



Safety Breakaway Coupling ABVC

Operating Instruction





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1 Introduction

These operating instructions describe the safe installation and operation of the ABVC breakaway coupling.

- Read through the operating instructions carefully prior to installation and operation.
- Keep the operating instructions during the entire service life of the breakaway coupling.
- Make sure that these operating instructions are accessible to the operator at all times.
- Pass on the operating instructions to each subsequent owner or user of the breakaway coupling.
- Add every supplement received from the manufacturer.
- Observe other applicable documents.

1.1 Validity

These operating instructions apply exclusively to the installation and operation of the ABVC breakaway coupling from Stäubli Hamburg GmbH.

1.2 Target group

These operating instructions for the ABVC breakaway coupling are directed at users (operators and planners) of refueling systems. The breakaway coupling is a safety component in a pipeline/hose line which leads from a refueling system to a mobile supply and disposal unit.

1 Introduction

1.3 Standards, guidelines and directives

These operating instructions were prepared based on the following directive:

- Pressure Equipment Directive DGRL 2014/68/EU

The breakaway coupling was developed, designed and manufactured based on the following standards, directives and guidelines:

- DGRL Pressure Equipment Directive 2014/68/EU (Category IV)
- AD 2000
- ATEX Product Directive 2014/34/EU
- ADR / RID / IMDG

1.4 Warnings, symbols and markings

1.4.1 Warnings in this documentation

Warnings are used in these operating instructions to prevent injuries or damage.

➔ Read and observe warnings.

The warnings are marked with the following symbols and signal words:

 DANGER
Imminent threat of danger! Upon non-compliance, death or very serious injuries are risked.
 WARNING
Possible imminent danger! Non-compliance could result in death or very serious injuries.
 CAUTION
Dangerous situation! Non-compliance could result in minor injuries or damage.

1.4.2 Symbols and markings

Symbols and markings are used in these operating instructions for simple, fast comprehension.

Symbol	Description
✓	Condition which must be met before you can begin an action.
➔	Action with one or more steps for which the sequence is irrelevant.
1. 2. 3. ..	Action with several steps for which the sequence is relevant and is therefore specified.
•	List of first level
(see chapter xx)	Cross-reference to a position in these operating instructions

Table 1-1: Symbols and markings

! NOTE
Important information for comprehension of for optimizing the work and installation processes.

1 Introduction

1.5 Applications

The ABVC breakaway coupling is intended for use in pipelines or hose lines for cryogenic fluids.

1.5.1 Industrial areas

- Refueling systems for:
 - Road tank vehicles
 - Ships
 - Tank containers

1.5.2 Fluids

- Cryogenic fluids in a temperature range from -196 °C to $+65\text{ °C}$, e.g. LNG (liquefied natural gas), nitrogen, oxygen and argon
- Others on request

2 Safety Instructions

2.1 Proper use

Breakaway couplings for the ABVC series are intended for use in pipelines and hose lines as an equipment part with a safety function in accordance with the Pressure Equipment Directive.

They are intended to separate a pipeline or hose line in a defined manner when the mechanical tensile load is exceeded and to close both ends of the line leak-tight in order to prevent dangerous fluids from escaping.

It is necessary to choose the suitable shear bolts for secure separation of the breakaway coupling. The choice is made in accordance with the maximum permissible tensile load of the product line (or pipeline/hose line) used, see the table in chapter 6.4.6.

The breakaway coupling is only intended for pumping the permissible fluids. The resistance of the material of the version used must be tested as part of the system approval procedure.

Any other use is considered improper. Improper uses include:

- Use outside the specified pressure and temperature ranges.
- Use for non-approved fluids.
- Faulty shear bolt design, see the table in chapter 6.4.6.

The standard version of the breakaway coupling described here is intended for permanent installation on a mobile pressure device in accordance with the TPED Directive 2010/35/EU.

The breakaway coupling must not be used as a safety coupling for pressure limitation.

