

Maintenance Manual

Air Spring System

GMT - No. 17308901



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1 On this manual

INFORMATION

These maintenance instructions for rubber-metal components refer exclusively to the visual inspection of the components when installed in the vehicle depot.

The separate maintenance instructions of the vehicle manufacturer are authoritative for the inspection and main inspection of the bogies!

This maintenance manual describes the necessary maintenance operations incurring throughout the service life of the rubber metal parts and air spring systems.

Proposals are made for the necessary tools and auxiliary devices and the necessary dimensions are named.

The maintenance intervals are based on the specification data and may be adapted according to the findings from the operation.

Criteria are described in which the parts are to be replaced or respectively forwarded to the supplier for an assessment of the further applicability.

1.1 Applicable documents

- Drawing GMT - No. 17308901
- DIN 7716:1982-05: Rubber products; requirements for storage, cleaning and maintenance
- ISO 2230:2002-04: Rubber products - Guidelines for storage
- DIN 13597:2008-04: Railway applications - Rubber suspension components - Rubber diaphragms for pneumatic suspension springs
- DIN EN 13913:2003-08: Railway applications - Rubber suspension components - Elastomer-based mechanical parts
- DIN EN 45545-1:2013-08: Railway applications - Fire protection on railway vehicles

1.2 Convention of description

The following representations are used in these manual:

NOTICE



- **Indicates situations or maloperation that may lead to material damage.**

INFORMATION

- **Indicates important information or instructions.**
- **Failure to comply with these instructions will prevent or substantially hinder the successful completion of the actions described in this documentation.**

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2 Safety

2.1 Warning and safety messages



This manual contains important warnings and safety instructions which must be observed by the user.

The product may only be used and operated by qualified personnel who are capable of complying with the necessary safety precautions for use and operation.

The repair of the product may only be carried out in the delivery unit or by the qualified personnel trained for this purpose.

Any damage resulting from non-compliance with the safety regulations and operating instructions described in this manual are excluded from the warranty and liability claims against the manufacturer!

2.2 Accident prevention regulations

Besides the instructions in this manual, the personnel must be familiar with all applicable local accident prevention regulations and the national safety regulations and must always comply with them.

2.3 Graduated warning and safety messages

The following icons and standard text formats are used in this manual:

CAUTION



- Indicates a hazard that may result in minor or moderate injuries.
- This is the general warning sign. It is used to alert the product user to potential hazards. All safety statements that follow this symbol must be followed in order to prevent possible damage.

2.4 Intended Use

The air spring system is intended only for use in rail vehicles and shall be used only in the destined vehicle by the vehicle manufacturer / developer. The components shall be installed as specified and shall only be subjected to the specified operating conditions. Should individual parameters deviate or disturbances appear, GMT has to be contacted to avoid risks and damages. Intended use also includes compliance with the instructions in this maintenance manual, conducting tests and maintenance.

3 Product description

3.1 Designation of delivery item

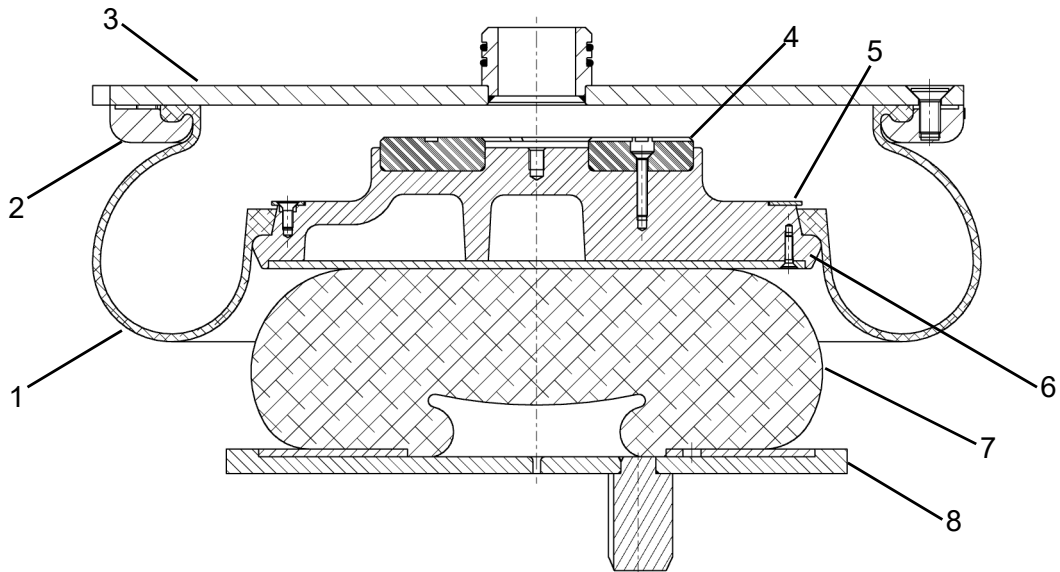
Air Spring System GMT - No. 17308901

3.2 Description of delivery item

The Air Spring System is assembled between car body and bogie frame and is used as isolation element and rotary element.

The air spring system consists of an air bellows and an additional spring.

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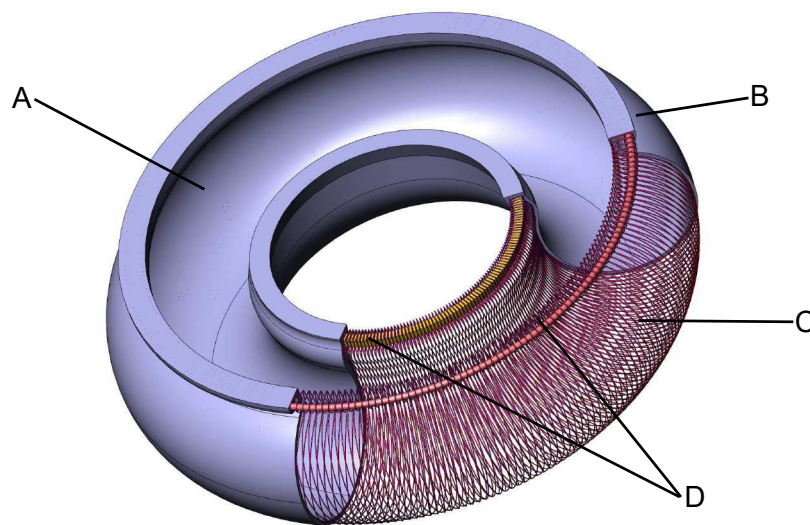
- [1] Air spring bellows 17016302
- [2] Mounting ring E860826
- [3] Top plate E860824
- [4] Sliding plate E860830

- [5] Clamping plate E860400
- [6] Rim E860822
- [7] Half hourglass spring 73002504
- [8] Ground plate E860823

Figure 1: Air Spring System 17308901

3.3 Construction of the air spring bellows

The air spring bellows consists of several layers of high-quality elastomers in which reinforcing material [C] is bedded. The inner layer [A] mainly has sealing function and the outer layer [B] is resistant against ozone and is weatherproof. Moreover the outer layer protects against mechanical damages. The steel core [D] in the top and lower bulge area serves for sealing between air spring and the respective holding fixtures



- [A] Inner rubber layer
- [B] Outer rubber layer

- [C] Reinforcing material
- [D] Steel core

Figure 2: Construction bellows

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3.4 Permissible reworking - grinding

The following pictures show the appearance of grinding areas on an air spring bellows.



Figure 3: Air spring bellows with grinding area

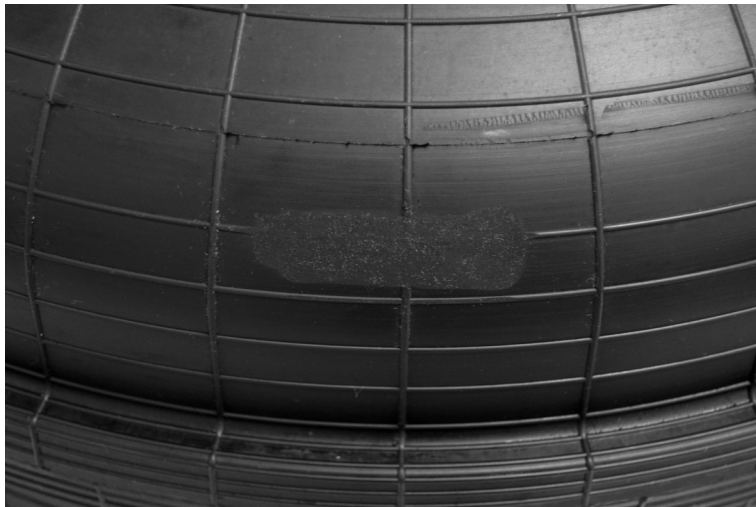


Figure 4: View of a grinding area

Air spring bellows for rail vehicles are manufactured semi-automatically in small batches with extensive manual machining. In individual cases, isolated, localized flow defects may occur on the bellows surface.

INFORMATION

The superficial flow defects have no functional influence on the characteristic values or service life of the air spring bellows as long as the functional fabric layers are provided with sufficient rubber coverage.

