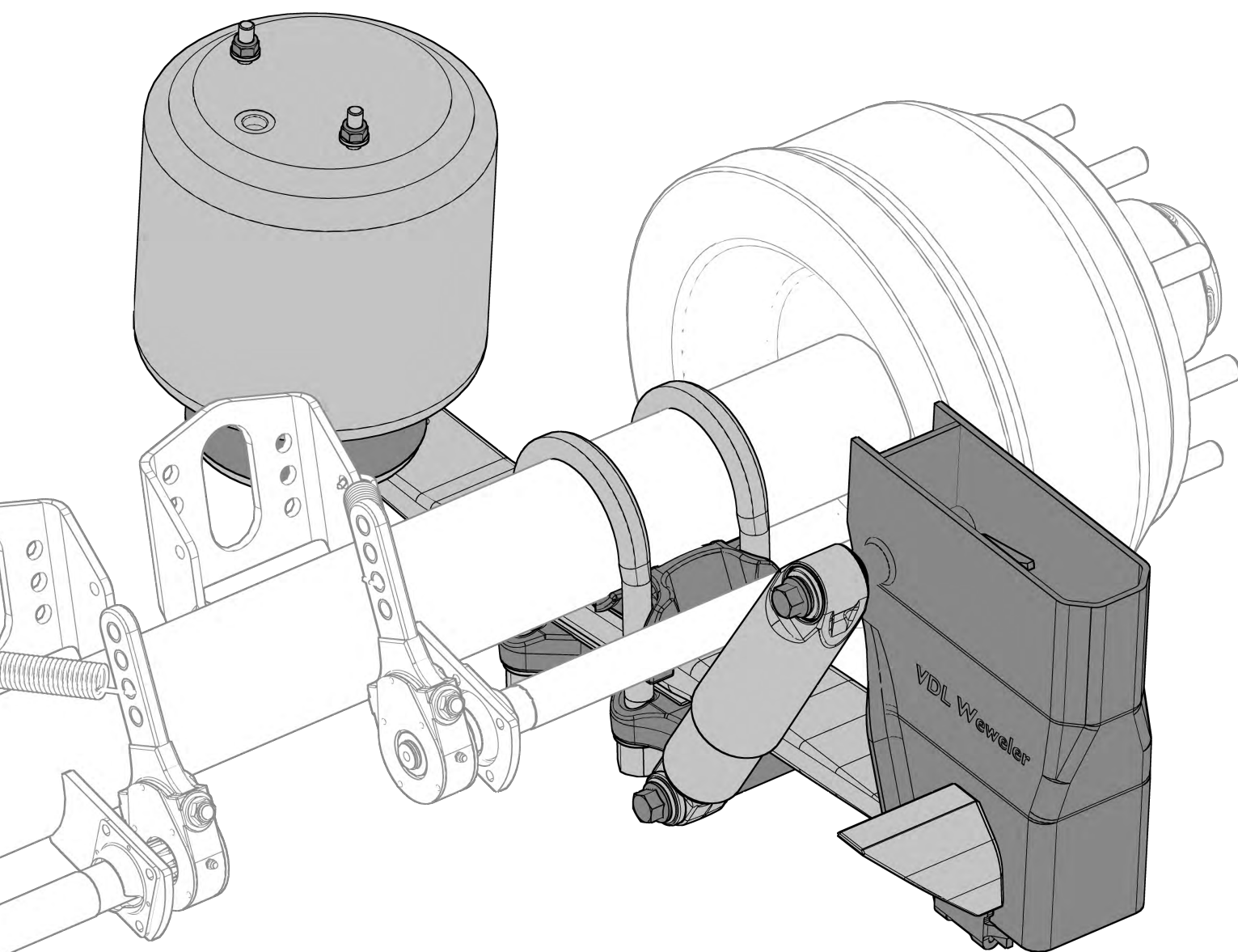


VDL Weweler



SUSPENSION INSTALLATION GUIDE



MBS HD RANGE AIR SUSPENSION FOR FUWA K-HITCH

DOCUMENT: SIG-HD-FKH-EN
DATE: 04-2021
REVISION: D

Contact Details

For additional information contact VDL Weweler b.v.

P.O. Box 142, 7300 AC Apeldoorn
Ecofactorij 10, 7325 WC Apeldoorn
The Netherlands

General:

Tel: +31 (0)55 538 51 00
Fax: +31 (0)55 538 51 93
Email: info@vdlweweler.nl
Website: www.vdlweweler.nl

Aftersales / warranty:

Tel: +31 (0)55 538 51 68
Fax: +31 (0)55 538 51 05
Email: aftersales@vdlweweler.nl (warranty claim)
Email: quality@vdlweweler.nl (0 km claim)

© 2017 VDL Weweler B.V.

Revision summary

Date	Revision	Comment	Author
May 2017	-	Initial version	RTS
December 2018	A	Corrected torque indication in image 12.14, 15.1a, 15.2a, 15.3a	RTS
April 2019	B	Modified Ø350 air spring general clearance (16) & symmetry (19)	RTS
July 2020	C	Shock absorbers added to section 6 overview. Updated tightening instructions section 10 (tolerance on M12 connections). Updated warranty & liability referral. Updated standards. Updated paint section.	RTS
April 2021	D	Welding instruction casted bracing improved (section 3.6). Updated code explanation (section 1).	RTS

This document and all information herein is and remains at all times the exclusive property of VDL Weweler B.V. and shall not - in whole nor in part - without the prior written consent of VDL Weweler B.V. be disclosed to any other person, published in any form of publicity or news story, copied, photographed, reproduced or stored in any retrieval system of any nature.

The information in this document has been prepared solely for the purpose of providing information about assembly, disassembly, repair and maintenance on the suspension system. It has been compiled in good faith by VDL Weweler B.V. and is provided without any express or implied warranty as to its completeness or accuracy. VDL Weweler B.V. reserves the right to make amendments to this document to reflect further developments.

The original English text in this document will be binding and shall prevail in case of any variance between the English text and a translation. As any translation may be imprecise and inaccurate in whole or in part, VDL Weweler B.V. does not accept any risk, liability and responsibility for any translation.

Any quotations, offers and agreements relating to goods to be delivered and/or services to be provided by VDL Weweler BV shall always be subjected to 'VDL Weweler General Conditions for Supplies'. Any other general terms and conditions shall apply only where expressly accepted in writing by VDL Weweler BV.

© 2017 VDL Weweler B.V. All rights reserved.

Contents

	General notes.....	5
	Welding remarks.....	5
	Warranty and liability.....	5
	Pictograms & symbols.....	6
1	Explanation MBS-HD Air suspension system coding.....	7
2	Technical specifications / design information.....	8
3	Hanger brackets & pedestals.....	9
	3.1 Dimensions of hanger bracket & pedestal.....	9
	3.2 Alignment of hanger bracket	9
	3.3 Welding of hanger bracket.....	10
	3.4 Welding of pedestal.....	10
	3.5 Welding of plate for hanger bracket bracing.....	11
	3.6 Welding of casting for hanger bracket bracing.....	11
	3.7 Welding of wear plates after alignment.....	12
4	Axle seats.....	13
	4.1 Welding of standard axle seats for round axles.....	13
	4.2 Welding of HD axle seats for round axles.....	14
	4.2 Welding of HD axle seats for square 150 axles.....	15
5	Air springs.....	16
	5.1 Standard Ø300 & Ø350.....	16
	5.2 Air spring general clearance.....	16
	5.3 Load-pressure diagram standard configuration Ø300 air springs.....	17
	5.4 Load-pressure diagram standard configuration Ø350 air springs.....	17
6	Shock absorber overview.....	18
7	Alignment of system & axle	19
	7.1 Alignment of air suspension versus axle.....	19
	7.2 Alignment of trailing arm eye height.....	19
	7.3 Alignment of axles.....	20
	7.4 Adjusting the hanger bracket alignment.....	20
	7.5 Adjusting the axle seat clamping alignment.....	21
8	Paint instruction.....	22
9	Axle lifts.....	23
	9.1 Axle lift versions.....	23
	9.2 General clearances two-sided axle lift.....	23
10	Torque settings MBS-HD Air suspension.....	24
11	Air suspension on axle assembly.....	25
12	Final air suspension assembly.....	31



Contents

13	Available axle clampings.....	36
	13.1 Standard axle seat Ø127 - Underslung application with front mounted shock absorbers.....	36
	13.2 Standard axle seat Ø127 - Overslung application with front mounted shock absorbers.....	36
	13.3 Standard axle seat Ø127 - Underslung application with rear mounted shock absorbers.....	37
	13.4 Standard axle seat Ø127 - Overslung application with rear mounted shock absorbers.....	37
	13.5 HD axle seat Ø127 - Underslung application with front mounted shock absorbers.....	38
	13.6 HD axle seat Ø127 - Overslung application with front mounted shock absorbers.....	38
	13.7 HD axle seat Ø127 - Underslung application with rear mounted shock absorbers.....	39
	13.8 HD axle seat Ø127 - Overslung application with rear mounted shock absorbers.....	39
	13.9 HD axle seat □150 - Underslung application with front mounted shock absorbers.....	40
	13.10 HD axle seat □150 - Overslung application with front mounted shock absorbers.....	40
	13.11 HD axle seat □150 - Underslung application with rear mounted shock absorbers.....	41
	13.12 HD axle seat □150 - Overslung application with rear mounted shock absorbers.....	41
14	Other used shock absorber options.....	42
	14.1 Rear mounted shock absorber for underslung application.....	42
	14.2 Rear mounted shock absorber for overslung application.....	42
15	Other used air spring options.....	43
	15.1 Air spring Ø300 - Offset 30 or 50mm.....	43
	15.2 Air spring Ø350 - Offset 30 or 50 or 95mm.....	44
	15.3 Air spring Ø350 - Offset 56mm.....	45
	15.4 Air spring Ø350 Reinforced - Offset 30 or 50mm.....	46

General notes

The installation instructions in this manual are specific for the VDL Weweler MBS-HD air suspension for Fuwa K-Hitch (FKH) and not valid for other systems. The used assembly jig(s) are examples that can assist with proper installation. The illustrated chassis and cross bracings are solely drawn as examples for installation as cross bracing and component dimensions depend upon the respective vehicle type and its field of application. The data is intended as a guideline for the trailer builders vehicle design.

The design of the vehicle chassis is always the responsibility of the trailer builder.

Further desired or required data for the VDL Weweler air suspensions such as additional dimensions, permitted center of gravity heights, etc. can be found in the additional technical documents (f.e. the standard and/or application system drawings).

Welding remarks

The trailing arms, air bags and plastic shock absorber covers are to be protected against welding sparks and weld spatter when carrying out all welding work. The earth clamp must never be connected to the trailing arm or the axle hub.

No welding is allowed on the trailing arms!

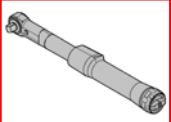
Warranty and liability

VDL Weweler B.V. warrants all in house manufactured products and all non VDL Weweler components needed to complete a VDL Weweler product, for a period as per listed in the “Warranty tables” in the “VDL Weweler General Defects Liability Statement Trailer” or otherwise agreed in writing.

The “VDL Weweler General Defects Liability Statement Trailer” can be downloaded from our website www.vdlweweler.nl.

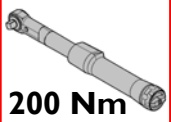
Pictograms & symbols

In this manual the following pictograms and symbols are used to illustrate specific instructions or warnings:



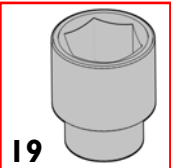
30 Nm

Use an appropriate calibrated torque wrench.
Tighten the fastener to the torque in Nm given in the left-hand corner.



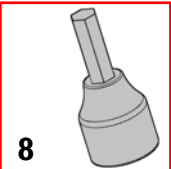
**200 Nm
+ 180°**

Use an appropriate calibrated torque wrench.
Tighten the fastener to the torque in Nm + the additional specified turn of the fastener in degrees given in the left-hand corner .



19

Use a socket wrench.
The value in the left-hand corner is the socket wrench size in mm.



8

Use a hex socket wrench.
The value in the left-hand corner is the hex socket wrench size in mm.



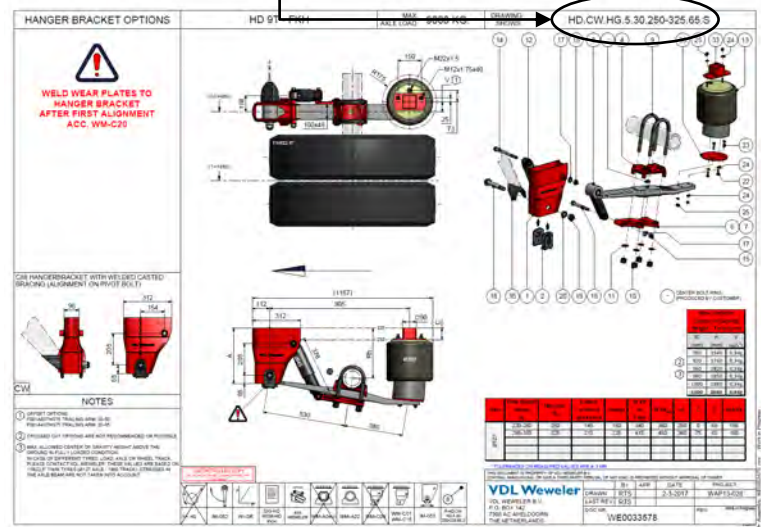
Use a rubber or plastic hammer.



CAUTION
Weight exceeds 25 kg.

I - Explanation MBS-HD Air Suspension system coding

The MBS-HD air suspension code refers to the available standard system drawings or customer specific application drawings. The code can be found at the righthand top on the drawing.



HD.A.RC.5C.36L.385.95

Air spring offset

Nominal ride height (minimum ride height with lifted axle)

Air spring

30 = EURO (Ø300)	36L = E2ST2 (Ø350)
30C = EURO-COMBO (Ø300)	36LT = E2ST2 (Ø350 - 45°)
30L = EURO-HYBRIDE (Ø300)	36LR = E2ST2R (Ø350 REINFORCED PISTON)
36 = E1ST2 (Ø350)	36LS = E2ST2S (Ø350 SWIVEL PISTON)
36R = E1ST2R (Ø350 REINFORCED PISTON)	36L4 = E2 (Ø350 - 4 STUDS)
36S = E1ST2S (Ø350 SWIVEL PISTON)	36M4 = F12 (Ø370 - 4 STUDS)
364 = E1 (Ø350 - 4 STUDS)	36ML = F14 (Ø350)

Axle clamping

3 = Ø133	7A = □150 - U-BOLT VERSION
4 = □120 BPW	7B = □150 HD - U-BOLT VERSION
5 = Ø127	7C = □150 HD
5C = Ø127 HD	8 = Ø146
6 = □120	8C = Ø146 HD
7 = □150	9 = NO CLAMPING

USE ADDITION "L" FOR EXTENDED U-BOLT PLATE

Trailing arm

H - Serie	= 100x48mm trailing arms
E & I - Serie	= 100x54mm trailing arms
R - Serie	= 100x59mm trailing arms
D - Serie	= 100x35mm + 100x35mm trailing arms
B & G - Serie	= 100x35mm + 100x45mm trailing arms
C - Serie	= 100x45mm + 100x45mm trailing arms

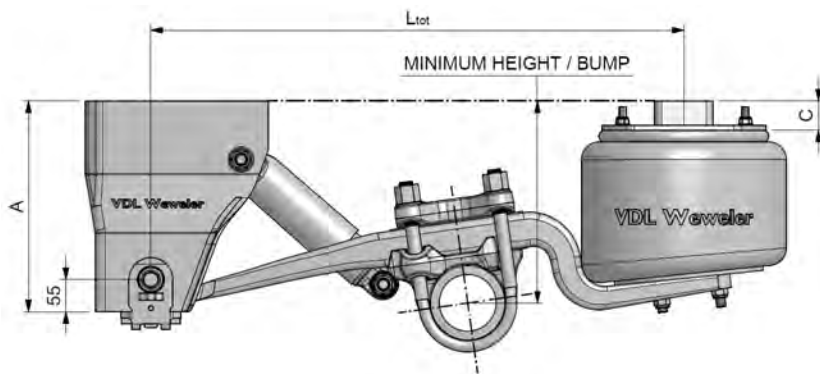
Hanger bracket

A	= UT001A36. / UT001A45. / UT001A88.
AM	= UT001A25.
C	= UT00C36. / UT00C45. / UT00C88.
CM	= UT00C25.
S	= TILT VERSION TYPE A & C (3° OR 5°)

USE ADDITION "B" FOR BOLT-ON BRACING
USE ADDITION "W" FOR WELDED CASTED BRACING
USE ADDITION "S" FOR DISC ALIGNMENT

2. Technical specifications / design information

MBS-HD air suspension system layout and overall system dimensions.



Minimum height & Bump:

Internal bump stops inside the air spring are used to limit the upward suspension stroke.

Bump

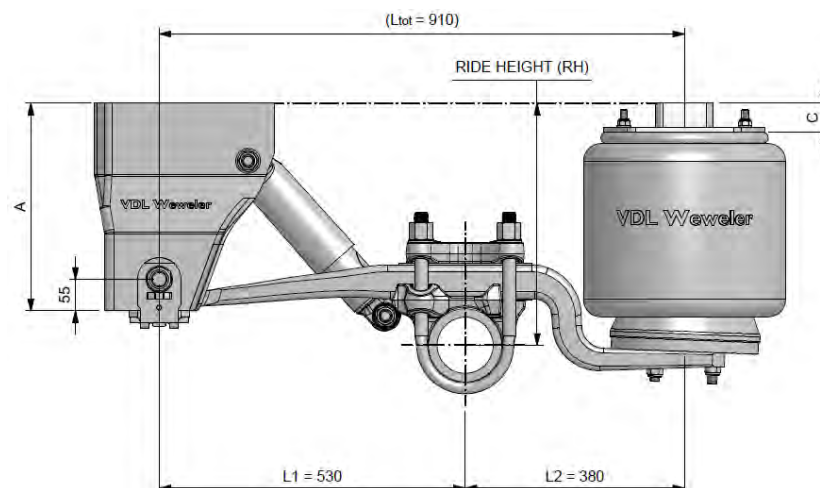
When the vehicle is empty without air the system rests on the bumpstop. This gives the system "Bump" dimension. The dimension bump also determines the lift height.

Minimum height (MH)

When the vehicle is fully laden without air the bump is compressed by a certain distance depending on the type of air spring.

This gives the system "Minimum Height" dimension (MH).

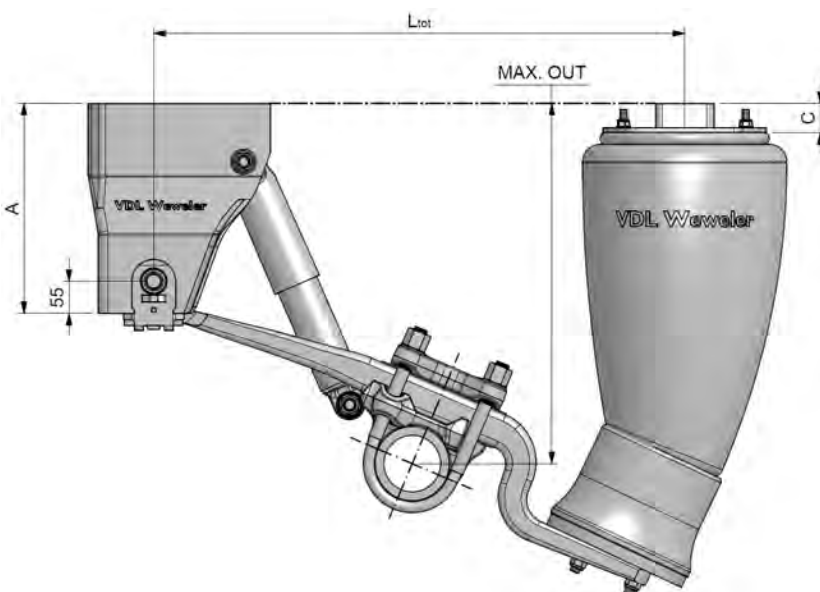
When an air spring failure occurs the internal bump stops enables the user to run (without air pressure) at very low speed for a short period of time to get to the nearest service station. To prevent further damage, always make sure that there is enough clearance for all moving parts.



Ride height (RH):

The ride height can be set with the levelling valve within a certain range. Check the specific system drawing for the possible settings.

If the vehicle is equipped with a raise/lower valve it is only allowed to use this valve for loading and unloading. Driving with the valve engaged may cause damage to the load, trailer, brakes and suspension system.



Max. out:

The VDL Weweler air suspension systems have been engineered so that the shock absorber acts as the outbound stroke limitation.

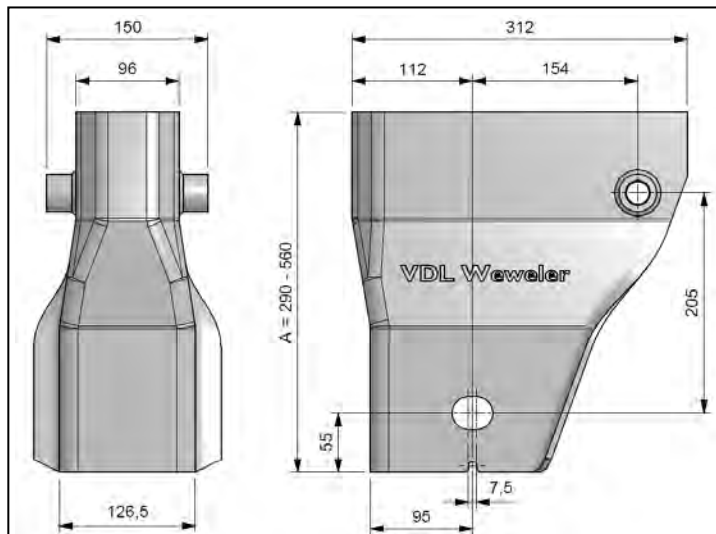
This obviates the need for check straps or other suspension stops.

The maximum shock absorber length and the air spring height at this maximum outward position are in relation to each other. Therefore the system configuration (hanger bracket height "A" and pedestal "C") may not be changed without the approval of VDL Weweler.

3. Hanger brackets & pedestals

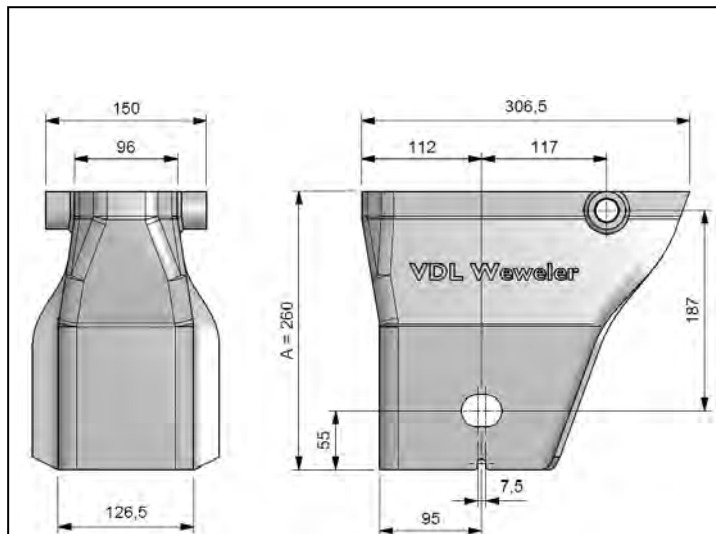
3.1 Dimensions of hanger brackets & pedestal

3.1a Standard hanger brackets



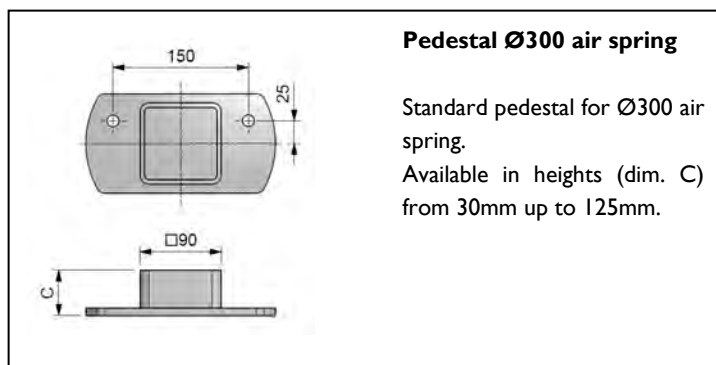
Hanger bracket (type "C") with system alignment option.
Standard hanger brackets available in heights (dim. A) from 290mm up to 560mm.
Separate wear/alignment plates are required.
At FKH used in combination with the welded casted bracing which creates type "CW".
Wear plates must be welded after alignment.

3.1b Special low hanger bracket



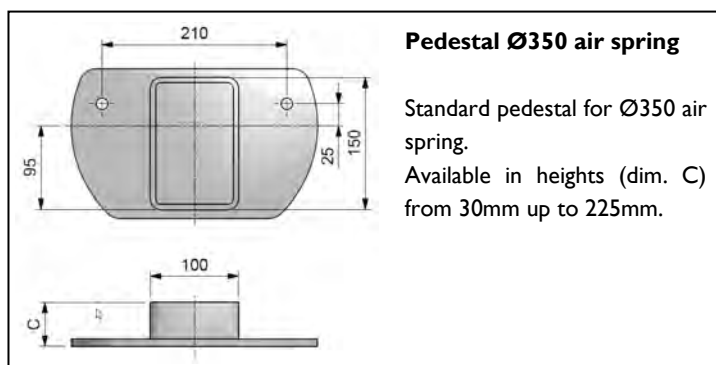
Hanger bracket (type "C") with system alignment option.
This low hanger bracket is only available in a height (dim. A) of 260mm. and only suitable for chassis beams with a maximum width of 150mm.
Separate wear/alignment plates are required.
At FKH used in combination with the welded casted bracing which creates type "CW".
Wear plates must be welded after alignment.

3.1c Pedestals



Pedestal Ø300 air spring

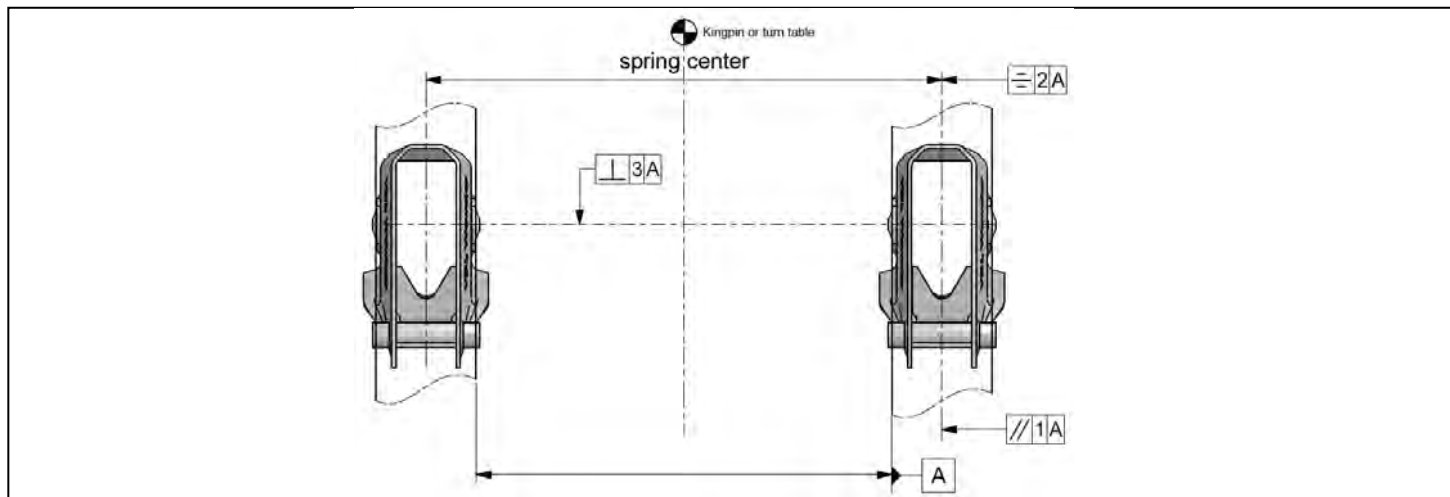
Standard pedestal for Ø300 air spring.
Available in heights (dim. C) from 30mm up to 125mm.