2 Safety Instructions

2.2 Safety regulations

The operator of the breakaway coupling is responsible for compliance with all relevant legal regulations, directives and guidelines.

- ➔ Only put breakaway couplings into operation, operate and service them in agreement with the following standards:
 - Operating instructions
 - Other applicable documents (national regulations on pressure equipment, operating safety, hazardous goods and environmental protection)
 - Regulations on hazardous substances and highly inflammable or combustible fluids
 - Regulations on systems in potentially explosive atmospheres
This applies in particular to avoidance of sparking caused by static electricity, for the grounding of system parts and for the contact resistance of the conductive hose.
 - Use in explosive atmospheres only with undamaged impact ring
 - System-specific regulations and requirements
 - Equipment and Product Safety Act for Pressure Equipment
 - Valid international, national and regional regulations
 - Accident prevention regulations
- ➔ The national occupational safety guidelines applicable for this application must always be complied with for the proper use of the ABVC breakaway coupling within the scope of the refueling of road vehicles with cryogenic liquid methane (LNG).
- ➔ Have the breakaway coupling, tank and product line approved by qualified persons (experts, skilled personnel through professional training, professional experience) and the approval documented.
- ➔ Comply with all approval procedures, required test regulations and inspection periods.

- Only allow qualified persons (experts, skilled personnel, professional training or professional experience) to carry out testing prior to commissioning and following maintenance work.
- Test the breakaway coupling regularly for proper condition and absence of leaks. Document the results of the tests.
- If the breakaway coupling is part of a system requiring testing, have the breakaway coupling checked by an expert at the initial inspection as well as at repeat inspections of the system.
- Carry out all necessary measures for inspection, maintenance and repair in agreement with the national regulations of the country of installation, the specifications of the monitoring body for the system and, if necessary, in coordination with the manufacturer.

2.3 Personnel qualifications

The operator is responsible for repair and maintenance work only being carried out by skilled personnel, who have been trained by Stäubli Hamburg GmbH.

- The operational regulations for personnel qualifications must be complied with.
- Make sure that the personnel have read and understood these repair and maintenance instructions and can implement them.
- Make sure that the personnel knows and observes the applicable accident protection and safety regulations.
- Make sure that the personnel uses suitable protective clothing/equipment.

2.4 Safe handling

- Check the breakaway coupling for proper function and absence of leaks before putting it into operation.
- When using the breakaway coupling in a raised position, make sure that no persons are injured by falling parts of the breakaway coupling.

3 Storage and Transport

3 Storage and Transport

- Only transport or store the breakaway coupling in cleaned condition.
- Cover the openings with protective caps and plugs to prevent damage to the surfaces/sealing surfaces and to protect them from soiling.
- Make sure that no damage can occur due to corrosion or extreme temperatures at the storage location.

4 Scope of Delivery

The ABVC breakaway coupling is supplied ready to use.

5 Tools

For installing the breakaway coupling:

- Open-end wrench with suitable wrench size (see chapter 6.4.1).
The open-end wrench is not included in the scope of delivery.

