



Installation Instructions for Air Suspensions

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1. General

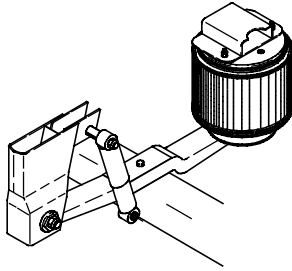
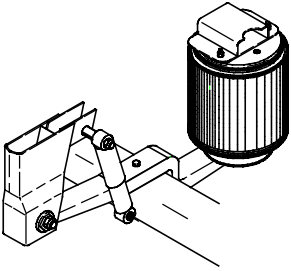
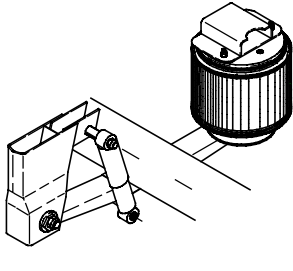
These installation instructions are an integral part of our general sales and delivery terms and conditions. On their not being observed we will have to refuse all warranty claims in case of damage.

The choice regarding the axle or spring attachments depends on axle type and construction of the suspension, **see register 5¹⁾** and suspension installation drawings.

The specified axle loads should not be exceeded. The centre of gravity heights and the directions in the installation instructions are to be respected.

For localization it has to be considered that in case of a semi-trailer the load must be stabilized by the lower fifth wheel of the truck.

We would like to particularly point out that sufficient clearance for free wheel rotation is to be considered for lowered vehicles

		
Model LR Register 2 ¹⁾	Model NLR with cranked spring Register 3 ¹⁾	Model TLR for low loader axles Register 4 ¹⁾

Detailed information can be found on the suspension installation drawings

For FB80 valid until 30.08.09

¹⁾ Standard catalogue air suspension

2. Constructional Description

GIGANT air suspensions are available as single or multiple axle suspensions.

The springs are parabolically shaped and designed in a way that they guide the axles, stabilize the vehicle and take up the braking torque. The U-shaped formed with the axle beam and springs acts as a stabilizer to give roll resistance.

By use of differently sized springs, vehicle stabilization can be adapted to the desired axle load and centre of gravity height.

The vertical forces are transferred into the chassis of the vehicle via the front brackets and the air bellows. Transverse and axial forces are exclusively transferred to the chassis via the front brackets. In order not to exceed the permitted torsional strains on the longitudinal beam of the chassis appropriate bracing should be fitted.


3. Installation

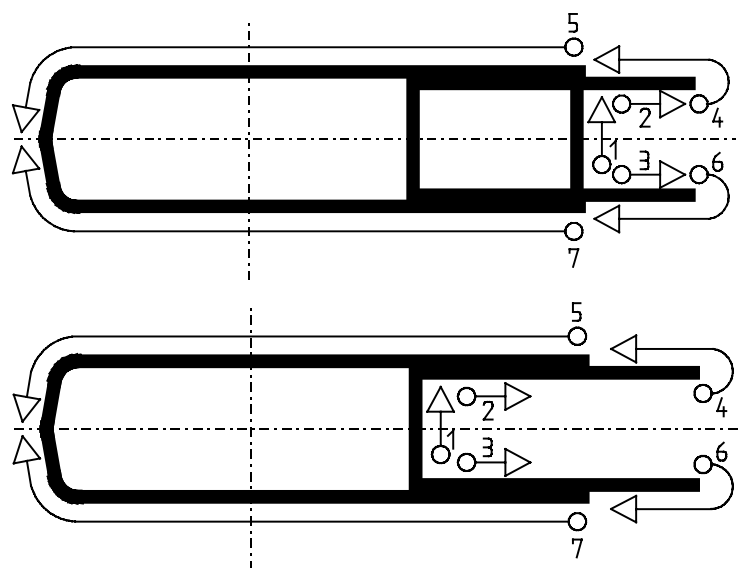
The latest generation of GIGANT front brackets are suitable for being welded on to the more and more frequently used narrow bottom flanges due to a taper in width to 82 mm.

Important Information:

- In order to avoid damage when welding the earth connection must not be fitted to any rotary components of the axle.
- It is not permitted to weld on fit the earth connection to the suspension spring.
- Suspension springs are to be protected against contact with weld splatter, electrodes and welding clamps (notch effect)

Welding sequence

Fig.1
Front bracket cross-section weld seam
a 4  DIN 1912
(1 ; 2 and 3 = approx. 50mm)
please avoid end
craters and
penetration notches

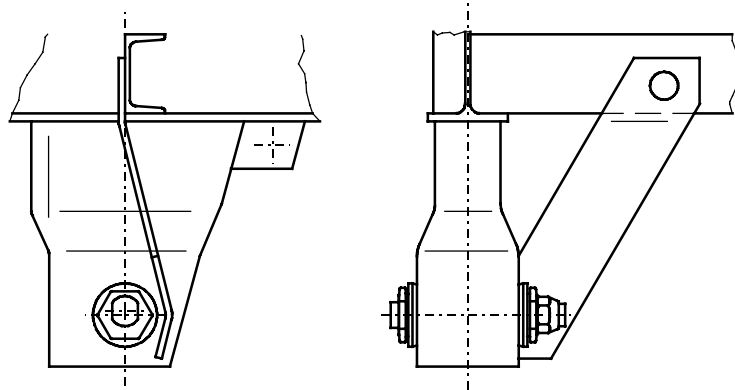


In order to take in the side forces a side support is to be fitted to the front brackets.

The data and instructions specified here can only serve as suggestions as brace rods and dimensioning depend on the type of vehicle and its operation conditions.

This data is only known to the vehicle manufacturer and it has to be considered by him in construction. In extreme cases even two gusset plates can be necessary.

Fig. 2
suggestion for side
support



Information:

For highly flexible (torsional weak) chassis suitable torsion-weak but nevertheless bending resistant support of the front brackets has to be used (e.g. platform trailers) **compare Fig. 2**.

For a torsion-resistant chassis the support of the front bracket can be accordingly resistant (e.g. tank trucks, bulk loading and delivery body vehicles).

We generally recommend open profiles such as U-profiles. Torsion-resistant, closed profiles should be avoided as chassis cross members (risk of fissures at the weld joints).

The air bellow must be protected against weld splatter.

The air bellow is preferably mounted with the studs and air supply in board.

Please see installation drawings for offset.

The bending forces (F_B) resulting from the offset (VS) have to be compensated via the appropriate gusset plates or cross members.

