

METAFLEX

Installation and Maintenance Manual

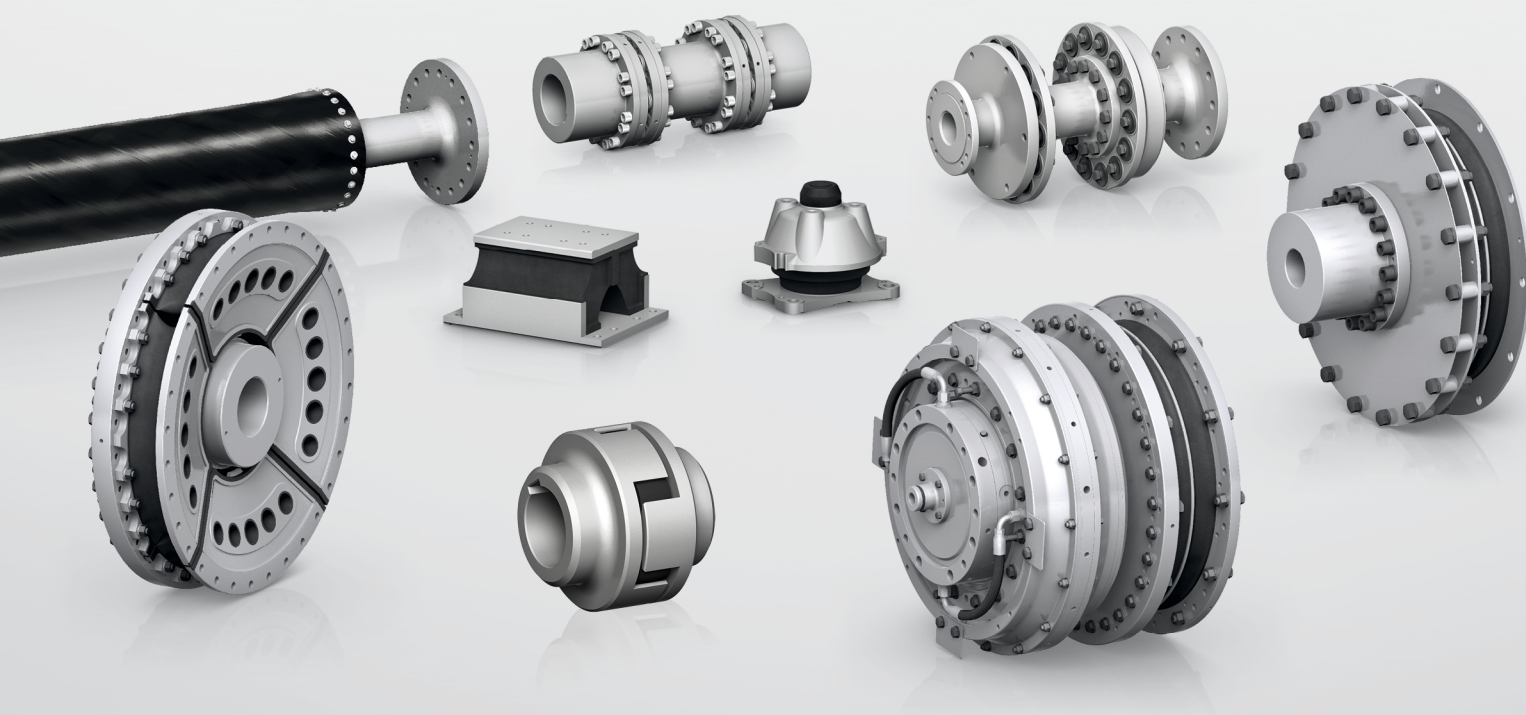
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1 General

1 General

1.1 Instructions concerning the manual

1.1.1 Information concerning this manual

Read this manual carefully all the way through to familiarize yourself with safe and correct installation, fault rectification, maintenance, and transport. The manual must be kept in the vicinity of the system where it is available to personnel at all times.

Only the procedures specified in the manual are safe. Prior to work, read and comply with the respective sections of the manual. This will help avoid injuries and product damage. If parts of the manual are not understood, contact VULKAN.

This manual is part of the product and must be transferred to the new owner if the product is resold.

The version status of the manual is specified at the beginning of the manual as shown in the following example: 00000010640017.4.14.

1.1.2 Target group

This manual must be read and complied with by every person who is entrusted with one of the following tasks:

- Unloading and unpacking
- Transport
- Installation
- Commissioning
- Maintenance
- Troubleshooting
- Dismounting
- Disposal

1.1.3 Copyright

The content of this manual is protected by copyright. Use of the manual is permitted as part of the use of the product. Any use that goes beyond this without the written permission of VULKAN is prohibited.

1 General

1.1.4 Other applicable documents

With this manual you have received various documents in the appendix. For example, the appendix can include drawings, parts lists, supplier documentation, and technical data. The scope may vary depending on the design. Comply with and observe the instructions and information contained in these documents.

If the product is a combination of several individual products, likewise take into account the respective manuals for these products.

1.1.5 Limitation of liability

All information and instructions in this manual have been provided with due consideration of applicable guidelines, the current state of technology, as well as our many years of experience.

VULKAN accepts no liability for damage due to:

- Failure to comply with the instructions in the operating manual
- Non-intended use
- Deployment of untrained personnel
- Unauthorized modifications
- Technical changes
- Use of non-approved spare parts
- Continued use after defects are detected

In the case of special versions, the ordering of additional options, or on the basis of the latest technical changes, the actual scope of delivery can deviate from the explanations and depictions described in this manual. The obligations stipulated in the delivery contract, the General Terms and Conditions and the Terms of Delivery of VULKAN, as well as the valid statutory regulations at the time the contract is entered into, shall apply.

1.1.6 Warranty terms

The warranty terms are included in the General Terms & Conditions of VULKAN.

1 General

1.2 Presentation of the information

1.2.1 Warnings

The warnings in this manual are indicated by symbols. The warnings are introduced through signal words that express the scope of the hazard.

DANGER

... indicates an imminent dangerous situation that will result in death or serious injury if it is not avoided.

WARNING

... indicates a possible dangerous situation that can result in death or serious injury if it is not avoided.

CAUTION

... indicates a possible dangerous situation that can result in minor injury if it is not avoided.

1.2.2 Warnings in action instructions

If warnings refer to individual actions, they are integrated in the action instructions. The signal words cited above are used.

Example:

1. Unscrew the fastening elements.

 **CAUTION!** Sharp edges

- Wear gloves.

2. Remove the disk flange.

1.2.3 Tips and recommendations

This symbol emphasizes useful recommendations, as well as information for efficient and fault-free operation.



Note

1 General

In action instructions the notice is presented as follows:

1. Action instruction

 Note

1.2.4 Information concerning the text presentation

1. Stands for action instructions with one or more instructions.

a) Stands for listings within the action.

 Stands for the result of an action.

For references to chapters the chapter number, chapter header, and page number are specified.

1.2.5 Illustrations

The illustrations in this manual are provided for purposes of basic understanding and can deviate from the actual version.

If, in the text, reference is made to a component in the associated illustration, this is done with position numbers. The position numbers in the manual differ from the position numbers used in the drawing and in the parts list.

1.3 Customer service

1.3.1 Customer service in Germany

Our customer service organization is available for technical information. The responsible contact is always available at the following contact address:

VULKAN Kupplungs- und Getriebebau B. Hackforth GmbH & Co. KG
Heerstrasse 66

44653 Herne

Germany

Tel.: +49 2325 / 922-0

Fax: +49 2325 / 711 10

Mobile: +49 (0) 178 / 8 922 179

In addition our employees are always interested in new information and experiences associated with the application that could be valuable for the improvement of our products.

2 Safety

2 Safety

2.1 Intended use

⚠ WARNING

Danger due to non-intended use!

Any use that extends beyond the intended use and/or any other type of use of the product can cause dangerous situations.

- Only use the product as intended.
- Comply with the information in this manual.
- The product can be overloaded if it is operated outside the limit values specified in the technical data.

2.1.1 Intended use of the product

Limits of use

Intended use	The METAFLEX coupling is a torsionally rigid, flexible shaft coupling for industrial applications and marine applications. Only qualified personnel are allowed to perform activities on the coupling. The following requirements apply for personnel: The qualified person must have been trained by the owner with respect to the tasks assigned to him/her and the possible dangers associated with improper behavior. The limits of the machine are defined in the catalog and in the manual.
Restrictions, limits of the permitted use	Exceeding or underranging the specified limits of the machine; wrong configuration of the coupling
Area of use	Industry and marine
The intended level with regard to training, experience or capabilities of the users	Installation by specialists and appropriately trained personnel

Tbl. 2-1 Limits of use

2 Safety

Spatial limitations

Movement ranges/traversing ranges, incl. safety distances	For use of the coupling an area is required that is free of obstructions and other hindrances. The rotational movement and displacement movement of the coupling must be ensured with a safety distance.
Spatial requirements for installation and maintenance	An area is required for installation and maintenance of the coupling that enables the fitter to install and maintain the coupling without hindrance
Material provision/removal	It must be ensured that the coupling reaches the intended position undamaged. Appropriate lifting and mounting tools must be present; weights and dimensions are provided in the drawing. Avoid mechanical damage. Contact the VULKAN customer service organization if damage is present.
Workstations/work areas	The coupling is not operated when the machine is in operation.
Interfaces to other machines	The coupling is intended to be connected to the drive-side unit and driven-side unit, possibly an auxiliary unit. Requirements imposed on the connected units: The connected units must be capable of bearing the generated restoring forces. The permissible displacement values specified in the technical data sheet must not be exceeded. The connection surfaces must be dry, clean and free of grease

Tbl. 2-2 Spatial limitations

2 Safety

2.1.2 Time limits of the elastic element

Limits to the service life of the machine or of components (intended duration of use)	The elastic element is designed for the following running time: 40,000 hours or 10 years
Recommended inspection period, maintenance and repair intervals	See maintenance schedule in the manual.
Max. operating duration without interruption	24 hrs / 365 days a year

Tbl. 2-3 time limits of the elastic element

2.1.3 Time limits of the steel parts

Limits to the service life of the machine or of components (intended duration of use)	The steel parts are designed to be fatigue endurable.
Recommended inspection period, maintenance and repair intervals	See maintenance schedule in the manual.
Max. operating duration without interruption	24 hrs / 365 days a year

Tbl. 2-4 time limits of the steel parts

2.2 Qualifications of personnel

2.2.1 General notices

To avoid accidents, every person who works on the product must meet the following minimum requirements:

- The person must be physically capable of executing the tasks.
- The person must understand the manual and must be able to implement the information.
- The person must understand the mode of operation of the product and must be able recognize and avoid the hazards associated with the work.
- The person must be able to execute the tasks described in this manual with the proper safety.

2 Safety

WARNING

Insufficiently qualified persons cannot assess the risks associated with handling the product and place themselves and others in danger of severe or fatal injury.

- Ensure that all tasks are only performed by personnel who are qualified to do so.
- Keep insufficiently qualified persons out of the work area.

2.2.2 Specialized personnel

Only have installation, commissioning, maintenance, and dismantling performed by a trained specialist. All mechanical tasks must only be performed by a qualified mechanic.

Underage persons or persons in training must only perform these tasks under the supervision of an experienced specialist and after obtaining the express permission of the owner.

Special qualifications are required for certain tasks:

- Training in the handling of transport equipment and lifting gear

2.2.3 Qualified electrician

Only have tasks on the electrical system and on live components performed by a trained and qualified electrician.

2.3 Safety instructions

NOTICE

Material damage if configured incorrectly!

If the coupling is configured incorrectly, extremely high dynamic forces can be transferred to the adjacent machine components and they could be damaged.

- Prior to installation, ensure that all characteristic values specified for the application in chapter  "3.3 Technical data" (Page 30) are correct.
- Only use the coupling in the original application intended by the manufacturer; this is the only application for which the coupling is configured.

2 Safety

2.3.1 Notes on safety instructions

This section provides an overview of all the important safety aspects for optimal protection of personnel, as well as for safe and trouble-free operation. Additional task-related safety notices and warnings are contained in the sections for the specific life-phases.

2.3.2 Responsibility of the owner

The owner is that person who operates the product himself for commercial or economic purposes or turns over the use/application of the product to a third person, and who during operation bears the product responsibility for protection of the user, personnel or third parties.

The owner is subject to the statutory occupational health and safety obligations. In addition to the warnings in this manual, applicable safety regulations, accident prevention regulations, and environmental protection regulations must also be complied with for the product's area of implementation. In this regard, the following particularly applies:

- The owner must inform himself of applicable occupational health and safety regulations, and in a risk assessment identify other hazards that may exist at the deployment site due to the special work conditions. The owner must convert this information into operating instructions for operation of the product.
- The owner must ensure during the entire implementation period of the product that the operating instructions prepared by the owner correspond to the current state of legislation, and if necessary the owner must adapt these operating instructions.
- The owner must clearly regulate and specify responsibilities for installation, operation, maintenance, and cleaning.
- The owner must ensure that all employees who handle the product have read and understood the manual. In addition, the owner must train personnel and inform them of hazards at regular intervals.
- The owner must attach an external catch-guard before commencing operation of the system. Ensure that parts cannot be ejected in the event of membrane breakage or shaft breakage.
- The owner must attach a distance protection fixture before commencing operation of the system.
- The owner must provide the required protective equipment for personnel.

Moreover, the owner is responsible for ensuring that the product is always in technically faultless condition:

- The owner must ensure that the maintenance intervals described in this manual are complied with.
- The owner must have all safety devices inspected regularly for function and for completeness.

2 Safety

2.3.3 Behavior in the event of danger or accident

The owner must specify behavioral measures in the event of danger or accident and ensure compliance with these measures. The instructions and rules for fire prevention and firefighting, as well as for behavior in the damage event, must be strictly complied with.

Regular training of personnel ensures proper behavior in the event of danger or accident. The following must be ensured:

- Personnel must obey all instructions for avoidance of dangerous situations.
- Personnel must understand the proper behavior in the event of danger or accident.
- Personnel must be familiar with the emergency stop devices and safety devices.
- Personnel must understand and comply with the information signs and markings on site.
- Personnel must be familiar with the fire extinguishing devices.

2.3.4 Environmental protection



Note

Danger for the environment due to improper handling of environmentally harmful substances!

Improper handling of environmentally harmful substances can cause significant environmental damage.

The instructions for handling and disposing of environmentally hazardous substances cited in this manual must always be complied with.

If environmentally harmful substances should inadvertently get into the environment, initiate suitable measures immediately.

The following environmentally harmful substances can be used:

- Lubricants: Lubricants, like greases and oils, contain toxic substances. Do not allow such substances to get into the environment. Disposal must be executed by a specialized disposal company.
- Cleaning fluids: Cleaning agents that contain solvents contain toxic substances. Do not allow such substances to get into the environment. Disposal must be executed by a specialized disposal company.

2 Safety

2.4 Protective devices

2.4.1 Personal protective equipment

Personal protective equipment is an important component of safety. Missing or unsuitable personal protective equipment increases the risk of health impairment and personal injury. Personal protective equipment includes:

- Protective gloves
- Safety footwear
- Protective clothing
- Respiratory protection
- Hearing protection
- Face and eye protection
- Hard hat

Specify and provide the personal protective equipment for the respective task.

Personal protective equipment must be worn when working to reduce health hazards.

- Always wear the protective equipment that is necessary for the respective task.
- Comply with the instructions concerning personal protective equipment posted in the work area.

Always wear the following during all tasks:

- Protective work clothing is tight-fitting work clothing with low resistance to tearing, with tight sleeves, and without projecting parts. It primarily serves as protection against entanglement through moving machine parts. Do not wear rings, chains or other jewellery.



- Hard hat to protect against falling and flying parts and materials.

2 Safety



- Safety footwear for protection against heavy falling parts and slipping on slippery surfaces.



- Protective goggles to protect eyes from flying parts and liquid splashes.



- Protective gloves to protect hands from friction, abrasion, puncture wounds, or deeper injuries, as well as from contact with hot surfaces.



2.4.2 Safety restraint

To avoid injuries in operation, rotating parts and/or moving parts should be provided with a safety restraint. The safety restraint prevents the shaft and/or coupling from being thrown out at high speed if there is a defect.

The safety restraint must be planned and installed by the owner.

2 Safety

2.4.3 Distance protection device

To avoid injuries in operation, rotating parts and/or moving parts should be provided with a distance protection device. This prevents personnel from reaching into the equipment.

The distance protection device must be planned and installed by the owner.

3 Product description

3 Product description

3.1 Overview and component description

3.1.1 Mode of operation

The METAFLEX shaft coupling is a torsionally-rigid multi-plate coupling. The design structure as an all-metal coupling makes it temperature-resistant.

The shaft coupling transmits power from the drive unit to the driven unit. The METAFLEX compensates for misalignments and displacement between the stub shafts in operation. The more precisely the system is aligned, the more effectively the coupling can compensate for operational displacements, the quieter it will be in operation, and the longer service life it will provide.

3.1.2 Product overview

Components

For example, a METAFLEX may consist of the following components:

- Hub / clamping hub
- Elastic element
- Intermediate shaft

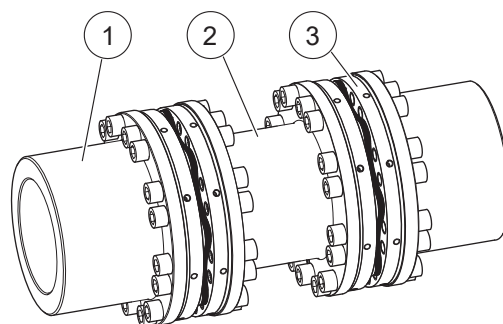


Fig. 3-1 Sample design of a METAFLEX

3 Product description

1	Hub
2	Intermediate shaft
3	Elastic element

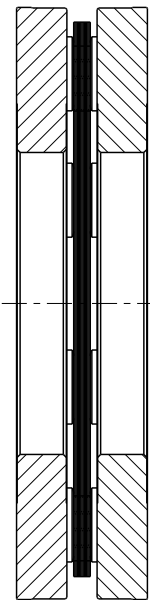
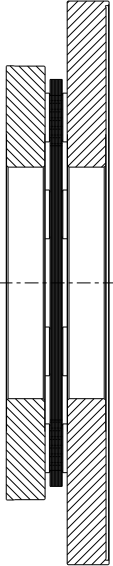
Tbl. 3-1 Component designations

Additional information concerning the specific components is provided in the appropriate chapters in  "3.1 Overview and component description" (Page 20).

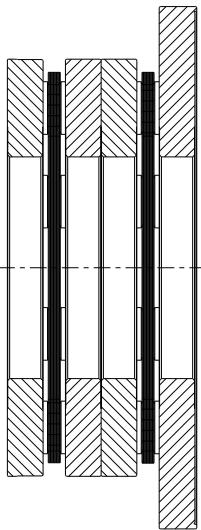
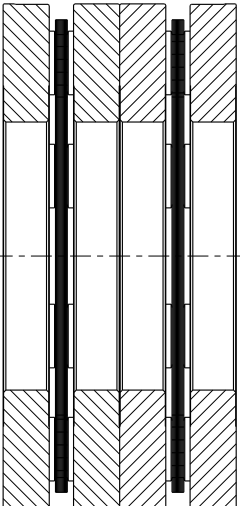
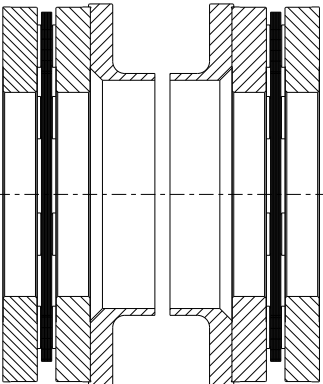
3 Product description

Variant overview

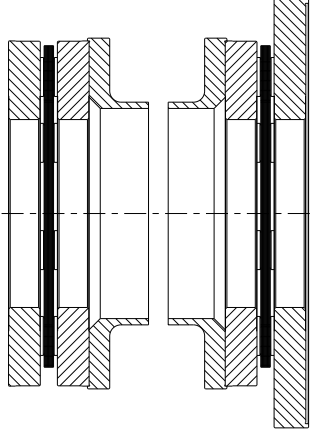
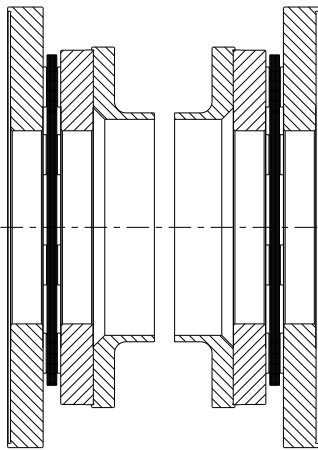
The variants of the METAFLEX are produced by combining different components. The METAFLEX is available in the following variants:

Variants	Designs
Elastic element (in different flange designs)	
	

3 Product description

Variants	Designs
Elastic part (in different flange designs)	
	
Elastic elements (in different flange designs) combined with an intermediate shaft	

3 Product description

Variants	Designs
	
	

3 Product description

3.1.3 Hub structure and function

The hub is the machine element that is used to fasten the coupling to the shaft. Depending on the version (see drawing) it is pre-bored, has a feather key groove as carrier element, or it is shrink-fit onto the shaft via a pull-on device and hydraulic support (oil pressure connection). In the case of a hub with an oil pressure connection, the number of connections required for disassembly may vary.