Pedestal Ø350 air spring

Standard pedestal for Ø350 air spring.
Available in heights (dim. C) from 30mm up to 225mm.

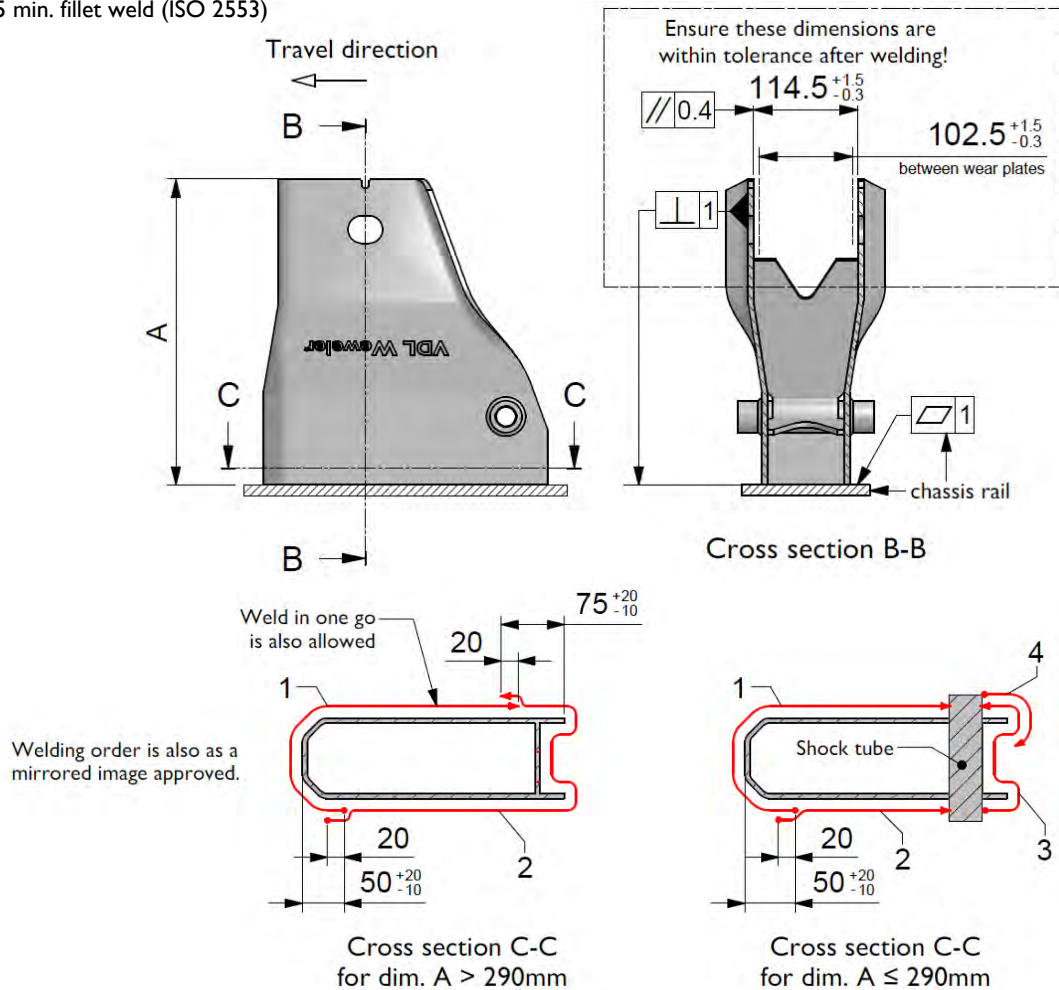
3.2 Alignment of hanger bracket



3. Hanger brackets & pedestals

3.3 Welding of hanger bracket

Weld thickness: S8a5 min. fillet weld (ISO 2553)



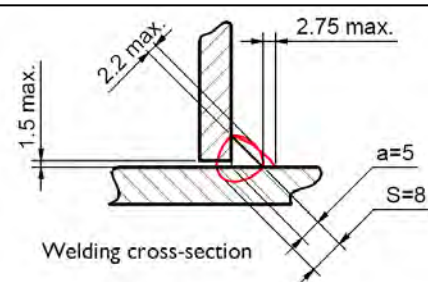
Welding order:

— Tack weld ● Begin → End

Material chassis = CEV ≤ 0.47%

CEV = C + (Mn/6) + ((Cr+Mo+V)/5) + ((Ni+Cu)/15)

Item	Specifications
Welding wire	Acc. DIN EN ISO 14341. Material-Nr 1.5125, Ø1.2 mm
Supply	I-wire technique
Gas mixture	92-8 Argon / O ₂ or Sagox2 84-13-3 Argon / CO ₂ / O ₂ or Sagox10 90-10 Argon / CO ₂
Welding parameters	Current: 240 - 340 A Puls voltage: 26 - 40 V



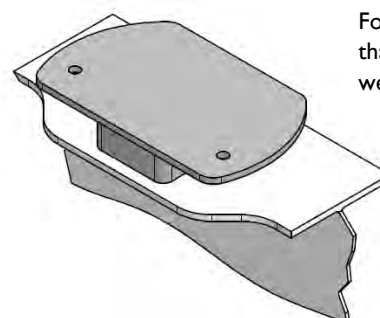
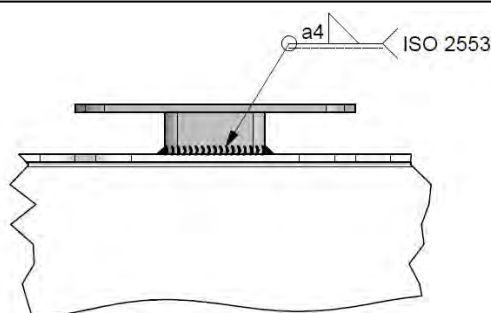
Check up:

1. Demands and qualification according DIN EN ISO 15614-1.

2. Judgement of craters according DIN EN ISO 5817 acc. class C.

Except for the numbers: 2011, 2012, 2016, 2017, 5012, 5213. Those should be judged according DIN EN ISO 5817 acc. **class B**.

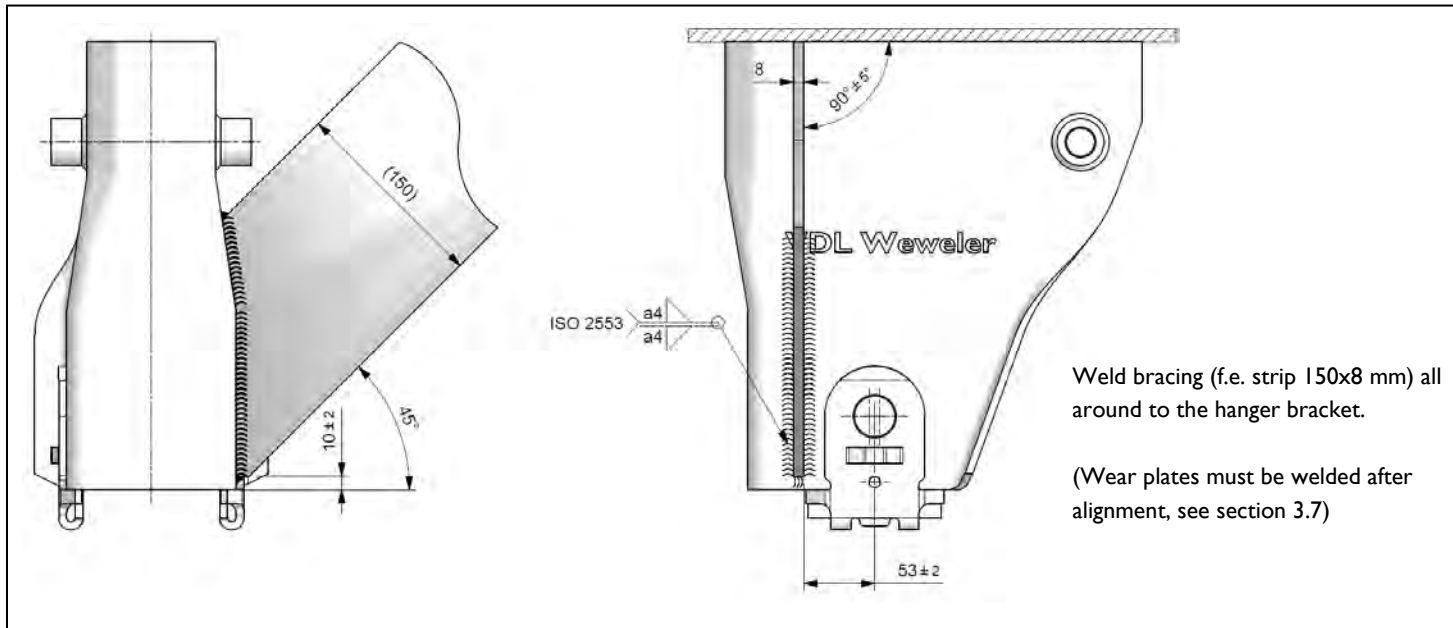
3.4 Welding of pedestal



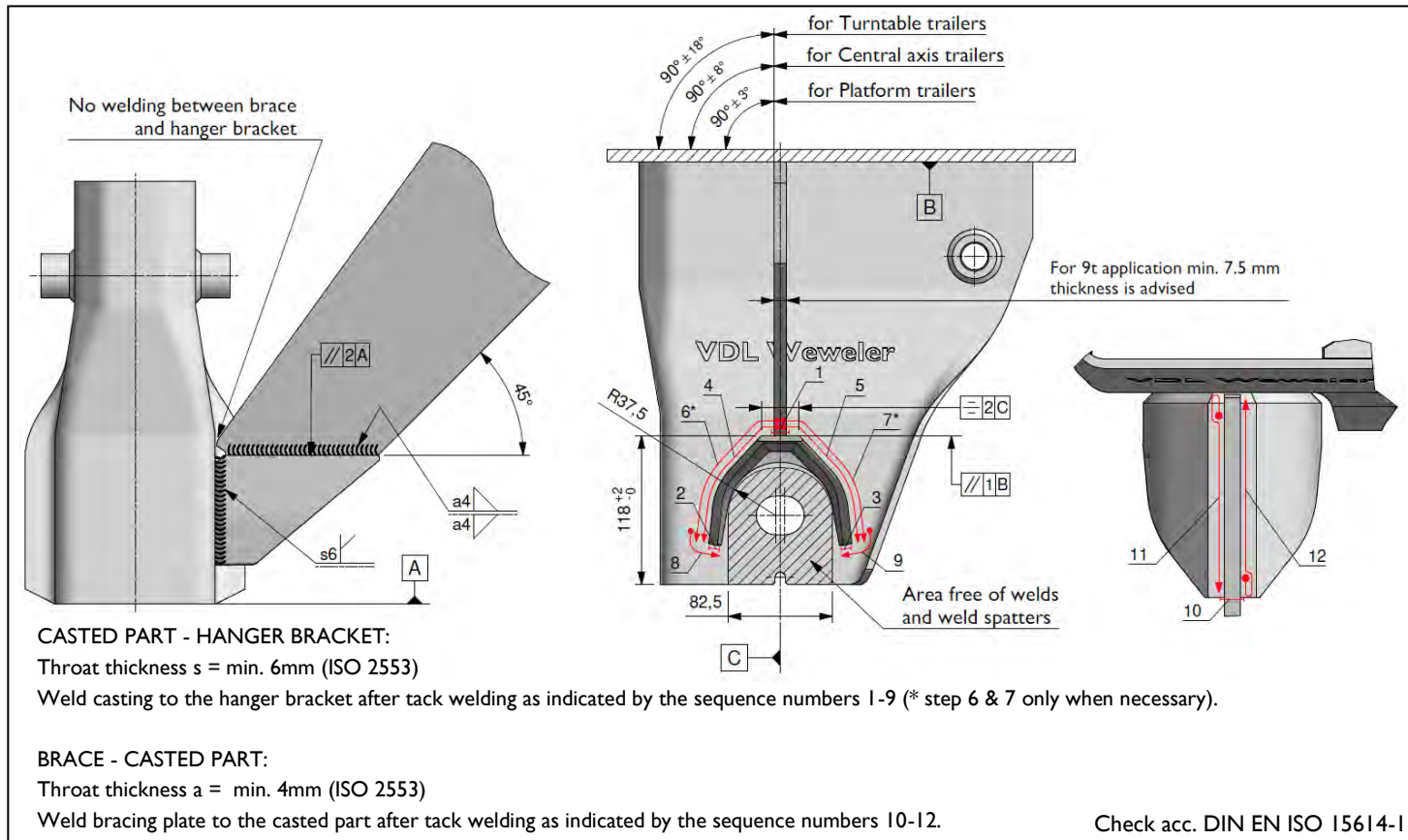
For pedestal heights less than 40mm it is sufficient to weld two opposite sides.

3. Hanger brackets & pedestals

3.5 Welding of plate for hanger bracket bracing



3.6 Welding of casting for hanger bracket bracing



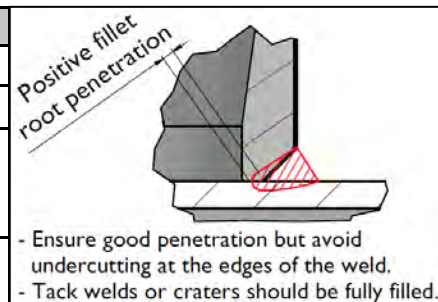
Welding order:

— Tack weld — Begin — End

Material brace = CEV $\leq 0.47\%$

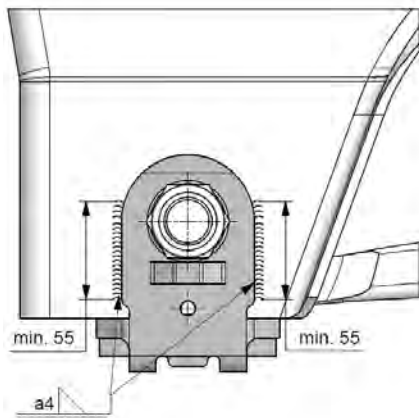
CEV = $C + (Mn/6) + ((Cr+Mo+V)/5) + ((Ni+Cu)/15)$

Item	Specifications
Welding wire	Acc. DIN EN ISO 14341. Material-Nr I.5125, $\varnothing 1.2\text{ mm}$
Supply	I-wire technique
Gas mixture	92-8 Argon / O_2 or 84-13-3 Argon / CO_2 / O_2 or 90-10 Argon / CO_2
Welding parameters	Current: 240 - 340 A Puls voltage: 26 - 40 V

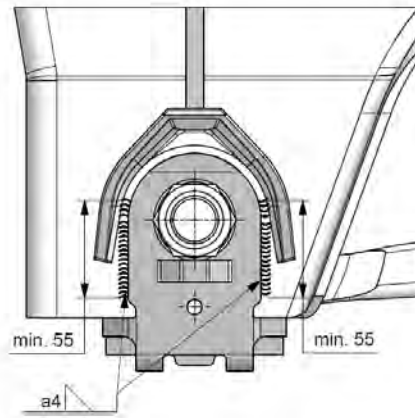


3. Hanger brackets & pedestals

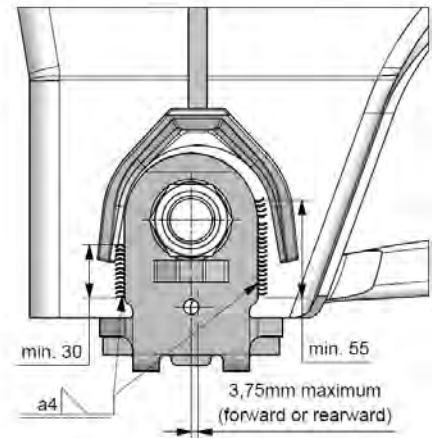
3.7 Welding of wear plates after alignment



Weld wear plates as shown after alignment where the casted brace has not been welded in place yet or is on the side of the hanger bracket that has no brace.
A full weld around the wear plate is also allowed.



Weld wear plates as shown after alignment where the casted brace has already been welded in place.

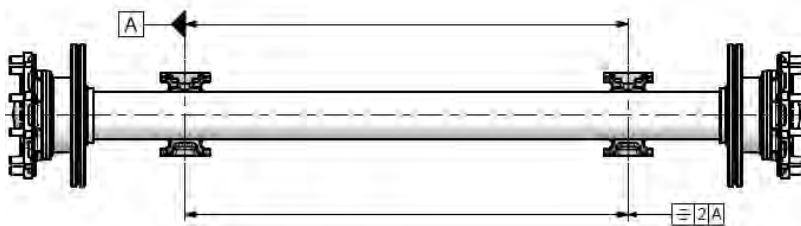


Welding as shown is only advised in cases where the alignment is done with the casted bracing in place and the wear plate is at its maximum alignment offset.

- NOTE:
- Both wear plates on each side of the hanger bracket must be welded.
 - Paint welded area afterwards in order to protect from oxidation.

4. Axle seat welding

4.1 Welding of standard axle seats for round axles

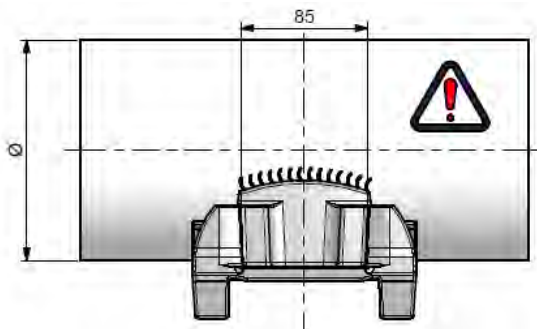
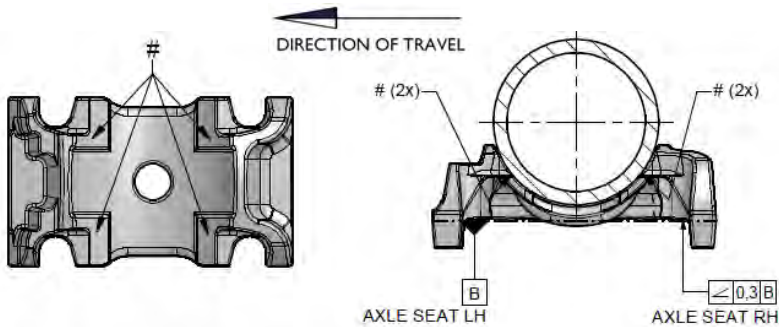


Before welding the temperature of the axle seat has to be $> 10^{\circ}\text{C}$ and follow the requirements of the axle manufacturer for the axle beam.

These instructions are valid for both underslung and overslung applications.

Both seats have to be positioned parallel horizontally and must be at the same level longitudinally to the axle beam. Max. variation in angle between seats = $0,3^{\circ}$. Ensure the axle beam contacts the four support surfaces of the axle seat #.

Ensure there is sufficient clamping force between the axle beam and the axle seat during tack welding (if possible use the weight of the axle beam on top of the axle seat) to avoid clearance arising between the axle beam and support surfaces of the axle seat. Do not use the U-bolts to clamp the seat in position as this may deform the axle seat or damage the U-bolts.



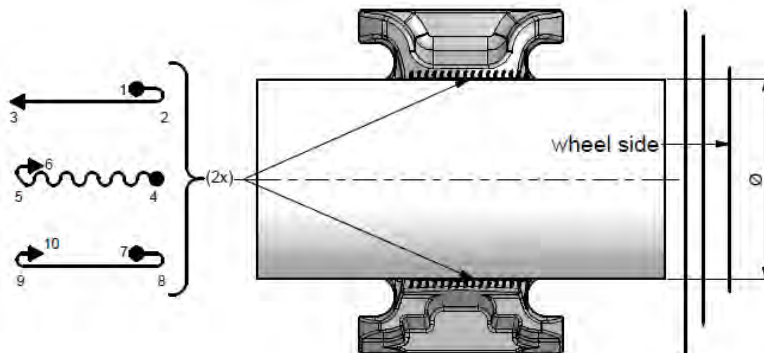
Note: Only weld the 85 mm. length on the front and back of the seat, as shown in the drawing.

Weld height $a=8$ mm. (ISO 2553)

Weld order (for MIG/MAG welds):

Building up of the weld in three layers as detailed below and shown in the drawing on the left.

Important: Weld first & second layer on one wheel end side (left or right), then weld the other wheel end side. And then go back and apply the third layer (as then the first two layers are cooled down enough).



1st layer:

- 1-2: Start weld from 1 and return through 180 degrees on initial weld.
- 2-3: Start "Stitching" welds.

2nd layer:

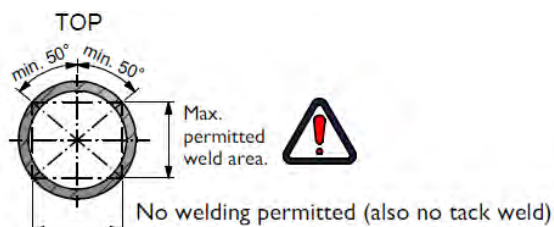
- 4-5: Start "Waving" welds.
- 5-6: Weld over to infill crater.

3rd layer:

- 7-8: Start weld from 7 on top of the weld and return through 180 degrees on initial weld.
- 8-9: Start "Seam" welds.
- 9-10: Weld over to infill crater.

General Welding Information

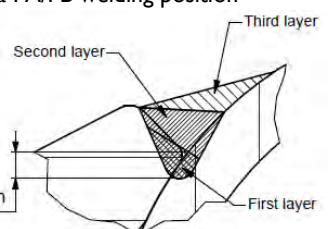
- Important: the earth connector should be attached to the axle beam in such a way that no welding current can be transferred to the bearing sets.
- Tack welds or craters should be fully filled.
- Never test the arc on the axle beam itself.



Rotate axle beam to obtain a PA/PB welding position (inverted welding)



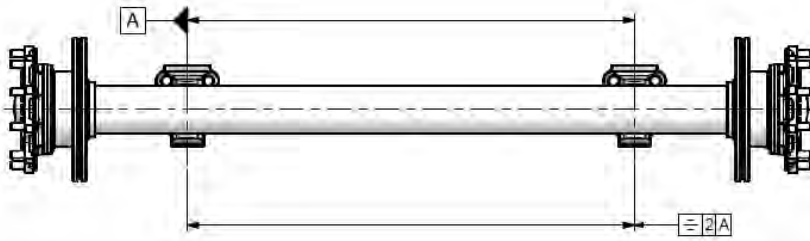
Positive fillet root penetration



Ensure good penetration but avoid undercutting at the edges of the weld.

4. Axle seat welding

4.2 Welding of HD axle seats for round axes

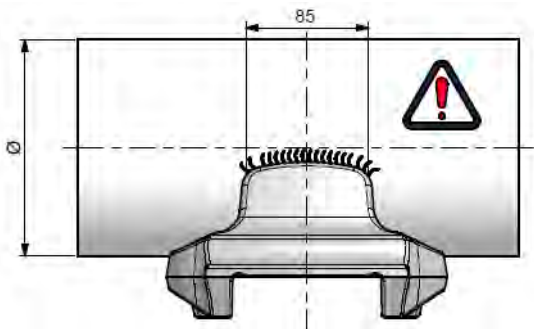
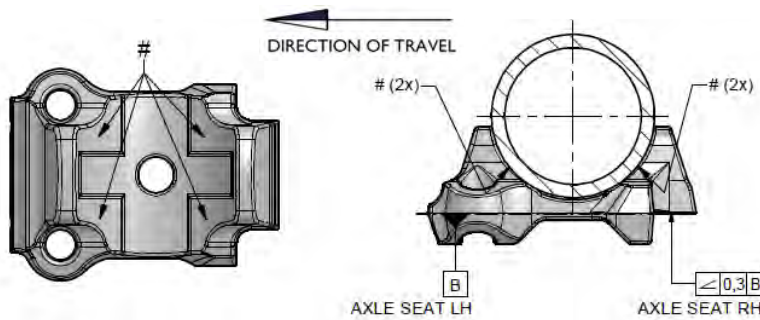


Before welding the temperature of the axle seat has to be $> 10^{\circ}\text{C}$ and follow the requirements of the axle manufacturer for the axle beam.

These instructions are valid for both underslung and overslung applications.

Both seats have to be positioned parallel horizontally and must be at the same level longitudinally to the axle beam. Max. variation in angle between seats = $0,3^{\circ}$. Ensure the axle beam contacts the four support surfaces of the axle seat #.

Ensure there is sufficient clamping force between the axle beam and the axle seat during tack welding (if possible use the weight of the axle beam on top of the axle seat) to avoid clearance arising between the axle beam and support surfaces of the axle seat. Do not use the U-bolts to clamp the seat in position as this may deform the axle seat or damage the U-bolts.



Note: Only weld the 85 mm. length on the front and back of the seat, as shown in the drawing.

Weld height $a=8$ mm. (ISO 2553)

Weld order (for MIG/MAG welds):

Building up of the weld in three layers as detailed below and shown in the drawing on the left.



Important: Weld first & second layer on one wheel end side (left or right), then weld the other wheel end side. And then go back and apply the third layer (as then the first two layers are cooled down enough).

1st layer:

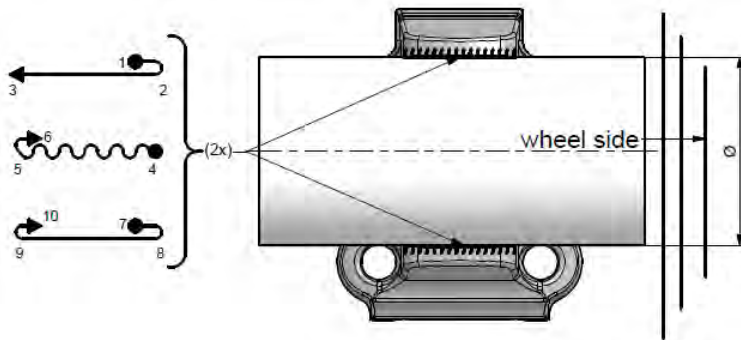
- 1-2: Start weld from 1 and return through 180 degrees on initial weld.
- 2-3: Start "Stitching" welds.

2nd layer:

- 4-5: Start "Waving" welds.
- 5-6: Weld over to infill crater.

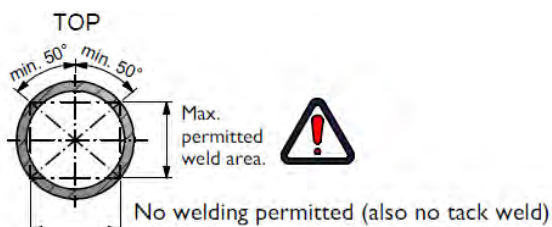
3rd layer:

- 7-8: Start weld from 7 on top of the weld and return through 180 degrees on initial weld.
- 8-9: Start "Seam" welds.
- 9-10: Weld over to infill crater.



General Welding Information

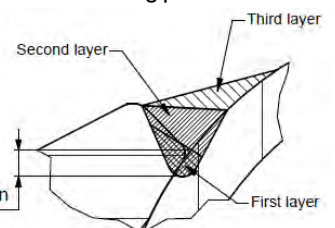
- Important: the earth connector should be attached to the axle beam in such a way that no welding current can be transferred to the bearing sets.
- Tack welds or craters should be fully filled.
- Never test the arc on the axle beam itself.



