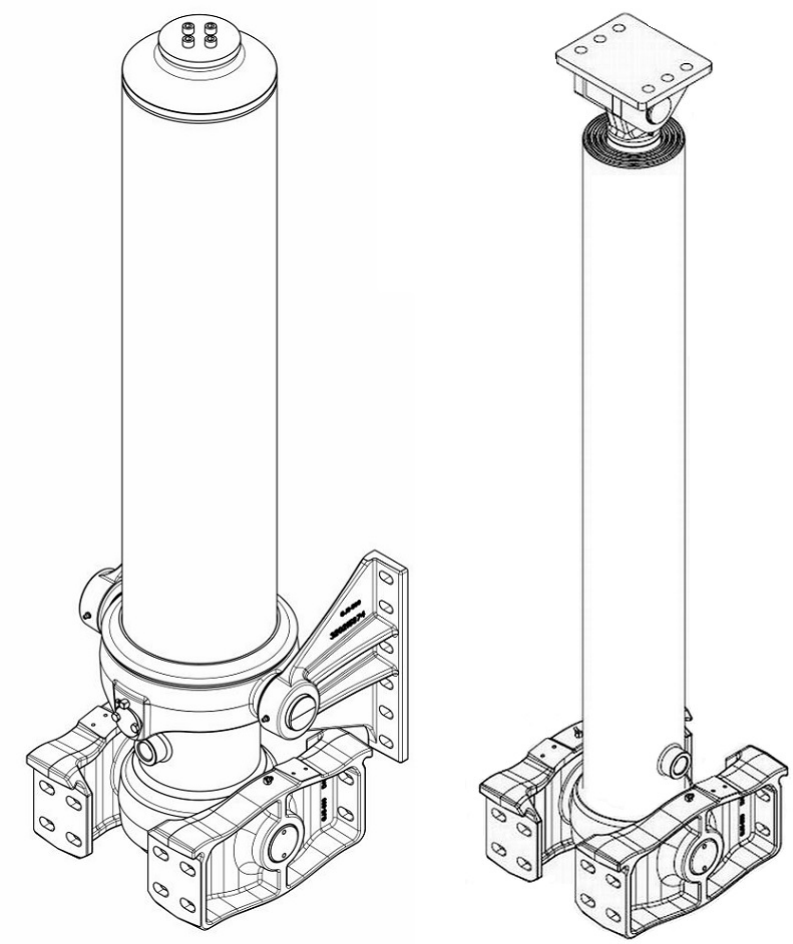
NUMMI DFC/DFE and EFC/EFE Tipping Cylinder

Installation Instructions



Version history

Version 1.0 28/08/2017

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CONTENTS

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1. Before installation

These instructions apply to vehicle superstructures that are intended for normal highway use.

NOTICE!

- **If the NUMMI DFC/DFE and EFC/EFE tipping cylinder is used in other conditions, the assembler must make sure that the structures and components are applicable for the given field of operation.**
- **Make sure that the manufacturer or importer has intended the chassis to be used with a tipping cylinder. If not, the retailer and the customer must agree on the responsibility for the assembly.**

Read these instructions and the official regulations before you start the installation:

- SFS 5339, Road vehicles, Tipping and cassette systems, constructional safety.
- SFS-EN 982, Safety of machinery. Safety requirements for fluid power systems and their components.
- SFS-EN 1050, Safety of machinery. Principles for risk assessment.
- The European Parliament and Council Directive 2006/42/EY (Machinery Directive).

Always obey the local laws and regulations.

The following instructions are of general nature. When you do the assembly, obey the model-specific instructions of the vehicle manufacturer.

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2. Safety instructions

2.1. Safety messages

The safety messages shown on this page are used to identify safety messages in these instructions:

DANGER

DANGER indicates a hazardous situation which, if not avoided, will result in death or serious injury.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in death or serious injury.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor or moderate injury.

NOTICE!

NOTICE indicates a situation which, if not avoided, could result in material damage.

This general hazard symbol identifies important safety messages in this manual. Carefully read, understand and obey the messages.

2.2. General warnings and notices

DANGER

CRUSHING HAZARD!

Attach the body with a service prop before you go under a raised body.

WARNING

- **The tipping cylinder is not designed for side loads and/or negative forces (pulling). Use the tipping cylinder only for tipping.**
- **Use safety straps and wires.**
- **The safety strap stretches. Confirm the stretch of the safety strap from the manufacturer before the assembly.**

CAUTION

- **Disconnect the negative battery cable before you start the installation. If the vehicle has ABS brakes, on-board computer or other electrical equipment, obey the instructions of the truck manufacturer to prevent damage to them.**
- **Use only applicable lifting devices to lift the tipping cylinder.**

NOTICE!

- **The tube speed is at maximum 0.5 m/s. Do not exceed the maximum speed.**
- **Use a constant flow valve or a hose brake valve in the tipping cylinder assembly.**
- **Make sure that the pressure relief setting is not more than the maximum cylinder pressure.**
- **Use a return filter and/or a pressure filter.**
- **The filling capacity of the oil tank must be a minimum of 20% larger than the displacement volume of the tipping cylinder.**

2.3. Safety labels and product labels

Install the labels on the clean surface.

Keep the safety labels clean and visible at all times. Cover the labels during the painting or install the labels after the painting.

Do not wash the cylinder with solvents, high pressure or steam washer

Do not use a high pressure washer to clean a tipping cylinder.

This safety label is located on the subframe near by the cylinder or on the cylinder.

Do not go below the lifted body without service prop and never go below the body when the body is loaded

This safety label is located on the subframe near by the cylinder.

NUMMI logo is located on the subframe near by the cylinder.

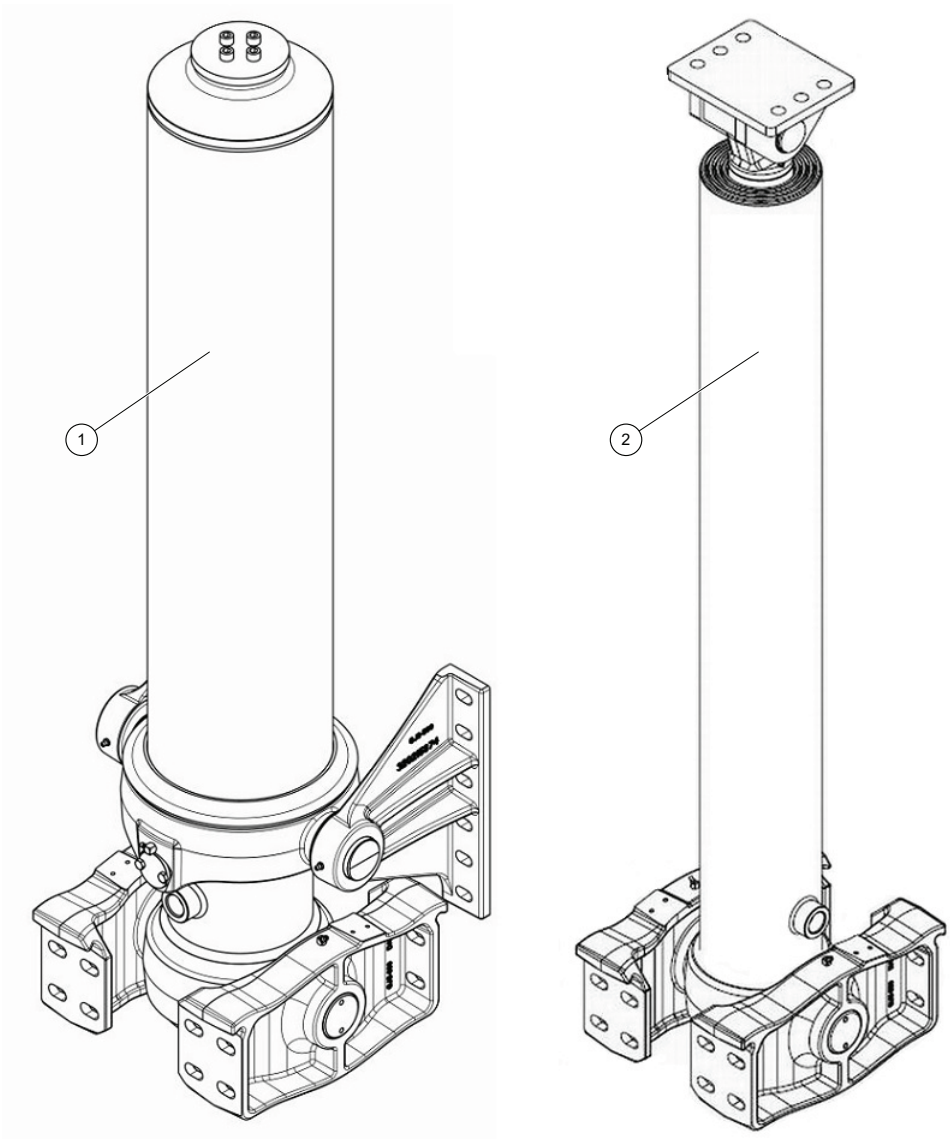
Product label is located on the subframe near by the cylinder or on the cylinder.