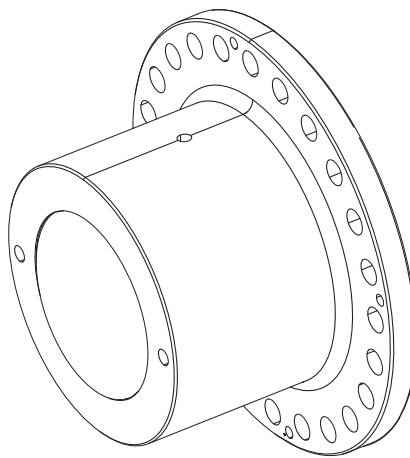


Fig. 3-2 Hub

3.1.4 Clamping hub

The clamping hub serves as a friction-fit connection of the coupling to the shaft. With the aid of clamping screws (3) the clamping ring (1) is pulled onto the conical seat of the clamping hub (2). The press fit generated in this manner ensures torque transmission and prevents axial displacement on the shaft. The clamping hub is available in steel and aluminum.

3 Product description

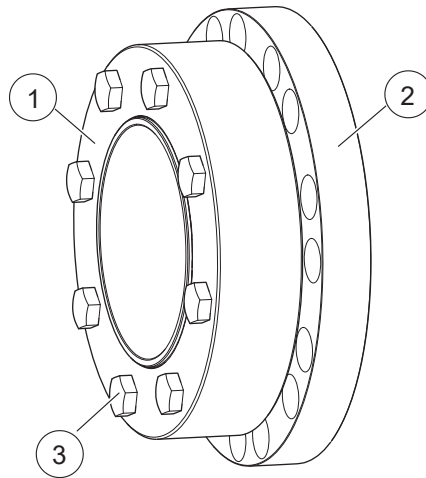


Fig. 3-3 Clamping hub

3 Product description

3.1.5 Elastic element

The elastic element is the basic element of the coupling.

The elastic element is used to compensate for radial and angular shaft displacement, and in a double-cardanic arrangement, it compensates for radial shaft displacement as well. The rigidity of the plate assembly (1) influences the vibration behavior of the drive train.

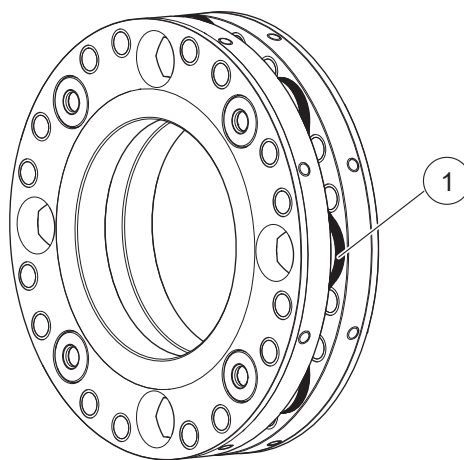


Fig. 3-4 Elastic element

Transport device

Starting with size BE, the METAFLEX is delivered with a transport device, to prevent the plate assembly from being damaged in transport.

When mounting the coupling, if there is not sufficient space for installation, it may be necessary to push the elastic elements together. The transport device can be used for this purpose. A transport device consists of the following parts:

- Eye bolts (1)
- Hexagon screw (2)
- Nuts (3)

3 Product description

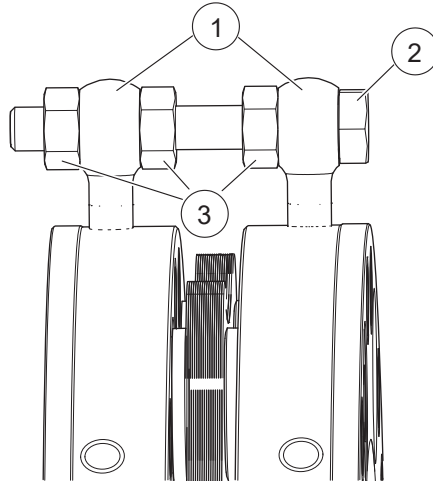


Fig. 3-5 Transport device

3.1.6 Intermediate shaft

The intermediate shaft is used for length compensation between the machines to be connected.

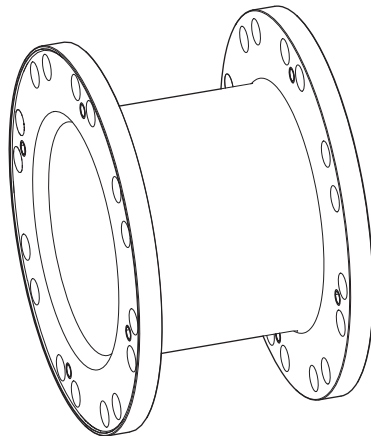


Fig. 3-6 Intermediate shaft

3 Product description

3.1.7 Disk flange

The disk flange is an optional component. The disk flange connects the METAFLEX to the customer connection.

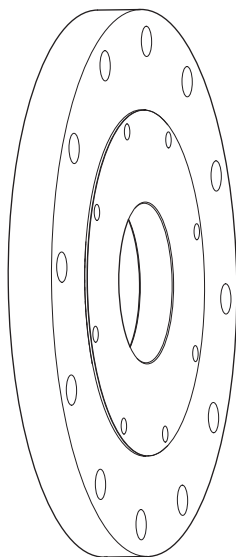


Fig. 3-7 Disk flange

3.2 Ambient conditions

3.2.1 Ambient conditions

Ambient temperatures (max/min)	Aluminum: -45°C to +80°C Steel: -35°C to +150°C Clamping hub: -35°C to +100°C
Ambient limitations	No coarse (mechanical) contaminants
Required degree of cleanliness	The connection surfaces must be dry, clean, and free of grease. Direct contact with salt water must be avoided. Coarse mechanical contamination must be avoided.

Tbl. 3-2 Ambient conditions

3 Product description

3.3 Technical data

3.3.1 Technical data of the product

The technical data, relevant drawings and part lists are provided in the appendix.

3.4 Scope of delivery

3.4.1 Scope of delivery of the product

Before assembly, check the scope of delivery for completeness. If there are deviations, contact VULKAN. The scope of delivery is shown on the drawing and the parts list.

3.4.2 Delivery status

The product is delivered in partially assembled status. The elastic element is always pre-assembled and all fastening elements are tightened to torque.

3.5 Product identification and marking

3.5.1 Marking on the product

The marking on the product contains the following information:

- Consignment number
- Production order number

3.6 Tools and auxiliary materials

3.6.1 Cleaning agents and lubricants

For all tasks involving cleaning agents and lubricants the safety data sheets provided by the respective manufacturers must be complied with.

3 Product description

CAUTION

Component damage due to the wrong cleaning agents or lubricants

If the wrong agents are used components can be damaged.

- Only use the agents specified below.

3.6.1.1 Cleaning agents

The following cleaning agents are recommended:

- Steel parts: Alkaline aqueous solutions, benzine
- Greases that protect against rust: Lucas Red N Tacky #2 or similar products

3.6.1.2 Lubricants

Only use greases without solid lubricants to lubricate moving parts and bearings. Greases of penetration class (NLGI class) 2 in accordance with DIN 51818 are recommended:

- Rivolta S.K.D 4002
- Alvania EP(LF)2
- or similar greases

4 Transport, packaging, and storage

4 Transport, packaging, and storage

4.1 Packaging

4.1.1 Packaging of the product

About the packaging

VULKAN recommends not to destroy the original packaging and to remove it just prior to assembly. Deviant behavior must not lead to premature product ageing, damage or restrictions in function and service life. The measures necessary for this must be realized effectively until the VULKAN product is installed. Individual packed goods are packaged according to the expected transport conditions. Environmentally-friendly materials have been used exclusively for the packaging. Packaging should protect the specific components from transport damage, corrosion and other damage until assembly.

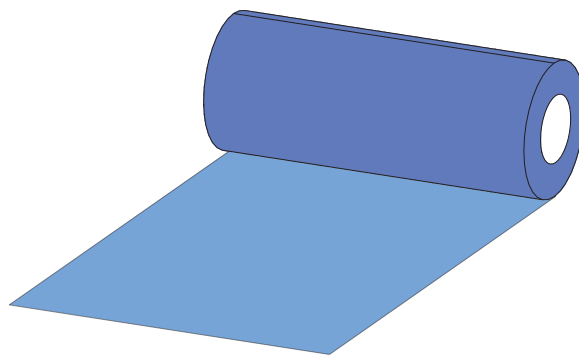


Fig. 4-1

4 Transport, packaging, and storage

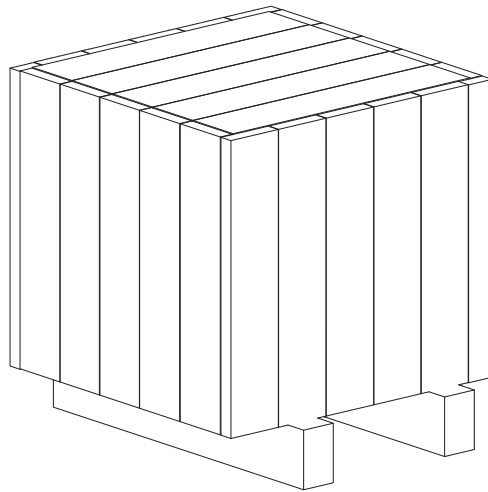


Fig. 4-2

4.1.2 Symbols on the packaging

Attachment point

Only attach lifting gear (sling chain, lifting strap) at the points marked with this symbol



Fig. 4-3 Attachment point

4 Transport, packaging, and storage

Weight, attached load

Indicates the weight of packages. Handle the marked package in accordance with its weight.



Fig. 4-4 attached load

4.2 Transport inspection

4.2.1 Transport inspection of the product

Check delivery immediately upon receipt to ensure that delivery is complete, and to identify any transport damage. Proceed as follows if there is apparent external damage:

- Do not accept the delivery or only accept it with reservation.
- Note the extent of transport damage on the transport documents or on the transport company's delivery ticket.
- Submit a complaint.

Report any defect as soon as it is detected. Claims for damage compensation can only be enforced during the applicable periods for giving notice of lack of conformity.

4.3 Transport

4.3.1 Safety instructions

4 Transport, packaging, and storage

⚠ WARNING

Life-threatening danger due to suspended loads!

When lifting loads there is a life-threatening hazard due to falling parts or parts swinging out of control.

Therefore:

- Never step under suspended loads.
- Comply with the instructions concerning the intended attachment points.
- Do not attach on projecting machine parts or on the eyes of installed components. Ensure that the sling gear is securely seated!
- Only use approved hoists and sling gear with sufficient bearing capacity.
- Do not use rope and straps that are torn or frayed.
- Do not place ropes and straps on sharp edges and corners; do not knot or twist ropes and straps.

4.3.2 Transporting the hub

Horizontal transport

Screw 2 eye bolts (T) offset by 180° into the tapped bores of the hub, if present, until the collar rests on the hub.

Use a shackle or self-closing hook to attach the hub to the eye bolts and connect it with the lifting gear.

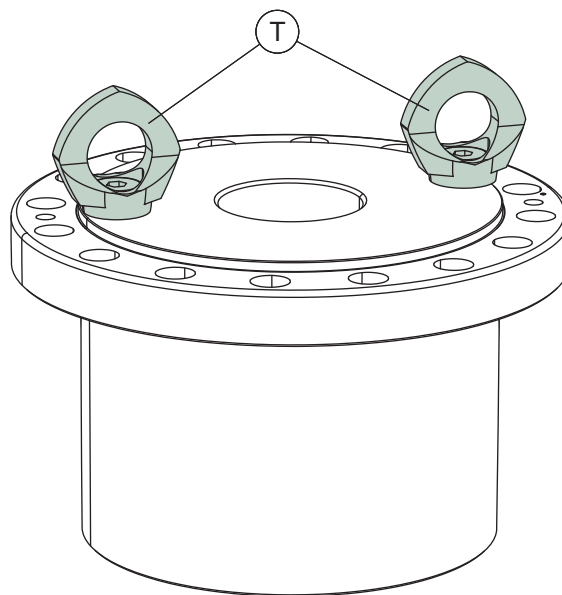


Fig. 4-5 Horizontal transport

4 Transport, packaging, and storage

Vertical transport

Connect the hub with a shackle at the marked bore (arrow) and insert it into a suitable lifting device.

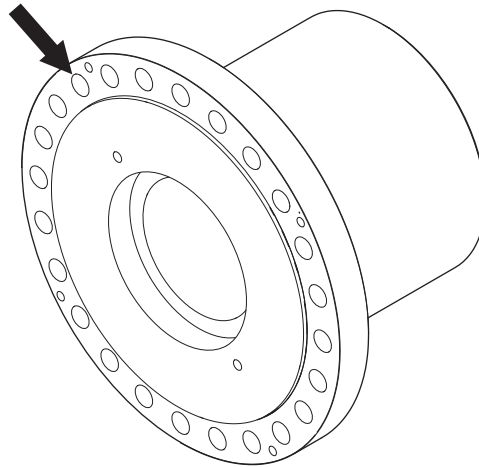


Fig. 4-6 Vertical transport

4.3.3 Transporting the clamping hub

Use a shackle to attach the clamping hub to one of the bores (arrow) and connect it to the lifting gear.

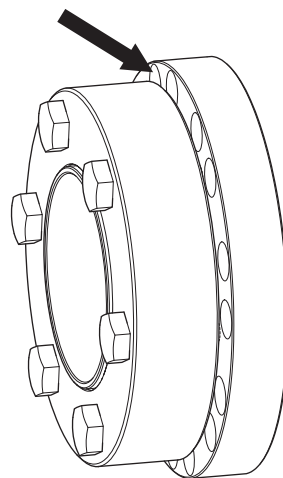


Fig. 4-7 Transport of the clamping hub

4 Transport, packaging, and storage

4.3.4 Transporting the elastic element

Screw the transport devices into the tapped bore holes (arrow). For more information on the transport devices see also  "Transport device" (Page 27).

NOTICE

Do not transport the elastic element with the aid of the transport device. This could break the eye bolts.

- Transport the elastic element with a load sling.

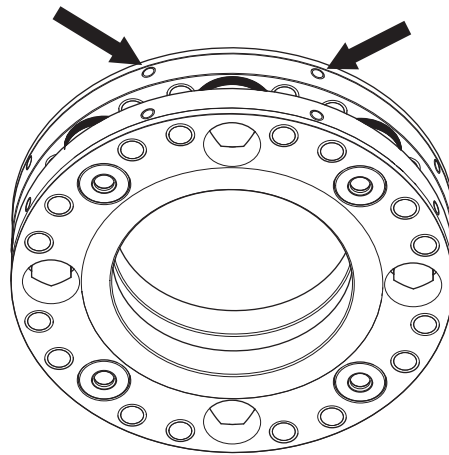


Fig. 4-8 Tapped bore holes for transport devices

4 Transport, packaging, and storage

Attach the elastic element with a textile load sling and connect it to the lifting gear.

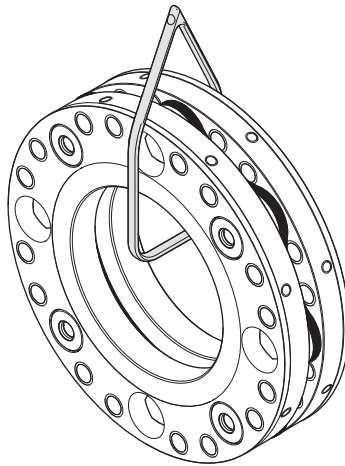


Fig. 4-9 Transport with load sling

4.3.5 Transporting the intermediate shaft

Attach the intermediate shaft with a textile load sling and connect it to the lifting gear.

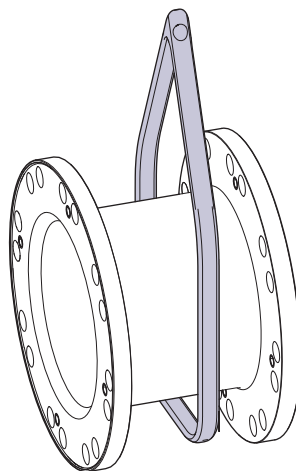


Fig. 4-10 Transporting the intermediate shaft

4 Transport, packaging, and storage

4.3.6 Transport of the disk flange

Attach the disk flange via a textile load sling and connect it to the lifting gear.

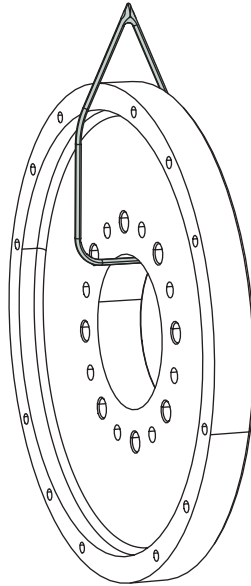


Fig. 4-11 Transport of the disk flange

4.3.7 Transport with a forklift

The following prerequisites must be met for transporting pallets with the forklift:

- The packages must be fastened on the pallet in such a manner that they cannot slip.
- The forklift must be designed appropriately for the weight of the transport units.
- The driver must be authorized to operate the forklift.
- It must be possible to drive the forks under the package's center of gravity.

4.3.8 Transport with the crane

The following prerequisites must be met for transporting pallets and product parts with the crane:

- The packages must be fastened on the pallet in such a manner that they cannot slip.
- The product parts must be attached at the point intended for this purpose.
- The crane and the lifting gear must be designed for the weight of the transport units.

4 Transport, packaging, and storage

- The operator must be authorized to operate the crane.
- The center of gravity of the package must be taken into account at transport. If the center of gravity is off-center the package could tip.

4.4 Preservation

4.4.1 Safety instructions

CAUTION

Corrosion preventatives are harmful!

Corrosion preventatives can cause poisoning through inhalation. Repeated or prolonged contact with corrosion preventatives can cause skin irritation or skin diseases.

- Only unpack the product in well-ventilated areas!
 - Only remove the corrosion preventatives in well-ventilated areas!
 - Wear chemical-resistant protective gloves and protective goggles with side protection!
 - After work wash thoroughly and use skin-care cream!
 - If inhaled get the person affected out into fresh air immediately! If there is skin or eye contact rinse immediately and thoroughly with water!
 - In case of accidents immediately consult a physician!
 - Comply with the individual manufacturers' safety data sheets!
-

4 Transport, packaging, and storage

4.4.2 Corrosion preventative agents used

	Standard corrosion preventative Steel and cast parts up to 6 months (Stored outdoors under a roof)	Additional corrosion preventative Steel parts and cast parts > 12 months (Stored indoors in a dry room)
Maritime freight overseas, tropical and subtropical regions	Metacoron 835, dry layer thickness min. 4 µm / max. 6 µm	Parts in VCI foil or aluminum foil; inside with VCI foam dispenser, if necessary
Intercontinental shipping points	Metacoron 835, dry layer thickness min. 4 µm / max. 6 µm	Parts in VCI foil; inside with VCI foam dispenser, if necessary
Within Europe	Metacoron 835, dry layer thickness min. 4 µm / max. 6 µm	Parts in VCI foil
Short hauls, domestic, bordering states via carrier	Metacoron 835, dry layer thickness min. 4 µm / max. 6 µm	Not necessary

Tbl. 4-1 Corrosion preventative

4.4.3 Preservation with Metacoron 850

Metacoron 850 is a corrosion preventative that is applied to the connection surfaces and, if necessary, in the bores of vulcanized steel and cast parts. Observe the safety data sheets of the respective manufacturers.

Storage conditions

Once Metacoron 850 has been applied, the following storage conditions apply:

- Dry indoor storage: up to 12 months
- Covered outdoor storage: up to 4 months
- Storage temperature: 5–40°C

4 Transport, packaging, and storage

Cleaning

Clean the connection surfaces and bores before installing the product. Spraying or dipping processes are suitable. Note the following points:

- Wear appropriate PPE.
- Use clean, lint-free cloths.
- Clean the connection surfaces and bores with an aqueous-alkaline solution.
- Do not allow cleaned connection surfaces to come into contact with hand perspiration.
- Let the connection surfaces and bores dry.

Reapplying corrosion protection

Corrosion protection must be reapplied if the preservation is damaged or the storage conditions have been exceeded.

Observe the following points when reapplying corrosion protection:

- Clean the connection surfaces and bores. See  "Cleaning" (Page 42).
- Apply Metacorin 850 undiluted to the connection surfaces and bores.
- Make sure the elastomer is not wetted with Metacorin 850. If necessary, remove any residue on the elastomer with a damp cloth.
- Do not allow preserved connection surfaces to come into contact with hand perspiration.
- Let the connection surfaces and bores dry.

After the applied Metacorin 850 has dried, a dry, waxy protective film forms.

4.4.4 Preservation with Metacorin 835

Metacorin 835 is a corrosion preventative that is applied to the connection surfaces and, if necessary, in the bores of steel and cast parts. Observe the safety data sheets of the respective manufacturers.

Storage conditions

Once Metacorin 835 has been applied, the following storage conditions apply:

- Dry indoor storage: up to 12 months
- Covered outdoor storage: up to 6 months
- Storage temperature: 10–30°C

4 Transport, packaging, and storage

Cleaning

Clean the connection surfaces and bores before installing the product. Spraying or dipping processes are suitable. Note the following points:

- Wear appropriate PPE.
- Use clean, lint-free cloths.
- Clean the connection surfaces and bores with an aqueous alkaline solution or a carbon solvent.
- Do not allow cleaned connection surfaces to come into contact with hand perspiration.
- Let the connection surfaces and bores dry.

Reapplying corrosion protection

Corrosion protection must be reapplied if the preservation is damaged or the storage conditions have been exceeded.

Observe the following points when reapplying corrosion protection:

- Clean the connection surfaces and bores. See  "Cleaning" (Page 43).
- Apply Metacolin 835 undiluted to the connection surfaces and bores.
- Do not allow preserved connection surfaces to come into contact with hand perspiration.
- Let the connection surfaces and bores dry.

After the applied Metacolin 835 has dried, a thin, oil-like protective film forms.

4.4.5 Advanced corrosion protection with VCI foil

All products supplied are packaged with VCI foil. The VCI foil provides additional corrosion protection during shipping and storage.

Storage conditions

The storage period is 2-5 years if used properly with an airtight seal.