Suggestions **compare Fig. 3 and 4**

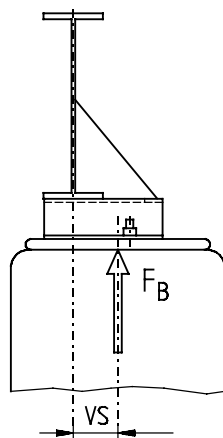


Fig. 3
bellow with top bracket

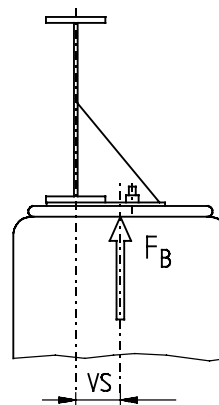


Fig. 4
bellow without top bracket

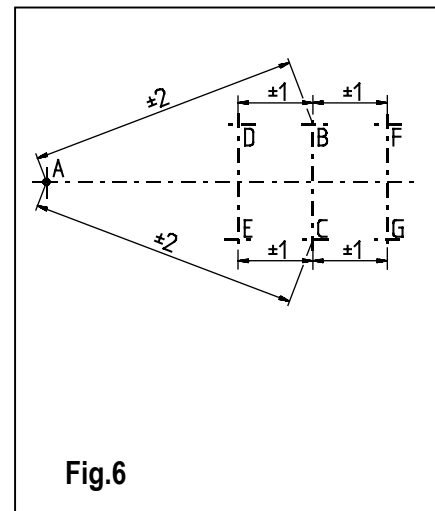
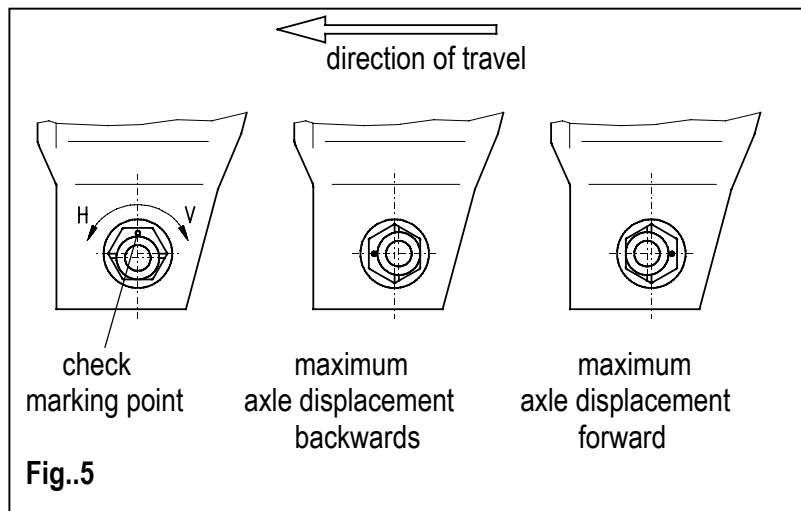
4. Axle Alignment with Eccentric Bushes

Before welding the front brackets to the chassis the axle should be aligned as exactly as possible in direction of travel.

In order to compensate manufacturing tolerances a track control and possibly a correction is necessary. This correction is carried out by means of the **proven eccentric bushes (compare Fig.5)**.

Attention – you have to look for that the both eccentric bushes of one air suspension bracket are in the same angle position and that the marking points are exactly opposite each other.

Determine the diagonal dimensions A-B and A-C by comparison measurements (tolerance ± 2 mm). Check wheelbase B - D and C - E for the front axle and B - F and C - G for the rear axle and correct if necessary (tolerance ± 1 mm). (**compare Fig. 6**)



5. Prescribed Tightening Torques

Designation	Thread	Tightening Moment
Stud (bellow)	M12	75 – 80 Nm
Screw (double bellow)	M8	20 – 25 Nm
Draw bar pin – piston base (bellow)	M22x1.5	max. 350 Nm
Piston base plate – spring (bellow)	M16	270 – 290 Nm
Stud – spring (double bellow)	M16	170 – 190 Nm
Shock absorber pin	M22x1.5	max. 350 Nm
'U' bolt	M20	340 – 380 Nm
'U' bolt	M20x1.5	580 – 630 Nm
'U' bolt	M22x1.5	650 – 700 Nm
'U' bolt	M24	650 – 720 Nm
'U' bolt	M24x2	850 – 950 Nm
Spring eye pin	M27x1.5	550 – 600 Nm

The locknuts used are to be replaced by new ones after two removals.

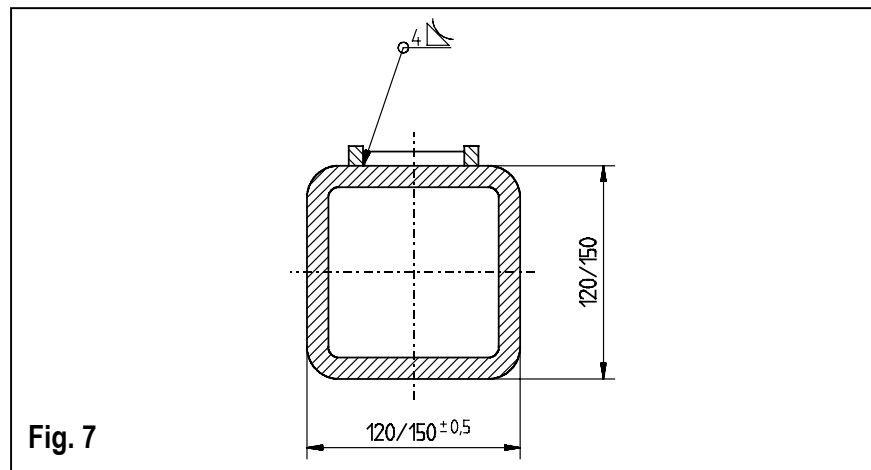
5. Axle Attachments

The constructions of the **GIGANT** axle attachments depend on the type of suspension, axle beam and the axle bottom plates arrangement.

For installation please observe the indications given in the respective installation drawings!

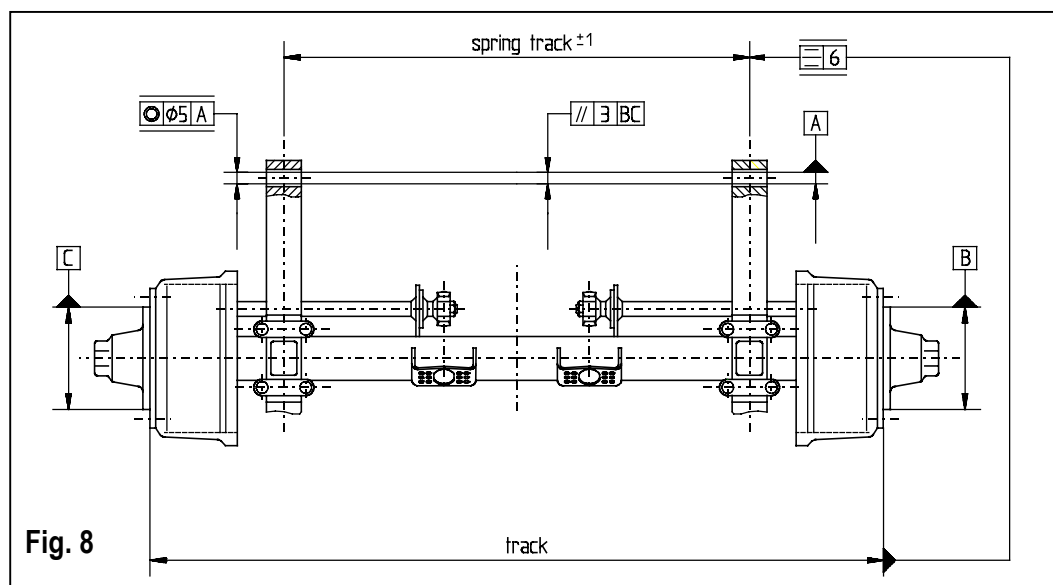
Assembly Instructions for GIGANT Clamp Attachment

The **GIGANT** clamping attachment is a non-welded and secure axle attachment. With this construction the spring guidance plate are no longer welded to the axle beam. Only the concentric rings - as long as not already done by the axle manufacturer - have to be welded in the correct position on the axle beam (Fig 7). The axle beam must show dimensions of 120 ± 0.5 or 150 ± 0.5 , respectively, in order to achieve a sufficient clamping effect. The axle beam has to be free of welding splatters in the attachment area.



