacturer name	BRUGG
Trade name	FLEXWELL®-HL Pipe
Type	FSR-HL
Integral primary/secondary system	PS
Nominal dimension	1", 1 ½", 2" or 3"
Nominal pressure	50 psig
Installation	Underground Use Only
OEM	Use Only OEM Fittings – Follow Installation Instructions
Medium	
Motor vehicles fuels	MV
Concentrated fuels	CT
High blend fuels	HB
Aviation and marine fuels	A&M-fuels

¹ Manufacturing date and manufacturing information of the material and manufactured article as well as all testings are traceable via the pipe number.

Installation instructions

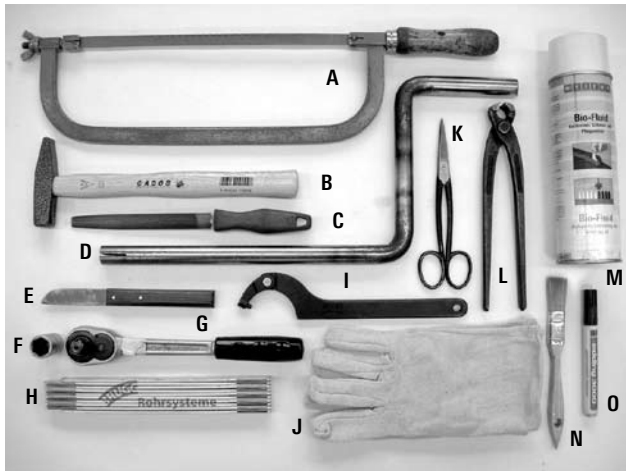
Open Secondary Containment Pipe System

1 End fitting – components



- 1 Threaded connector
- 2 Thrust collar
- 3 Core piece
- 4 Graphite seal
- 5 Grooved pins
- 6 Positioning pin
- 7 Support ring
- 8 Test boot
- 9 Clamp

2 Installation tools



- | | |
|---------------------------------|----------------------|
| A Hacksaw | I Spanner wrench |
| B Tinsmith's hammer | J Gloves |
| C Smoothing file | K Metal shears |
| D Secondary pipe stripping tool | L End cutting pliers |
| E Safety knife | M Lubricant |
| F Socket 1/2" (17 mm) | N Brush |
| G Socket wrench | O Marker |
| H Folding rule | |

3 Installation tools



Alternative:
Pipe cutter¹ for plastics



¹ Note the warning notices of the manufacturer.

4 Assembly flanges



Flanges to assemble couplings.

Installation instructions

Open Secondary Containment Pipe System

5 Remove PE jacket

Remove PE jacket according to table below

ND	L1 dimension with		
	Welding	NPT Thread	EZ-Fit
1 1/2"	6.9	4.9	6.3
2"	7.0	5.1	5.9
3"	3.5	8.0	7.9

All dimensions in inch



Use protective gloves at all times.



6 Remove PE jacket

Take care not to damage the corrugated pipe while cutting the PE jacket. Set knife tangential to PE jacket and start cutting.



Caution. Risk of knife injury.



7 Remove PE jacket

Pull PE jacket away from pipe while performing radial cut.



Caution. Do not squeeze fingers between pipe and PE jacket.

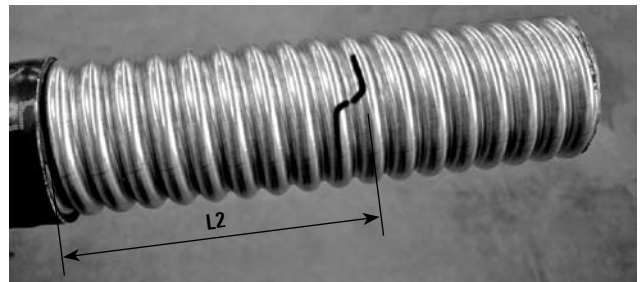


8 Remove secondary pipe

Remove secondary pipe according to table:

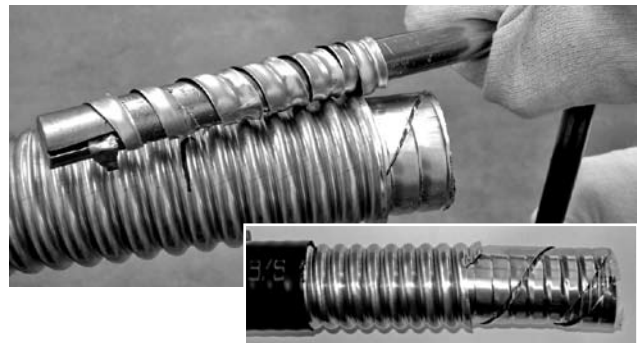
ND	L2
1 1/2"	1.2
2"	1.0
3"	1.3

All dimensions in inch



9 Remove secondary pipe

Cut in pipe at crest of a wave at the pipe end and bend up the metal strip. This strip should have an appr. length of 2 inch. Straighten metal strip inbetween two hammers. Apply secondary pipe stripping tool to metal strip and "peel" down at an angle of 30° to the pipe axis.



10 Armoring tape

Cut back the armoring tape to the end of the secondary pipe using shears.



Watch out for sharp edges.



Caution. Risk of injury through burr formation. Reinforcement tape may spring open.

Installation instructions

Open Secondary Containment Pipe System

11 Saw back primary pipe

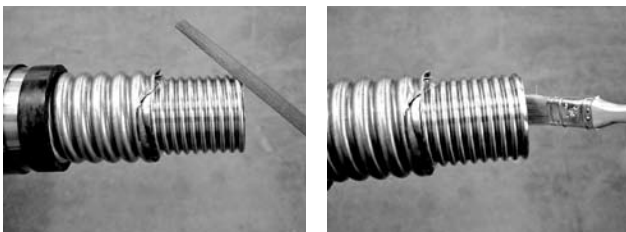
Screw back thrust collar until it stops. Notice that the groove is always in the "12 o'clock" position. Use thrust collar as sawing gage. At the groove point the saw is always in pipe valley. Secure thrust collar with one hand while sawing off the pipe piece.

