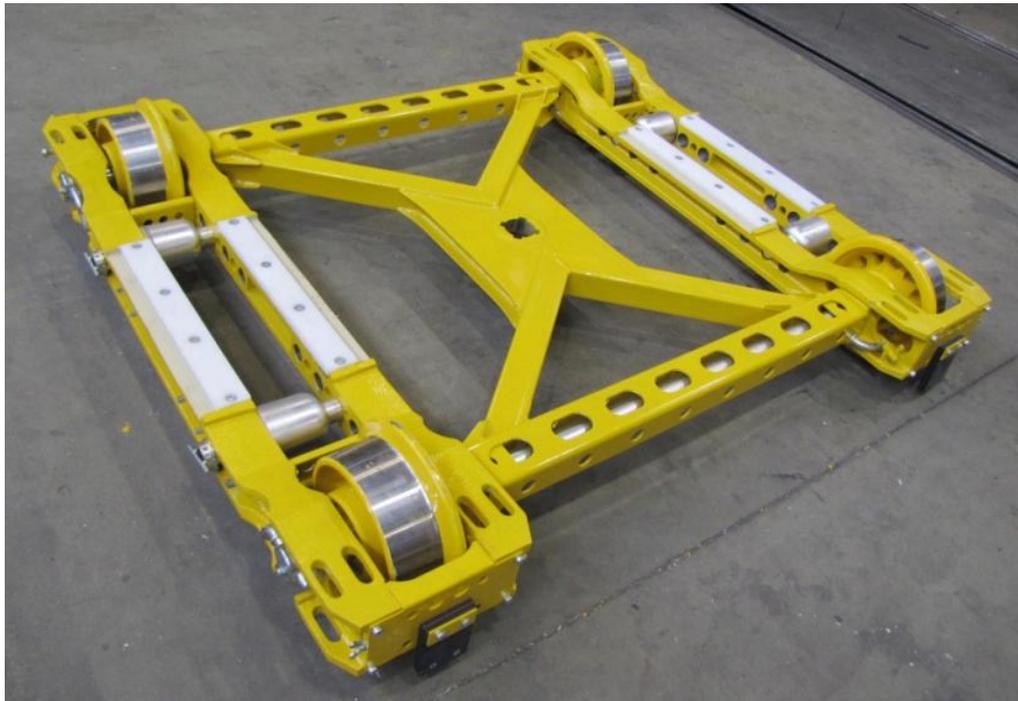


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Operating Manual

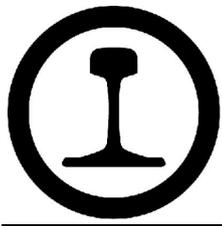
Towing Device 52.18 / 05

(track gauge 1520)



Robel Bahnbaumaschinen GmbH	Industriestraße 31,	83395 Freilassing
	Postfach 3222,	83398 Freilassing
e-mail: info@robел.info	Telefon / Phone / Téléphone	(08654) 609 - 0
Internet: www.robел.info	Telefax / Fax	(08654) 609 - 445

This operating manual was issued taking into consideration
the latest technology at the time of printing.
It is subject to change due to new developments.
Weights and measurements approximate.
Some photos show special designs.



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1 TECHNICAL DATA

Gauge 1520 mm

Length	1.790 mm
Width	2.034 mm
Height	332 mm
Weight	ca. 654 kg
max. permitted single-part weight	120 kg / 4 Pers. (bzw. 30 kg / Pers.)
Wheelbase	1.300 mm
Measuring circle diameter (running wheel diameter))	300 mm
Wheel tyre width	135 mm
Wheel rim height	32 mm
Loading capacity	max. 30 t (300 kN)
Towing velocity on a clear line carrying a towing load	max. 40 km/h *
Minimum track radius (without superelevation)	100 m
Maximum superelevation in combination with minimum track radius R=250 m	160 mm

Measured. Distance	Gauge	Superelevation	Angle
1500	1435	150	5,74°
1585	1520	160	5,79°

Railway vehicles to be towed:

with measuring circle diameter (running wheel dia.)	(500) 630 – 1.250 mm
Height of running wheel of towed vehicle above head of rail (dependent on wheel set)	ca. 17 – 84 mm
Height of PE supporting plate	20 mm

* In the variant "Towing using **sprung wheel set** loading" accord. to section 5.4.1, a max. 24 ton (240 kN) load may be carried at speeds of up to 50 km/h **if the track is in good condition.**

See also section 4.1

52.18/05TOWING DEVICE

1.1 Accessories

- Adapter for re-railing bridge
- Carrying aids

1.2 Extras (if ordered)

Re-railing bridge (LUKAS + MFD; DUO-LUKAS)	upon request
Supporting width (re-railing bridge)	upon request
Slewing range of re-railing bridge	upon request
Re-railing equipment	upon request
Transverse re-railing device	upon request

2 SAFETY

2.1 General dangers

Towing device 52.18 is designed and built for towing machinery and equipment up to a loading capacity of 30 tons.

For further information see Appendix A.

2.2 Information about danger

All the following information and instructions are intended to protect the operator's personal safety and physical well-being against dangers and the assets of the company operating the machine from damage. The instructions on hand consistently use certain terms to distinguish between types of danger and the level of consequences to be expected from not complying with instructions. These are as follows:



DANGER: points out that non-compliance with instructions may result in death or severe injury to the operator or considerable damage to the operating company's assets.



Points out that non-compliance with instructions may result in injury to the operator or damage to the operating company's assets.



INFORMATION: contains important information about the machine, its operation or about a section of the instructions on hand.

2.3 First Aid

Always ensure that proper "first aid" equipment is provided.

Consult the medical service or doctor at your office regarding "first aid" measures and appropriate.

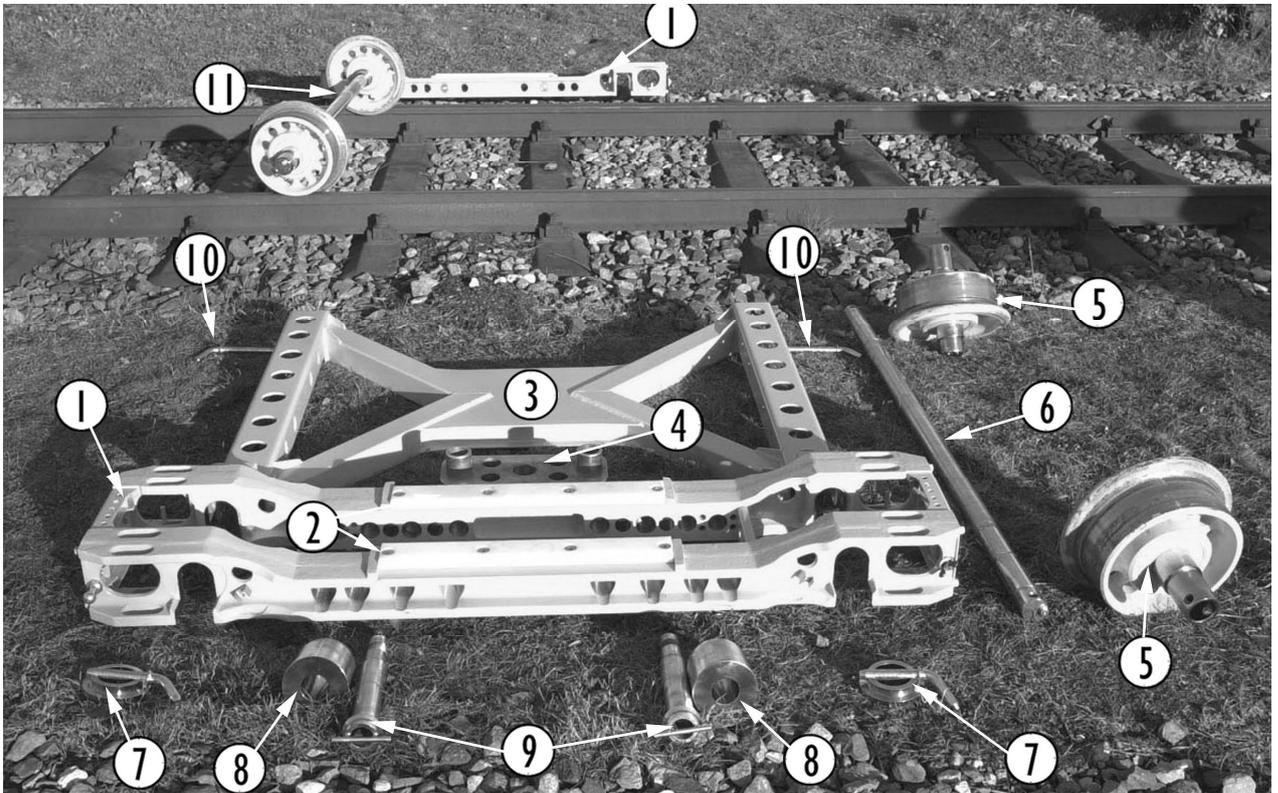
52.18/05

TOWING DEVICE

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3 DESCRIPTION

3.1 Components

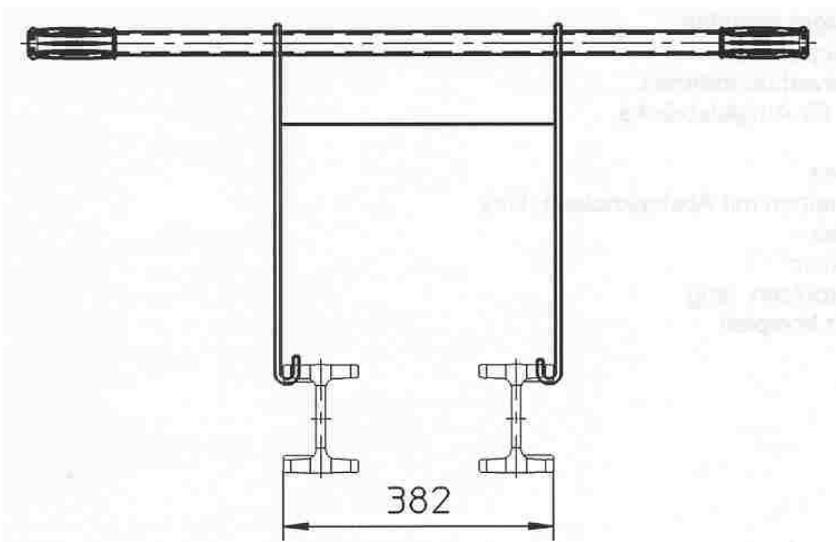


Symbolic figure (regular gauge)

