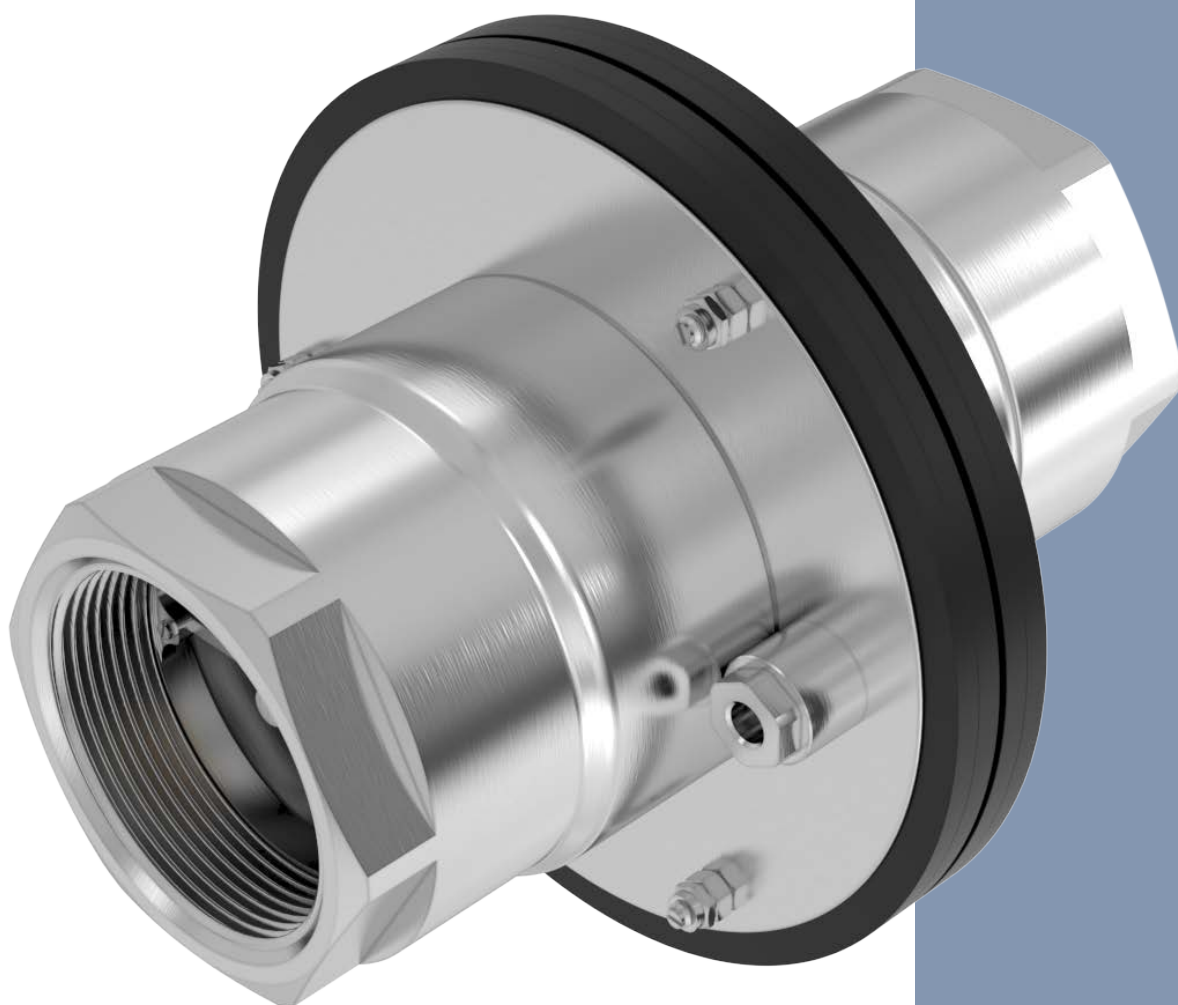


# MannTek

## PERC Operating Manual



[manntek.se](http://manntek.se)

### FOREWORD

This operating manual applies to the person or persons using the Dry Disconnect Couplings.

It is very important to read and understand this operation manual before use of this coupling. Become familiar with the unit's operation, applications and limitations. Be particularly aware of its specific hazards. Store this manual in a clean area and always at a readily available location. Additional copies at no charge can be obtained through written requests.

### **IMPORTANT!! READ THE COMPLETE DOCUMENTATION**

The base for this manual follows the EC-Directive:

Pressure Equipment Directive  
2014/68/EU of 15<sup>th</sup> May 2014

- Do not make modifications that are not authorized by the manufacturer.
- Read and respect all warnings and instructions provided to you.
- Use only original MannTek spare parts for maintenance.