Attention: The cut has to be in a right angle to the pipe axis. Use smoothing file for deburring.



12 Deburr primary pipe

Remove thrust collar. Deburr pipe end. Remove shavings with brush.



13 Slide on test boot

Push test boot onto the PE jacket until the face side aligns with the secondary pipe.



14 Rubber support ring

Thread support ring up to the PE jacket (for 1 1/2" and 2" pipes). In lieu of the support ring (for 3") seal the space between secondary pipe and PE jacket with Butyl rubber tape. Make sure to fill the "valley" of the corrugation.

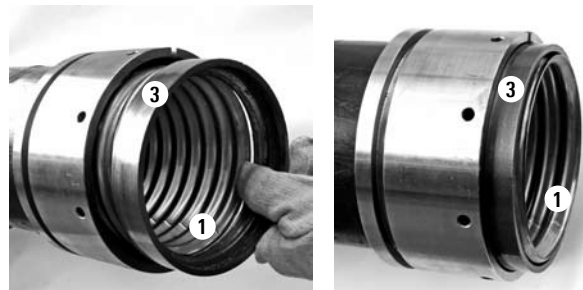


Caution. Sharp edges on the secondary pipe.

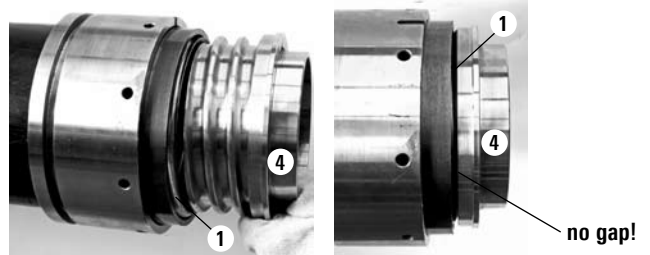


15 Establish primary pipe seal

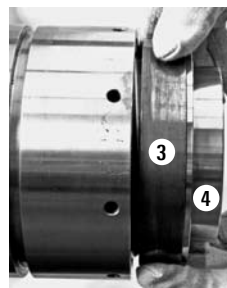
Screw on sealing ring (3) with corrugated pipe geometry ahead until corrugated pipe (1) is visible.



Screw core piece (4) into the corrugated pipe (1) until stop position. The core piece has to fit properly to the corrugated pipe.



Screw back sealing ring (3) against the arrester of the core piece (4).

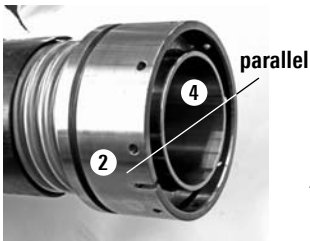
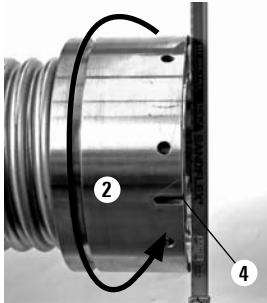


Installation instructions

Open Secondary Containment Pipe System

16 Positioning of the pressure ring for pipe sizes 1 1/2", 2" and 3"

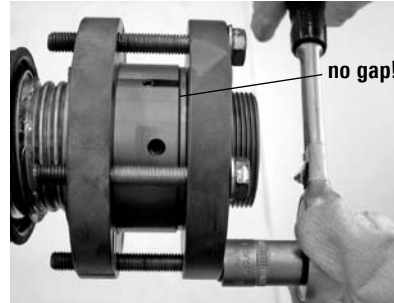
Turn back the pressure ring (2) until it fits properly with the leading edge of the core piece (4). **Work precisely – use auxiliary devices!**



Caution. Risk of injury when spanner wrench slips off.

19 Assembly flanges

Tighten screws clockwise alternating until there is no gap remaining between connecting piece and thrust collar. Remove flanges after installation. To secure fitting, hammer in all grooved pins.



Watch your fingers while hammering in grooved pins.

17 NPT or EZ-Fit connector

Align positioning pin of connector with groove in thrust collar.



20 Position test boot

Push back rubber collar over the end fitting. Note that the lip in the test boot snaps into the groove of the thrust collar.



18 Assembly flanges

Setting of assembly flanges. Put the rear split flanges into the slot. **Caution!** Use lubricant on screw thread and in split flange.



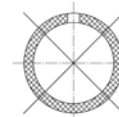
Caution. Do not drop split flanges.



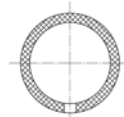
Caution. Some lubricants are extremely flammable. Be sure to read warning labels on containers as well as disposal details.



21 Position test boot hole



Incorrect!



**Correct!
6 o'clock
Position**



The hole in the test boot has to face down in the 6 o'clock position.

Installation instructions

Open Secondary Containment Pipe System

22 Assembled fitting

Install clamp in the order 1-2-3 and with the tightening screws on opposite sides.