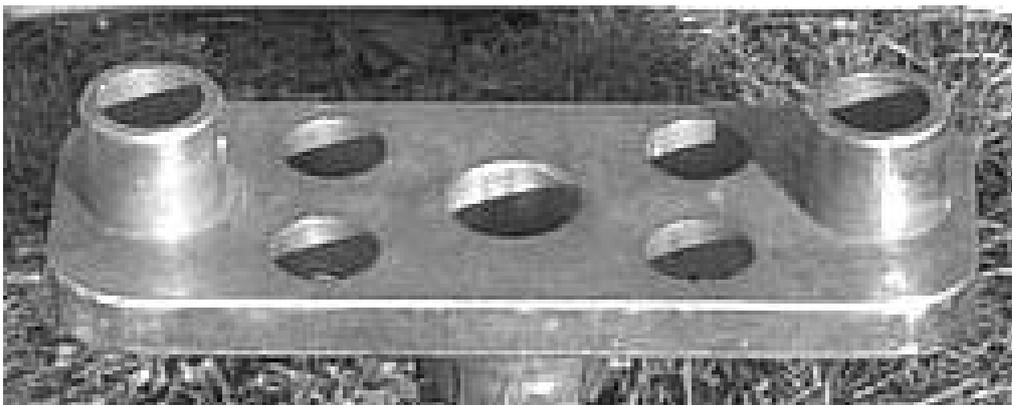
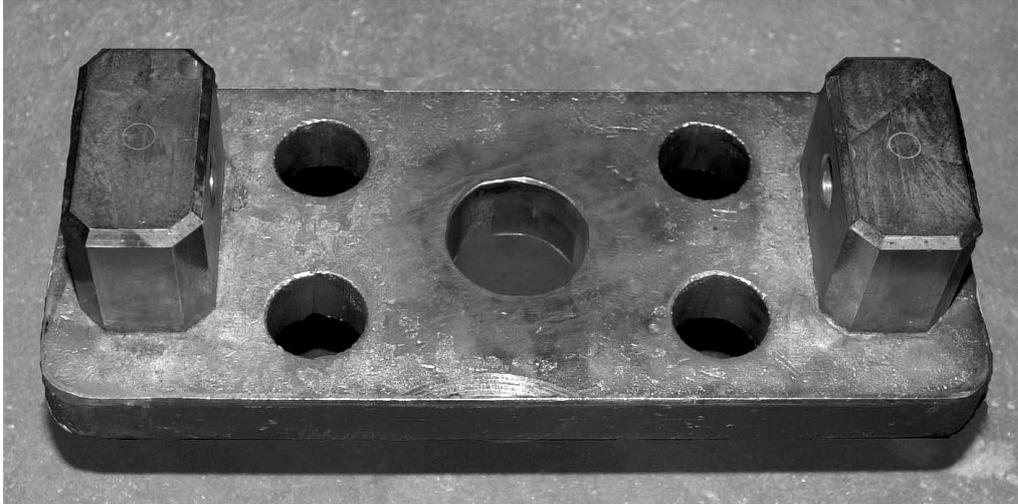
- 1 Longitudinal beam assembly
- 2 PE supporting plate
- 3 Cross-linked frame
- 4 Adapter for re-railing bridge
- 5 Running wheel
- 6 Carrying axle
- 7 Axle disks with locking bolts, short
- 8 Support rollers
- 9 Fixing bolts
- 10 Locking bolts, long
- 11 Wheel set assembly

52.18/05**TOWING DEVICE****3.2 Accessories****3.2.1 Carrying aid for longitudinal beam**

Two carrying aids are required per longitudinal beam (see arrow above) (4 people to lift the longitudinal beam assembly!)

Hooking the carrying aids into the longitudinal beam

3.2.2 Adapter for re-railing bridge



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TOWING DEVICE

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4 OPERATING INSTRUCTIONS

4.1 General

- Before being put into operation the device must be examined for any signs of damage, hot running marks or cracks etc. and, if necessary, taken out of service straight away.
- All of the plug-in connections are to be checked to ensure they engage securely (see p. 13 ff).



Damage hazard!

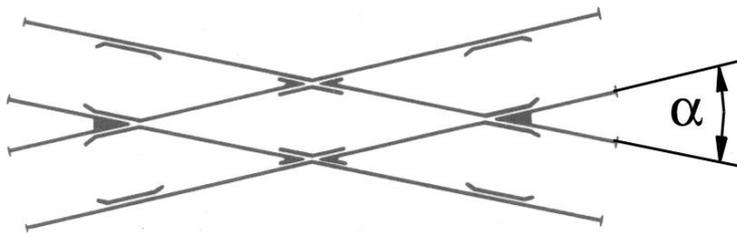
When setting down the railway vehicle, always take care that the towing device's freedom of movement is not impeded (relative movements during travel through curves, dips and humps with regard to freedom of movement of the brake linkage and other parts relevant for operation).

Otherwise, severe damage may occur.

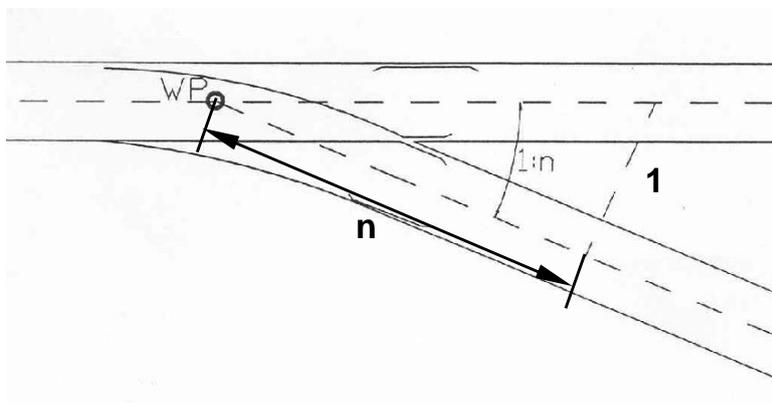
52.18/05**TOWING DEVICE****DANGER!**

- The permitted loading and speed figures relate always to the whole device.
- With partial assemblies the device's operating characteristics are altered permanently, and the operating parameters indicated on the previous page can therefore no longer be applied.

- Owing to the small wheels, the towing speed is to be reduced to a **maximum of 10 km/hr** when **passing points**, particularly at points crossings without movable frogs, three-throw turnouts, points with triple frogs and especially at facing points where $n \geq 6.694$ or $\alpha \leq 8.5g$ ($8^{\circ}30'$).



Angle of inclination α derives from the inclination ratio 1:n, see below



Example: Ordinary points:

Inclination ratio 1:n
e.g. 1:6.6 = $8^{\circ}36'56''$

5 CONDITIONS OF USE

5.1 Operating conditions

Max. operating temperature + 65°C. Use of the towing device is otherwise not subject to any restrictions due to weather conditions.

5.2 Storage conditions

- The towing device is to be stored in a dry place.
- Threads and bearings are to be kept greased in order to run smoothly.
- Uncoated parts are to be greased.
- Max. storage temperature + 65° C.

5.3 Transport conditions

The towing device normally is to be transported when dismantled (longitudinal beam as a whole), properly protected and stowed in the container for transportation.

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TOWING DEVICE

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6 ASSEMBLY AND DISASSEMBLY

The following sequence of assembly and disassembly is only a proposal. In actual operating cases you may have to adapt the sequence due to lack of space etc.

6.1 Assembly

- If necessary, grease the carrying axle beforehand (flat grease nipple).
- Then mount the wheels on the axle and apply further grease with a grease gun.

Putting the running wheel on the axle:



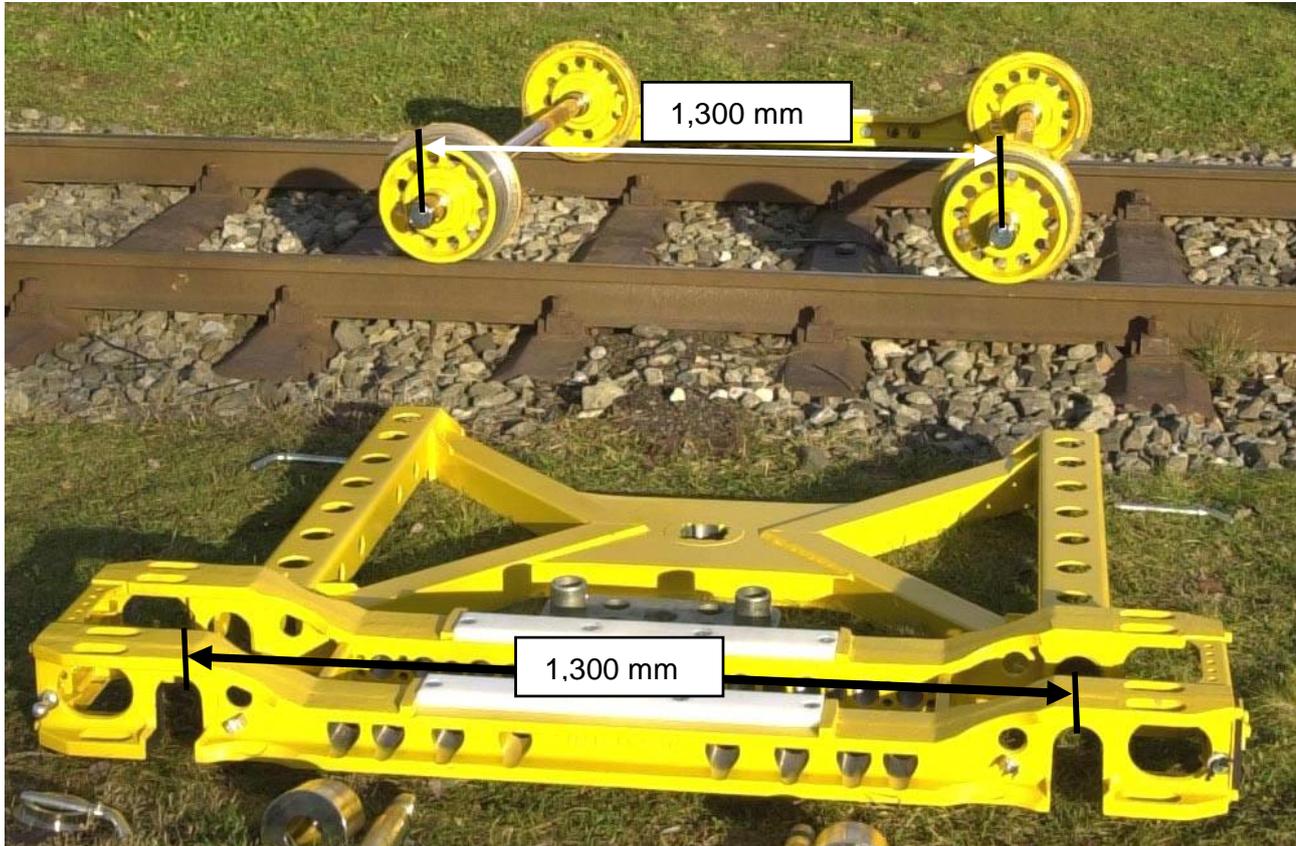
The bore hole of the wheel's bushing must be horizontal and aligned with the bore hole of the axle (see arrow)!



52.18/05

TOWING DEVICE

- Arrange the wheel sets on the track at the proper mounting distance (1.3 m).



Symbolic figure (regular gauge)

CAUTION On inclined tracks, the wheel sets must be fixed at the proper mounting distance **and secured against rolling downhill!**

- Now the longitudinal beams can be mounted on the axles by **four** persons.
- Use lifting aids, mounting jacks or belts - see accessories!

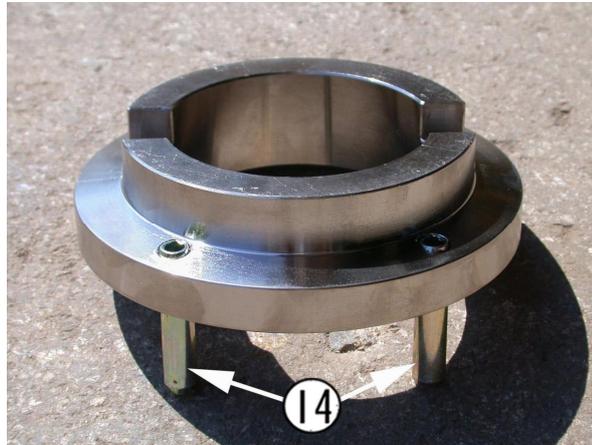
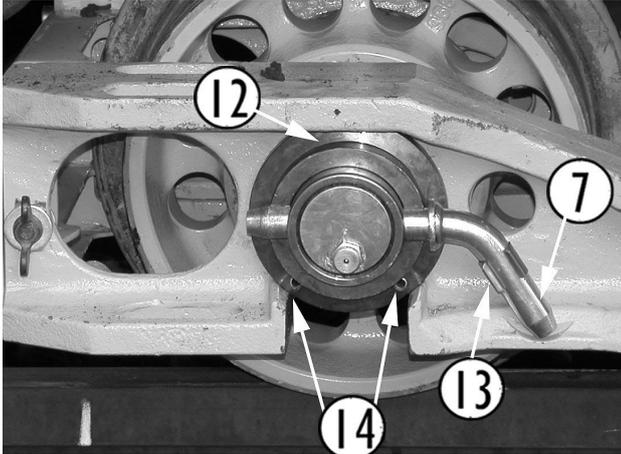


Symbolic figure (regular gauge)

- When mounting the beam take care that the beam's "noses" point toward the opposing wheel of the wheel set (see arrows in figure above), i.e. they are inside!