Rotate axle beam to obtain a PA/PB welding position (inverted welding)



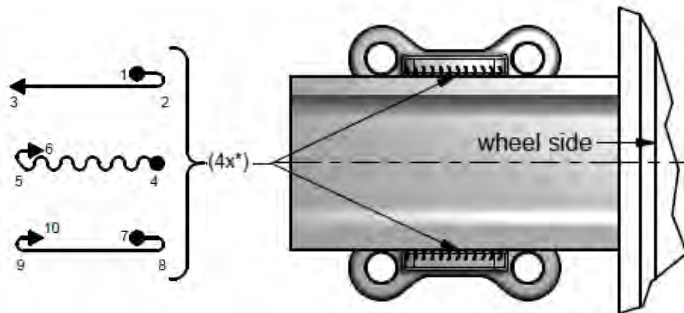
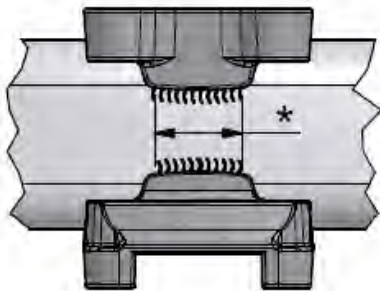
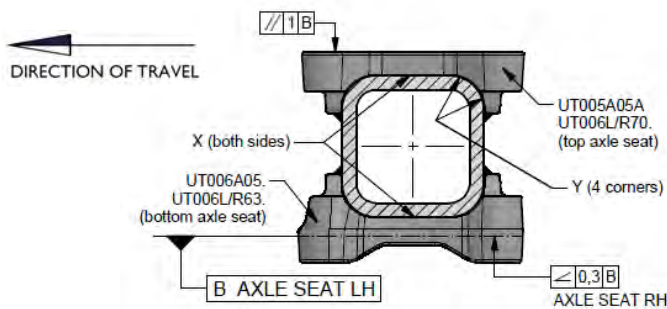
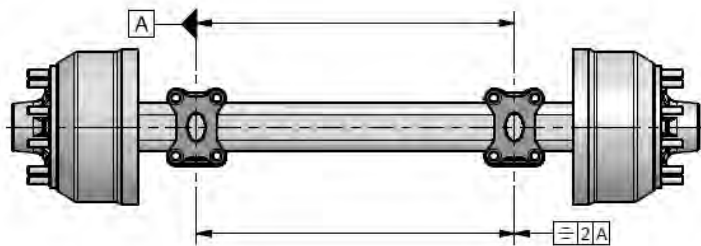
Positive fillet root penetration



Ensure good penetration but avoid undercutting at the edges of the weld.

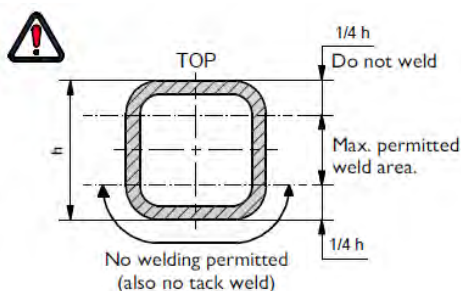
4. Axle seat welding

4.3 Welding of HD axle seats for square 150mm axles



General Welding Information

- Important: the earth connector should be attached to the axle beam in such a way that no welding current can be transferred to the bearing sets.
- Tack welds or craters should be fully filled.
- Never test the arc on the axle beam itself.



Before welding the temperature of the axle seat has to be $> 10^{\circ}\text{C}$ and follow the requirements of the axle manufacturer for the axle beam.

These instructions are valid for both underslung and overslung applications with front and rear mounted shock absorbers.

Bottom and top axle seats have to be positioned parallel horizontally and must be at the same level longitudinally to the axle beam. Max. variation in angle between seats = $0,3^{\circ}$

The axle beam must contact the base of the bottom and top axle seat (X) **OR** on two points in the radius of the axle seat on all 4 corners (Y).

Ensure there is sufficient clamping force between the axle beam and the axle seat during tack welding (if possible use the weight of the axle beam on top of the axle seat) to avoid clearance arising between the axle beam and support surfaces of the axle seat. Do not use the clamping (U-)bolts to clamp the seat in position as this may deform the axle seat or damage the (U-)bolts.

Weld height $a=8\text{ mm}$. (ISO 2553)

Weld order (for MIG/MAG welds):

Building up of the weld * in three layers as detailed below and shown in the drawing on the left.

Important: Weld first & second layer on one wheel end side (left or right), then weld the other wheel end side. And then go back and apply the third layer (as then the first two layers are cooled down enough).

1st layer:

- 1-2: Start weld from 1 and return through 180 degrees on initial weld.
- 2-3: Start "Stitching" welds.

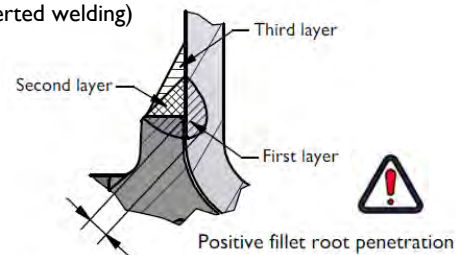
2nd layer:

- 4-5: Start "Waving" welds.
- 5-6: Weld over to infill crater.

3rd layer:

- 7-8: Start weld from 7 on top of the weld and return through 180 degrees on initial weld.
- 8-9: Start "Seam" welds.
- 9-10: Weld over to infill crater.

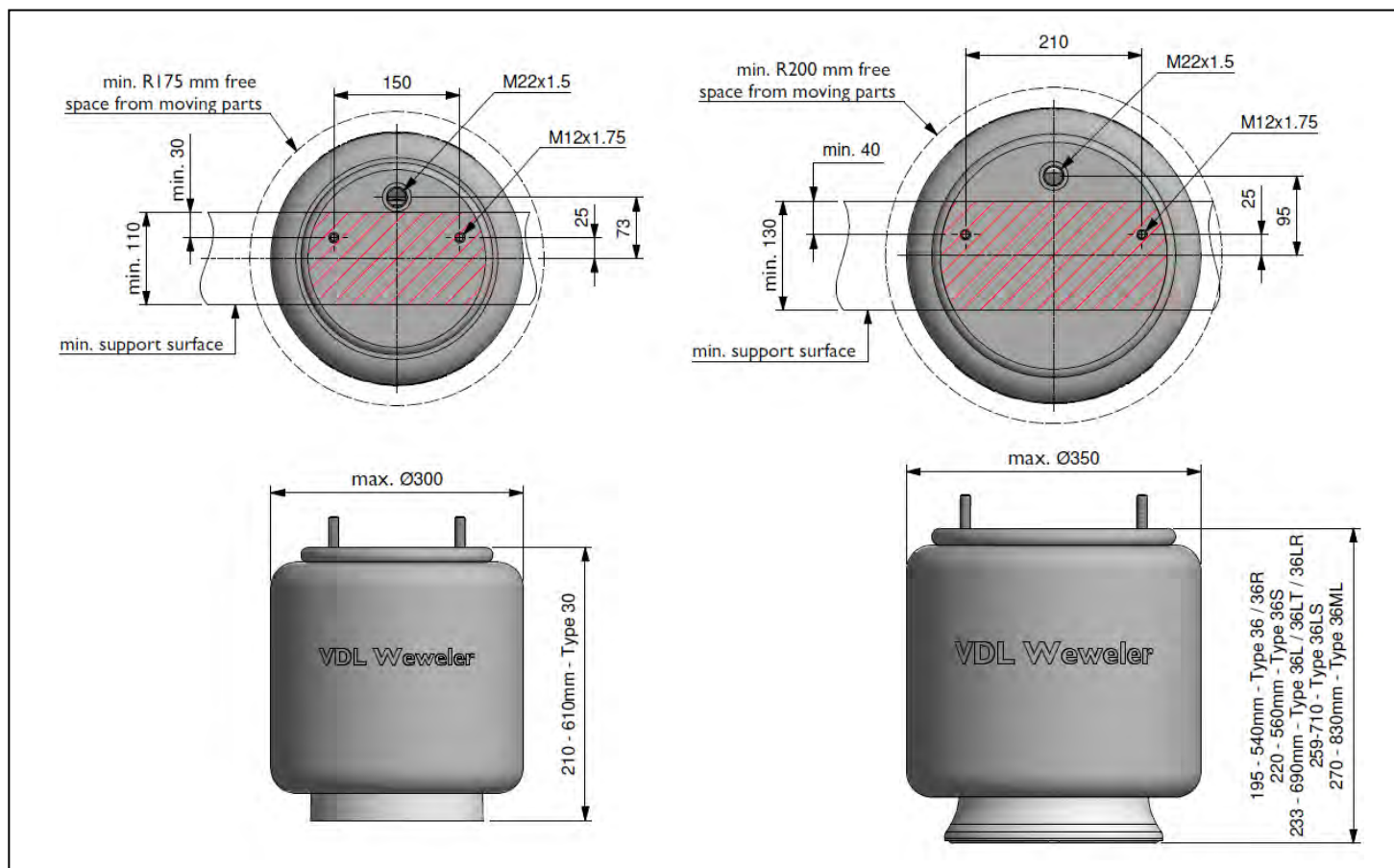
Rotate axle beam to obtain a PA/PB welding position. (inverted welding)



Ensure good penetration but avoid undercutting at the edges of the weld.

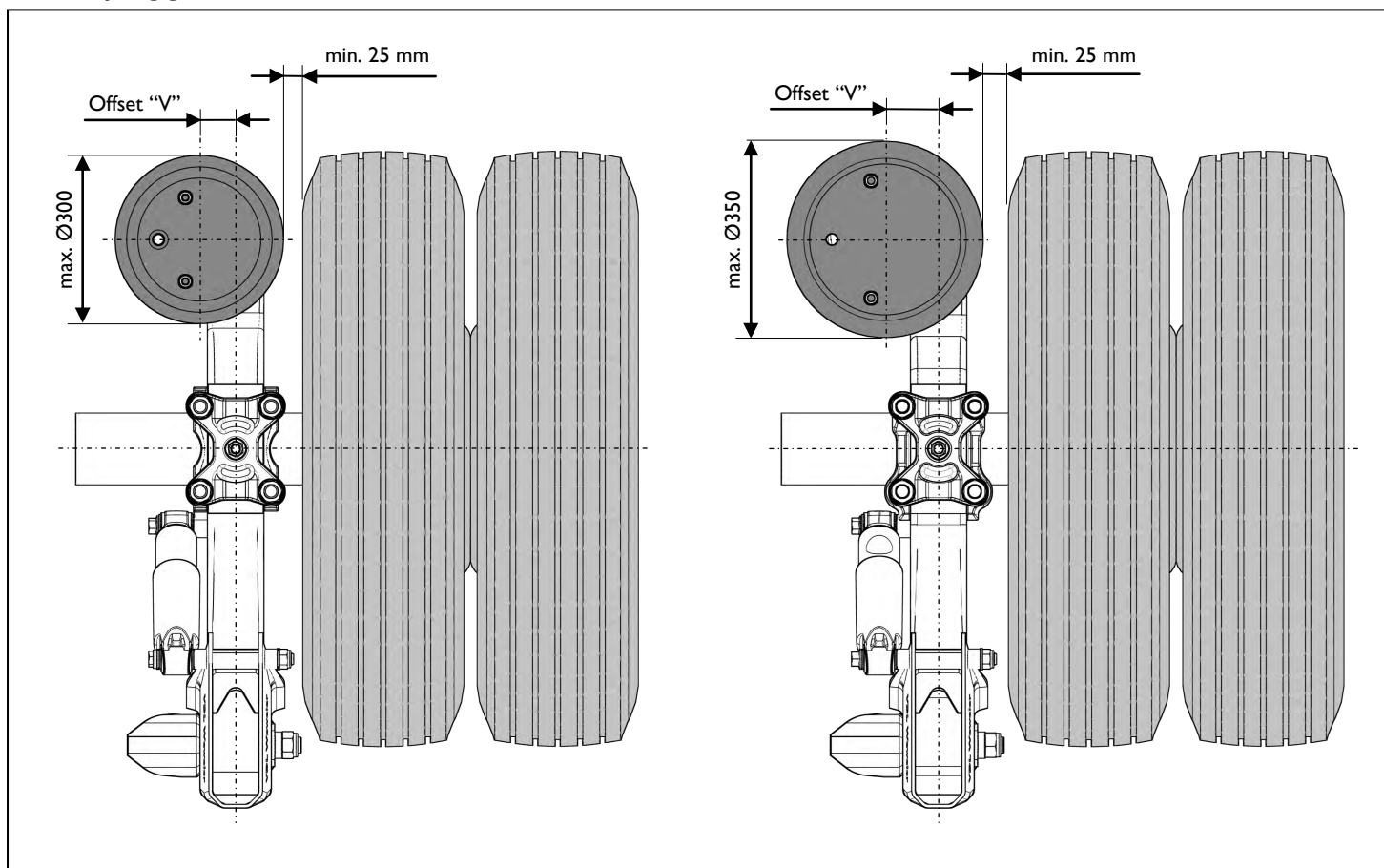
5. Air springs

5.1 Standard Ø300 & Ø350



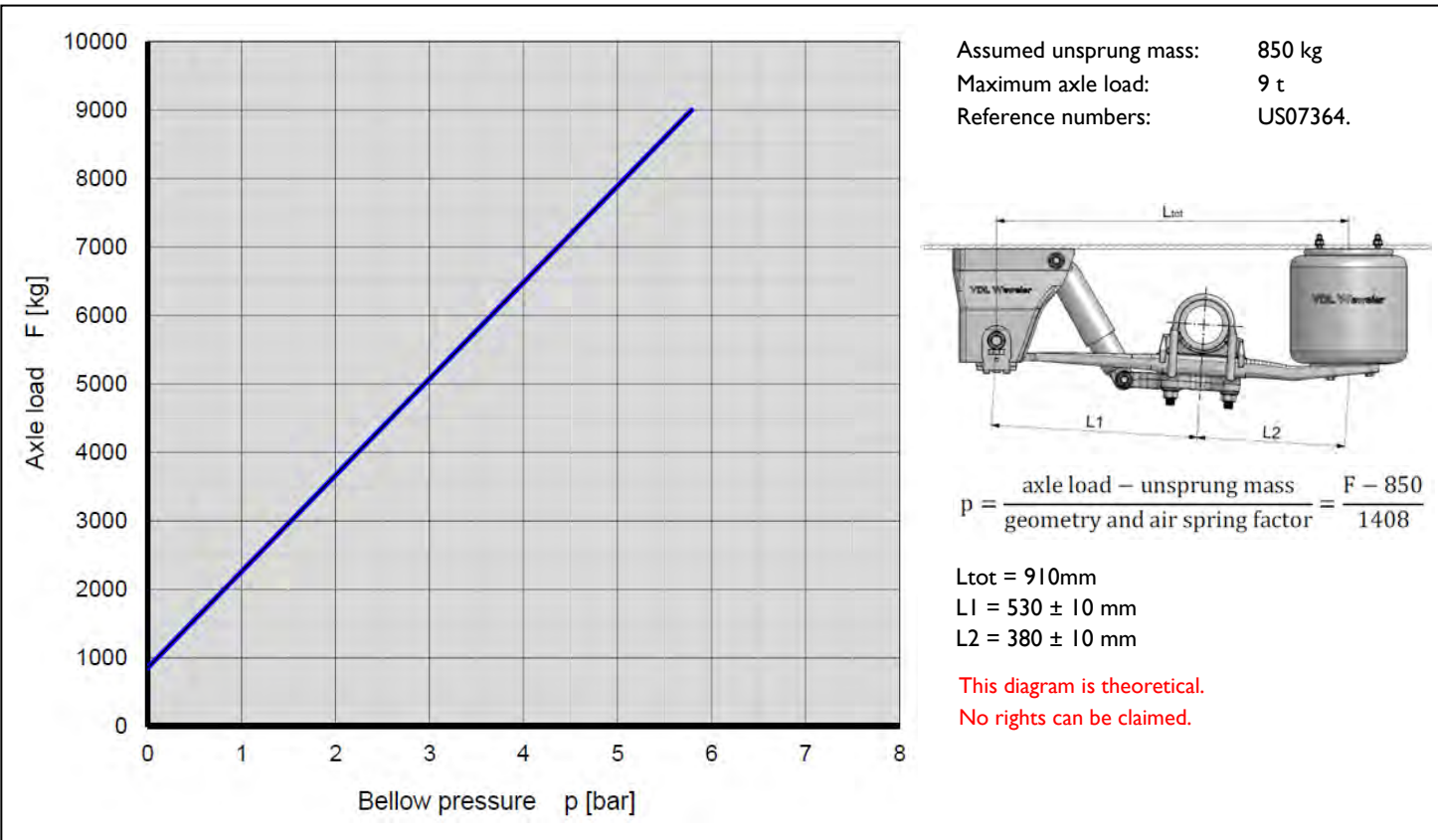
If the minimum support surface is less than indicated an additional support plate has to be added.

5.2 Air spring general clearance

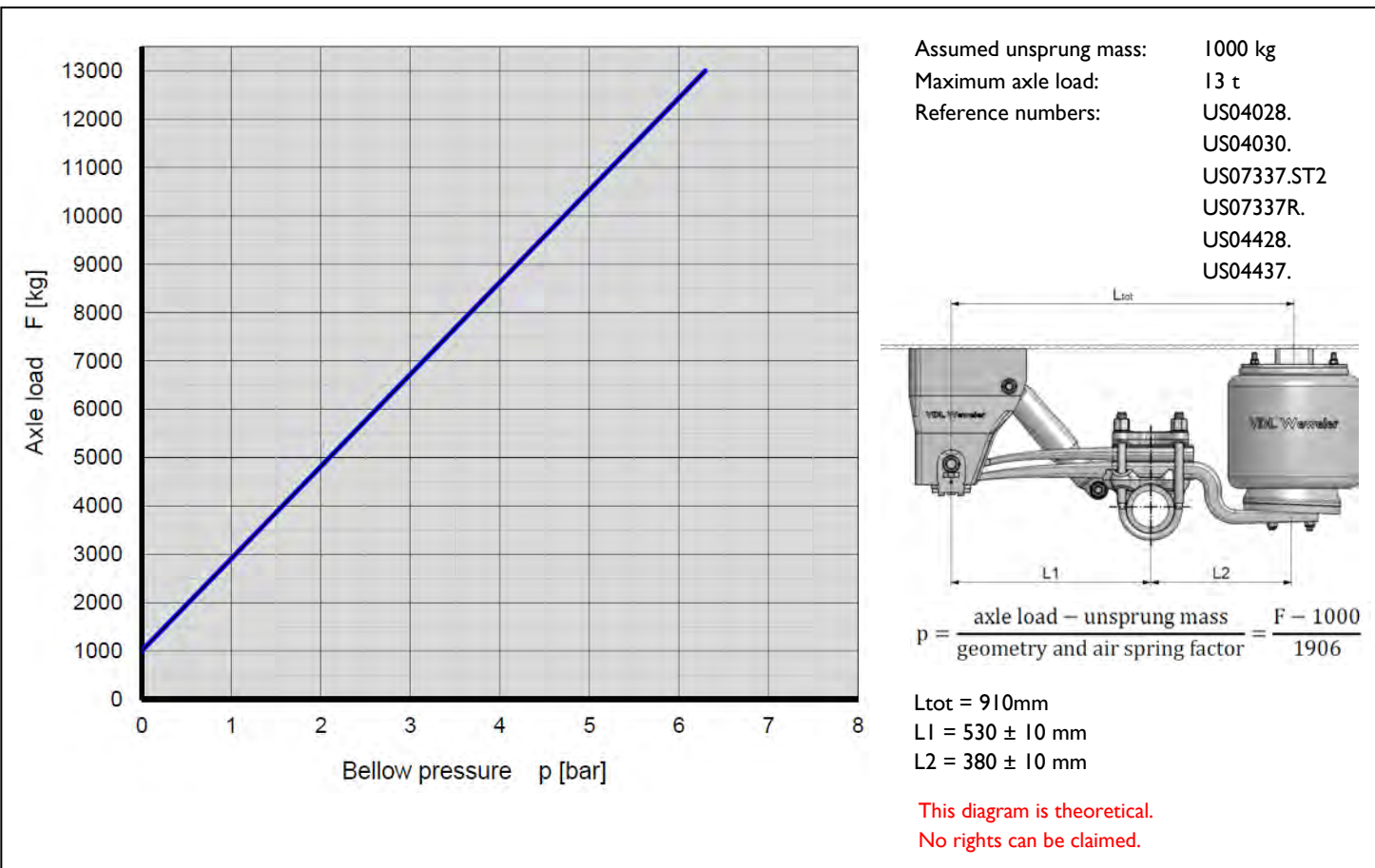


5. Air springs

5.3 Load-pressure diagram Ø300 air springs - standard system geometry

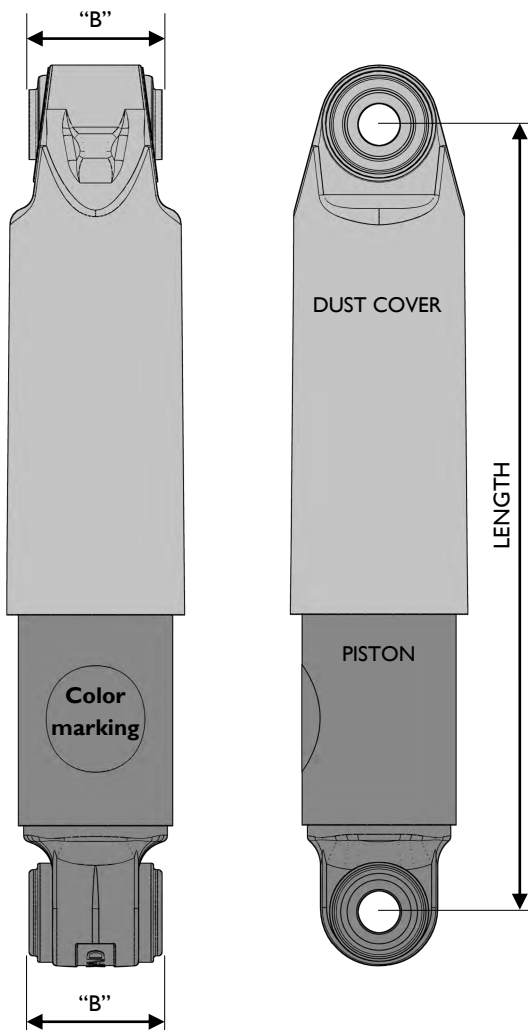


5.4 Load-pressure diagram Ø350 air springs - standard system geometry



In case of different system geometry, unsprung mass or air spring type please contact VDL Weweler for the correct diagram.

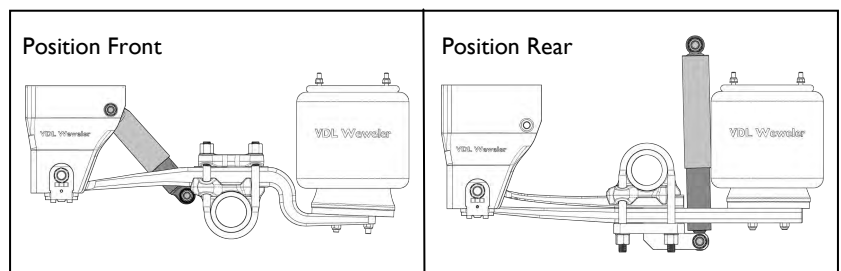
6. Shock absorber overview



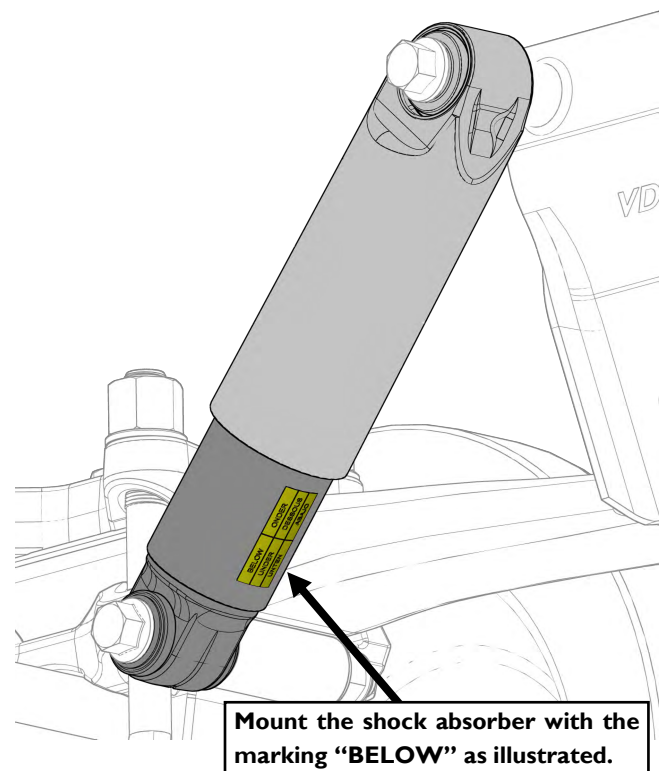
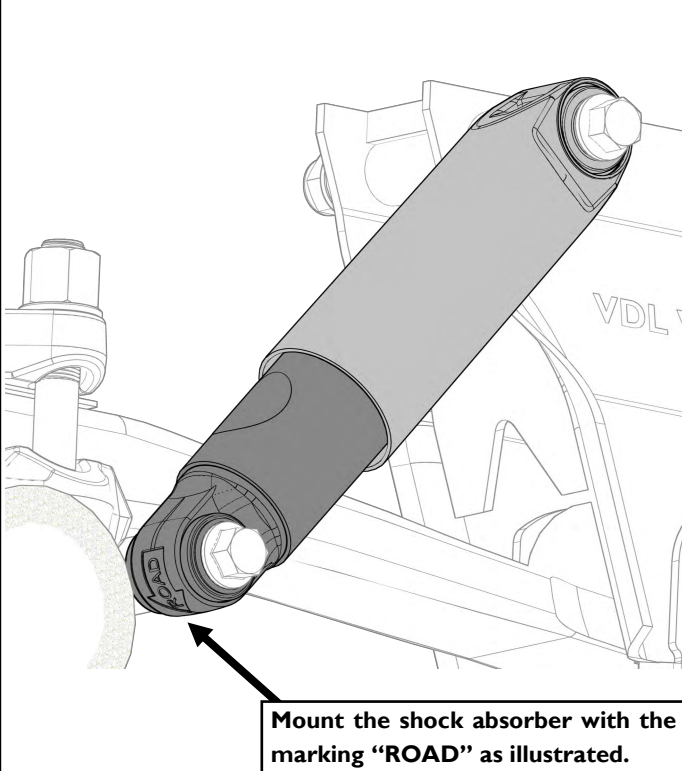
For the MBS-HD air suspension range are several standard shock absorbers available. These can be identified based on the type number and color. The plastic dust cover are in all cases black. The color is applied on the complete bottom piston part of the shock absorber or by means of a colored sticker on the shock absorber.

For the FKH systems only two shock absorbers are used. One front mounted and one read mounted version. In this case both are black.

Type	Color	Min. length	Max. length	Mounting	Width "B"	Position
2643W	Black	294 mm	429 mm	M20	62 mm	Front
2637S	Yellow	321 mm	479 mm	M20	62 mm	Front
2036W	Red	296 mm	429 mm	M20	62 mm	Front
2024SP3	Black	474 mm	791 mm	M24	55 mm	Rear

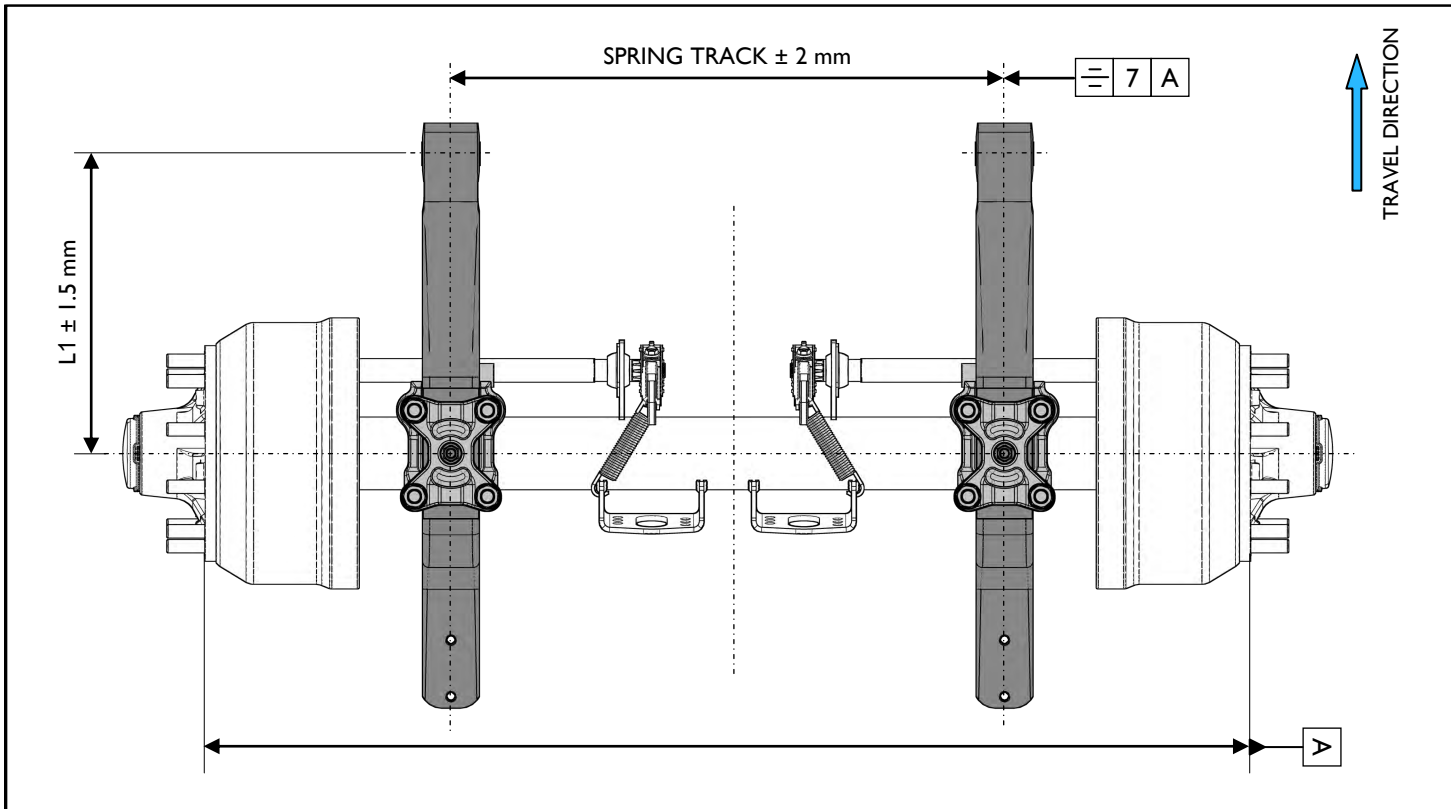


Follow the below instructions (if present on the shock absorber) when mounting the shock absorbers.