Wrapping the product with VCI foil

The product may only be wrapped with VCI foil once the applied corrosion preventative is completely dry. If the VCI foil is damaged, it must be replaced. If the VCI foil is damaged, VULKAN accepts no liability for any damage to the product caused by corrosion.

4 Transport, packaging, and storage

Replacing damaged VCI foil

If the VCI foil is damaged, do the following:

- Wear appropriate PPE.
- Remove damaged VCI foil.
- Replace the VCI foil.

4.5 Storage

4.5.1 Environmental influences and storage of the packages

Only store packages under the following conditions:

- Do not store outdoors.
- Store in a dry and dust-free location.
- Do not expose to aggressive media.
- Protect against direct sunlight and other UV sources.
- Do not store in the vicinity of ozone-generating devices.
- Avoid mechanical shocks.
- Storage temperature: 15 to 25°C.
- Relative humidity: max. 60%.
- For longer periods of storage (> 3 months) regularly check the general status of all parts and the status of the packaging. Touch-up or reapply preservation agents as needed.
- If stored for longer than 3 years, a repetition of the static test of the elastic elements is required.
- For storage longer than 5 years, the technical data, such as dynamic torsion spring stiffness and the static angle of rotation characteristic of the elastic elements, must be verified.

If the environmental influences cited above cannot be completely avoided, we would be pleased to advise you in more detail in this regard and offer possibilities for surface preservation.



Note

Under certain circumstances, storage instructions are on the packages that extend beyond the requirements cited here. Comply with these instructions accordingly.

5 Assembly

5 Assembly

5.1 Safety instructions

DANGER

Life-threatening danger due to restarting the machine!

When working in danger zones, persons can be seriously injured by unauthorized switching on of the power supply.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.
- If combustion motors supply the motive power then the safety instructions and the instructions for switching off and safeguarding against restart in the assembly manuals provided by the manufacturers must be complied with.

WARNING

Excessive temperature or non-uniform heating can cause material damage!

At temperatures in excess of 300 °C or if not heated uniformly, the structure of the hub can change and it can lose strength.

- Monitor the temperature when heating.
- If the temperature of the hub exceeds 300 °C, use a new hub or inform the manufacturer in order to coordinate other measures.

CAUTION

Danger of burns due to hot surfaces!

Contact with the hot hub or shaft can cause burns.

Therefore:

- Always wear protective work clothing and protective gloves for all tasks performed in the vicinity of hot components.
- After pulling on the hub and before further assembly of coupling parts, ensure that all components have cooled to ambient temperature.

5 Assembly

CAUTION

Risk of injury due to careless working!

Injuries can occur if work is not carried out properly.

- Ensure sufficient mounting space before starting work.
- Handle open, sharp-edged components with care.
- Ensure the mounting location is clean and orderly! Loose components and tools lying on top of or around each other can cause accidents.
- Mount components properly. Observe the specified tightening torques.
- Secure components so that they do not fall or topple over.



Note

The version of the precise design is specified on the drawing. This must be taken into account in the assembly sequence.



Note

The tightening torques for all fastening elements are specified in the drawing in the appendix or in the installation instructions and must be complied with.

We recommend marking all fastening elements that are tightened to the tightening torque with thread-locking fluid.



Note

Prior to assembly the possibility of any danger to persons or material damage must always be excluded.



Note

To ensure an ideal assembly sequence, VULKAN recommends compliance with the work steps described here.



Note

On customer request the assembly can also be executed by VULKAN employees. For questions concerning assembly please contact VULKAN customer service. See  "1.3 Customer service" (Page 10).

5 Assembly

5.2 Mounting the product

5.2.1 Preparing the product for installation

The handling instructions below describe tasks that must be executed prior to installation.

**Note**

Secure the components against falling!

1. The stub shafts must be clean, deburred, and free of contamination or corrosion. Check the stub shafts, deburr them and clean them as needed.

 **CAUTION!** Solvents can cause chemical burns.

- Comply with the instructions in the safety data sheets. Wear protective equipment, such as protective gloves and protective goggles.

2. Completely remove corrosion preventative from all surfaces that come into contact with each other. Use conventional solvents.
 3. Dry all components that have been treated with solvents.
-  The product is prepared for installation.

5.2.2 Hub assembly

** CAUTION**

Material damage due to impermissible effect of force.

When pushing on or pushing off the hub, the plate assembly can be damaged through impermissible introduction of force.

- Do not push on or push off the hub over the plate assembly.

In the chapters below the parts mounted on the hub are not shown.

**Note**

Heat the hub and the mounted components uniformly, to avoid material damage.

5 Assembly

5.2.2.1 Mounting the hub with feather key connection to the customer connection

Heat the hub for mounting. The following devices can be used for heating:

- Ring burner
- Furnace
- Hotplate
- Induction heater
- Temperature measuring device



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

1. Check that the feather key (B) fits into the groove of the customer connection (A) and the groove of the hub (1). See chapter .

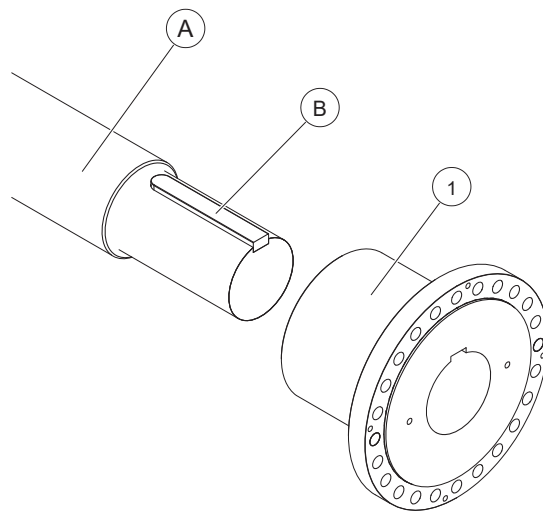


Fig. 5-1 Checking the dimensions

5 Assembly

2. Clean the feather key as well as the connection surface of the customer connection and the hub. See chapter  "3.6.1 Cleaning agents and lubricants" (Page 30).
3. Coat the area of the hub seat with hydraulic oil. See chapter  "3.6.1 Cleaning agents and lubricants" (Page 30).
4. Turn the customer connection (A) and knock the feather key (B) into the groove of the customer connection (A) with a rubber hammer.

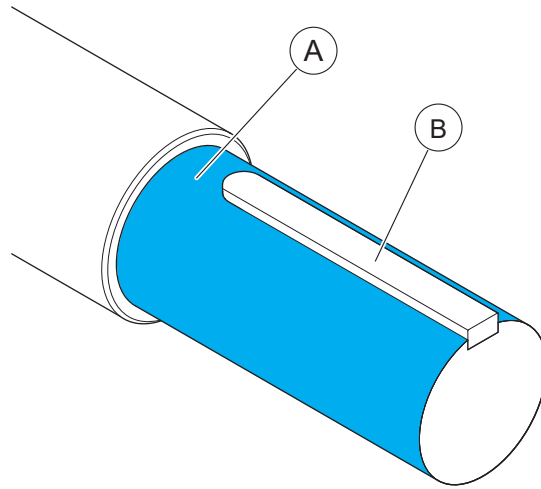


Fig. 5-2 Turning the customer connection, knocking in the feather key

5. If there are multiple grooves on the customer connection, repeat action steps 1–4.
6. Insert and secure 2 guiding aids offset by 180° (arrow) into the bores of the hub (1).



Note

The position of the guiding aids is horizontal to the groove of the hub!

5 Assembly

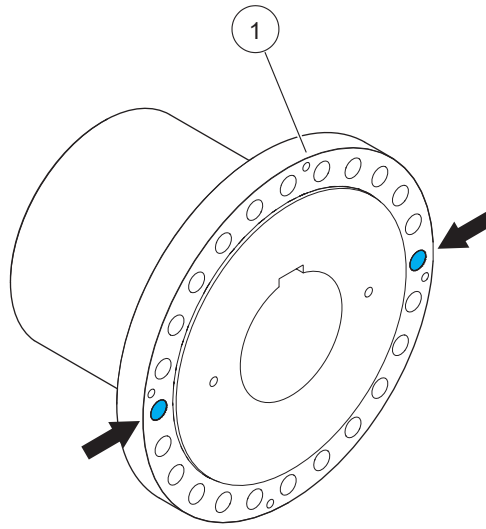


Fig. 5-3 Mounting the guiding aids

7. Attach the hub with suitable slings. See chapter "4.3 Transport" (Page 34).

DANGER! Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

8. Insert the hub into the system.

WARNING! Danger of burns from hot surfaces!

- Wear personal protective equipment.

9. Heat the hub evenly so that the temperature is 110–150°C above ambient temperature.

10. Slide the hub (1) onto the customer connection (A).



Note

Observe the installation situation, the installation direction and the coupling control dimension for the push-on distance. See chapter .

5 Assembly

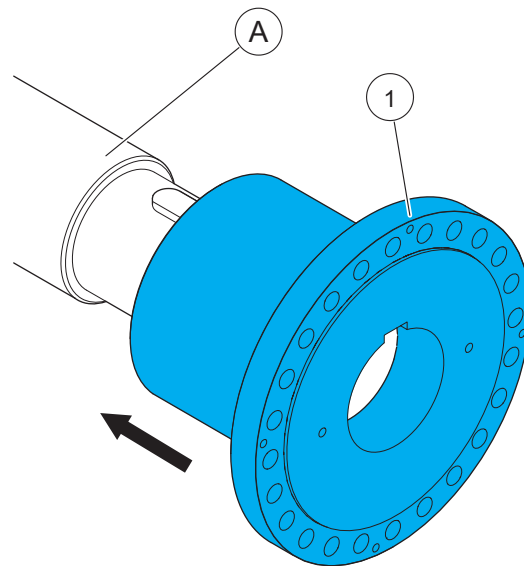


Fig. 5-4 Sliding the hub onto the customer connection

11. Maintain the axial pressure (arrow) on the hub (1) with an auxiliary material (A) until the hub has cooled.

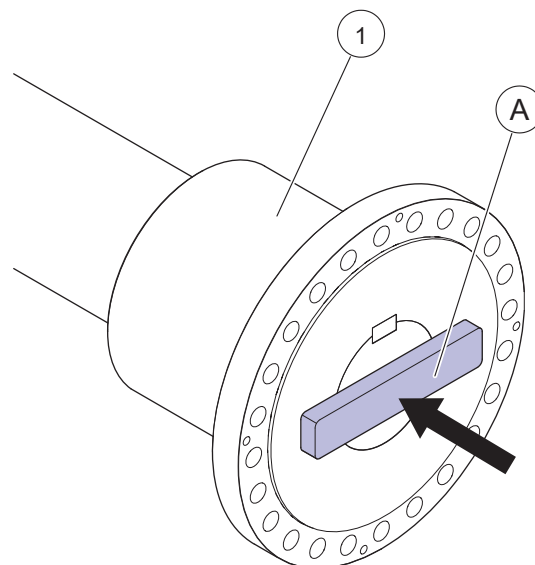


Fig. 5-5 Applying axial pressure to the hub

12. Remove the lifting gear, auxiliary material, guiding aids and sling.
- ➡ The hub is mounted on the customer connection.

5 Assembly

5.2.2.2 Mounting the hub with tapered oil pressure connection on the customer connection

DANGER

Danger to life due to pressurized hydraulic fluid escaping from the hydraulic unit!

If the hydraulic unit, hoses or connections are leaking, the hydraulic fluid will escape at high pressure and can cause fatal injuries.

- Before starting installation, check whether the hydraulic unit, the hoses and the connections are tight.

NOTICE

Risk of material damage if the oil film between the connection surfaces breaks when pushed on!

If the hub is not gradually expanded and pushed onto the customer connection, the oil film will break and material abrasion will occur.

- Ensure that the pump and the leads are completely filled with hydraulic oil.
- Expand the hub step by step with the hydraulic unit and push it onto the customer connection.
- Observe the axial pressure on the hydraulic unit.



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

Widen the hub for installation using the pressurized oil method. The following devices can be used for widening:

- 2x Hydraulic unit (adequately sized)
- Hydraulic oil
- Hollow compact
- Dial gauge

5 Assembly

1. Unscrew the threaded screw (1) from the hub (2).

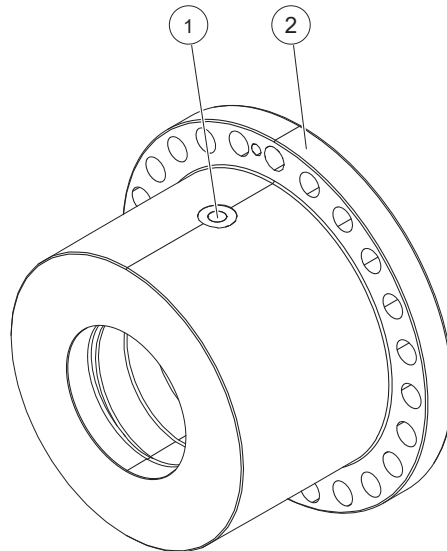


Fig. 5-6 Unscrewing the threaded screw

2. Clean the connecting surface of the customer connection and the hub. See chapter  "3.6.1 Cleaning agents and lubricants" (Page 30).
3. Insert and secure 2 guiding aids offset by 180° into the bores (arrows) of the hub (1). The position of the guiding aids is horizontal to the connection (detail) of the hydraulic unit.

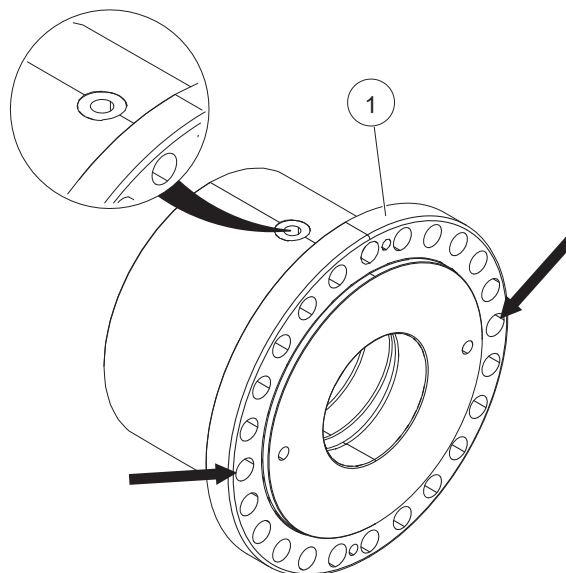


Fig. 5-7 Mounting the guiding aids

5 Assembly

4. Attach the hub with suitable slings. See chapter  "4.3 Transport" (Page 34).

 **DANGER!** Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

5. Insert the hub into the system.
6. Slide the hub (1) onto the customer connection (A) until the conical surfaces are close together. Do not exert any further pressure on the hub!

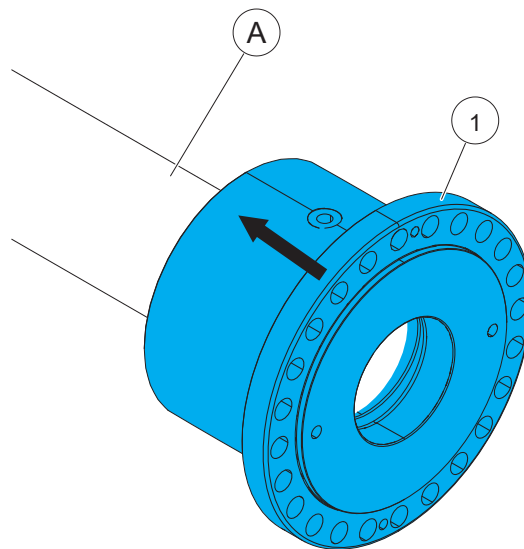


Fig. 5-8 Sliding the hub onto the customer connection

5 Assembly

7. Remove the guiding aids from the bores (arrows) on the hub (1).

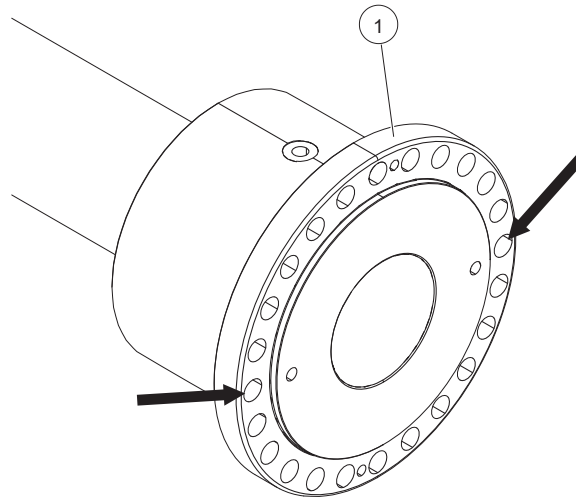


Fig. 5-9 Removing the guiding aids

8. Screw the hollow compact (B) to the customer connection (A) using the threaded rod (C).

i Note

If the cone is 1:15 or steeper, the customer must also axially secure the hub!

i Note

Comply with the instructions provided by the respective manufacturer.

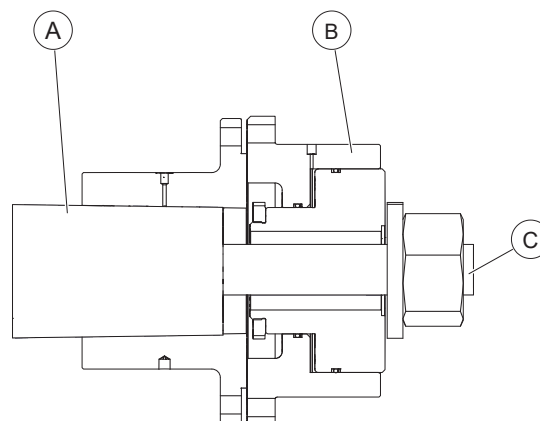


Fig. 5-10 Mounting the hollow compact

5 Assembly

9. Connect the hydraulic unit at the marked points (arrows) on the hub (1) and the hollow compact (A). Make sure that the hydraulic oil is clean and meets the required specification.

i Note
Use a separate hydraulic unit.

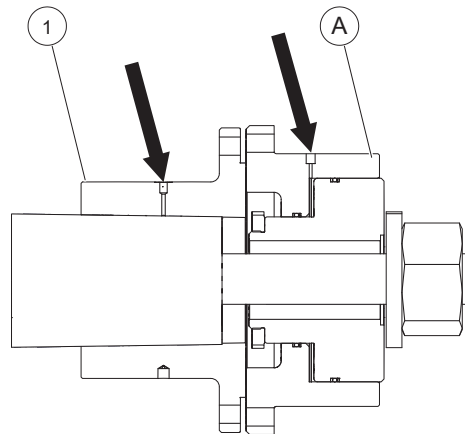


Fig. 5-11 Connecting the hydraulic unit

10. Check the push-on distance (X) with a dial gauge (A). Make sure the dial gauge (A) is set to zero.

i Note
Observe the installation situation, the installation direction and the coupling control dimension for the push-on distance. See chapter .

5 Assembly

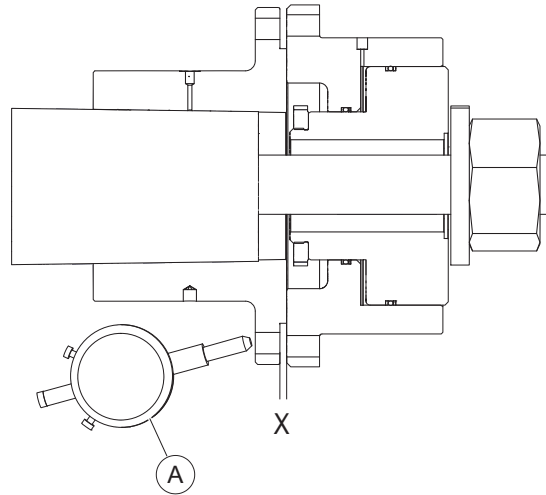


Fig. 5-12 Mounting the dial gauge

11. To expand the hub (1), press oil between the conical surfaces (detail) until it comes out at the end face of the hub (1).

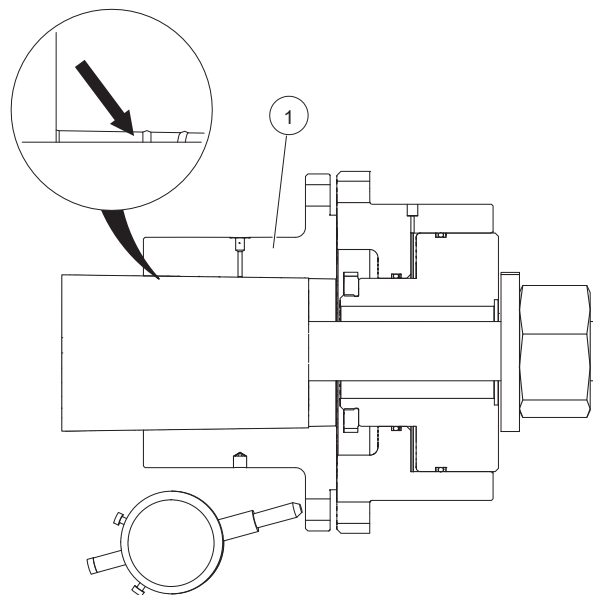


Fig. 5-13 Expanding the hub

NOTICE! Risk of material abrasion on the connection surfaces due to breaking oil film!

- Observe the dial gauge for uneven deflection.
- Observe the axial pressure on the hydraulic unit.

5 Assembly

12. To slide the hub (1) onto the customer connection (A), gradually increase the pressure on the connections (arrows).



Note

If the oil film breaks, perform the following actions:

- Disassemble the hub. See chapter "9.2.4 Dismounting the hub" (Page 104).
- Check the customer connection as well as the hub for material abrasion.
- Remount the hub if no material abrasion is visible. See chapter "5.2.2.2 Mounting the hub with tapered oil pressure connection on the customer connection" (Page 52).