52.18/05**TOWING DEVICE**

The axles are secured by four washers (12) and the short locking bolts (7).



- Insert the locking bolts from inside out.
- Press the handle of the locking bolt firmly into the clip (13).
- Both dowel pins (14) must fit into the designated bore holes (twist lock).

Securing the locking bolts:

WRONG



CORRECT



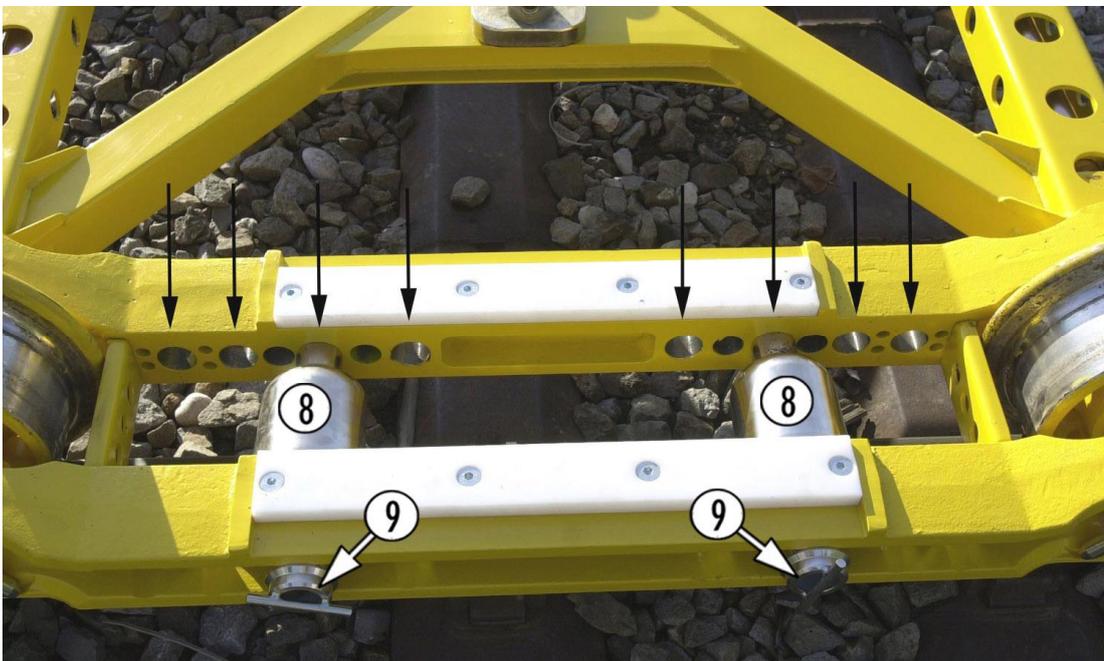
- Insert two fixing bolts (9) with the support rollers (8) for the wheel sets of the load into each longitudinal beam: the flat part of the roller has to face downwards, the small diameter (see white arrow) has to point inwards.



Support roller:
Arrow: small diameter

Fixing bolt

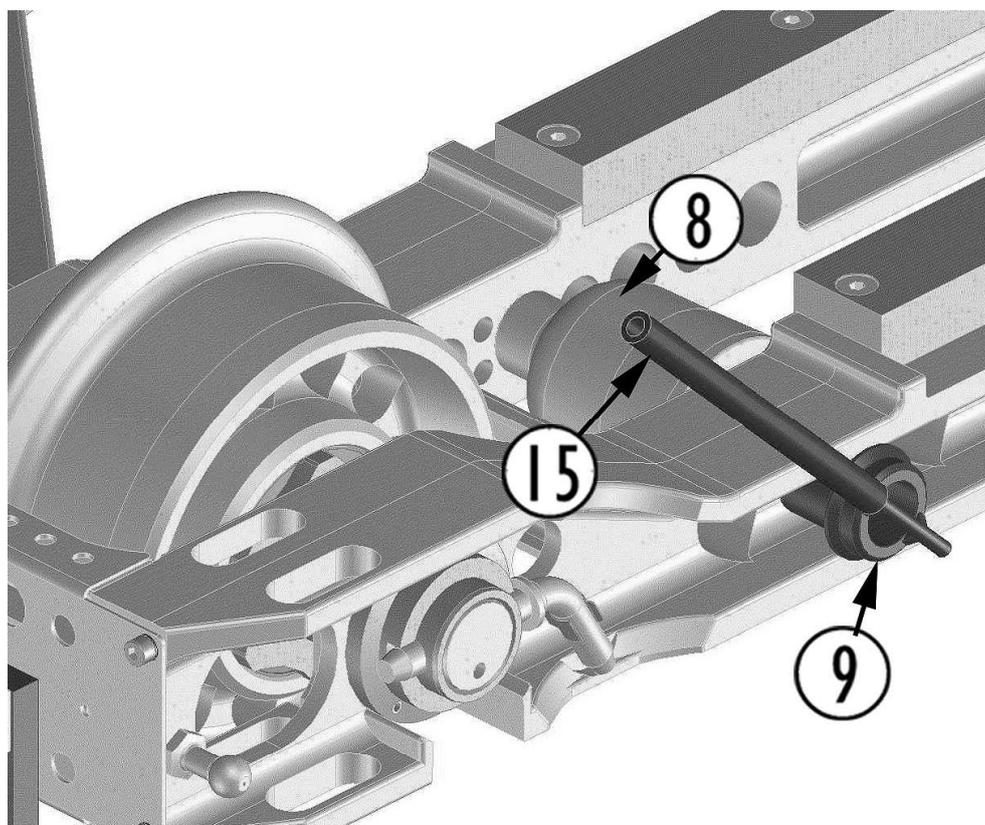
- Choose the appropriate distance of the fixing bolts and support rollers, symmetrically from the centre between the axles (see arrows in image below):



See also chapter 6.4, pages 23 ff!

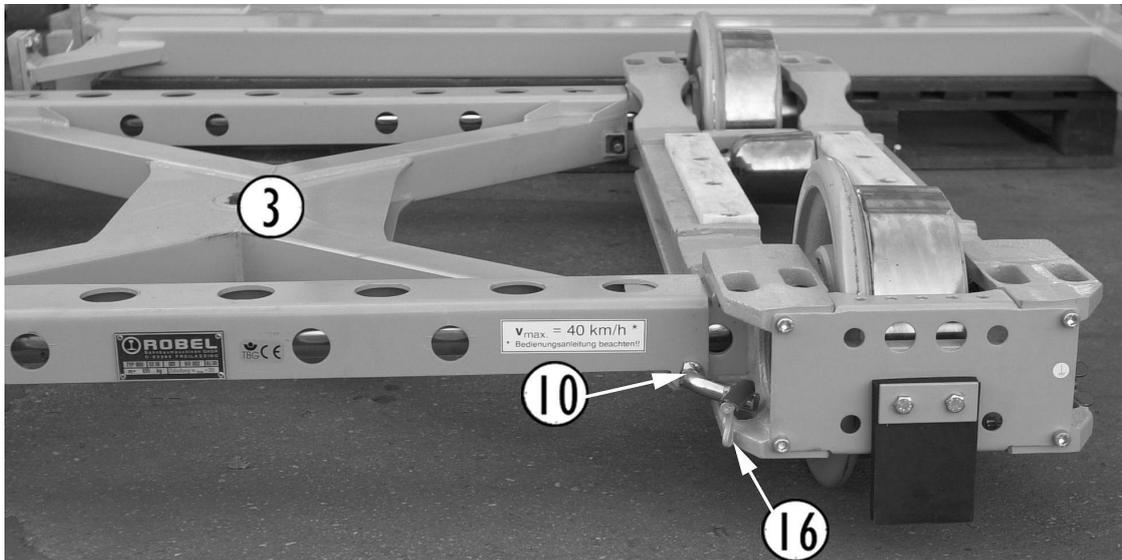
52.18/05

TOWING DEVICE

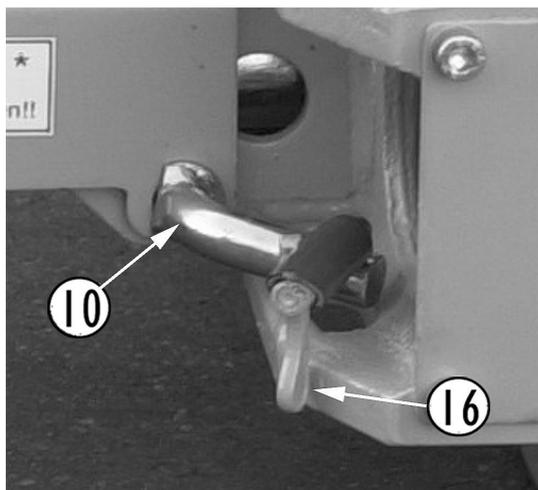


For correct and safe operation, the fixing bolts (9) have to be screwed in tightly (by a tool, e.g. a steel tube: pos. 15)!

- Mount the cross-linked frame (3) on the noses of the beams so that the perforated profile comes to lie above the carrying axles.



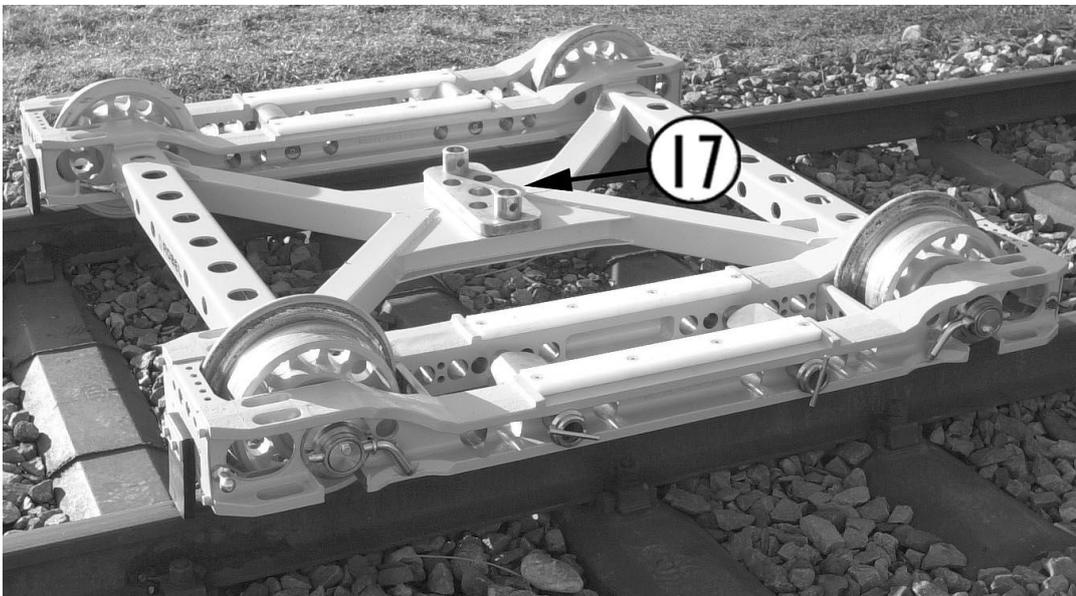
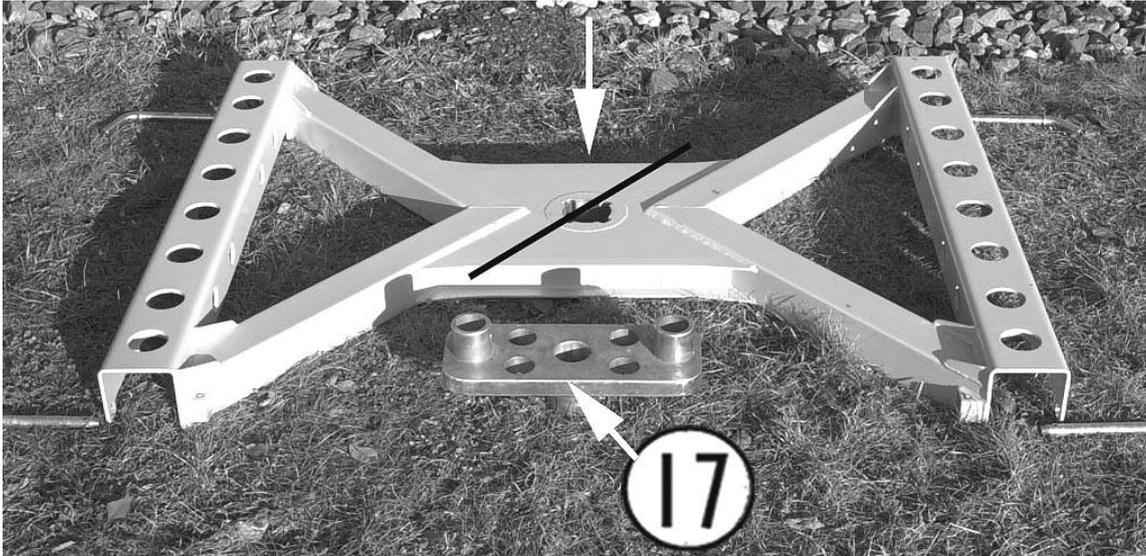
- Release the spring bolt (16)
- Secure the cross-linked frame using the four long locking bolts (10), inserting the bolts from outside in. Turn the handle downwards until it comes to lie below the spring bolt.
- Lock the spring bolt (16) by turning the handle of bolt (10) downwards (see detail below).