### SUMMARY OF REVISIONS

<b>Date of change</b>	<b>Description</b>
2015-12-18	1. Edition
2017-12-22	General review % new front page layout

## TABLE OF CONTENT

FOREWORD .....	2
SUMMARY OF REVISIONS .....	2
TABLE OF CONTENT .....	3
1 INTRODUCTION.....	4
1.1 Intended use .....	4
1.2 Product specification.....	5
1.3 Technical data .....	5
1.4 Breaking Bolts.....	6
1.5 Identification plate e.g. for PERC 4"-4"NPT.....	7
1.6 Scope of delivery .....	7
2 GENERAL SAFETY RULES .....	7
2.1 Safety Instructions .....	7
3 TRANSPORT AND STORAGE.....	8
3.1 Delivery Check.....	8
3.2 Complaints / Return of goods .....	8
3.3 Storage .....	8
4 INSTALLATION .....	9
4.1 Initial Operation.....	9
4.2 Installation.....	9
5 OPERATION.....	10
5.1 General notes .....	10
5.2 Daily visual inspection .....	10
5.3 Dismantling .....	10
5.4 Improper use.....	11
6 MAINTENANCE AND REPAIR .....	11
6.1 General information .....	11
6.2 Maintenance and service instruction .....	12
6.3 Spare parts and tools.....	13
6.4 Pressure and tightness test .....	13
7 APPLICABLE DOCUMENTS.....	14
7.1 Declaration of Conformity .....	14

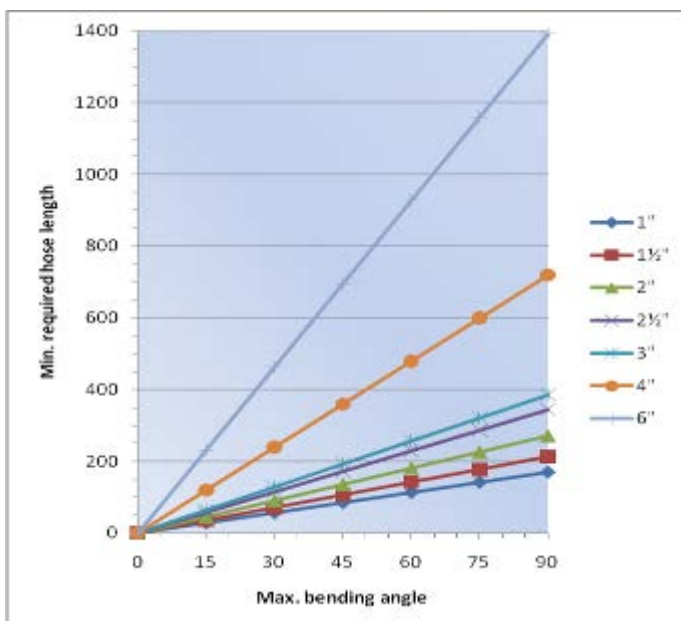
## 1 INTRODUCTION

### 1.1 INTENDED USE

The Powered Emergency Release Coupling (PERC/CBC) acts as a safety component in the supply line of mobile systems, preventing damage to personnel and environment, instead of a supply hose or pipe rupture during filling or emptying due to a change in location of the tank. The coupling valves on the tank and on the supply line immediately close whenever the PERC/CBC halves separate.

The PERC/CBC is specially designed for trouble free operation in cryogenic service conditions down to  $-196^{\circ}\text{C}$ . Reliable and safe operation is dependent upon the correct installation and handling of the equipment. Regular and appropriate maintenance is essential to ensure both safety and reliability over the life of the equipment. Take care that the product is only used inside the limits of the following product specification.

There are two kinds of PERC/CBC available. A marine type version is designed for offshore applications. The specific design requires an installation between two hoses. It is only possible to release the coupling by axial force.



The length of the hose segments should not be less than  $L = a/57,3 \times (r+d/2)$ .

$L$  = min. required hose length

$a$  = max. bending angle

$r$  = min. bending radius

$d$  = outer hose diameter

Figure 1: min. required hose length depending on bending angle shown for hoses according to EN12115

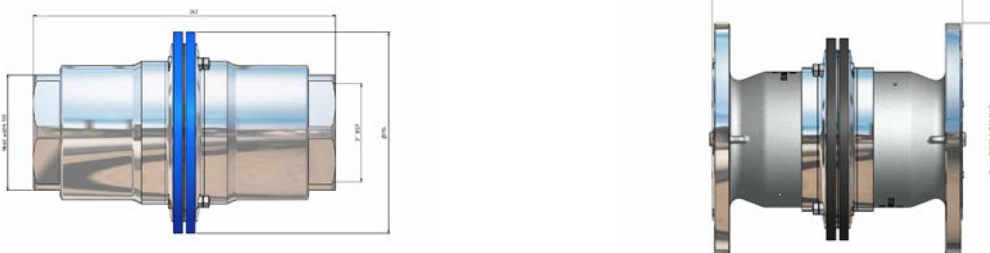
The second PERC/CBC-type is an industrial version. Duly installed it is connected to a tank or a fix connection point inside a loading station on one side and a hose or a loading arm on the other side. This makes that the PERC/CBC can be released under a pull force angle up to  $90^{\circ}$ .