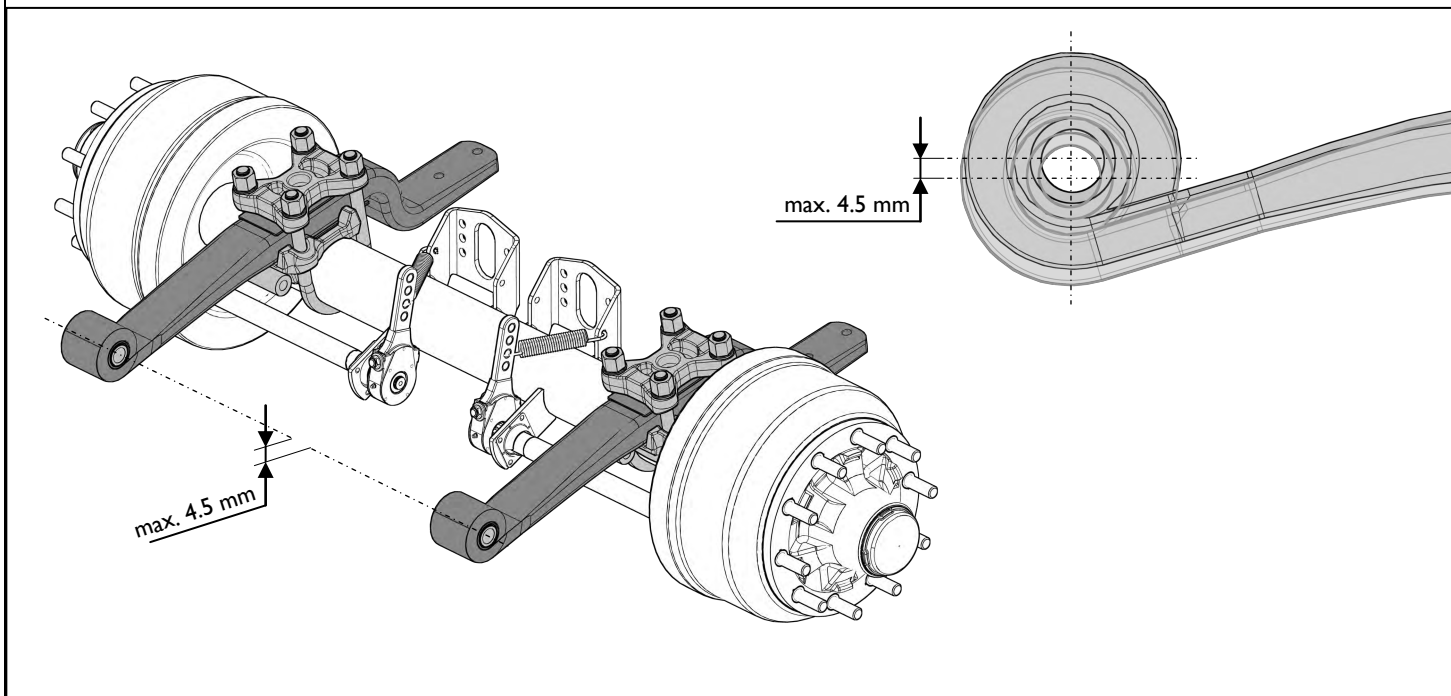


7. Alignment of system & axle

7.1 Alignment of air suspension versus axle

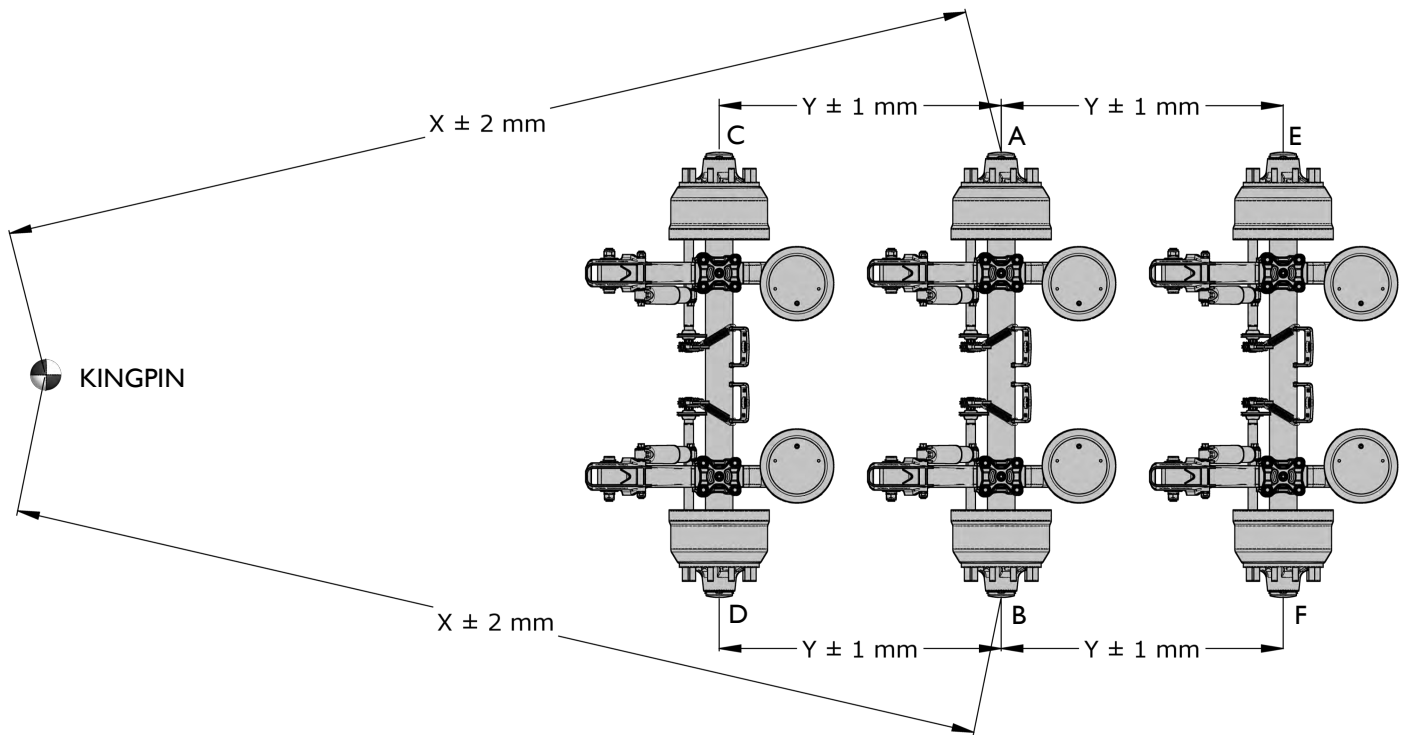


7.2 Alignment of trailing arm eye height



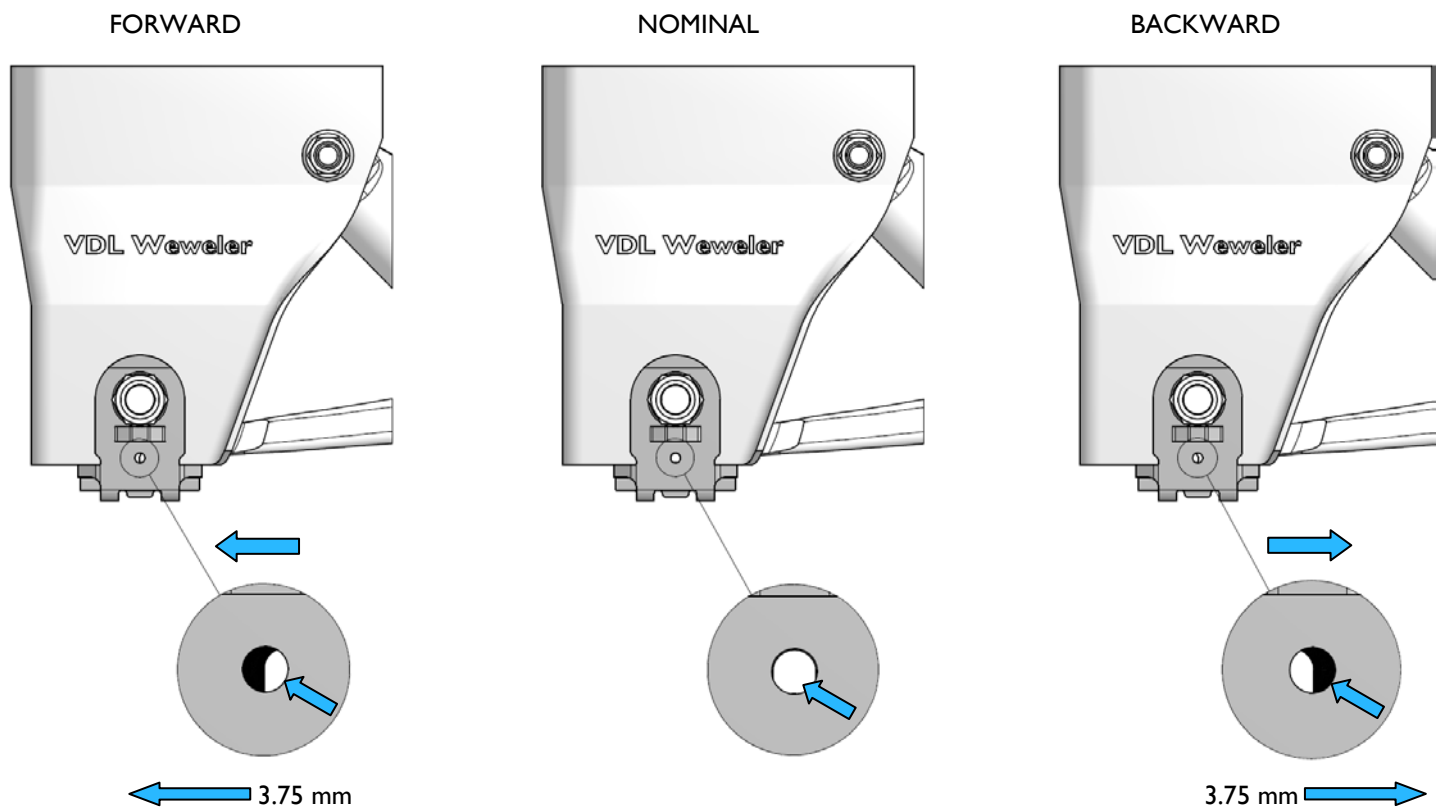
7. System & axle alignment

7.3 Alignment of axles



Align all axles (disc or drum) within the tolerances given at system ride height, taken the second axle as a reference. The same tolerances apply for alignment using a laser. A through F are the axle centres.

7.4 Adjusting the hanger bracket alignment

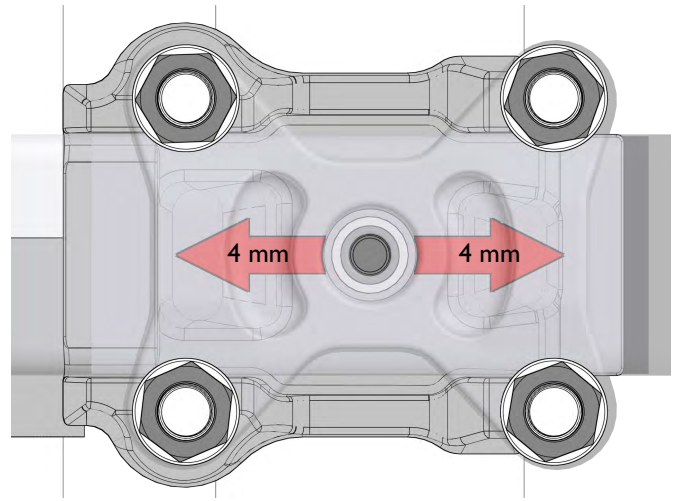
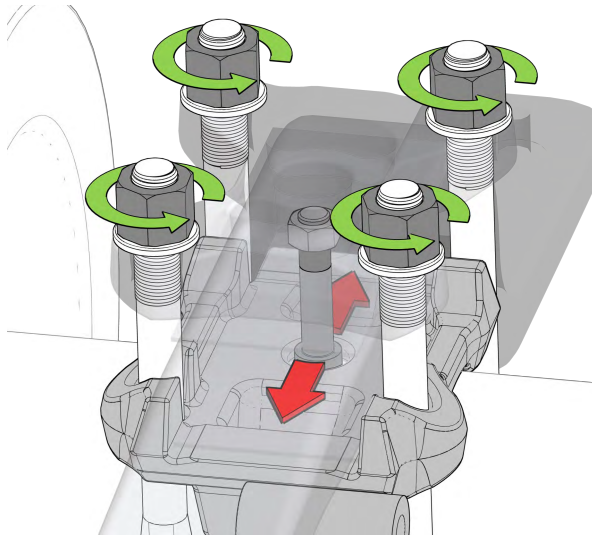


Due to slotted holes in the hanger bracket the pivot bolt and wear plates can move over 7 mm.

7. System & axle alignment

7.5 Adjusting the axle seat clamping alignment (centerbolt spacers must be removed for this procedure)

1. Check if the axle alignment is within the prescribed tolerances (see section 7.3). If the axle need (re-)aligning, follow the next steps for axle alignment in the axle seat clamping.

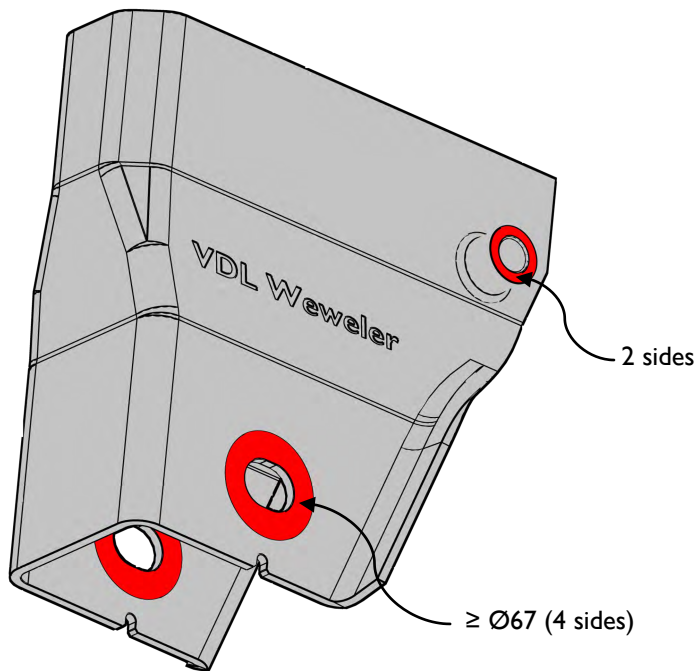


2. Loosen (U-)bolt nuts, until the axle can move in the clamping (nuts remain on (U-)bolt). Due to the clamping construction the aligning can now be adjusted within $\pm 4\text{mm}$ (each side).
3. Align the axle at ride height within the prescribed tolerances (section 7.3).
4. Tighten (U-)bolts at ride height according the prescribed procedure (see section)

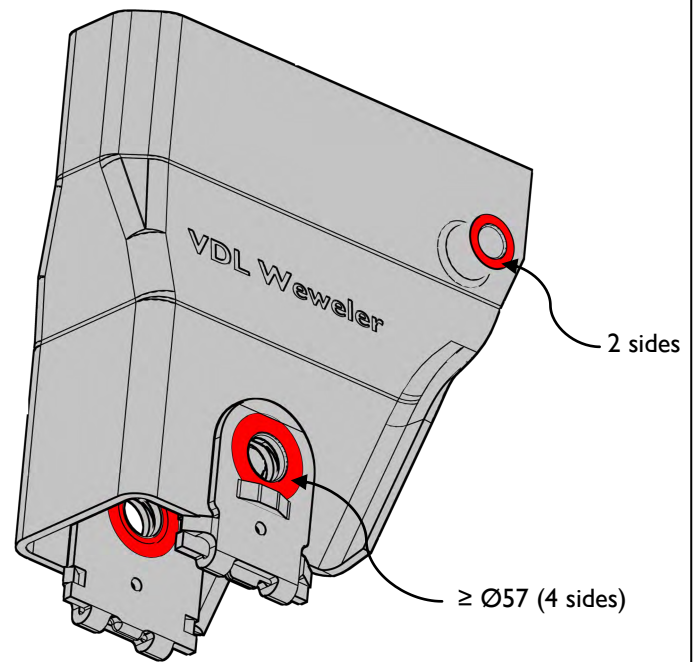
8. Paint instruction

The red marked areas are only allowed to be primed, KTL coated (max. 30µm) or zinc dipped (50 - 100µm).

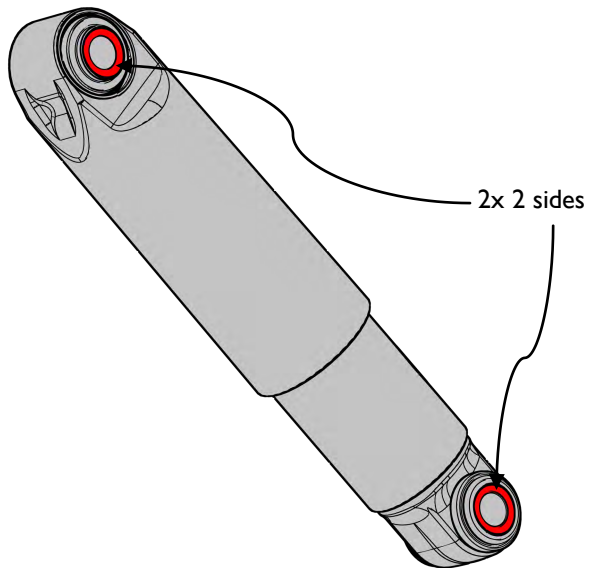
Hanger bracket with alignment option



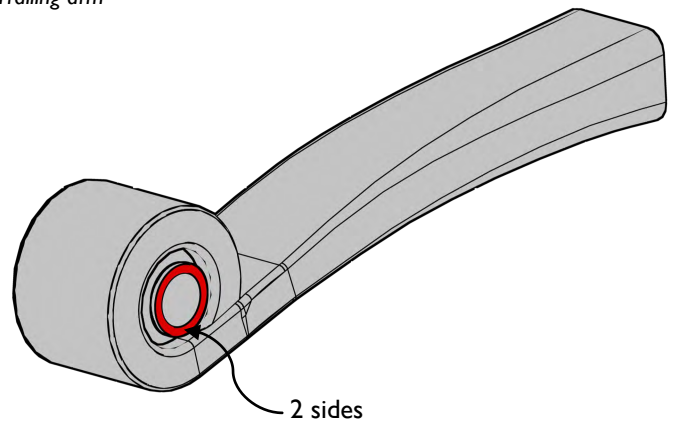
Hanger bracket with fixed welded wear plates



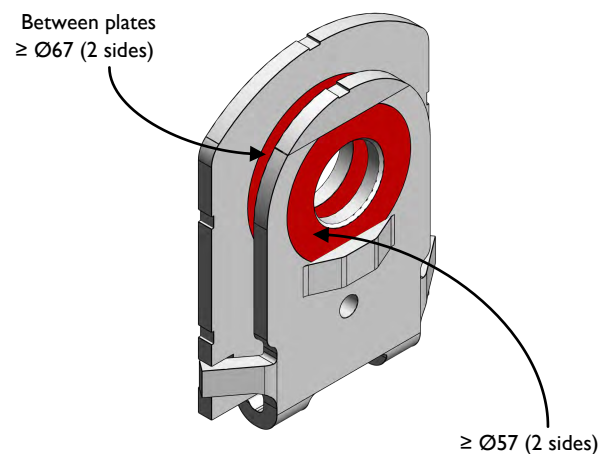
Shock absorbers



Trailing arm



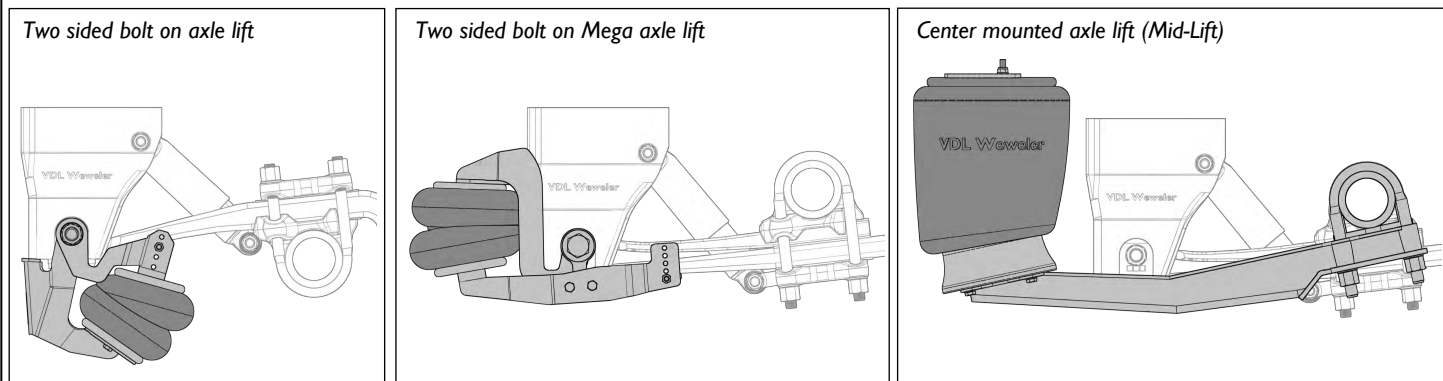
Wear plate (standard already KTL coated)



9. Axle lift

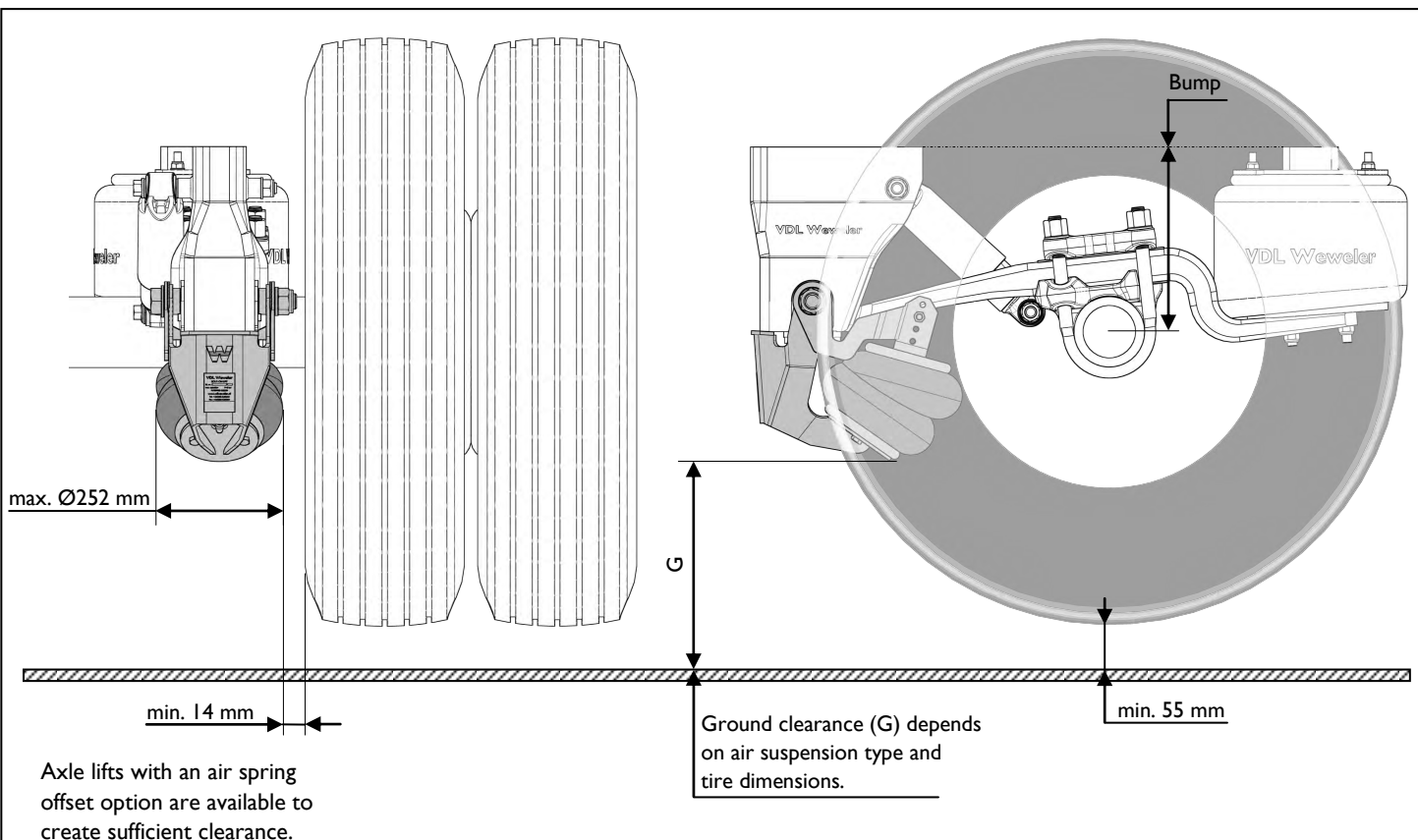
9.1 Axle lift versions

For the MBS-HD air suspension range several axle lifts are available. Depending on the air suspension system and application the most suitable axle lift can be selected. Please check the available individual system drawings or contact VDL Weweler for the required correct axle lift version. The axle lifts can be classified into three categories:



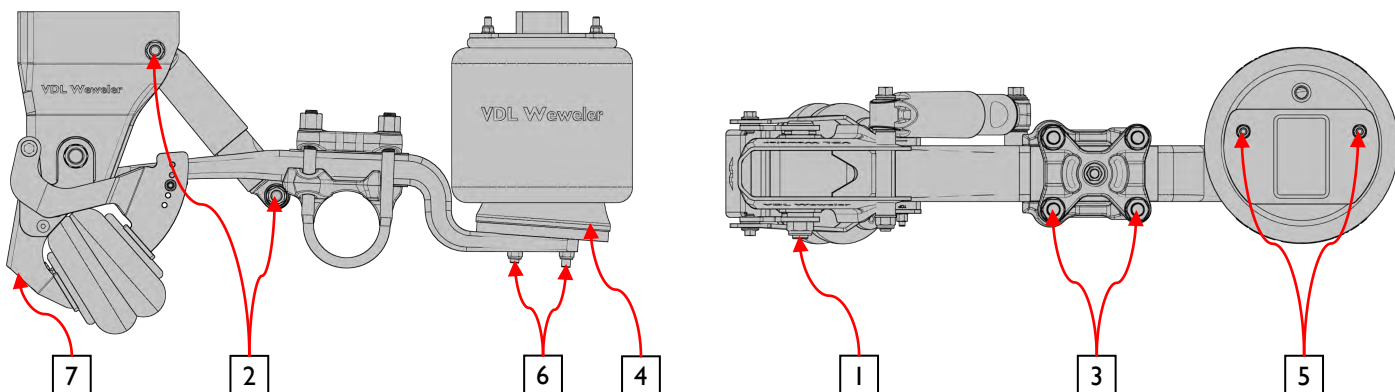
The maximum allowed pressure for all versions is 8,5 bar. For center mounted axle lifts (Mid-Lift) a residual pressure of 0,5 bar is required when the axle is not lifted.