Detail:

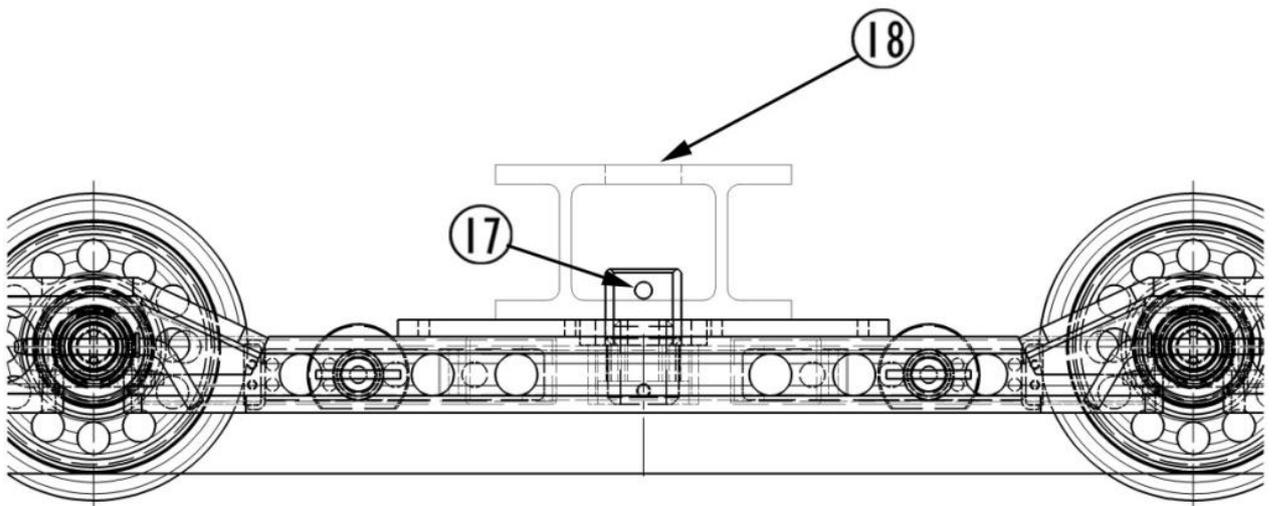
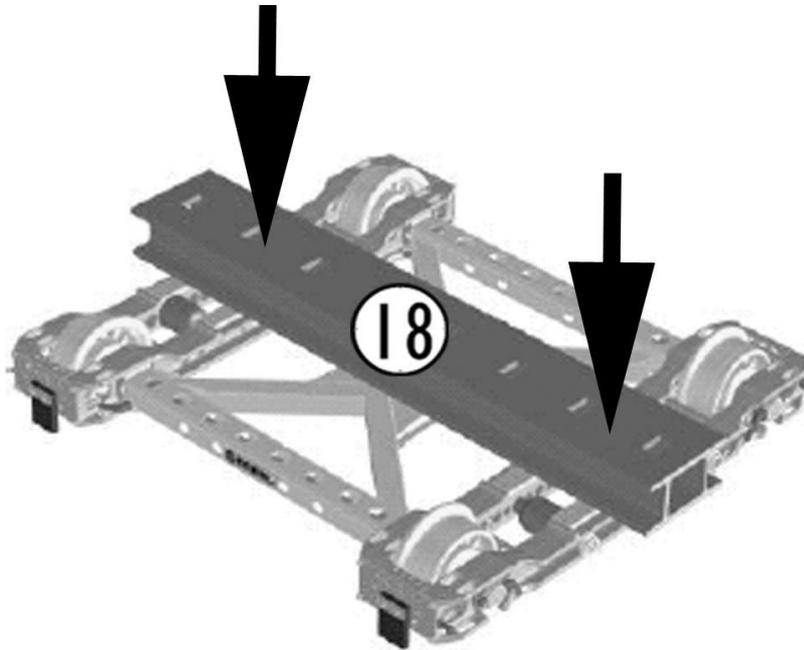
52.18/05**TOWING DEVICE**

- Attach the appropriate adapter (17) if a re-railing bridge is going to be used.
- Place the adapter diagonally (black line), insert it in the centre (white arrow) and secure it by rotating it by 45° so it ends up in a perpendicular position related to the rails, see image at bottom.

Photos serve as examples:



- Finally, attach the appropriate re-railing bridge (18):



See also chapter 6.4.2!

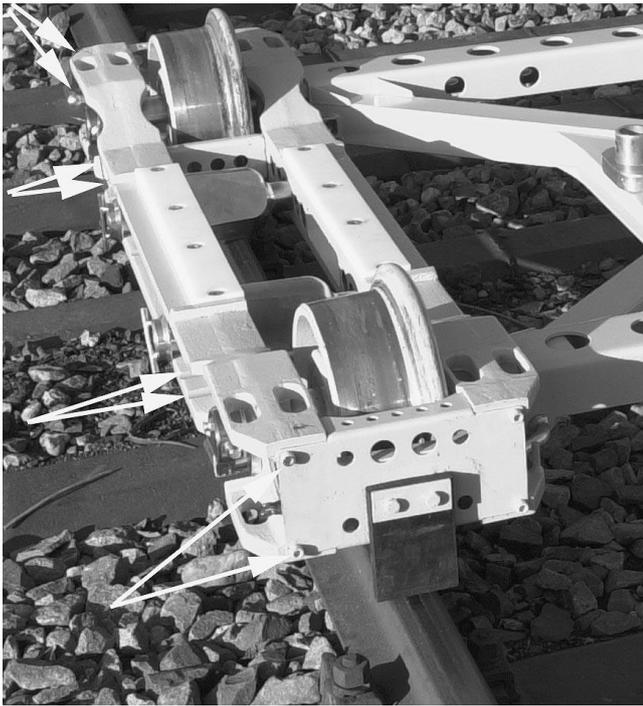
52.18/05**TOWING DEVICE**

6.2 Disassembly

Follow the steps described above, but in reverse order.

6.3 Option of dividing the longitudinal beam

Each longitudinal beam can be dismantled into sections by undoing the external screw connections on the front sides and spacing plates – 8 bolts (see arrows).



separated beam:

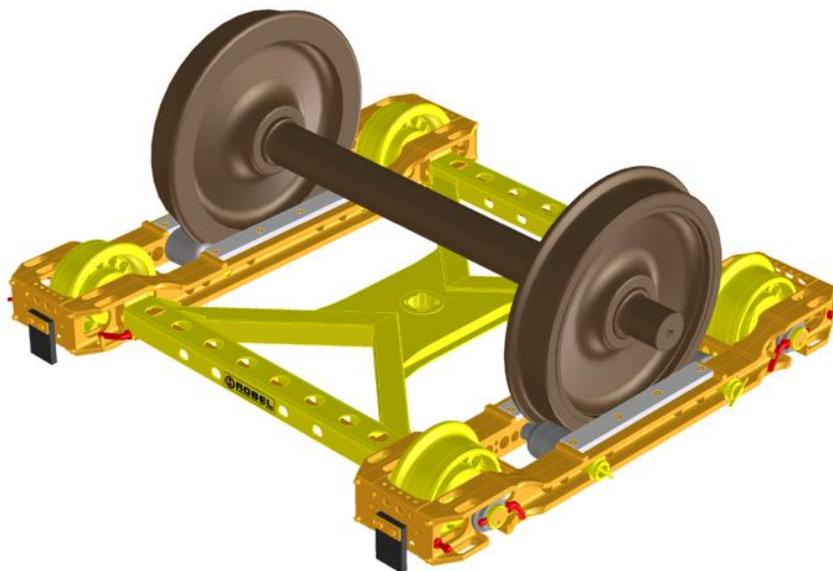
6.4 Possibilities of use

CAUTION Danger of accident!

If the towed axis is a driven wheelset, the drive of the driven wheelset must be switched off during towing.