6 Design and Function

6.1 Design

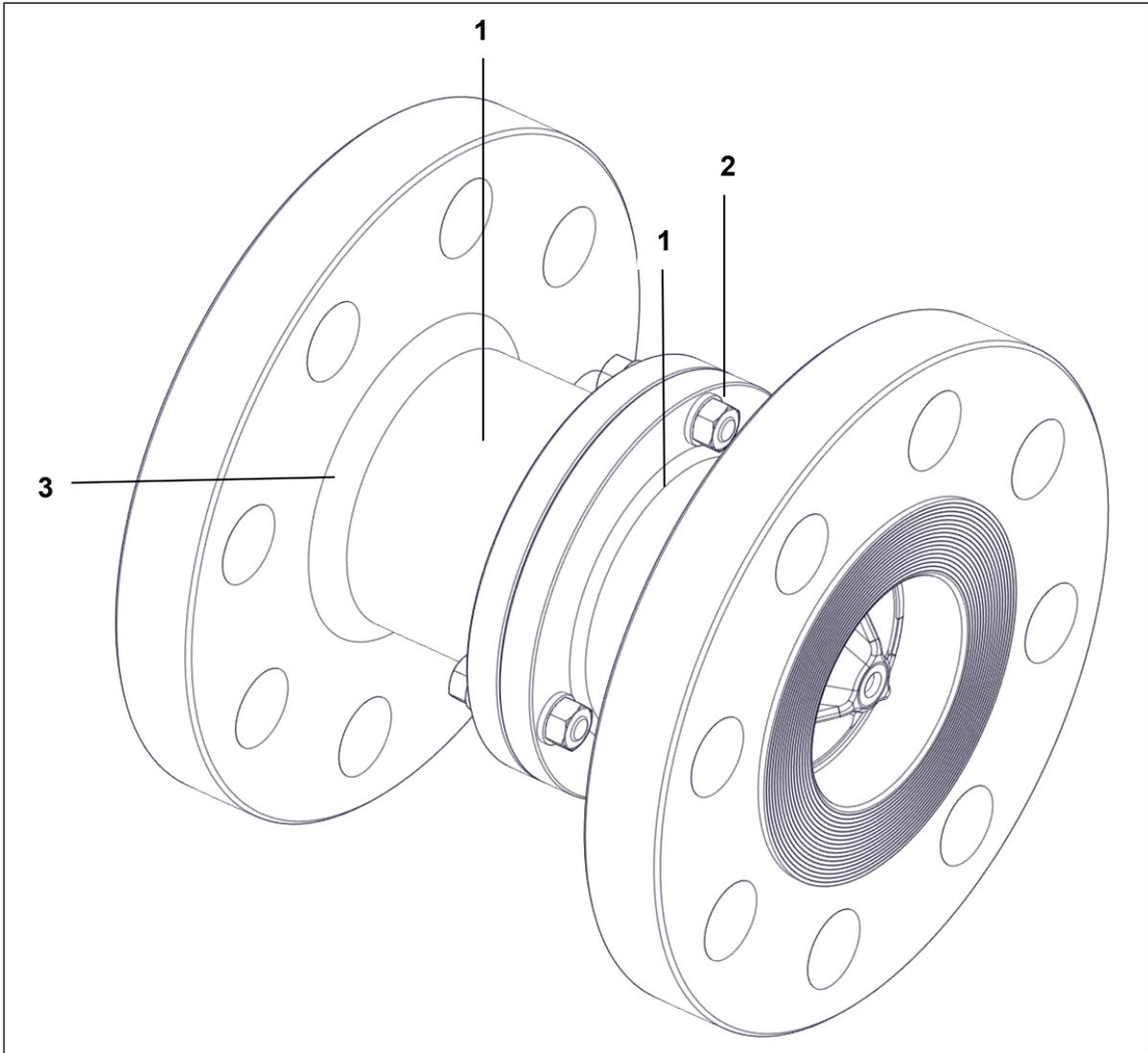


Figure 6-1: Parts of ABVC breakaway coupling

- | | | | |
|---|--------------------|---|----------------------------|
| 1 | Housing halves | 3 | Connection to product line |
| 2 | Breaking pins (3x) | | |