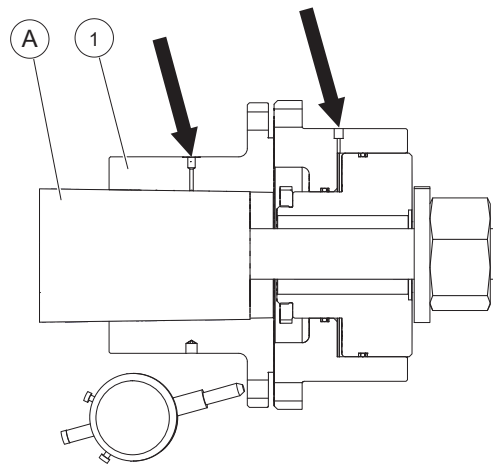


Fig. 5-14 Increasing the pressure gradually

5 Assembly

13. When the push-on distance (X) is reached, maintain the pressure on the hub (1) for at least 1 hour.

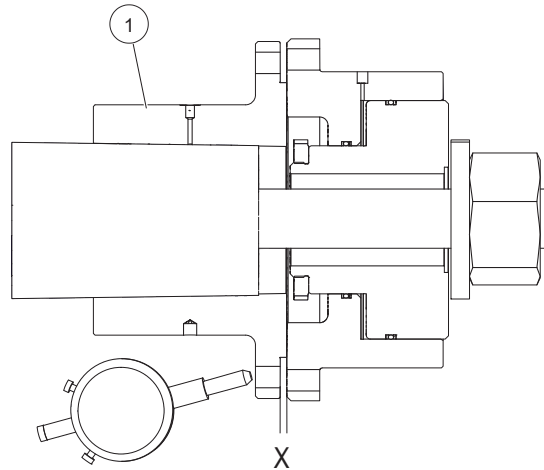


Fig. 5-15 Maintaining the pressure on hub

14. Disassemble the dial gauge.
15. Loosen the hydraulic unit at the marked points (arrows) on the hub (1) and the hollow compact (A).



Note

Comply with the instructions provided by the respective manufacturer.

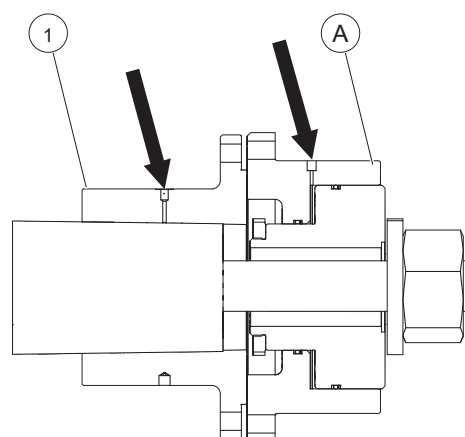


Fig. 5-16 Loosening the hydraulic unit

5 Assembly

16. Disassemble the hollow compact (A).

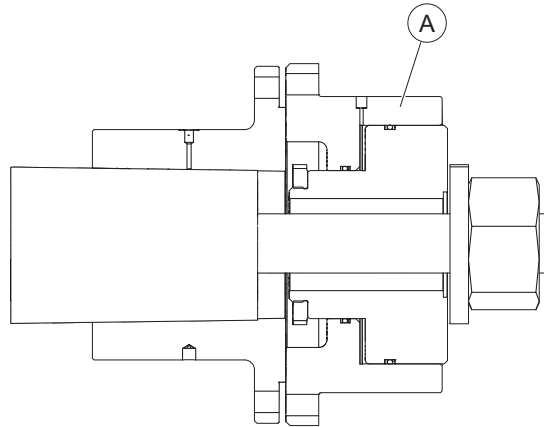


Fig. 5-17 Disassembling the hollow compact

17. Tighten the threaded screw (1) in the hub (2).



Note

Comply with the tightening torques!

The tightening torques are indicated on the drawing.



Note

Wait 24 hours before operating the oil pressure connection at the full rated engine speed.

This is necessary to ensure that the pressure fluid has escaped out of the fit joint.

5 Assembly

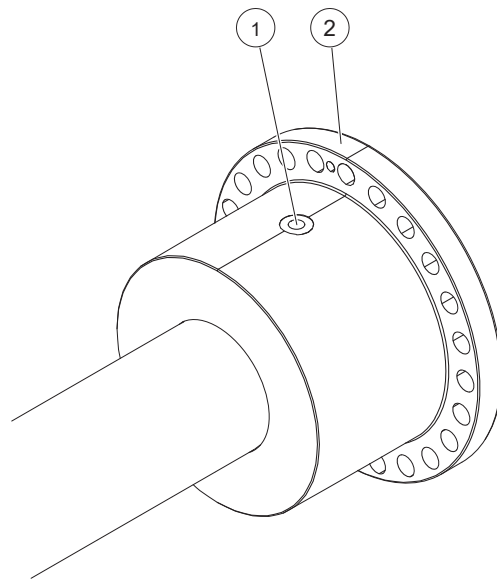


Fig. 5-18 Tightening the threaded screw

18. Remove the lifting gear, auxiliary material, guiding aids and sling.

✎ The hub is mounted on the customer connection.

5.2.2.3 Mounting the hub with the cylindrical oil pressure connection on the customer connection

Heat the hub for mounting. The following devices can be used for heating:

- Ring burner
- Furnace
- Hotplate
- Induction heater
- Temperature measuring device



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

5 Assembly

1. Clean the connection surface on the customer connection and the hub. See chapter  "3.6.1 Cleaning agents and lubricants" (Page 30).
2. Insert and secure 2 guiding aids offset by 180° into the bores (arrows) of the hub (1). Ensure that the position of the guiding aids is horizontal to the connection (detail) for the hydraulic unit.

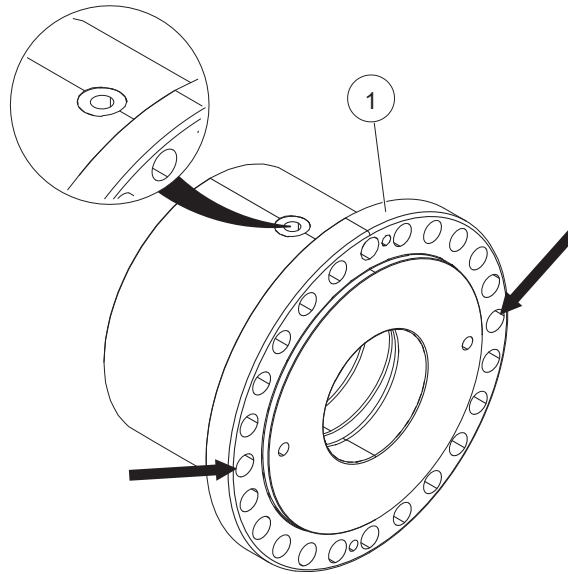


Fig. 5-19 Mounting the guiding aids

3. Attach the hub with suitable slings. See chapter  "4.3 Transport" (Page 34).

 **DANGER!** Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

5 Assembly

4. Insert the hub into the system.
5. Insert a heat insulator (B) between the customer connection (A) and the hub (1).

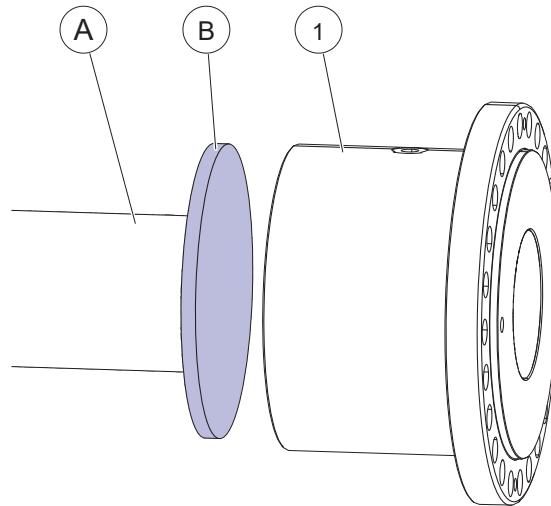


Fig. 5-20 Inserting the heat insulator

⚠ WARNING! Danger of burns from hot surfaces!

- Wear personal protective equipment.

5 Assembly

6. Heat the hub evenly so that the temperature is 250-300°C above ambient temperature.
7. Remove the heat insulator.
8. Slide the hub (1) onto the customer connection (A) until the installation dimension is reached. See chapter .

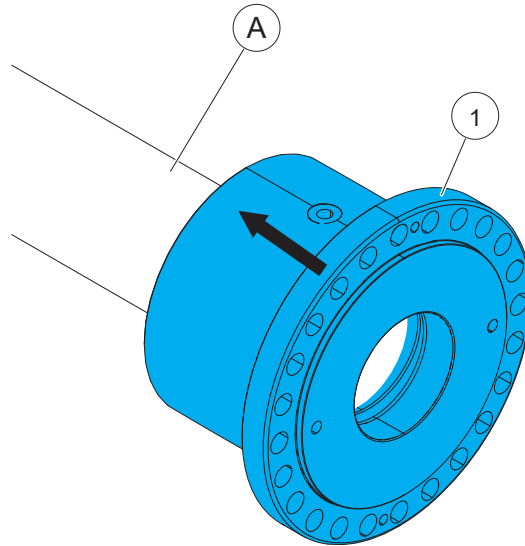


Fig. 5-21 Sliding the hub onto the customer connection

5 Assembly

9. Maintain the axial pressure (arrow) on the hub (1) with an auxiliary material (A) until the hub has cooled.

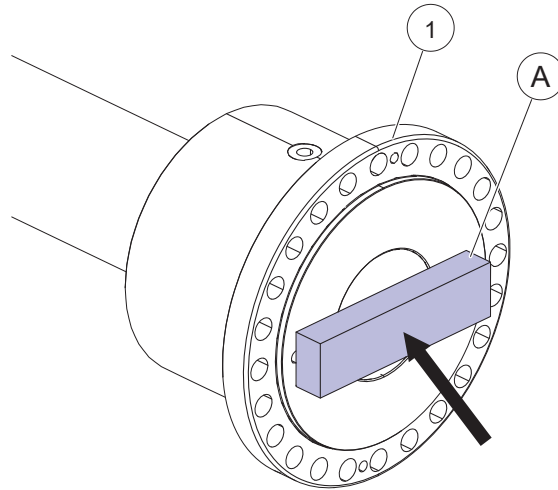


Fig. 5-22 Applying axial pressure to the hub

10. Remove the lifting gear, auxiliary material, guiding aids and sling.
↳ The hub is mounted on the customer connection.

5.2.2.4 Mounting the clamping hub with external threaded fitting



Note

The tightening torques must be complied with!



Note

Secure the components against falling!

5 Assembly

1. Clean the clamping surfaces (arrow) with brake cleaner.

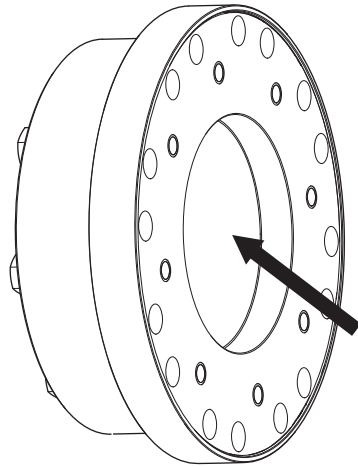


Fig. 5-23 Torque transmitting surfaces

2. Attach the clamping hub with a suitable sling. See chapter "4.3 Transport" (Page 34).
3. Bring the clamping hub into the system.
4. Slide the clamping hub (1) onto the customer connection (A).

Note

If the fastening elements for mounting the clamping hub on the elastic element are covered by the clamping ring, first separate clamping ring and clamping hub from each other, slide both onto the customer connection, and then fasten the clamping hub on the elastic element. Thereafter, slide the clamping ring back onto the clamping hub, and continue with the installation of the clamping hub.

5 Assembly

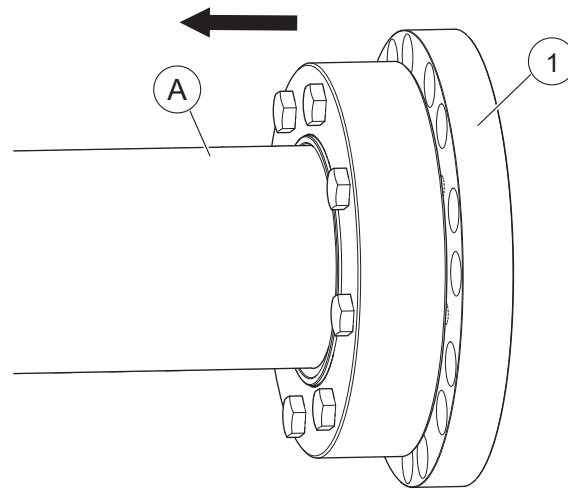


Fig. 5-24 Slide clamping hub on customer connection

5. Screw the fastening elements (1) into the clamping hub (2), all around with approximately a 1/4 turn. In this process, ensure that the gap between clamping ring and clamping hub remains parallel and that the clamping ring does not tilt. Repeat this process, until the fastening elements cannot be further tightened by hand.

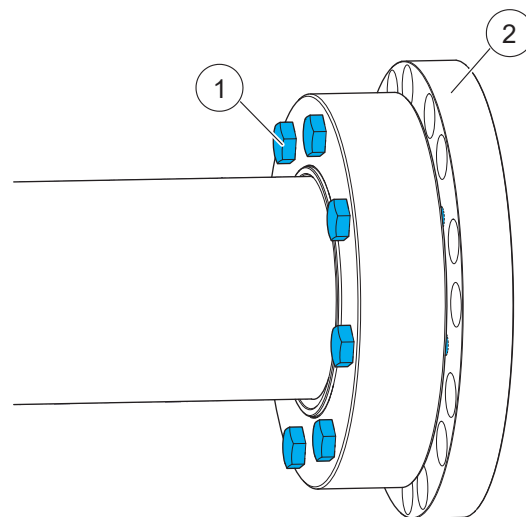


Fig. 5-25 Tighten clamping ring hand-tight

5 Assembly

6. Tighten the fastening elements (1) with 20% of the nominal torque, all around, one after the other. In this process, ensure that the gap between clamping ring and clamping hub remains parallel.

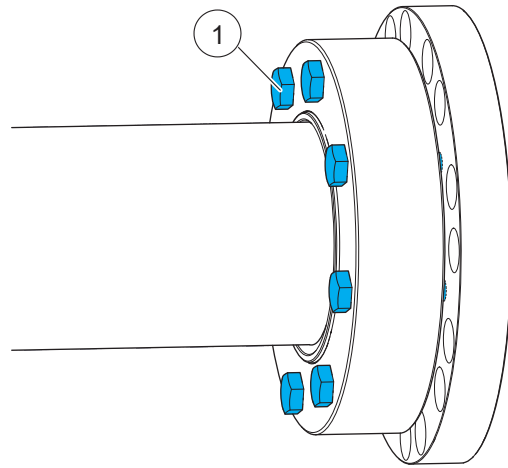


Fig. 5-26 Fasten clamping ring

5 Assembly

7. Repeat the procedure described in step 6 with 40%, 60%, 80% of the required tightening torque, until the clamping ring rests completely on the clamping hub and there is no gap.
8. Tighten the fastening elements (1) again with the full tightening torque specified in the drawing.

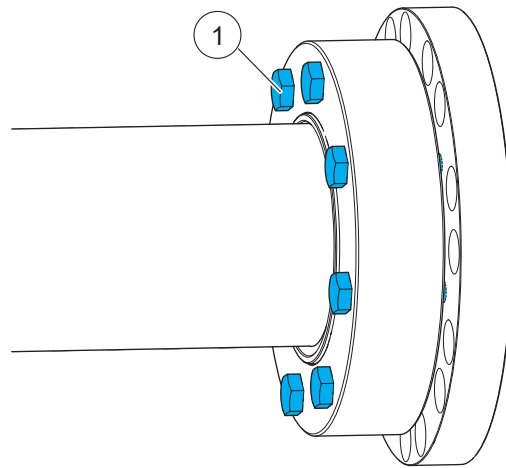


Fig. 5-27 Fasten clamping ring

9. Mark the bolts that have been tightened to tightening torque with thread locking fluid.

✎ The clamping hub is mounted.

5.2.2.5 Mounting the clamping hub with internal threaded fitting



Note

Comply with the tightening torques!
The tightening torques are indicated on the drawing.



Note

Secure the components against falling!

5 Assembly

1. Clean the clamping surfaces (arrow) with brake cleaner.

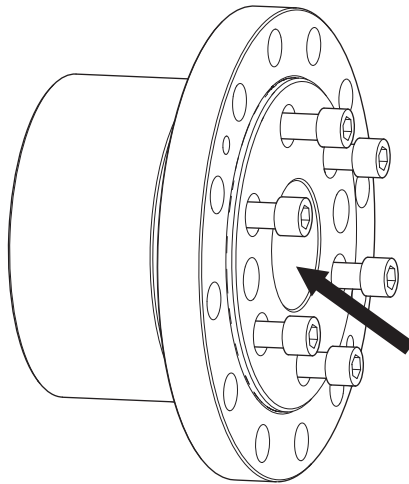


Fig. 5-28 Torque-transmitting surfaces

2. Attach the clamping hub with a suitable sling. See chapter  "4.3 Transport" (Page 34).

 **DANGER!** Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

5 Assembly

3. Insert the clamping hub into the system.
4. Unscrew the fastening elements (3) from the clamping hub (2) until the clamping ring (1) has play on the clamping hub (2).

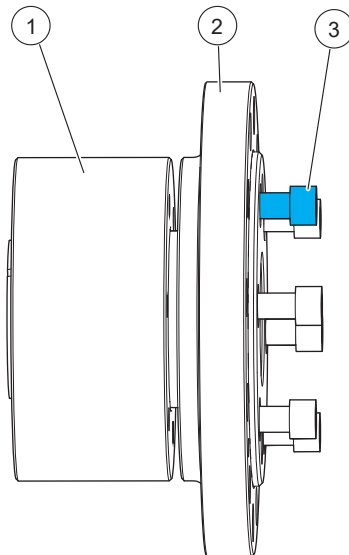


Fig. 5-29 Preparing clamping hub

5. Slide the clamping hub (1) with the loosened clamping ring (2) onto the customer connection (A).

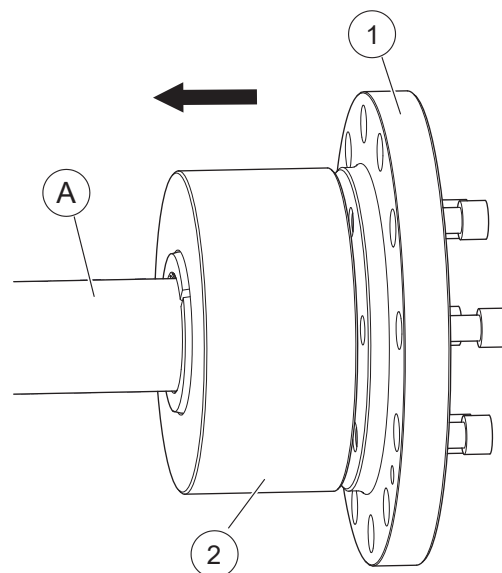


Fig. 5-30 Sliding the clamping hub onto the customer connection

6. Screw the fastening elements (2) into the clamping ring (1) by approx. 1/4 turn all the way round. Ensure that the air gap between the clamping ring and clamping hub remains parallel and that the clamp-

5 Assembly

ing ring does not tilt. See chapter . Repeat this process until the fastening elements cannot be further tightened by hand.

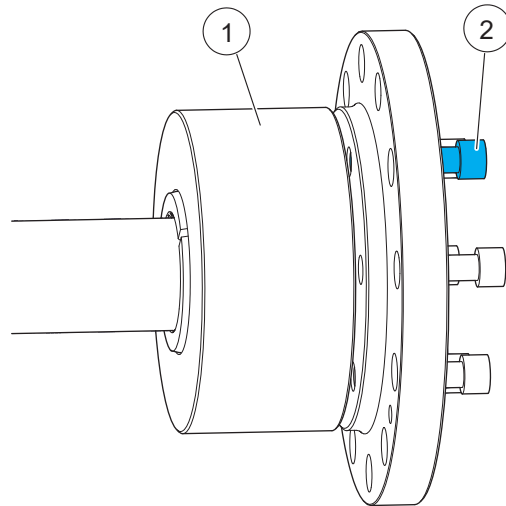


Fig. 5-31 Hand-tightening the clamping ring

7. Tighten the fastening elements (1) to 20% of the nominal torque all the way round. In this process, ensure that the air gap between the clamping ring and clamping hub remains parallel. See chapter .

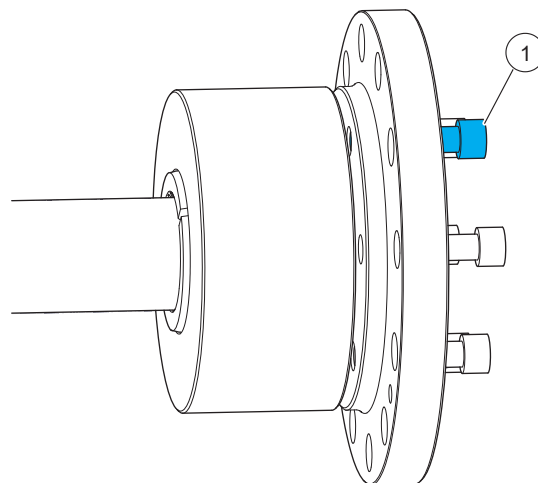


Fig. 5-32 Screwing on the clamping ring

5 Assembly

8. Repeat the process described in step 7 with 40%, 60% and 80% of the required tightening torque until the air gap corresponds to the dimension shown on the drawing. See chapter .
9. Tighten the fastening elements (1) again with the full tightening torque specified in the drawing.