3. Introduction to the DFC/DFE and EFC/EFE tipping unit

NUMMI DFC/DFE and EFC/EFE tipping cylinder is suitable for rear-end tipping. The tipping cylinder is installed to a vehicle's subframe crosswise with a bearing beams.

The tipping angle is limited with a hydraulic knock-off kit or with a pneumatic knock-off kit.

Differences between DFC/DFE and EFC/EFE cylinders are tube surface treatment.



1. DFC and EFC lifting unit
2. DFE and EFE lifting unit

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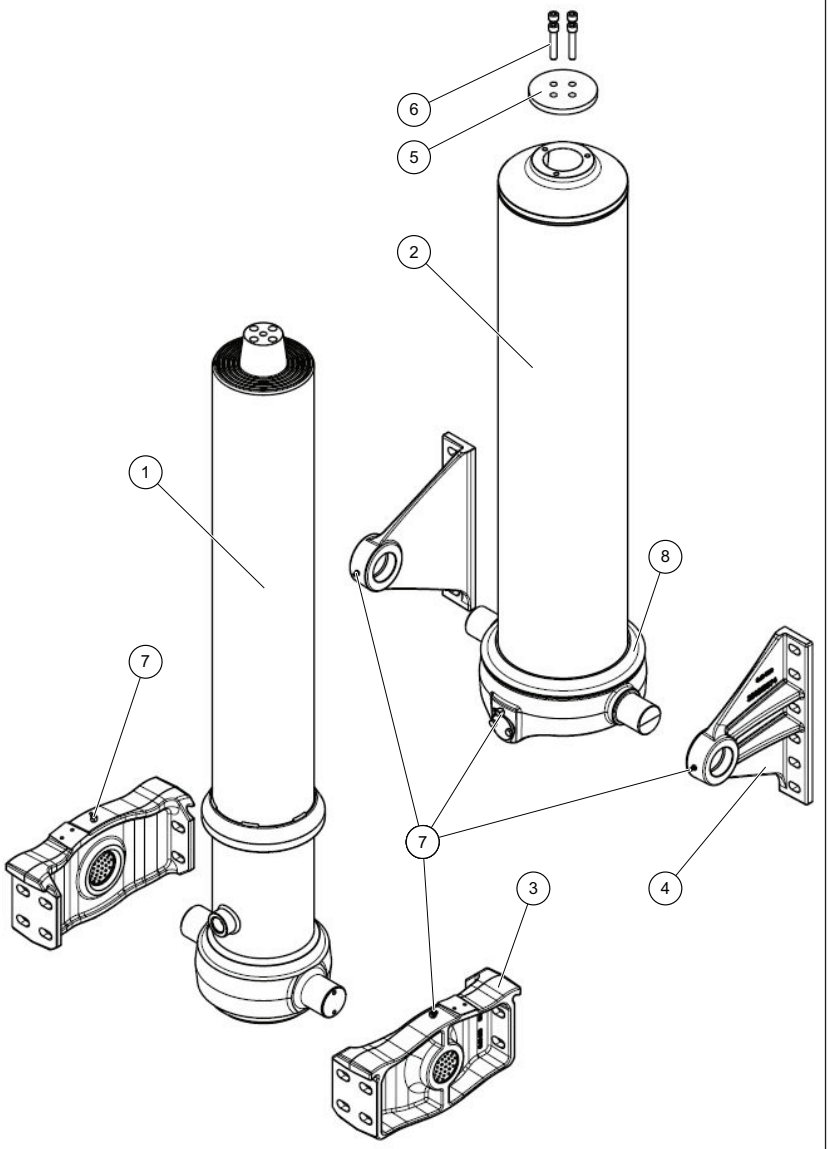
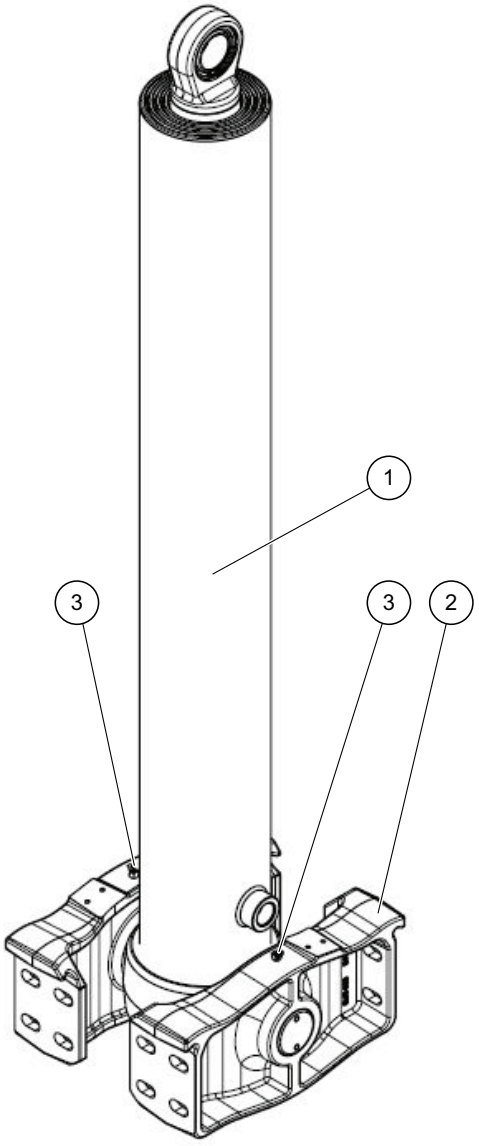
3.1. Delivery content of the DFC and EFC tipping unit



1. Cylinder
2. Cover tube
3. Bearing beam 2 pcs
4. Body bracket 2 pcs
5. Mounting plate
6. Allen screw M12x65 4 pcs
7. Greasing nipples
8. Rubber for cover tube

NOTICE! **The pneumatic or the hydraulic knock-off kit neither body bracket for DFC and EFC is not included in the delivery content.**