6 Design and Function

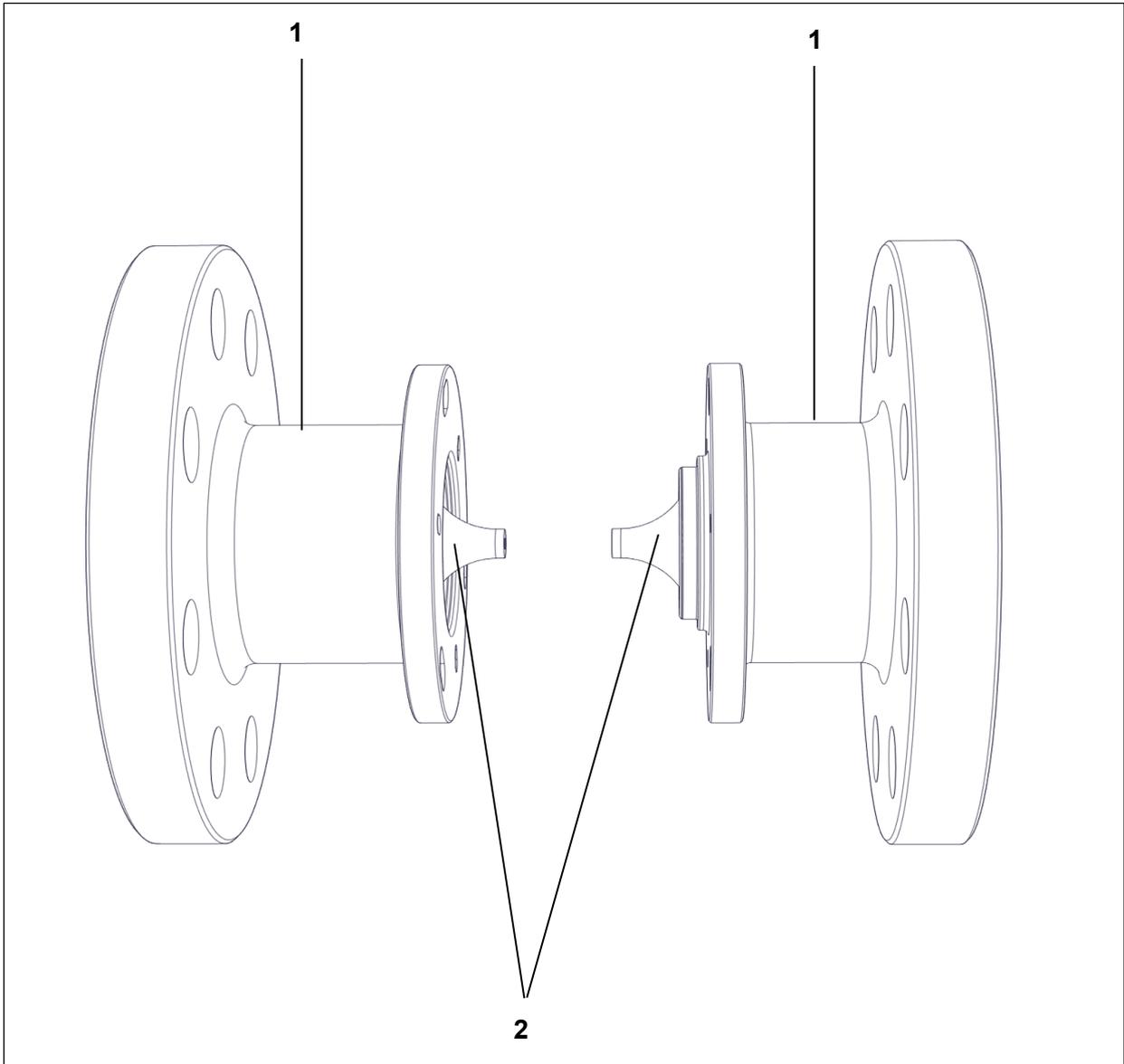


Figure 6-2: Coupling halves following an emergency breakaway

1 Separated housing halves

2 Closed valves

6.2 Function

The ABVC breakaway coupling consists of two housing halves with one check valve each. The housing halves are held together in the operating mode with shear bolts. The two check valves support each other in the operating mode and hold the flow area open.

A separation of the breakaway coupling is initiated when, for example, the tank car/tank truck rolls away or the product line was not disconnected before the tank truck starts off. The two housing halves are separated from each other as soon as an impermissible application of force is present at the product line. In the process, the three shear bolts with which the predetermined breaking point is provided shear off.