Assembly

The permitted tolerances for the completely assembled guidance springs are to be respected according to Fig.8.



The alignment of the two guidance springs be made i.e. by setting out the spring lug by a round material \varnothing - 30 mm.

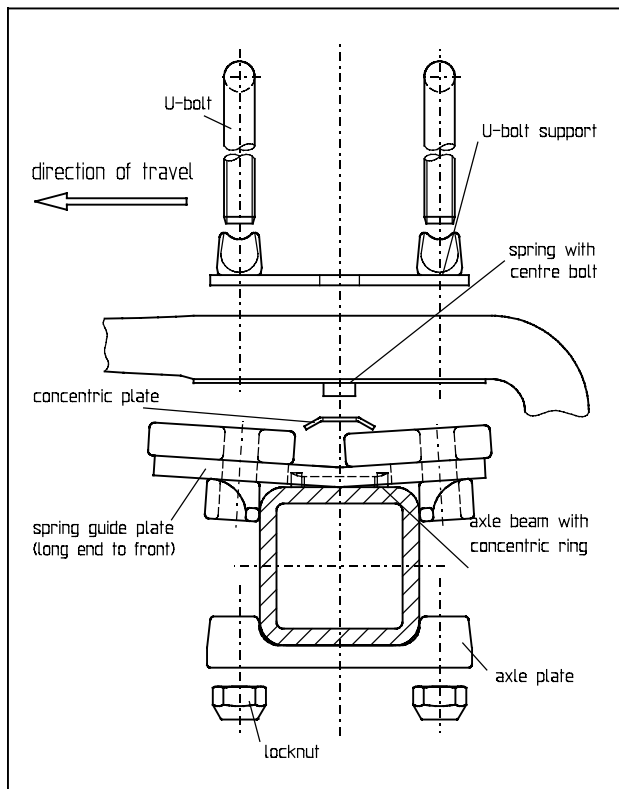


Fig.9 KSP/KEBO

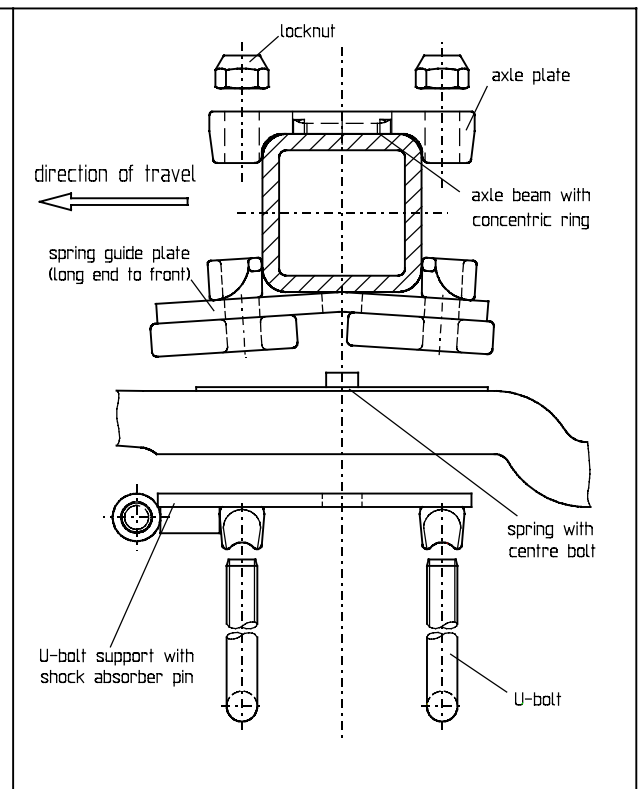


Fig.10 KTSP

Assembly Steps

KSP/KEBO (Fig.9))

- Put the bent spring guide plates positionally accurate on to the concentric rings of the axle beam..
- Insert plugwash into the spring guide plate..
- Put suspension spring into spring guide plate so that the spring screw head goes in the plugwash (especially check equal heights of spring eye, spring eye centres and equal lengths to axle centre).
- Put on the axle plates and manually screw the locknuts on the "U" bolts.
- Equally tighten locknuts in several steps (always tighten per "U" bolt) until the tightening torque of 650-720 Nm is obtained and the spring guide plate lies flat on the axle beam.

KTSP (Fig.10)

- Mount the bent spring guide plate positionally accurate under the axle beam.
- Put suspension spring into the spring guide plate so that the spring screw head goes in the centre hole of the spring guide plate (especially check equal heights of spring eyes, spring eye centre and equal lengths to axle centre).
- Put the axle plates on to the concentric rings of the axle beam.
- Mount "U" bolts support plates, "U" bolts and locknuts tighten the locknut equality in several steps (always tighten per "U" bolt) until the tightening torque of 650-720 Nm is obtained and the spring guide plate lies flat on the axle beam.

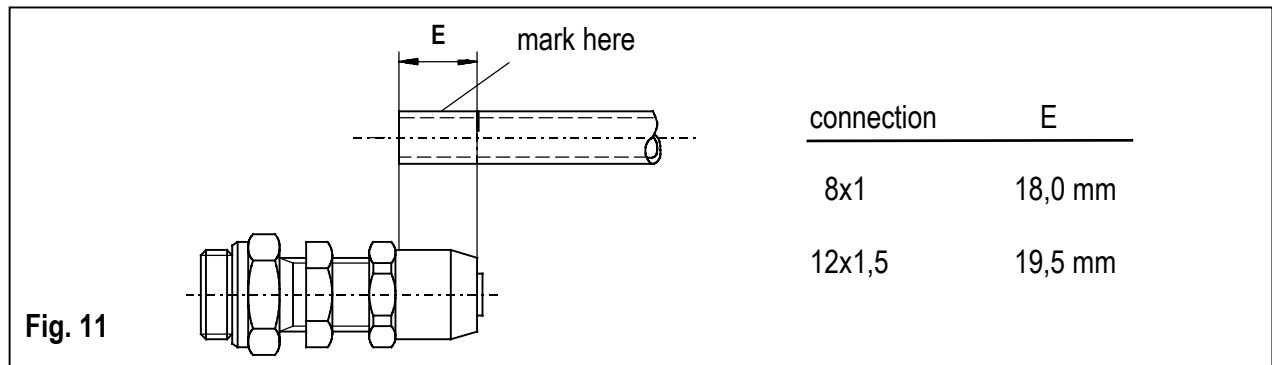
Caution:

There must not occur any irregular distortions by irregular tightening of "U" bolts.