## 1.2 PRODUCT SPECIFICATION

Product name:	Powered Emergency Release Coupling
Sizes:	1", 2", 2½", 3", 4" and 6"
Thread Connection:	NPT-Thread ANSI B1.20.1
Flange Connection:	Flange EN 1092, ANSI B16.5
Other Connection:	On request
Material:	EN 10272 – 1.4401/1.4404+AT ASTM A479 – S31603 (316L)
Working pressure:	10 bar / 16 bar / 25 bar / 150 psi / 300 psi
Max test pressure:	16 bar / 25 bar / 40 bar / 240 psi / 450 psi
Temperature range:	-196°C to +80°C

## 1.3 TECHNICAL DATA

Table 1: Nominal Widths, Weight and Dimensions [mm] (preliminary)



Nominal width	Breaking force	Connection	kg (stainless)	D [mm]	L [mm]
1"	3,2 kN	1" Thread	1,7	74	126
		1" Flange	4,2	115	132
2"	13 kN	2" Thread	2,6	114	178
		2" Flange	7,3	165	178
2½"	22 kN	2½" Thread	7,4	140	251
		2½" Flange	13,2	191	214
3"	33 kN	3" Thread	8,5	174	279
		3" Flange	15,1	210	222
4"	52 kN	4" Thread	15,5	211	320
		4" Flange	20,7	254	239
5"	81 kN	5" NPT male	32,0	269	362
		5" Victaulic	31,0	269	341
6"	92 kN	6" Thread	46,8	304	400
		6" Flange	57,6	318	384

Table 2: Materials

Component	Material no.	Standard	Operating temperature
Housing	1.4401	EN 10272 – 1.4401+AT	
Check valve	1.4404	EN 10272 – 1.4404+AT	-200°C to 250°C
Spring	1.4401	EN 10270 – 1.4401	-200°C to 250°C

## 1.4 BREAKING BOLTS

Mann Technik AB delivers breaking bolts according to customer specification. The breaking force should be specified for the weakest component.

Without any specification we supply our couplings with bolts according to the following table.

Example: On the ID-plate of the coupling the mentioned pressure rate is 25 bar. If the minimum burst pressure of the hose is 4 times 25 bar = 100 bar. For a DN65 (2½") coupling the standard breaking bolts are **22 kN**.

Table 4: Recommended breaking force for different hose burst pressures:

Burst pressure hose	DN 25	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
30 bar		4 kN	7 kN	11 kN	18 kN	28 kN	40 kN
40 bar		6 kN	10 kN	15 kN	24 kN	37 kN	54 kN
48 bar		7 kN	12 kN	18 kN	28 kN	45 kN	65 kN
60 bar		9 kN	15 kN	23 kN	36 kN	56 kN	81 kN
68 bar							92 kN
80 bar	3,0 kN	12 kN	20 kN	30 kN	48 kN	75 kN	108 kN
100 bar	3,2 kN	13 kN	<b>22 kN</b>	33 kN	52 kN	81 kN	117 kN
600 psi		6 kN	10 kN	15 kN	24 kN	39 kN	56 kN
1200 psi	3,1 kN	12 kN	21 kN	31 kN	49 kN	78 kN	112 kN

For your special application you can specify the breaking force depending on the burst pressure of your hose or depending on another weak point in your installation.

The breaking forces become reduced by increasing internal pressure. The influence per nominal diameter is independent from the breaking bolts. The following table shows the influence.

Table 5: Reduced force to release the coupling because of internal pressure

Breaking Force at	DN 25	DN 50	DN 65	DN 80	DN 100	DN 125	DN 150
0 bar	3,2 kN	13 kN	22 kN	33 kN	52 kN	81 kN	92 kN
6 bar	2,5 kN	11,9 kN	19,4 kN	29,2 kN	46,3 kN	73,1 kN	80,9 kN
10 bar	2,1 kN	11,1 kN	17,6 kN	26,7 kN	42,5 kN	67,8 kN	73,4 kN
16 bar	1,3 kN	9,9 kN	15,0 kN	22,9 kN	36,8 kN	59,8 kN	62,2 kN
25 bar		8,1 kN	11,0 kN	17,1 kN	28,3 kN	47,9 kN	45,5 kN
37,5 bar		5,7 kN	5,5 kN	9,2 kN	16,4 kN	31,3 kN	22,2 kN
40 bar		5,2 kN	4,4 kN	7,6 kN	14,0 kN	28,0 kN	17,5 kN
150 psi	2,0 kN	11,0 kN	17,5 kN	26,5 kN	42,2 kN	67,3 kN	72,8 kN
300 psi		9,0 kN	12,9 kN	19,9 kN	32,4 kN	53,6 kN	53,5 kN