9.2 General clearances two sided axle lift



Always check the ground clearance (G). Minimum allowed ground clearance is 50mm when the vehicle is standing level and on the suspension bump. The clearance between the road and tyre when the axle is lifted is the inbound axle travel minus the deformation of the tyre (min.55 mm).

10. Torque settings MBS-HD Air Suspension



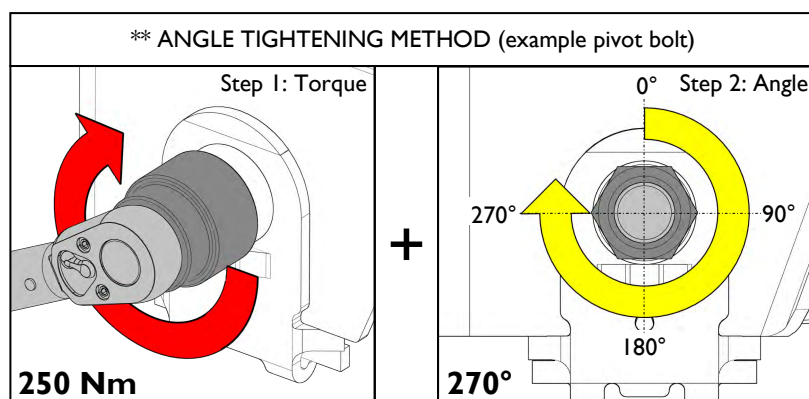
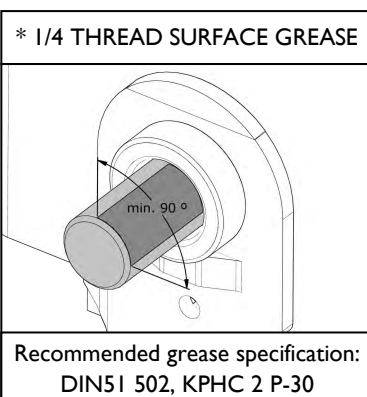
Item	Size	Width across flats (A/F)	First Assembly Torque **		Inspection Field check (maintenance)
			Step 1 : Torque	Step 2 : Angle	
1 Pivot bolt ^{1) 2)}	M27	41	250 Nm (+25 / -0) + apply grease on 1/4 of thread surface *	270° (+27° / -13°)	1000 Nm
2 Shock absorber - side mounted ^{1) 2)}	M20	24 (bolt) / 30 (nut)	200 Nm (+20 / -0)	180° (+18° / -9°)	550 Nm
	M20	24 (bolt) / 30 (nut)	550 Nm (+50 / -0)	-	550 Nm
	M24	36	620 Nm (+50 / -0)	-	620 Nm
3 U-bolts M22 ³⁾	M22	32	600 Nm (+25 / -0)	-	600 Nm
	M24	36	800 Nm (+50 / -0)	-	800 Nm
4 Air spring (bottom)	M12	19	65 Nm (+10 / -0)	-	65 Nm
5 Air spring (top)	M12	19	30 Nm (+10 / -0)	-	30 Nm
	M22	32	65 Nm (+0 / -15)	-	50 Nm
6 Air spring support plate (Ø300)	M12	19	65 Nm (+10 / -0)	-	65 Nm
	M16	24	200 Nm (+20/- 20)	-	200 Nm
7 Axle lift	See separate axle lift data sheets for the correct torque settings for each type of axle lift.				

¹⁾ Tighten at ride height.

²⁾ During angle tightening of the nut/bolt it is essential to secure the counterside.

³⁾ Tighten U-bolts evenly and crosswise.

Always tighten or check the fasteners with a calibrated torque wrench.

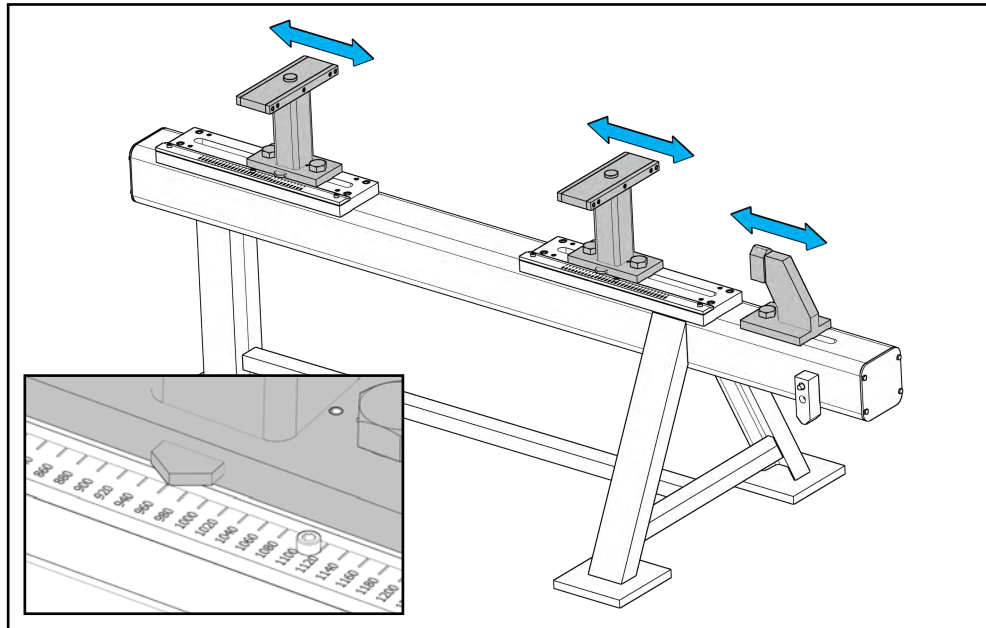


11. Air suspension on axle assembly

The assembly example shows a standard underslung single leaf 9t. application equipped with standard axle seats and Ø300 air springs with offset 65mm.

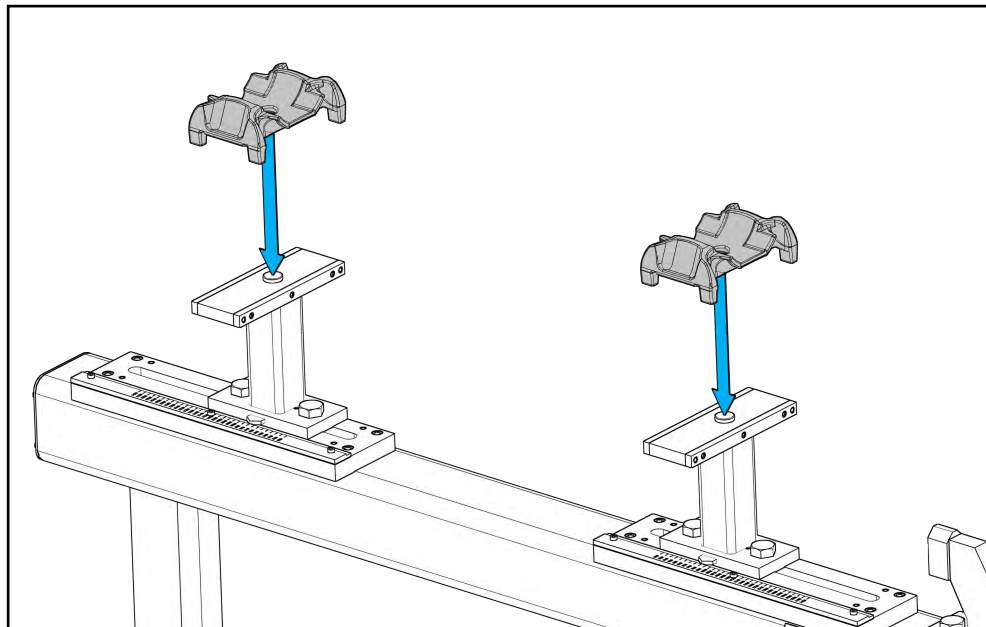
11.1 Welding Jig

Set up welding jig for corresponding axle. The outer support is positioned against the hubface in the next steps. Adjust the two axle seat supports to the correct spring track. In this example the spring track is set at 960mm.



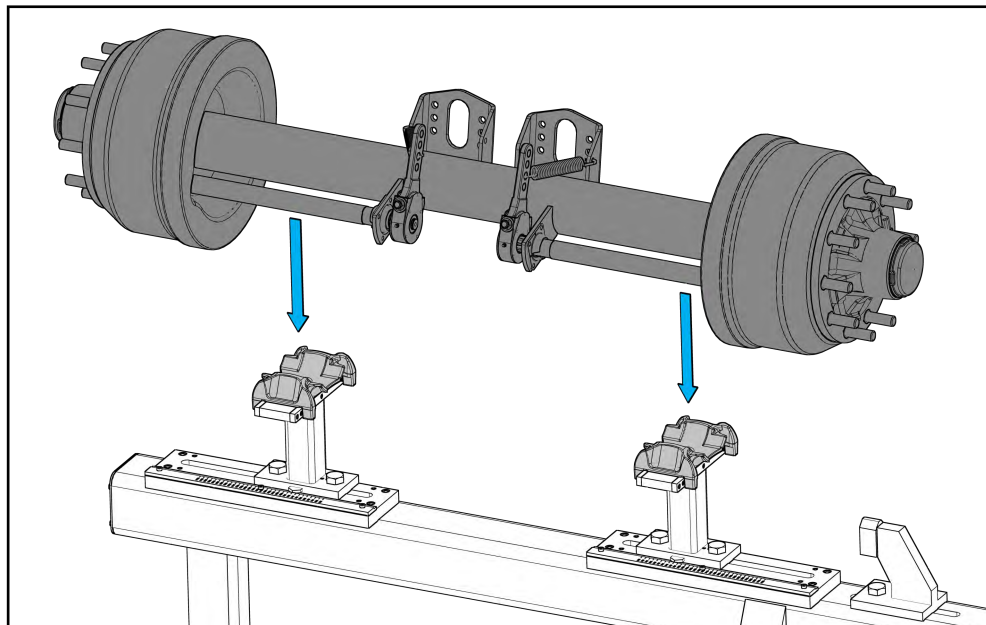
11.2 Axle seats

Place the axle seats on the welding jig.



11.3 Axle

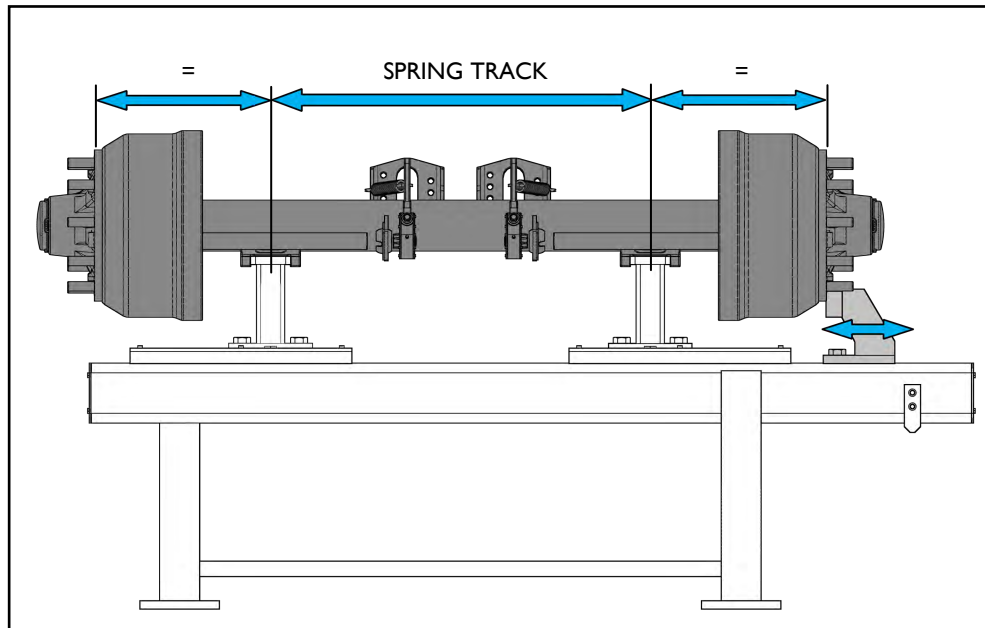
Place the axle on the axle seats. Make sure the axle is positioned in the correct driving direction.



11. Air suspension on axle assembly

11.4 Align axle

Align the axle in relation to the axle seats. Make sure the distance between the axle seats left and right to the hubfaces are equal. Adjust and secure the welding jig side support in the correct position.

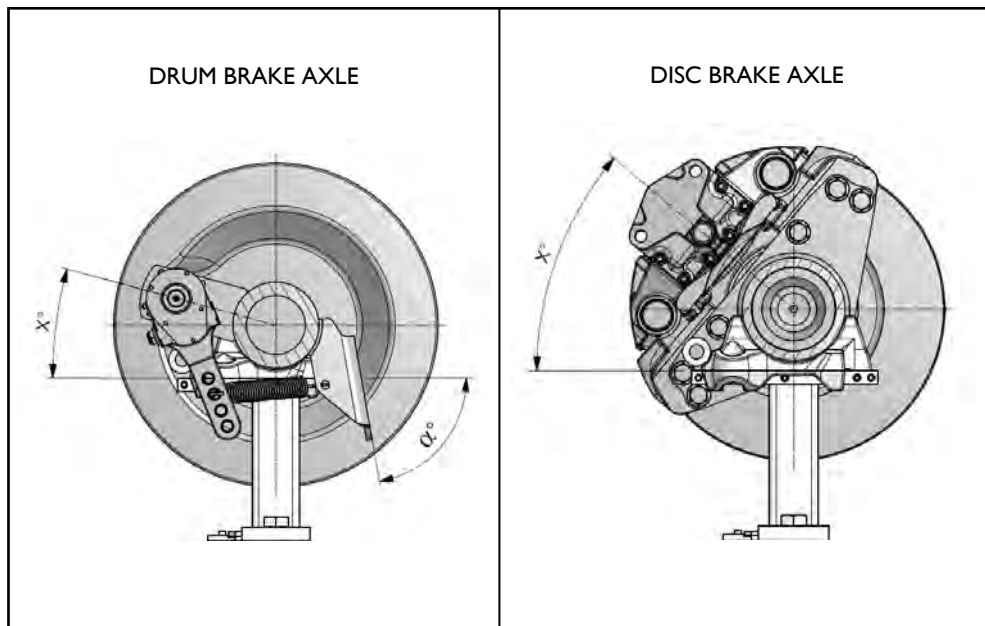


11.5 Position brake booster (bracket)

Check the position of the brake booster bracket (angle α) or camshaft (angle X) for drum brake axles.

Check the position of the brake booster (angle X) for disc brake axles.

Follow the prescribed angle as stated by VDL Weweler or the axle manufacturer. Mind under- or overslung systems. The images show an overslung configuration.

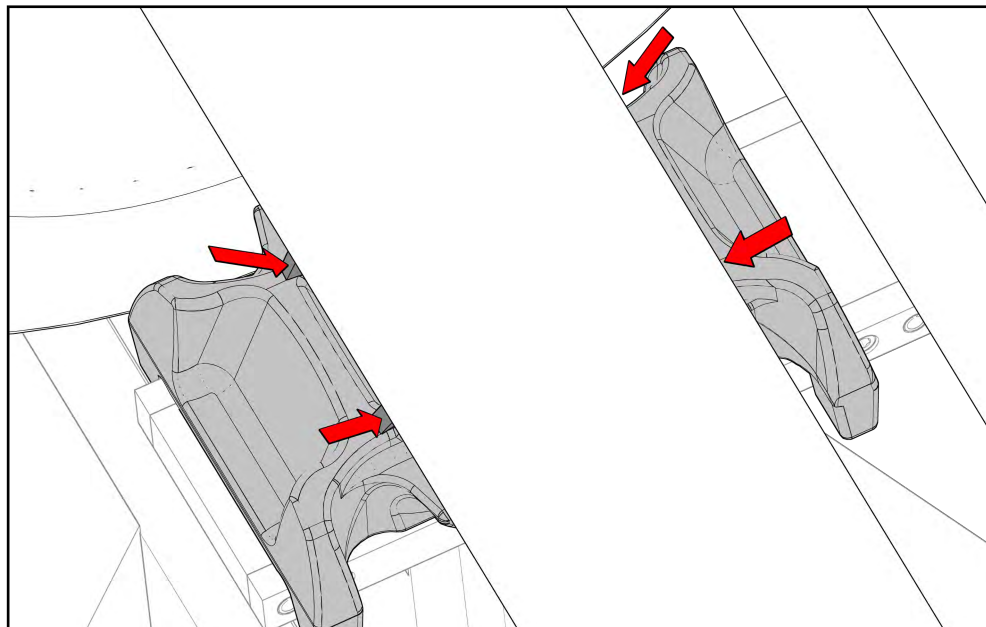


11.6 Tack welding axle seats

Make sure the axle is supported on the axle seat support surfaces.

Tack weld the axle seats on the four indicated positions on the front and the rear on both sides.

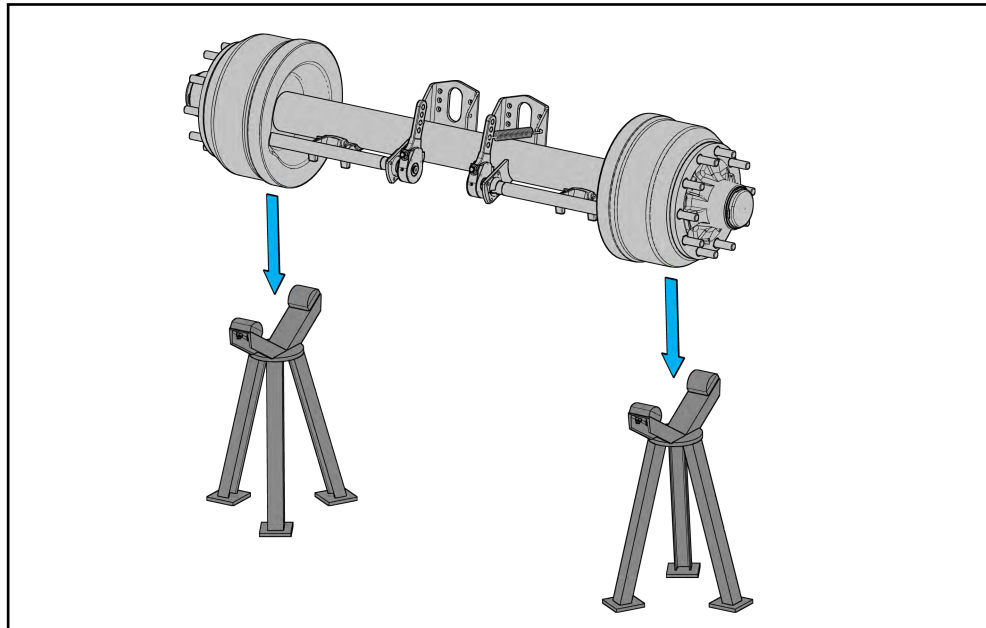
See instructions: Section 4.1



11. Air suspension on axle assembly

11.7 Assembly supports

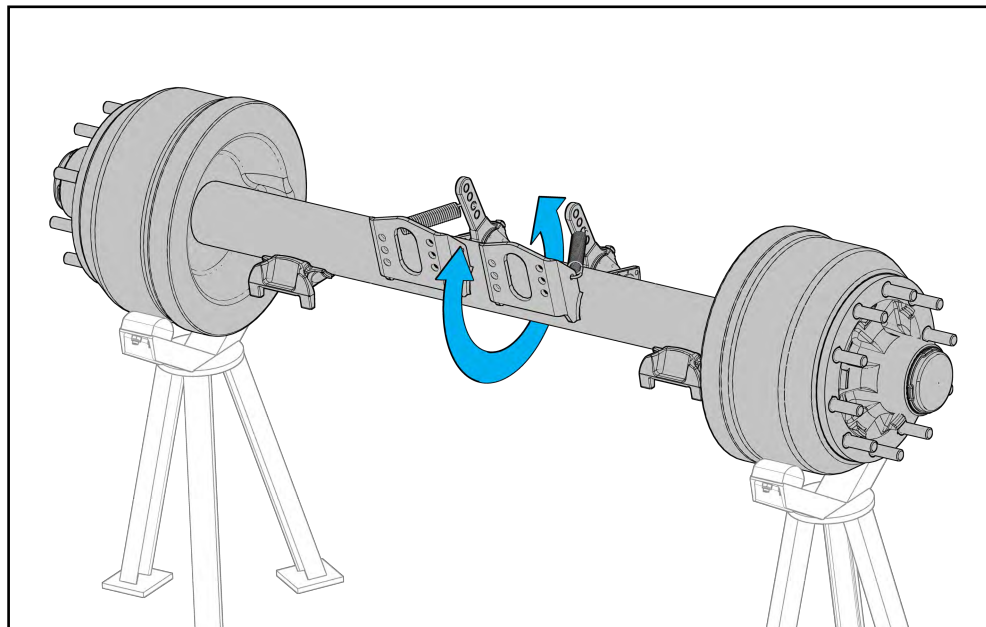
Place the axle on the assembly supports so that the axle can still be rotated.



11.8 Welding preparation

Rotate the axle beam to allow for inverted welding (PA/PB welding position).

See welding instructions: Section 4



11.9 Welding axle seats

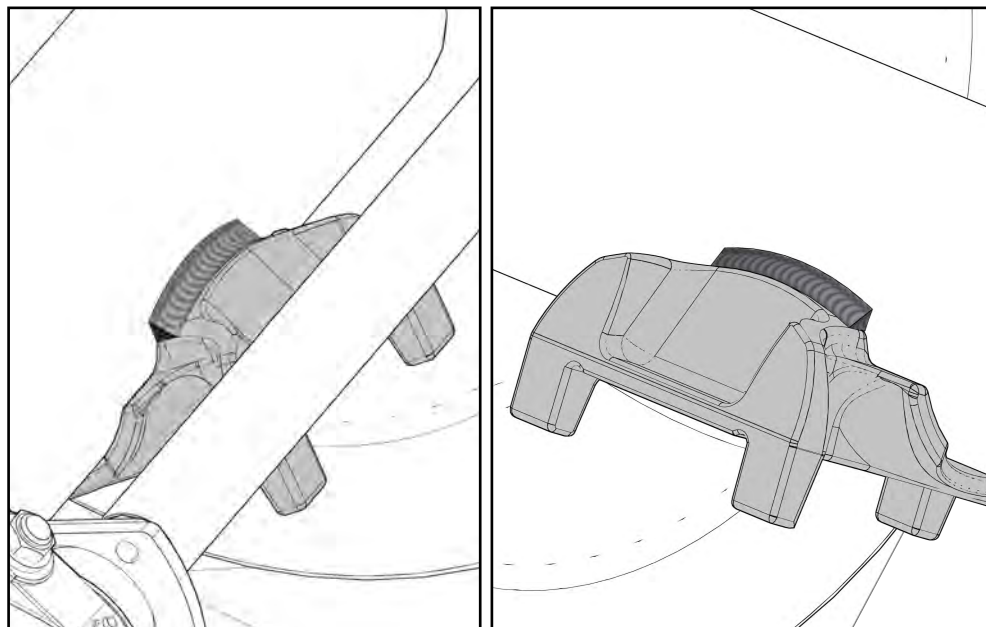
Weld the axle seats to the axle beam according to the instructions.

See instructions: Section 4.1 & 4.2



DO NOT WELD THE AXLE SEAT TO THE TRAILING ARM!!

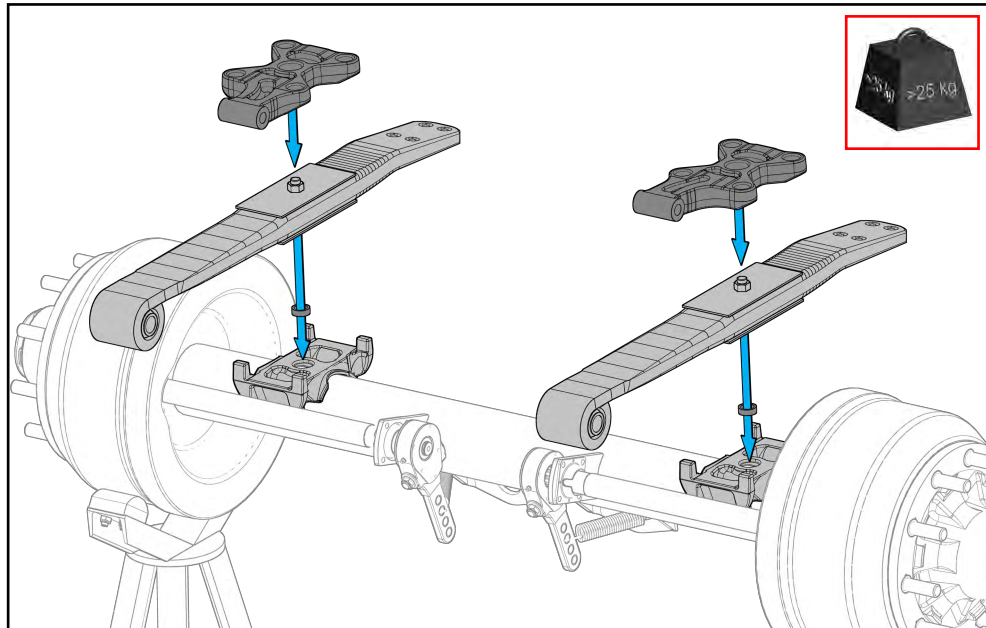
TO PREVENT DAMAGE TO THE BEARINGS AND TRAILING ARM, NEVER CONNECT THE EARTH CONNECTOR TO THE AXLE HUB, WHEEL END OR TRAILING ARM!



II. Air suspension on axle assembly

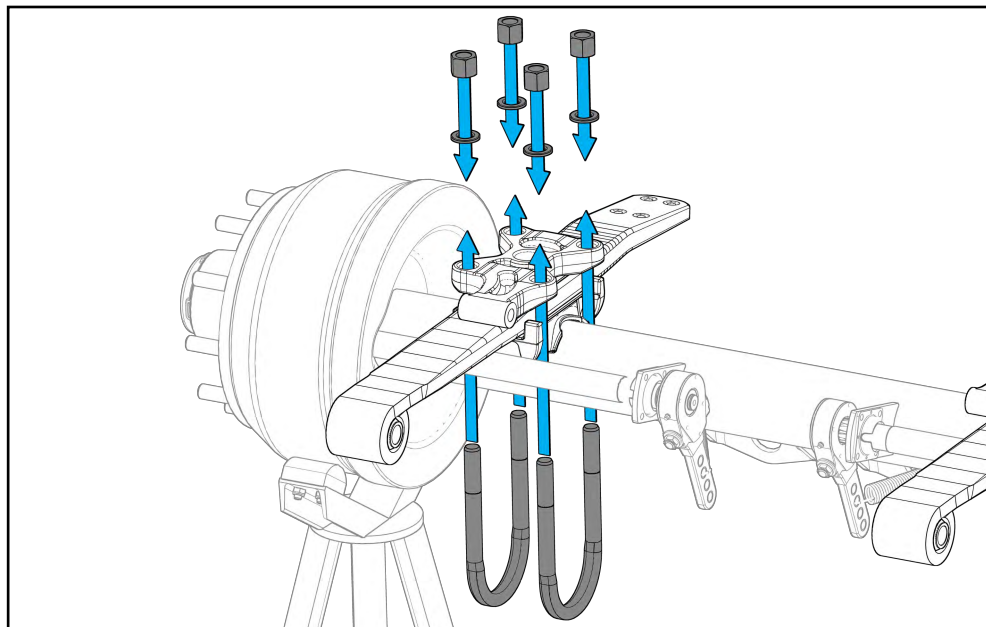
II.10 Trailing arms

Place the centerbolt spacers in the center holes of the axle seats.
Place the trailing arms on the axle seats. Make sure the center bolt head of the trailing arm is placed in the centerbolt spacer.
Place the u-bolt plates on top of the trailing arm. Make sure the center bolt is placed in the center hole of the u-bolt plate.