To ensure that the flow defects are superficial and that the covering of the fabric is still fully intact, such flow defects are ground off as a step in the finishing and quality control process. Fur-

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thermore, this grinding smoothes the surface to avoid misperceptions in the field, as flow defects are often perceived as „cracks“ or „cuts“.

INFORMATION

Grinding areas on air spring bellows are checked and approved by Quality Assurance. They therefore do not represent a fault or defect and do not require any action.

3.5 Technical Specification

Technical Specification	
Diameter	730 mm
Hight	300 mm
Weight	104 kg
Temperature Range	-10 °C to +50 °C

Table 1: Technical Specification

3.6 Identification

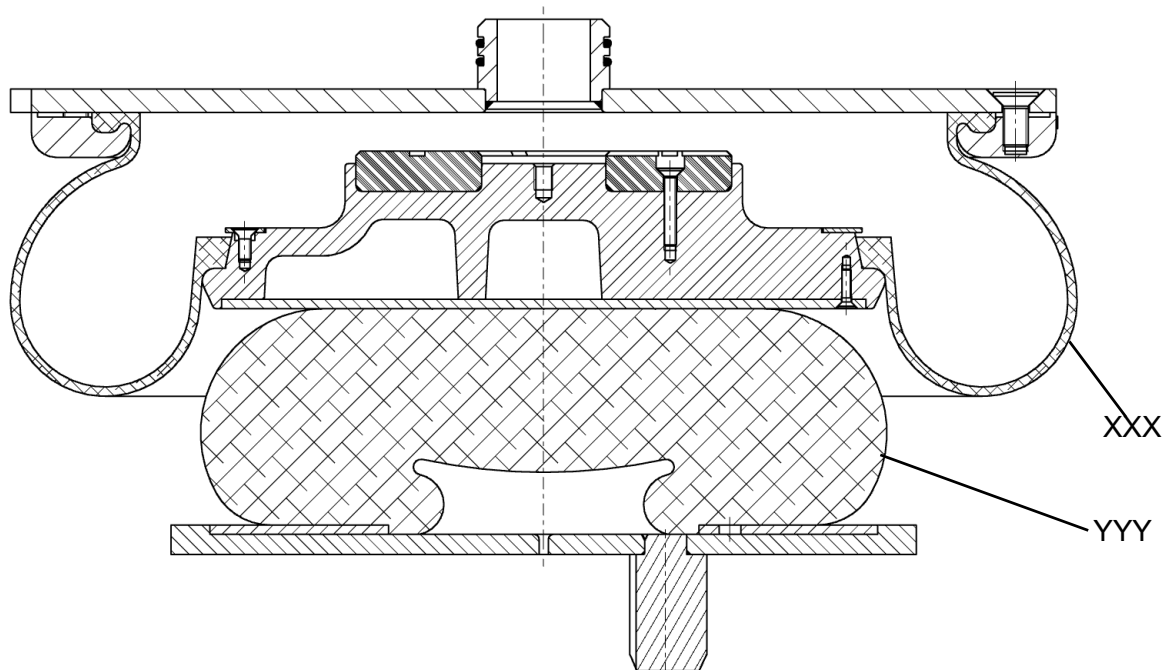


Figure 5: Identification

YYY Marking in rubber (raised)
Date of manufacture
GMT logo
17016302
Serial no.
Cavity no.

XXX Marking in rubber (raised)
GMT logo
73002504
Date of manufacture
Cavity no.

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3.7 Type plate

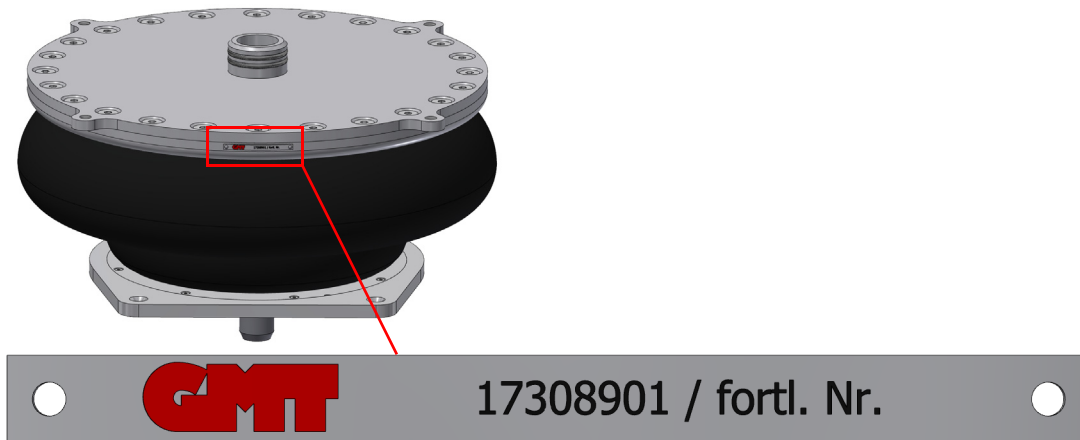


Figure 6: Type plate

4 Transport and storage

4.1 Transport

The air spring system is delivered completely assembled.

CAUTION



High weight of the air spring system

- Always carry the air spring system in pairs or with a lifting device.
- Lift the air spring system only by using an eye bolt
- Wear safety shoes!

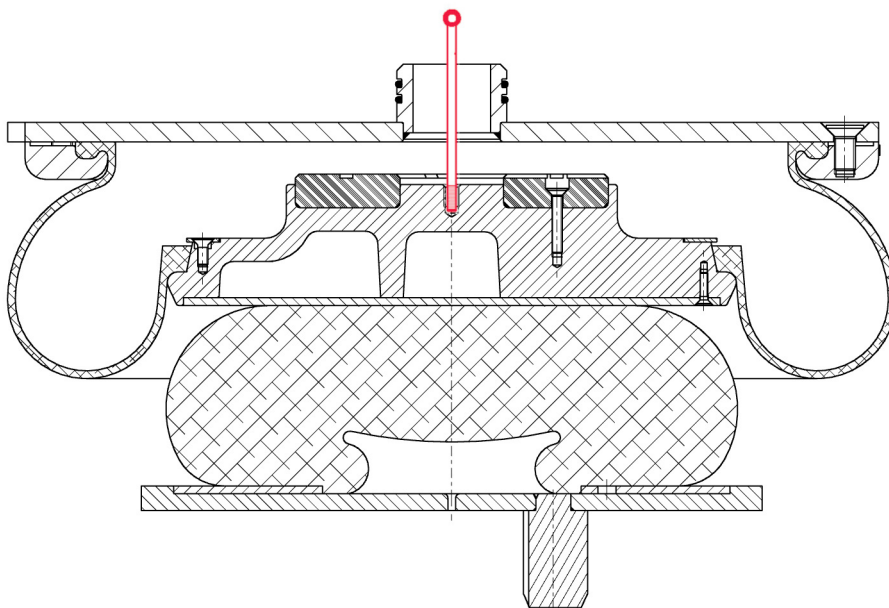


Figure 7: Lifting air spring system by an eye bolt

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4.2 Storage

The storage of elastomer components is regulated in DIN 7716:1982-05 and ISO 2230: 2002-04 and mainly covers long-term storage (longer than 6 months). However, it can also be used for short-term storage (less than 6 months), e.g. production or delivery storage with continuous material flow.

Storage and storage time recording of elastomer components are described in ISO 2230:2002-04. In this standard the elastomer products are divided into three groups with different storage times. These are shown in Table 2.

Classification acc. to ISO 2230:2202-04	Designation	Storage time (in years)	Extension of storage time (in years)*
Group 1	NR (Natural Rubber)	5	2
Group 2	NBR (Acrylic Nitrile Rubber), CR (Chloroprene Rubber)	7	3
Group 3	EPDM (Ethylene-propylene Rubber)	10	5

* same storage conditions as for the initial storage time

Table 2: storage times of elastomers

The storage temperature should be below +25 °C and products should be stored away from direct sources of heat such as boilers, radiators and direct sunlight.

If the storage temperature is below +15 °C, handle the stored products carefully as they may have stiffened and become susceptible to distortion.

The temperature of products taken from such low-temperature storage should be raised to approximately +30 °C throughout their mass, before the products are put into service.

Care must be taken to ensure that the components are protected from air supply, in particular to keep away the ozone which is detrimental to elastomers.

The storage of elastomeric products in humid storage areas is to be avoided. Condensation should not occur. A relative humidity of 65 % in the storage room is most favorable.

NOTICE



- Solvents, fuels, lubricants, chemicals, acids, brines, disinfectants or else are not allowed in the storage room.
- Vapors of these substances can damage the rubber.

Elastomer products are to be stored stress-free which means without tension, compression or any other deformation since stress promotes a lasting deformation as well as the development of cracks, unless this is provided for constructively.

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NOTICE



- Particular metals, especially copper and manganese have a damaging effect on rubber products.

Due to this, rubber products should not be stored in contact with these metals but have to be protected by packaging them or by covering them with a layer of a suitable material, e.g. paper or polyethylene.

The material of the containers and the material for packaging- and covering should not contain any damaging ingredients for the rubber products, e.g. copper or copper-containing alloys, petrol, oil or suchlike.