## 1.5 IDENTIFICATION PLATE E.G. FOR PERC 4"-4"NPT

	Industrial Type	Marine Type
Article no:	NCP517D44*	NCP517M44*
Working Pressure PS:	25 bar	25 bar
Max Test Pressure PT:	37,5 bar	37,5 bar
Breaking force BF:	52 kN	52 kN
Seal:	PTFE	PTFE
Mtrl:	Stainless Steel	Stainless steel
Size:	DN100 – 4"	DN100 – 4"



\*For key of article no. please ask for explanation list.

## 1.6 SCOPE OF DELIVERY

1 pcs                                      NCP517D44                                      PERC Powered Emergency Release Coupling

In case of flange connection gaskets and bolts to mount the coupling into the application is not part of the delivery. For NPT thread use PTFE tape for sealing (see chapter 4.2). The design and delivery of the release system is not in the scope of this manual.

## 2 GENERAL SAFETY RULES

**For a safe operation, read this manual completely before operating this product.**

Failure to follow the warnings may result in serious personal injury, property damage, leakage or unexpected separation.

Before you install any MannTek equipment it is essential to check that the material and performance specifications are acceptable for your specific application. The pressure ratings and primary materials of the couplings are clearly indicated on the identification plate of each MannTek product. A drawing showing the materials of construction relating to each individual component is available upon request. Specification checks should always be carried out before the product is supplied, but if unsure, ask!

As with all equipment, a check should be made to ensure that the installation fulfils the requirements of applicable prevailing industry, local, national and international standards. Particular attention should be paid to pressure ratings, safety factors and the position of upstream and downstream affiliated closures.

### 2.1 SAFETY INSTRUCTIONS



Wear proper safety clothing consists of thermal gloves, full face shield approved for cryogenic use and solid shoes capable to withstand cryogenic spill whenever operating PERC.



Make sure the operating space is clear to avoid accidental contact with others. In case of release the coupling need to have space for free movement.



Keep the atmosphere in the pressure chamber of the PERC dry, with a dew point below -196°C (-321°F). This can be achieved by a permanent pilot pressure of dry nitrogen gas at e.g. 2 bar (30 psi)



Do not use the PERC/CBC in any way, not described in the specification. The user is responsible to comply with all applicable federal, state and local laws and regulations.



Do not operate the PERC/CBC if there is any visible damage. Stop immediately if leakage occurs.



Make sure that there is no trapped liquid or excessive pressure.



Authorized and qualified personnel must carry out all assembly and maintenance operations as described in this operating manual.

## 3 TRANSPORT AND STORAGE

The product may only be transported or stored absolutely clean. Suitable protection must be used for both openings to ensure no damage occurs to the surfaces/sealed areas. The storage location must guarantee adequate protection from corrosion or extreme temperatures.

### 3.1 DELIVERY CHECK

- Check for any transportation damage. If so report this immediately to the forwarder.
- Check that the products and quantities are in accordance with the delivery note.

### 3.2 COMPLAINTS / RETURN OF GOODS

- If returning goods, please contact Mann Teknik AB to receive a Complaint Report form.
- Complete the form with as much details as possible.
- Return the goods with the Complaint Report attached on the outside of the package!

### 3.3 STORAGE

Store coupling in a dry, dust free, dark place, in ambient temperature.



## 4 INSTALLATION

### 4.1 INITIAL OPERATION

The correct installation of all MannTek products is essential to ensure safe and satisfactory operation. Checks should be made to ensure that the fitting of MannTek products does not interfere with the correct operation of affiliated equipment (i.e. isolation valve, excess flow valves, etc). Before securing the flange or thread connections to mating equipment (i.e. hose, loading arm and storage tank) ensure that no foreign objects, dirt, grit, water (moisture) etc. are present in the coupling.

All flange and thread connections should be made without imparting excessive strain to the equipment. All gaskets and sealing materials used to make the permanent connection should be of suitable material.

Each MannTek product is designed to take reasonable axial loads associated with good handling practice but is not designed to accept continuous excessive load values associated with maladjustment or poor installation. Continuous excessive strain will equate to increased component wear and possibly premature failure if not corrected.

When MannTek equipment is used with hoses, attention should be paid to hose length to ensure correct handling characteristics. The hose assembly should be designed such that the minimum hose length is supported by the coupling or the operator. Hoses should be of sufficient length to ensure operation well within the stipulated hose minimum bend radius up to the maximum operation envelope.

