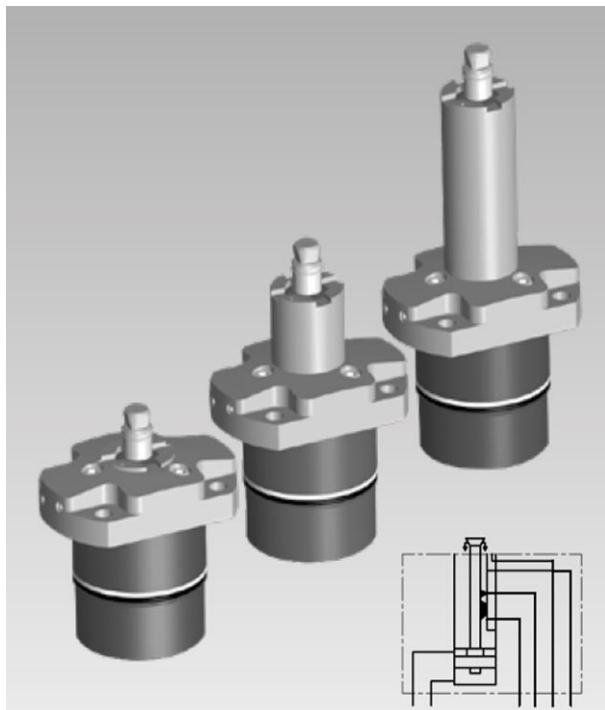




Bore clamps

Pneumatic seat check and clamping monitoring



1 Description of the product

The double-acting hydraulic cylinder operates a conical clamping bolt centrally located in the housing, which expands the hardened clamping bushing. The expansion force causes the points to penetrate into the softer bore surface. This positive connection guarantees a secure clamping of the workpiece (see also "Clamping principle" on the data sheet). All functions can be monitored pneumatically. The use of the connection for positive air pressure protection can prevent liquids and swarf from entering the clamping bushing.

Application

The hydraulically-operated bore clamp is particularly suitable for clamping in workpieces with smooth bore holes in the support surface. The workpiece is placed directly onto the hardened supports of the bore clamp and is not deformed during clamping. Since clamping is effected within the bore, the remaining surfaces are free for machining on 5 sides.

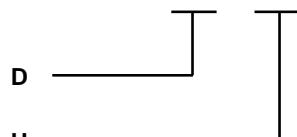
2 Validity of the documentation

This document applies to the following products:

Bore clamps as per data sheet B1.487. The following types or part numbers are concerned:

2.1 Code for part numbers

ID. **BCC 1 XXX H XXX S Z**



D = Bore diameter

055 = 5.5 mm

060 = 6.0 mm

070 = 7.0 mm

080 = 8.0 mm

090 = 9.0 mm

100 = 10.0 mm

110 = 11.0 mm

120 = 12.0 mm

130 = 13.0 mm

H = Height

016 = 16 mm

026 = 26 mm

036 = 36 mm

046 = 46 mm

056 = 56 mm

066 = 66 mm

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3 Target group of this document

- Specialists, fitters and set-up men of machines and installations with hydraulic expert knowledge.

Qualification of the personnel

Expert knowledge means that the personnel must

- be in the position to read and completely understand technical specifications such as circuit diagrams and product-specific drawing documents,
- have expert knowledge (electric, hydraulic, pneumatic knowledge, etc.) of function and design of the corresponding components.

An **expert** is somebody who has due to its professional education and experiences sufficient knowledge and is familiar with the relevant regulations so that he

- can judge the entrusted works,
- can recognize the possible dangers,
- can take the required measures to eliminate dangers,
- knows the acknowledged standards, rules and guidelines of the technology.
- has the required knowledge for repair and mounting.

4 Symbols and signal words

WARNING

Person damage

Stands for a possibly dangerous situation.

If it is not avoided, death or very severe injuries will result.

CAUTION

Easy injuries / property damage

Stands for a possibly dangerous situation.

If it is not avoided, minor injuries or material damages will result.

Hazardous to the environment

The symbol stands for important information for the proper handling with materials that are hazardous to the environment.

Ignoring these notes can lead to heavy damages to the environment.

Mandatory sign!

The symbol stands for important information, necessary protection equipment, etc.