NOTICE



- Foils containing softeners are not allowed to be used as packaging material.

If rubber products have to be powdered, the powder should not contain any harmful ingredients for rubber-products. Appropriate materials for powdering purposes are French chalk, prepared chalk, fine-grained mica flour and rice starch.

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5 Assembly / Disassembly

INFORMATION

Incorrect mounting / dismounting

- Incorrect procedure leads to damages of the air spring bellows or the sealing areas of the top plate or rim.
- Perform the dismounting and mounting carefully by adequately trained and experienced staff.

5.1 Safety messages

Note to Reader



Please read and observe the following safety instructions before and during assembly / disassembly or when using this air spring system. Maintenance and control work as well as the exchange of components must be carried out by suitably trained and knowledgeable personnel.

CAUTION



High weight of the additional spring system

- If the complete system is lifted, the additional spring may separate from the air spring bellows (Figure 8).
- This leads to risks for injuries.
- Do not lift the complete system at the top plate or air spring bellows for transportation, disassembly or similar.
- Wear safety shoes!

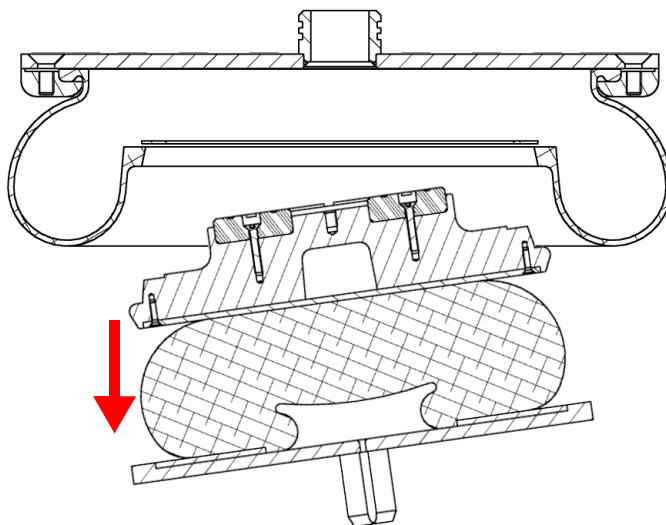


Figure 8: Loosen of the additional spring

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CAUTION



High pressure in the bellows

- If the installation height is not fixed, the bellows can explosively separate from the additional spring.
- This leads to risks of injury.
- Fix the system in a suitable mounting device or in the bogie and load the air spring system with the appropriate axial force before applying pressure.
- A hearing protection has to be worn all the time.

5.2 Required tools

For the assembly and disassembly the following tools are required:

- Torque key (torque range 3 Nm up to 120 Nm)
- Hexagon socket screw key
- Hammer (1000 g)
- Assembling aid (hard wood)
- Cleaning wipes
- Soap water
- Compressed air supply
- Mounting lever

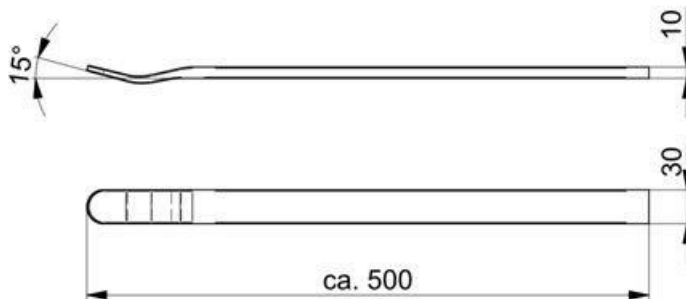


Figure 9: Mounting lever

NOTICE



Sharp edges of the mounting levers

- Sharp edges can cause damages on the bellows.
- Make sure that the mounting levers have no sharp edges to avoid damages on the bellows.

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5.3 Mounting additional spring

5.3.1 Mounting the ground plate

1. Place the ground plate on a secure and non-slip surface.

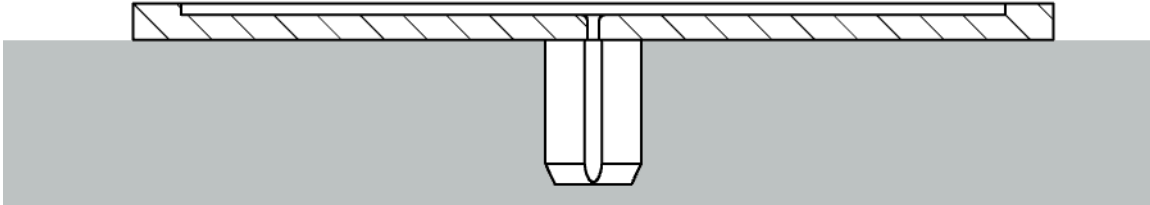


Figure 10: Place the ground plate

2. Place the half hourglass spring onto the ground plate with an exact fit and fasten it with the screws M6x15 (secured with Loctite 243, tightening torque 15 Nm) in the ground plate.

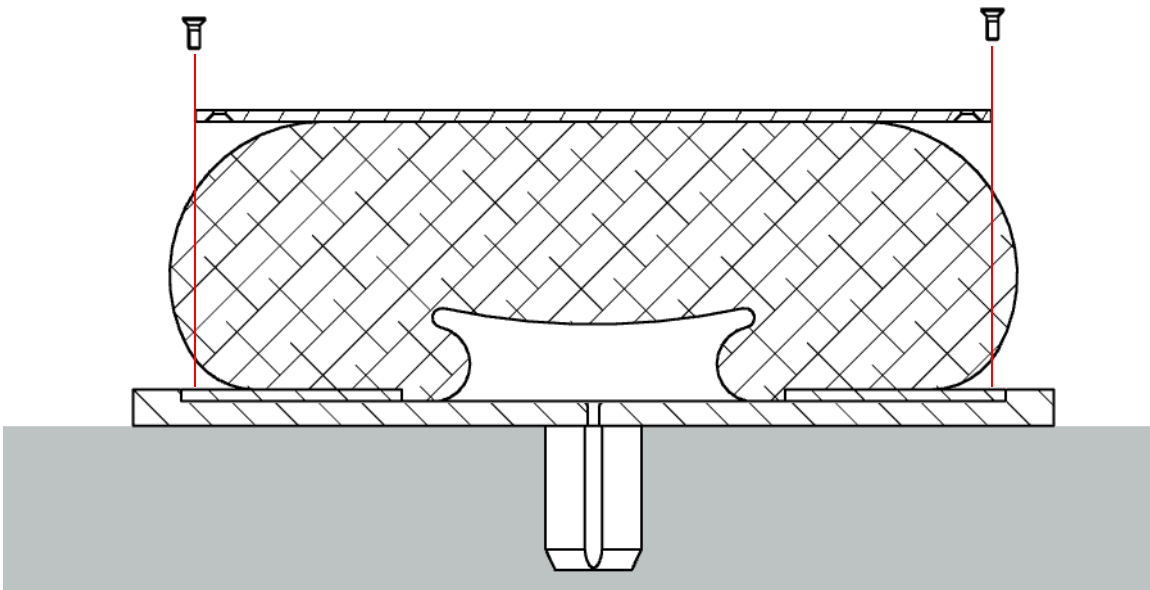


Figure 11: Positioning and fastening the half hourglass spring

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5.3.2 Mounting the Rim

1. Position the rim on the half hourglass spring.

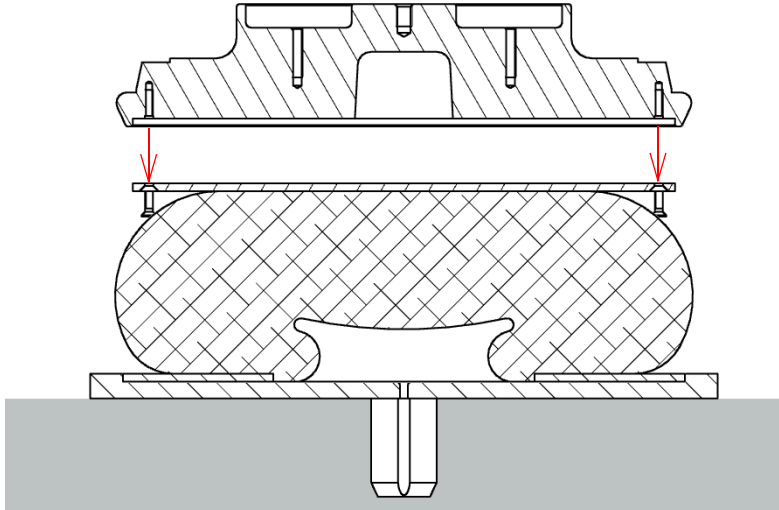
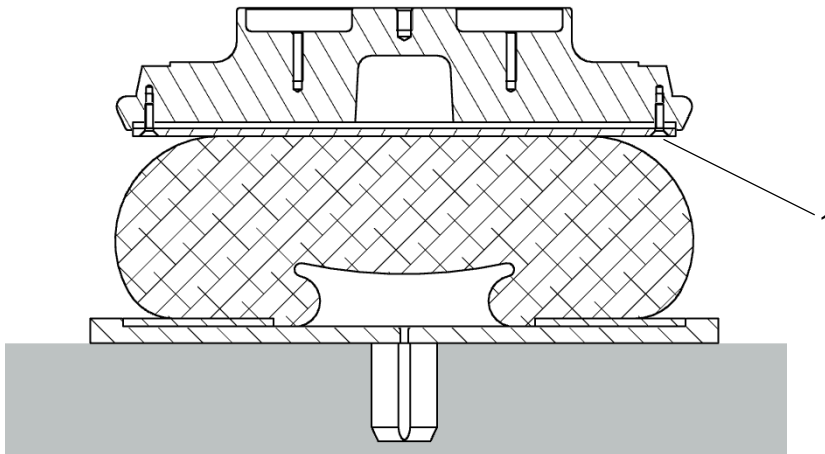