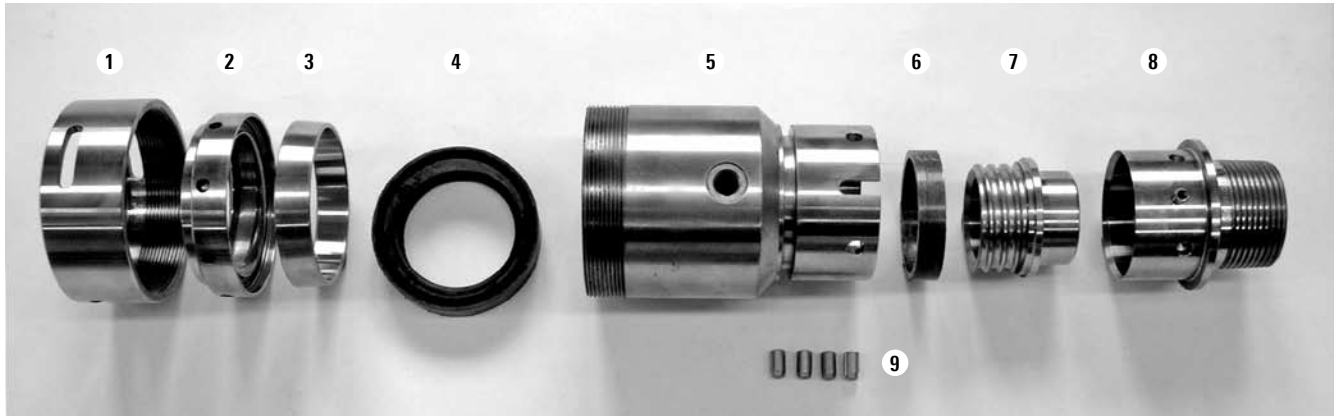
In case a leak occurs in the primary pipe, the fluid will flow out of the rubber collar hole into the sump, which then will typically be indicated by a liquid sensor.

Install nipple in drain hole for leak test of the secondary containment (interstitial space).

Installation instructions

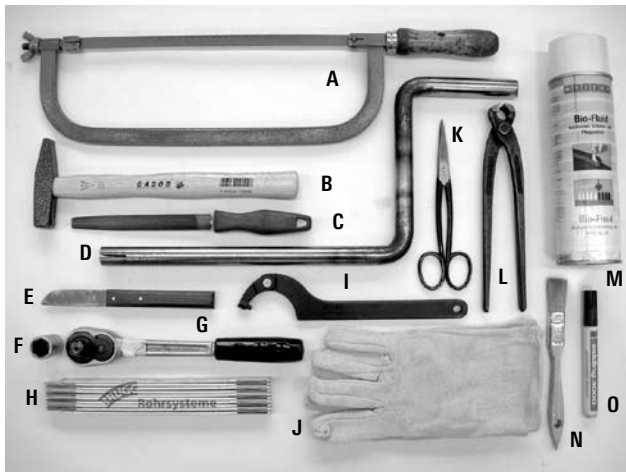
Closed Secondary Containment Pipe System

1 End fitting – components



- | | |
|------------------|----------------------|
| 1 Lock nut | 6 Graphite seal |
| 2 Clamping nut | 7 Core piece |
| 3 Expansion ring | 8 Threaded connector |
| 4 Secondary seal | 9 Grooved pins |
| 5 Thrust collar | |

2 Installation tools



- | | |
|---------------------------------|----------------------|
| A Hacksaw | I Spanner wrench |
| B Tinsmith's hammer | J Gloves |
| C Smoothing file | K Metal shears |
| D Secondary pipe stripping tool | L End cutting pliers |
| E Safety knife | M Lubricant |
| F Socket 1/2" (17 mm) | N Brush |
| G Socket wrench | O Marker |
| H Folding rule | |

3 Installation tools



Alternative:
Pipe cutter¹⁾ for plastics



¹⁾ Note the warning notices of the manufacturer.

4 Assembly flanges



Flanges to assemble couplings.

Installation instructions

Closed Secondary Containment Pipe System

5 Remove PE jacket

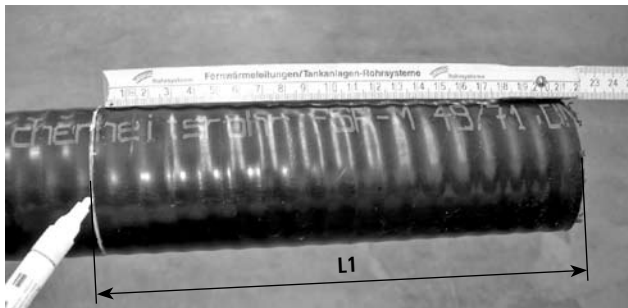
Remove PE jacket according to table below

ND	L1 dimension with	
	Thread	EZ-Fit
1"	8.0	7.8
1 1/2"	8.5	8.3
2"	8.9	8.7

All dimensions in inch



Use protective gloves at all times.



6 Remove PE jacket

Take care not to damage the corrugated pipe while cutting the PE jacket. Set knife tangential to PE jacket and start cutting.



Caution. Risk of knife injury.



7 Remove PE jacket

Pull PE jacket away from pipe while performing radial cut.



Caution. Do not squeeze fingers between pipe and PE jacket.

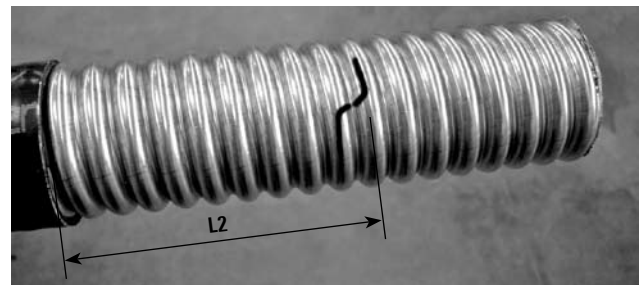


8 Remove secondary pipe

Remove secondary pipe according to table:

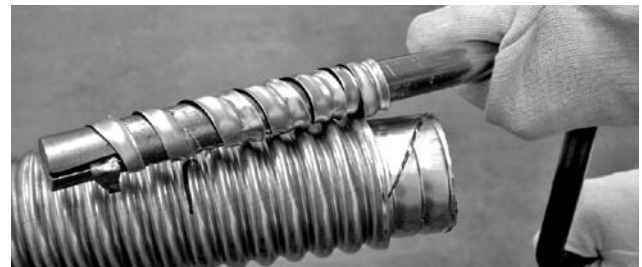
ND	L2
1"	4.7
1 1/2"	4.7
2"	4.7

All dimensions in inch



9 Remove secondary pipe

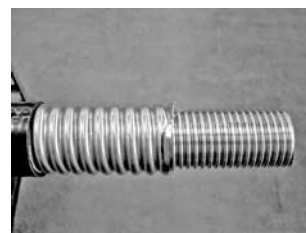
Cut in pipe at crest of a wave at the tube end and bend up the metal strip. This strip should have an appr. length of 2 inch. Straighten metal strip inbet-ween two hammers. Apply secondary pipe stripping tool to metal strip and "peel" down at an angle of 30° to the pipe axis. Cut away flat steel armoring tape along the secondary pipe with plate shears.