The required application of force which must be present to separate the breakaway coupling is considerably less than the force required to tear apart the hose or to disconnect it.

If a separation occurs, the spring-loaded check valves suddenly close off both ends of the line. The one coupling half remains firmly attached to the tank car/tank truck, while the second coupling half remains firmly attached to the product line.

The unchecked escape of liquids or gases at the two ends of the product-carrying line is prevented.

6 Design and Function

6.3 Marking

Each coupling half is provided with a marking.

The marking contains the following information:

Marking (exemplary)	Meaning
Manufacturer's abbreviation: Stäubli Hamburg	Manufacturer's identification
ABVC.080300.xxxxx-xx	Article number for identifying the product
No. 1038/19	Serial number/Year of manufacture
1.4301/1.4404/1.4462	Material designation of housing
PTFE/PE	Material designation of seal
DN PN	Nominal diameter, pressure rating
II 2G TX	Ex marking

Table 6-1: Marking on the housing

6.4 Technical data

6.4.1 Nominal diameters and pressure ratings

Nominal size	Connection version	Pressure rating	Wrench size
DN 25	1" NPTF ASA/EN 1092-1 flange Others on request	PN 40	SW 38
DN 40	ASA/EN 1092-1 flange Others on request	PN 16	-
DN 50	2" NPTF ASA/EN 1092-1 flange Others on request	PN 40	SW 65
DN 80	3" NPTF ASA/EN 1092-1 flange Others on request	PN 40	SW 100
DN 100	4" NPTF ASA/EN 1092-1 flange Others on request	PN 40	SW 125

Table 6-2: Nominal diameters and pressure ratings

! NOTE
Additional nominal sizes and pressure ratings on request.

6.4.2 Materials

The couplings are available in the following materials:

- 1.4404 AISI 316L

! NOTE
Other materials for housings and seals on request.

6 Design and Function

6.4.3 Seals

Component	Material abbreviation	Designation
Thread seal	PTFE	Polytetrafluoroethylene

Table 6-3: Seals

6.4.4 Temperature range

The ABVC breakaway coupling is approved for a temperature range from $-196\text{ }^{\circ}\text{C}$ to $+65\text{ }^{\circ}\text{C}$ and can be used under all temperature conditions.

6.4.5 Triggering angle

The angle of the application of force at which an emergency separation is guaranteed is a maximum of 90° from the longitudinal axis of the coupling rotationally symmetrical to all sides.

6.4.6 Triggering force and residual quantities

Nominal diameter	Pressure rating	Tear-off force [kN]	Residual quantity [cm ³]
DN 25	PN 16	7.0	20
	PN 25	12.0	
	PN 40	18.0	
DN 40	PN 16	13.0	91
	PN 25	20.0	
DN 50	PN 16	10.0	56
	PN 25	16.0	
	PN 40	26.0	
DN 80	PN 16	24.0	220
	PN 25	38.0	
	PN 40	58.0	
DN 100	PN 16	33.0	399
	PN 25	55.0	
	PN 40	92.0	

Table 6-4: Triggering force and residual quantities

The triggering force is adjusted by the choice of shear bolts.

➔ Choose the shear bolts so that they correspond to the triggering force in the pressureless state.

The shear bolts are marked with the value of the triggering force in kN.

The marking applies in each case to the entire number of shear bolts used per coupling.

The triggering force can vary by a maximum of 0 % to –20 %.

Shear bolts are available on request for values other than those in Table 6-4.

Values for the maximum occurring residual quantities including double safety.

7 Installation/Assembly

- ➔ Read and comply with the provisions in chapter 2 before installation/assembly.
- ➔ Make sure that the tensile strength of the hose used is at least 1.5 times the value of the coupling triggering force. Shear bolts are marked with the triggering force value.
 - See the table in chapter 6.4.6 for the triggering force.

Required tools for installation:

- ➔ Use a suitable tool for the wrench surfaces provided on the breakaway coupling.
- ➔ See the table in chapter 6.4.1 for the thread sizes.