Figure 12: Position the rim

2. Fasten the rim with the M6x25 screws (secured with Loctite 243, tightening torque 12 Nm).



[1] Screw M6x25

Figure 13: Fasten the rim

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5.3.3 Mounting sliding plate

1. Place the sliding plate on the rim.

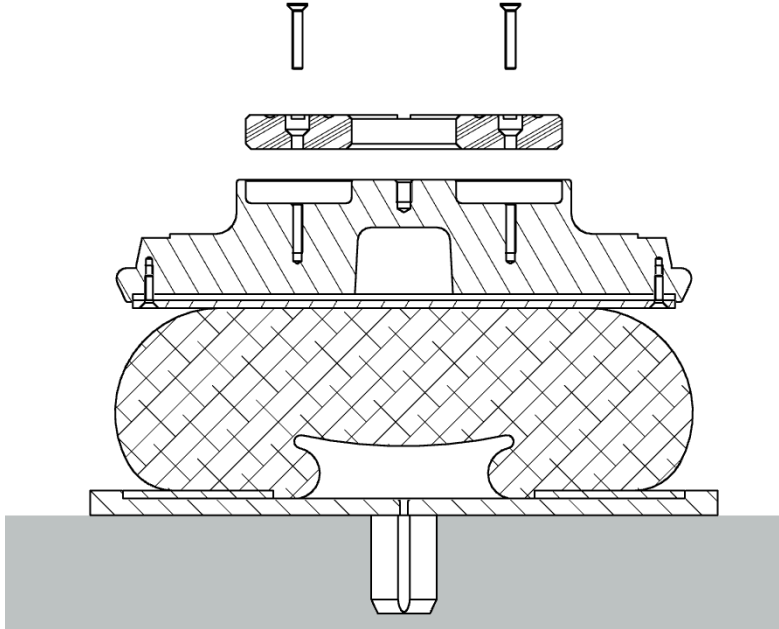


Figure 14: Place sliding plate

2. Wet the screws M8x50 with Loctite 243 and fix them with a torque of 3 Nm.

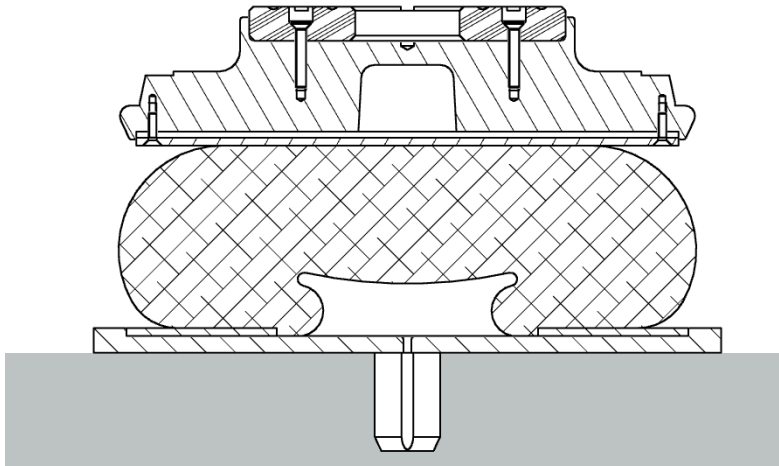


Figure 15: Place the sliding plate

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5.4 Assembly of the bellows on mounting ring

1. Clean the air spring bellows with a cleaning cloth.
2. The mounting ring is clamped in a corresponding mounting device.

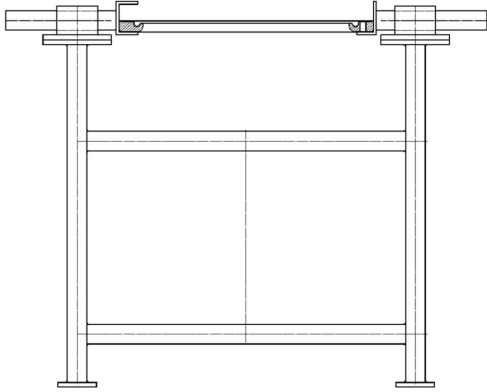


Figure 16: Mounting device

3. Moisten the outside of the bellows with soapy water so that the bellows can easily slide through the ring.
4. Set the bellows one-sided at the clamped mounting ring and press it step by step behind the clamp nose.

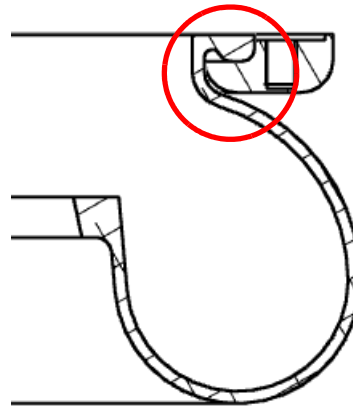


Figure 17: fix bellows to mounting ring

5. The bellows must be located on each point on the circumference clean and completely behind the clamp nose.

5.5 Assembly of the bellows

1. Clean the air bellows with a cleaning cloth. The cleaned areas are then coated with clear or soapy water.
2. The bellows is initially manually placed on the rim by hand. Ensure that the air spring bellows is placed in a straight position in order to avoid tilting.

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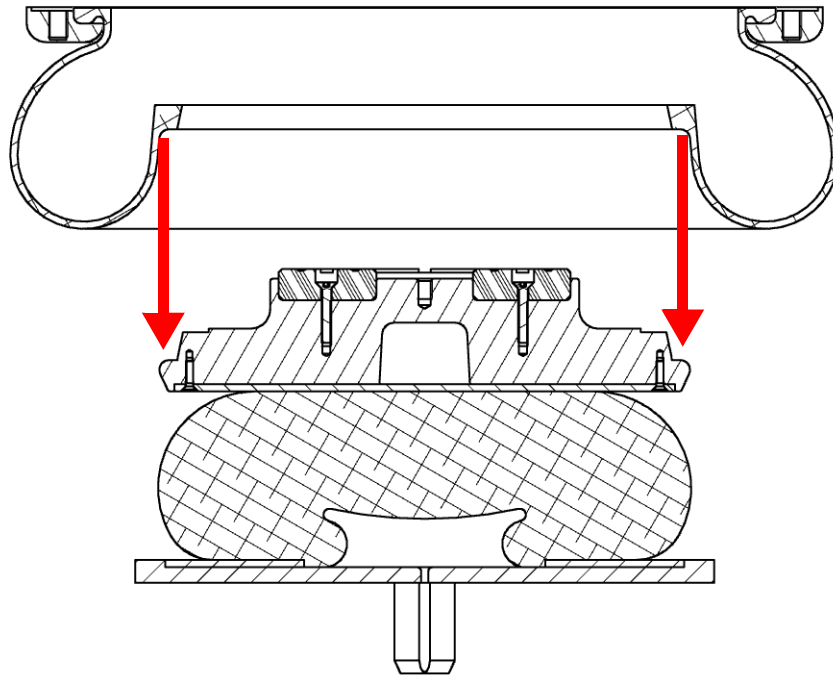


Figure 18: Place bellows on additional spring

3. After being fitted, the air spring bellows is pressed downwards along the circumference by hand to ensure a uniform fit. The assembly can be supported by means of a hammer (1000 g) and the assembly aid (hardwood).