10 Install secondary pipe seal

Attention: Install parts in the exact order and position.

Lock nut (1), Clamping nut (2), Expansion ring (3), Secondary seal (4)



Caution. Risk of injury thru burr formation. Reinforcement tape may spring open. Watch for sharp edges.

Installation instructions

Closed Secondary Containment Pipe System

11 Saw back primary pipe

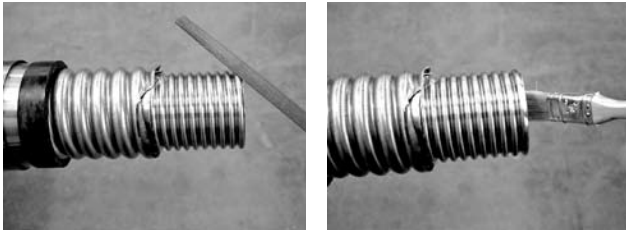
Screw back thrust collar until it stops. Notice that the groove is always in the "12 o'clock" position. Use thrust collar as sawing gage. At the groove point the saw is always in pipe valley. Secure thrust collar with one hand while sawing off the pipe piece.

Attention: The cut has to be in a right angle to the pipe axis. Use smoothing file for deburring.



12 Deburr primary pipe

Remove thrust collar. Deburr pipe end. Remove shavings with brush.



13 Establish primary pipe seal

Screw on thrust collar. Insert graphite seal. Screw core piece into corrugated pipe until stop. Tighten support ring slightly with pipe wrench.



14 Thrust collar

Turn thrust collar toward tube end. Face side of core piece and pressure ring have to align. Use spanner wrench if necessary.



15 Marking of position

Mark position of the thrust collar along the corrugated pipe.



16 NPT or EZ-Fit connector

Position split pin in the groove of the connecting piece.



Installation instructions

Closed Secondary Containment Pipe System

17 Assembly flanges

Setting of assembly flanges. Put the rear split flanges into the slot.
Caution. Use lubricant on screw thread and in split flange.



Caution. Do not drop split flanges.



18 Assembly flanges

Tighten screws clockwise alternating until there is no gap remaining between connecting piece and thrust collar. Remove flanges after installation. To secure fitting, hammer in all grooved pins



Watch your fingers while hammering in grooved pins.



19 Rubber seal

Apply lubricant to the secondary seal and expansion ring surfaces. Thread the secondary seal into the thrust collar until stop (appr. 5/16 inch of the rubber seal remains visible). Insert expansion ring into secondary seal.



Some lubricants are extremely flammable. Be sure to read warning labels on containers as well as disposal details.



20 Secondary pipe sealing

Screw back the clamping nut with the spanner wrench. Through this process the expanding ring is being pushed further into the sealing ring to ensure the sealing of the secondary pipe. Leave a gap between clamping nut and thrust collar of about 0.02 inch.



Caution. Risk of injury when spanner wrench slips off.

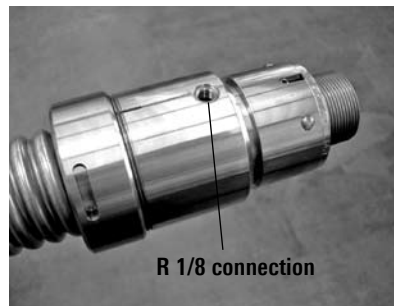


21 Assembled fitting

Tighten lock nut with spanner wrench. End fitting is now assembled. R 1/8 connection for leakage test of primary and secondary pipe or for leak monitoring. Remove test port plug only shortly before installing the leak monitoring system.



The monitoring system has to comply with the technical specification of the FLEXWELL®-HL Pipe.

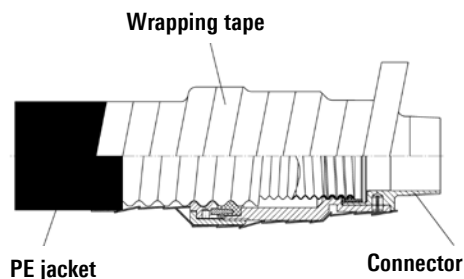


22 Wrapping tape or shrink sleeve

To protect the exposed area between end fitting and PE jacket a wrapping tape or a shrink sleeve should be used. Ideally the end fitting is also wrapped or covered with a shrink sleeve at the same time.



Be sure to read instructions of the wrapping tape manufacturer.



Start of operation and maintenance

Open Secondary Containment Pipe System

1. Fuels

This pipe system is intended for the following fuels in accordance with UL 971 regulations table 15A.1:

Motor vehicle fuels:	MV
Concentrated fuels:	CT
High blend fuels:	HB
Aviation and marine fuels:	A&M

Where applicable the fuels have to follow the ASTM rules.

The material of construction of the integrated primary and secondary pipe system is 316L or 316Ti stainless steel.



Caution: The suitability of the material of construction of the FLEXWELL®-HL Pipe for other fluids or media has to be investigated and verified.