NOTE

- This symbol stands for tips for users or especially useful information. This is no signal word for a dangerous or harmful situation.

5 For your safety

5.1 Basic information

The operating instructions serve for information and avoidance of dangers when installing the products into the machine as well as information and references for transport, storage and maintenance.

Only in strict compliance with these operating instructions, accidents and property damages can be avoided as well as trouble-free operation of the products can be guaranteed.

Furthermore, the consideration of the operating instructions will:

- avoid injuries
- reduce down times and repair costs,
- increase the service life of the products.

5.2 Safety instructions

The product was manufactured in accordance with the generally accepted rules of the technology.

Observe the safety instructions and the operating instructions given in this manual, in order to avoid personal damage or material damage.

- Read these operating instructions thoroughly and completely, before you work with the product.
- Keep these operating instructions so that they are accessible to all users at any time.
- Pay attention to the current safety regulations, regulations for accident prevention and environmental protection of the country in which the product will be used.
- Use the ROEMHELD product only in perfect technical condition.
- Observe all notes on the product.
- Use only accessories and spare parts approved by the manufacturer in order to exclude danger to persons because of not suited spare parts.
- Respect the intended use.

• You only may start up the product, when it has been found that the incomplete machine or machine, in which the product shall be mounted, corresponds to the country-specific provisions, safety regulations and standards.

- Perform a risk analysis for the incomplete machine, or the machine.

Due to the interactions between the product and the machine/fixture or the environment, risks may arise that only can be determined and minimized by the user, e.g. :

- generated forces,
- generated movements,
- Influence of hydraulic and electrical control,
- etc.

6 Application

6.1 Intended use

The products are used in industrial / commercial applications to transform hydraulic pressure to a radial movement and / or force. They must only be operated with hydraulic oil.

Furthermore the following belongs to possible uses:

- Use within the capacity indicated in the technical characteristics.
- Use as per operating instructions.
- Compliance with service intervals.
- Qualified and trained personnel for the corresponding activities.
- Mounting of spare parts only with the same specifications as the original part.

6.2 Misapplication

WARNING

Injuries, material damages or malfunctions!

Modifications can lead to weakening of the components, reduction in strength or malfunctions.

- Do not modify the product!

The use of these products is not admitted:

- For domestic use.

- On pallets or machine tool tables in primary shaping and metal forming machine tools.
- In areas for which special guidelines apply, especially installations and machines:
 - For the use on fun fairs and in amusement parks.
 - In food processing or in areas with special hygiene regulations.
 - In mines.
 - In explosive and aggressive environments (e.g. ATEX).
- For other operating and environmental conditions.

e.g.:

- Higher operating pressures or flow rates than indicated on the data sheet or installation drawing.
- With hydraulic fluids that do not correspond to the specifications.

Special solutions are available on request!

7 Installation

⚠ WARNING

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Improper connection can lead to escapes of oil under high pressure at the connections.

- Mounting or dismounting of the element must only be made in depressurised mode of the hydraulic system.
- Connection of the hydraulic line as per DIN 3852/ISO 1179.
- Unused connections have to be locked professionally.
- Use all mounting holes.

Injury by high-pressure injection (squirting out of hydraulic oil under high pressure)!

Wear, damage of the seals, ageing and incorrect mounting of the seal kit by the operator can lead to escapes of oil under high pressure.

- Before using them make a visual control.

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Injury by dropping parts!

Some products have a heavy weight and can cause injury when dropping.

- Transport products professionally.
- Wear personal protection equipment!

Weight specifications see chapter "Technical characteristics".

⚠ CAUTION

Malfunction or early failure

Side loads and forced conditions acting on the piston lead to increased wear.

- Provide external guides.
- Avoid forced conditions (overdetermination) of the piston.

7.1 Design

⚠ NOTE

The bore clamp has no centring function

To insert and position the workpiece, suitable guides and centring bolts must be provided.

The centring bolts also have to absorb the occurring side loads during machining.

For further information see ROEMHELD data sheet or installation drawing.

Positioning tolerance

Since the clamping bushing in the housing is radially movable, the workpiece can be positioned with a positioning tolerance of ± 0.4 mm.