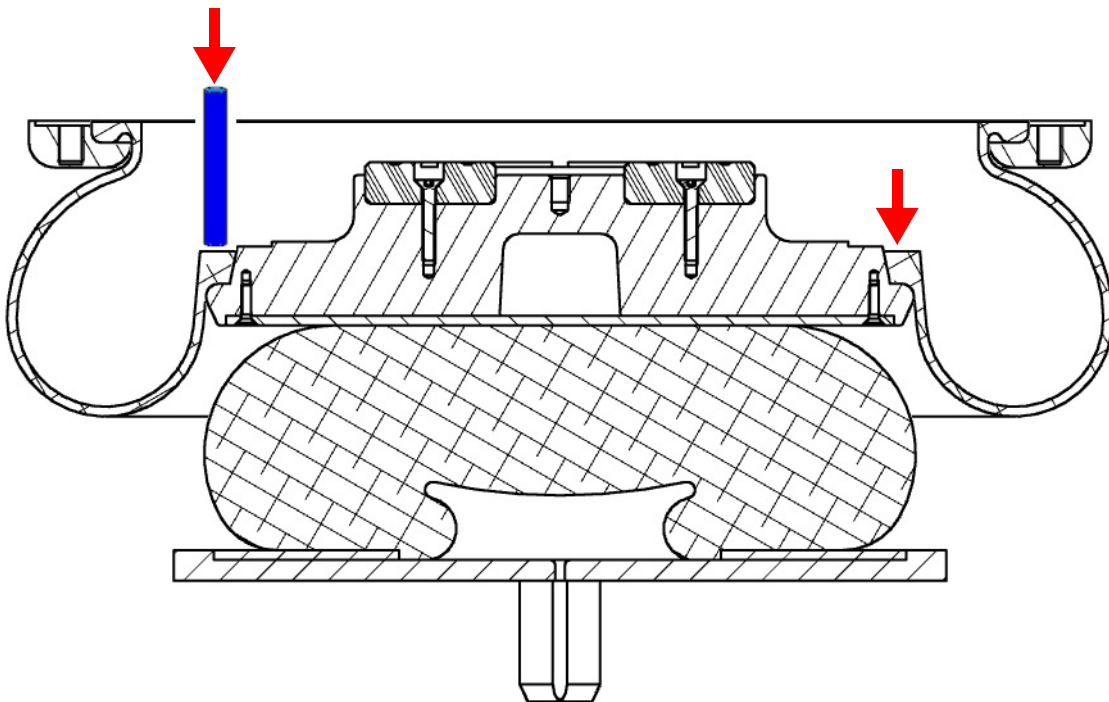


Figure 19: Bellows mounted on additional spring

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4. Place the clamping plate.

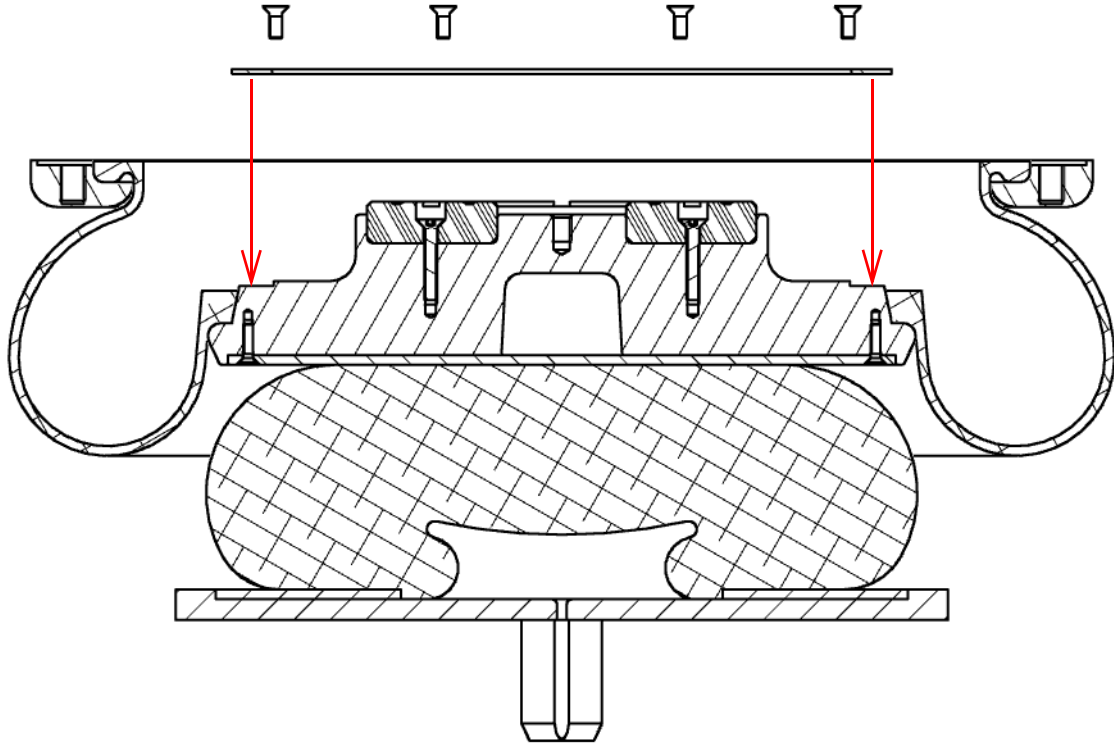


Figure 20: Place the clamping plate

5. Wet the screws M8x20 with Loctite 243 and fix them with a torque of 20 Nm.

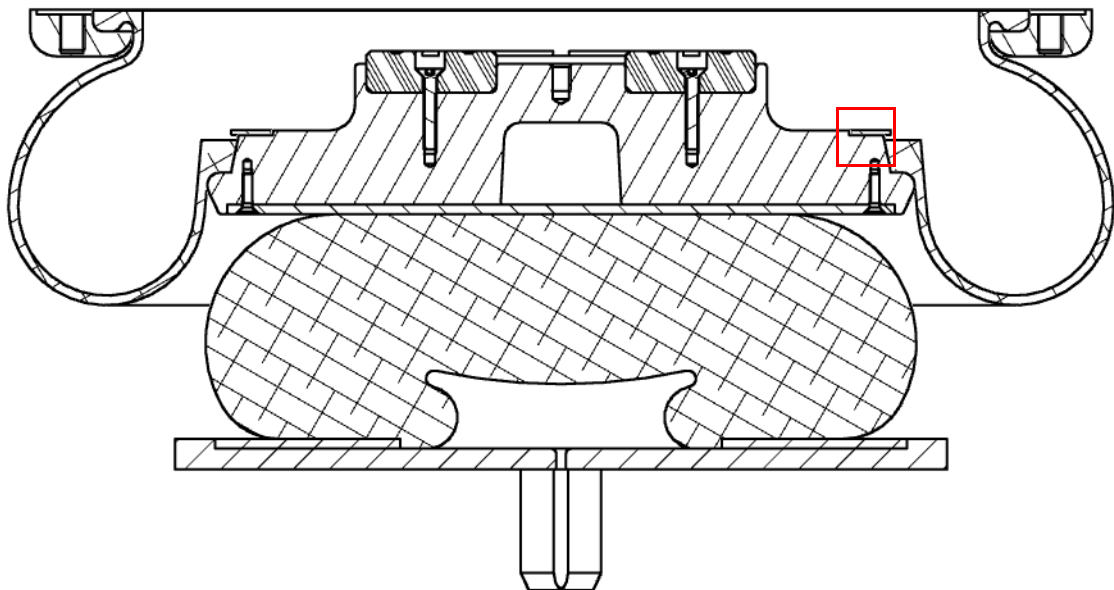


Figure 21: Fix the clamping plate

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5.6 Mounting the top plate

1. Mount the top plate on the system and secure the screws according to the drawing GMT No. 17308901.

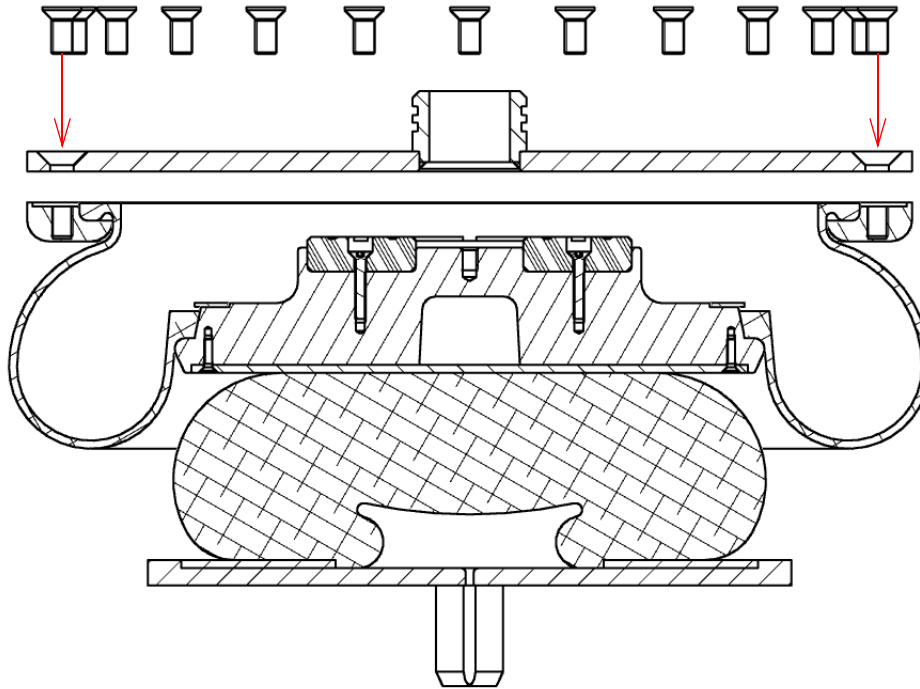


Figure 22: Mounting top plate

5.7 Before installation in the vehicle

1. GMT recommends the use of a silicone oil-based lubricant (silicone grease) to prevent damage to the O-rings. This lubricant should be applied to the entire outside of the air inlet as it is not powder coated.