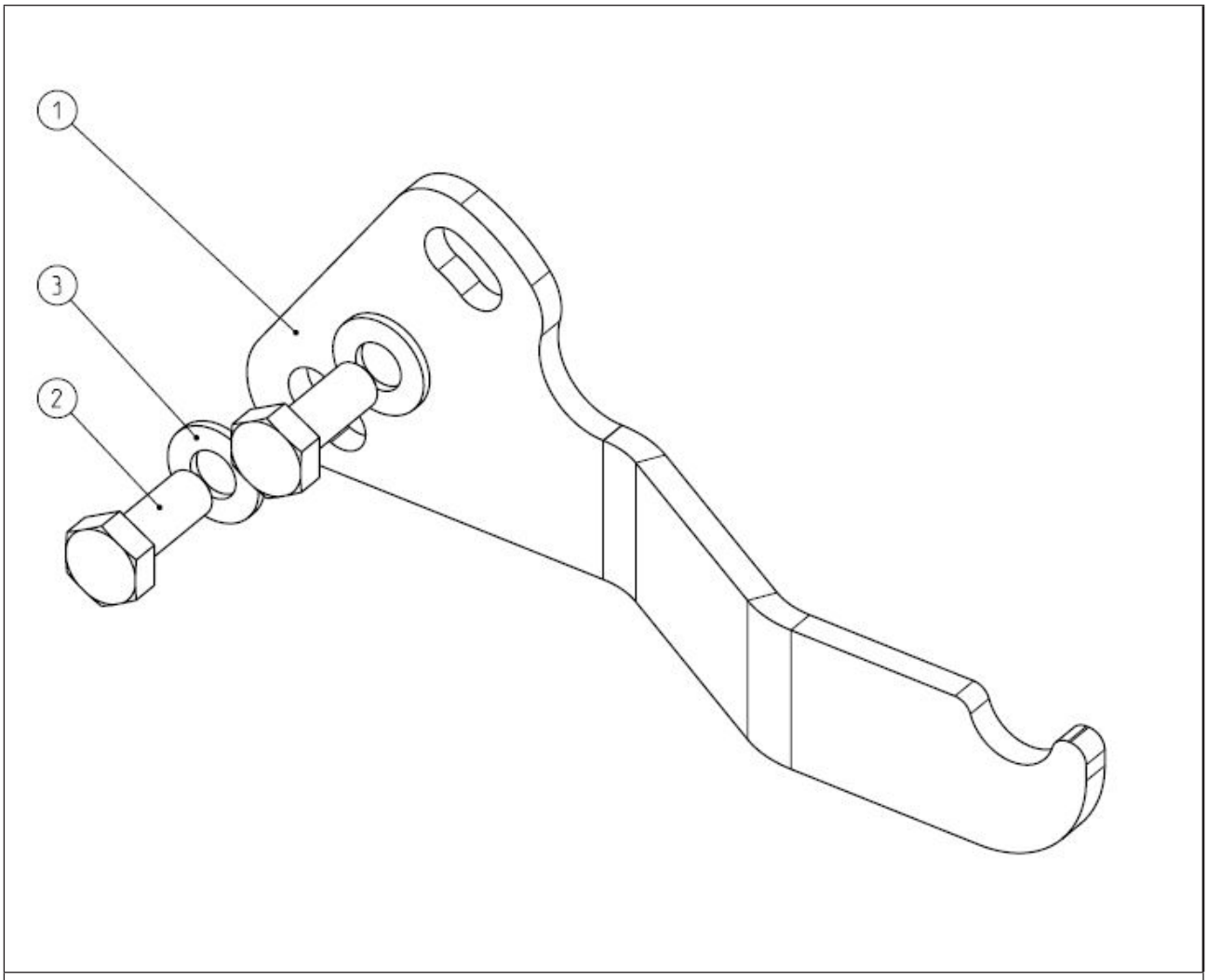
3.2. Delivery content of the DFE and EFE tipping unit



1. Cylinder
2. Bearing beams 2 pcs
3. Greasing nipples

NOTICE! **The pneumatic or the hydraulic knock-off kit neither body bracket for DFE and EFE is not included in the delivery content.**

3.3. Delivery content for the DFC/DFE and EFC/EFE lever



1. Knock-off lever
2. Hexagon screw M8x20
3. Washer M8

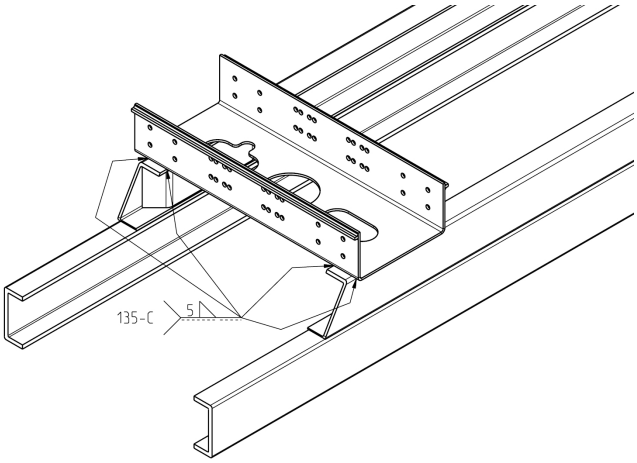
NOTICE!

The DFC/DFE and EFC/EFE lever can be used with pneumatic knock-off or with hydraulic knock-off valve.

Knock-off valve must be ordered separately. Pneumatic knock-off valve p/n 360508437 and hydraulic knock-off valve p/n 360507832.

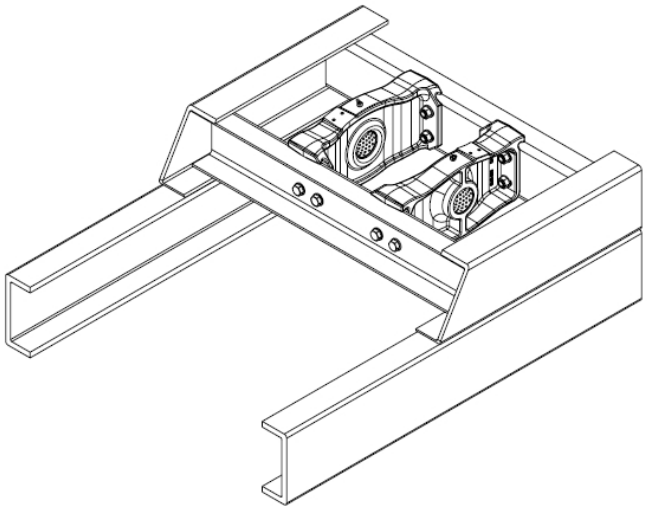
4. Mounting the DFC/DFE and EFC/EFE with mounting cradle / bearing beam

4.1. Mounting cradle / bearing beam above the subframe or with cross beams



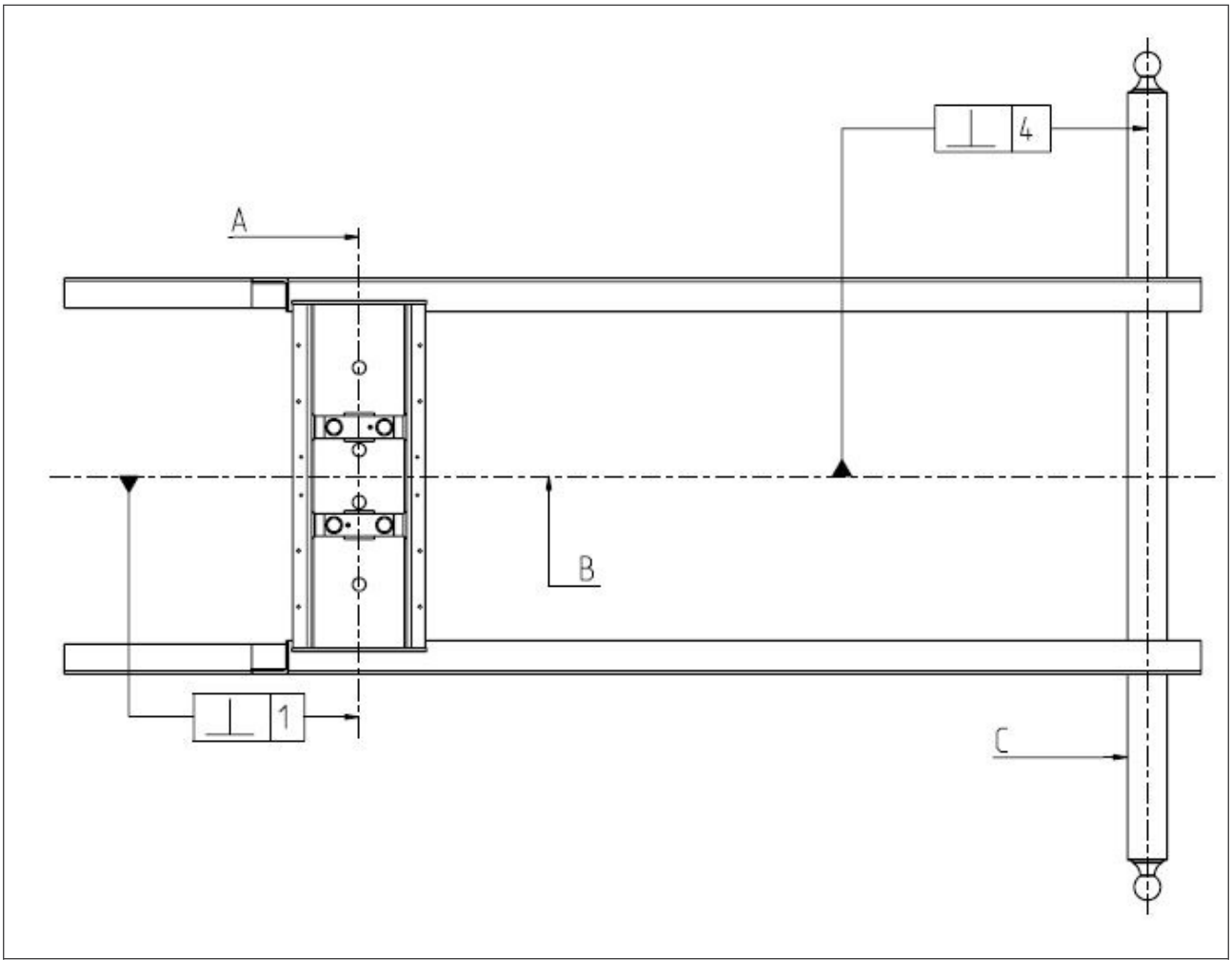
Mounting cradle mounted above the subframe:

- Attach the support beam from its support points as illustrated.