6. Assembly Instructions for Plug and Socket Fittings

Assembly of the plastic pipe into the plug and socket fitting

1. Squarley cut off the plastic pipe with pipe cutter. The cutting areas must be internally and externally without any burrs.
2. Take a marker or tape to mark the insertion depth at the plastic pipe. The insertion depth (length E) can be determined at the union nut or taken from the table (Fig. 11)



3. Slide plastic pipe over total insertion length up to the limit stop into plug and socket fitting. The marking has to be positioned exactly at the bottom hole of the union nut.
4. After assembly strongly pull back the plastic pipe in order to check whether perfect pipe fixing has been achieved.

CAUTION: The plastic pipes to be piped have to exactly match the appropriate plug and socket fittings. For example in plug and socket fittings for plastic pipe 8x1 you cannot use 8x1.25 or similar.

Plug and socket fittings must not be used for plastic pipes with braking function between chassis and axle.

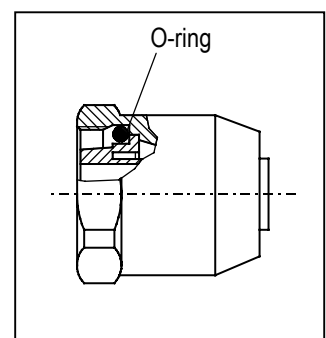
Mounting of loose plug and socket units

Check first of all whether support sleeve has been inserted from the thread side of the plug and socket unit as no pipe mounting must be done without support sleeve. Then manually screw plug and socket unit to the junction neck and finally tighten with wrench. Torques (compare table) should not be exceeded as otherwise deformations of the union nut could occur:

Connection	Torque
8x1	17 Nm
12x1,5	30 Nm

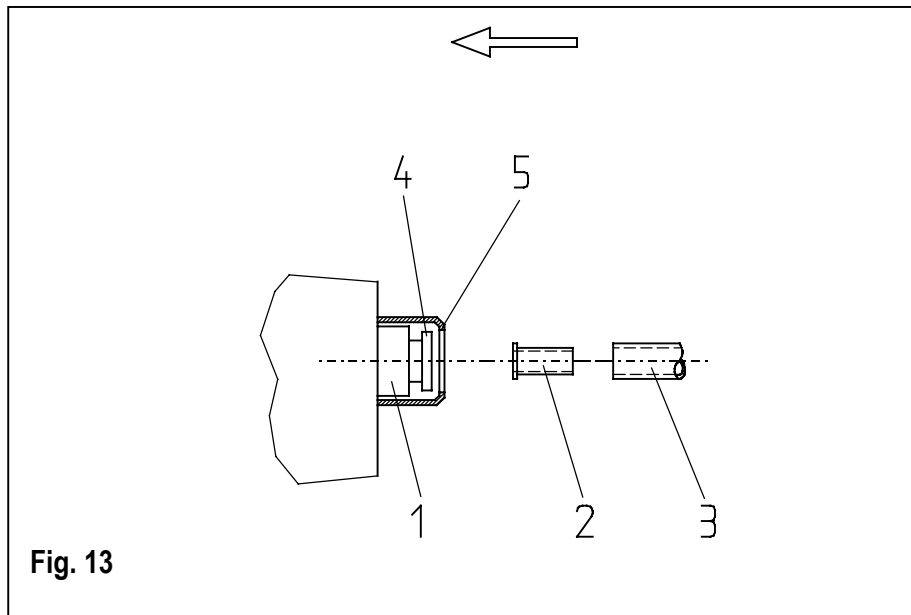
Dismounting of the plug and socket unit

Remove O-ring from the thread relieve with a safety pin.
Push back union nut on the pipe and draw out support sleeve.
Then cut off pipe at the split clamping ring in direction to the union nut and pull off split clamping ring from the cut-off pipe piece .
Finally, the plug and socket unit can be reassembled and used again.
Always pay special attention to the split clamping ring to have its original initial tension and not to be damaged. Press the O-ring back into the thread relieve.



7. Valves with Plug and Socket Fittings (GRAU)

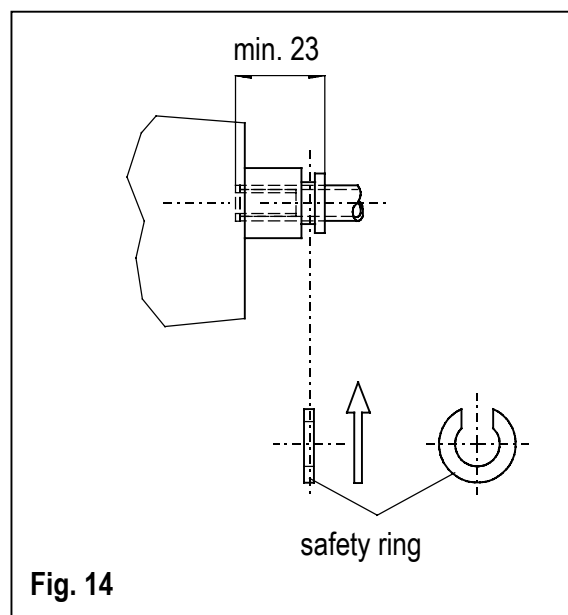
Many of the valves delivered by us are equipped with plug and socket fittings by the manufacturer. Therefore, a plastic pipe according to DIN 74324 - 8x1 has to be used as pneumatic pipe. When mounting the pipes, take care to squarely cut them to the necessary length without any burrs occurring. Before pressing the pipes (3) into the plug and socket fittings (1) the support sleeves (inserts) (2) have to be pressed into the pipe ends (Fig.13):



Press the pipe at least 23mm into the plug and socket fitting.

For the model with protection cap (5) assembly is now complete.

For the open model after pipe assembly the safety ring has to be applied (Fig.14).



For dismantling with the closed model remove the protection cap (5), with the open model remove the safety ring. Then push sleeve (4) in direction of the valve and draw out the plastic pipe. Replace protection cap if necessary.

8. Air Suspension Valve (Function and Assembly)

GIGANT air suspensions are equipped with an air suspension valve as a standard. This valve controls the pressure in accordance to the load and keeps the ride height constant at any load condition. Ride height adjustment should be according to installation drawings for suspensions (EH). The air suspension valve should be mounted on the axle centre, if possible.

In order to prevent the valve rods from inverting the air suspension has to be exhausted to the bellow stop limit and also to be inflated to the limit.