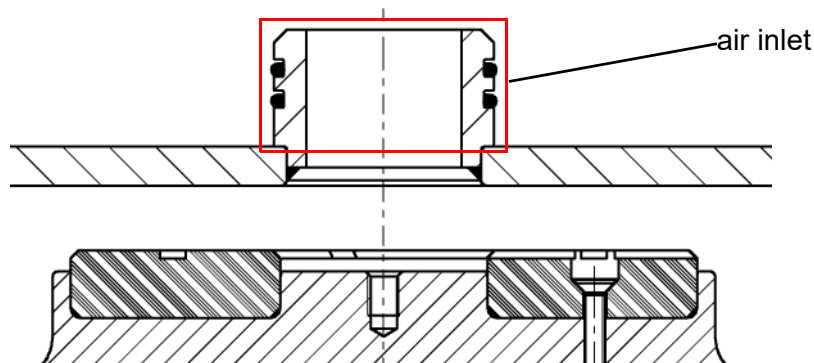


Figure 23: Air inlet

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2. GMT recommends the use of a silicone oil-based lubricant (silicone grease SOB1316) to prevent damage to the sliding plate. This lubricant should be applied on the surface of the sliding plate.

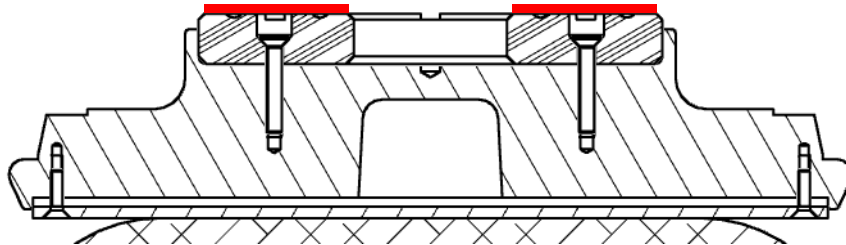


Figure 24: Sliding Plate

5.8 Leakage test

The leakage test shall be performed after assembling completely the air spring system. During the test, appropriate safety precautions such as the wearing of safety gloves, safety goggles and hearing protection must be strictly observed. The leakage test can be performed at the completed bogie.

CAUTION

High pressure in the bellows

- If the installation height is not fixed, the bellows can explosively separate from the additional spring.
- This leads to risks of injury.
- Fix the system in a suitable mounting device or in the bogie and load the air spring system with the appropriate axial force before applying pressure.

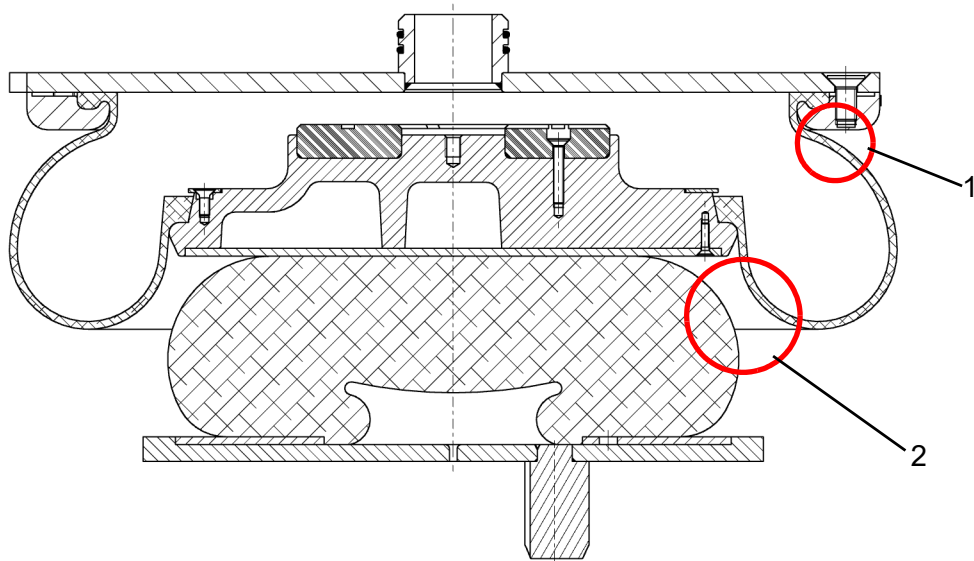
CAUTION

When air is supplied, the bellows fills suddenly with the operating pressure

Here is an acute danger that limbs (fingers, etc.) are clamped.

- Do not grab between the bellows and additional spring.
- Do not grab between the bellows and the upper plate.

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[1] danger spot bellows - upper plate

[2] danger spot bellows - additional spring

Figure 25: place of danger

We recommend following test procedure:

1. Connect a pressure measuring device to the pressure conduction between the stop valve and the air spring system
2. Fill up the air spring up to 1.3 times the maximal pressure P_M 6 bar at F_M 160 kN), that means 7.8 bar. Keep the compression constantly for 30 seconds.
3. Reduce the pressure to 0.9 times the nominal pressure, that means 5.4 bar. Close the air supply for at least 10 minutes.
4. Measure the decrease in pressure. This should not exceed 0.15 bar between 5 and 10 minutes.
5. In case of a major pressure loss, the leakage location must be localized with leakage detection spray or soapy water and sealed by appropriate measures.

6 Initial operation

- not applicable -

7 Operation

- not applicable -

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8 Maintenance

8.1 Maintenance plan

MAINTENANCE						
Activity	Interval					Chapter
	monthly	3 month	6 month	yearly	6 years	
Visual inspection bellows	X	X				see chapter 8.5
Leakage Test bellows					X	see chapter 5.8
Air Spring System	X	X		X	X	see chapter 8.6

Table 3. Maintenance plan

Lifetime	Activities
Daily	Visual inspection
Trip - every 3 days or 5,000 km (whichever is earlier)	Visual inspection
Monthly - 30 days ± 2 days	Visual inspection: - Damage to the bellows wall, e.g. abrasion, cracks, injuries due to external influences, signs of aging, blisters - Contamination of foreign bodies/ dirt between bellows and connecting components
Quarterly - 90 days ± 3 days	Visual inspection: - mechanical damage, - loose or missing parts, - loss of air
Nine Monthly - 270 days ± 3 days	Deepened visual inspection: - mechanical damage, - loose or missing parts, - Deformations or cracks, - loss of air
yearly	Deepened visual inspection: - mechanical damage, - loose or missing parts, - Deformations or cracks, - loss of air
Shop Schedule 18 Months ± 5 Days	Deepened visual inspection: - mechanical damage, - loose or missing parts, - Deformations or cracks, - loss of air

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Lifetime	Activities
Shop Schedule 2 36 Months ± 5 Days	Deepened visual inspection: - mechanical damage, - loose or missing parts, - Deformations or cracks, - loss of air
Shop Schedule 3 72 Months ± 5 Days	Renewal / replacement of the air spring system

Table 4: Maintenance plan Activities

8.2 Range of coverage

The following guidelines for controlling, cleaning and maintaining apply to elastomeric components and rubber-metal components, based on the use of caoutchouc and rubber in pure form. Alternatively to metallic materials partially plastics are used. These documentation were drawn up in line with DIN 7716:1985-05 and ISO 2230:2002-04 and are also valid for the use of synthetic rubber products regarding the general conditions.

8.3 General

Under unfavorable storage conditions or improper treatment most elastomer products change their physical properties. This can lead to a significant decrease in lifetime of elastomer products. For example from excessive hardening, softening, permanent deformation as well as from flaking, cracks or other surface damage they can become unusable. The changes can be caused by the influence of oxygen, ozone, heat, light, humidity, solvents or by storing under stress.

Properly stored and treated rubber products remain virtually unchanged in their characteristics for a long time (several years).

INFORMATION

- Rubber-to-metal-bonded parts are mainly suited for the usage in compression- and shear-loads. Pulling-loads should be avoided.

8.4 Service life and Control

The Air Spring Systems do not require any servicing.

8.5 Visual check

8.5.1 Air spring bellows

Check the air spring bellows visually at least once a month.

NOTICE



In general: If first fabric layers visible, the air spring must be replaced preventively.

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INFORMATION

Deposits at the bellows

- If there are deposits on the bellows wall or at contact points to other parts, these should be removed for cleaning according to the instructions in the following chapter. An operational risk is not necessarily given at this time.
- On locally damaged areas in the form of cracks, scuffs, rubber peeling or blistering should be checked immediately how far the damage has progressed.
- For this check, use only dull and edgeless tooling.