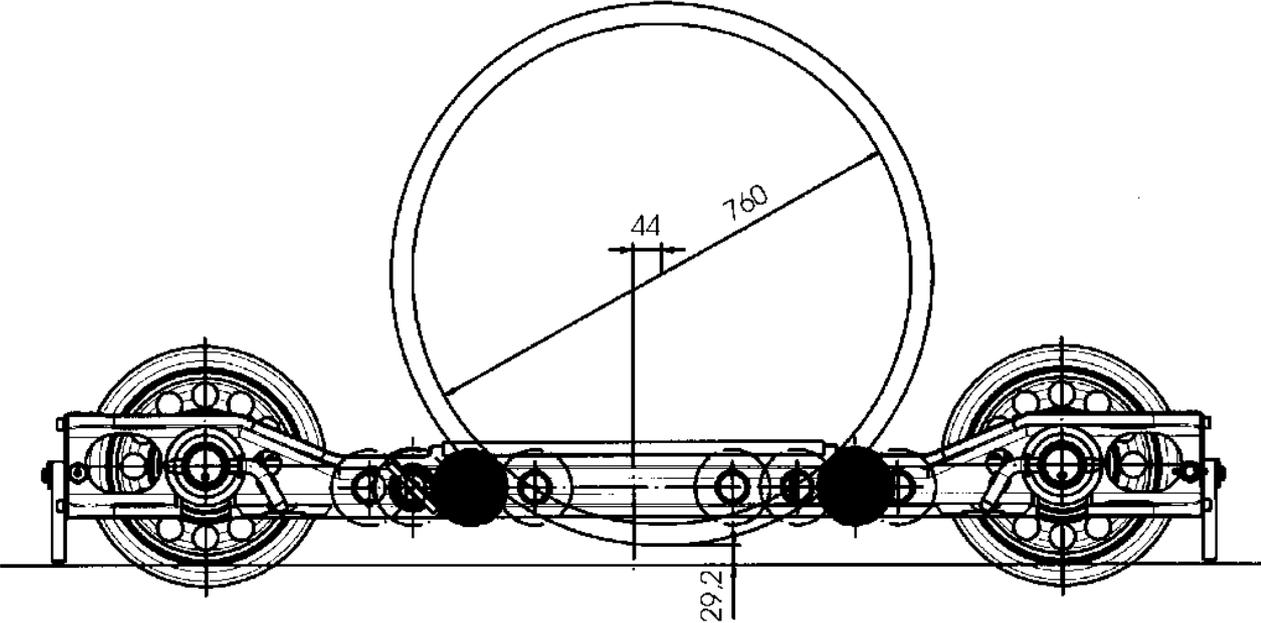
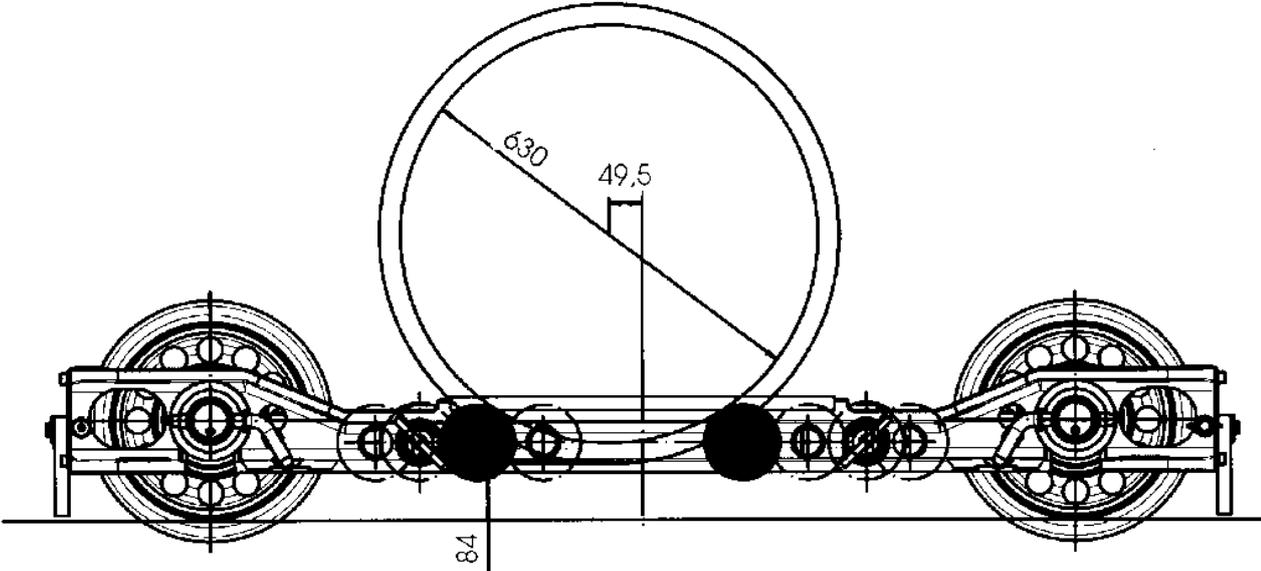
6.4.1 Towing by loading the wheelset

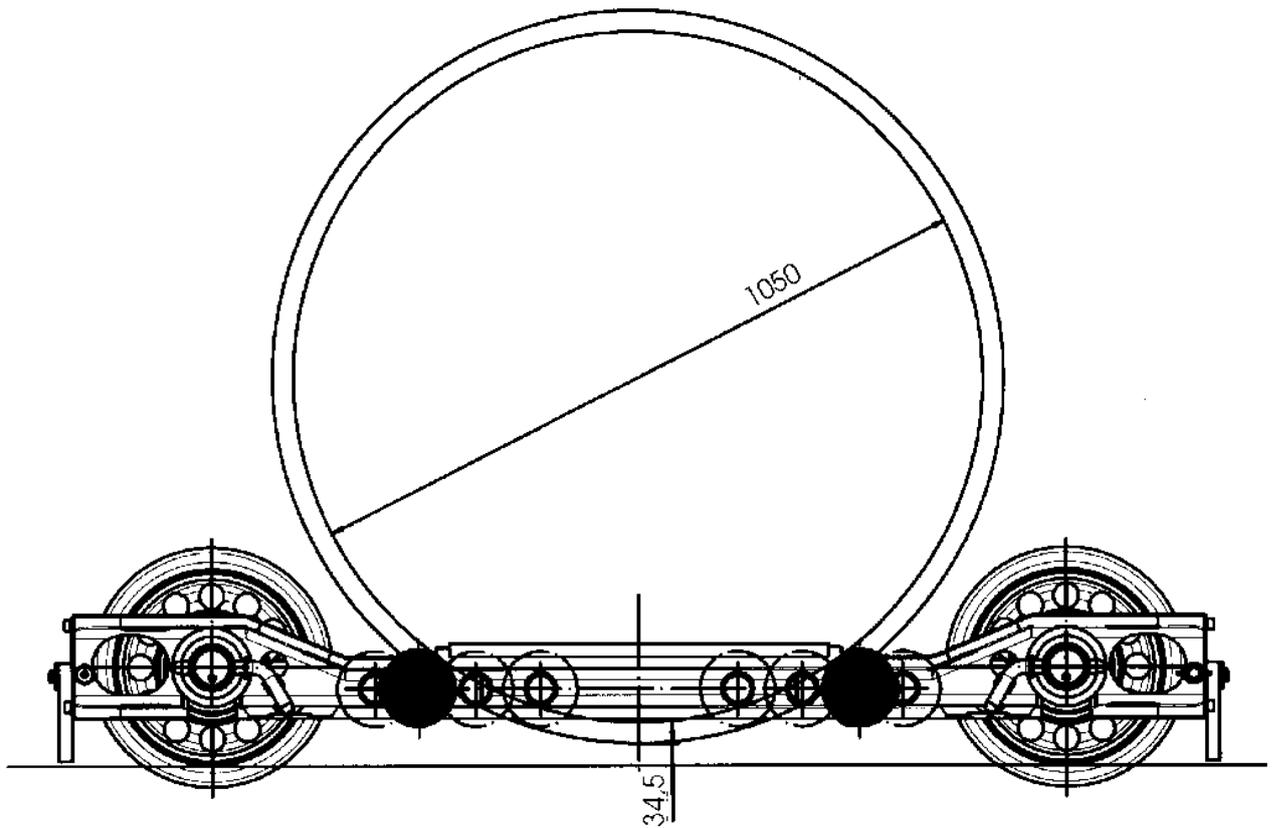
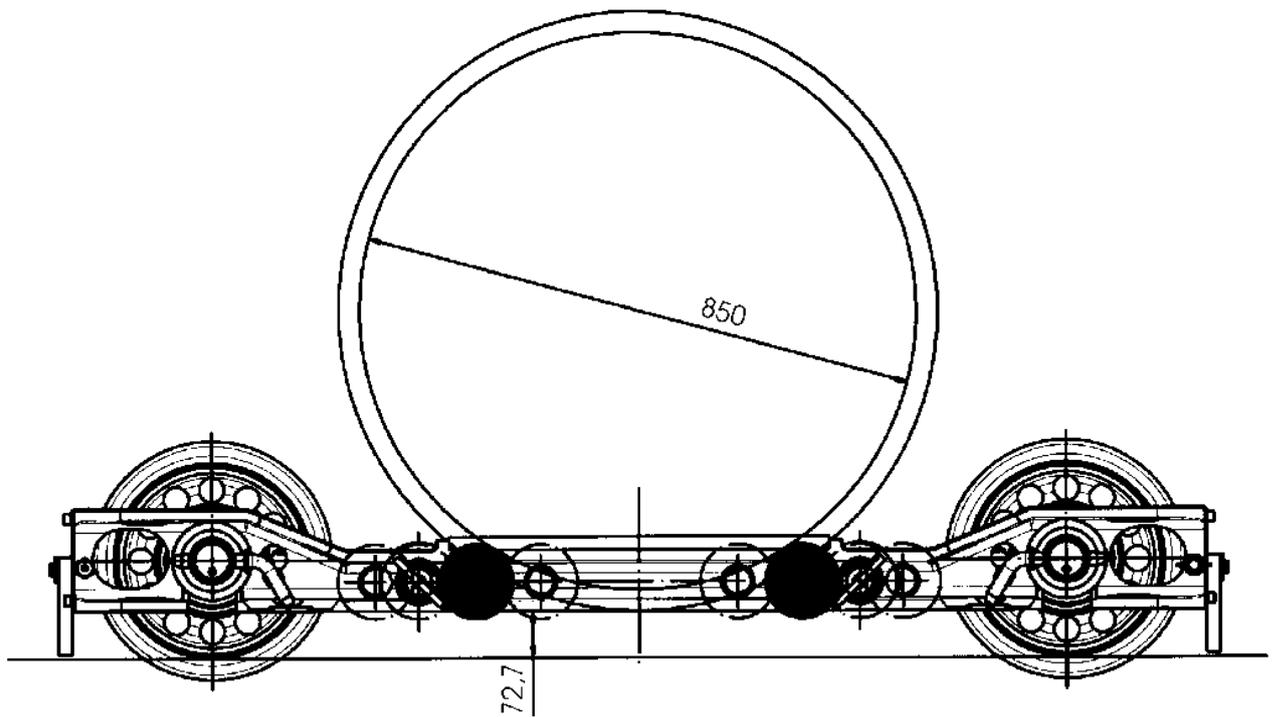
Suggestions for wheelset loading with various wheel diameters – see following pages.



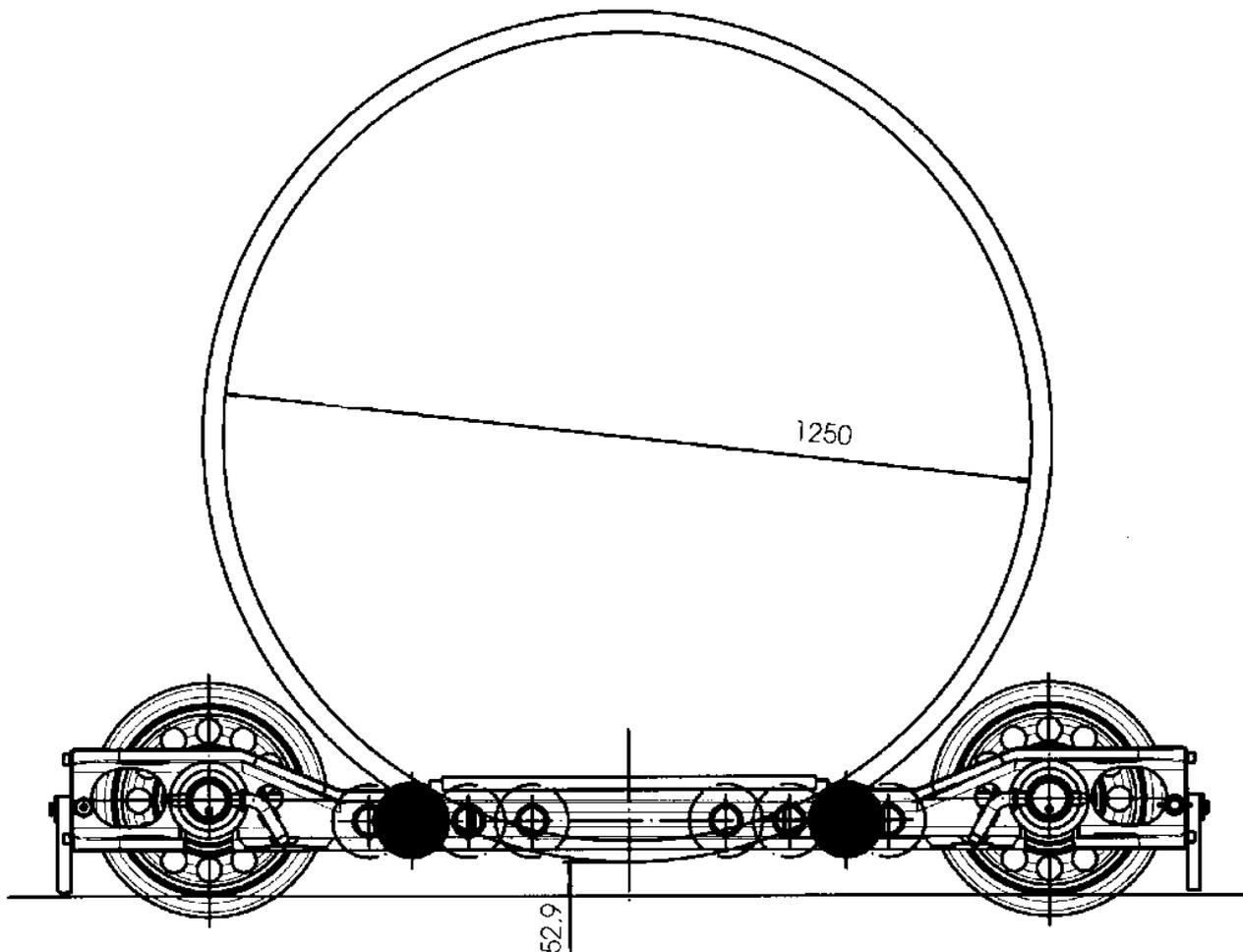
Arrows: Re-railing equipment (extras)

52.18/05
TOWING DEVICE





52.18/05**TOWING DEVICE**



Sensible and appropriate lashing is to be used in all cases.