### 4.2 INSTALLATION

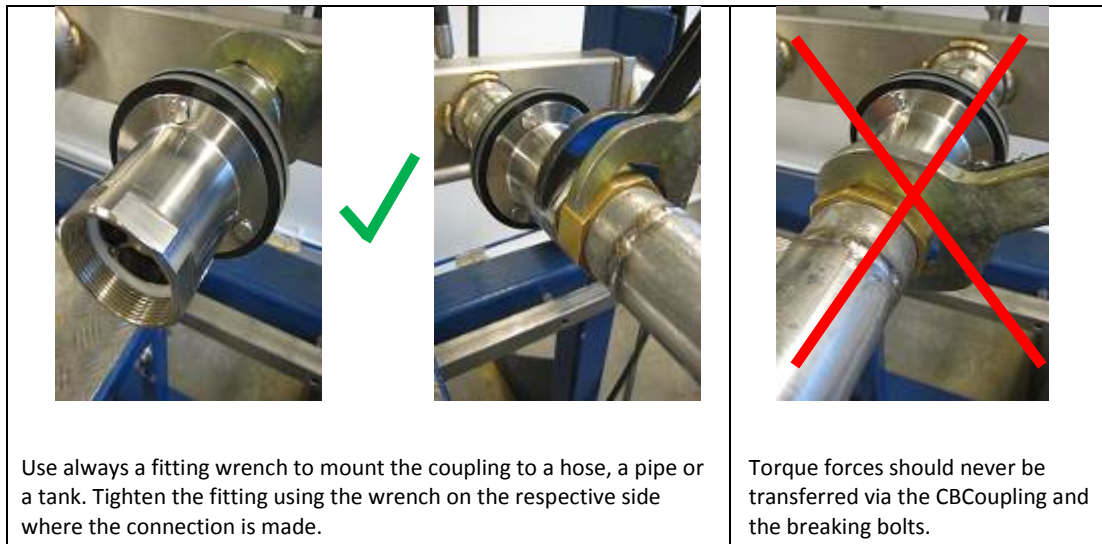
When installing MannTek equipment to new pipe work, tanks, etc. ensure the system is free from debris that may be transferred through the coupling. Where the hose or loading arm assembly is the primary static dissipation or earth route, the electrical continuity value of the assembly shall be checked to ensure regulatory compliance. Special attention should be paid to the balancing of loading arms. It is usual for loading arm balance settings to account of weight variations due to differences in the full / empty cycle. The loading arm should be set to balance in the condition present at the time of connection.

Before mounting the PERC/CBC ensure that trapped liquid never can occur in the installation. In combination with a Dry Cryogenic Coupling or Emergency Shut Down Valve measures shall be taken to ensure that no liquid can be trapped in any operating mode.

Then the PERC/CBC can be installed directly in the product line and is ready for use after removing the transport protection if applicable.

The installation is as follows:

- Remove the packaging.
- Check the coupling for damages before mounting.
- Ensure that the product line is empty and all valves are closed before you assemble the coupling into the line.
- To prevent damages during mounting a suitable wrench should be used for the intended nut flats on the coupling (threaded connection) or the bolts (flanged connection).



The start-up may take place only when the PERC/CBC has been mounted as instructed and the necessary function tests and leak tests have been conducted by the approved authorities.

The connection of the release system needs to be done according to the respective P&ID by a qualified technician. MannTek can also provide the complete transfer system including equipment to release the PERC. Please ask your sales representative for further information.

## 5 OPERATION

### 5.1 GENERAL NOTES

Operators are obliged to provide qualified and trained personnel familiar with the handling of supply pipes, safety couplings, any fluid being pumped as well as its danger potential. Such staff must also be familiar with the applicable safety regulations and the regulations of the employer's liability association.

### 5.2 DAILY VISUAL INSPECTION

All couplings should be inspected at the start of each day's operation. Check for leakage and any obvious physical damage (such as impacts, etc.).

### 5.3 DISMANTLING

When the PERC/CBC is taken out of service, the risk of liquid or gas spurting out should be taken into consideration. Special protective measures such as personal protection equipment must therefore be adopted.

How to dismantle:



- a. Wear suitable personal safety equipment.
- b. Make sure that the coupling is depressurized and empty.
- c. Unscrew coupling always with a wrench fit for purpose.