For this, the angle between the two valve rod levers must be approx. $\alpha_{EF} > 15^\circ$ when exhausted and approx. $\alpha_{AF} < 165^\circ$ when inflated (**compare Fig. 15**).

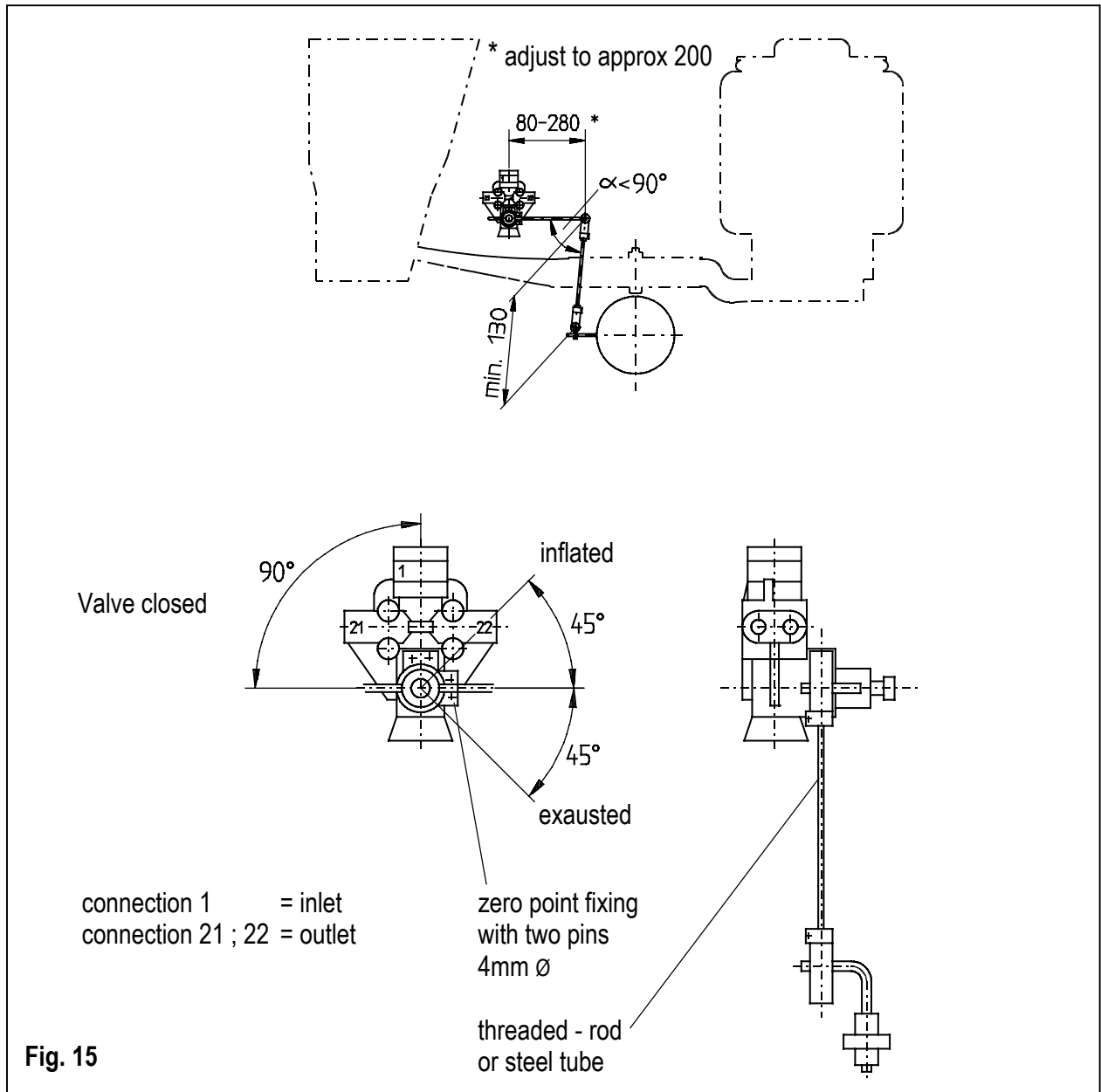


Fig. 15

Plastic pipe according to DIN 74 324 - 8x1 is to be used. For mounting of the pipes you have to pay attention to cutting them squarely and without any burrs and to the necessary length.

Before pressing the pipes into the plug-type connections the support sleeves (inserts) must be pressed into the pipe ends.

Also see the mounting instructions for valves with plug and socket fittings - page 8.

9. Air Suspension Valve with Integrated Height Limitation

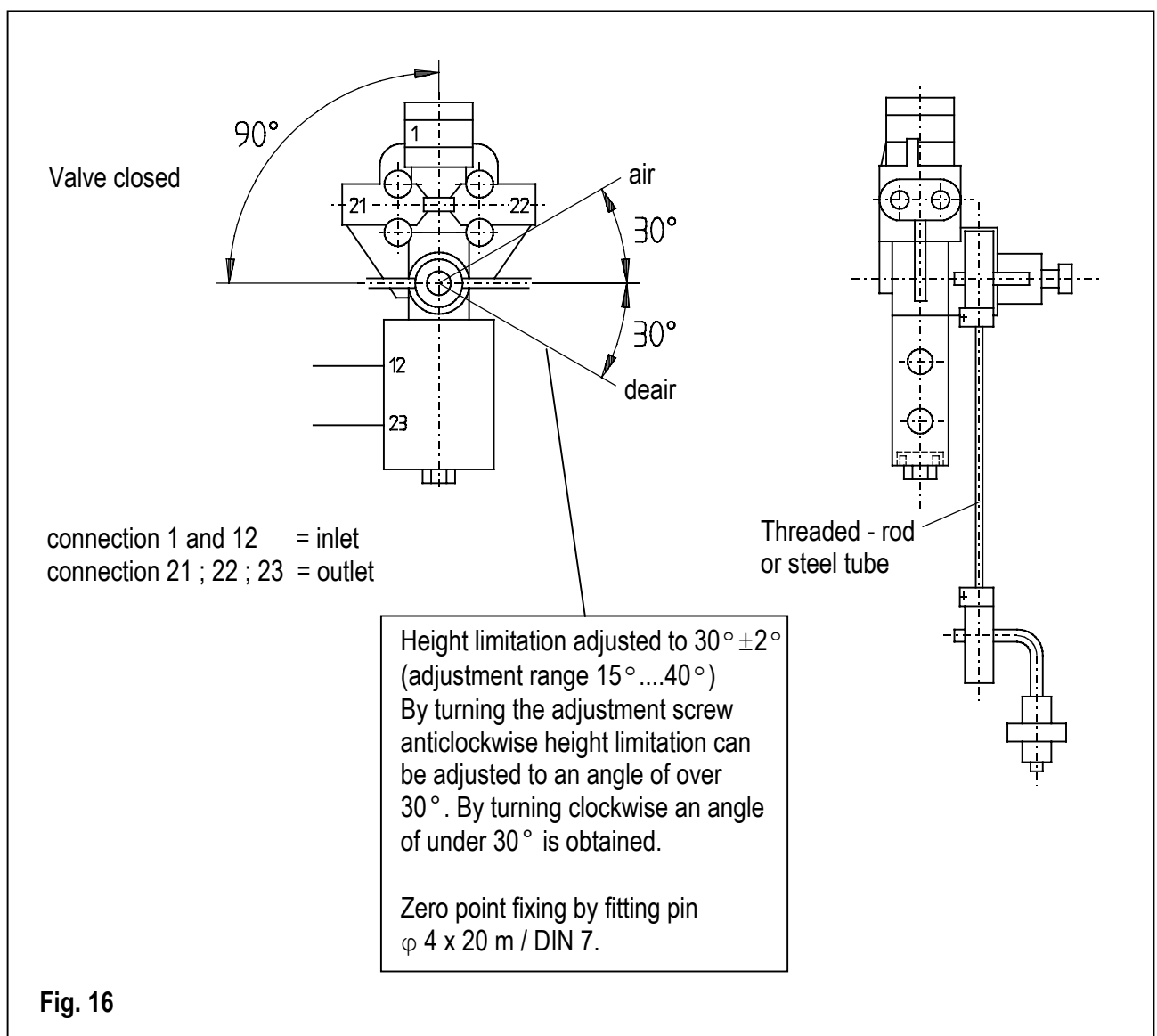
The air suspension valve with integrated height limitation is built into vehicles equipped with raising and lowering functions.