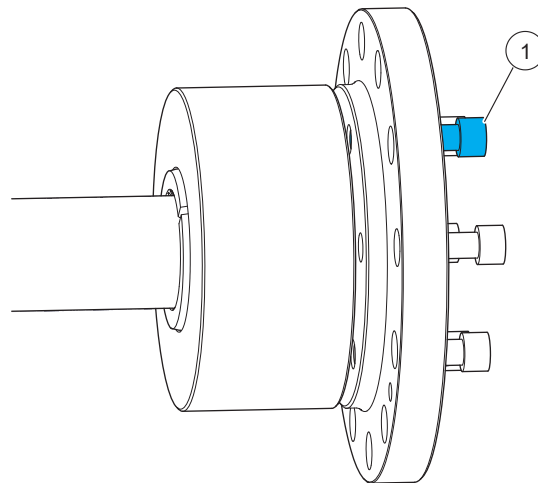


Fig. 5-33 Screwing on the clamping ring

10. Mark the bolts that have been tightened to tightening torque with thread locking fluid.

✎ The clamping hub is mounted.

5.2.3 Mounting elastic element



Note

Only use the provided components and fastening elements as specified in the drawing. Do not dismantle the flexible elements.



Note

Comply with the tightening torques!
The tightening torques are indicated on the drawing.

5 Assembly

1. Check the connection dimensions and ensure compliance with the tolerances.
2. Attach the elastic element using a suitable sling. See chapter  "4.3 Transport" (Page 34).
3. Insert the elastic element into the system.
4. Remove the transport devices if they are not needed to mount the intermediate shaft.
5. Position the elastic element (2) in the pilot of the hub (1). While doing this, take any balance marks into account.

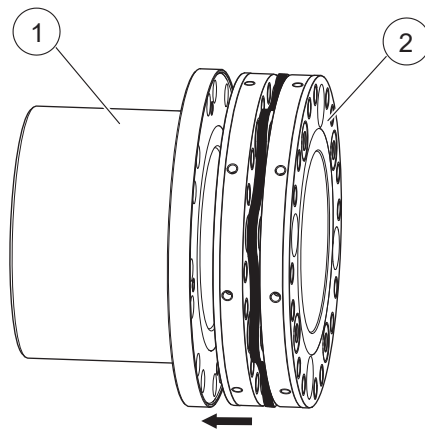


Fig. 5-34 Positioning elastic element

NOTICE! Risk of material damage to the plate assembly due to excessively long fastening elements.

- Use fastening elements with correct installation depth.

5 Assembly

6. Screw the elastic element (3) onto the hub (1) using the fastening elements (2). Ensure that the fastening elements (2) are flush with the elastic element (detail).

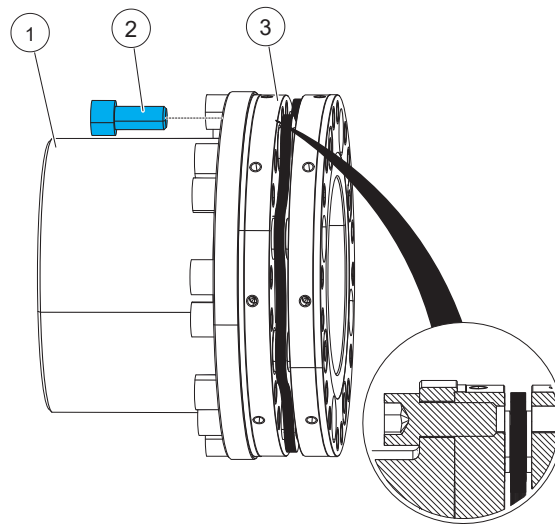


Fig. 5-35 Mounting elastic element

7. Perform the steps described above for each elastic element.

👉 The elastic elements are mounted.

5.2.4 Mounting intermediate shaft

⚠ CAUTION

Risk of crushing or impact injuries if the shaft falls.

The intermediate shaft can fall if it is not propped up.

- Keep the intermediate shaft horizontally in place using supports!



Note

Only use the provided components and fastening elements as specified in the drawing. Do not dismantle the flexible elements.



Note

Comply with the tightening torques!

The tightening torques are indicated on the drawing.

5 Assembly

1. Check the connection dimensions and ensure compliance with the tolerances.
2. Attach the intermediate shaft using a suitable sling. See chapter  "4.3 Transport" (Page 34).
3. Insert the intermediate shaft into the system.
4. Insert the intermediate shaft between the two elastic elements. While doing this, take any balance marks into account.
5. If there is not enough space between the elastic elements, press the elastic elements together until there is sufficient installation space.



Note

If transport devices are present, use all transport devices so that the elastic element is pushed together uniformly. See also  "5.2.3 Mounting elastic element" (Page 73) in this regard.

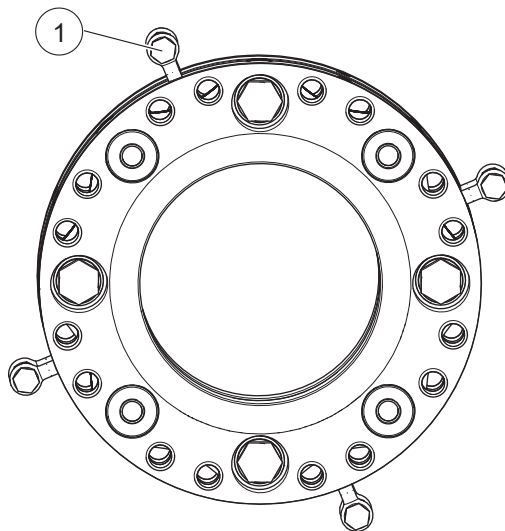


Fig. 5-36 Pushing elastic element together

6. Remove the transport devices from the elastic elements.



Note

The transport devices will be needed again for disassembly.

NOTICE! Risk of material damage to the plate assembly due to excessively long fastening elements.

- Use fastening elements with correct installation depth.

5 Assembly

7. Screw on the intermediate shaft (1) on both sides using the fastening elements (2). Ensure that the fastening elements (2) are flush with the elastic element (detail).

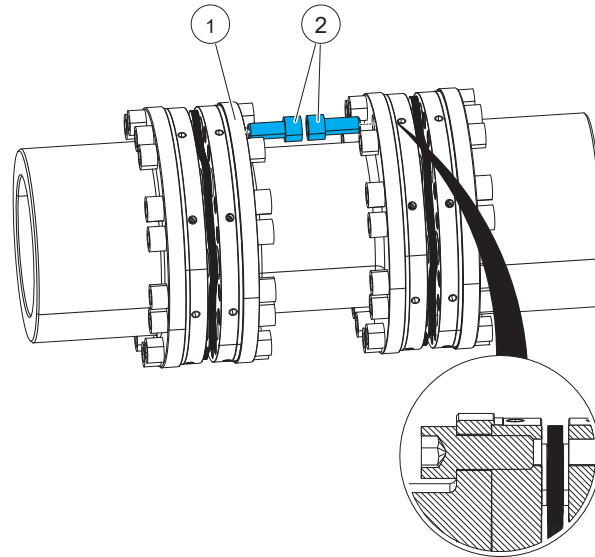


Fig. 5-37 Mounting intermediate shaft

➤ The intermediate shaft is mounted.

5.2.5 Mounting the disk flange on the customer connection

1. Attach the disk flange with suitable slings. See chapter "4.3 Transport" (Page 34).
2. Bring the disk flange into the system.
3. Screw the disk flange (1) onto the customer connection using the fastening elements (arrow).



Note

The fastening elements are not included in the VULKANscope of delivery and must be configured by the owner!

5 Assembly

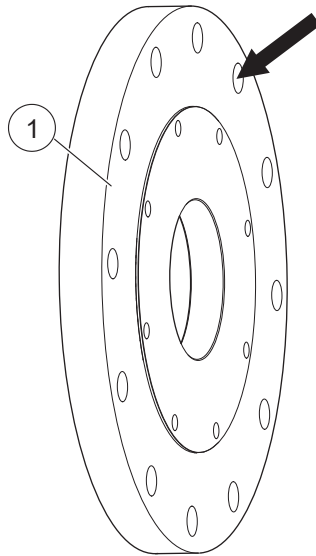


Fig. 5-38 Mount disk flange

↙ The disk flange is mounted.

5.2.6 Alignment

5.2.6.1 Alignment fundamentals

The METAFLEX couplings are capable of compensating misalignments of the connected machines. The more precisely the system is aligned, the more effectively the coupling can compensate for operational displacements, the quieter it will be in operation, and the longer service life it will provide.

5 Assembly

When aligning the coupling, angular and axial ductility must be kept as low as possible. Maximum 20% of the maximum permissible values is allowed. Maximum permissible axial ductility and angular ductility must not occur simultaneously. See  "5-39 Diagram" (Page 79) for their dependency.

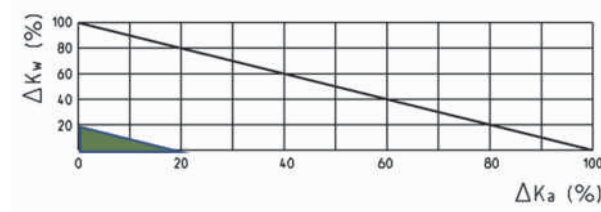


Fig. 5-39 Diagram

The maximum permissible values are specified in the technical data sheet (see Appendix). If values are not specified, contact the VULKAN customer service organization.

CAUTION

Improper alignment can cause system damage!

If there are excessive displacements, high forces can be transferred to the adjacent machine parts.

- Ensure that the system is aligned correctly.
- If the maximum permissible alignment values are exceeded, do not operate the system. Coordinate additional measures with the manufacturer.

Plate assembly

After concluding the alignment procedure in installed status, the plates should form a flat, homogeneous assembly that is as torsion-free as possible, unless a specific displacement has already been prescribed.

5 Assembly



Note

The specified displacements refer to the warmed-up condition of the system.

System-specific thermal expansion must be determined by the system engineer and taken into account. If required, the coupling can be installed with a prescribed axial displacement, so that an optimal axial displacement is reached at operating temperature.

For flexibly mounted systems, please contact the engine manufacturer or bearing manufacturer for further information on the setting behavior of the elastic bearing. Due to the setting behavior of the elastic bearing, it may be necessary to operate the system slightly outside of the recommended tolerances at the beginning.

In this regard, the restoring forces of the coupling must be taken into account.

For realignment in cold condition, system-specific values apply and must be determined and complied with by the system engineer. The maximum permissible displacement values are specified in the technical data sheet and they must not be exceeded.

Contact the engine manufacturer or bearing manufacturer for further information.

If there are questions regarding VULKAN bearings/mounts, please contact your local VULKAN agency or the VULKAN customer service organization (see chapter  "1.3 Customer service" (Page 10)).



Note

The permissible coupling displacements are specified in the technical data sheet. The maximum permissible axial (ΔK_a) and angular (ΔK_w) displacements must not be used simultaneously. Comply with the diagram in the technical data sheet.

5.2.6.2 Aligning the coupling

The coupling can be aligned with various devices:

- Dial gauge and measuring stick
- Caliper and dial gauge
- Dial gauge and adapter

NOTICE

If there is an alignment error the plate assembly can be overloaded. This can impair the functionality of the coupling.

- Ensure that the coupling is correctly aligned!

5 Assembly

Figure 5-40 "Possible displacement" (Page 81) shows a radial displacement. The radial displacement arises from the parallel displacement of the drive shaft and driven shaft, where these two shafts are also angled towards each other. In this situation the angle between the shafts is added to the angle from radial displacement as the total angle for a plate assembly.

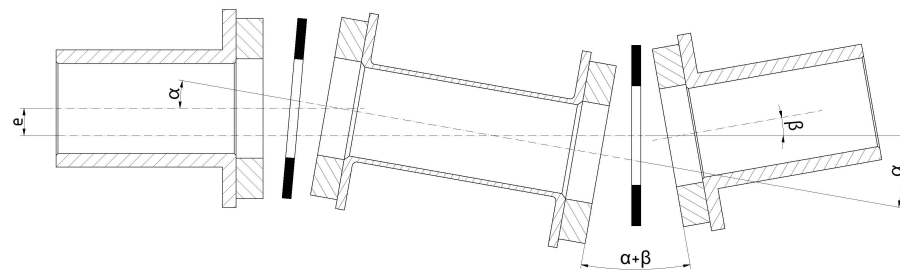


Fig. 5-40 Possible displacement

α =Angle from parallel displacement

β =Angle due to the inclination of the shafts

e =Parallel displacement

Aligning with dial gauge and measuring stick

1. Push the customer connections together.



Note

Comply with the instructions provided by the respective manufacturer.

2. Attach the dial gauge with the measuring stick on the outer diameter of the coupling. The measuring point should be close to the outer diameter of the coupling.

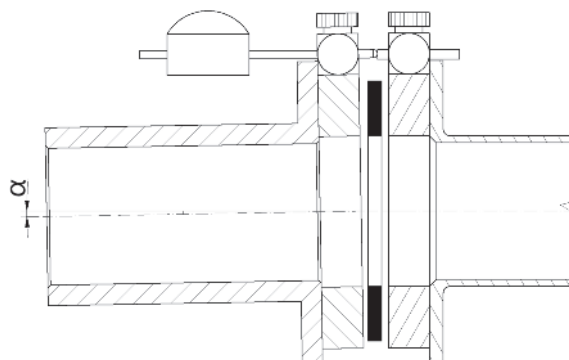


Fig. 5-41 Attach dial gauge with measuring stick

5 Assembly

3. Turn the coupling 360°.
4. Note the measured value on the dial gauge and compare it with the alignment tolerance.

Alignment tolerance	The deflection determined on the dial gauge must not exceed 0.015 mm per 10 mm of outer diameter.
Example	Outer diameter 200 mm is $20 \times 0.015 \text{ mm} = 0.3 \text{ mm}$ max.

5. Align the drive side and driven side to each other until the permissible value is complied with.
 6. Fasten the drive side and driven side such that the position of the coupling can no longer change.
 7. Check the alignment of the coupling again.
- ➞ The drive side and driven side are aligned.

Aligning with caliper and dial gauge

1. Push the customer connections together.

i Note
Comply with the instructions provided by the respective manufacturer!
2. Attach the caliper with dial gauge on the outer diameter of the coupling. The measuring point should be close to the outer diameter of the coupling.

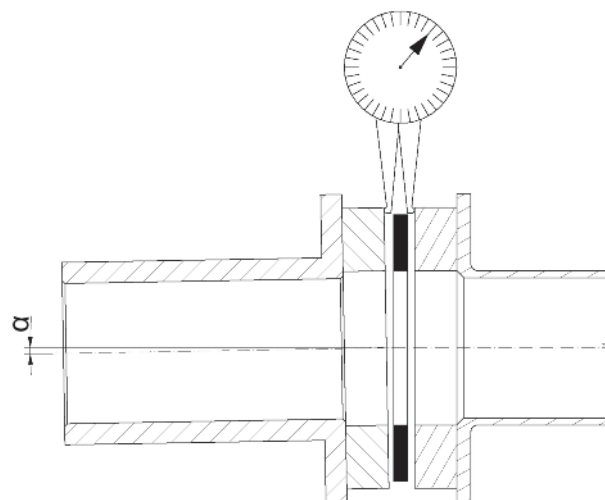


Fig. 5-42 Attach caliper with dial gauge

5 Assembly

3. Turn the coupling 360°.
4. Note the measured value on the dial gauge and compare it with the alignment tolerance.

Alignment tolerance	The deflection determined on the dial gauge must not exceed 0.015 mm per 10 mm of sampled diameter.
Example	Sampled diameter 200 mm is $20 \times 0.015 \text{ mm} = 0.3 \text{ mm max.}$

5. Align the drive side and driven side to each other until the permissible value is complied with.
 6. Fasten the drive side and driven side such that the position of the coupling can no longer change.
 7. Check the alignment of the coupling again.
- ↪ The drive side and driven side are aligned.

Aligning with dial gauge and adapter

1. Push the customer connections together.



Note

Comply with the instructions provided by the respective manufacturer!

2. Attach the adapter on the outer diameter of the coupling. The measuring point should be close to the outer diameter of the coupling.

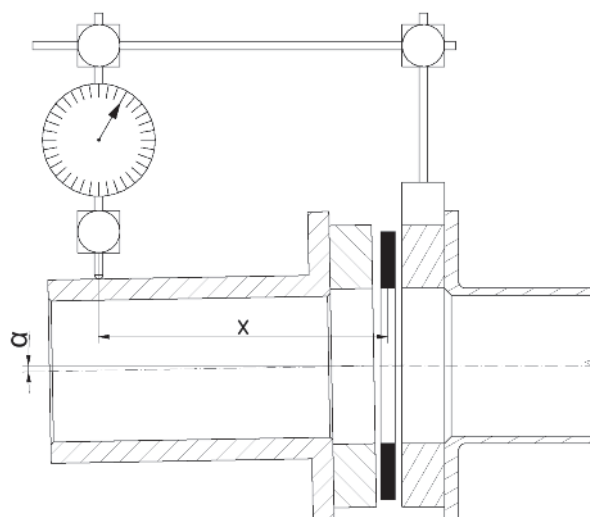


Fig. 5-43 Attach dial gauge with adapter

5 Assembly

3. Turn the coupling 360°.
4. Note the measured value on the dial gauge and compare it with the alignment tolerance.

Alignment tolerance	The deflection determined on the dial gauge must not exceed 0.015 mm per 10 mm length.
Example CM:	"x" = 400 mm: 40 x 0.015 mm = 0.6 mm max. dial gauge deflection

5. Align the drive side and driven side to each other until the permissible value is complied with.
 6. Fasten the drive side and driven side such that the position of the coupling can no longer change.
 7. Check the alignment of the coupling again.
- ➡ The drive side and driven side are aligned.

Align with sliding caliper

1. Measure and note the gap (X) of each elastic element in the equally aligned cycle every 45°.

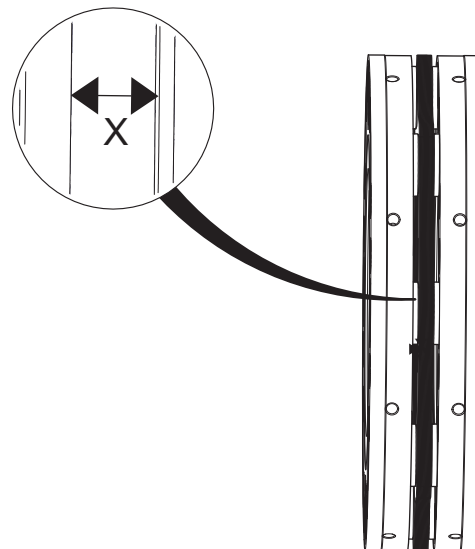


Fig. 5-44 Gap

- i** Note
Do not turn the coupling to measure it!

5 Assembly

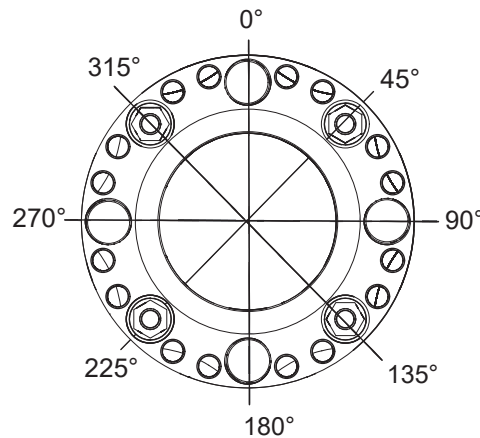


Fig. 5-45 Measuring points with sliding caliper

2. Compare the values of opposite points, e.g. 0° and 180°, and determine the delta. Example:
 $0^\circ = 10.00 \text{ mm}$
 $180^\circ = 12.0 \text{ mm}$
 $12.00 \text{ mm} - 10.00 \text{ mm} = 2 \text{ mm}$
 3. Determine the angle: Angle = delta/diameter. Example:
 $2.0 \text{ mm} / 200 \text{ mm} = 0.57^\circ$
 4. Fasten the drive side and driven side such that the position of the coupling can no longer change.
 5. Compare the angle determined in this manner with the information in the technical data sheet. The calculated value must equal 20% of the value in the technical data sheet.
 6. Align the drive side and driven side to each other until the permissible value is reached.
 7. Fasten the drive side and driven side such that the position of the coupling can no longer change.
 8. Check the alignment of the coupling again.
- 👉 The drive side and driven side are aligned.

5 Assembly

5.2.7 Concluding tasks and final inspection

1. Retighten all threaded joints with a torque wrench again as specified in the drawings, complying with the prescribed tightening torque. See chapter  "5.1 Safety instructions" (Page 45).
 2. Perform a concluding alignment check.
 3. Ensure that an owner-provided reach-in guard and safety device for the rotating parts have been attached before the system is commissioned. See chapter  "2.3.2 Responsibility of the owner" (Page 15).
-  The installation is concluded.

6 Commissioning

6 Commissioning

6.1 Safety instructions

⚠ WARNING

Danger of crushing and shear injury for arms and hands!

Moving parts can cause severe injuries.

- Provide an external anti-entry protection.

⚠ WARNING

Life-threatening danger due to ejected fragments or loose shaft ends in the event of membrane or shaft breakage.

- Install a safety restraint.

⚠ WARNING

Life-threatening danger and danger of material damage due to incomplete or incorrect assembly!

If components are not correctly mounted, they can be thrown out at high speed in operation. Parts flying about can cause severe injury and material damage.

- Prior to commissioning, ensure that all parts are mounted in accordance with this assembly manual.
- Only operate the product with the necessary protective fixture. This protective fixture must be installed by the owner.
- After tasks on the product, ensure that all bolt connections are firmly tightened in accordance with the specified tightening torques (see drawing).