The breakaway coupling is installed in the product line.

Recommendation:

- ➔ Install the breakaway coupling directly between the hose line and the product line coupling.
- ➔ Install the breakaway coupling as close to the mobile unit (e.g. tank car) as possible.

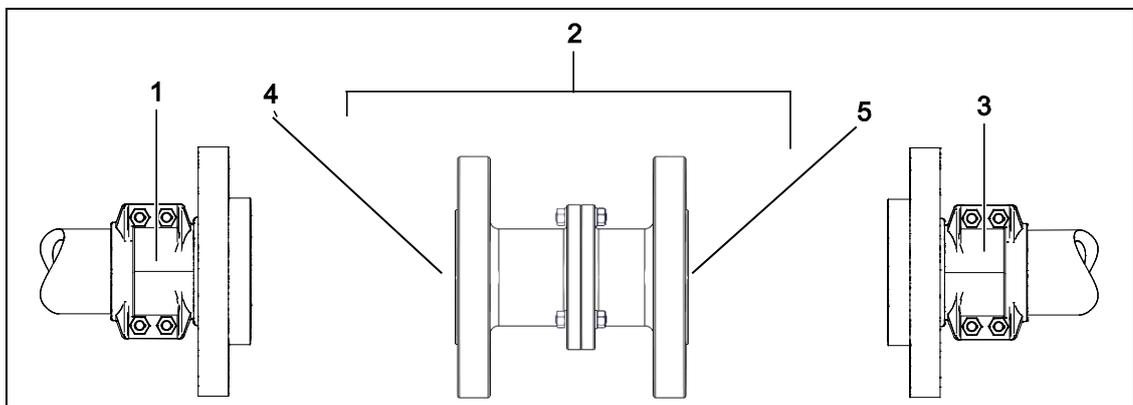


Figure 7-1: Installing breakaway coupling

- | | | | |
|---|--|---|---|
| 1 | Pipeline/hose line/
tank connection 1 | 4 | Connection 1 |
| 2 | ABVC Breakaway Coupling | 5 | Connection 2 |
| 3 | Pipeline/hose line/
tank connection 2 | 6 | Threaded protective caps
(not illustrated) |

7.1 Installing breakaway coupling

CAUTION

Danger of injury caused by sharp edges!

→ Wear protective gloves.

CAUTION

Danger of injury caused by falling coupling parts!

A greater load effect from the outside can result in triggering of the breakaway coupling.

→ Prevent persons or objects being support by or leaning on the coupling.

CAUTION

Danger of injury caused by escaping liquids and danger of environmental damage!

→ Wear protective equipment.

→ Completely drain lines carrying product.

→ Use catch containers.

CAUTION

Danger of injury with larger nominal diameters of the breakaway coupling!

→ Use suitable lifting devices.

→ Carry out installation together with a second person.

→ Wear protective equipment.

For the operator:

Only qualified persons may be commissioned with the installation of the breakaway coupling. Qualified persons are experts and skilled personnel following professional training/with professional experience.