Distance tolerance

The distance tolerance of 2 clamping bores can be max. ± 0.8 mm if both bore clamps are positioned at the zero point (nominal dimension).

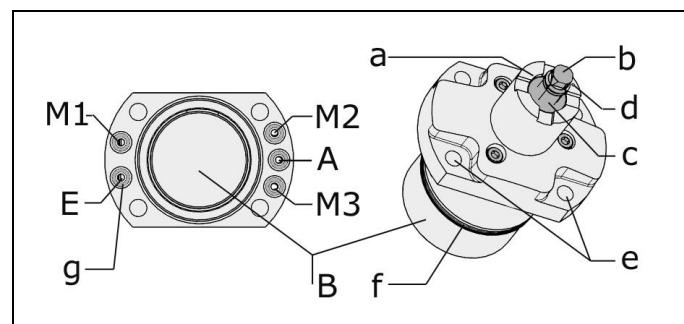


Figure 1: Components

A Port - clamping	a Support surface work-piece
B Port - unclamping	b Clamping bolt
E Port - positive air pressure connection	c Clamping bushing
M1 Port - seat check	d Seat check
M2 Port - unclamping monitoring	e Mounting holes for screws (4x)
M3 Port - clamping monitoring	f Seals
	g O-rings 4x1.5 (5x)

⚠ NOTE

Fixing screws

- Use fixing screws M5 with property class 12.9.

7.2 Throttling of the flow rate

A flow rate throttling has to be effected in the supply line to the element. This avoids pressure intensification and thereby pressures exceeding the max. operating pressure. The hydraulic circuit diagram shows flow control valves which allow oil return from the element without any impediments.

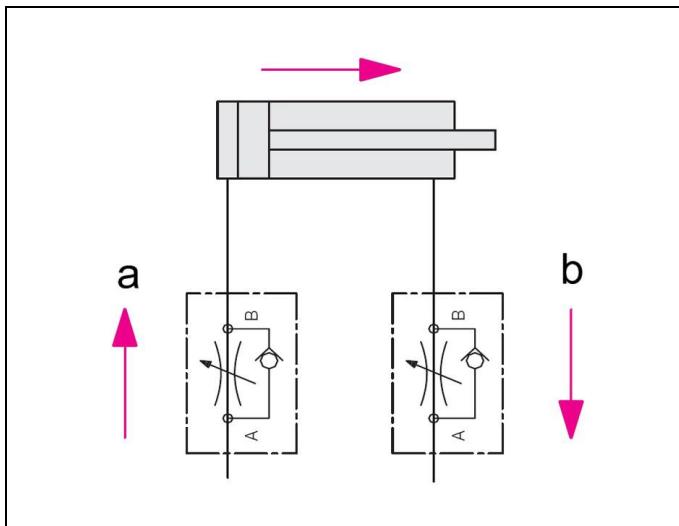


Figure 2: Hydraulic circuit diagram with flow control valves

a Throttle direction	b free flow
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7.3 Installation of products with external sealing

7.3.1 Design

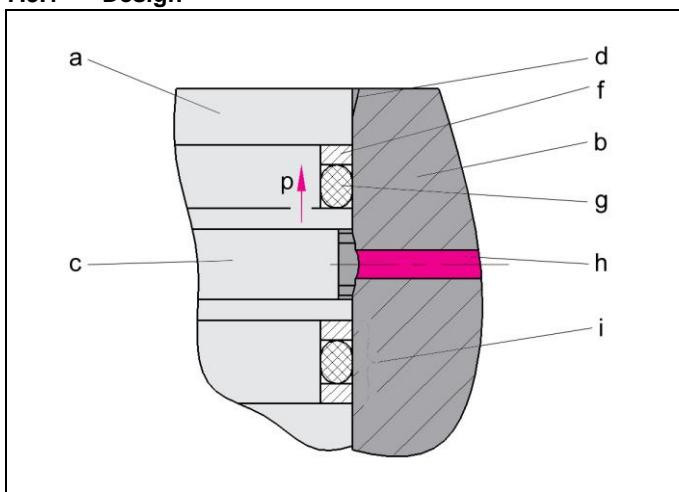


Figure 3: Components

a Housing of the element	g O-ring sealing
b Fixture body	h Supply hole in the fixture body
c Slot for transmission of the pressure medium	i Combination with applied pressure from both sides
d Insertion chamfer	p Pressure direction
e Back-up ring on the side that is not subject to pressure	



For works at and with the product,
wear protective gloves!