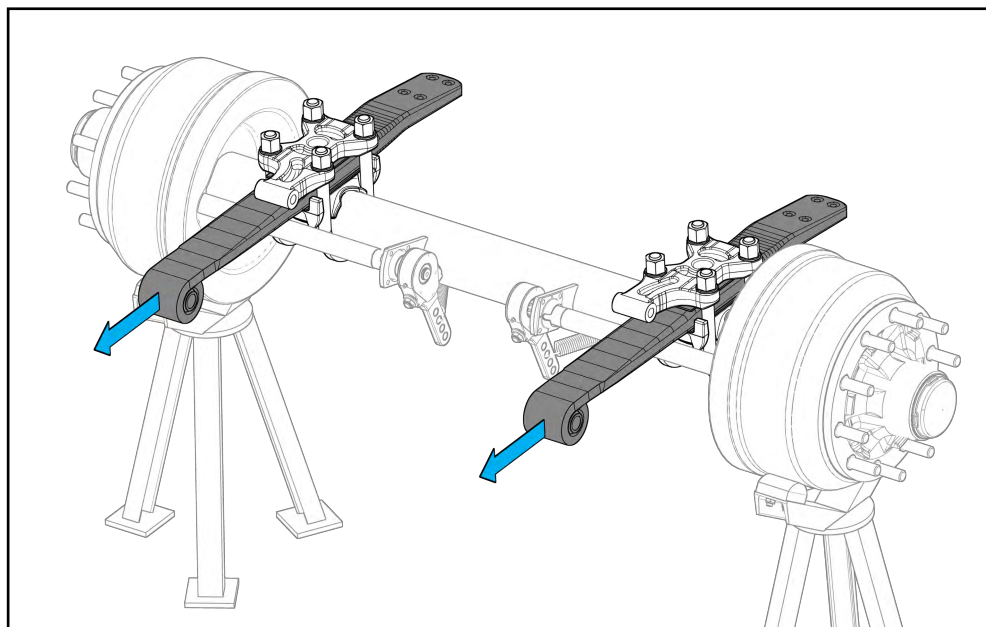
II.11 U-Bolts

Place the u-bolts around the axle and through/along the axle seat, u-bolt plate and washers and tighten the nuts slightly (hand tighten) until the u-bolts are positioned against the axle tube.
Repeat the same procedure for the other side.



II.12 Clamping

Pull both trailing arms forward in the axle clamping as much as possible.



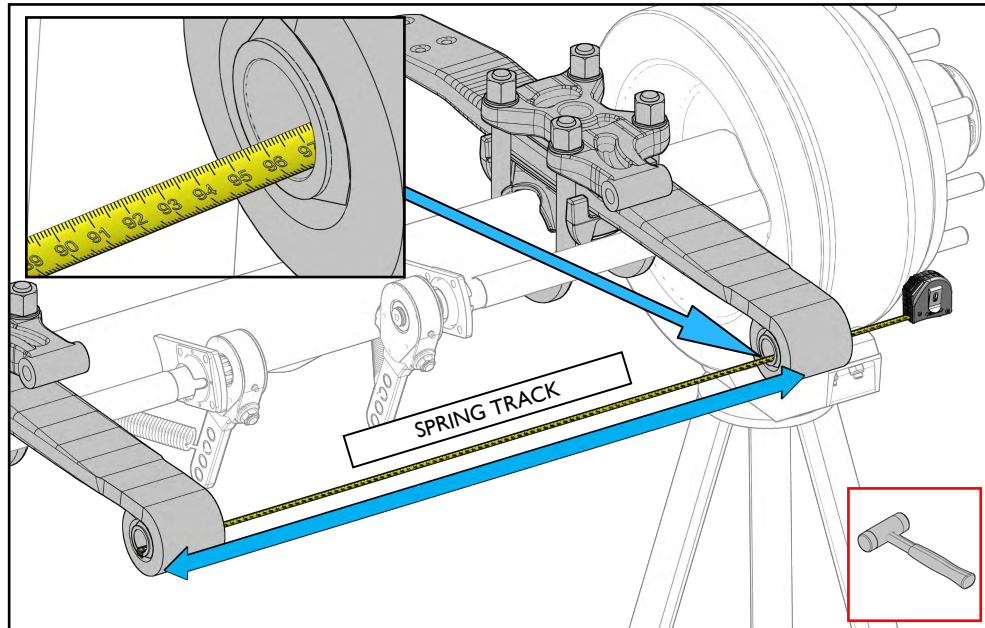
11. Air suspension on axle assembly

11.13 Spring track

Check the spring track again by measuring the distance through the spring eyes. In this example the spring track is 960mm.

If necessary adjust the spring track to the correct track by moving the trailing arm within the clamping using a rubber/plastic hammer.

See instructions: Section 7.1 & 7.2

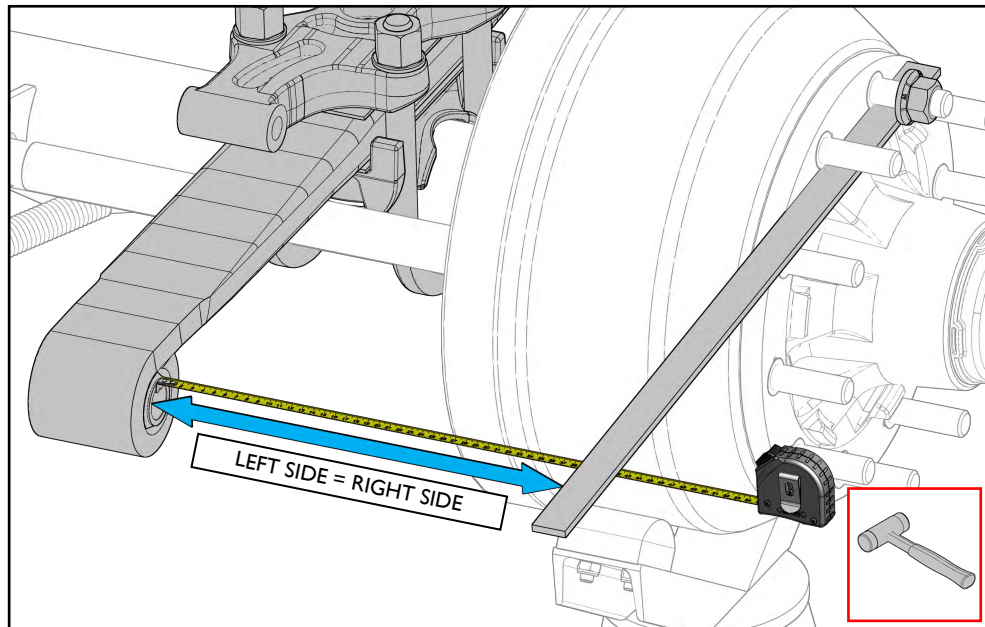


11.14 Alignment suspension to axle

Check the distance between the trailing arm eye and the hubface on both sides of the axle. This dimension should be the same on both sides.

If necessary by moving the trailing arm within the clamping using a rubber/plastic hammer.

See instructions: Section 7.1 & 7.2

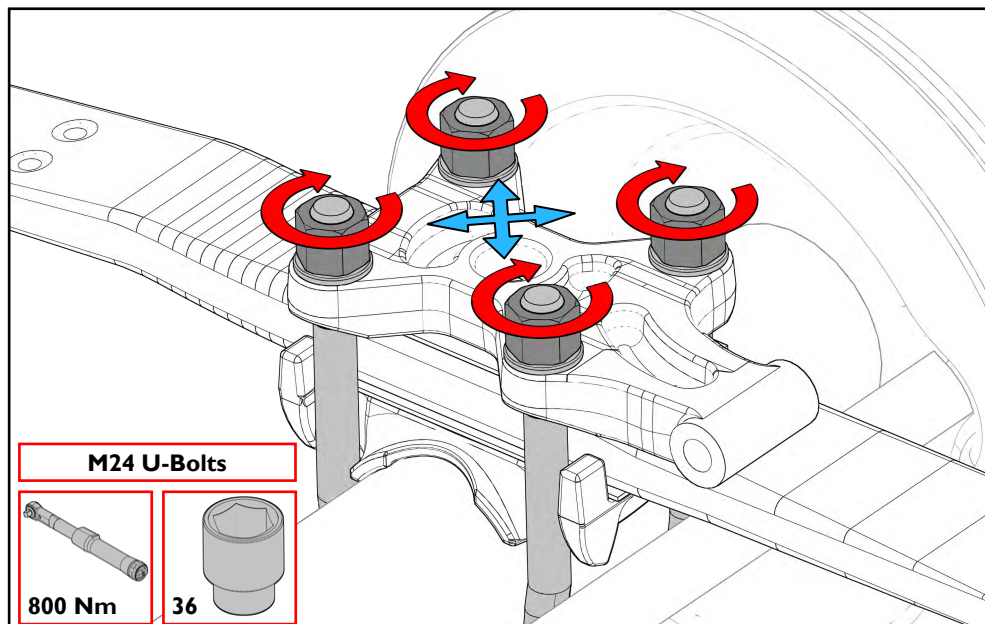


11.15 Tighten U-Bolts

Tighten the U-bolts crosswise and evenly on both sides.

After tightening check if the dimensions from step 11.13 and 11.14 are within tolerance.

See tightening instructions: Section 10



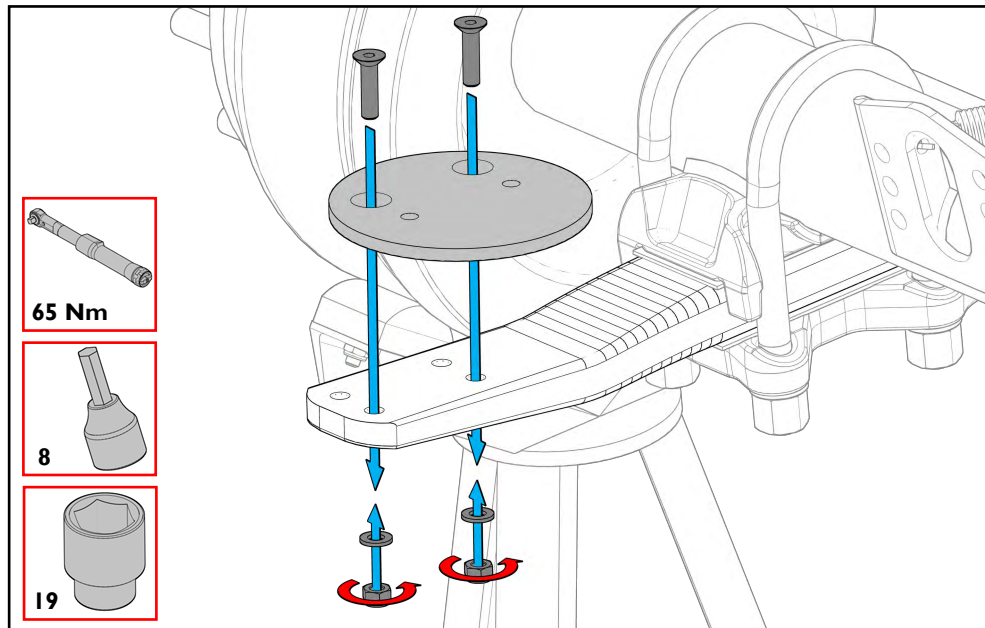
II. Air suspension on axle assembly

II.16 Air spring support plate Offset 65mm

Mount the air spring support plate on the trailing arm with the M12 countersunk bolts. Tighten the locknuts to torque according the instructions.

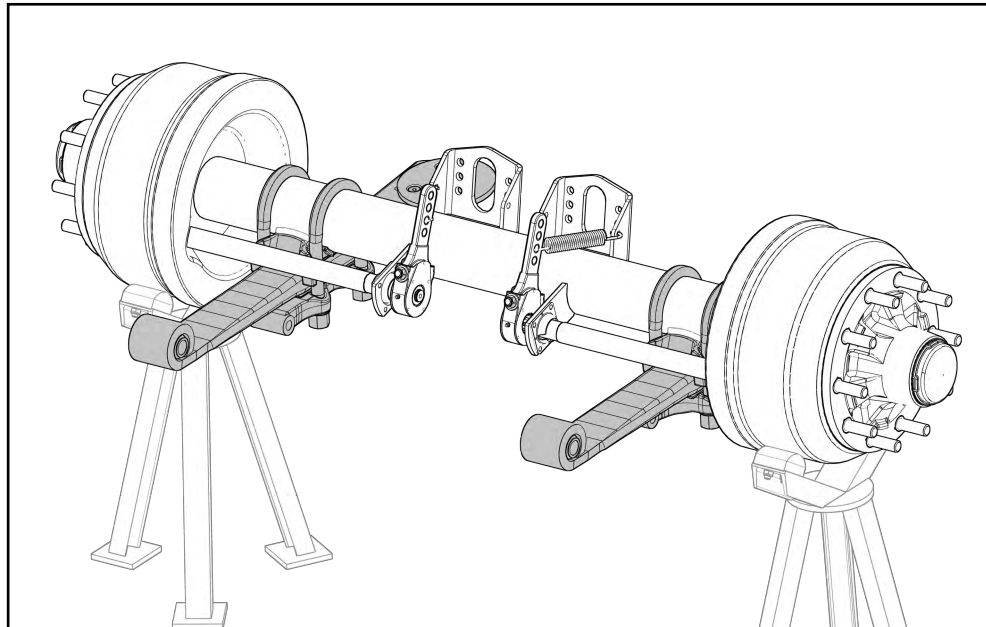
Follow the same steps for the other side.

See tightening instructions: Section 10



II.17 Axle & suspension assembly

Finished sub-assembly of the air suspension on the axle.

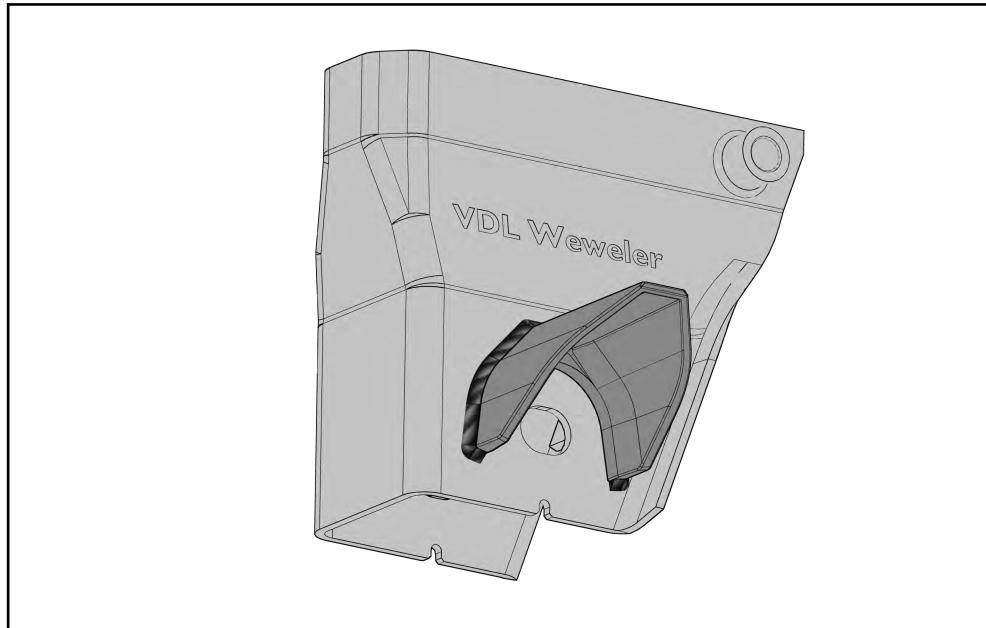


12. Final air suspension assembly

12.1 Hanger bracket & casting

Weld the casted bracing part to the hanger bracket according instructions.
Make per axle a lefthand and righthand version.

See instructions: Section 3.6

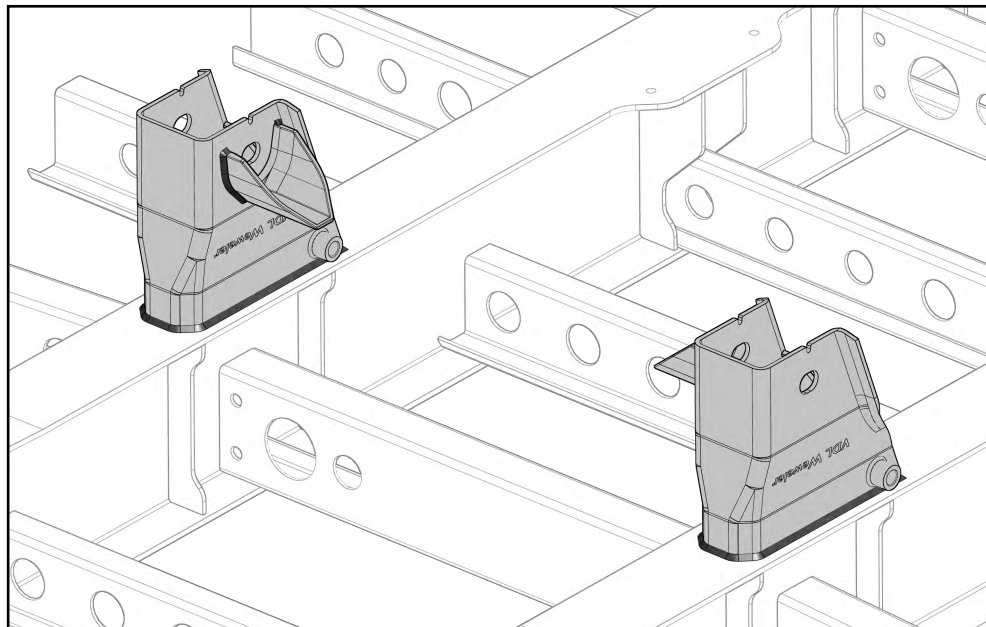


12.2 Hanger brackets

Align and weld the hanger brackets to the chassis rails according instructions at the correct spring track.

The trailer builder is responsible that there are sufficient reinforcements in the vehicle chassis to guide the occuring forces on the hanger brackets.

See instructions: Section 3.2 & 3.3

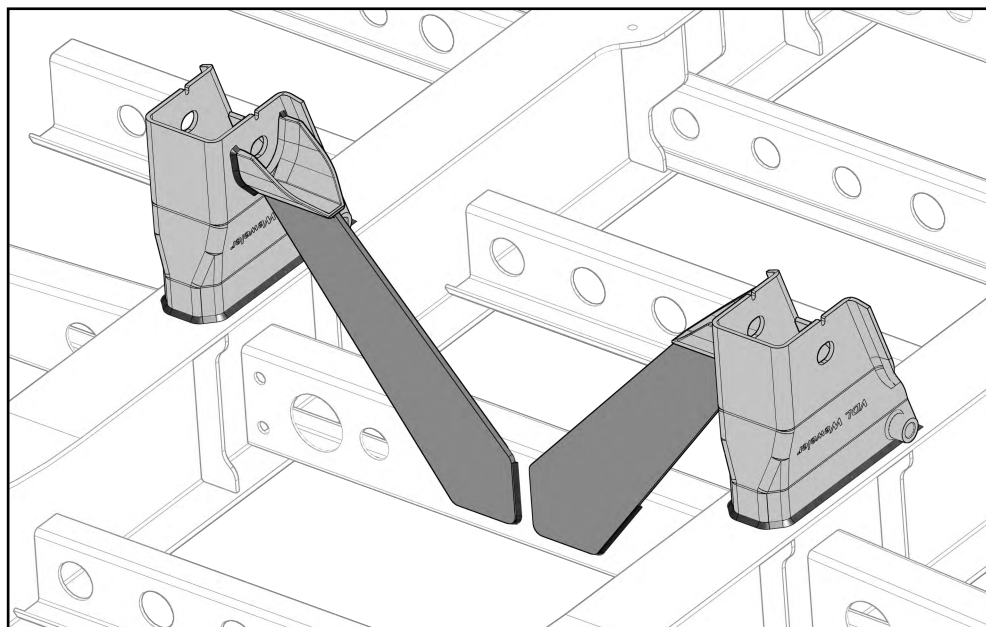


12.3 Bracing plates

Weld the bracing plates to the casted bracing parts and the cross members in the chassis according instructions.

The plates must be straight and are not allowed to be bended.

See instructions: Section 3.6



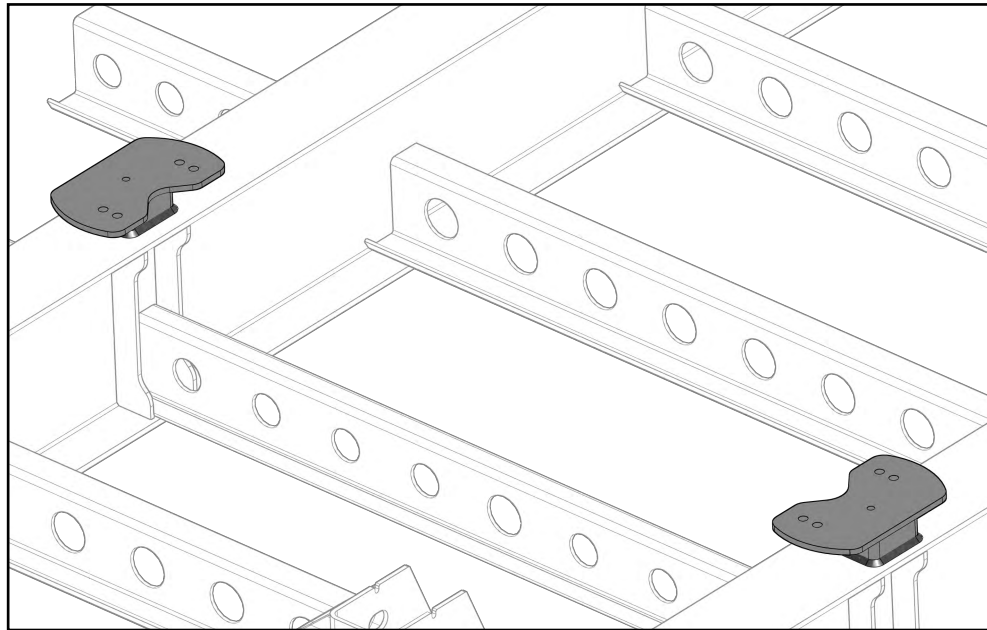
12. Final air suspension assembly

12.4 Pedestals

Weld the pedestals (if present in the suspension assembly) to the chassis according to instructions.

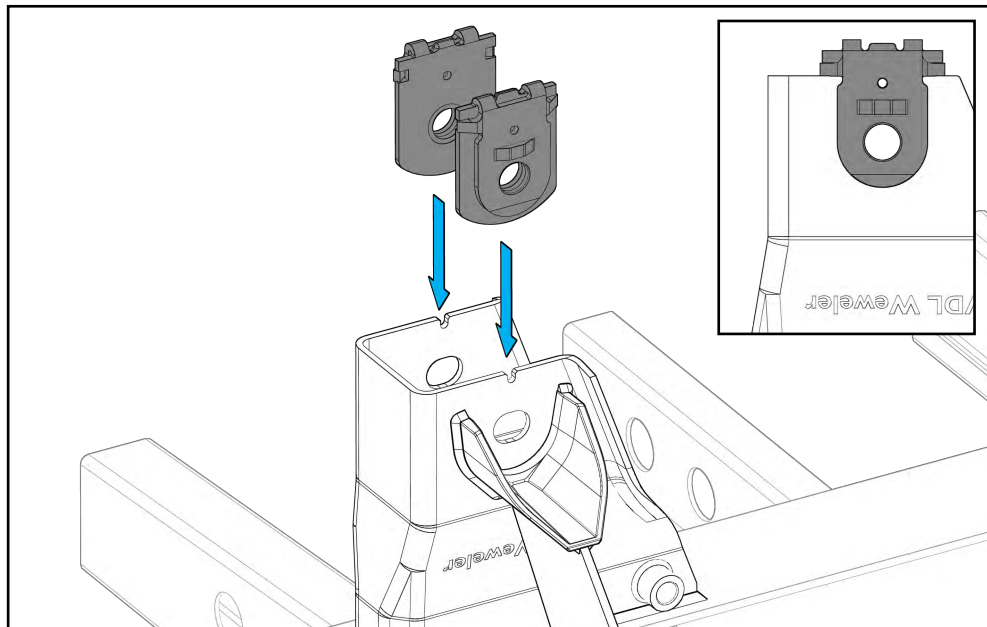
The trailer builder is responsible that there are sufficient reinforcements in the vehicle chassis to guide the occurring forces on the pedestals.

See instructions: Section 3.4



12.5 Wear/alignment plates

Place the wear/alignment plates over the bottom edges of the hanger brackets.

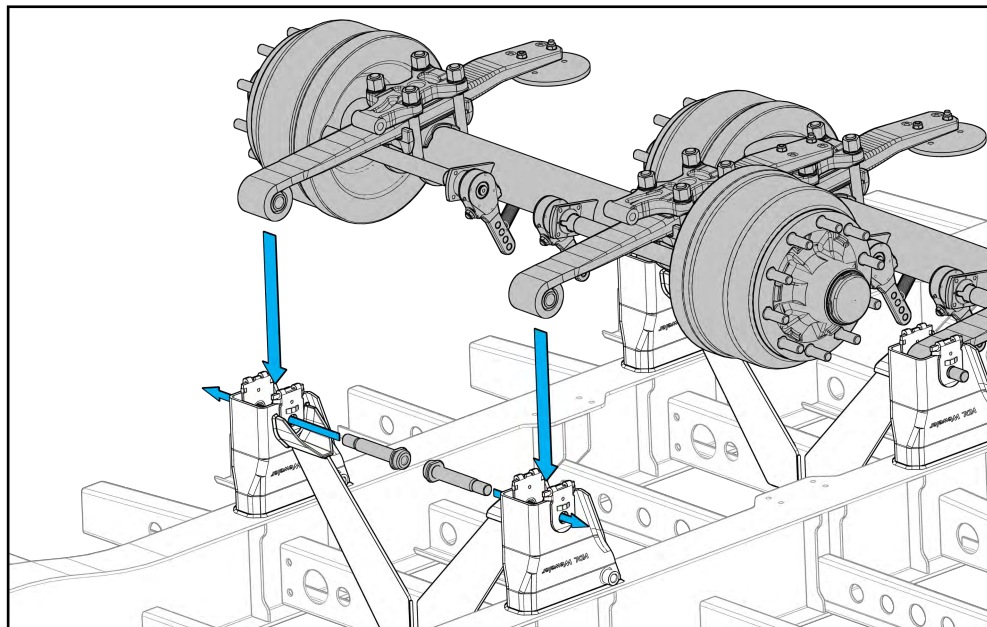


12.6 Axle placement

Place the sub-assembled axles in the hanger brackets between the wear plates and place the pivot bolts.

Make sure all the axles are secured on the required **ride height** using axle supports or blocks under the suspension system.

After alignment (step 12.7 & 12.8) the connection can be torqued.