2. Start of operations of the FLEXWELL®-HL Pipe System

2.1 Leak testing of the FLEXWELL®-HL Pipe System

After installation of the pipe system a leak test has to be performed at a maximum pressure of 100 ± 10 psig in the primary pipe and 6 ± 1 psig in the interstitial space (annular gap between primary and secondary pipe). The test is to be performed with dry air or an inert gas.



Caution: Do not use any liquids or solid materials for the leak test.



Caution: The local rules and regulations for pressure testing have to be strictly adhered to.

2.2 General operating instructions

The operator of a pipe system for flammable or hazardous liquids has to maintain such in proper operating condition and to operate it according to all applicable rules and regulations. The system has to be monitored constantly and necessary maintenance and repair work has to be performed immediately and, depending on the circumstances, appropriate safety measures have to be taken.

The pipe system may not be operated, if it has deficiencies, which can endanger employees, other persons present or the environment. Appropriate steps have to be taken immediately to eliminate a dangerous condition.



Caution: Product pipe may be under pressure after completion of testing.

The operator is obligated to issue the necessary orders, to take the necessary steps and to make sure such orders are adhered to to avoid any dangerous conditions.

2.3 Startup of the FLEXWELL®-HL Pipe System



Caution: Startup and commissioning has to be performed in strict accordance with the local rules and regulations.

2.4 Inspections by the operator

The operator inspects the pipe system in required intervals for proper operating condition in accordance with the operating instructions and other regulatory mandates.

In particular he makes sure that,

1. fire protection installations are ready for service and that binder for spilled fluids is available in the specified quantity and at the predetermined location(s),
2. fire alarms are operational,
3. no prohibited materials and objects are located in areas with explosion hazards,
4. pipes and fittings are tight, procedure for testing of leaks in the interstitial space (annular gap between primary and secondary pipe) as described in point 2.1
5. the required safety installations are functioning,
6. fire lanes are unobstructed at all times
7. and in explosion hazardous areas bans of smoking and open fires are strictly observed.

2.5 Maintenance of the FLEXWELL®-HL Pipe System



Caution: Maintenance work and intervals have to be performed in accordance with the local regulations.

After completion of cleaning, maintenance and repair work and inspections the installation has to be returned to operating condition.

In particular all the safety devices have to be returned to operating condition.

2.6 Shutdown and taking out of service of the FLEXWELL®-HL Pipe System

Pipe systems, which are shut down, are to be secured in a such a way that they are no danger to employees or others.

Start of operation and maintenance

Open Secondary Containment Pipe System

Pipes, which are taken out of service temporarily, are to be emptied and cleaned in such a way that neither an explosive atmosphere exists nor can develop, and that no danger to the environment and groundwater can occur.

Pipes are to be secured against utilization. Leak detection systems and cathodic corrosion protection systems are to remain in operation.

2.7 Problems

If leakage or damage is detected in any part of the system (either by inspection of the sump, a leak detector, or similar monitors), the problems are to be immediately investigated by the site operator.

If leakage or damage to the piping system is verified, the manufacturer must be notified:

Manufacturer: BRUGG Pipesystems, LLC
P.O. Box 1836
Rome, GA 30162-1836
706.235.5606
Pipesystems.na@brugg.com

Open system

A secondary piping system with ends normally open at the sump and a minimum rated pressure of 5.0 psig (35 kPa) in accordance with UL 971 regulations.

If a leaking fluid is detected, the operator is to immediately investigate whether the FLEXWELL®-HL Pipe has a leak.

In case a leak is detected in the pipe, the pipe has to be shut down until the leak is repaired and a leak test to verify the successful repair is performed. Proceed according to point 2.1 for leak testing.



Caution: For the pressure test all local and otherwise relevant rules and regulations have to be observed.

Start of operation and maintenance

Closed Secondary Containment Pipe System

1. Fuels

This pipe system is intended for the following fuels in accordance with UL 971 regulations table 15A.1:

Motor vehicle fuels:	MV
Concentrated fuels:	CT
High blend fuels:	HB
Aviation and marine fuels:	A&M

Where applicable the fuels have to follow the ASTM rules.

The material of construction of the integrated primary and secondary pipe system is 316L or 316Ti stainless steel.



Caution: The suitability of the material of construction of the FLEXWELL®-HL Pipe for other fluids or media has to be investigated and verified.

2. Start of operations of the FLEXWELL®-HL Pipe System

2.1 Leak testing of the FLEXWELL®-HL Pipe System

After installation of the pipe system a leak test has to be performed at a maximum pressure of 100 ± 10 psig in the primary pipe and 6 ± 1 psig in the interstitial space (annular gap between primary and secondary pipe). The test is to be performed with dry air or an inert gas.



Caution: Do not use any liquids or solid materials for the leak test.



Caution: The local rules and regulations for pressure testing have to be strictly adhered to.

2.2 General operating instructions

The operator of a pipe system for flammable or hazardous liquids has to maintain such in proper operating condition and to operate it according to all applicable rules and regulations. The system has to be monitored constantly and necessary maintenance and repair work has to be performed immediately and, depending on the circumstances, appropriate safety measures have to be taken.

The pipe system may not be operated, if it has deficiencies, which can endanger employees, other persons present or the environment. Appropriate steps have to be taken immediately to eliminate a dangerous condition.



Caution: Product pipe may be under pressure after completion of testing.

The operator is obligated to issue the necessary orders, to take the necessary steps and to make sure such orders are adhered to to avoid any dangerous conditions.

2.3 Startup of the FLEXWELL®-HL Pipe System



Caution: Startup and commissioning has to be performed in strict accordance with the local rules and regulations.