Bearing beam mounted with cross beams:

- Install cross beams between subframe where bearing beams can be bolted.
- Make sure that cross beams are durable enough to withstand the tipping cylinder forces.
- Look the dimensions for bearing beams from the cylinder drawing. It is also possible to use bearing beams to install the cross beams to the correct position.



A. Axis through cradle bearings
B. Center line
C. Rear tipping axle

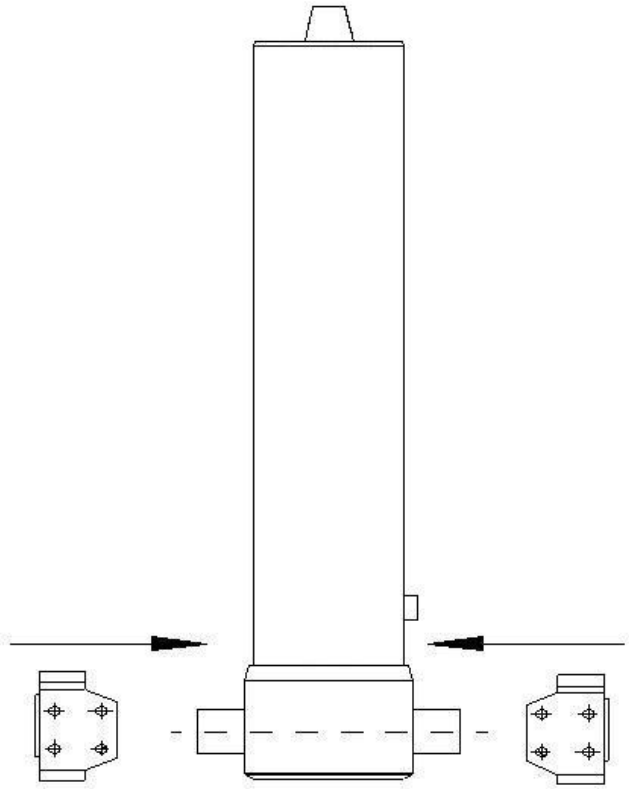
WEAKENED STABILITY!

CAUTION

Secure that the mounting cradle is on perpendicular position on the chassis and in line with the tipping hinge.

If the mounting cradle and the tipping hinge are not in line the cylinder will get extra side force and the tipping stability can be weakened significantly.

4.2. Mounting DFC/DFE and EFC/EFE cylinder on the bearing beams



1. Lubricate slide bearings with grease.
2. Mount the bearings on trunnion axles of cylinder.

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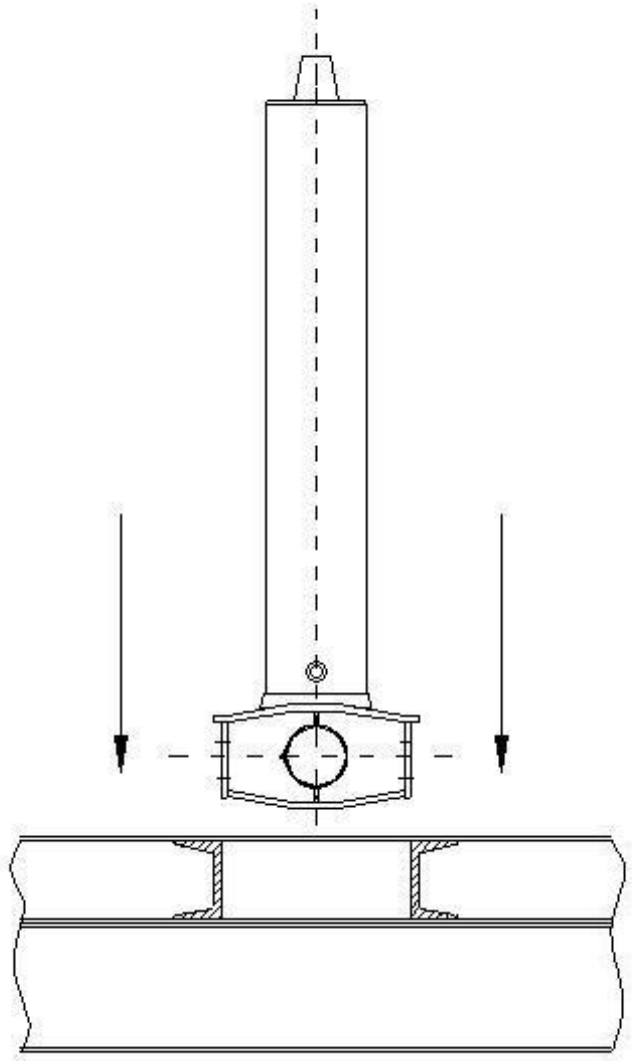
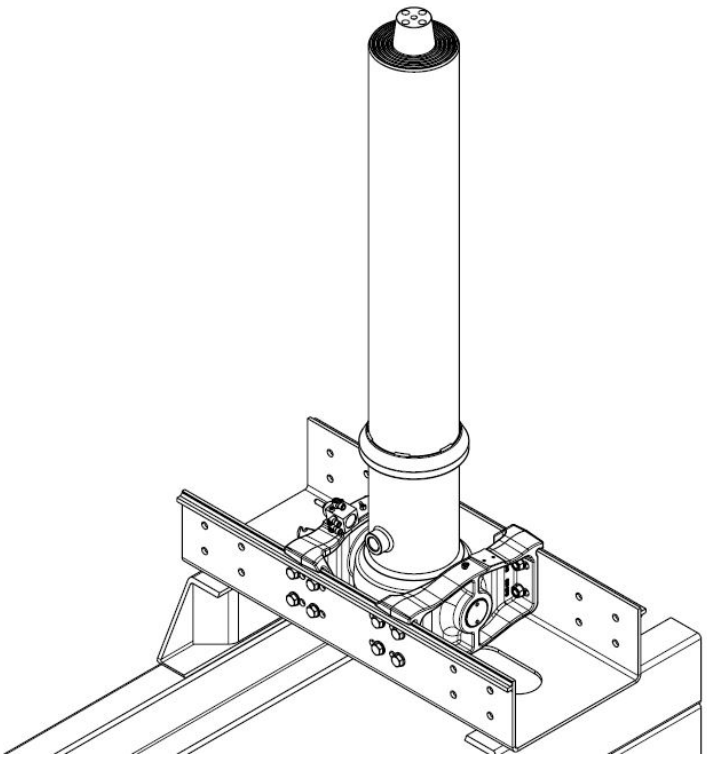
4.3. Mounting cylinder with bearing beams



1. Attach the bearing beams when cylinder mounted to beams with bolts between two welded cross beams on subframe of vehicle or on the mounting cradle depending on installation method.



2. Mount bearing beams or mounting cradle between two cross beams with the distance of 368 mm or 268 mm depending on model.

   See the installation dimensions from the tipping unit drawing.

   - Use bolts M16 with minimum strength class 8.8.
   - Tightening torque must be minimum 190 Nm.
   - Use washers with bolts and nuts.
   - Make sure that the transverse beams are strong enough to hold the tipping cylinder forces.

CAUTION

WEAKENED STABILITY!

Secure that the transverse beams are on perpendicular position on the chassis and in line with the tipping hinge.

If the support beam and the tipping hinge are not in line the cylinder will get extra side force and the tipping stability can be weakened significantly.