Before starting the installation check the following:

- Is the location hole made as per data sheet?
 - Are the indicated tolerances and surfaces kept?
 - Is the wall thickness in the fixture sufficient?
- Are the tapers in the fixture made as per drawing?
- Are the bore holes in the installation geometry are deburred and round?
- Are machining residues as swarf, dirt and foreign particles removed?
- Are crests of threads covered?
- Are seals and components greased or lubricated before installation?
 - Pay attention to compatibility of seals with the medium!
 - It is recommended to use the medium to be sealed for lubrication.
- Do not use grease with additions of solids as molybdenum sulphite or zinc sulphite.
- Do not use sharp objects for installation!
- Pay attention to protruding back-up rings. Use aids for correct positioning.
- Use always installation aids, if possible.

Procedure for installation

1. Insert seals.
2. Insert or screw in into location hole.
3. Screw in or fasten, pay attention to smooth running.
Pay attention that the seals will not be damaged.
4. Fasten with corresponding tightening torque (see general characteristics).
See chapter Technical characteristics.

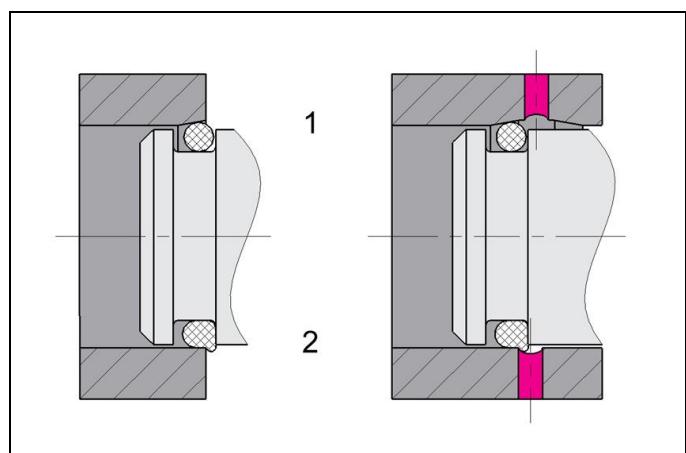


Figure 4: Installation with insertion chamfer and cross hole

1 Correct with chamfer

2 Incorrect without chamfer

7.3.2 Installation

WARNING

Injury by crushing!

Due to protruding components there can be pinch points during installation.

- Keep hands and fingers away from pinch points!

CAUTION

Product not properly tightened

Product can loosen during operation.

- Fix and/or secure with sufficient tightening torque.

7.4 Connection of hydraulic and pneumatic equipments

1. Connect hydraulic and pneumatic lines professionally and pay attention to cleanliness (A = clamping, B = unclamping, M1= seat check, M2= unclamping monitoring, M3= clamping monitoring, E = positive air pressure connection)!



NOTE

More details

- See ROEMHELD data sheets A 0.100, F 9.300, F 9.310 and F 9.360.

Pressure fluids

- Use hydraulic oil as per ROEMHELD data sheet A 0.100.

7.5 Leakage due to the system

The piston rod is set in motion by the hydraulic oil to perform the clamping task.

The hydraulic oil must be sealed at the piston rod to the atmosphere. During extension of the piston rod, the hydraulic oil must remain in the cylinder.

For ROEMHELD products, sealing systems are used for the piston rod, generally consisting of several sealing elements. Those sealing systems enable the sealing points to be absolutely leak-proof in the total specified pressure area, when the system is not in operation. Neither does oil escape at the piston rod, nor is oil transferred from the piston side and piston rod side.

Important: ROEMHELD products do not leak oil when static. To ensure an adequate working life, the sealing systems must be lubricated by the hydraulic fluid while in motion, in dynamic operation. Since the hydraulic fluid must reach the sealing lip, a certain amount of oil is lost from leakage, in the process. According to the used sealing and the corresponding application conditions the amount can be very different depending on the product group. However the leakage should be very little (see A 0.100 General characteristics of hydraulic equipment).