⚠ WARNING

Ejected parts can cause severe injuries.

- Remove all loose parts and tools before the system is commissioned.

6 Commissioning

NOTICE

Material damage if configured incorrectly!

If the coupling is configured incorrectly, extremely high dynamic forces can be transferred to the adjacent machine components and they could be damaged.

- Prior to installation, ensure that all characteristic values specified for the application in chapter  "3.3 Technical data" (Page 30) are correct.
- Only use the coupling in the original application intended by the manufacturer; this is the only application for which the coupling is configured.

6.2 Tasks for commissioning

6.2.1 Commissioning the coupling

The installed shaft coupling will be subjected to a one-hour to two-hour trial run under normal operating conditions.

1. Observe the coupling during the trial run.
 - If irregularities or noises occur immediately bring the coupling to a standstill.
 - Check the alignment of the coupling, the fitting dimensions, and the installation position, and make corrections if there is deviation.
2. After concluding the trial run, check the tightening torque of all threaded joints and retighten if there are deviations.

7 Troubleshooting

7 Troubleshooting

7.1 Safety instructions

DANGER

Life-threatening danger due to restarting the machine!

When working in danger zones, persons can be seriously injured by unauthorized switching on of the power supply.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.
- If combustion motors supply the motive power then the safety instructions and the instructions for switching off and safeguarding against restart in the assembly manuals provided by the manufacturers must be complied with.

7.2 Fault table

Possible fault causes and the tasks to correct these faults are described in the following section.

If faults occur more frequently, the maintenance intervals must be shortened to correspond to actual system load.

Contact the manufacturer if there are faults that cannot be corrected by following the instructions below. See chapter  "1.3 Customer service" (Page 10).

7 Troubleshooting

7.2.1 Fault table for METAFLEX

The faults listed below refer to the components that are included in the actual scope of delivery.

Component	Fault	Possible cause	Fault rectification	Rectification by
Coupling	Increased vibration and operating noise	Faulty alignment or installation of the multi-plate couplings	Check alignment and installation. Check plates for cracks or breaks. If this is the case, replace the elastic element.	Specialist
Coupling	Increased bearing forces	Faulty alignment	Alignment check	Specialist
Elastic element	Impermissible plastic deformation of the plates; the Kmax values are exceeded	Faulty alignment, operation outside the limits of the machine	Contact customer service department. Check all coupling components and replace the plate coupling if it is defective. Determine the cause of the damage and eliminate it. Check whether the Kmax values are complied with. If the values are exceeded, replace the elastic element.	Specialist

Tbl. 7-1 Fault table

7 Troubleshooting

7.3 Fault correction tasks

7.3.1 Behavior in the event of faults

Always comply with the following instructions:

1. For faults that pose an imminent hazard for personnel or material assets, immediately trigger the emergency stop function through the emergency stop device.
2. Interrupt/switch off the customer-provided media and energy supply.
3. Depressurize pressurized parts.
4. Determine the cause of the fault.
5. If fault rectification requires work in the danger zone, switch off the machine and prevent it from being restarted.
6. Inform the responsible parties at the implementation site of the fault without delay.
7. Depending on the type of fault, have authorized, specialized personnel correct the fault.

7.3.2 Checking the gap of the plates

1. Measure the gap of the plates and compare it with the K_{max} values in the table below.

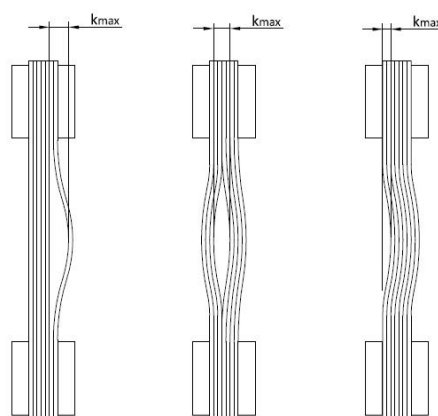


Fig. 7-1 Gap of the plates

7 Troubleshooting

2. If the Kmax values are exceeded, replace the elastic element. See chapters  "9.2 Dismounting the product" (Page 100) and  "5 Assembly" (Page 45) in this regard.

 The gap of the plates is checked.

7.3.3 Kmax values

Size	Kmax value
AA	0.6 mm
AB	0.8 mm
AC	0.8 mm
BA	1.0 mm
BB	1.0 mm
BC	1.0 mm
BD	1.3 mm
BE	1.5 mm
CA	1.5 mm
CB	1.8 mm
CC	1.8 mm
CD	1.8 mm
CE	2.3 mm
DA	2.5 mm
DB	2.5 mm
DC	3.3 mm

Tbl. 7-2 Kmax values

7.3.4 Alignment check

- Execution only by a specialist.
 - Special tools required
1. Radial measuring device
 2. Axial measuring device
 3. Angle measuring device

7 Troubleshooting

The alignment process is described in detail in the "Alignment" chapter.

Replacing the surface protection

- Execution only by a specialist.

7.4 Start-up after a corrected fault

7.4.1 Commissioning after troubleshooting

After rectifying the fault and before switching on, perform the following steps:

1. Firmly tighten all previously unscrewed threaded joints to the specified tightening torque.
2. Ensure that all previously removed protective devices and covers have been properly reinstalled.
3. Ensure that all tools, materials, and other equipment used has been removed from the work area.
4. Clean the work area and remove any substances that may have escaped, such as liquids, processing material, etc.
5. Ensure that all system safety devices are again functioning properly.
6. Owner-installed emergency stop devices, if present, must be reset.
7. Ensure that no one is in the danger zone.

8 Maintenance

8 Maintenance

8.1 Safety instructions

DANGER

Life-threatening danger due to restarting the machine!

When working in danger zones, persons can be seriously injured by unauthorized switching on of the power supply.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.
- If combustion motors supply the motive power then the safety instructions and the instructions for switching off and safeguarding against restart in the assembly manuals provided by the manufacturers must be complied with.

8.2 Spare parts

8.2.1 Notes on spare parts

WARNING

The wrong spare parts or defective spare parts can cause damage, malfunction, or total failure; they can also impair safety.

Danger of injury if the wrong spare parts are used!

- Only use original VULKAN spare parts.

Order spare parts via authorized dealers or direct from VULKAN customer service. For the contact address, see chapter  "1.3 Customer service" (Page 10).

Specify the following information when ordering spare parts:

- Order number or consignment number
- Drawing number
- Parts list number

8 Maintenance

8.3 Maintenance schedule

8.3.1 Maintenance table

The following sections describe the maintenance tasks that are necessary for optimal and fault-free operation. If increased wear is detected during regular inspections, then reduce the required maintenance intervals according to the actual indications of wear. If you have questions concerning maintenance tasks and maintenance intervals, contact VULKAN.

8.3.2 Maintenance table for METAFLEX

The maintenance intervals are based on the system operating hours. Coupling maintenance should occur 1x yearly for single-shift operation, 2x yearly for two-shift operation, and 3x yearly for three-shift operation.

8 Maintenance

Interval	Maintenance task	Execution by:
After 500 operating hours	Check the tightening torques	Specialist
	Check alignment and correct it if there are deviations, in this process pay attention to the entire permissible displacement.	Specialist
	Check whether the Kmax values are complied with. If the values are exceeded, replace the elastic element.	Specialist
1x yearly for single-shift operation	Alignment check	Specialist
	Steel parts: Visual inspection for cracks	Specialist
	Plates: Visual inspection for cracks, damage, and rust Attention! If cracks, damage, or corrosion with pitting are determined on the plates, take the system out of service and contact the VULKAN customer service organization!	Specialist
After a repair has been performed	Alignment check	Specialist
	Plates: Visual inspection for cracks, damage, and rust Attention! If cracks, damage, or corrosion with pitting are determined on the plates, take the system out of service and contact the VULKAN customer service organization!	Specialist
After maintenance or dismounting of connected machine parts	Alignment check	Specialist

8 Maintenance

Interval	Maintenance task	Execution by:
If there is damage or malfunction	Alignment check	Specialist
	Visual inspection for cracks and damage	Specialist
	Plates: Visual inspection for cracks, damage, and rust Attention! If cracks, damage, or corrosion with pitting are determined on the plates, take the system out of service and contact the VULKAN customer service organization!	Specialist

Tbl. 8-1 Maintenance table

At VULKAN, the terms, damage, and malfunction refer, for example, to:

- Failure of the system – further operation of the system is not possible
- Adjacent components could be damaged
- Severe damage or severe or fatal injuries at coupling failure in operation, if a coupling protection element is not present

8.4 Maintenance tasks

8.4.1 Alignment check

- Execution only by a specialist
- Special tools required: See chapter  "5.2.6 Alignment" (Page 78).

Alignment of the METAFLEX coupling is described in detail in chapter  "5.2.6 Alignment" (Page 78).

8 Maintenance

8.4.2 Measures to be executed after maintenance activities

Execute the following steps after concluding maintenance tasks and before switching the system on:

1. Firmly tighten all previously unscrewed threaded joints to the specified tightening torque.
2. Ensure that all previously removed protective devices and covers have been properly reinstalled.
3. Ensure that all tools, materials, and other equipment used has been removed from the work area.
4. Clean the work area and remove any substances that may have escaped, such as liquids, processing material, etc.
5. Ensure that all system safety devices are again functioning properly.
6. Owner-installed emergency stop devices, if present, must be reset.
7. Ensure that no one is in the danger zone.

9 Disassembly and disposal

9 Disassembly and disposal

9.1 Safety instructions

DANGER

Life-threatening danger due to restarting the machine!

When working in danger zones, persons can be seriously injured by unauthorized switching on of the power supply.

- Prior to starting the tasks switch off all energy supplies and safeguard them from being switched on again.
- If combustion motors supply the motive power then the safety instructions and the instructions for switching off and safeguarding against restart in the assembly manuals provided by the manufacturers must be complied with.

WARNING

High dead-weight and high spring forces pose a life-threatening danger!

Life-threatening crushing injuries can result if the pull-off device slips or if the hub suddenly becomes detached from the shaft.

- Only specialized personnel familiar with the installation should select the thrust bearing required for the axial travel limitation of the hub after loosening.
- If in doubt, contact the manufacturer.

CAUTION

Danger of burns due to hot surfaces!

Contact with the hot hub or shaft can cause burns.

Therefore:

- Always wear protective work clothing and protective gloves for all tasks performed in the vicinity of hot components.
- After pulling on the hub and before further assembly of coupling parts, ensure that all components have cooled to ambient temperature.



Note

Prior to dismounting, the possibility of any danger to persons or material damage must always be excluded.

9 Disassembly and disposal



Note

In the interest of an optimal dismantling sequence VULKAN recommends compliance with the work steps described here.



Note

For questions concerning dismantling contact VULKAN customer service. See  "1.3 Customer service" (Page 10).

9.2 Dismounting the product

9.2.1 Dismount disk flange from customer connection

1. Attach the disk flange with suitable slings. See chapter  "4.3 Transport" (Page 34).
2. Unscrew the fastening elements (arrow) from the disk flange (1) and the customer connection.

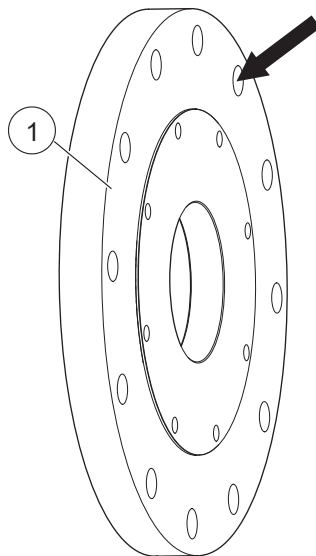


Fig. 9-1 Dismount disk flange

3. Take the disk flange out of the system.
-  The disk flange is dismantled.

9 Disassembly and disposal

9.2.2 Disassembling intermediate shaft



Note

Only use the provided components and fastening elements as specified in the drawing. Do not dismantle the flexible elements.

1. Attach the intermediate shaft using a suitable sling. See chapter "4.3 Transport" (Page 34).
2. Unscrew the fastening elements (2) from the intermediate shaft (1).

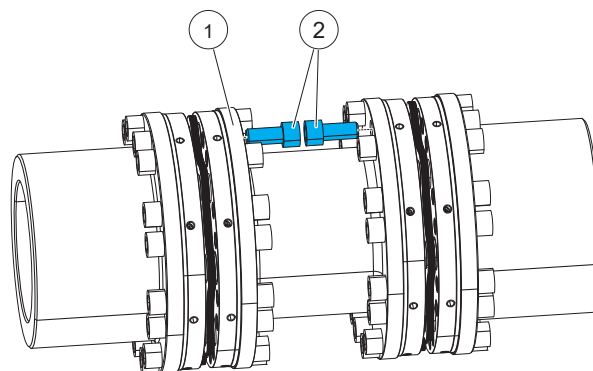


Fig. 9-2 Disassembling intermediate shaft

3. If there is not enough space between the elastic elements, press the elastic elements together until there is sufficient space to remove the intermediate shaft. If present, use the transport devices (1) for this.

Note

Use all transport devices, so that the elastic element is pushed together uniformly. See also "3.1.5 Elastic element" (Page 27) in this regard.

9 Disassembly and disposal

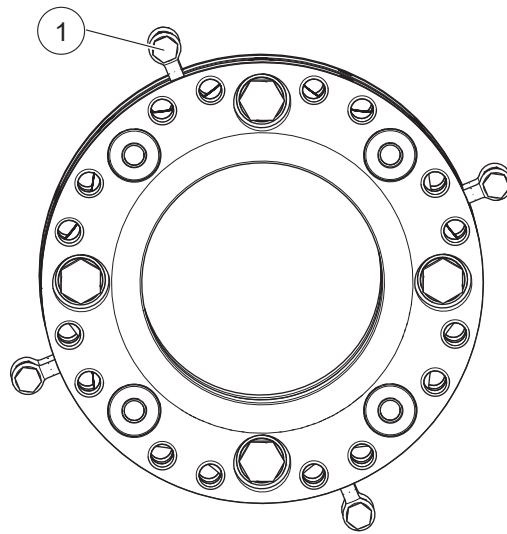


Fig. 9-3 Pushing elastic element together

4. Take the intermediate shaft out of the system.
↳ The intermediate shaft is disassembled.

9.2.3 Disassembling elastic element



Note

Only use the provided components and fastening elements as specified in the drawing. Do not dismantle the flexible elements.

9 Disassembly and disposal

1. Attach the elastic element using a suitable sling. See chapter  "4.3 Transport" (Page 34).
2. Unscrew the fastening elements (2) from the elastic element (3) and the hub (1).

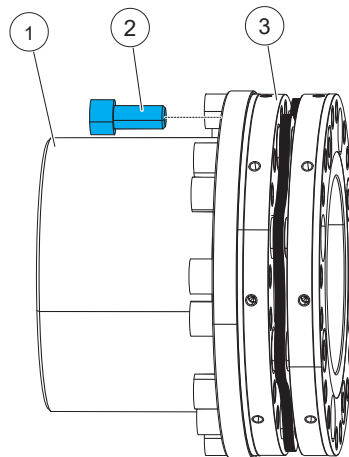


Fig. 9-4 Disassembling elastic element

3. Pull the elastic element (2) out of the pilot of the hub (1).

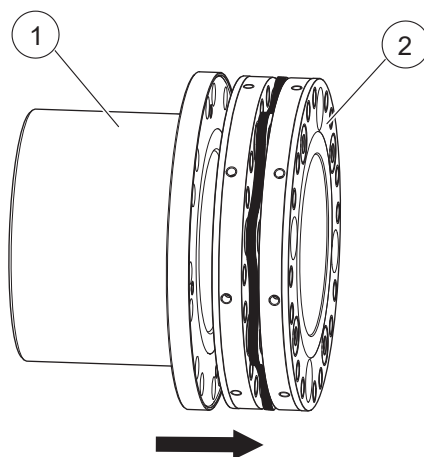


Fig. 9-5 Pulling elastic element out of pilot

4. Take the elastic element out of the system.
 5. Perform the steps described above for each elastic element.
-  The elastic elements are disassembled.

9 Disassembly and disposal

9.2.4 Dismounting the hub

CAUTION

Material damage due to impermissible effect of force.

When pushing on or pushing off the hub, the plate assembly can be damaged through impermissible introduction of force.

- Do not push on or push off the hub over the plate assembly.

9.2.4.1 Disassembling the hub with the feather key connection from the customer connection

DANGER

Danger to life due to pressurized hydraulic fluid escaping from the hydraulic unit!

If the hydraulic unit, hoses or connections are leaking, the hydraulic fluid will escape at high pressure and can cause fatal injuries.

- Before starting installation, check whether the hydraulic unit, the hoses and the connections are tight.

DANGER

Danger to life due to the compact slipping off when pulling off the hub!

If the compact slips off the hub and the hub suddenly detaches from the shaft, the slipping can cause life-threatening injuries to the body.

- Make sure that the compact is correctly mounted.
- Make sure that the compact has an axial travel limit for the hub.



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

Heat the hub for disassembly and push it off the customer connection with a compact. The following devices can be used for heating and pushing off:

- Ring burner
- Induction heater
- Hydraulic unit
- Hydraulic oil
- Compact for pushing off
- Temperature measuring device

9 Disassembly and disposal

1. Attach the hub with suitable slings. See chapter  "4.3 Transport" (Page 34).
2. Screw the compact (2) to the hub (1) to push off and connect it to the hydraulic unit.

i Note
Comply with the instructions provided by the respective manufacturer.

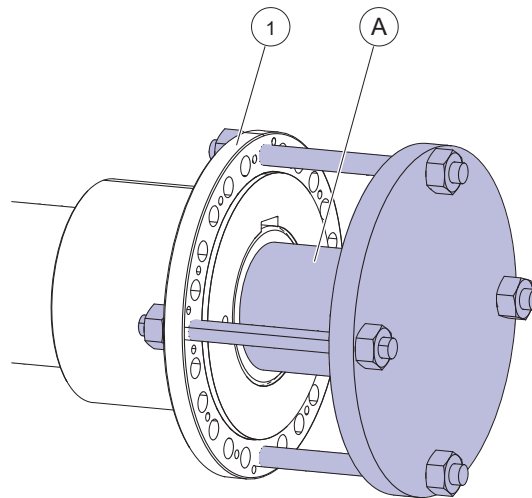


Fig. 9-6 Screwing on the compact, connecting the hydraulic unit

9 Disassembly and disposal

3. Use the compact (2) to build up axial pressure (arrow) against the customer connection (1).

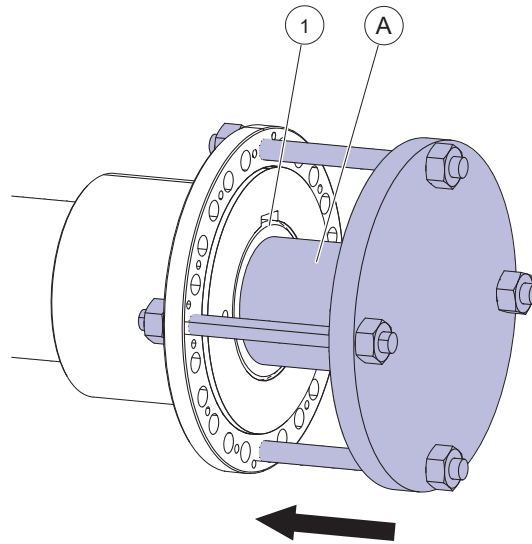


Fig. 9-7 Building up axial pressure

⚠ CAUTION! Danger of burns from hot surfaces!

- Wear personal protective equipment.

4. Heat the hub evenly so that the temperature is 110–150°C above ambient temperature.

i Note

Apply the heat quickly in the area of the groove and the flange.

i Note

With thin-walled hubs, the entire hub surface can be heated. With thick-walled hubs, only heat the bar area and the areas above and opposite the feather key. If you have any questions, please contact VULKAN Customer Service!

9 Disassembly and disposal

5. Increase the axial pressure evenly until the hub detaches from the customer connection.

⚠ DANGER! Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

i Note
Observe the maximum load of the pressing-off device.

i Note
Comply with the instructions provided by the respective manufacturer.

6. Remove the hub from the system and set it down at a safe place.
 7. Remove the lifting gear, auxiliary material, guiding aids and sling.
- 👉 The hub is disassembled from the customer connection.

9.2.4.2 Disassembling the hub with tapered oil pressure connection from the customer connection

⚠ DANGER

Danger to life due to pressurized hydraulic fluid escaping from the hydraulic unit!

If the hydraulic unit, hoses or connections are leaking, the hydraulic fluid will escape at high pressure and can cause fatal injuries.

- Before starting installation, check whether the hydraulic unit, the hoses and the connections are tight.

⚠ DANGER

Risk of the hollow compact slipping off when pulling off the hub!

If the hollow compact slips off the hub and the hub suddenly detaches from the customer connection, the slipping can cause life-threatening injuries to the body.

- Make sure that the hollow compact is correctly mounted.
- Make sure that the hollow compact has an axial travel limit for the hub.