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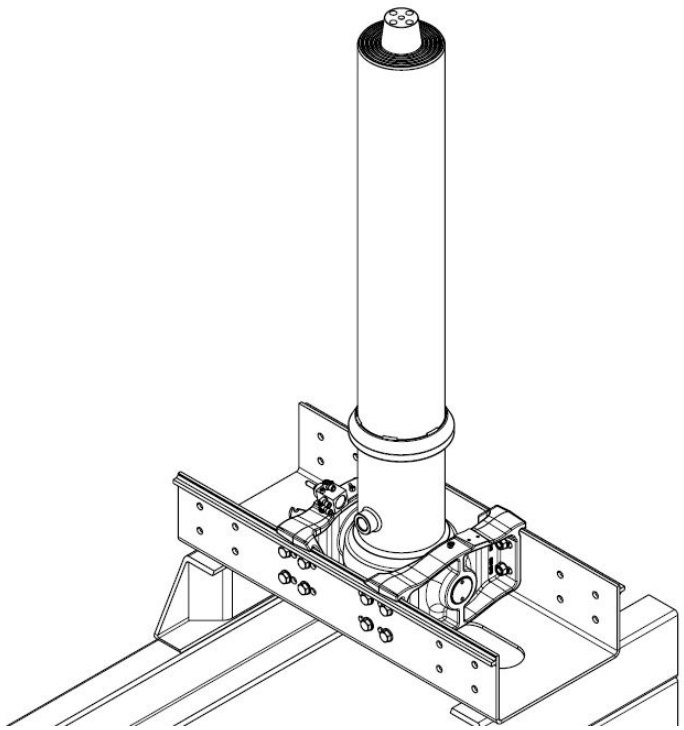
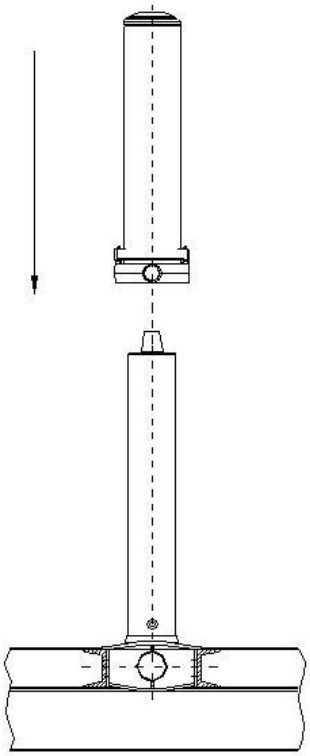
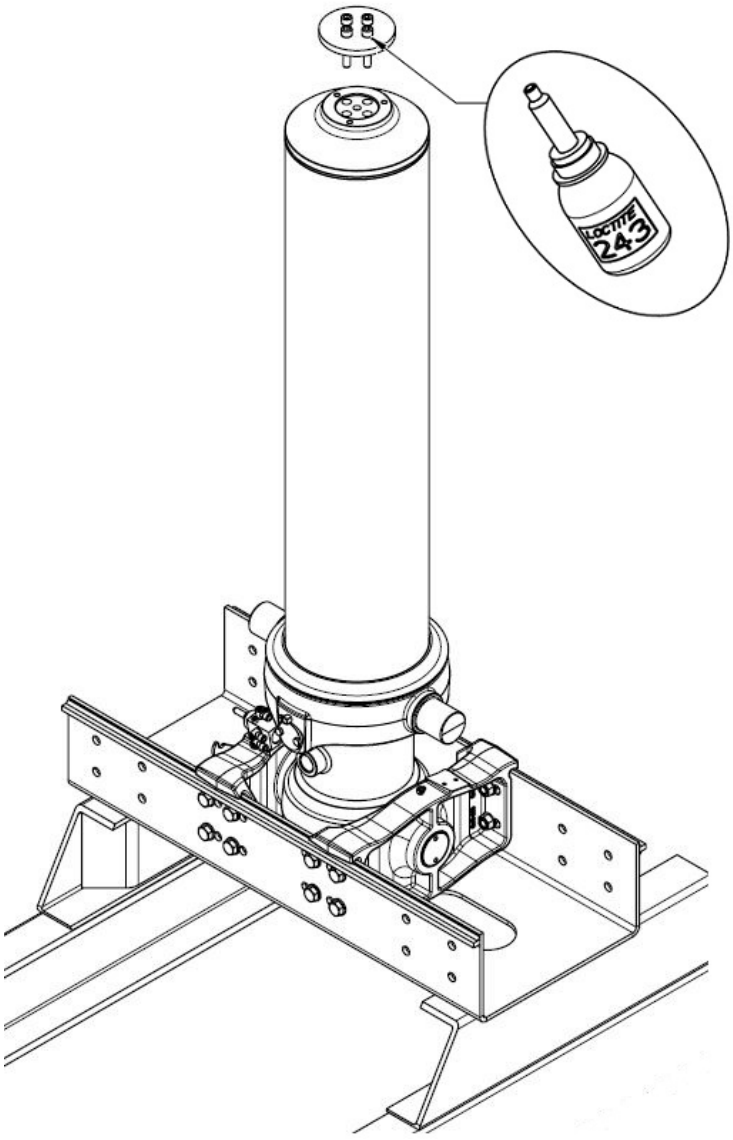
5. Mounting the cover tube DFC/EFC



1. Before mounting the cover tube make sure that cylinder is installed in the bearing beams and beams are mounted on mounting cradle or cross beams and all bolts are tightened according to chapter 4.3.



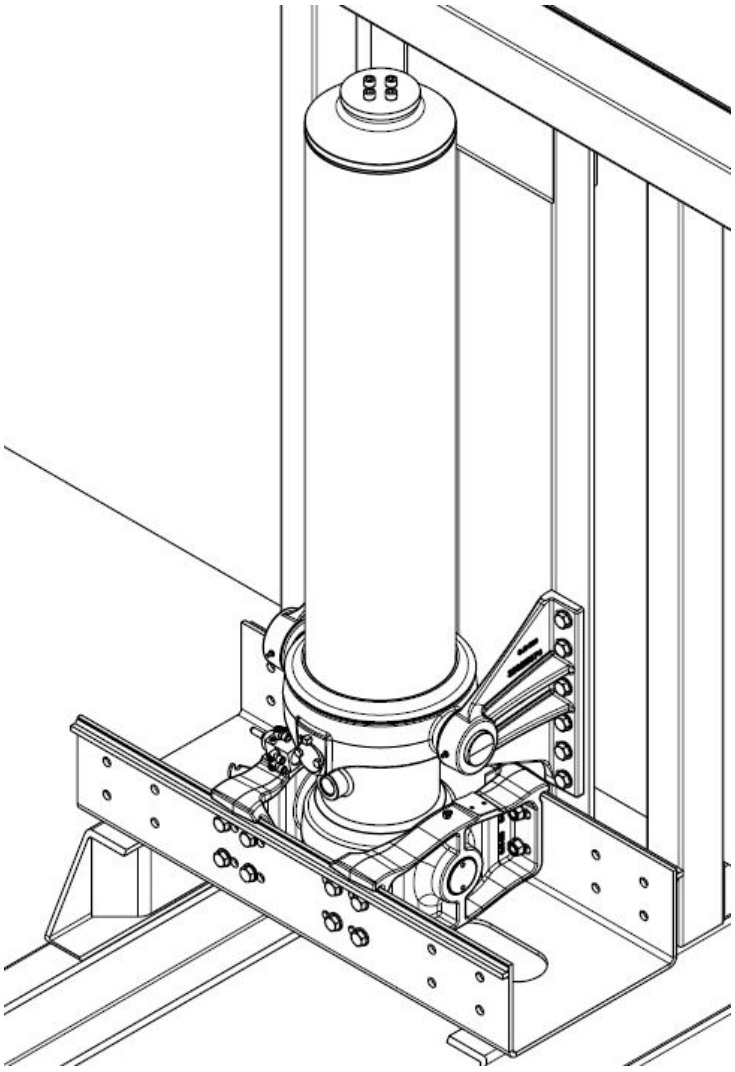
2. Use a crane to lift the cover tube on the cylinder.
   - Make sure that the cover tube fits tightly in the cone of the cylinder's inner tube.
   - There should not be any clearance between cover tube and cone.



3. Install the mounting plate with four M12x65 allen screws with strength class 12.9 on the cylinder inner tube.

   - Use Loctite 243 or similar in screws.
   - Tightening torque is 120 Nm.

6. Mounting the body brackets for DFC/DFE and EFC/EFE



1. Attach the body brackets with bolts to the front end of the body.

   Pull the cylinder with cover tube up 20-50 mm to ensure the mounting space.