Leakage-free cylinders (leakage re-circulation or special sealing) are available on request.

8 Start up

WARNING

Poisoning due to contact with hydraulic oil.

Wear, damage of the seals, aging and incorrect mounting of the seal kit by the operator can lead to escapes of oil.

Incorrect connection can lead to escapes of oil at the ports.

- For handling with hydraulic oil consider the material safety data sheet.
- Wear protection equipment.

Injury by crushing!

Components of the product make a movement while they are in operation.

- This can cause injuries.
- Keep parts of the body and items out of the working area!

Danger of crushing due to segment clamping bushing!

The gap in the segment clamping bushing decreases in unclamped mode. This may result in crushing.

Work on this element must only be carried out in unclamped position and by qualified personnel.

CAUTION

Injury due to bursting or malfunction

Exceeding the max. operating pressure (see technical data) can cause the product to burst or malfunction.

- The maximum operating pressure must not be exceeded.
- If necessary, avoid overpressure by using suitable valves.

1. Check tight seat.

2. Check tight seat of the hydraulic ports (check tightening torque of the hydraulic ports).
3. Bleed the hydraulic system.

NOTE

Clamping time

- Without bleeding the clamping time will be considerably prolonged and function problems may occur.

Distortion-free workpiece clamping

A distortion-free workpiece clamping is only guaranteed if the workpiece rests backlash-free on all bore clamps.

Achieve clamping forces

The specified clamping forces are only achieved if the points of the clamping bushing penetrate into the bore wall.

Positive air pressure protection

If swarf and liquids penetrate into an open clamping bore, positive air pressure must be continuously switched on.

Function control

You will find a detailed description on the data sheet.

8.1 Bleeding of manifold-mounted types

1. Loosen carefully the bleeding screws of the fixture at low pressure.
2. Pump until bubble free oil comes out.
3. Fasten the bleeding screws.
4. Check correct function.
5. Check sealing of the hydraulic connections!

9 Maintenance

WARNING

Burning due to hot surface!

During operation, surface temperatures on the product can exceed 70°C.

- Maintenance and repair work should only be performed in a cooled down condition and/or with protective gloves.

Injury by crushing!

Due to the stored energy, an unexpected start of the product can occur.

- Maintenance works at the product must only be made in de-pressurised mode!
- Keep hands and other parts of the body out of the working area!

9.1 Cleaning

CAUTION

Material damage, damage to moving components

Damage to piston rods, plungers, bolts, etc., as well as wipers and seals can lead to leakage or premature failure!

- Do not use cleaning agents (steel wool or similar) that cause scratches, marks or the like.

The element must be cleaned at regular intervals.

NOTE

Clean the support surface and blast clean the clamping bushing before every clamping cycle.

If swarf fall into an open clamping bore, blast air must be continuously switched on.

9.2 Regular checks

1. Check tightness of hydraulic connections (visual control).
2. Check clamping bushing if there are damages.
3. Check for possible leakage on the housing - piston rod, bolts or flange.
4. Clamping force control by pressure control.
5. Check the observance of the maintenance intervals.