The actual air suspension valve's function is identical to that of the normal air suspension valve. With this valve the height limitation can be adjusted by turning an adjustment screw, i.e. the air supply to the raise/lower valve is interrupted when the maximum permitted body height (from connection 12 to 23) is achieved.

(compare Fig. 16)

A height limitation of $30 \pm 2^\circ$ is adjusted by the manufacturer. If this adjustment is to be changed, the protection cap has to be removed and the adjustment screw has to be turned. By turning it anticlockwise the height limitation can be adjusted to an angle over 30° . By turning it clockwise an angle of under 30° is obtained.

(assembly see Fig. 15)



plastic pipe according to DIN 74 324 - 8x1 is to be used. For assembly of the pipes you should pay attention to cut them squarely without any burrs to the necessary length. Before pressing the pipes into the plug-type connections the support sleeves (inserts) have to be pressed into the pipe ends.

Also see assembly instructions for valves with plug-type connections - page 8.

10. Raising and Lowering

GIGANT air suspensions in container vehicles and interchangeable swap bodies or for ramp height adaption are equipped with valves for raising and lowering.

On the on/off valve, a solenoid valve is located on the bottom side of the device. When this solenoid valve is connected to the ABS, the on/off valve receives a pulse at a vehicle speed of > 15 km/h. This results in an automatic return back to the "ride" position.

A manual return back to the "ride" position is carried out by pulling out the lever. The ride height is then automatically re-adjusted.

The necessary lifting limitation for air suspensions with raising and lowering valves is carried out via the air suspension valve with integrated height limitation.

For vehicles that are to be lifted for ramp height adaption for being loaded or unloaded a height re-adjustment during loading and unloading is recommended.

Caution:

In general at every activation of the raise/lower valve the brake should be released in order to prevent in from "holding" the ride height.

If necessary the vehicle is to be secured by means of blocks.

The raising and lowering device should not be activated during maintenance procedures in order to avoid any risk exposure to the maintenance staff.

During the raising and lowering process, no people may stay in the danger area.

Plastic pipe according to DIN 74 324 - 8x1 is to be used. For assembly of the pipe you should pay attention to cut it squarely and without any burrs to the necessary length. Before pressing the pipes into the plug-type connections the support sleeves (inserts) must be pressed into the pipe ends.

Also see the installation instructions for valves with plug-type connections - page 8

11. Axle Lift

GIGANT-air suspensions can be equipped with different axle lift types (register 6) ¹⁾.

The twinlift is characterized by its very compact construction and can be used for most air suspensions with one-leaf springs. Due to the fact that it is exclusively mounted on the front bracket and the spring, no further bracings are necessary.

The side axle lift is particularly suitable for lifting the first axle, and with sufficient axle spacing for the 2nd and 3rd axle, too. The axle lift lever is mounted under the spring at the front bracket and the lift bellow on the chassis of the vehicle.

For a side axle lift no additional transverse beams are necessary.

For lifting the middle or rear axles or in case of restricted space the central axle lift is especially suitable. This axle lift is mounted at the centre of the vehicle by means of an additional bracket at a cross member of the chassis. The lift bellow forces are also to be compensated by a cross member.

Control of the lift axles can be found in the connecting diagrams (register 10) ¹⁾.

For air suspensions with axle lift the ride height has to be adjusted to a minimum exhaust distance of approx. 100 mm.

Caution

Before carrying out any maintenance works on the vehicle the axle lift device has to be turned off by closing the cut-off cock.

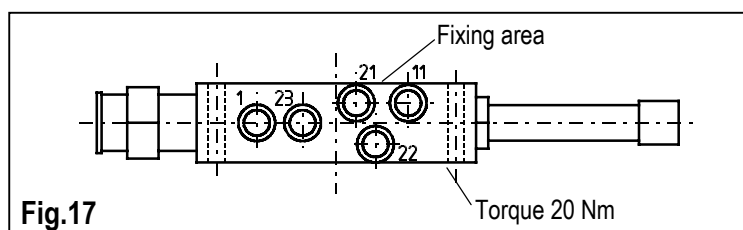
1) Union catalogue air suspension

Mounting and Adjustment Instructions for the Automatic ILAS-Valve

The cut-off cock has to be closed for all of these working steps.

Caution - danger: Automatic raising or lowering of the lift axle(s) when the changeover pressure is reached. Do not stay in the danger area.

The installation is carried out via the boreholes provided on the housing.



The ILAS valve must not be located in the areas with splash spray or hose water and must be protected from high-pressure cleaning units. During varnishing work, use suitable agents in order to prevent the varnish from penetrating into any of the exposed plug-type connections, into the respiratory borehole or into the deaeration device. After the varnishing, remove the protective agents.

Plastic pipe according to DIN 74 324 - 8x1 is to be used. For the mounting of the pipes you have to take care to cut them off squarely and without any burrs and to the necessary length. Before pressing the pipes into the plug-type connections the inserts have to be pressed into the pipe ends..

Please also see installation instructions for valves with plug and socket fittings - page 8.

Adjustment of Actuating Pressures

For determination of bellow pressure see bellow pressure diagrams in GIGANT catalogue register 10¹⁾.

Adjustment of actuating pressure P_{S1} : axle lowered

For adjustment purposes when the vehicle is empty, it is recommended to install a **simulating connection**, **order no.: 190169** in front of connection 11.