2. Leave a mounting space minimum of 20 mm (recommendation 50 mm) to the cylinder so that vertical forces while driving does not affect the cylinder.

   See the installation dimensions for the body brackets from the tipping unit drawing. Use bolts M16 with minimum strength class 10.9.

   - Use hard washers with bolts and nuts.
   - Tightening torque is 280 Nm.

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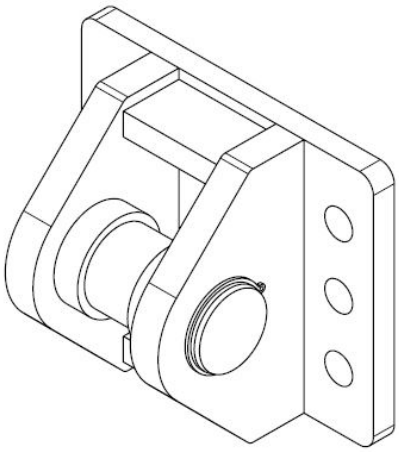

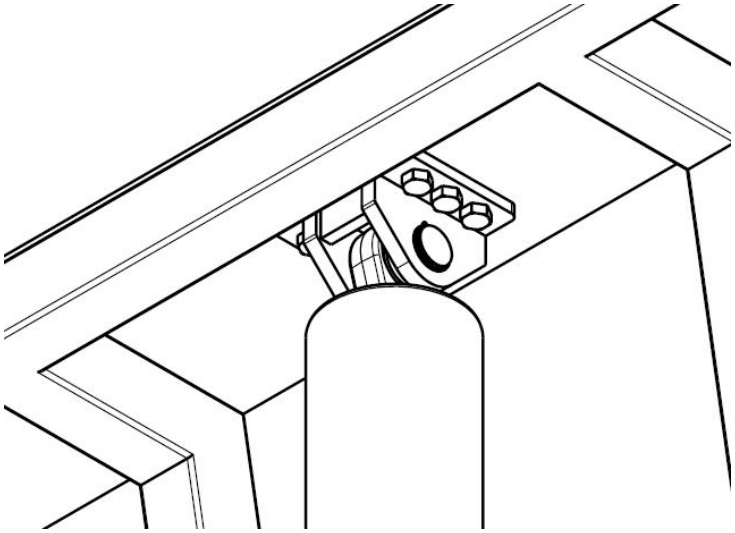

1. Attach the top bracket with bolts to the top of the body.
2. Leave a mounting space minimum of 20 mm (recommendation 50 mm) to the cylinder so that forces while driving does not affect the cylinder.
   - Use bolts M20 with minimum strength class 8.8.
   - Tightening torque is 300 Nm.

NOTICE! **The DFE/EFE body bracket is not included with the lifting unit.**

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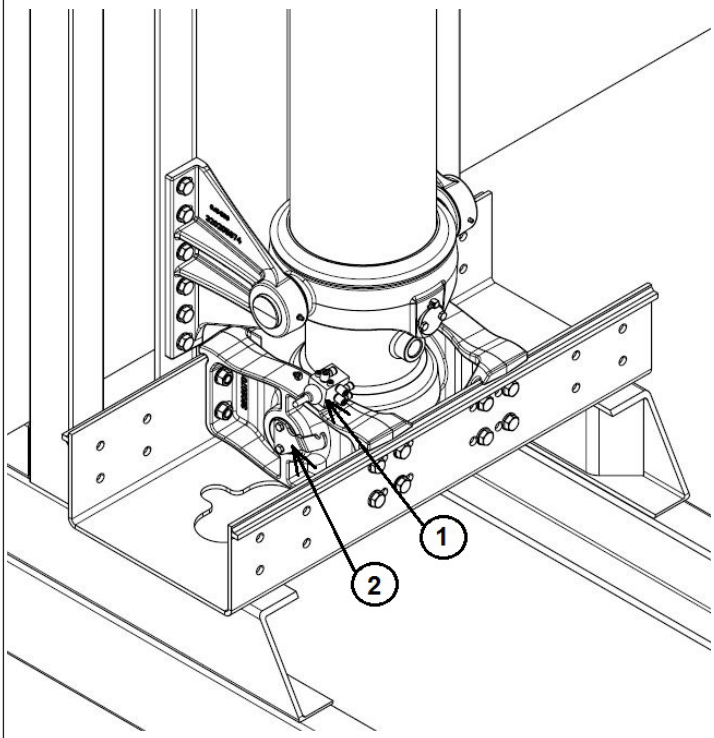
8. Mounting the knock-off kit for DFC/DFE and EFC/EFE



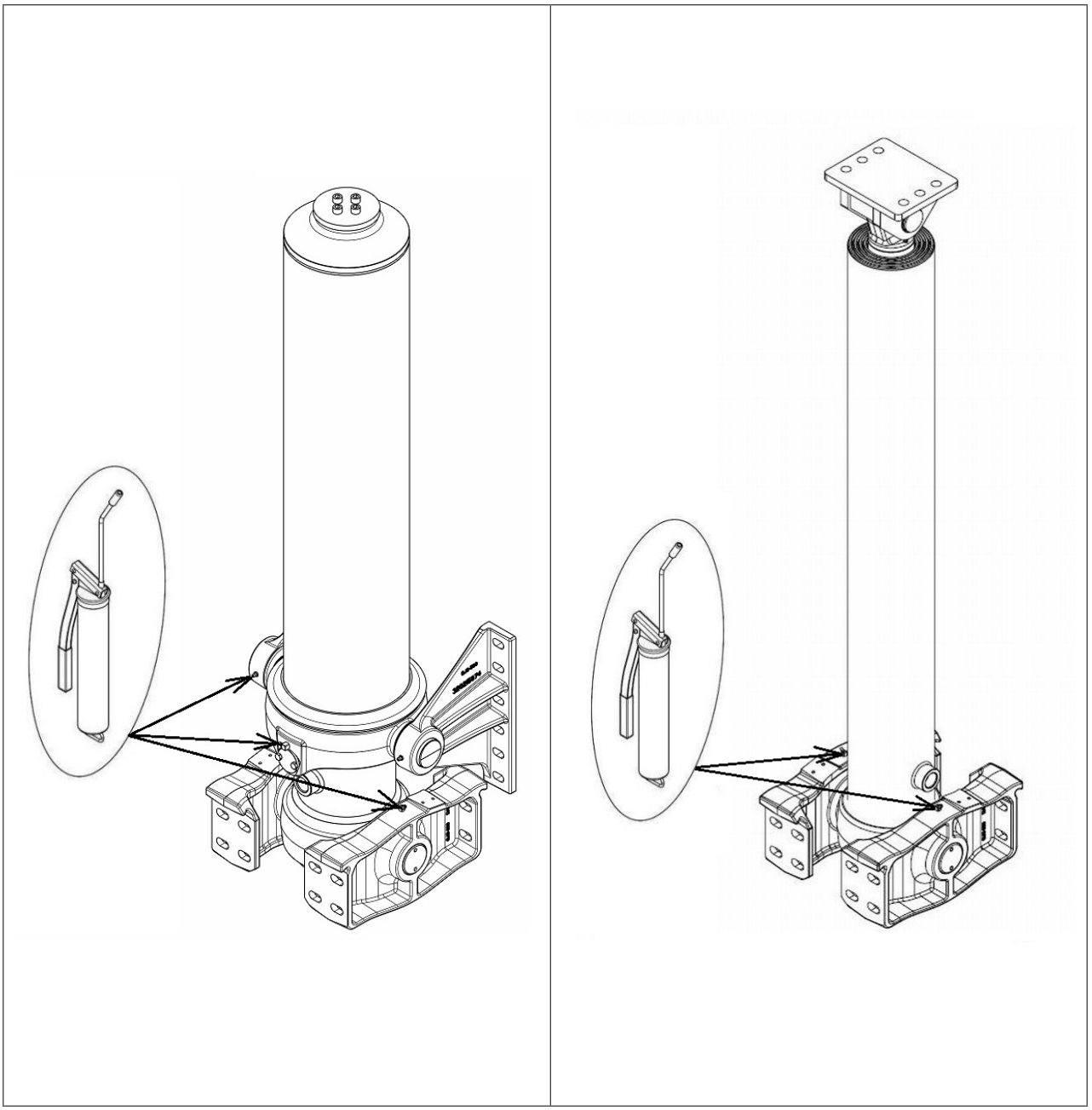
1. Attach the pneumatic knock-off valve part 1 on the holes of bearing bracket:
   - Use two M6x50 allen screws.
   - Tightening torque is 8 Nm.
2. Mount the knock-off lever part 2 to the end of the trunnion axle:
   - Use two M8x20 screws.
   - Adjust the knock-off lever to achieve correct tipping angle.
3. The same knock-off lever can be used together with the hydraulic knock-off valve:
   - Weld the support plate on the mounting cradle or cross beam. Support plate must be done separately. There is no ready made support.
   - Mount the hydraulic knock-off valve on support plate.