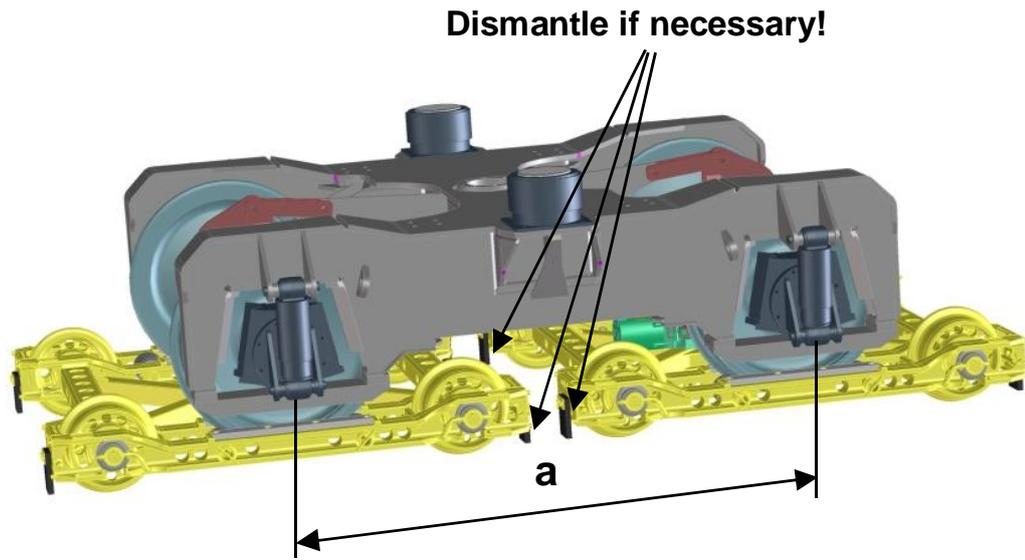
Clamping collars above the locating rollers (circles marked in black) for improved positioning of the supported wheel set can be supplied on request.



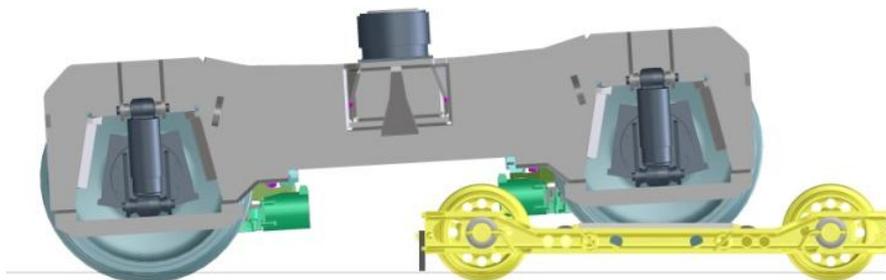
When towing three-axle pivoted bogies, the relevant regulations of the railway vehicle manufacturer and of the emergency squads are to be adhered to!

When towing two-axle pivoted bogies, please pay special attention to the following points:

- the internal rail guards need to be unscrewed in certain cases to ensure freedom of movement
- the wheel base **a** of the bogie must be at least 1,800 mm



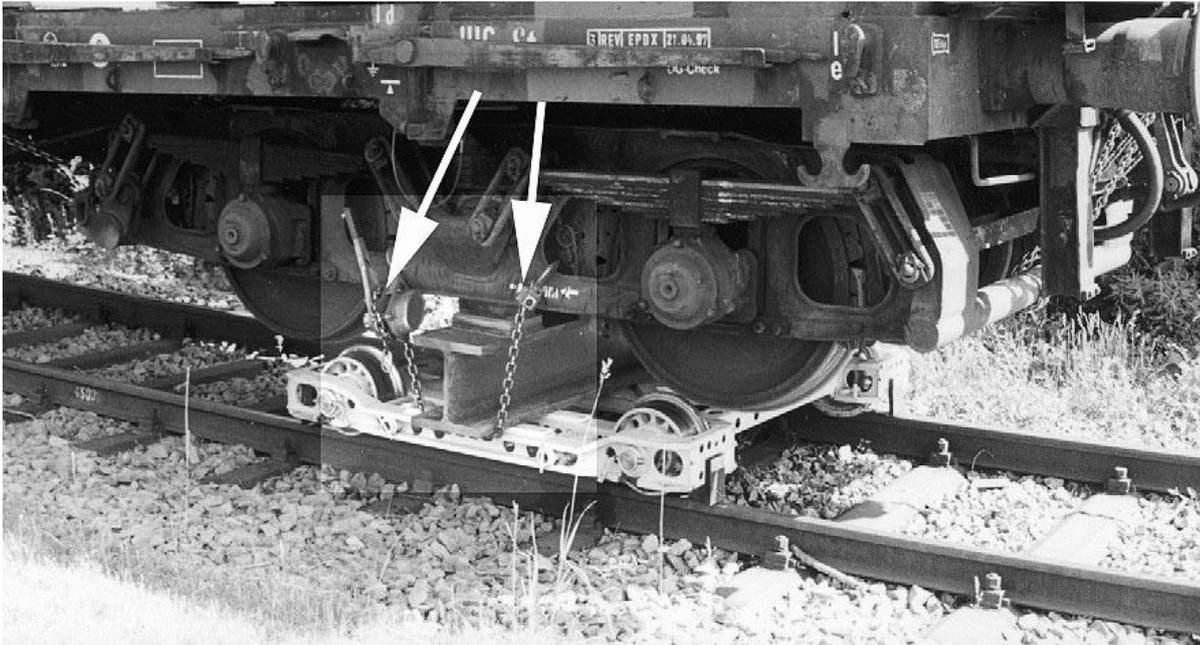
- the minimum distance between the two towing devices must be at least 50 mm or the devices are to be loaded asymmetrically to ensure freedom of movement
- there must be an adequate margin for the relative movements between the bogie and main frame of the railway vehicle to be towed and the towing device
- the manufacturer's specifications for permissible angled position of the vehicle frame to the bogie, or of the bogie of the railway vehicle to be towed, must not be exceeded



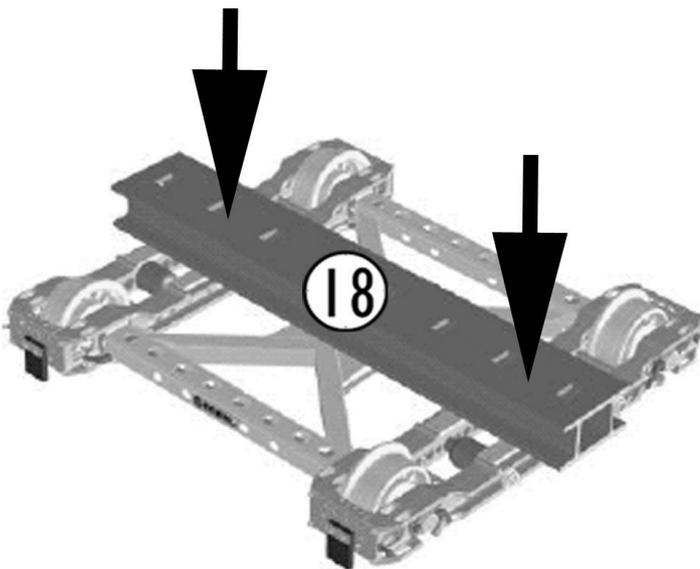
- the permissible buffer height of the towed railway vehicle is to be taken into account

52.18/05**TOWING DEVICE****6.4.2 Towing by using the re-railing bridge**

- Grease the adapter bolts, cross-linked frame bore hole and PE supporting plates for the re-railing bridge.
- When loading using the re-railing bridge, particular care must be taken that:
 - the re-railing bridge is firmly joined to the vehicle to be towed (see illustration below)



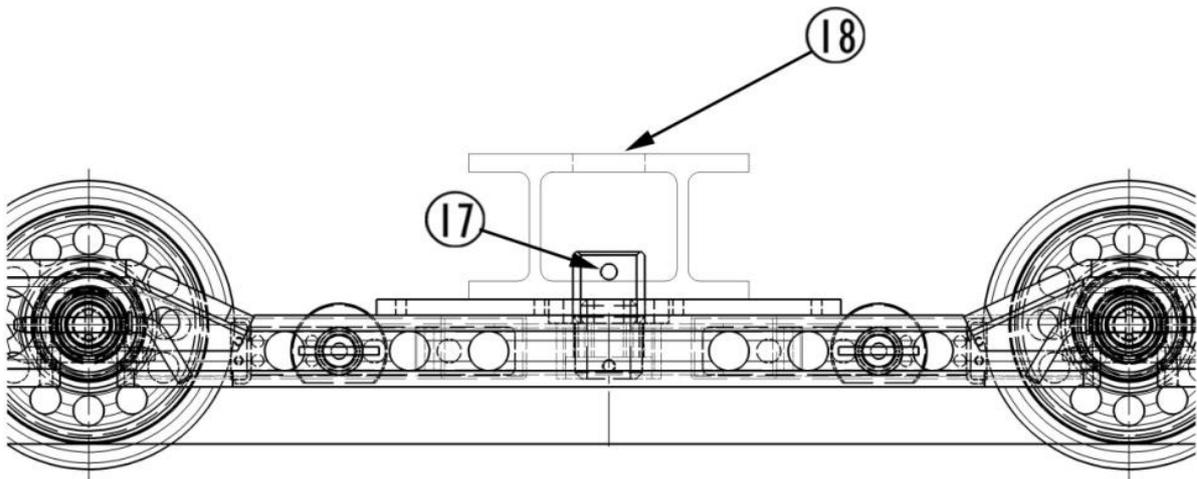
- the re-railing bridge is loaded such that the weight to be towed is evenly distributed in the area over the longitudinal beams (see diagram below)



A mounted bogie must not seesaw under any circumstances (care for stability or lashing).

- An earth connection must be made between the railway vehicle and towing device (e.g.: “Device for rail earthing accord. to DB (German Railways) module range 931.0001 Appendix 9“).
- If the fixing bolts are used, make certain that they are secured properly (danger of loosening).

It is possible to join the re-railing bridge (18) and adapter (17) firmly by inserting a rod through the bore hole in the adapter.