Actuating pressure P_{S1} - 3.0 to 5,3 bar - for autom. lowering of a lifted axle can be adjusted as follows by use of an **adjusting wrench**, **order-no.: 190121**:

- Connect test connection with pressure gauge.
- Remove yellow cap from the tube.
- Slowly increase pneum. Pressure at the simulating connection to actuating pressure P_{S1} -target value (shown at the manometer) until change-over sound is heard (or lift axle is lowered or connection 23 is exhausted).
- If the switching pressure is not reached turn the nut in the tube with adjusting wrench as follows:-
 - clockwise: actuating pressure increases
 - anticlockwise: actuating pressure decreases
- Stamp actuating pressure P_{S1} on to plate and fix it at a conspicuous place near the lift axle.
- Loosely press yellow cap to the pipe; it has click into place.
- Remove manometer and fit protection cap.

Adjustment of actuating pressure P_{S2} : lift axle

For adjustment purposes when the vehicle is empty, it is recommended to install a **simulating connection**, **order no.: 190169** in front of connection 11.

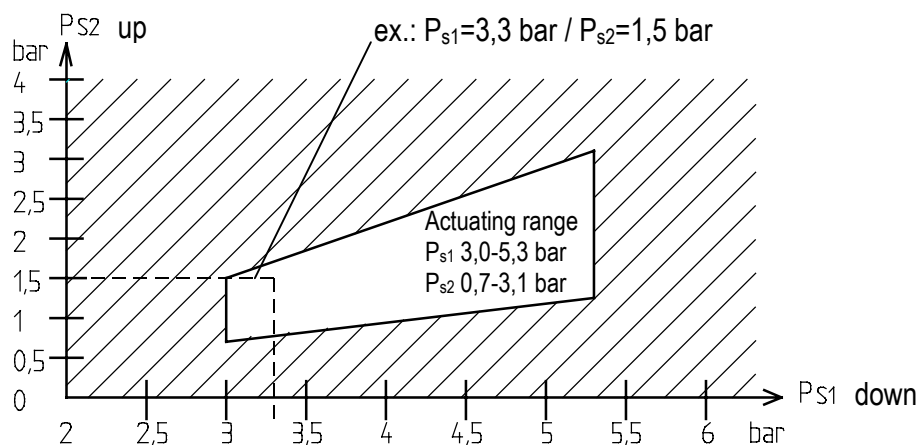
The actuating pressure P_{S2} - compare pressure diagram - for autom. lifting of the lift axle can be adjusted as follows:

- Connect test connection with manometer.
- Remove red cap from the pipe.
- Slowly lower pneum. Pressure at connection 11 to actuating pressure P_{S2} - target value (shown at manometer) until change-over sound is heard (or lift axle lifts or connection 23 is aired)

1) Union catalogue air suspension

- If the switching pressure is not reached turn knurled nut as follows:
clockwise: actuating pressure increases
anticlockwise: actuating pressure decreases
- Imprint actuating pressure P_{S2} on attached sign and fix the sign at a conspicuous place near the lift axle.
- Press red cap on to limit stop.
- Remove manometer and fit protection cap and secure it using cable fasteners.

Pressure Diagram for Adjustment of Actuating Pressure P_{S2} : Lift Axle

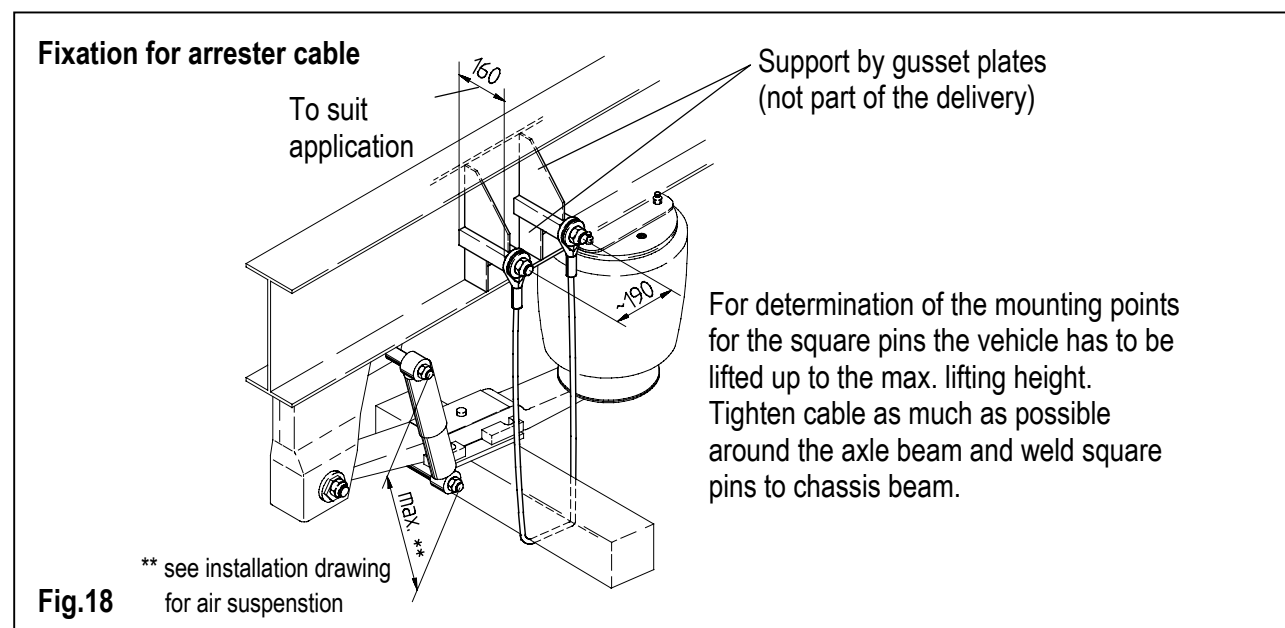


12. Catch Straps and Automatic Quick Deaeration Device

These components serve for lifting limitation and for rapid ventilation of the air suspension. For GIGANT air suspensions normally neither catch straps nor quick deaeration device are necessary.

Nevertheless, we recommend:

- Catch straps or quick deaeration device (connecting diagram see GIGANT-Catalogue register 10) ¹⁾ for tipper trailers (at least on the last axle) or chassis of containers trailer as well as for vehicles that are quickly unloaded.
- Catch straps for vehicles that are frequently loaded or lifted by means of a crane.