NOTICE! **The knock-off valves must be ordered separately with the lever.**

9. Lubricating the lubrication points of the DFC/DFE and EFC/EFE tipping unit

Before you use the tipping unit, lubricate:

- bearing beam
- body bracket.



10. Connecting the hydraulics

10.1. Requirements for the hydraulic oil

Wipro recommends the use of hydraulic oils that meet these standards in the ISO VG 22-32 viscosity class:

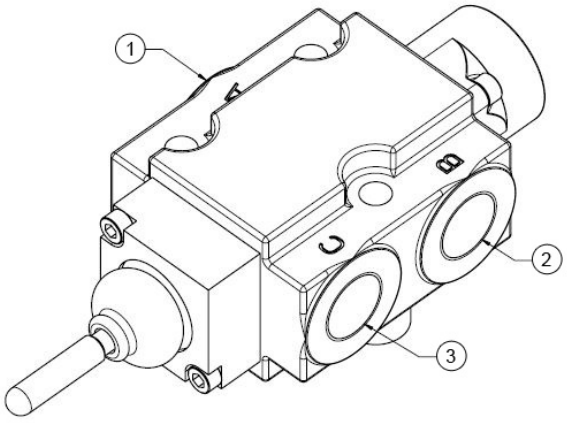
- ISO 11158 HV
- DIN 51524 HVLP.

The level of cleanliness must be as in the standard ISO 4406 18/16/13.

10.2. Connecting the hydraulic knock-off valve

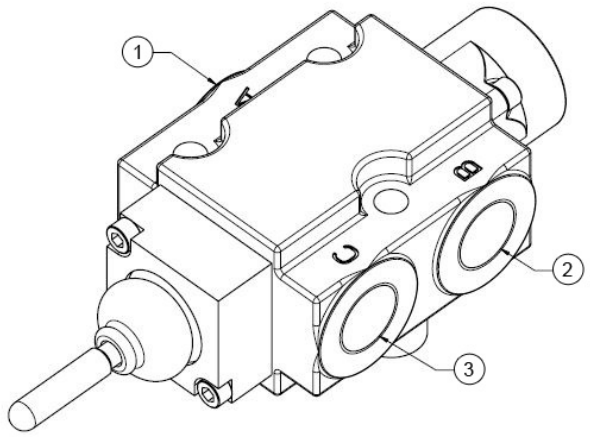
You can connect the hydraulic knock-off valve in two different ways.

10.2.1. With a 2-line connection



1. A. Pressure
2. B. Return
3. C. Cylinder

10.2.2. With a 1-line connection

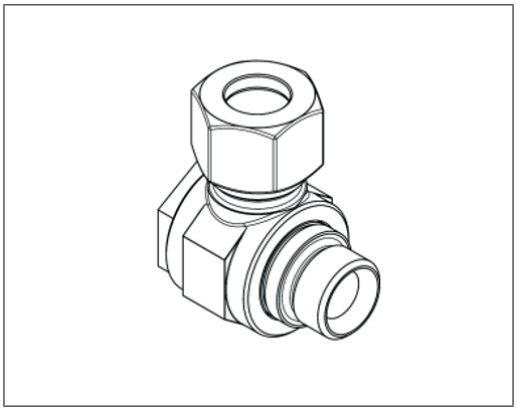


1. A. Pressure
2. B. Plug
3. C. Cylinder

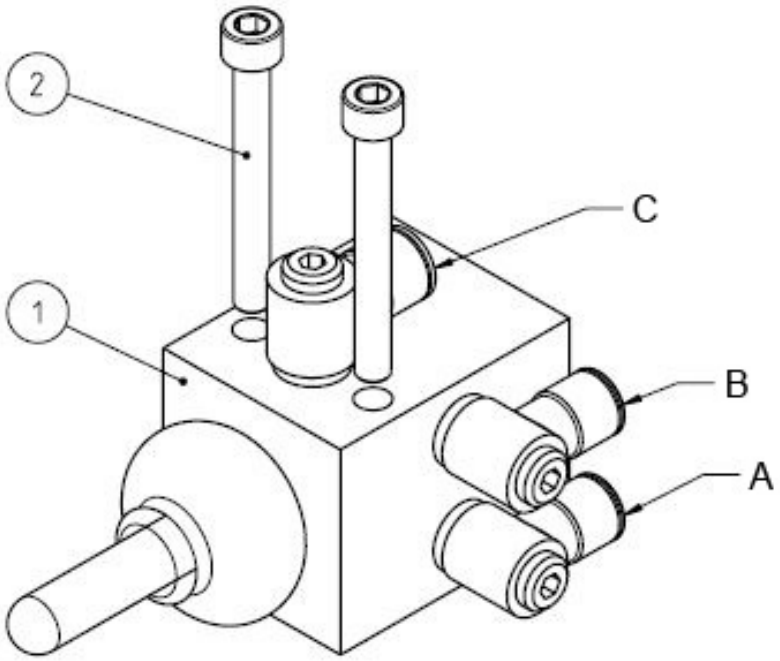
- The 1-line connection is used for example, in trailer installations, if the hydraulic connection is made without a separate return line.
- The return port (B) of the knock-off valve is sealed with a plug.

10.3. Connecting hydraulics to the tipping cylinder when using a pneumatic knock-off kit

When you use a pneumatic knock-off kit, connect the hose from the tipping valve with a swivel adapter p/n 360408844 to the oil connection of the tipping cylinder.



10.3.1. Pneumatic knock-off connection



A.	In
B.	Cylinder
C.	Out

11. Adjusting the tipping angle

11.1. Adjusting the safety strap or the safety wire

The function of the safety strap or the wire is to stop the movement of the tipper body and the tipping cylinder before the tipping cylinder has extended to its full length.

Make sure that knock-off kit stops the cylinder movement before you tighten the safety strap or wire. There must be a lateral allowance of 2-4 cm in the line.

WARNING

The safety strap stretches. Confirm the stretch of safety strap from the manufacturer before the assembly.

11.2. Removing air with test tipping

Before you make adjustments to the tipping angle:

- Rear-tip the tipping cylinder to the full length 5 times carefully to remove air out from the system.
- Monitor that the tipping cylinder is working properly.

11.3. Adjusting the angle for rear tipping

Adjust the wanted tipping angle.

NOTICE!

- **You must adjust all limiting devices to make sure that the tipping cylinder stops before the safety strap or wires tighten.**
- **Make sure that the strap or wires have a lateral allowance of 2-4 cm after the cylinder movement stops.**
- **Make sure that the tipping cylinder does not touch the frame or other solid structures during tipping.**
- **The maximum cylinder angle for the rear tipping is 32 degrees.**