7 Installation/Assembly

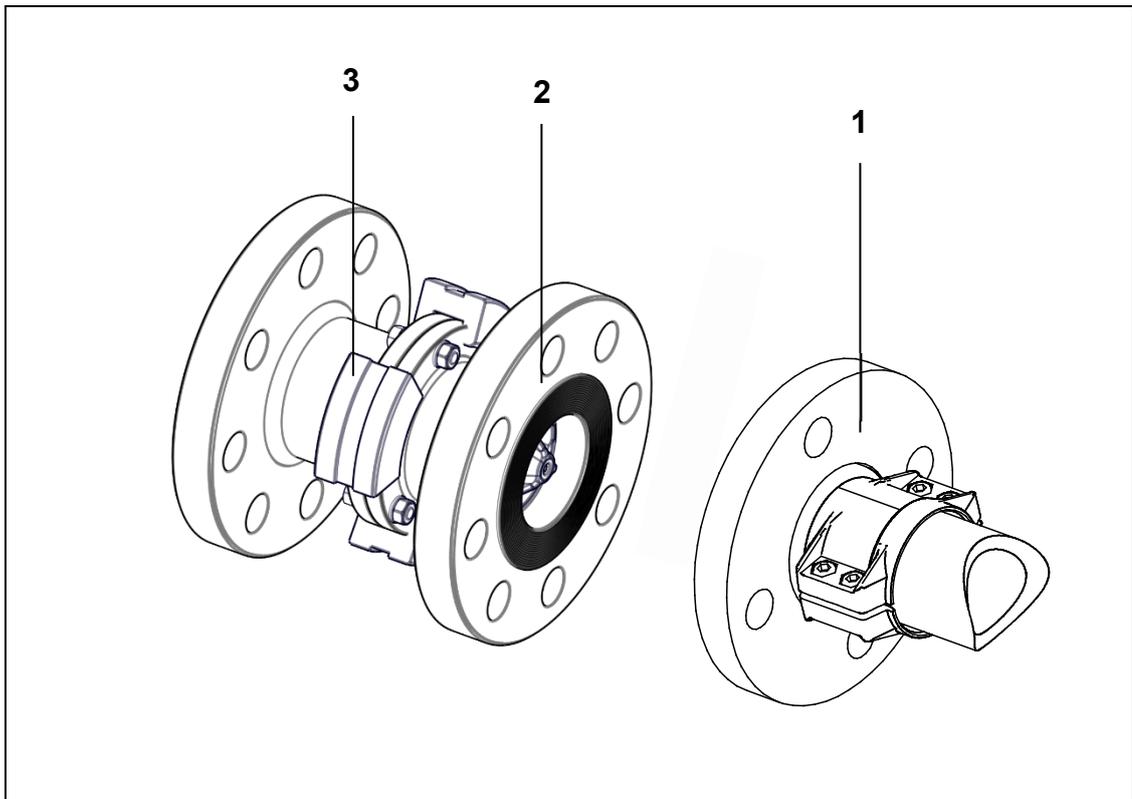


Figure 7-2: Fastening hose

1. Remove the packaging and thread protection caps.
2. Check the breakaway coupling for damage.
3. Firmly screw the pipeline/hose line end (1) onto the end of the coupling (2).
4. Firmly screw on the connection side to the tank car/tank truck on the other end of the coupling.
5. Check the connections for leaks.
6. Check the pipe/hose/tank in accordance with the system-specific specifications.
7. Remove jaws to transport lock (3).

Grounding of breakaway coupling:

Make sure that the coupling is conductively connected to the pipe/hose/tank.

7.2 Commissioning

⚠ WARNING

Danger of injury caused by escaping liquids and danger of environmental damage!

- Make sure that the tensile strength of the hose used is 1.5 times the value of the coupling triggering force.
- See the table in chapter 6.4.6 for the triggering force.

- Do not carry out commissioning until the breakaway coupling is properly installed and fastened at the product pipes.
- Observe the operating instructions of the refueling system.
- Check the following points each time before putting the system into operation:
 - Check the conductivity in accordance with the system-specific specifications
 - Check the breakaway coupling for leaks.
 - Check the connection from the system to the breakaway coupling for leaks.
 - Check the shear bolts for damage.
Replace damaged shear bolts immediately, see chapter 11.
- Do not put the breakaway coupling into operation in case of visible damage or known previous damage with which there is a danger of malfunctioning.
- Put the system into operation and start conveying and/or pumping.
Observe the system operating instructions when doing so.

8 Operation

⚠ WARNING

Danger of injury caused by extreme cold!

The breakaway coupling is designed for use in a temperature range from -196 °C to $+65\text{ °C}$.

→ Always observe the safety regulations applicable for handling cryogenic fluids.

⚠ WARNING

Danger of injury caused by extreme cold!