Additional Information for Installation of GIGANT Air Suspensions with C - Profile

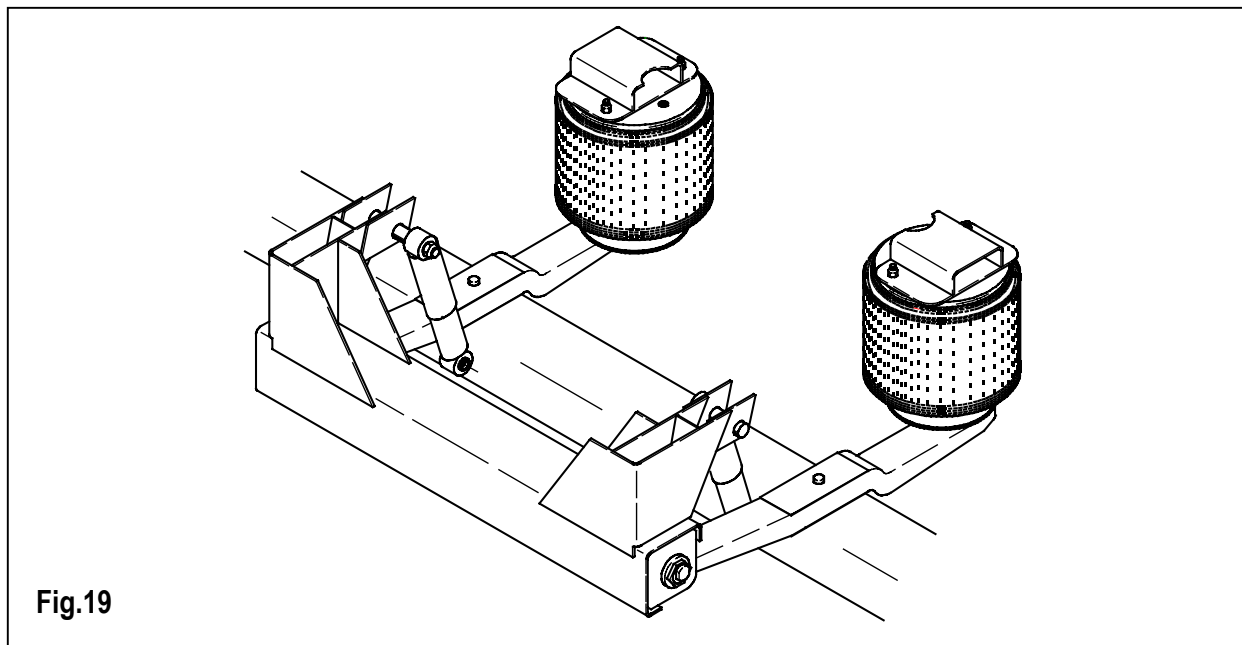
Constructional Description

The GIGANT C-profile air suspensions distinguish from the standard series by the shaped C-profile linking each side. This profile largely takes over all lateral forces leading into the suspension. Depending on the chassis construction chassis cross members can be omitted in the suspension area.

The trailer manufacturer nevertheless has to check whether the strength of his chassis is sufficient, i.e. whether support members can be omitted.

Due to very narrow construction of the mountings the air suspensions can be welded while the trailer is lying on its back.

Detailed information can be found in the installation drawings for air suspensions available upon request.



Installation

GIGANT C - profiles are also suitable for being easily welded to the frequently used narrow bottom flanges, due to the width of the c-profile air support being 82 mm..

Welding sequence

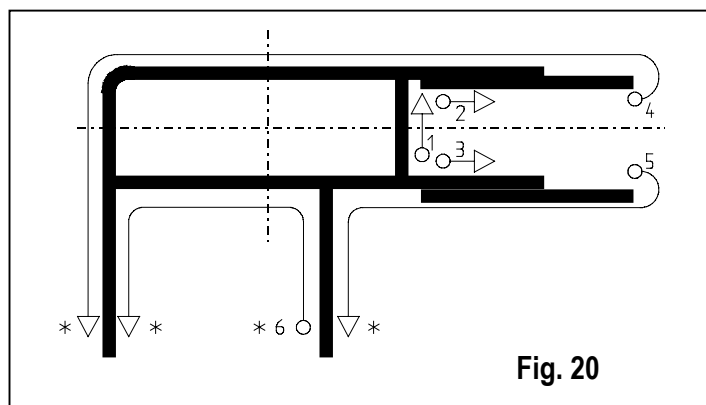
cross-section weld seam

a 4  DIN 1912

1 ; 2 and 3 = approx. 50 mm

Please avoid penetration notches and end craters

* do not weld to the edge of the chassis beam



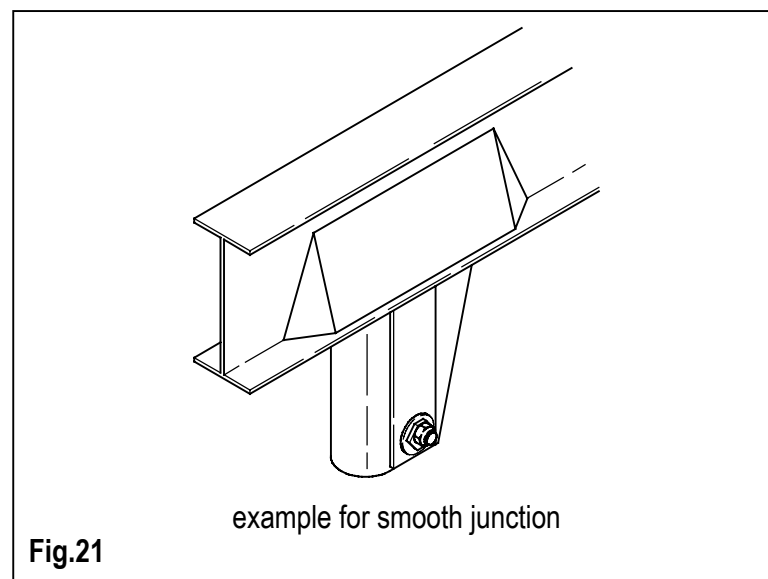
Additional Information for Installation of Aluminium Version of GIGANT Air Suspensions

The following instructions for welding of aluminium are to be observed:

The front brackets as well as the bellow tops consist of the material AlMg4.5Mn. In general this material can easily be welded without preheating process.

Nevertheless, preheating reduces the internal welding stress as well as the distortion resulting from it. WIG and MIG manual welding processes are possible. For the suitable additional welding materials please compare table below.

Compared to a steel construction, you have to consider the higher bending of the beams, this is of special importance. Therefore the longitudinal beams must have a “**smooth**” junction with regard to flexibility in the area of the front brackets.



Recommended welding additions (according to DIN 1732 Part 1) for gas-shielded metal-arc welding of aluminium-forging and cast alloys.

The welding addition mentioned first should have preference, S-AlMg5 can be replaced by S-AlMg4.5Mn.

Material	Addition
AlMg 4 Mn	S-AlMg 4,5 Mn S-AlMg 5
AlMg 4,5 Mn	
AlMgSi 0,5	
AlMgSi 0,7	
AlMgSi 1	
AlMg 1 SiCu	
AlZn 4,5 Mg 1	

Material	Addition
AlSi-cast alloys	S-AlSi 5
AlMgSi-cast alloys with Si<7%	
AlSi-cast alloys	S-AlSi 12
AlSiMg-cast alloys with Si>7%	
AlMg-cast alloys	S-AlMg 5

basic material¹⁾ = AlMg 4 Mn basic material B¹⁾ = AlMg 4,5 Mn

¹⁾ according to DIN 1725 Parts 1 and 2 as well as DIN 1712 Part 3

Please also compare the GIGANT Maintenance Instructions!