## 5.4 IMPROPER USE

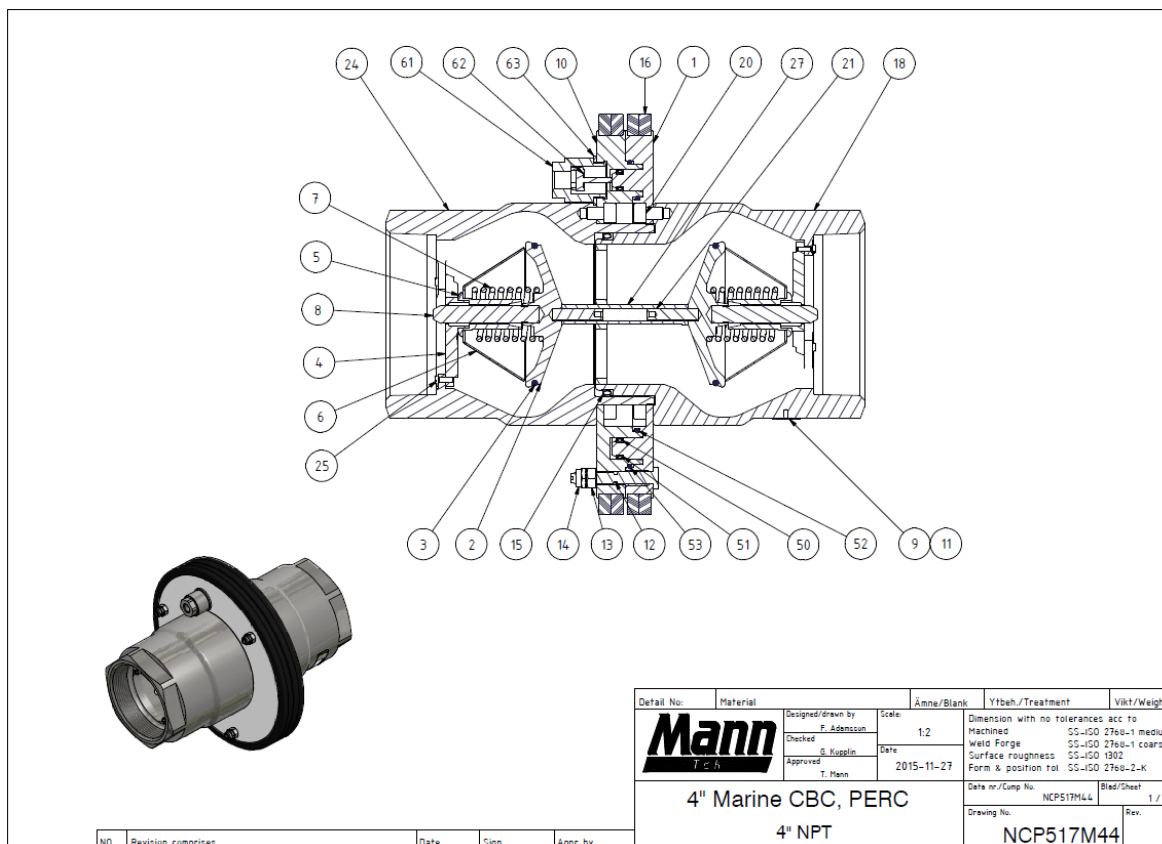
The equipment should never be used in the case of visible damage or where there is prior knowledge of damage that may lead to malfunction.

## 6 MAINTENANCE AND REPAIR

### 6.1 GENERAL INFORMATION

The PERC/CBC consists of two housing halves with a check valve in each. The housings are held together by three breaking bolts during normal operation. The two check valves support each other during normal operation and keep the conduit open.