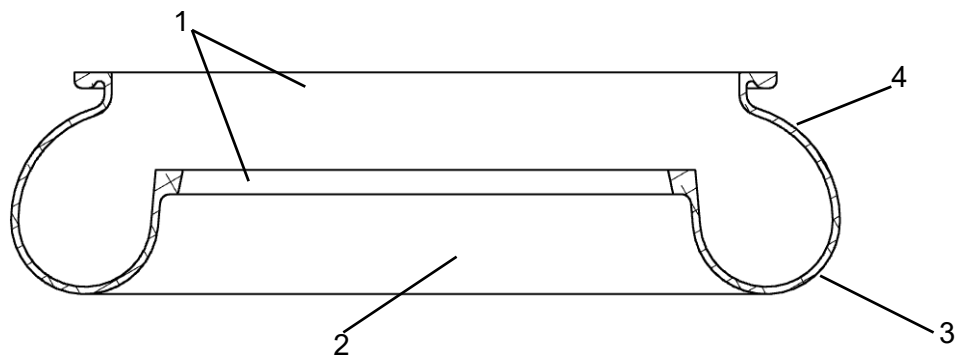


Figure 26: air spring bellows

1. Top and lower sealing surface

These areas are extremely important for the functionality of the air spring bellows and is checked by performing a 100 % tightness check after production. Provided that the air spring bellows has been fitted properly, there is no way of hurting these areas. If any damages are detected there could be following reasons:

- Incorrect mounting
- Incorrect dismounting
- Incorrect storage before initial operation

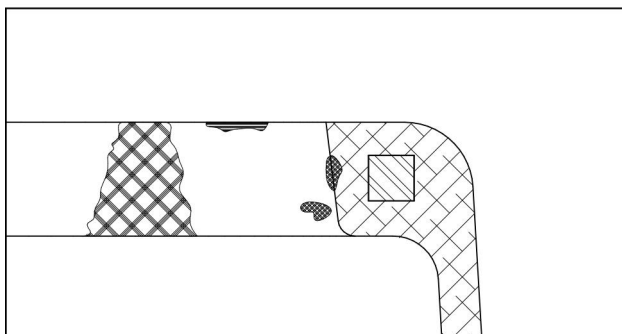


Figure 27: Delamination

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NOTICE



- Delamination due to mechanical influences or foreign bodies could cause leaks.
- Do not use spring bellows with these defects again.
- **Replace the bellows within the next 3 months!**

INFORMATION

- Irregular partial delamination can be caused by the former disassembly of the bellows. These faults can usually be tolerated.

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2. Cuts in the lower area of the loop

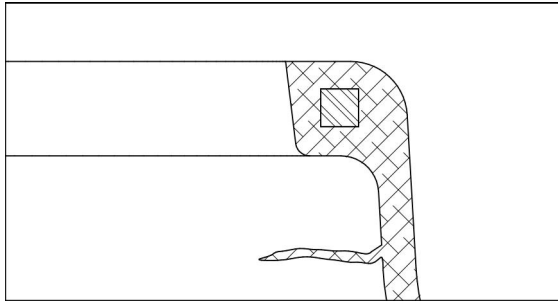


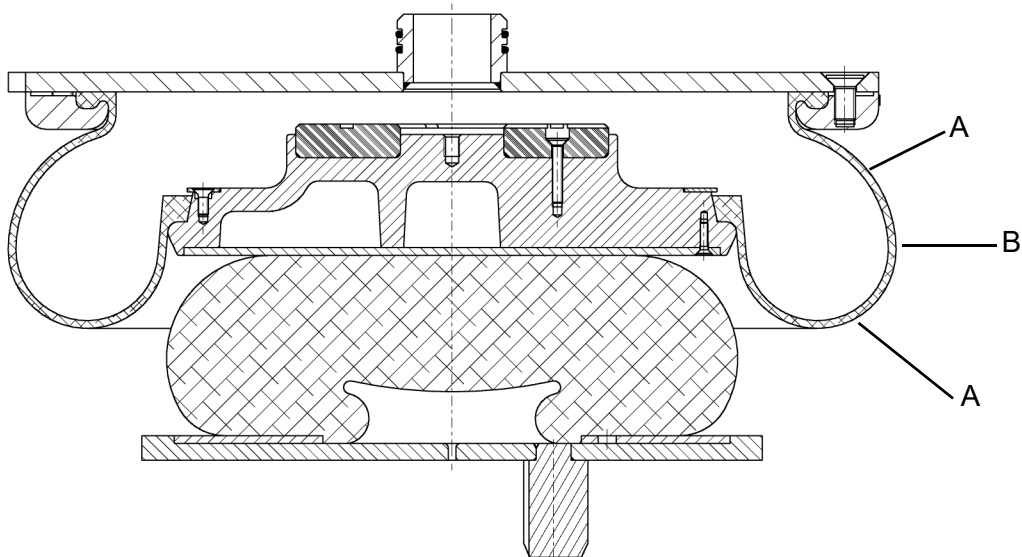
Figure 28: Cuts

NOTICE



- **Exchange the air spring bellows within the next 3 months if any cuts are detected in this area during inspection.**

3. Abrasive damages and cuts



A - Abrasive damages

B - Cuts

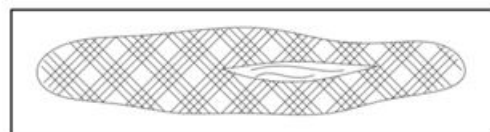
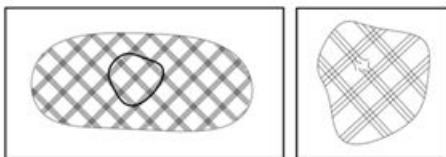


Figure 29: Abrasive damages and cuts

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NOTICE



- Abrasive damages or small cuts on the outer rubber layer of the bellows can be tolerated as long as the reinforcing material is not visible.
- **Exchange the air spring bellows within the next 3 months, if it is visible and frayed (A) or incised (B).**

4. Detachment of the outer layer of the rubber

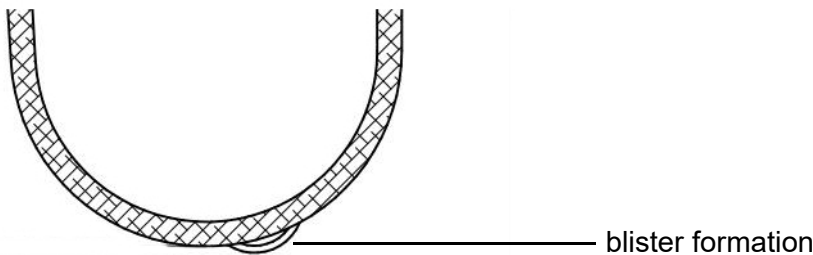


Figure 30: Blistering

When a bubble appears on the surface during operation, it is usually caused by incorrect storage and long-term oil contact.

Level 1 - Small bubbles:

Highlight the bubbles. Pierce the bubbles with the dimensions (diameter or length) < 30 mm with a needle. The needle should penetrate into the bubble as far as possible parallel to the surface of the air spring bellows.

No additional checks are required, visual check of marked area at next regular visual inspection.

Level 2 - Medium bubbles:

Highlight the bubbles. Pierce the bubbles with dimensions between 30 and 50 mm. The bellows may stay in operation under normal service conditions.

Replace it preventively at next opportunity. No additional checks are required, visual check of marked area at next regular visual inspection.

Level 3 - Big bubbles:

Do not pierce the bubbles with dimensions > 50 mm!

Critical: Replace the bellow.

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8.5.2 Additional spring

INFORMATION

Perform a visual check before assembly and afterwards regularly between the general inspections.

The check of the bonding between rubber and metal can be supported by hand by a mechanical bonding test. The rubber may be pressed back with a blunt test iron (rounded corners > 1 mm).

NOTICE



Partial debonding of the edges of the bonding zone between the elastomer and the metal

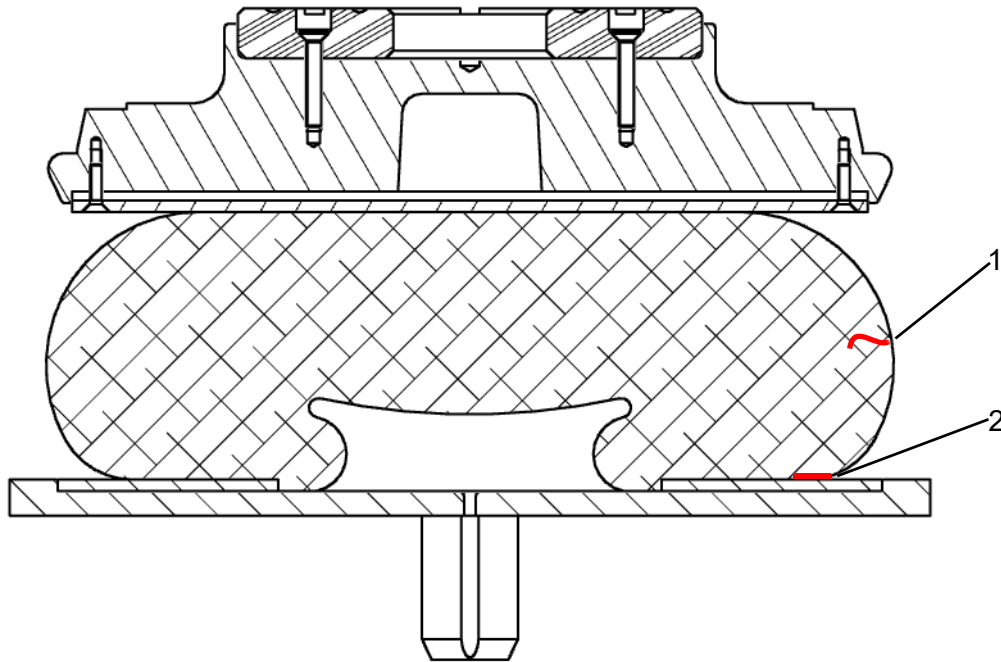
- Partial debonding of the edges of the bonding zone between the elastomer and the metal up to a depth of 9 mm and surface cracks in the individual elastomer layers also up to a depth up to 9 mm are acceptable and do not affect the function and safety of the components.
- Exchange the part if the debonding or the cracks are larger than 9 mm.