2.4 Inspections by the operator

The operator inspects the pipe system in required intervals for proper operating condition in accordance with the operating instructions and other regulatory mandates:

In particular he makes sure that,

1. fire protection installations are ready for service and that binder for spilled fluids is available in the specified quantity and at the predetermined location(s),
2. fire alarms are operational,
3. no prohibited materials and objects are located in areas with explosion hazards,
4. pipes and fittings are tight, procedure for testing of leaks in the interstitial space (annular gap between primary and secondary pipe) as described in point 2.1
5. the required safety installations are functioning,
6. fire lanes are unobstructed at all times
7. and in explosion hazardous areas bans of smoking and open fires are strictly observed.

2.5 Maintenance of the FLEXWELL®-HL Pipe System



Caution: Maintenance work and intervals have to be performed in accordance with the local regulations.

After completion of cleaning, maintenance and repair work and inspections the installation has to be returned to operating condition.

In particular all the safety devices have to be returned to operating condition.

2.6 Shutdown and taking out of service of the FLEXWELL®-HL Pipe System

Pipe systems, which are shut down, are to be secured in a such a way that they are no danger to employees or others.

Start of operation and maintenance

Closed Secondary Containment Pipe System

Pipes, which are taken out of service temporarily, are to be emptied and cleaned in such a way that neither an explosive atmosphere exists nor can develop, and that no danger to the environment and groundwater can occur.

Pipes are to be secured against utilization. Leak detection systems and cathodic corrosion protection systems are to remain in operation.

2.7 Problems

If leakage or damage is detected in any part of the system (either by inspection of the sump, a leak detector, or similar monitors), the problems are to be immediately investigated by the site operator.

If leakage or damage to the piping system is verified, the manufacturer must be notified:

Manufacturer: BRUGG Pipesystems, LLC
P.O. Box 1836
Rome, GA 30162-1836
706.235.5606
Pipesystems.na@brugg.com

Closed, constantly monitored system

A closed system has to be monitored constantly by the installed monitoring system. If the monitoring system indicates a leak in the pipe, the pipe has to be shut down until the leak is repaired and a leak test to verify the successful repair is performed.



Caution: If a leak monitoring system is shut down, the leak tightness of the primary and secondary pipes of the FLEXWELL®-HL Pipe system is no longer monitored. A possible leak will no longer be indicated. This means that, if a leak detection system is shut down, the entire pipe system has to be taken out of service.

Proceed according to point 2.1 for leak testing. For an exact damage analysis it is allowable to pressurize the primary pipe with a maximum pressure of 100 ± 10 psig.

Installation and design instructions for marinas

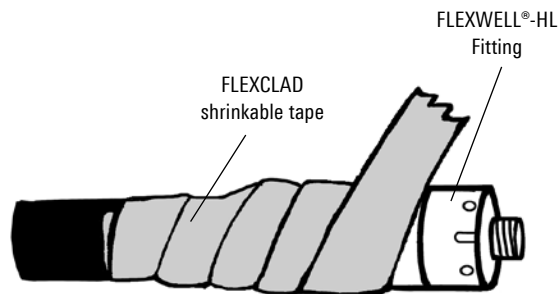
Installation

For floating marinas the pipe is typically attached underneath or to the side of the gangway connecting the land to the floating dock. Due to the flexibility of the pipe the pipe can be installed from the storage unit or fill box to the dispenser on the floating dock in one continuous run.

Whenever the installation does not allow a minimum slope of 1/8" per foot, such as in floating docks, then each transition sump in the path of the pipe installation has to be equipped with a leak detection device.

Corrosion protection

The polyethylene pipe jacket and shrink sleeves or tape for the exposed fittings provide further corrosion protection. All metallic parts must be covered by using heat shrink sleeves or heat shrinkable insulation tape.



In the following two pages are two examples of pipe installations for floating type marinas. In both cases the flexibility of the pipe compensates the length changes required of the pipe due to the tidal fluctuations without additional flexible connections.

For a specific installation **always consult BRUGG Pipesystems** for design input and assistance to make sure that all the variables are being considered.