9.3 Replace clamping bushing and clamping bolt

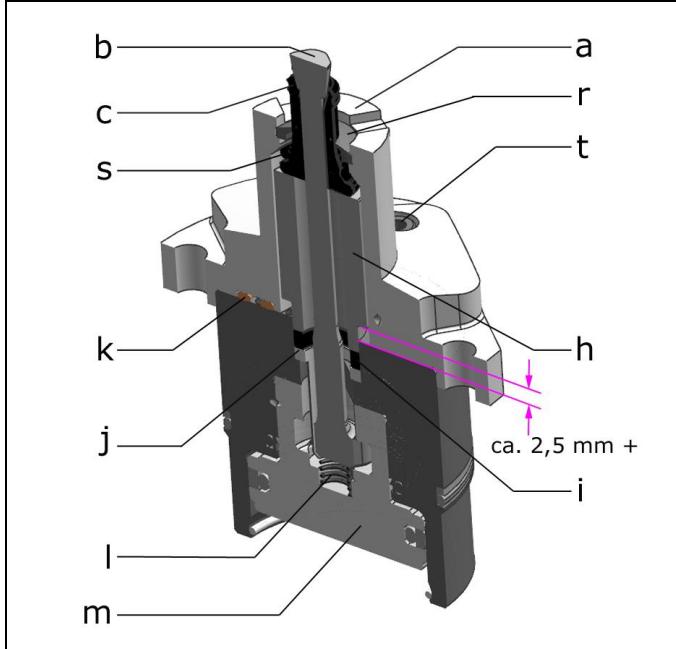


Figure 5: Change clamping bushing and clamping bolt

a Workpiece support	s O-ring
b Clamping bolt	h Pull-down disk
c Clamping bushing	i Thrust collar
t Screw M3 flange mounting	j Anti-rotation device
r Sealing ring	l Spring
m Clamping piston	k O-ring (3x)

1. To exchange the clamping bolt, port **B** must be pressurised and then depressurised again.
2. Loosen the fixing screws M5.
3. Remove the clamping element from the fixture and clamp the housing in a vice.

NOTE

Use a vice with protective jaws!

3. Unscrew workpiece support (**a**) with two screws M3 (**t**). Remove workpiece support (**a**).
4. Remove used clamping bushing (**c**).
5. Remove the pull-down disk (**h**) and thrust collar (**i**).
6. Remove anti-rotation device (**j**).
7. Press down used clamping bolt (**b**), turn by 90° and remove.
8. Remove spring (**l**) (**ATTENTION** spring is preloaded!).

NOTE

Make sure that the parts that are not worn out are installed clean.

8. Insert spring (**l**).

9. Insert new clamping bolt (**b**), press down and turn by 90°. (**CAUTION** when pressing down the clamping bolt (**b**) it is important to press against the piston (**m**) from below so that it does not move downwards.)
10. Insert anti-rotation device
11. Insert thrust collar (**i**) and pull-down disk (**h**).
12. Push the new clamping bushing (**c**) complete with O-ring (**s**) onto the clamping bolt (**b**) and put it onto the pull-down disk (**h**).
13. Carefully put the workpiece support (**a**) onto the clamping bushing and fix it with three screws M3 (tightening torque 1.5 Nm).
14. Insert the clamping element with mounted O-rings into the fixture. Tighten 4 fixing screws M5 - 12.9 (tightening torque 10 Nm).

9.4 Exchange seal kit

The exchange of the seal kit is made in case of external leakages. For high availability, the seals have to be changed at the latest after 500,000 cycles or 2 years.

The seal kit is available as spare part. An instruction for the exchange of the seal kit is available on request.

NOTE

Seal Kits

- Do not install seal kits which were exposed to light for a longer time.
- Pay attention to the storage conditions (see chapter "Technical characteristics").
- Only use original seals.

10 Trouble shooting

Fault	Cause	Remedy
Bore clamp no longer clamps	Clamping bolt torn	Change clamping bolt
	Clamping bushing torn	Change clamping bushing
	Teeth on clamping bushing worn or broken	
Clamping bolt does not move downwards	Clamping bolt torn	Change clamping bolt
	Clamping bolt not engaged in the bayonet	Clamping bolt engaged in the bayonet
Clamping bushing does not go to the unclamping position	Swarf are located between the clamping bolt and the clamping bushing	Remove swarf Connect positive air pressure connection
	O-ring or sealing ring torn or no more preload	Replace seals
	Anti-rotation device (bayonet) of the clamping bolt not installed correctly	Install the clamping bolt correctly (Check the distance of approx. 1.5 mm)
Air blows off at flange surface	Screws not tightened	Tighten screws to the specified torque
	O-ring forgotten	Insert O-ring
	O-ring defective	Replace O-ring

Clamping bolt extends jerkily:	Air in the hydraulic system	Hydraulic bleeding
System pressure drops:	O-rings defective Wear of the seals	Replace O-rings Replace sealing rings.

Note: Valid for workpieces and set screws made of steel with metric thread and connecting surface dimensions as per DIN 912, 931, 933, 934 / ISO 4762, 4014, 4017, 4032
 In the table values for tightening torques the following is considered:
 Design steel/steel, friction value $\mu_{ges} = 0.14$ - not oiled, utilisation of the minimum yield point = 90%.