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TOWING DEVICE

6.5 Situations to be avoided

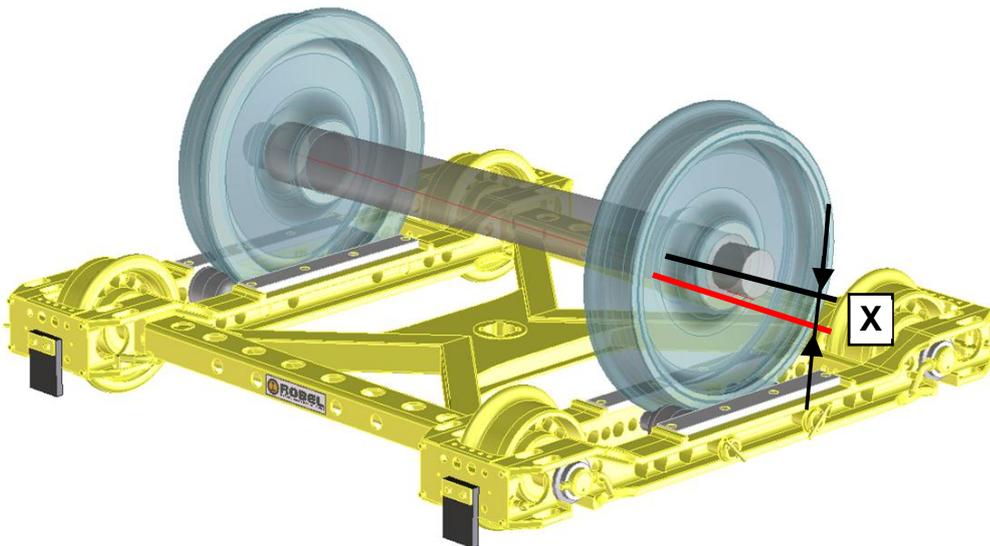
6.5.1 Different wind-down distance of the wheels

Make sure that the **wind-down distance** of the wheels in the longitudinal beams of the towing device is the same on both sides, unless the frame of the towed vehicle is contorted.

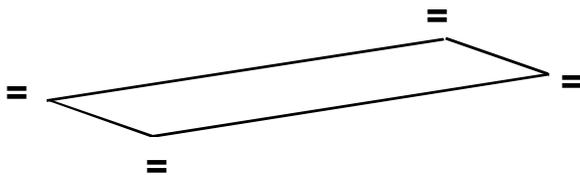
A **difference in the wind-down distance between left and right** (measure **X**) leads to inappropriate wheel load reallocations and has a negative influence on the wheel loads of the towing device, especially in curves and junction curves.

When the **frame of the towed vehicle is contorted**, have a close look at the spring travels on both sides. If they differ when putting the vehicle on the towing device, the distortion ought to be compensated for in order to avoid inappropriate wheel load reallocations as described above.

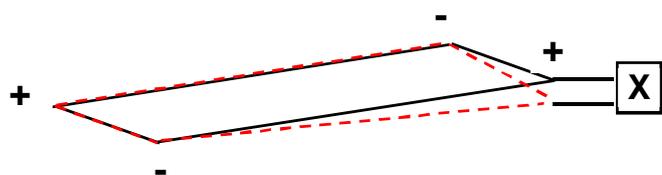
See image and sketches below.



sound frame, no distortion: all 4 wheel loads are equal (=)

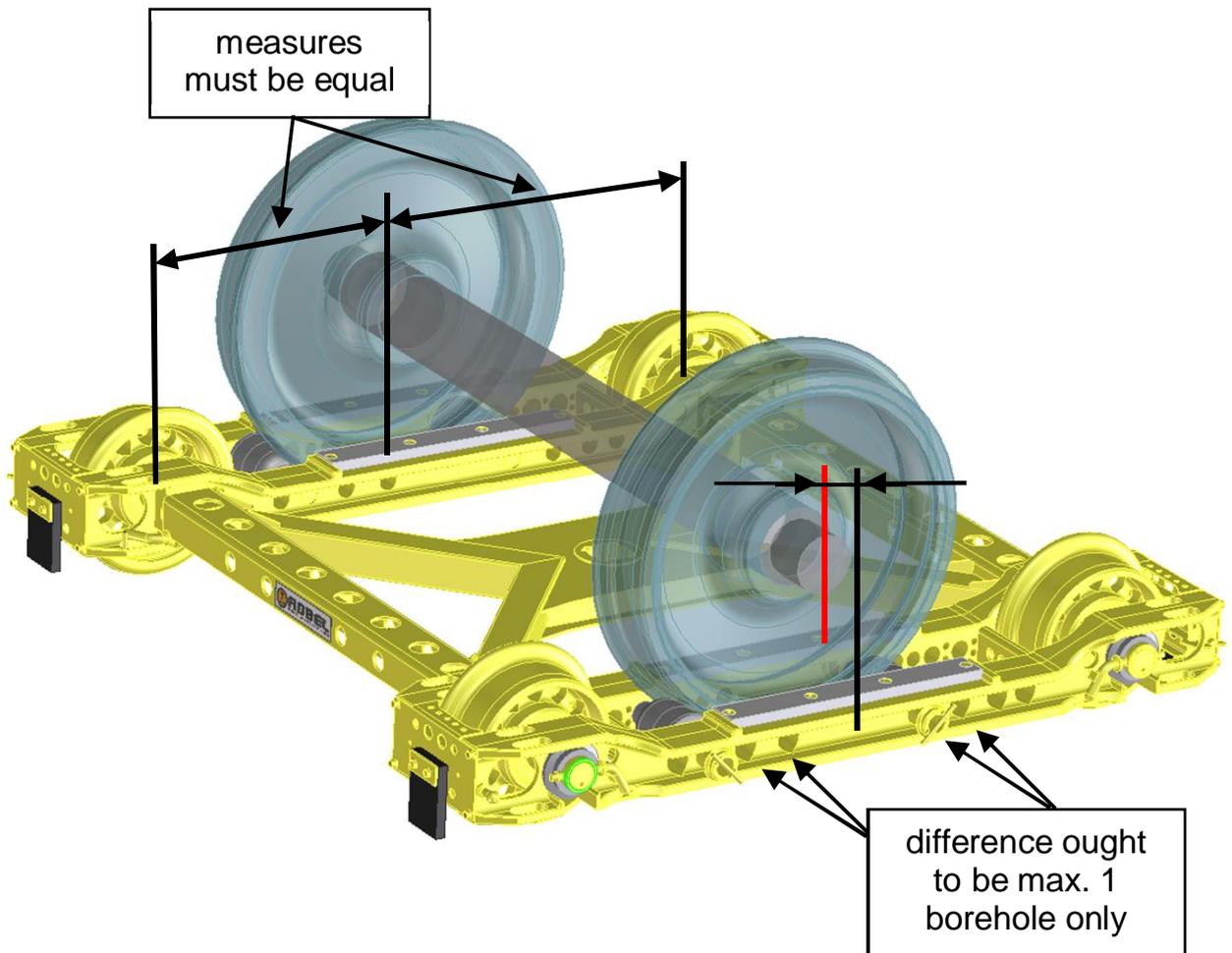


distorted frame or different wind-down distance (measure **X**): wheel loads differ (+ / -)



6.5.2 Asymmetry

Avoid asymmetric loading situations in machine direction as good as possible, as this has a negative influence on the towing device's runnability.

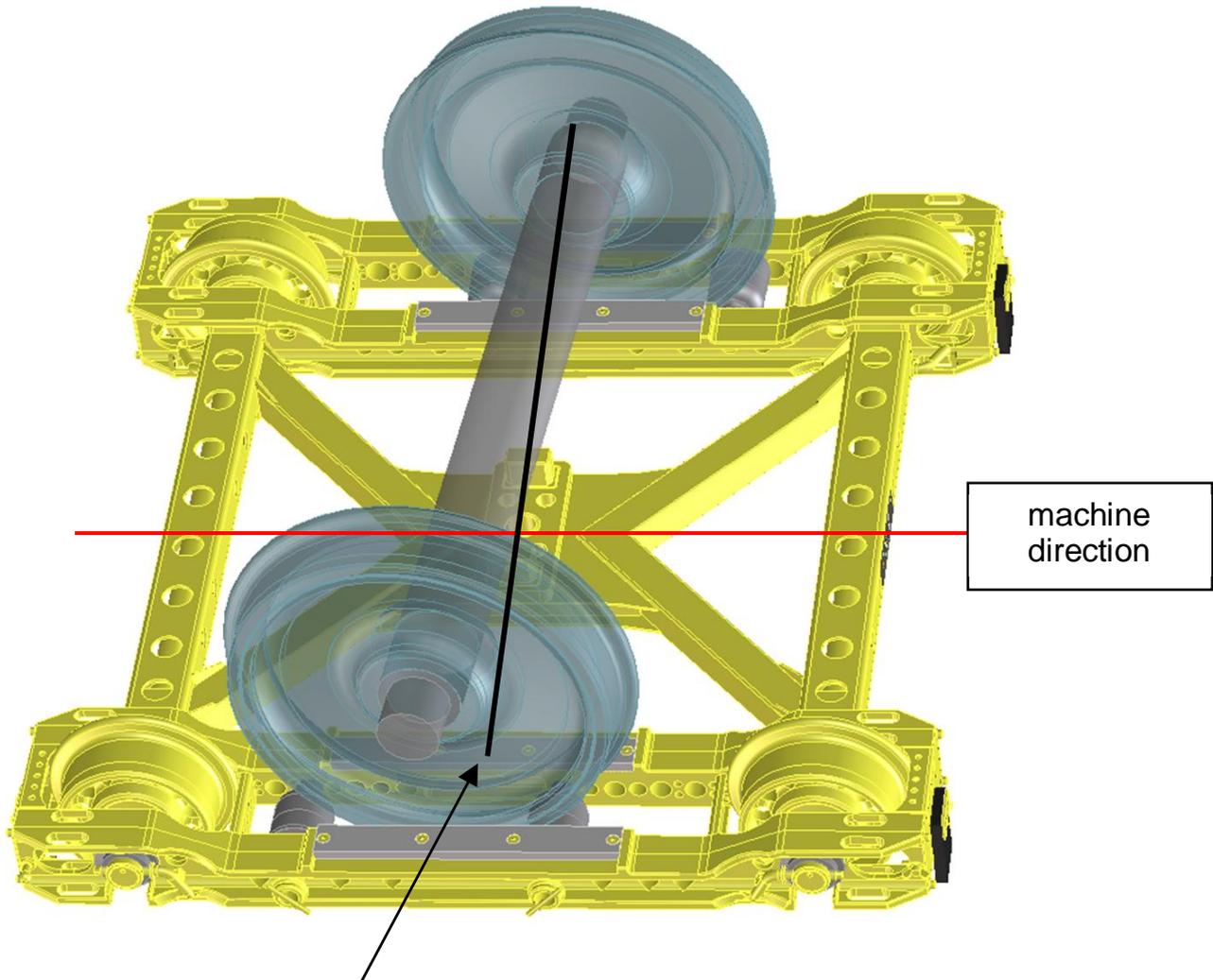


If you cannot avoid asymmetry at all, try to restrict it to max. 1 borehole difference where the fixing bolts are located. The example above shows a difference of two holes which is too much.

52.18/05**TOWING DEVICE**

6.5.3 Distorted axles

Never attach the axle in a distorted manner, as seen in the image below. This also (as well as asymmetry) has a negative influence on the towing device's runnability.



The axle ought to be rectangular to the machine direction.



Any combination of the above mentioned “mistakes” has even worse consequences, of course!