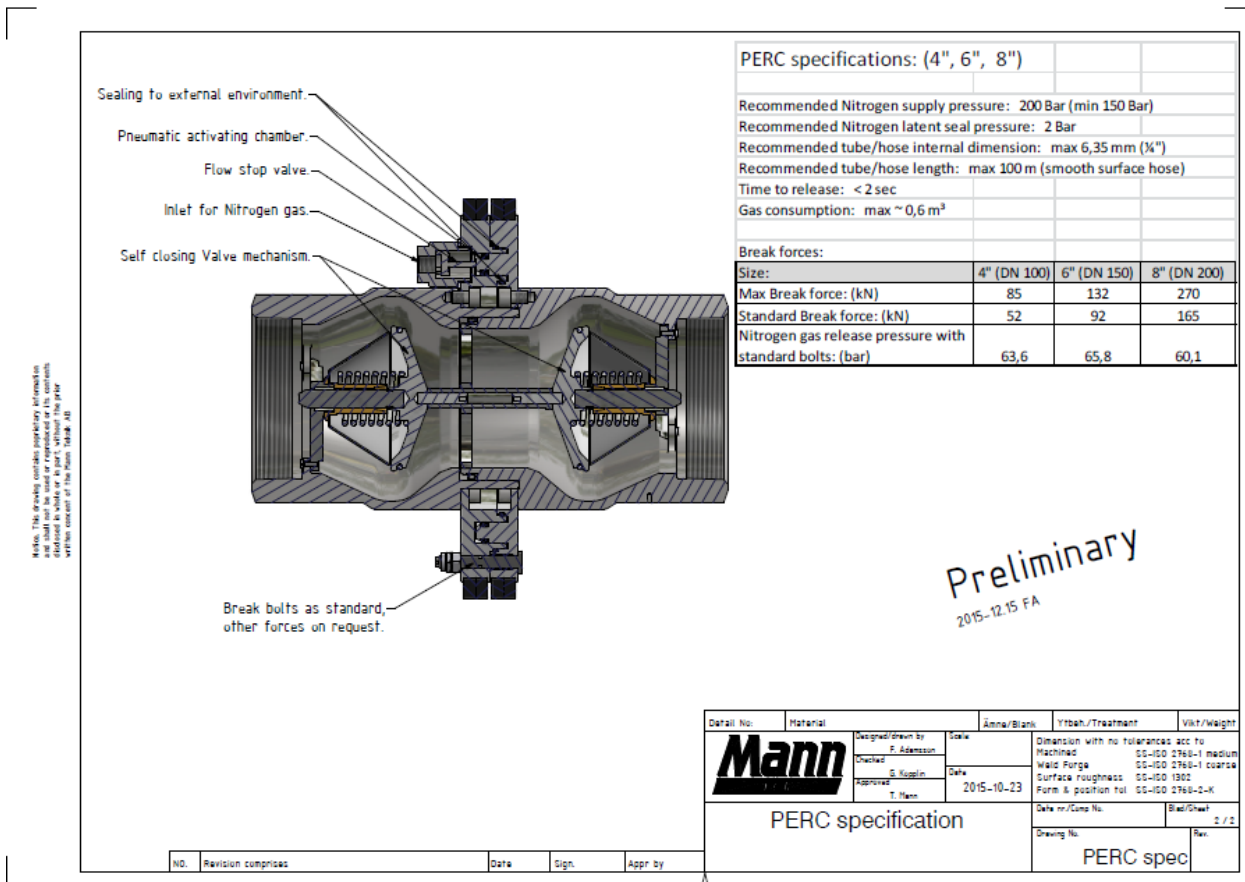
Two functions are covered by the PERC. It works as a CBCoupling with breaking bolts, to ensure always that the coupling will release in case of an excessive load beyond a specified limit. The second function is to release the PERC manually or automatically by charging the actuating chamber with dry Nitrogen gas pressure.



In case the supplying tank, e.g. tank truck or vessel, moves from the filling area and one forgot to disconnect the supply line, the CBC function is activated as follows:

Before the supply line is stressed by undue external forces the breaking bolts will break. The CBC halves are separated from each other and the spring-loaded check valves instantaneously close both ends of the line. On the industrial version one half of the coupling remains firmly connected to the mobile tank while the other half of the coupling remains connected to the supply line. The marine type is always placed between two hoses. The pull force is only working in axial direction. After releasing, both halves remain at the end of each hose. This prevents the outflow of liquids or gases from both product carrying ends of the line.

The PERC will be activated either automatically by a control system or manually by pushing a release button. In case of release, high gas pressure (Nitrogen with dew point max 196°C) will be charged into an actuating chamber and the breaking bolts will be destroyed. System parameters you will find in the following drawing:



Maintenance tasks, to put the released coupling back into service, may be performed only by trained personnel from an authorised professional workshop. All measures necessary for inspection, maintenance and repair must be carried out in accordance with the national regulations of the country where the system is installed.

## 6.2 MAINTENANCE AND SERVICE INSTRUCTION



Always depressurise the system and rinse off the parts before beginning any maintenance work. Use protective goggles. Do not handle O-ring seals if the material appears charred, gummy or sticky.



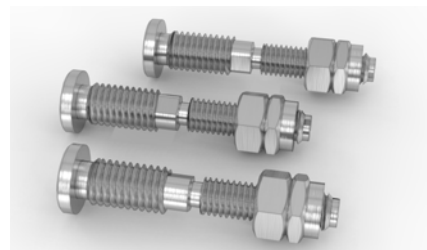
Use tweezers; wear gloves and protective goggles in appropriate material, consult the material safety data sheet (MSDS) of your product. Do not touch adjacent parts with unprotected hands. Rinse off the parts once again before starting the "daily inspection"

## 6.3 SPARE PARTS AND TOOLS

3 Breaking bolts

Seal-kit

In case of failure or break away please ask your sales representative for support.



## 6.4 PRESSURE AND TIGHTNESS TEST

After each service a pressure and tightness test of each coupling is mandatory. Test each half separately before you connect both halves with the breaking bolts. The following test parameters are in accordance with EN12266 and ISO5208:

Shell tightness test: 1,5 x Working Pressure

Seat tightness test: 6 bar +/- 1bar

0,1 x Working Pressure

stop time 1 min.

stop time 15 s.

stop time 15 s.