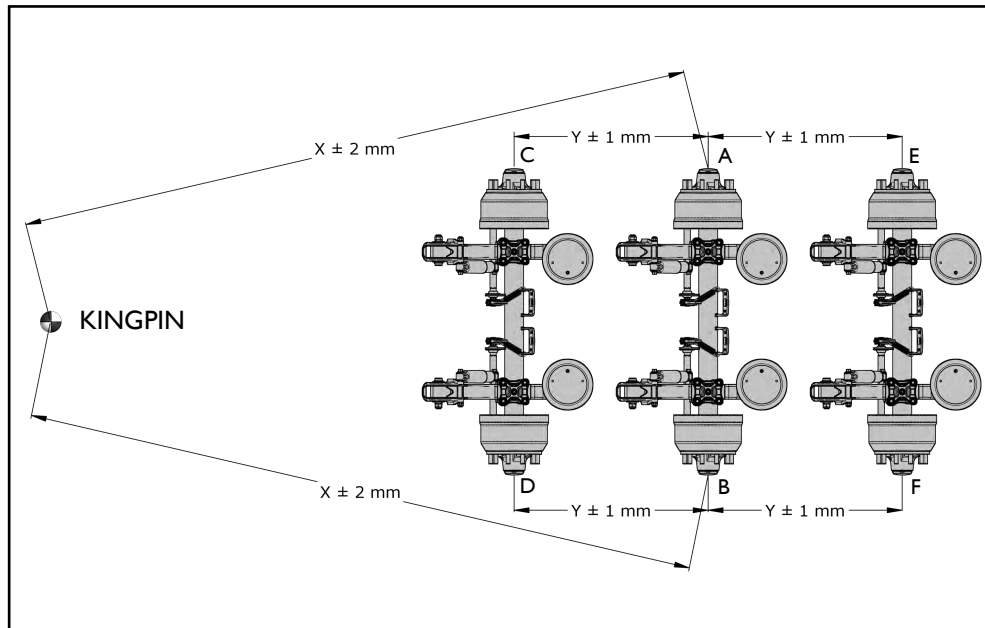


12. Final air suspension assembly

12.7 Axle alignment

Align all axles (disc or drum) within the tolerances given, taken the second axle as a reference. A through F are the axle centres. The same tolerances apply for alignment using a laser.

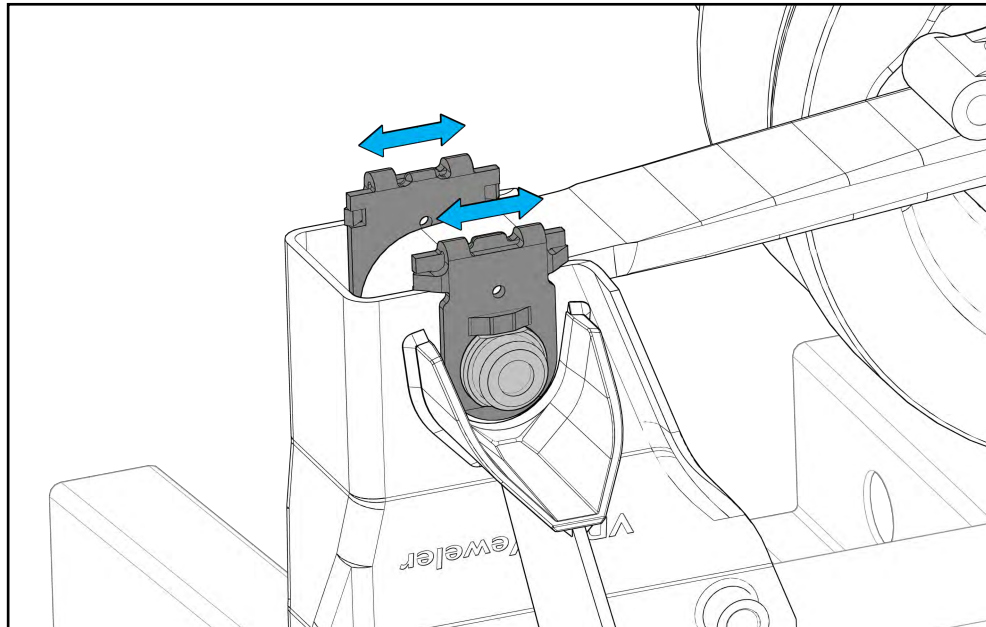
See instructions: Section 7.3



12.8 Axle alignment

Follow the instructions for adjusting the alignment in the hanger bracket.

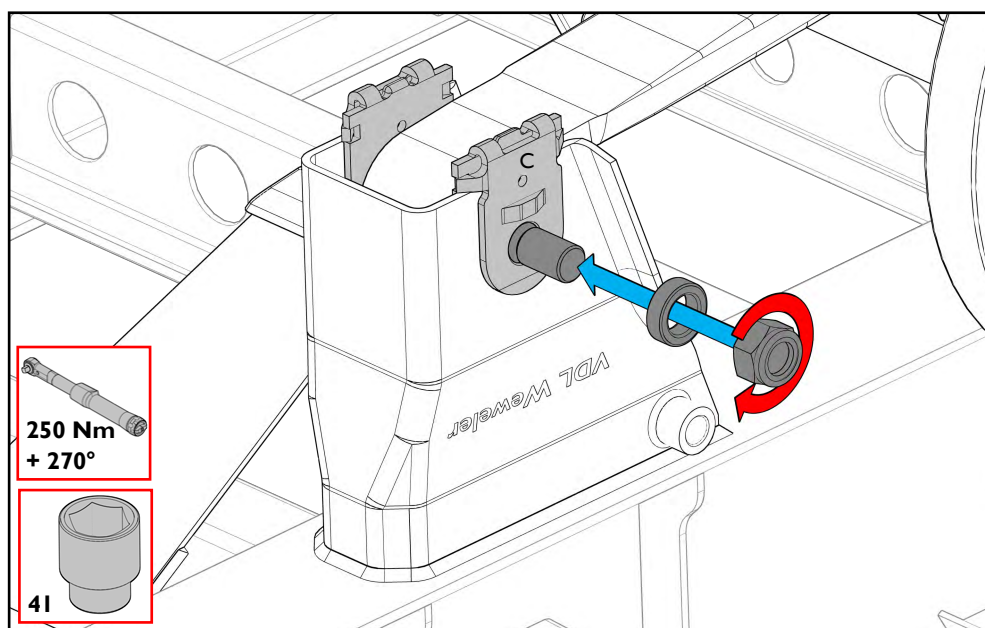
See instructions: Section 7.4



12.9 Pivot bolt connection

Apply grease on $\frac{1}{4}$ of the thread surface. Place the spacers and nuts. Tighten the pivot bolt connection **at ride height** according instructions to torque. Repeat the same procedure for the other side.

See tightening instructions: Section 1.0



12. Final air suspension assembly

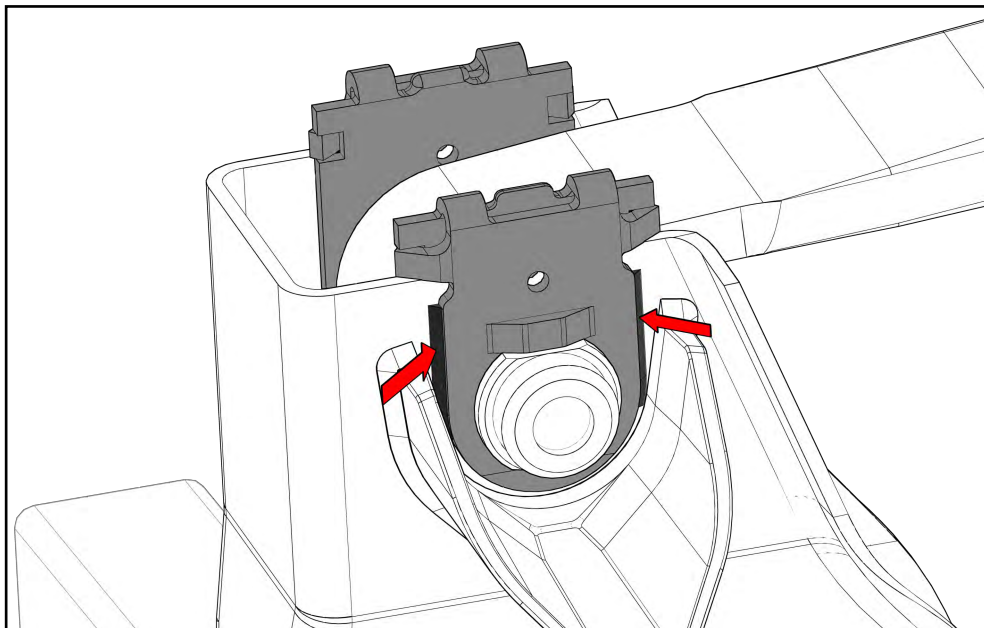
12.10 Welding wear plates

Weld the wear plates to the hanger bracket after system alignment.

See instructions: Section 3.7



TO PREVENT DAMAGE TO THE BEARINGS AND TRAILING ARM, NEVER CONNECT THE EARTH CONNECTOR TO THE AXLE HUB, WHEEL END OR TRAILING ARM!



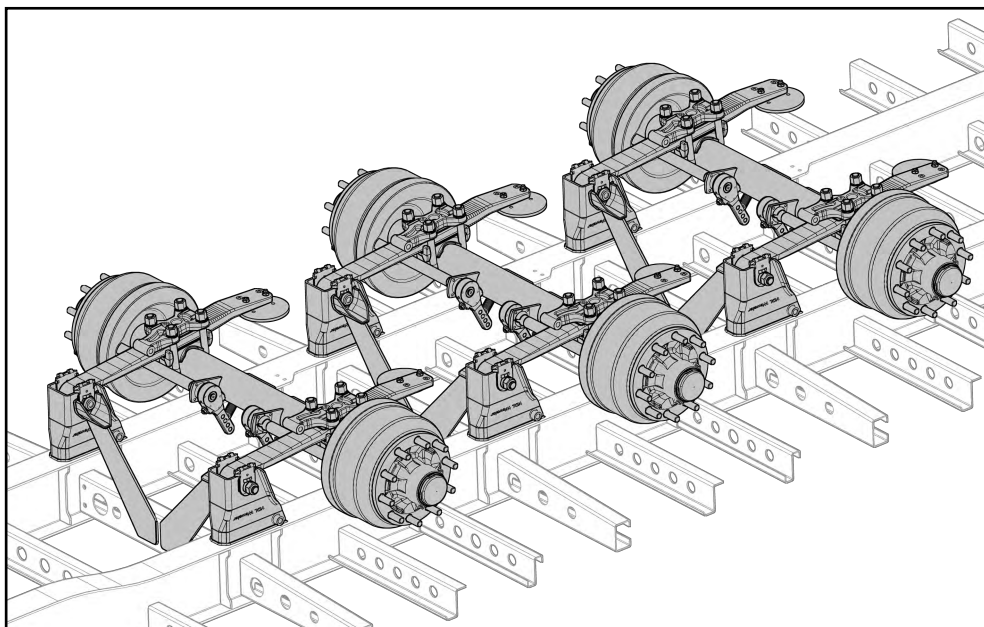
12.11 Coating / painting

The complete chassis including suspension systems can be coated or painted.

Before this point the shock absorbers and air springs can also be mounted, but the rubber flexmember of the air spring must be covered if this order of assembly is chosen.

See instructions for areas which must be free from paint/coating or can only be primed.

See instructions: Section 8



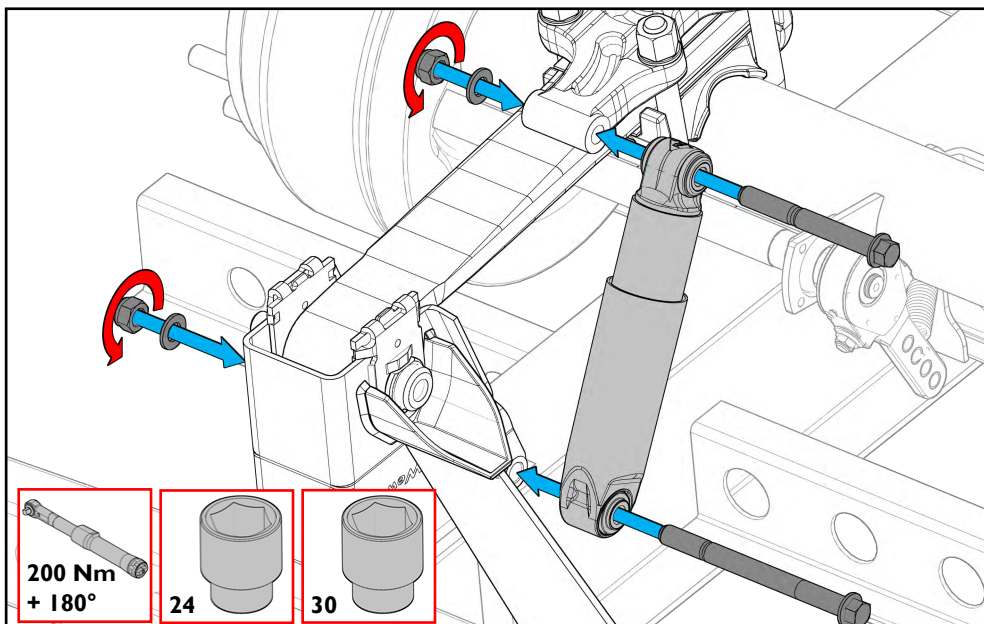
12.13 Shock absorbers

Place the shock absorbers, bolts, nuts and washers. If present, follow the instructions on the shock absorber (see Section 6).

Tighten the top and bottom connection **at ride height** to torque according the instructions.

The shock absorber length at system ride height can be found on the system/application drawing.

See tightening instructions: Section 10

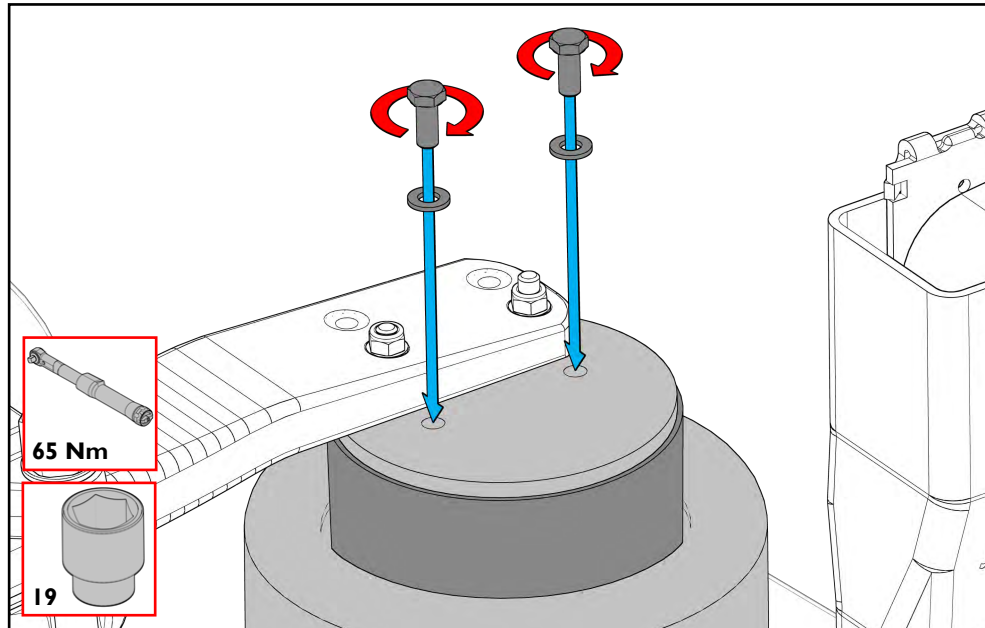


12. Final air suspension assembly

12.14 Air spring Ø300 - Offset 65mm

Finally mount the Ø300 air spring to the support plate with the M12 bolts. Make sure the studs on top of the air spring are on the correct side. Tighten to torque according to the instructions.

See tightening instructions: Section 10

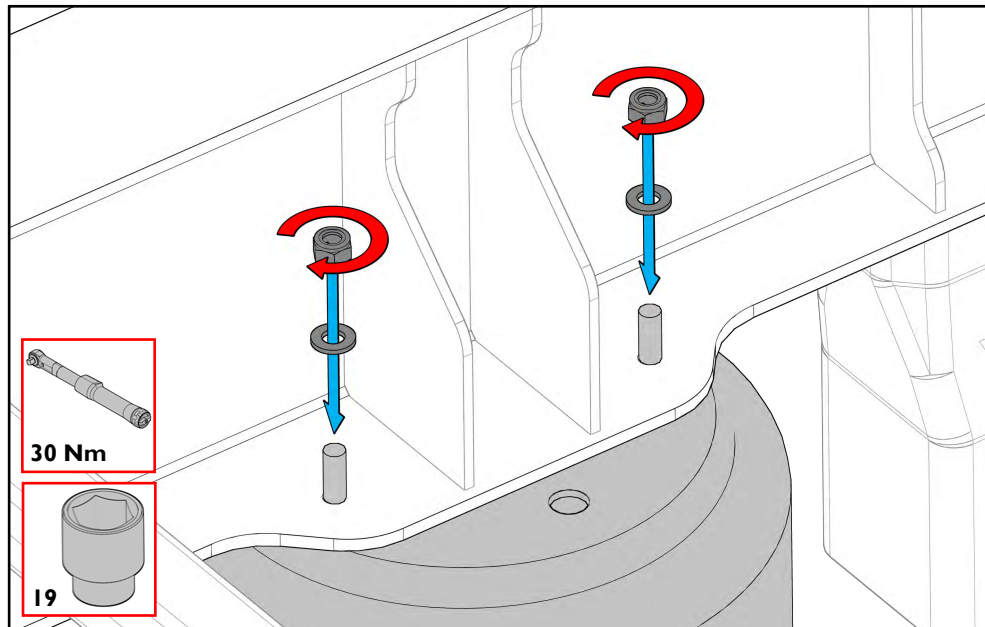


12.15 Air spring to chassis / pedestal

Mount the air spring top to the chassis or pedestal. Tighten the (lock)nuts to torque according to the instructions.

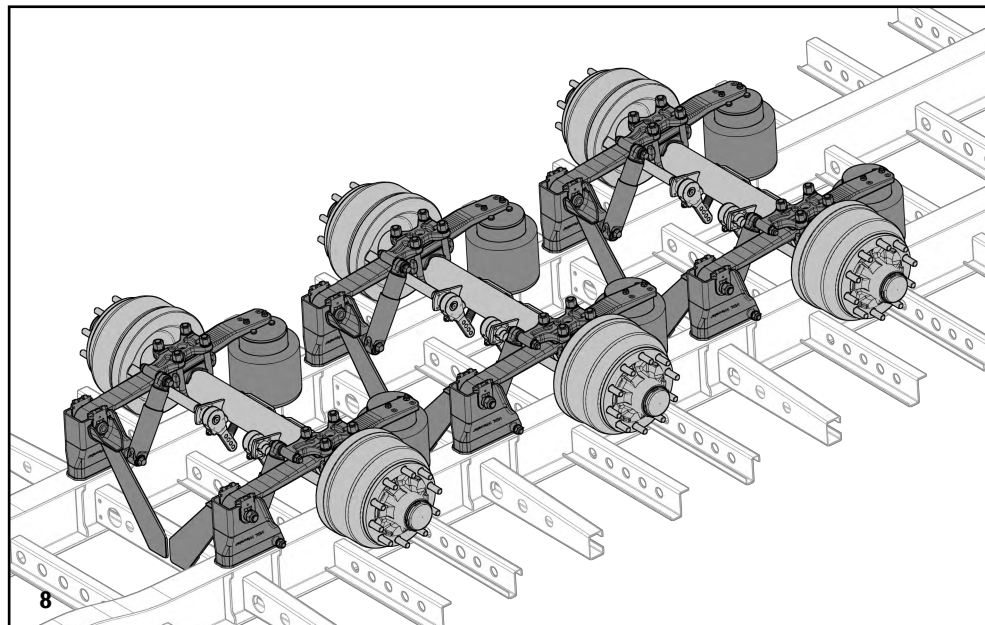
The maximum lateral offset between the upper and lower air spring connection must not exceed 10mm.

See tightening instructions: Section 10



12.16 Complete assembly

System assembly complete. Ready for wheel mounting and air connections.



13. Available axle clampings

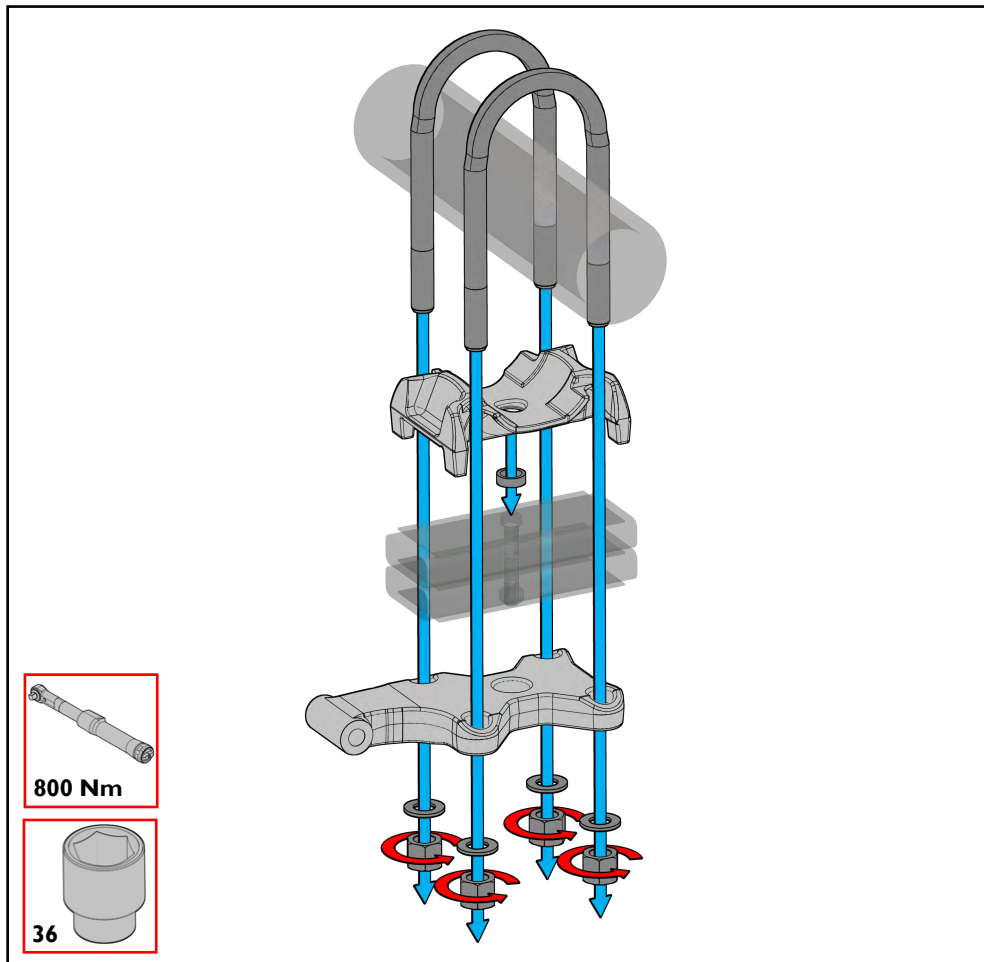
13.1 Standard axle seat Ø127 Underslung application Front mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



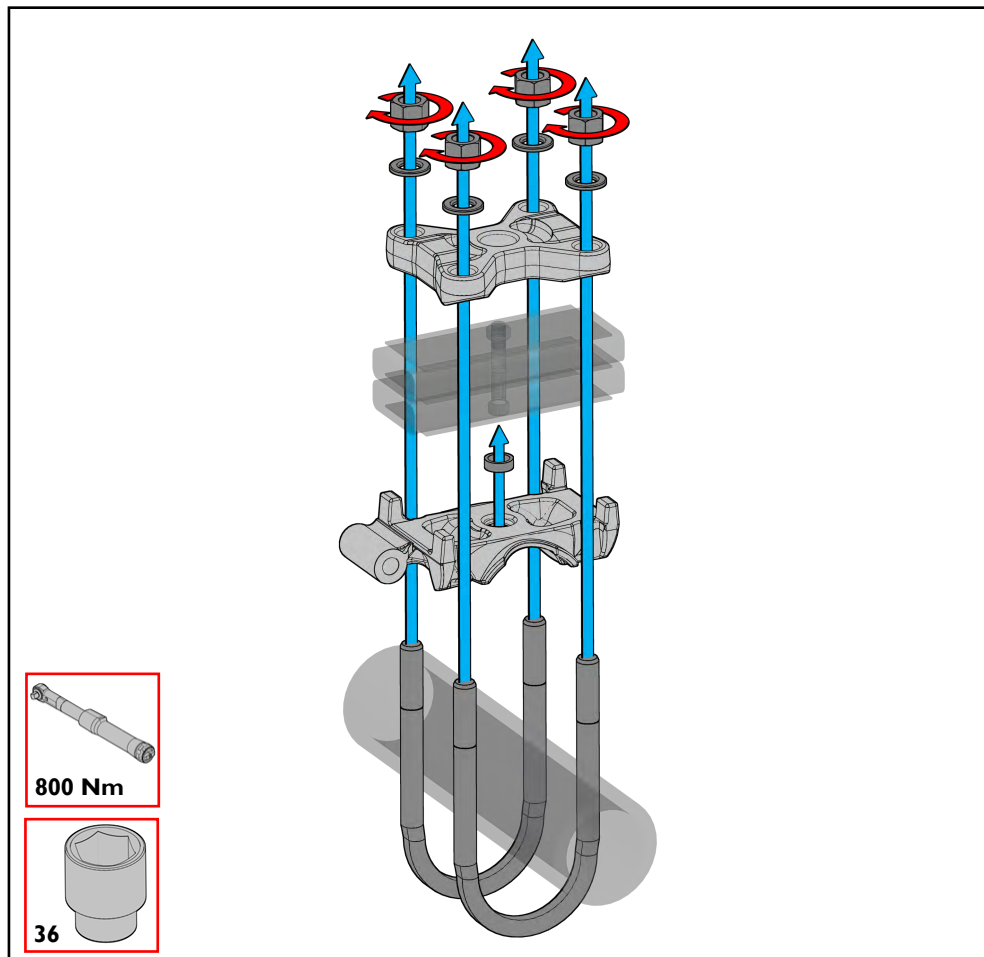
13.2 Standard axle seat Ø127 Overslung application Front mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13. Available axle clampings

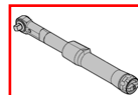
13.3 Standard axle seat Ø127 Underslung application Rear mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

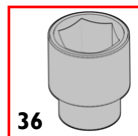
Example shows vehicle lefthand side.

See welding instructions: Section 4

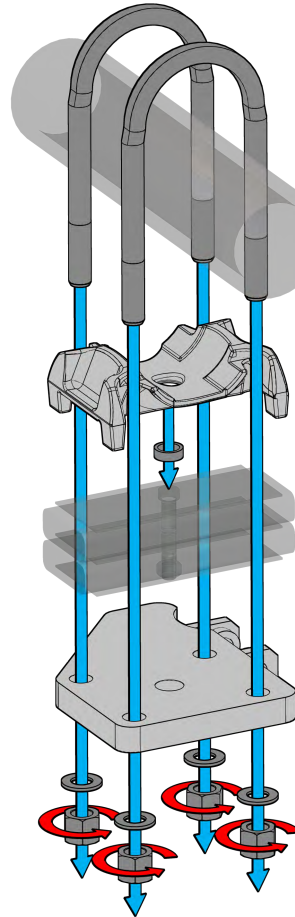
See tightening instructions: Section 10



800 Nm



36



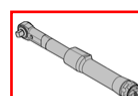
13.4 Standard axle seat Ø127 Overslung application Rear mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

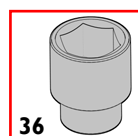
Example shows vehicle lefthand side.