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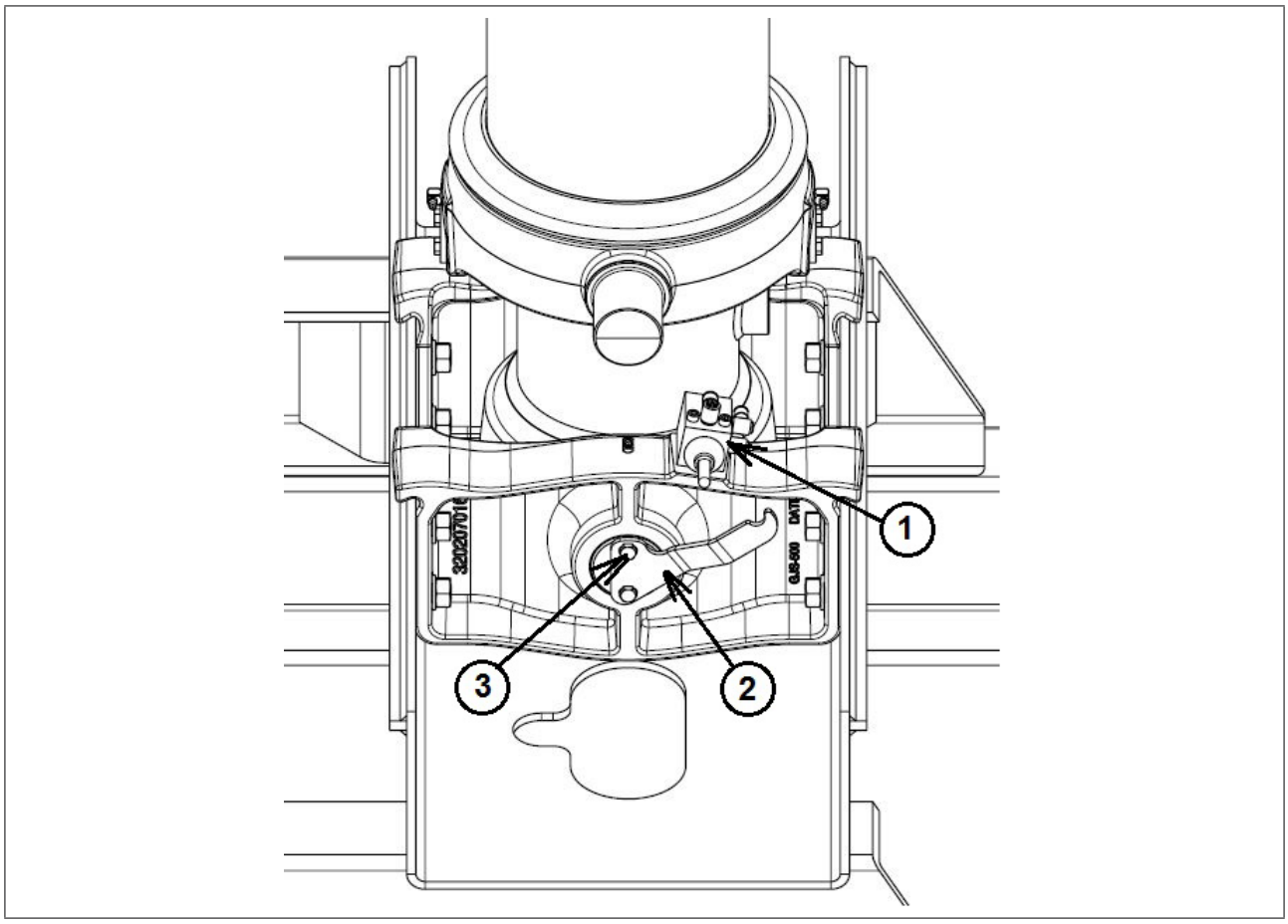
1. Lift the body to the planned angle.

2. Tighten the lever adjustment screws (part 3) to a position where the lever (part 2) pushes the spool (part 1) of knock-off valve.

3. Always do a test tipping to examine the adjustment of the tipping angle.



WARNING

The tipping cylinder is not designed for side loads and/or negative forces (pulling). Use the tipping cylinder only for tipping.

12. Final check

- Check all connections.
- Check visually the whole system.
- Lubricate all lubrication points.
- Measure the oil level.
- Make sure that the tipping cylinder does not touch surfaces or solid constructions.
- Make sure that all bolts and nuts are correctly tightened.

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13. Technical documents

The tipping cylinder is delivered with an operator's manual and a warranty certificate. This certificate is also applicable for the EC Certificate of Conformity, as required by the Machinery Directive.

13.1. Submitting the documents

1. Fill in the form fully.
2. Send the page 1 back to Wipro.
3. Keep the page 2 with the vehicle's technical documentation.
4. Send the page 3 to the owner of the truck.
5. Make sure that all the type and warning signs that are provided with the tipper are attached to the superstructure in clearly visible places.

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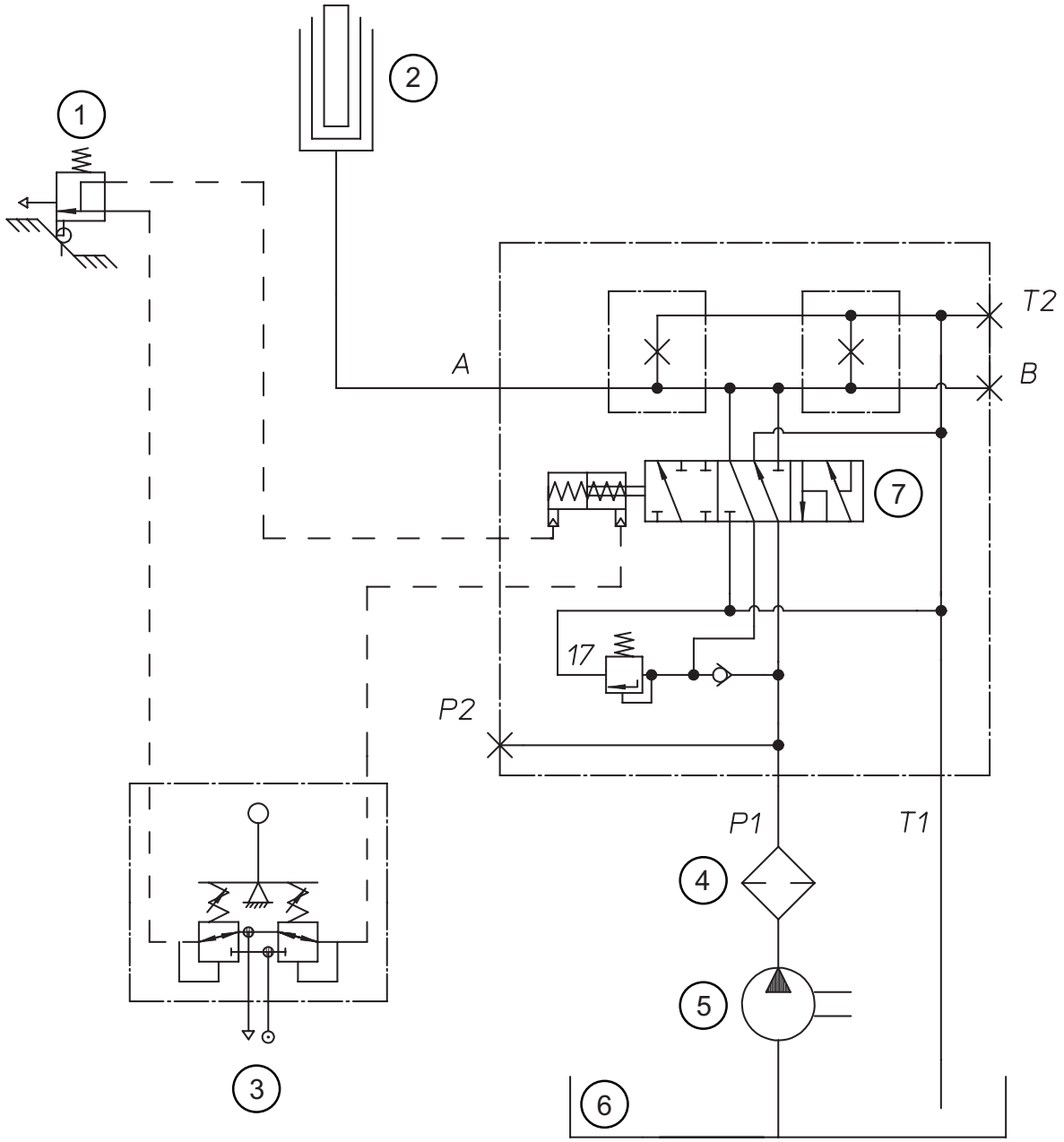
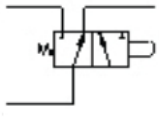
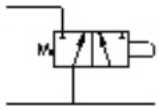
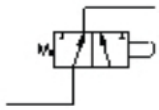
Appendix A. Example of a pneumatic knock-off connection



1. Pneumatic knock-off
2. Tipping cylinder
3. Cabin control
4. Pressure filter
5. Pump
6. Tank
7. Tipping valve

Appendix B. Example of a hydraulic knock-off connection

2-LINE CONNECTION		Cylinder
Return		
Pressure		
PARALLEL CONNECTION		Cylinder
Return		
Pressure		
1-LINE CONNECTION		Cylinder
Pressure		

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