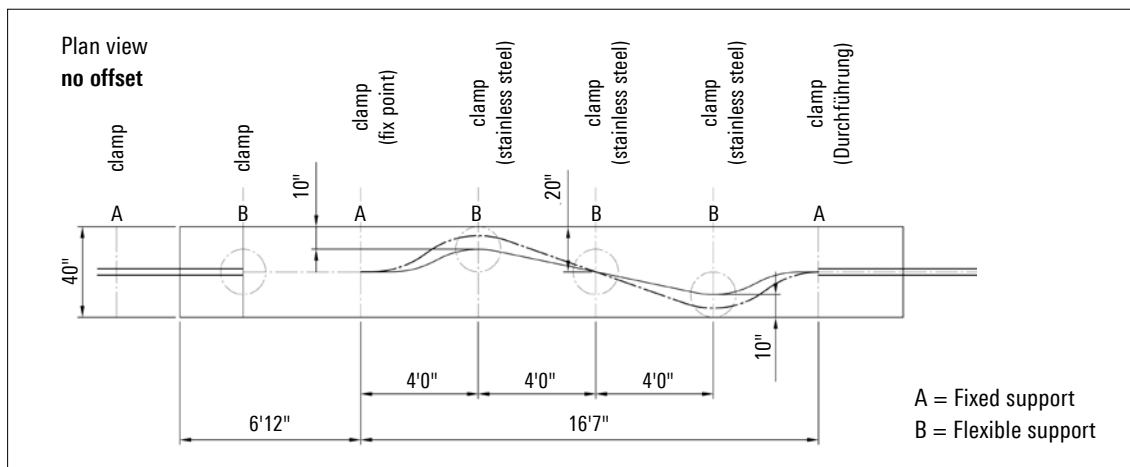
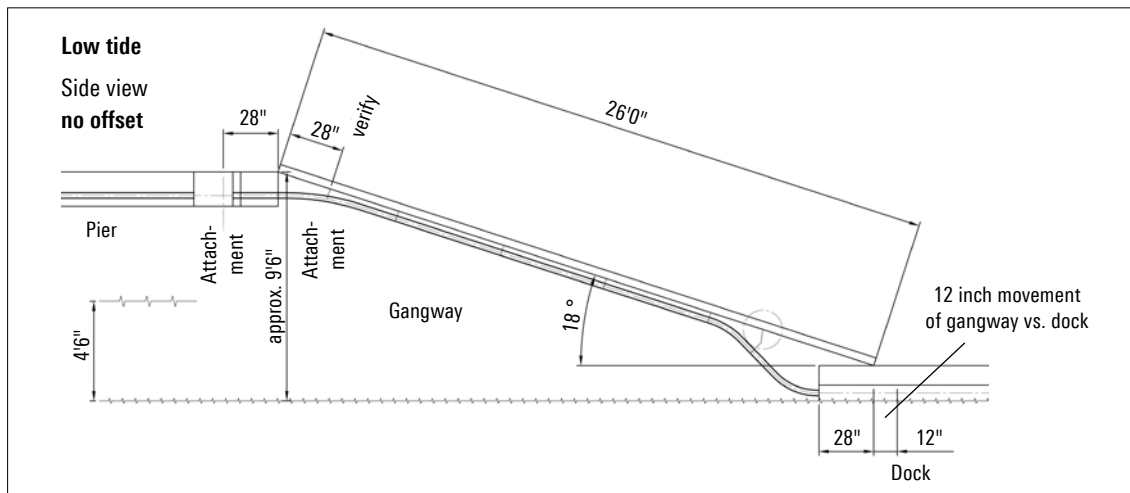
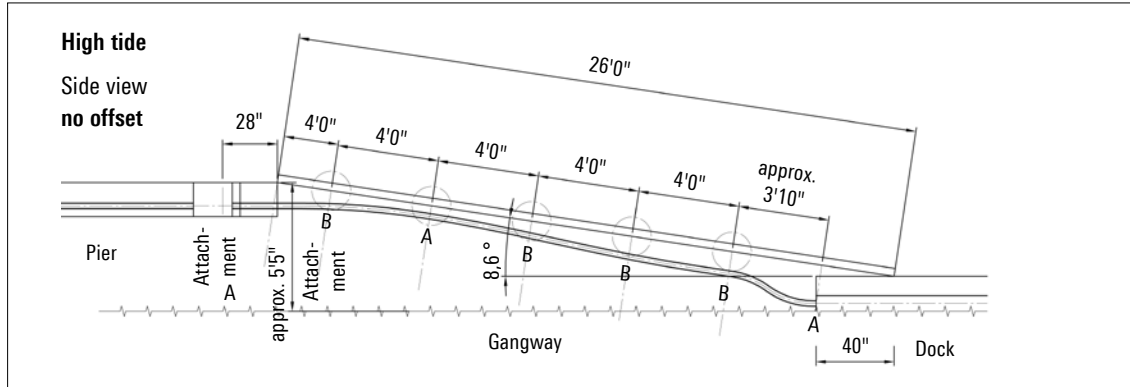


Installation and design instructions for marinas

Installation example typical

The FLEXWELL®-HL Pipe provides a continuous, uninterrupted run from storage tank on land to the dispenser on the floating dock. The inherent flexibility of the pipe compensates for the tidal movement. The pre-shaped pipe, supported by a stainless steel rope, compensates for the longitudinal movement between gangway and floating dock caused by the tides.

The "S" is preformed on land prior to the installation. It is preferred to create the bends with a special bending machine.



This is a typical fuel pipe installation for floating marinas. For actual cases please ask for a specific layout.