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

9 Disassembly and disposal

Widen the hub for disassembly using the pressurized oil method. The following devices can be used for expanding:

- 2x Hydraulic unit (adequately sized)
- Hydraulic oil
- Hollow compact

1. Unscrew the threaded screw (1) from the hub (2).

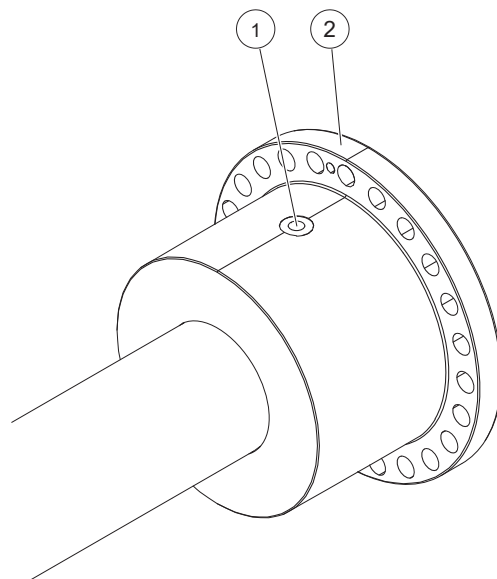


Fig. 9-8 Unscrewing the threaded screw

2. Attach the hub with suitable slings. See chapter  "4.3 Transport" (Page 34).

⚠ DANGER! Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

9 Disassembly and disposal

3. Note the maximum push-on distance "X" (arrow) of the hub (1).

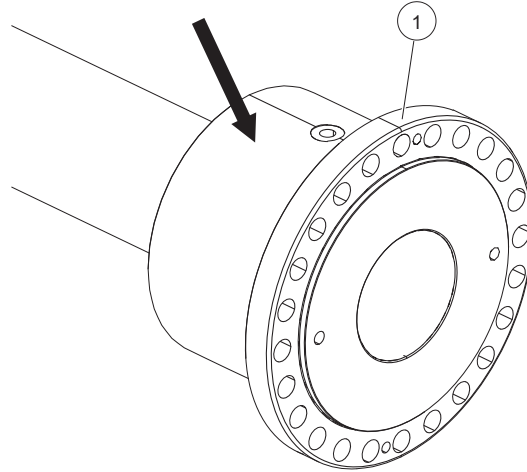


Fig. 9-9 Noting the push-on distance "X"

4. Screw the hollow compact (B) to the customer connection (A) using the threaded rod (C).



Note

If the cone is 1:15 or steeper, the customer must also axially secure the hub!



Note

Comply with the instructions provided by the respective manufacturer.

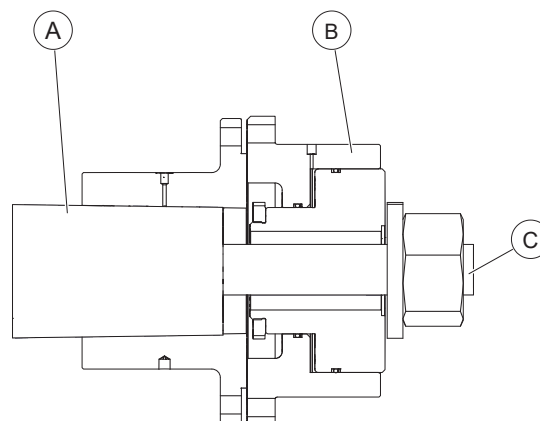


Fig. 9-10 Mounting the hollow compact

9 Disassembly and disposal

5. Connect the hydraulic unit at the marked points (arrows) on the hub (1) and the hollow compact (A). Make sure that the hydraulic oil is clean and meets the required specification.



Note

Use a separate hydraulic unit.

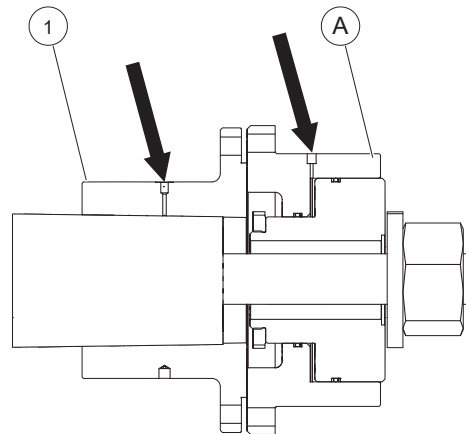


Fig. 9-11 Connecting the hydraulic unit

6. Loosen the fastening element (A) until the piston (B) of the hollow compact (C) has extended by the dimension $X + 4$ mm.

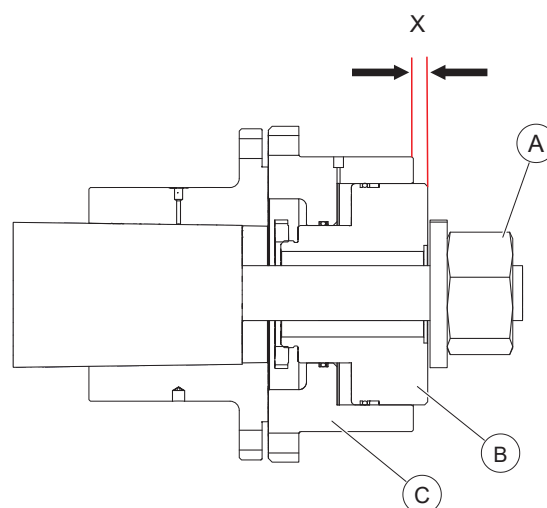


Fig. 9-12 Extending the piston by dimension X

9 Disassembly and disposal

7. Increase the pressure on the hollow compact (A) until the hollow compact (A) rests against the hub (1).

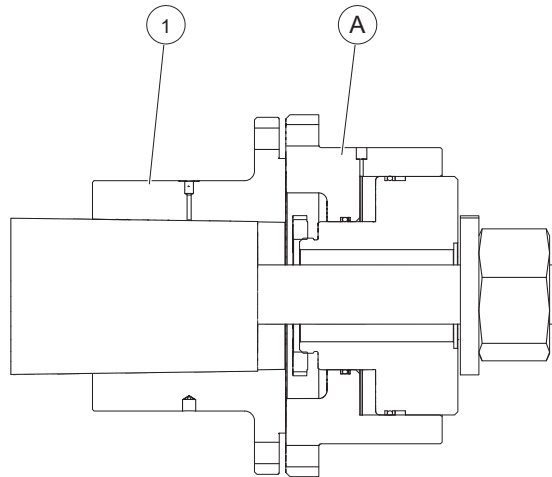


Fig. 9-13 Placing the hollow compact against the hub

8. To expand the hub (1), increase the pressure (arrow) until the pressure on the hydraulic unit manometer rises.

i Note

Increase the expansion pressure by a maximum of 100 bar every 3 minutes so as not to exceed the elongation value limit.

If the hub has not loosened with the maximum expansion pressure, carry out the following actions:

- Maintain the expansion pressure for 1 hour.
- Attach an additional pull-off device on the hub.
- Heat the hub to 150°C.
- Use an oil with a higher viscosity.

9 Disassembly and disposal

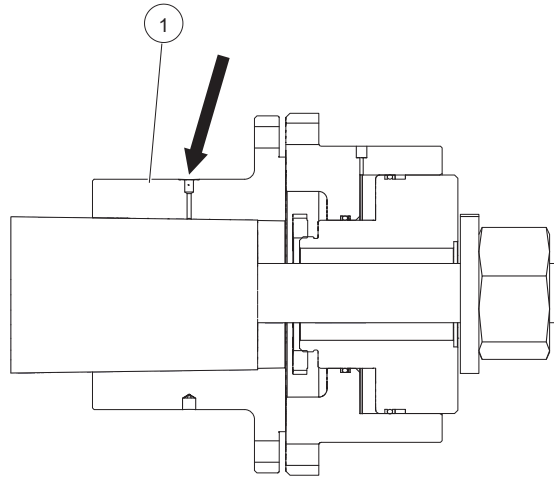


Fig. 9-14 Expanding the hub

9. To pull the hub (1) off the customer connection (A), gradually release the pressure (arrows) on the hollow compact (B) and at the same time maintain the pressure on the hub (1) until the hub (1) is released from the conical seat.

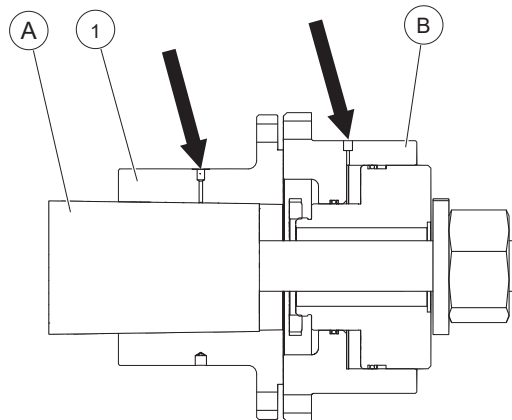


Fig. 9-15 Loosening the hub

9 Disassembly and disposal

10. Completely release the pressure on the hollow compact and the hub. Make sure that the hub and hollow compact are free of pressure.

11. Disassemble the hydraulic unit and the hollow compact.



Note

Comply with the instructions provided by the respective manufacturer.

12. Tighten the threaded screw (1) in the hub (2).



Note

Comply with the tightening torques!

The tightening torques are indicated on the drawing.

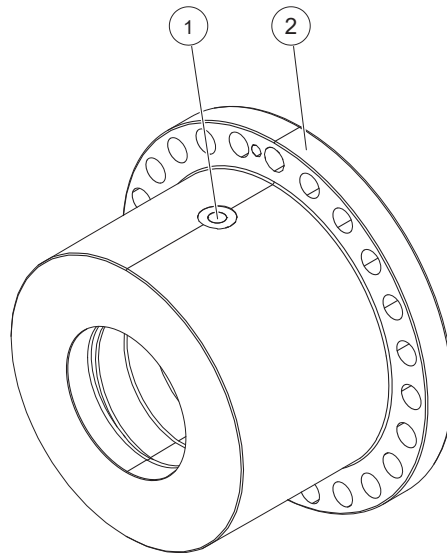


Fig. 9-16 Tightening the threaded screw

13. Remove the hub from the system and set it down at a safe place.

14. Remove the lifting gear, auxiliary material, guiding aids and sling.



The hub is disassembled from the customer connection.

9 Disassembly and disposal

9.2.4.3 Disassembling the hub with cylindrical oil pressure connection from the customer connection

DANGER

Danger to life due to pressurized hydraulic fluid escaping from the hydraulic unit!

If the hydraulic unit, hoses or connections are leaking, the hydraulic fluid will escape at high pressure and can cause fatal injuries.

- Before starting installation, check whether the hydraulic unit, the hoses and the connections are tight.

DANGER

Risk of the hollow compact slipping off when pulling off the hub!

If the hollow compact slips off the hub and the hub suddenly detaches from the customer connection, the slipping can cause life-threatening injuries to the body.

- Make sure that the hollow compact is correctly mounted.
- Make sure that the hollow compact has an axial travel limit for the hub.



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

Widen the hub for disassembly using the pressurized oil method. The following devices can be used for expanding:

- 2x Hydraulic unit (adequately sized)
- Hydraulic oil
- Hollow compact

9 Disassembly and disposal

1. Unscrew the threaded screw (1) from the hub (2).

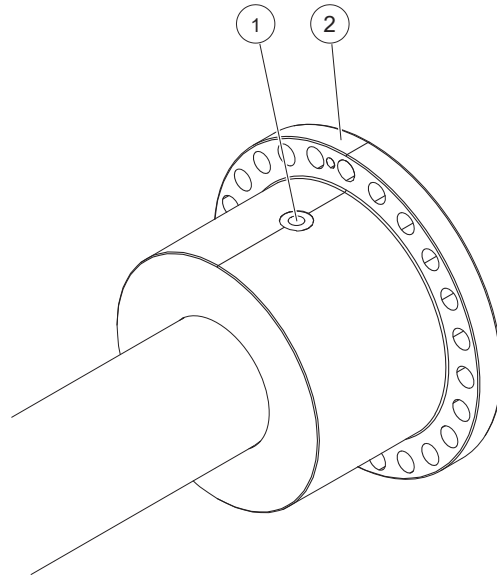


Fig. 9-17 Unscrewing the threaded screw

2. Attach the hub with suitable slings. See chapter "4.3 Transport" (Page 34).

⚠ DANGER! Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

3. Screw the hollow compact (B) to the customer connection (A) using the threaded rod (C).

i Note
Comply with the instructions provided by the respective manufacturer.

9 Disassembly and disposal

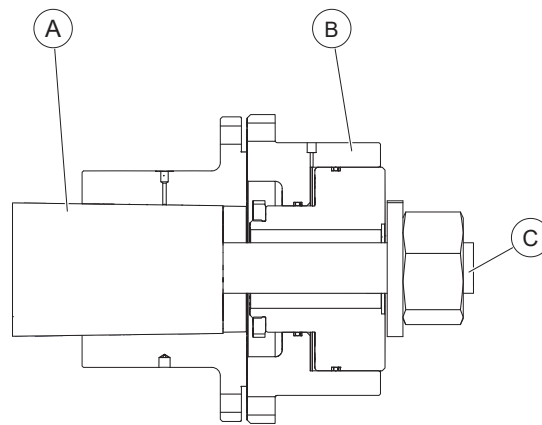


Fig. 9-18 Mounting the hollow compact

4. Connect the hydraulic unit at the marked points (arrows) on the hub (1) and the hollow compact (A). Hubs for a cylindrical oil pressure connection have 3 connections (A). Make sure that the hydraulic oil is clean and meets the required specification.



Note

Use a separate hydraulic unit.

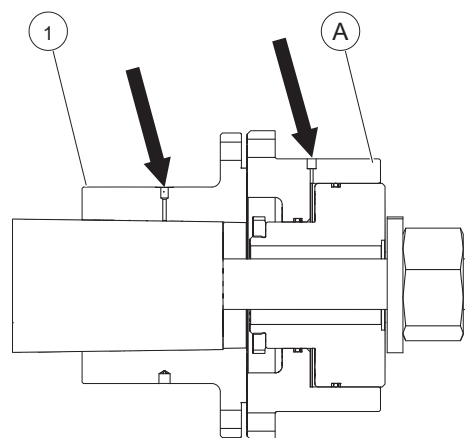


Fig. 9-19 Connecting the hydraulic unit

9 Disassembly and disposal

5. Loosen the fastening element (A) until the piston (B) of the hollow compact (C) has extended by the dimension $X + 4$ mm.

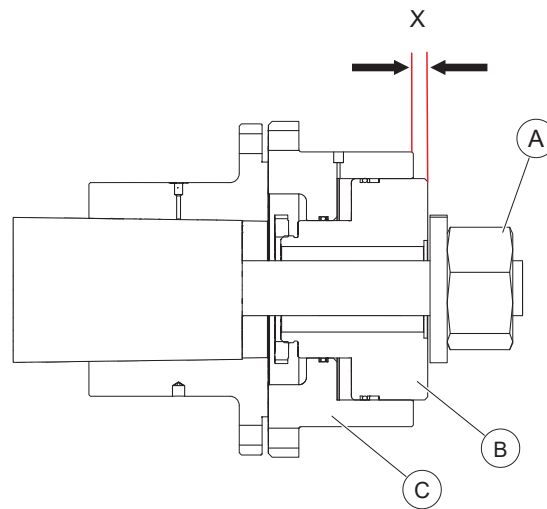


Fig. 9-20 Extending the piston by dimension X

6. Increase the pressure on the hollow compact (A) until the hollow compact (A) rests against the hub (1).

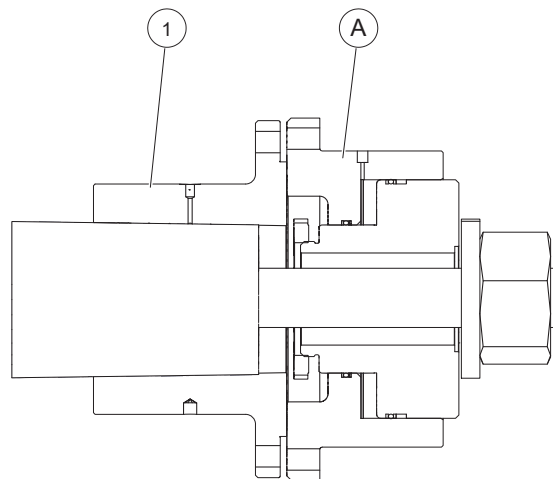


Fig. 9-21 Placing the hollow compact against the hub

9 Disassembly and disposal

7. To expand the hub (1), increase the pressure (arrow) until the pressure on the hydraulic unit manometer rises.



Note

Increase the expansion pressure by a maximum of 100 bar every 3 minutes so as not to exceed the elongation value limit.

If the hub has not loosened with the maximum expansion pressure, carry out the following actions:

- Maintain the expansion pressure for 1 hour.
- Attach an additional pull-off device on the hub.
- Heat the hub to 150°C.
- Use an oil with a higher viscosity.

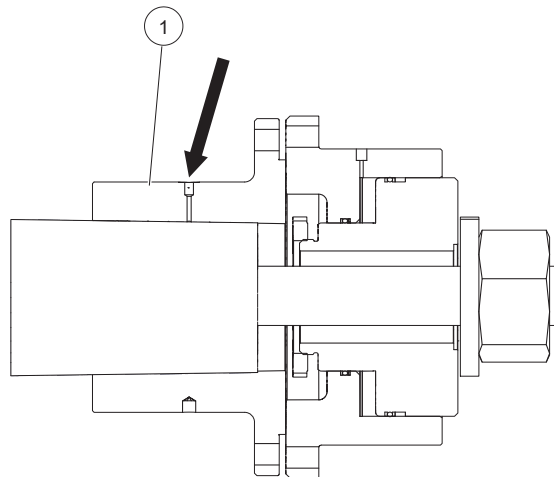


Fig. 9-22 Expanding the hub

8. To pull the hub (1) off the customer connection (A), gradually release the pressure (arrows) on the hollow compact (B) and at the same

9 Disassembly and disposal

time maintain the pressure on the hub (1) until the hub (1) is released from the seat.

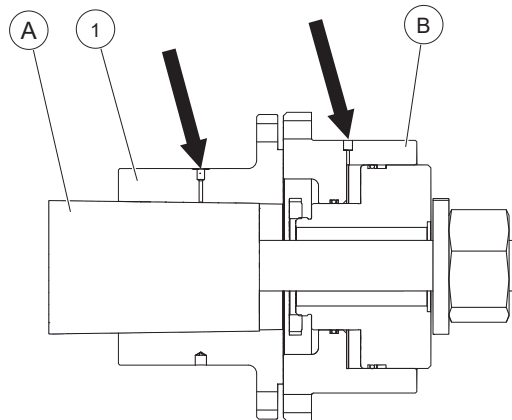


Fig. 9-23 Loosening the hub

9. Completely release the pressure on the hollow compact and the hub. Make sure that the hub and hollow compact are free of pressure.
10. Disassemble the hydraulic unit and the hollow compact.
 - i** Note
Comply with the instructions provided by the respective manufacturer.
11. Tighten the threaded screw (1) in the hub (2).
 - i** Note
Comply with the tightening torques!
The tightening torques are indicated on the drawing.

9 Disassembly and disposal

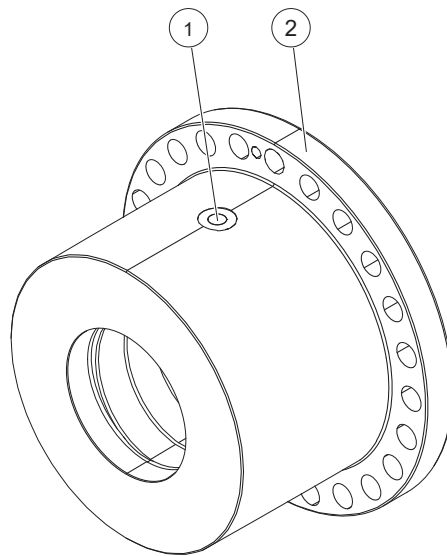


Fig. 9-24 Tightening the threaded screw

12. Remove the hub from the system and set it down at a safe place.
 13. Remove the lifting gear, auxiliary material, guiding aids and sling.
- ✎ The hub is disassembled from the customer connection.

9.2.4.4 Disassembling the hub with cylindrical oil pressure connection from the customer connection

⚠ DANGER

Danger to life due to pressurized hydraulic fluid escaping from the hydraulic unit!

If the hydraulic unit, hoses or connections are leaking, the hydraulic fluid will escape at high pressure and can cause fatal injuries.

- Before starting installation, check whether the hydraulic unit, the hoses and the connections are tight.

⚠ DANGER

Risk of the hollow compact slipping off when pulling off the hub!

If the hollow compact slips off the hub and the hub suddenly detaches from the customer connection, the slipping can cause life-threatening injuries to the body.

- Make sure that the hollow compact is correctly mounted.
- Make sure that the hollow compact has an axial travel limit for the hub.

9 Disassembly and disposal



Note

The guiding aids and sling are not included in the VULKAN scope of delivery and must be designed by the operator!

Widen the hub for disassembly using the pressurized oil method. The following devices can be used for expanding:

- 2x Hydraulic unit (adequately sized)
- Hydraulic oil
- Hollow compact

1. Unscrew all threaded screws (1) from the hub (2).

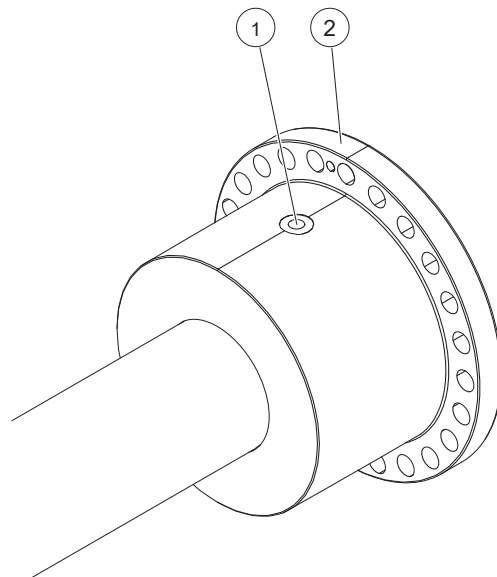


Fig. 9-25 Unscrewing all threaded screws

2. Attach the hub with suitable slings. See chapter  "4.3 Transport" (Page 34).

 **DANGER!** Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

3. Screw the hollow compact (B) to the customer connection (A) using the threaded rod (C).



Note

Comply with the instructions provided by the respective manufacturer.