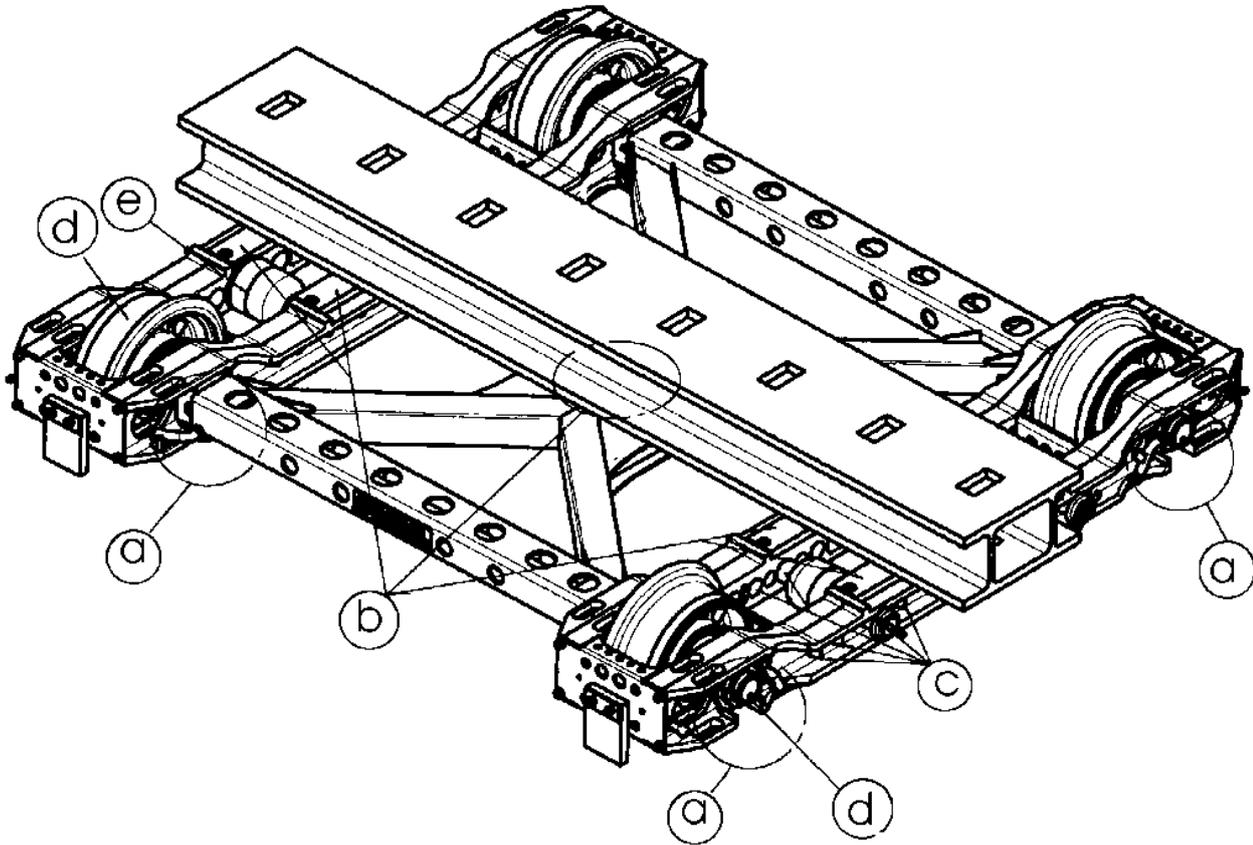
7 MAINTENANCE

- Always use the recommended lubricants and, in the event of repairs, use genuine replacement parts at all times. In addition to complying with the terms of guarantee this is also important for the added operational safety of your machine.

Ordering spare parts correctly can substantially speed up delivery thus making the machine more economical.

- When ordering spare parts please supply the following:
 - Machine type
 - Machine number
 - Component
 - Spare part description and number
 - Quantity
 - Delivery method
 - Delivery address
- Observe the specified maintenance checks.
- During maintenance follow the for your country specific safety and environment instructions

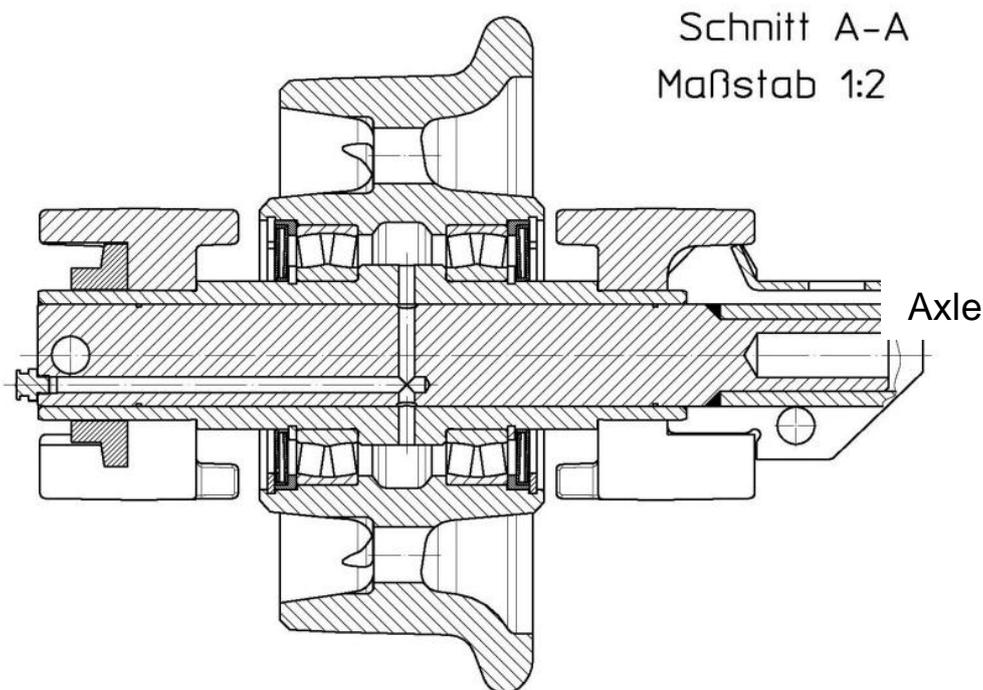
52.18/05**TOWING DEVICE**

7.1 Lubricating instructions

1. All locking bolt connections are to be kept greased; the securing mechanisms are to be checked regularly to ensure they are working properly.
2. Grease the adapter bolts, cross-linked frame bore hole and PE supporting plates for the re-railing bridge.
3. Clean and regrease the fixing bolts and corresponding bore holes in the longitudinal beam (also serves as corrosion protection).

4. Running wheel bearings:

Lubrication (with SHELL ALVANIA RL2) is possible via the carrying axle with the wheels fitted by means of a grease gun (see arrow in following image).



- Grease is to be pumped in about every 6 months, and the grease changed completely annually.
- Grease the carrying axle first of all and only then push the wheels onto it. Finish off the lubrication using a grease gun.
- Regreasing is recommended before or after prolonged journeys (200-250 km), depending on the loading on the bearings.
- Pressure can be relieved by pulling out the carrying axle. Therefore, it makes sense to regrease before dismantling the wheelsets.
- When assembling or dismantling be careful that no dirt enters the bearing area!

CAUTION**Damage!**

- When assembling or dismantling be careful that no dirt enters the bearing area!

5. Support rollers – lightly grease the contact surface to the wheel flange of the towed railway vehicle after use.

52.18/05

TOWING DEVICE

7.2 Wheels

- If the wheels are to be turned off, a maximum of 2 mm (\varnothing min. = 296mm) can be turned off, and care must be taken to ensure that this is done equally on all four wheels.
- When machining the wheels, care must be taken to ensure no cooling lubricant penetrates into the bearing.
- It is generally advisable to apply a light coat of grease to any surface damage.

8 APPENDIX A

8.1 Area of application

The towing device 52.18 is designed and built for towing machinery and equipment up to a loading capacity of 30 tons.

8.2 Liability exclusions

Any use of the device other than that specified above is not designated and endangers the lives and health of operating and maintenance personnel as well as the material assets of the operating company. The manufacturer of the device declares himself free from liability for damage to persons or property belonging to the operating company or third parties if:

- the device is not used according to the regulations,
- the operating and maintenance personnel have not read or understood the available instructions,
- the operating and maintenance personnel have used the device for purposes other than it was devised for,
- the operating and maintenance personnel are not sufficiently qualified
- the device is operated under conditions which exceed the specified limiting values,
- the device is not / has not been serviced according to the rules within the specified intervals.

These exclusions from liability for damage to people or material property do not affect other grounds for exclusion.

8.3 Copyright

Specific characteristics and constructional peculiarities of the device are the intellectual property of ROBEL Bahnbaumaschinen GmbH. The copyright on this operating manual remains the property of ROBEL. It may not be reproduced either in full or in part, published or otherwise exploited for competitive purposes, regardless of whether payment takes place or not. The operator's personnel may not pass on the contents of the manual to anyone outside the business.

52.18/05**TOWING DEVICE**

8.4 General rules

Effective legal provisions and accident prevention regulations in the respective fields of application must generally be observed. If they are not observed, the operator of the device is liable for the legal consequences.

In the event of differences between prevailing regulations applying to the operator's use of the device and the manufacturer's or its subcontractor's regulations, whichever stipulations are the most stringent must apply.

The buyer must provide all necessary machinery, equipment and material resources for putting the delivered product into operation and training staff. He must also make unrestricted, safe and sufficiently long track and work sections available, on which staff can learn how to operate and use the delivered product and practise these tasks.

As the manufacturer and/or the supplier of the purchased item have no influence over the personnel and operational circumstances of the buyer they will not be responsible for the effectiveness of the training.

However, ROBEL Bahnbaumaschinen GmbH, together with its customer service organisation, is happy to provide advice, training and other consultative services; details and conditions relating to these services must be agreed separately.

8.5 Acceptance, equipment, operating licence

The buyer is responsible for checking that the purchased item is equipped according to the specified and agreed specifications and that its condition, operative capability, and especially its safety features conform to these specifications; the buyer is responsible for accepting the purchased item according to the contractually agreed stipulations.

Following delivery by ROBEL Bahnbaumaschinen GmbH the buyer must install all equipment stipulated by respective operating and safety regulations, standards, statutory requirements or other regulations in the purchased item.

Unless agreed otherwise such equipment is not included in the scope of supply of the purchased item.

The buyer is also responsible for presenting the purchased item with the necessary documentation from the office in charge so that the operating licence can be granted. The necessary documentation to do this (descriptions, proof, certificates, etc.), to be supplied by the manufacturer or supplier, must be specified and agreed in the contract of sale.

The buyer shall pay for any other measures that might be necessary to obtain additional operating licences.

8.6 Safety regulations

The necessary requirements for protecting life, health, material property and the environment when handling the device must take precedence!

- Before using the device, make sure you can prove that all personnel affected have been made aware of all the relevant:
 - statutory safety regulations,
 - stipulations of the respective building code and works rules,
 - stipulations of the respective professional and trade associations,
 - industrial and environmental safety regulations,
 - licensing regulations,
 - internal company regulations, especially those of the emergency management departments, and
 - all other applicable regulations,

in addition to and in concert with the manufacturer's safety and operating regulations of the device and equipment.

If necessary, the office in charge of operation of the device must lay down additional regulations and measures geared to the special tasks of the device to ensure that all additional safety requirements are met.

We would ask you to pay special attention and adhere to the following safety regulations pertaining to the system, in addition to the information detailed above.

8.7 Protection and use of the device

- Protect the device to prevent unauthorised persons starting it up or using it.
- The device should only be started up and used if all necessary conditions for safe operation have been fulfilled.

8.8 Intended audience for the operating manual

These instructions contain the necessary information for using the device they describe in accordance with the regulations.

The instructions have been written exclusively for technically qualified personnel. Qualified personnel in this sense are personnel who have proven their ability to use this device, either on the basis of certificates or experience.

8.9 Accident prevention

The basic health and safety regulations also apply to this operating manual.

- Familiarise yourself with potential dangers connected with the device's specific area of activity and ensure that you receive appropriate training before using the device.

- Check to make sure the device is in proper working condition before using it:
 - Make sure equipment, devices, tools, accessories, safety equipment, etc. are complete and intact.
 - Make sure all prerequisites for carrying out work safely have been met with regard to you and other persons, property and the environment.

- Beware of the particular dangers of the device and your work area, especially:
 - People and obstacles.
 - Compliance with safety clearances.
 - Work on adjacent tracks.
 - Compliance with all operationally necessary protective measures.

- Also eliminate minor defects immediately; this will enable you to avoid more serious defects.

- Safekeeping of tools and accessories.