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1. These Terms and Conditions will govern all sales by Brugg Pipesystems, LLC (hereinafter "Brugg" or "Seller") unless otherwise agreed to in writing, signed by Brugg at its home office in Rome, Georgia by an authorized agent. Terms and conditions contained in Buyer's purchase order or any other document that are different from or in addition to these Terms and Conditions are objected to and will not be binding on Brugg. Buyer will be deemed to have agreed to these Terms and Conditions by issuing a purchase order number and upon receipt from Brugg of a written acknowledgement of Buyer's placement of an order. Notwithstanding the foregoing, if Brugg, at Buyer's request, commences performance in any way prior to receipt by Buyer of Brugg's written acknowledgement, Buyer's acceptance of these Terms and Conditions will be deemed to have occurred on the date such performance commences.
2. All sales are made F.O.B. Rome, Georgia and each shipment or delivery shall be considered a separate and independent transaction. Buyer has risk of loss upon acceptance of shipment by a common carrier or truck man at the place of shipment. Freight costs will be prepaid and added to the invoice for reimbursement by Seller.
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8. Net payment shall be due within 30 days from date of invoice unless otherwise agreed in writing by Seller. Any invoice not paid in full within such time will be deemed overdue. All invoices are payable in United States dollars. Checks are accepted subject to collection and the date of collection shall be deemed the date of payment. Any check or remittance received from or on account of Buyer may be accepted and applied by Seller against any indebtedness or obligation owing by Buyer, as shown on the books and records of Seller, without prejudice to the discharge of the remainder of any such indebtedness or obligations, regardless of any condition, proviso, statement, legend or notation appearing on, referring to, or accompanying said check or remittance. Should Buyer fail to make any timely payment, Seller may declare all outstanding invoices of Buyer immediately due and payable and Seller may cancel any outstanding purchase order issued by Buyer.
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10. Except as otherwise expressly provided herein, Buyer agrees that any claim of any kind by Buyer based on or arising out of this contract or otherwise shall be barred unless asserted by Buyer by the commencement of legal action within 12 months after the delivery of the products or other event, action or inaction to which such claim relates. This provision shall survive any termination of this contract, however arising.
11. Buyer shall pay interest to Seller on overdue invoices at the rate of 1.5 % per month on the unpaid portion.
12. Should Seller employ professional collection agents or attorneys to effect payment of monies due under this contract or related to the sale of goods by Seller to Buyer, all costs incident to said collection, including but not limited to court costs and reasonable attorney's fees of 15% of the total unpaid contract price, or in such amount as determined by the court to be reasonable, will be borne by Buyer.
13. This instrument and any signed acknowledgments issued by Brugg constitute the entire and only agreement between the parties hereto, and any representation, affirmation of fact, course of prior dealing, promise or condition in connection therewith or usage of the trade not specifically incorporated herein shall not be binding on either party. No waiver, alteration, or modification of any of the provisions hereof shall be binding unless in writing and signed by a specifically authorized representative of Seller.
14. **EXCLUSIVE WARRANTY:** Brugg warrants to the Buyer that the pipes and fittings sold by Brugg hereunder are warranted to be free from defects in materials and workmanship for a period of thirty (30) years for underground installations, a period of fifteen (15) years for above ground installations, and a period of five (5) years for marina installations. The warranty periods set forth above shall commence on the date of shipment to Buyer. BRUGG'S SOLE AND EXCLUSIVE OBLIGATIONS AND LIABILITIES UNDER THESE EXCLUSIVE WARRANTIES ARE AND SHALL BE LIMITED TO ISSUANCE OF CREDIT FOR OR REPAIR OR REPLACEMENT OF ANY PIPES OR FITTINGS OR PARTS THEREOF WHICH ARE PROVED TO BE OTHER THAN AS WARRANTED, AND BRUGG SHALL HAVE SOLE DISCRETION AS TO WHICH OF THESE REMEDIES IT SHALL PROVIDE. BRUGG SHALL NOT REIMBURSE OR MAKE ANY ALLOWANCE TO A BUYER FOR ANY LABOR OR SHIPPING CHARGES INCURRED BY THAT BUYER FOR REPLACEMENT, ADJUSTMENT, OR REPAIR OF ANY GOODS OR PARTS THEREOF OR FOR ANY OTHER WORK UNLESS SUCH CHARGES ARE AUTHORIZED IN ADVANCE BY BRUGG. ANY PIPES OR FITTINGS WHICH BRUGG DECIDES TO REPAIR OR REPLACE ARE WARRANTED TO BE FREE FROM DEFECTS IN MATERIALS AND WORKMANSHIP FOR THE REMAINDER OF THE INITIAL WARRANTY PERIOD SET FORTH ABOVE.
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 - (b) Any claim for breach of Brugg's warranties shall conclusively be deemed to be waived unless written notice of such claim is given to Brugg within thirty (30) days after the date on which the claimed defect is discovered or should have been discovered.
 - (c) Brugg's warranties shall be considered null and void if the original Buyer for use transfers ownership of the warranted goods, unless Brugg receives notification in writing providing the name and address of the new owner by no later than fifteen (15) days after the date on which the transfer is made.
 - (d) Brugg's warranties for all marina applications shall be considered null and void if a Quotation Processing form is not completed by the Buyer and approved in writing by Brugg prior to installation of the goods.
 - (e) Brugg's warranties shall not apply to any goods or parts thereof which are obtained from manufacturers other than Brugg and resold by Brugg. Further, these warranties shall not apply to any goods or parts thereof which have been subjected to any misuses, neglect or accidental damage or which contain defects which are in any way attributable to improper transit, installation, or to alterations or repairs made or performed by any person or entity not under the control of Brugg and further conditioned upon the following:
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 - The installation of the goods is performed in accordance with all applicable federal, state, local, and administrative rules and regulations;
 - Brugg's timely receipt of a written claim under this warranty by Buyer as set forth above;
 - Only fuels specified by UL971A or otherwise approved in writing by Brugg are used in the goods; and
 - The goods are installed by Brugg certified installers in accordance with the valid installation instructions issued by Brugg, which were in effect at the time the goods are installed, and the goods are operated, monitored, serviced, maintenance, and repaired in accordance with all applicable federal, state, local, and administrative rules and regulations.
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15. The foregoing warranty will not cover and Brugg makes no warranties with respect to any goods subjected to abuse, misuse, misapplication, neglect, alteration or accident; to improper and incorrect installation or maintenance; or to abnormal conditions of use, temperature, moisture, dirt or corrosive matter; and any materials, parts, goods or other components that are manufactured by someone other than Brugg.

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Buyer agrees to provide Brugg with written notice of any breach of the above warranty within thirty days after Buyer discovers, or should have discovered, the alleged breach. Time is of the essence herein, and Buyer's failure to provide written notice to Brugg within the required time of any alleged breach of the foregoing warranty will release and discharge Brugg from any obligation or liability for that breach of warranty. The foregoing warranty extends only to Buyer and to no other person.
16. All products should be inspected thoroughly upon receipt. Claims of defect must be asserted by Buyer by written notice to Seller within thirty days of receipt. Buyer will be deemed to be in receipt of products if delivered to Buyer or to the ship to address designated by Buyer in the purchase order. Failure to give Seller notice of any claim within 30 days of receipt of the materials concerned shall constitute a waiver of such claim by the Buyer. Any request for return for replacement, repair, or credit must be made in writing to the Seller at Rome, Georgia within this time period.
17. No returns will be allowed unless the Seller has given prior written authorization from Rome, Georgia. Authorized returns must be carefully identified and tagged with quantity and reason for return. All unauthorized returns will be shipped back to the sender by collect freight with no action taken.
18. The validity and construction of this contract shall be determined under the laws of the State of Georgia. Should any provision be held void or unenforceable for any reason, all remaining provisions hereof remain in full force and effect.
19. The parties consent to the jurisdiction of the Superior Court of Floyd County, Georgia, the courts of Georgia, and the United States District Court for the Northern District of Georgia for all matters relating to or arising out of this contract.

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14.06.2012

Subject to technical changes.

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