11 Technical characteristics

Characteristics

Types	Maximum operating pressure [bar]	Maximum clamping force [kN]
BCC1055HXXXSZ	30	1.2
BCC0160HXXXSZ	30	1.2
BCC1070HXXXSZ	80	3.3
BCC1080HXXXSZ	80	3.3
BCC1090HXXXSZ	80	3.3
BCC1100HXXXSZ	120	5.0
BCC1110HXXXSZ	120	5.0
BCC1120HXXXSZ	120	5.0
BCC1130HXXXSZ	120	5.0

Weights

Types	Weight [kg]
BCC1XXXH016SZ	0.49
BCC1XXXH026SZ	0.52
BCC1XXXH036SZ	0.54
BCC1XXXH046SZ	0.57
BCC1XXXH056SZ	0.60
BCC1XXXH066SZ	0.62

Proposal, tightening torques for screws of tensile strength 8.8, 10.9, 12.9

NOTE

The indicated values are approximate values and have to be interpreted according to the user's application!
 See note!

Thread	Tightening torque [Nm]		
	8.8	10.9	12.9
M3	1,3	1,8	2,1
M4	2,9	4,1	4,9
M5	6,0	8,5	10
M6	10	15	18
M8	25	36	45
M10	49	72	84
M12	85	125	145
M14	135	200	235
M16	210	310	365
M20	425	610	710
M24	730	1050	1220
M30	1,450	2100	2450

NOTE

Further information

- For further technical data see ROEMHELD data sheet B1487

12 Storage

CAUTION

Damage due to incorrect storage of components

In case of improper storage, the seals can embrittle and resinification of the anti-corrosive oil or corrosion on/in the element can occur.

- Storage in the packaging and moderate environmental conditions.
- The product must not be exposed to direct sunlight, since UV light may cause serious damage to the seals.

The elements are tested by default with mineral oil. The exterior of the elements is treated with a corrosion inhibitor.

The oil film remaining after the test provides for a six-month interior corrosion protection, if stored in dry and uniformly tempered rooms.

For longer storage times, the element has to be filled with a non-resinifying corrosion inhibitor and the outside surfaces must be treated.

13 Disposal

Hazardous to the environment



Due to possible environmental pollution, the individual components must be disposed only by an authorised expert company.

The individual materials have to be disposed as per the existing regulations and directives as well as the environmental conditions.

Special attention has to be drawn to the disposal of components with residual portions of hydraulic fluids. The instructions for the disposal at the material safety data sheet have to be considered.

For the disposal of electrical and electronic components (e.g. stroke measuring systems, proximity switches, etc.) country-specific legal regulations and specifications have to be kept.

14 Declaration of manufacture

Manufacturer

Römheld GmbH Friedrichshütte

Römheldstraße 1-5

35321 Laubach, Germany

Tel.: +49 (0) 64 05 / 89-0

Fax: +49 (0) 64 05 / 89-211

E-mail: info@roemheld.de

www.roemheld.com

Responsible person for the documentation:

Dipl.-Ing. (FH) Jürgen Niesner, Tel.: +49(0)6405 89-0.

Declaration of manufacture of the products

They are designed and manufactured in line with the relevant versions of the directives **2006/42/EC**(EC MSRL) and in compliance with the valid technical rules and standards.

In accordance with EC-MSRL, these products are components, that are not yet ready for use and are exclusively designed for the installation in a machine, a fixture or a plant.

According to the pressure equipment directives the products are not to be classified as pressure reservoirs but as hydraulic placing devices, since pressure is not the essential factor for the design, but the strength, the inherent stability and solidity with regard to static or dynamic operating stress.

The products may only be put into operation after it was assessed that the incomplete machine / machine, in which the product shall be installed, corresponds to the machinery directives (2006/42/EC).

The manufacturer commits to transmit the special documents of the products to state authorities on request.

The technical documentation as per appendix VII part B was prepared for the products.

14.1 Declaration on design and manufacture in relation to ISO 13849 Part 2: Validation

Their design and manufacture took into account fundamental and proven safety principles of ISO 13849-2:2013.

- Appendix A - Mechanical systems
- Appendix C - Hydraulic systems

The above products are not designed as safety components.

The parameters, limitations, environmental conditions, characteristic values, etc. for the intended operation are defined in the documentation.

Laubach, 17.01.2022