Instead of water we recommend to make the tightness test with gas, e.g. N2. If water is used as testing media, after testing all water must be removed from the couplings to avoid freezing under low temperature service.

If a pressure test should be achieved for the coupling mounted in an assembly, follow the respective test instructions for the equipment but do not exceed our recommended maximum test pressure of the coupling which you will find in the following table. If testing with higher pressure is necessary, please ask our sales department for a special test bolt kit.

DN 25		DN 50		DN 65		DN 80		DN 100		DN 125		DN 150	
kN	bar	kN	bar	kN	bar	kN	bar	kN	bar	kN	bar	kN	bar
		4	10	7	10	11	10	18	10	28	10	40	10
		6	16	10	16	15	16	24	16	37	16	54	16
		7	20	12	20	18	20	28	20	45	20	65	20
		9	25	15	20	23	25	36	25	56	25	81	25
4,8	25											92	25
3	16	12	50	20	30	30	35	48	35	75	40	108	40
3,2	16	13	37,5	22	37,5	33	37,5	52	37,5	81	37,5	117	37,5

Table 8: Maximum Test Pressure depending on size and breaking force:

## 7 APPLICABLE DOCUMENTS

EC Guideline 97/23/EC PED, 94/9/EC ATEX  
 International Transport of Dangerous Goods ADR, RID, IMDG  
 Test standards EN12266, ISO5208  
 Thread standard ANSI B1.20.1 - Flange standards EN 1092, ANSI B16.5

For use in other countries:  
 Respective national requirements and guidelines

### 7.1 DECLARATION OF CONFORMITY

**DECLARATION OF CONFORMITY:**  
**Pressure Equipment Directive 97/23/EC**

Mann Teknik AB of Strandvägen 16, SE-542 31 Mariestad, Sweden hereby declares that the products listed comply with the essential requirements of the Pressure Equipment Directive 97/23/EC.

**Pressure accessories:**  
 DCCouplings (STANAG), DGCouplings, DCCouplings (ISO45),  
 DCCouplings, SBCouplings and CBCouplings

Conformity assessment procedure followed:  
 no CE marking\*\* SEP-accord engineering praxis Article 3 section 3\*  
 CE 0038 Cat 2-Category 2 Module A  
 CE 0038 Cat 2-Category 2 Module D1

For piping intended for gases, liquefied gases, gases dissolved under pressure, etc. according to article 3 paragraph 1.3 (Annex 2 Table 1)

	a)		b)		c)	
	PN10	PN16	PN10	PN16	PN25	PN50
TR25	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
TR40	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR25	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR40	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR50	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR63	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR80	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR100	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR150	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR200	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*

For piping intended for liquids according to article 3 paragraph 1.3 (Annex 2 Table 1)

	a)		b)		c)	
	PN10	PN16	PN10	PN16	PN25	PN50
TR25	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
TR40	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR25	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR40	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR50	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR63	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR80	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR100	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR150	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*
CR200	SEP*	SEP*	SEP*	SEP*	SEP*	SEP*

\*\*According to Article 3 section 2, the products designed and manufactured in accordance with the above engineering praxis (SEP) must not bear the CE marking. Unauthorised product modifications lead to an invalid declaration.

\*Reference of the piping as Examined for ATEX classification.

**Notified body**  
 Identification number 0038  
 Lloyd's Register Verification Ltd.  
 71 Finsbury Square  
 EC2M 4EU London  
 United Kingdom

Signed: *[Signature]*  
 Name: Tony Mann  
 Title: General Manager  
 Date: 24<sup>th</sup> January 2014

97/23/EC PED – Conformity Declaration

**DECLARATION OF CONFORMITY:**  
**EC-Directive 94/9/EC (ATEX)**

Mann Teknik AB of Strandvägen 16, SE-542 31 Mariestad, Sweden hereby declares that the products listed comply with the essential requirements of the ATEX EC-Directive 94/9/EC.

**Product models listed**  
 SBCouplings (Safety Break-Away Couplings)  
 CBCouplings (Cryogenic Break-Away Couplings)

The following harmonised standards are applicable:  
 EN 1127-1  
 EN 13463-1  
 EN 13463-5

Marking: II 2G

The manufacturer attests that the SBCouplings and CBCouplings satisfy the stated requirements and that the marking is used in accordance with the ATEX classification.

**Notified body**  
 Identification number 0038  
 Lloyd's Register Verification Limited  
 71 Finsbury Square  
 EC2M 4EU London  
 United Kingdom

Signed: *[Signature]*  
 Name: Göran Kogelnik  
 Title: Technical Manager  
 Date: 20<sup>th</sup> January 2015

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94/9/EC ATEX – Conformity Declaration

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Mann Teknik AB is a certified ISO9001-company.