8.6 Replacement criteria

A replacement of elastomer components or elastomer-metal components is required e.g. in the following cases when:

- more than 10 clearly visible cracks per cm² have appeared on the rubber surface as a result of atmospheric exposure
- the parts have swollen strongly, due to inadmissible oil-moistening
- a loss in the rubber-metal bonding (possibly due to rust creep or corrosion of the metal parts) has occurred
- there is mechanical damage which could lead to a further destruction of the product due to sensitivity for notches of natural rubber
- local bulges are visible that do cover the entire side and with a depth of a multiple of the layer thickness
- Frayed bulges occur parallel to metal parts
- an above-average deformation occurs on metal parts of an elastomer-metal component as a result of deflection
- a crack depth > 9 mm is reached (both in rubber itself as well as at the transitions to the metal)

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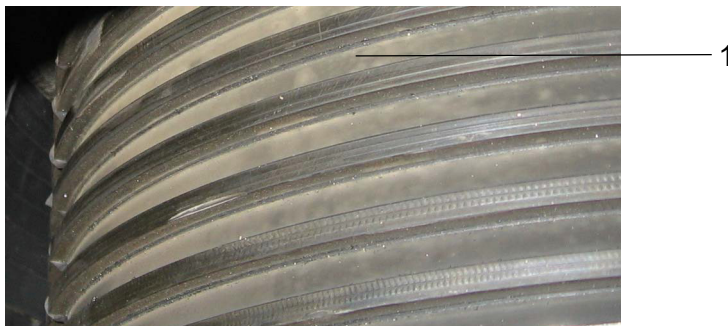
[1] Replacement criterion: crack depth > 9 mm

[2] Replacement criterion: debonding T > 9 mm

Figure 31: Replacement criterion

During operation a white-grayish film might show on the rubber surface. This film is aging protecting wax or compounding ingredients that are blended with the elastomer compound to protect against ozone and other environmental influences. Due to component deformations these ingredients migrate to the surface of an elastomeric component. In the area of wrinkles the film might be levigated.

At first sight, such an area can be diagnosed incorrectly as cracks in the elastomer or sulfur rash. This folding is typical for the structure of the elastomeric surface and is caused by compression of the component and the incompressibility of the elastomer. Should uncertainty persist, report to the supervisor.



[1] Discoloration

Figure 32: Discoloration example

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INFORMATION

- Sliding surfaces of PTFE or similar materials must be free from cracks and breakouts. A fixed connection to the other component is required.

8.7 Media resistance

8.7.1 General information

The bogie components include rubber compounds out of natural rubber with different shore hardness and related synthetic rubber composites. The chemical resistance of these rubber compounds is chosen according to the mechanical requirements and therefore is comparable among each other.

8.7.2 Environmental impacts and loads

The rubber compounds used in bogies are resistant to environmental influences under normal climatic conditions which mean temperatures between -10 °C to $+50\text{ °C}$. Resistance against climatic influence, especially against ozone, and higher temperatures, caused e.g. by the waste heat of motors, is improved by the proportioning of appropriate chemicals.

INFORMATION

- The elastomers used are resistant against loads which are usual in railway application.
- Pollutions caused by oil and lubricants as well as feces have to be removed regularly by using cleaning agents commonly used for bogies.
- Elastomers made of natural rubber are not permanently resistant against mineral oils and fuels.

8.7.3 Resistance against machine cleaning

The elastomers used are resistant against phosphoric acids and hydrochloric acids as well as against alkaline cleaning agents used for cleaning of the exterior of vehicles.

The resistance has been proven at selective elastomers made of natural rubber in test fluids according to DIN EN 13913:2003-08 representing other cleaning agents which are customary in trade.

INFORMATION

Non pH neutral cleaning agents

- Non ph-neutral cleaning agents damage the rubber.
- Use cleaning agents with a neutral pH-value. Do not use cleaning agents containing non-polar solvents (e.g. petrol). The components of the bogie have to be rinsed with water after the cleaning process otherwise the rubber-metal-bonding has to be protected against cleaning agents by constructive measures.

8.8 Cleaning

The components can be cleaned using detergents mentioned in Table 5. The specified concentrations as well as the specifications of manufacturer shall be observed obligatorily. The residues of the detergents shall be rinsed with clear water. The cleaned Air Spring System has to be dried at room temperature.

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NOTICE



Use of other differing cleaning agents

- The use of different detergents can damage the rubber.
- Only use detergents mentioned in Table 5.

Detergent	Concentration
Alkaline detergent	
Oxalic detergent	
Rapidol A	10 %
Rapidol W	10 %
Rapidol 58	10 %
Rapox	5 %
Rapox OS	5 %

Table 5: Detergents

NOTICE



Cleaning with sharp objects

- Cleaning with sharp objects, e.g. wire brushes, emery paper etc. will cause damage on the air spring system.
- Do not use sharp objects for cleaning.

Brief overview of resistance behavior or different elastomer compounds:														
	GROUP 1			GROUP 2						GROUP 3				
	NR			NBR	CR						EPDM			
acid resistance	B			B	A						A			
alkali resistance	B			B	A						A			
oil resistance	U			A	B						U			
Resistance to fuel	U			B	U						U			
Solvent resistance	U			B	B						B			
ozone resistance	B			B	A						A			
weatherability	B			A	A						A			
A = very good, little or no attack														
B = satisfactory, moderate to severe attack.														
U = unsuitable for the application														

Table 6: resistance behavior of elastomers

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8.9 Fire protection

The elastomers used in these components of the air spring system do not contain flame retardants.

9 Decommissioning

- not applicable -

10 Disassembly

INFORMATION

Perform the disassembly only in a pressure-free state!

1. Remove the top plate.
2. Open the screws of the clamping plate and remove the clamping plate.
3. In the next step, the mounting lever is slowly inserted between the lower bulge of the air spring and the shoulder of the rim. The mounting lever is inserted until metal contact between the mounting lever and the conical receiving area takes place.

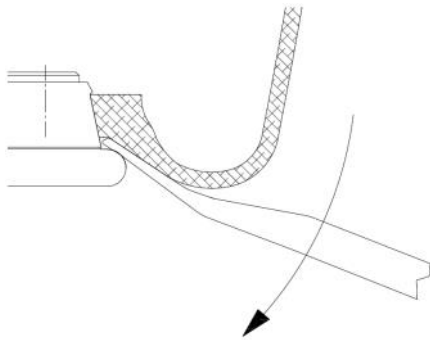


Figure 33: Disassembly additional spring (sample)

INFORMATION

- Push the mounting lever as far as possible. Otherwise damage may be caused to the air spring top plate and the bellows, or the bellows can not be disassembled.
- A second mounting lever in the near the first (approximately 10 cm) can be used for support.
- Damage to the corrosion protection that have arisen through the disassembly must be corrected.
- Sharp scratches can cause damage to the bellows.
- Remove sharp scratches on affected parts.

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11 Disposal

Disposal / Product:

- Rubber-metal bonded materials with high rubber content may be disposed of in compliance with the local regulations of combustion (e.g. thermal recycling).
- Smaller quantities can be disposed of in compliance with the local regulations in the domestic waste dump.
- After dismantling, metallic components can be disposed of in the metal scrap recycling.

12 Error identification

- not applicable -

13 Annex

Part numbers of items / components

Pos.	Part No.	Component designation	Quantity	Geometry
1	E860824	Top plate	1	D660/H60
2	E860826	Mounting ring	1	D660/d532/H29
3	E860400	Clamping plate	1	D410/d360/t3
4	17107201	Additional spring system	1	D480/H326,5
5	17016302	Bellows	1	D637/H174
6	E860096	Countersunk screw	8	M8x20
7	E860827	Type plate	1	L99/B8/t1
8	E860671	Countersunk screw	24	M16x35 (thread to the head)
9	E860009	O-Ring	2	D77/t5
10	E860180	Grooved pin	2	D3x8
11	E860830	Sliding plate	1	D242/d80/H26
12	E860822	Rim	1	D440/H93,5
13	73002504	Half hourglass spring	1	D430/H218
14	E860823	Ground plate	1	D480/L480/H94
15	E860825	Insert	0	D233/d89/t1
16	E860514	Insert	0	D233/d89/t2
17	E860516	Insert	0	D233/d89/t4
18	E860523	Countersunk screw	8	M6x16
19	E860598	Countersunk screw	8	M6x25
20	E860502	Countersunk screw	4	M8x50 (thread to the head)

Table 7: Spare parts list

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14 Subject Index

- not applicable -

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Document Modification										
Mod.	Index (Record Modified Chapters Here)									
	01	02	03	04	05	06	07	08	09	10
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02	2022-08-30	modification chapter 5.7 and 8.1	C. Palm

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