Danger of skin injuries.

→ Wear gloves.

⚠ WARNING

Sudden separation of the breakaway coupling will occur on triggering!

The conveyed medium can spray onto the skin or into the eyes.

→ Wear face protection.

→ Make sure that all areas of the skin are covered.

⚠ CAUTION

Emergency separation is not guaranteed when the triggering angle is exceeded!

→ Do not exceed the maximum triggering angle of 90° .

- ✓ Both product line ends are properly connected and ready for use
- ✓ Breakaway coupling closed
- ✓ Shear bolts undamaged

The breakaway coupling will be separated suddenly when the set tear-off force is present.

9 Procedure Following Triggering of Breakaway Coupling

WARNING

Danger of injury caused by escaping liquids and danger of environmental damage!

Liquid can escape when the breakaway coupling is triggered or when closures are opened.

- Wear suitable personal protective equipment.
- Make sure that the coupling halves are pressure-free and the product line has been completely drained.
- Use suitable tools.

WARNING

Danger of injury caused by extreme cold!

The breakaway coupling is designed for use in a temperature range from -196 °C to $+65\text{ °C}$.

- Always observe the safety regulations applicable for handling cryogenic fluids.
- Wear face protection.
- Wear gloves.
- Make sure that all areas of the skin are covered.

NOTE

The breakaway coupling cannot be reused after triggering.

It is absolutely necessary that it be repaired by the manufacturer or by an authorized service partner.

- Clean the breakaway coupling of product residues.
- Send the breakaway coupling together with the filled-out contamination sheet for repair to Stäubli Hamburg GmbH or to an authorized service partner.

10 Cleaning

10 Cleaning

- Always check the breakaway coupling and connections for leaks before cleaning.
- Use only compressed air for cleaning.
- Clean the breakaway coupling prior to removal (regardless of the medium conveyed).

11 Maintenance/Repair

- Do not use damaged breakaway couplings.
- Perform maintenance regularly, however at the latest after the system inspection interval expires.
- Do not reuse the breakaway coupling after triggering.
Repair always has to be carried out by the manufacturer.
- Only have maintenance and repair of the breakaway coupling carried out by Stäubli Hamburg GmbH or by companies/persons authorized by Stäubli Hamburg GmbH.
- Conduct a visual inspection at regular intervals.
 - Check the breakaway coupling for damage or defects.
 - Check the operating condition and absence of leaks of the breakaway coupling.
- Comply with and document the specified maintenance intervals.

NOTE

Damage to the breakaway coupling can be caused by personally conducted repair measures.

- Do not carry out repairs yourself.
- Only have a defective breakaway coupling repaired by Stäubli Hamburg GmbH or by persons authorized by Stäubli Hamburg GmbH.

12 Removing

 WARNING**Danger caused by release volume of dangerous fluids!**

Fluid can escape when removing the breakaway coupling.

→ Take fluid-specific safety precautions and comply with the safety regulations.

 WARNING**Danger of injury caused by extreme cold!**

The breakaway coupling is designed for use in a temperature range from –196 °C to +65 °C.

→ Always observe the safety regulations applicable for handling cryogenic fluids.

→ Wear cold or heat-resistant protective clothing.

1. Make sure that the coupling halves are depressurized and free of fluids.
2. Clean the coupling with a lint-free cloth and dishwashing liquid before removal.
Only use compressed air in the absence of any fluids.
3. Screw off the hose line with a suitable open-end wrench.

13 Disposal

- Comply with the national and regional regulations when disposing of or recycling the breakaway coupling or its components.
- If you have questions on the disposal of the breakaway coupling, please contact the manufacturer or an authorized expert.

14 Liability Disclaimer

Stäubli Hamburg GmbH shall assume no liability for consequential damage due to faulty installation, incorrect handling and negligent or incorrect maintenance work.

The operator bears the sole responsibility for the installation, operation and maintenance of the breakaway coupling.



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