9 Disassembly and disposal

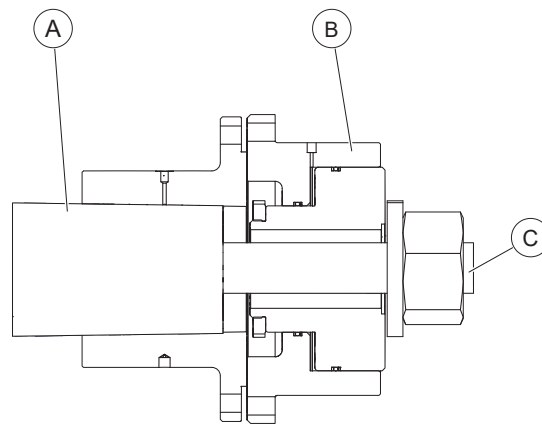


Fig. 9-26 Mounting the hollow compact

4. Ensure that the hydraulic unit is connected to all provided points (arrows) of the hub (1) and the hollow compact (A). Make sure that the hydraulic oil is clean and meets the required specification.



Note

Use a separate hydraulic unit.

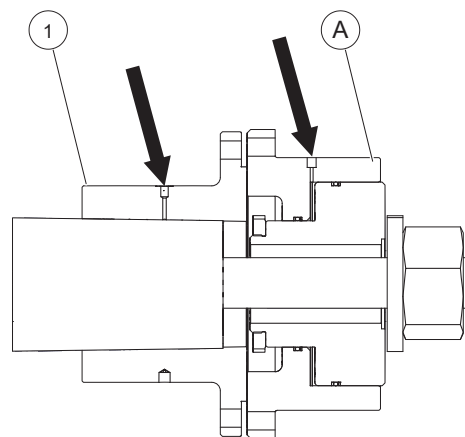


Fig. 9-27 Connecting the hydraulic unit

9 Disassembly and disposal

5. Loosen the fastening element (A) until the piston (B) of the hollow compact (C) is extended.

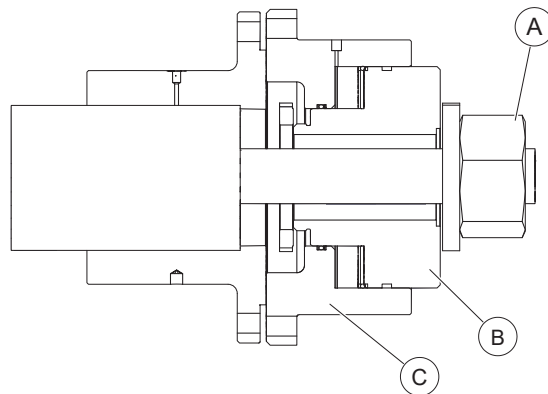


Fig. 9-28 Extending the piston

6. Increase the pressure on the hollow compact (A) until the hollow compact (A) rests against the hub (1).

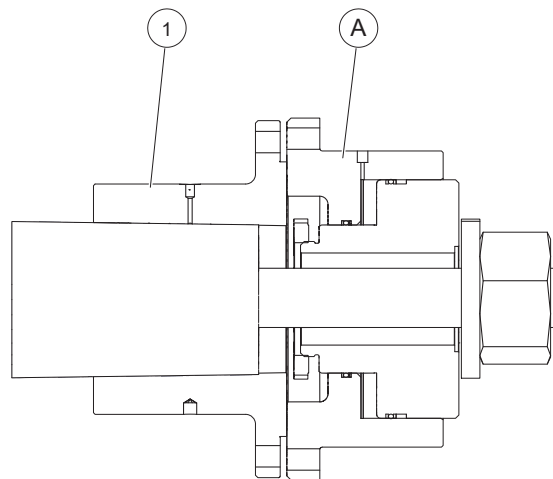


Fig. 9-29 Placing the hollow compact against the hub

9 Disassembly and disposal

7. To expand the hub (1), increase the pressure (arrow) on all connections until the pressure on the hydraulic unit manometer rises.

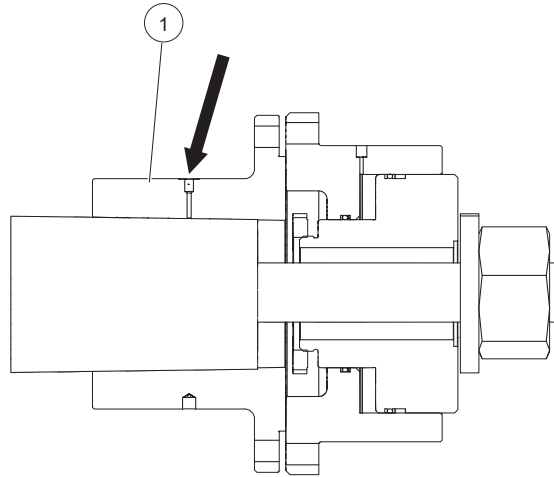


Fig. 9-30 Expanding the hub

8. Maintain the pressure at the connections (arrows) of the hub (1) and the hollow compact (B) until the hub (1) with the 1st groove detaches from the customer connection (A).



Note

Increase the expansion pressure by a maximum of 100 bar every 3 minutes so as not to exceed the elongation value limit.

If the hub has not loosened with the maximum expansion pressure, carry out the following actions:

- Maintain the expansion pressure for 1 hour.
- Attach an additional pull-off device on the hub.
- Heat the hub to 150°C.
- Use an oil with a higher viscosity.

9 Disassembly and disposal

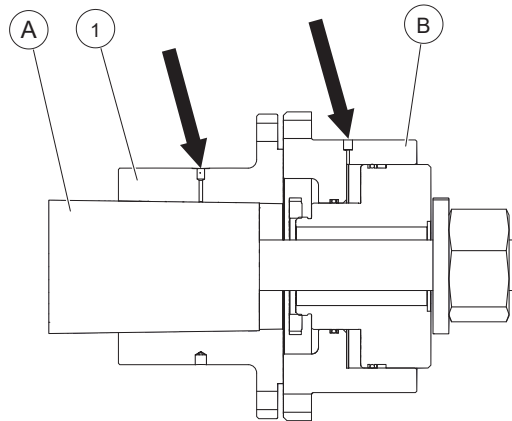


Fig. 9-31 Loosening the hub

9. Depressurize the connection of the 1st groove on the hub.
10. Repeat action steps 8 and 9 for each connection (arrow) on the hub (1) until the hub (1) is released from the seat of the customer connection (A). If necessary, reattach the hollow compact (B) to the hub (1).

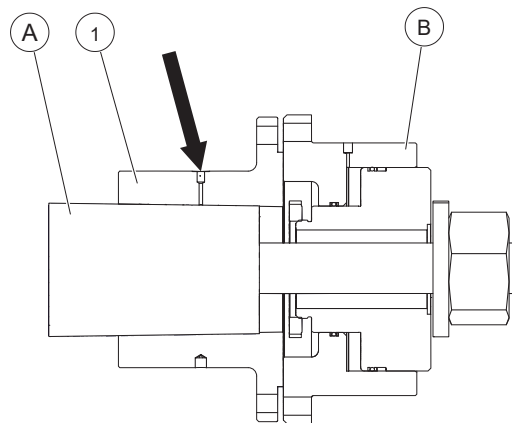


Fig. 9-32 Loosening the hub

9 Disassembly and disposal

11. Completely release the pressure on the hollow compact and the hub. Make sure that the hub and hollow compact are free of pressure.

12. Disassemble the hydraulic unit and the hollow compact.



Note

Comply with the instructions provided by the respective manufacturer.

13. Tighten all the threaded screw (1) in the hub (2).



Note

Comply with the tightening torques!

The tightening torques are indicated on the drawing.

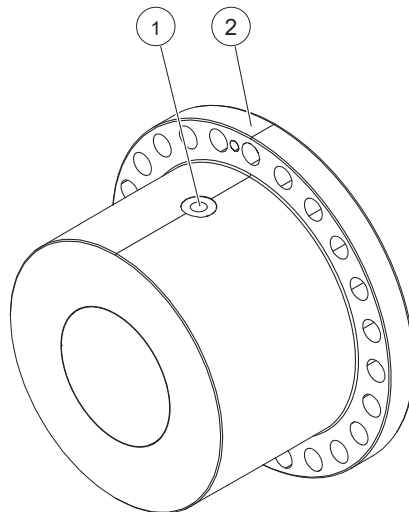


Fig. 9-33 Tightening the threaded screw

14. Remove the hub from the system and set it down at a safe place.

15. Remove the lifting gear, auxiliary material, guiding aids and sling.



The hub is disassembled from the customer connection.

9.2.4.5 Dismounting the clamping hub with external threaded fitting



Note

Secure the components against falling!

9 Disassembly and disposal

1. Attach the clamping hub with a suitable sling. See chapter  "4.3 Transport" (Page 34).
2. Unscrew the fastening elements (1).

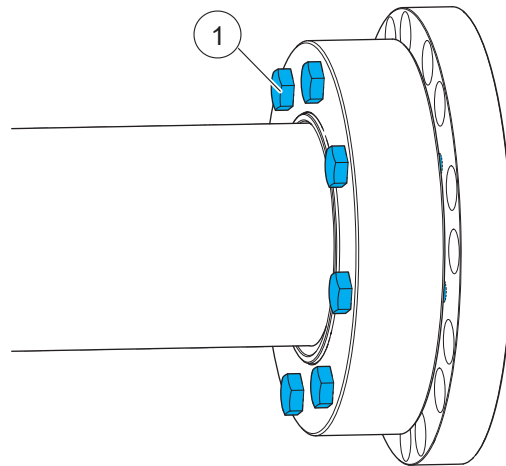


Fig. 9-34 Unscrew fastening elements

3. Unscrew the fastening elements (1) uniformly and sequentially with a torque wrench, starting at 20% of the nominal torque, until resistance is noticeable. For each round of tightening, increase this torque by an additional 20%. Do this until the clamping hub can be pulled off of the customer connection.

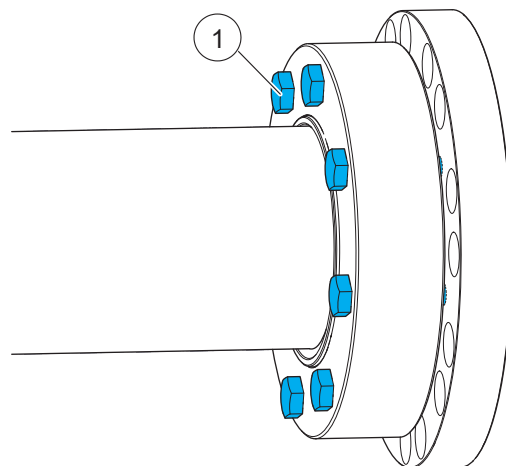


Fig. 9-35 Unscrew fastening elements from clamping ring

9 Disassembly and disposal

4. Slide the clamping hub (1) off of the customer connection (A).

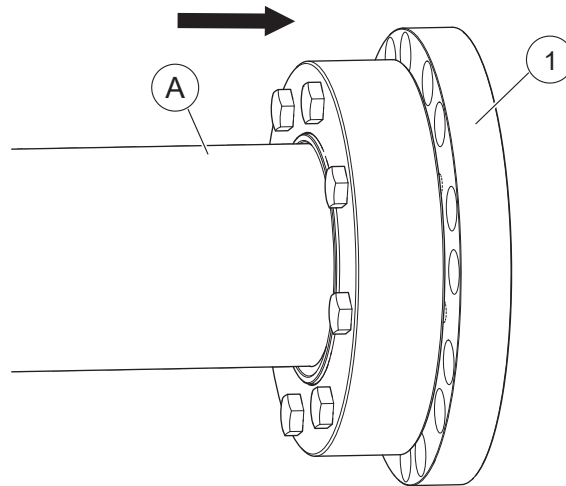


Fig. 9-36 Slide clamping hub off customer connection

5. Take the clamping hub out of the system.
✎ The clamping hub is dismantled.

9.2.4.6 Disassembling clamping hub with internal thread fitting



Note

Secure the components against falling!

9 Disassembly and disposal

1. Attach the clamping hub with a suitable sling. See chapter  "4.3 Transport" (Page 34).
2. Loosen and remove the fastening elements (1).

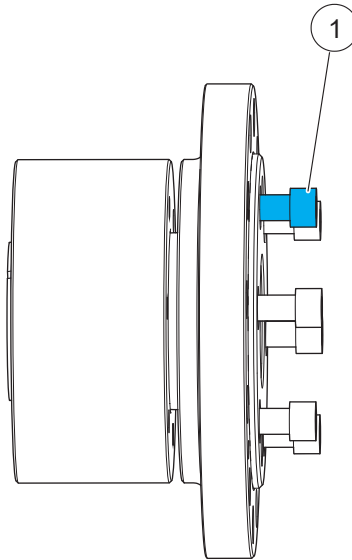


Fig. 9-37 Loosening the fastening elements

3. Screw the removed fastening elements into the jacking threads and press off the clamping ring.
4. Slide the clamping hub (1) off the customer connection (A).

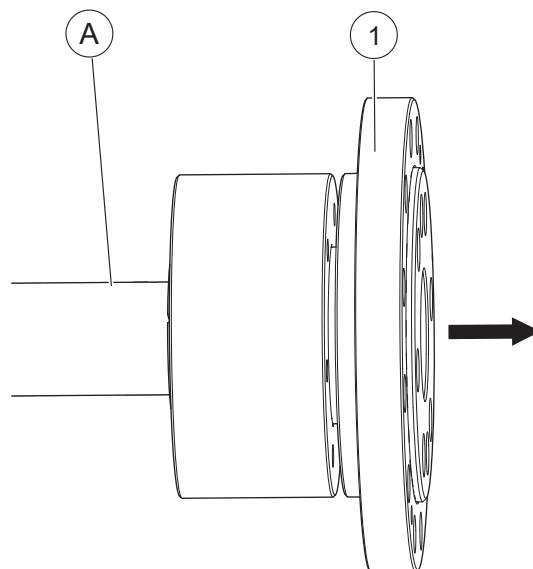


Fig. 9-38 Sliding clamping hub off the customer's connection

9 Disassembly and disposal

 **DANGER!** Life-threatening danger due to suspended loads!
Loads can fall or swing uncontrollably when lifting.

- Do not step under suspended loads.
- Ensure that the lifting gear is securely attached.

5. Take the clamping hub out of the system.

6. Take the clamping ring out of the system.

 The clamping hub is disassembled.

9.3 Disposal

9.3.1 Product

If a return or disposal agreement has not been entered into, then recycle the dismantled components:

- Dispose of components sorted by material composition, in accordance with national regulations.
- Remove fuels and auxiliary materials, as well as residual processing materials and dispose of these items in an environmentally responsible manner.

9.3.2 Packaging

Dispose of packaging materials in accordance with the respectively valid statutory regulations and local guidelines.

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11 Appendix

11 Appendix

11.1 Abbreviations of the technical data

11.1.1 Explanation of the technical data

Abbreviation	Description
T_{KN}	Permissible nominal torque
$T_{KN\ max}$	Permissible maximum nominal torque
$T_{Kmax\ 1}$	Permissible maximum torque for normal transient processes
$T_{Kmax\ 2}$	Permissible maximum torque for abnormal transient processes
T_{Kmax}	Permissible maximum torque
$\Delta T_{Kmax.}$	Permissible maximum torque range
T_{KW}	Permissible vibratory torque
P_{KVt}	Permissible power loss at ambient temperature t, e.g. 30°C, in continuous operation
$P_{KV\ t; 1\ h}$	Permissible power loss at ambient temperature t, e.g. 30°C, for 1 hr operating time
n_{Kmax}	Maximum permissible speed (operational correction may be necessary)
ΔK_a	Permissible axial coupling displacement
ΔK_r	Permissible radial coupling displacement
$\Delta K_r'$	Permissible radial coupling displacement (operational correction may be necessary)
ΔK_w	Permissible angular coupling displacement
C_{axstat}, C_{axdyn}	Axial spring stiffness
$C_{ax\ 1.0}$	Axial spring stiffness at 1.0 mm deflection
C_{rstat}, C_{rdyn}	Radial spring stiffness
C_{wdyn}	Angular spring stiffness
C_{Tdyn}	Dynamic torsional spring stiffness
$C_{Tdyn\ X\ \%TKN}$	Dynamic torsional stiffness at X% T_{KN}
$\Psi_{nominal}$	Nominal relative damping

11 Appendix

Abbreviation	Description
$\Delta L_{a, b, c}$	Coefficient for determining the change in length at speed (a), temperature (b) and torque (c)

Tbl. 11-1 Explanation of technical data

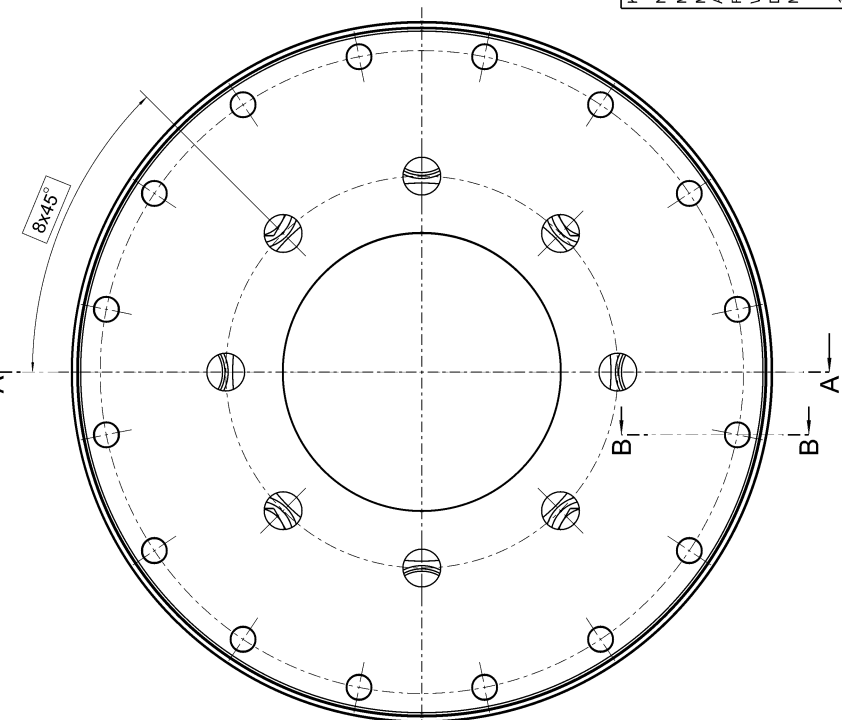
11 Appendix

11.2 Technical data

Characteristic	Unit	Value
BRANCHE	-	Industrie
T_{KN}	Nm	6400
$T_{K \max}$	Nm	12500
$n_{K \max}$	1/min	15600
LC	mm	50
ΔK_r	mm	0,4
ΔK_a	mm	4,2
ΔK_w	deg	0,5
$C_{T \text{ dyn}}$	MNm/rad	3,240
J	kgm ²	0,1300
S_M	kg	16,8

Tbl. 11-2

11.3 Drawing

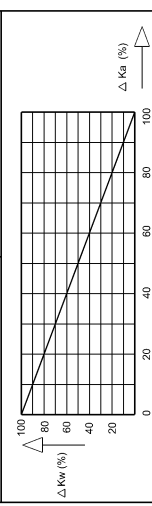


Schrauben bzw. Muttern
mit Motorenöl eingesetzt.
Bolts respectively nuts
installed using lubricating

Die genannten Nachgebigkeiten sind max. Werte beim Ausrichten nur eines der beiden Bauteile im Betrieb. Mehrere Nachgebigkeiten gleichzeitig zu reduzieren sind nicht gefordert, so reduzieren sich die Nachgebigkeiten additiv. Das Diagramm und Formel $\Delta K = \Delta K_1 + \Delta K_2 + \dots + \Delta K_n$ gelten für ein Bauteil.

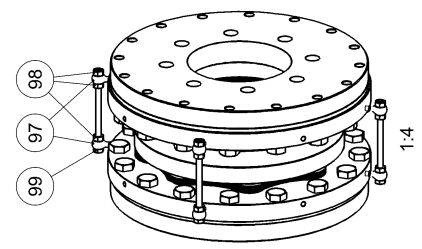
The given misalignments are maximum values for only one direction of misalignment. If several misalignments simultaneously, the values will be reduced according to the shown graph and formula: $\Delta K = \Delta K_1 + \Delta K_2 + \dots + \Delta K_n$ for one DKW.

The graph shows a linear relationship between the misalignment ΔK (x-axis) and the resulting misalignment ΔK_w (y-axis). Both axes are scaled from 0 to 100 in increments of 20. A straight line represents the relationship, starting at the origin (0,0) and extending to the point (100,100). This indicates that the resulting misalignment ΔK_w is equal to the input misalignment ΔK .



Die genannten Nachbigeigkeiten sind max. Werte beim Auftreten einer. Werden im Betrieb mehrere Nachbigeigkeiten gleichzeitig gefordert, so reduzieren sich die Nachbigeigkeiten entsprechend abgebildetem Diagramm und Formel: $Dkr = \dots \times \text{tan Dkw}$

1.4



11.4 Parts list

Pos.	Quantity	Unit	Material number	Designation	Dimensions
1	1	ST	MFBBE04S0002	Flexible Element	278X 102
2	2	ST	MFEBEFTS0002	Plate Flange	FM 273 X110 X 25
3	32	ST	7001112040	HEXAGON BOLT	M 12 X 40
97	8	ST	7039806030	Eye Bolt	M6 X 30
98	12	ST	7020006000	HEX NUT	M 6
99	4	ST	7001006090	Hexagon Head Bolt	M6 X 90

Tbl. 11-2