See welding instructions: Section 4

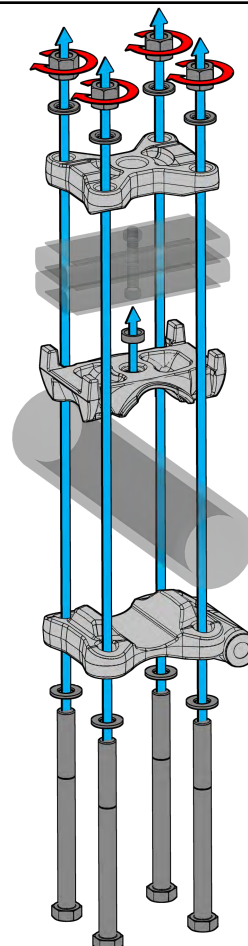
See tightening instructions: Section 10



800 Nm



36



13. Available axle clampings

13.5 HD axle seat Ø127

Underslung application

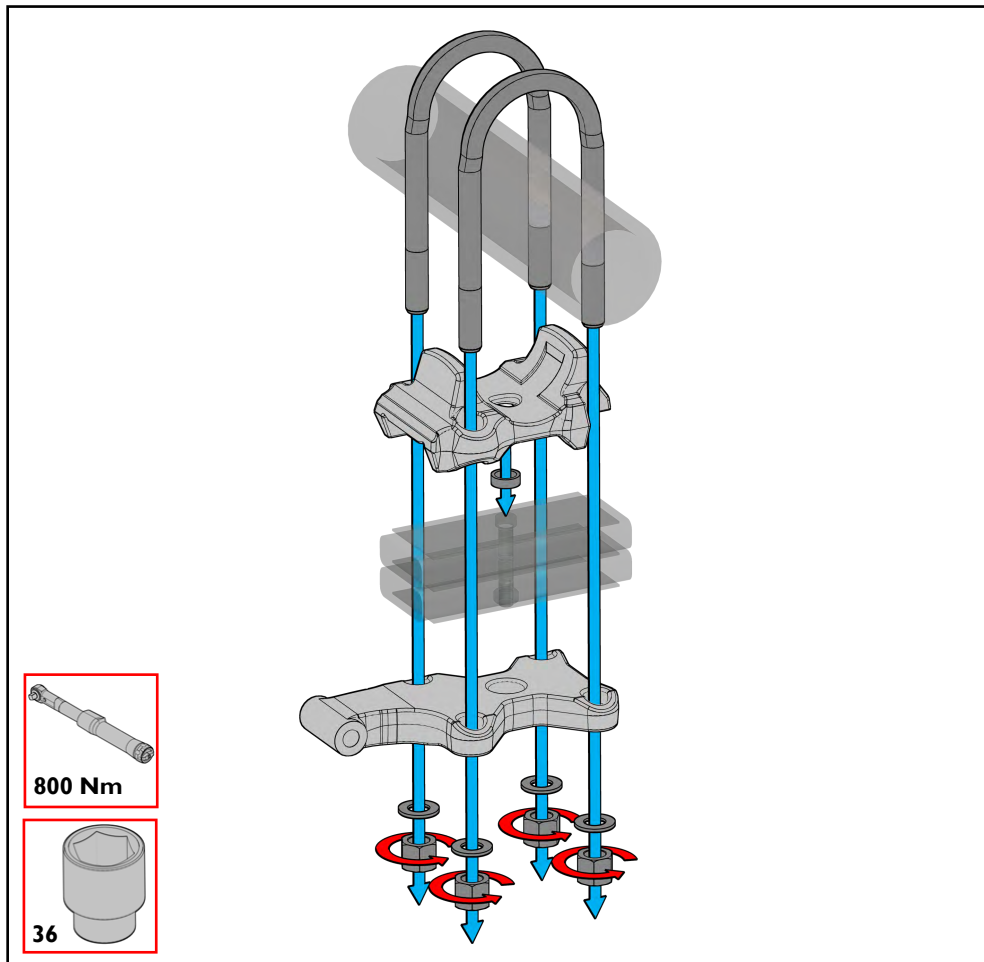
Front mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13.6 HD axle seat Ø127

Overslung application

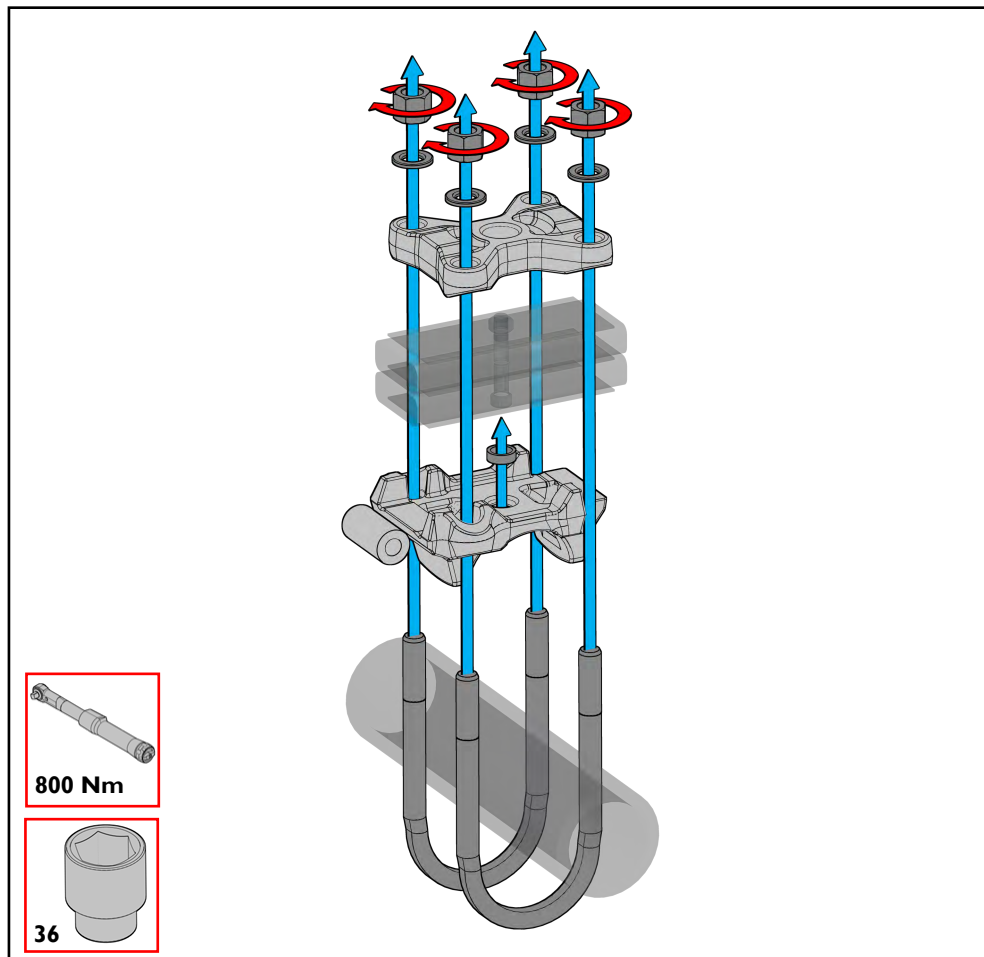
Front mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13. Available axle clampings

13.7 HD axle seat Ø127

Underslung application

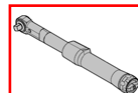
Rear mounted shock absorbers

U-bolts vary in length depending on the total trailing arm thickness.

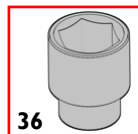
Example shows vehicle lefthand side.

See welding instructions: Section 4

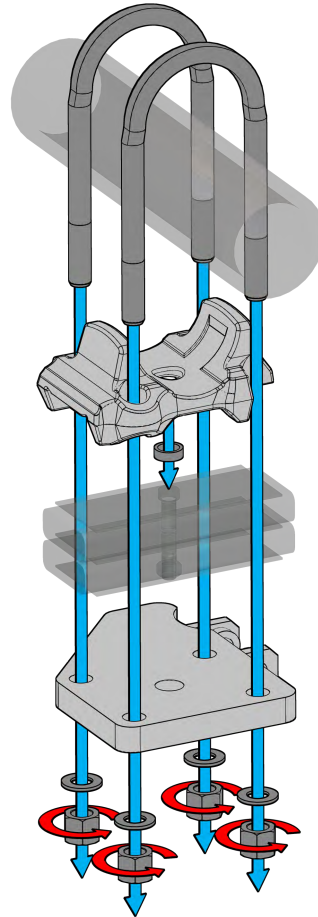
See tightening instructions: Section 10



800 Nm



36



13.8 HD axle seat Ø127

Overslung application

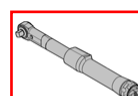
Rear mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

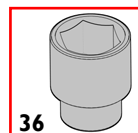
Example shows vehicle lefthand side.

See welding instructions: Section 4

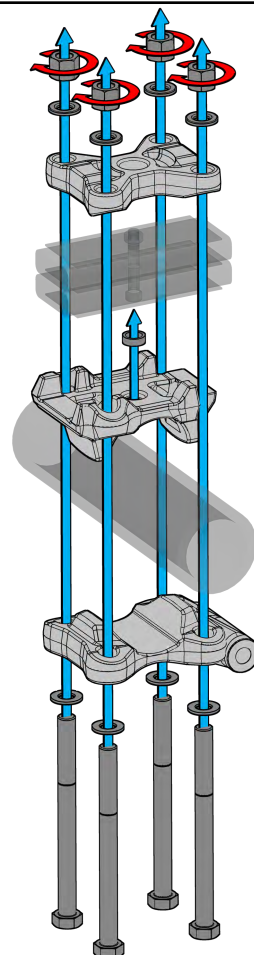
See tightening instructions: Section 10



800 Nm



36



13. Available axle clampings

13.9 HD axle seat □150

Underslung application

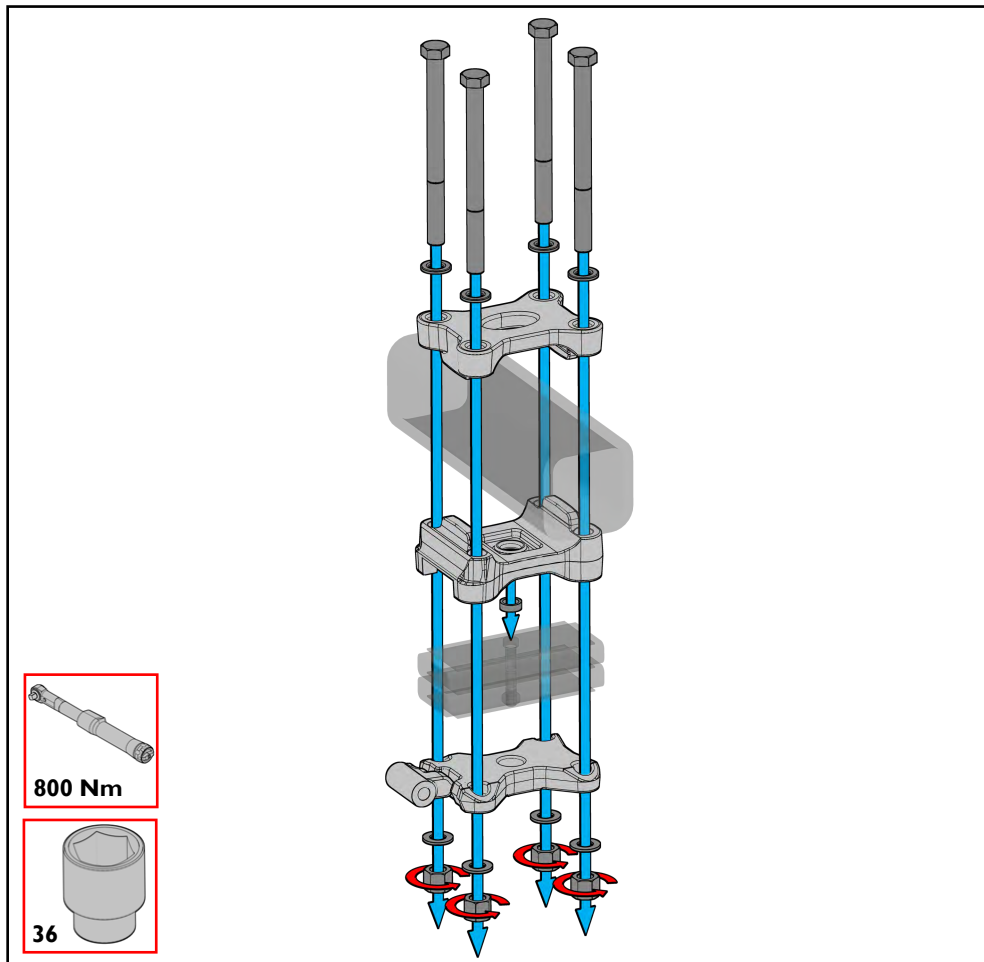
Front mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13.10 HD axle seat □150

Overslung application

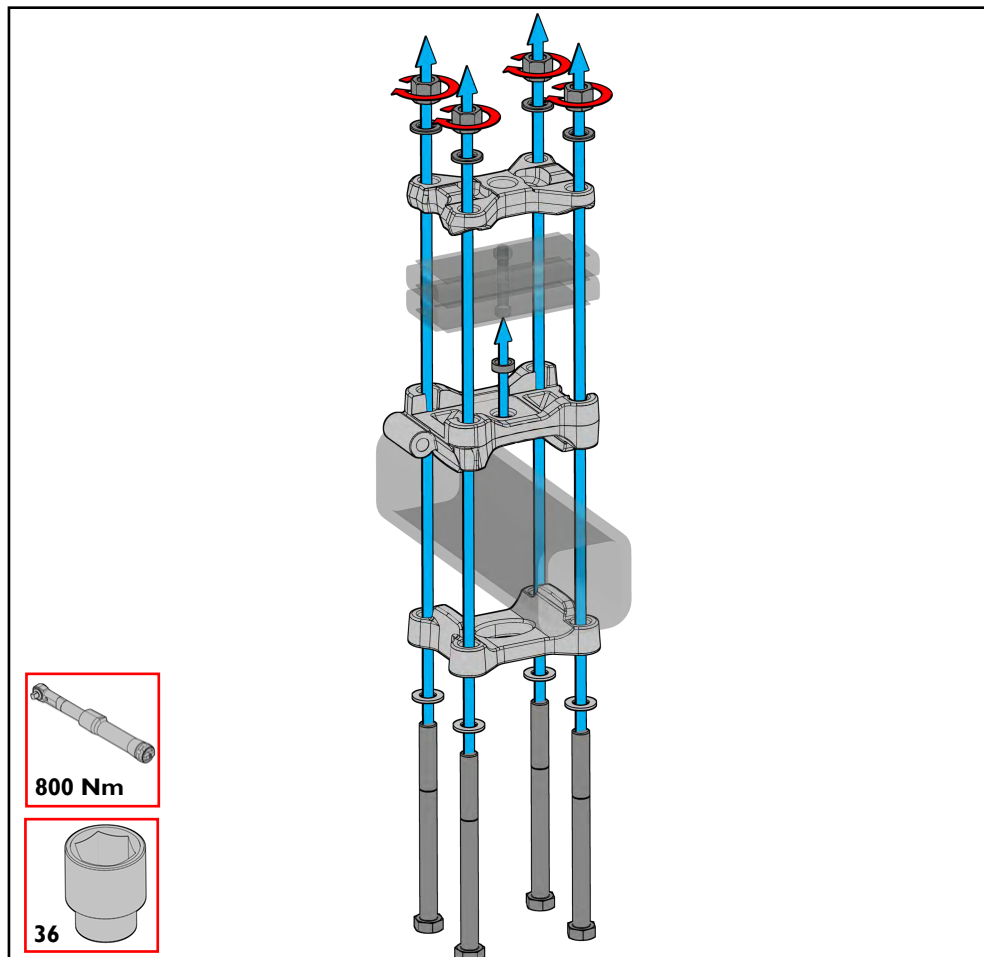
Front mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13. Available axle clampings

13.11 HD axle seat □150

Underslung application

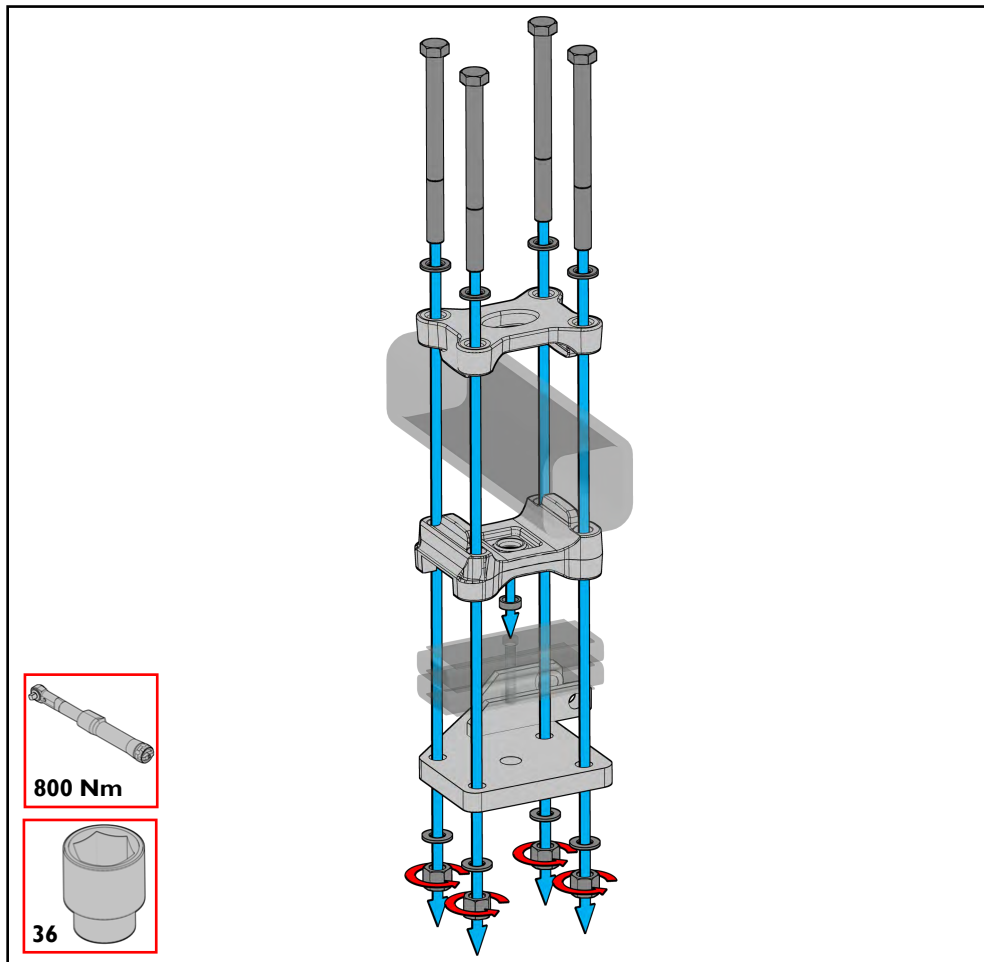
Rear mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



13.12 HD axle seat □150

Overslung application

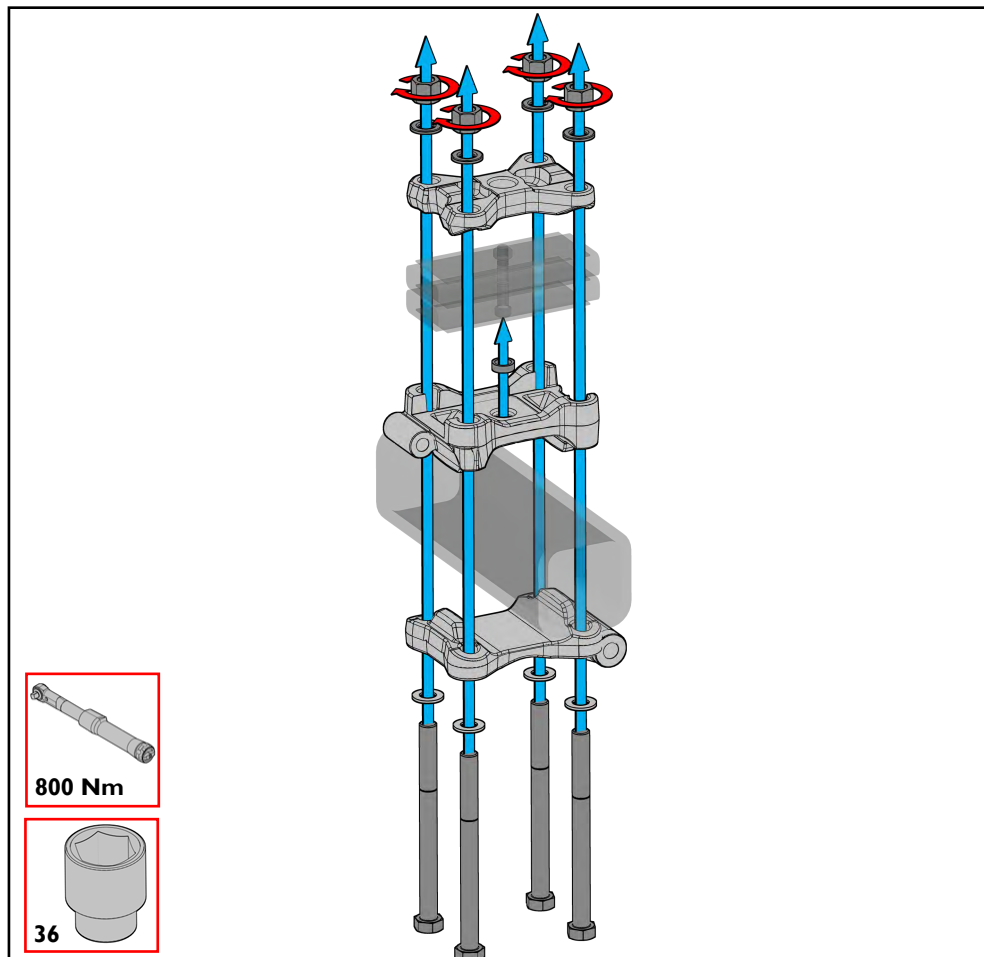
Rear mounted shock absorbers

Clamping bolts vary in length depending on the total trailing arm thickness.

Example shows vehicle lefthand side.

See welding instructions: Section 4

See tightening instructions: Section 10



15. Other used shock absorber options

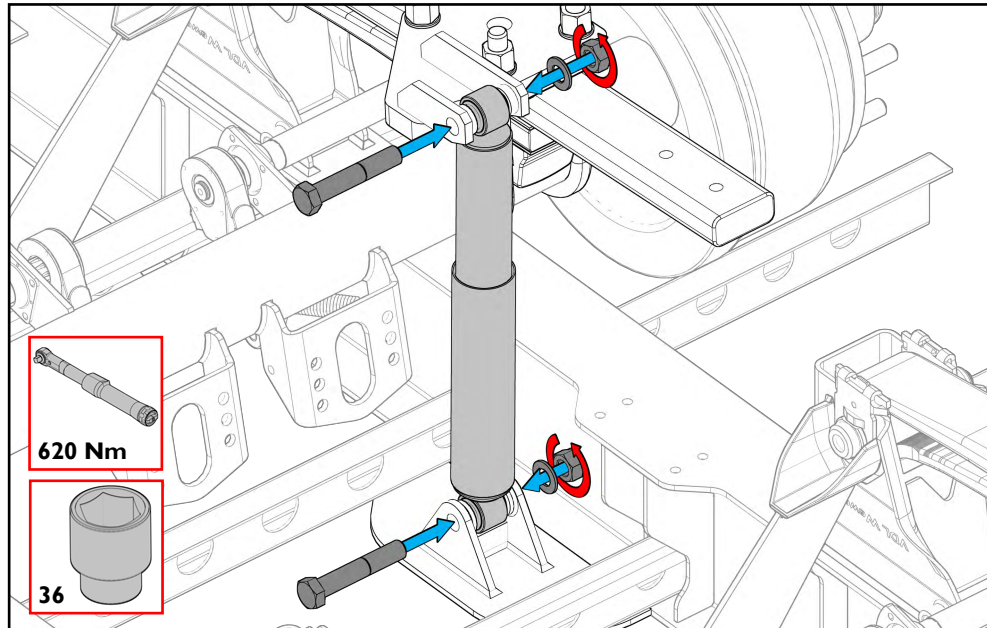
14.1 Rear mounted shock absorber Underslung application

Place the shock absorbers, bolts, nuts and washers. If present, follow the instructions on the shock absorber (see Section 6).

Tighten the top and bottom connection **at ride height** to torque according the instructions.

The trailer builder is responsible for the design of the M24 top connection point in the chassis.

See tightening instructions: Section 10



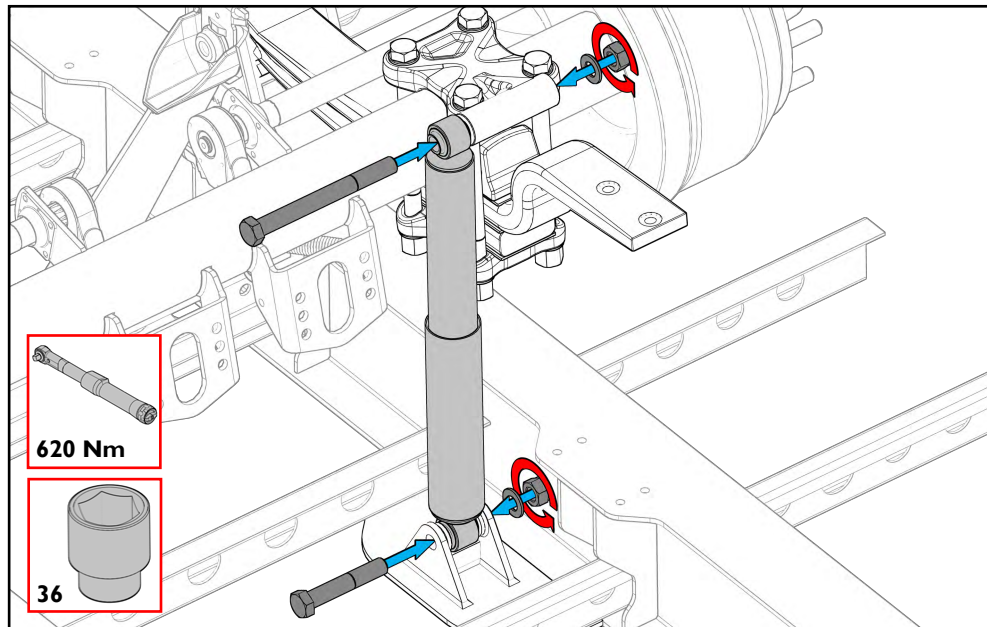
14.2 Rear mounted shock absorber Overslung application

Place the shock absorbers, bolts, nuts and washers. If present, follow the instructions on the shock absorber (see Section 6).

Tighten the top and bottom connection **at ride height** to torque according the instructions.

The trailer builder is responsible for the design of the M24 top connection point in the chassis.

See tightening instructions: Section 10



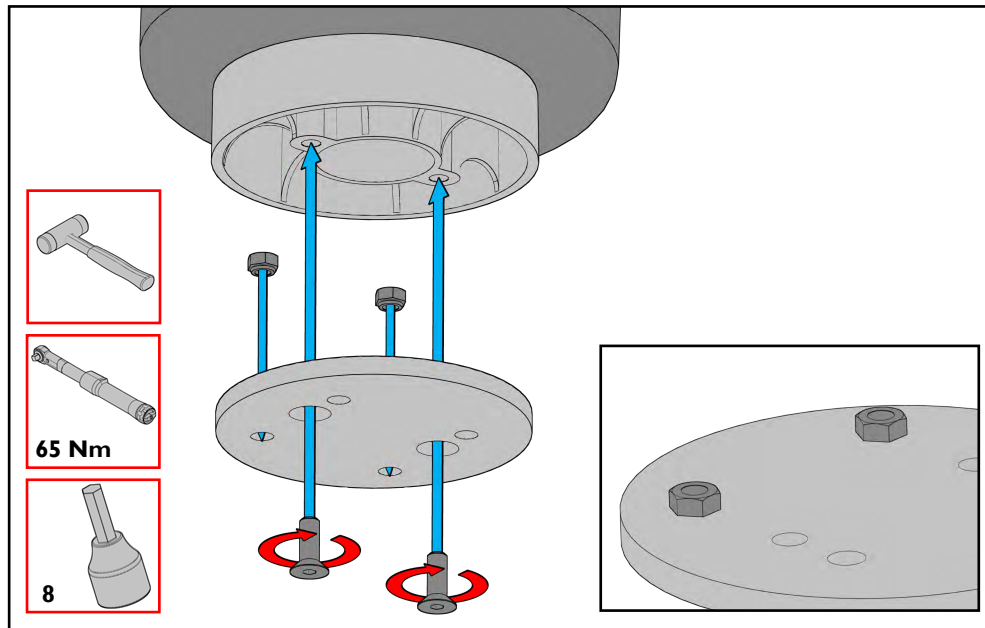
15. Other used air spring options

15.1a Air spring Ø300 Offset 30 or 50mm

First mount the M12 press nut on the support plate with a rubber/plastic hammer until the collar is fully pressed into the plate and the nut lies flush with the plate (see illustration on the far right).

Next mount the Ø300 air spring to the support plate with the M12 countersunk bolts. Make sure the studs on top of the air spring are on the correct side. Tighten to torque according the instructions.

See tightening instructions: Section 10

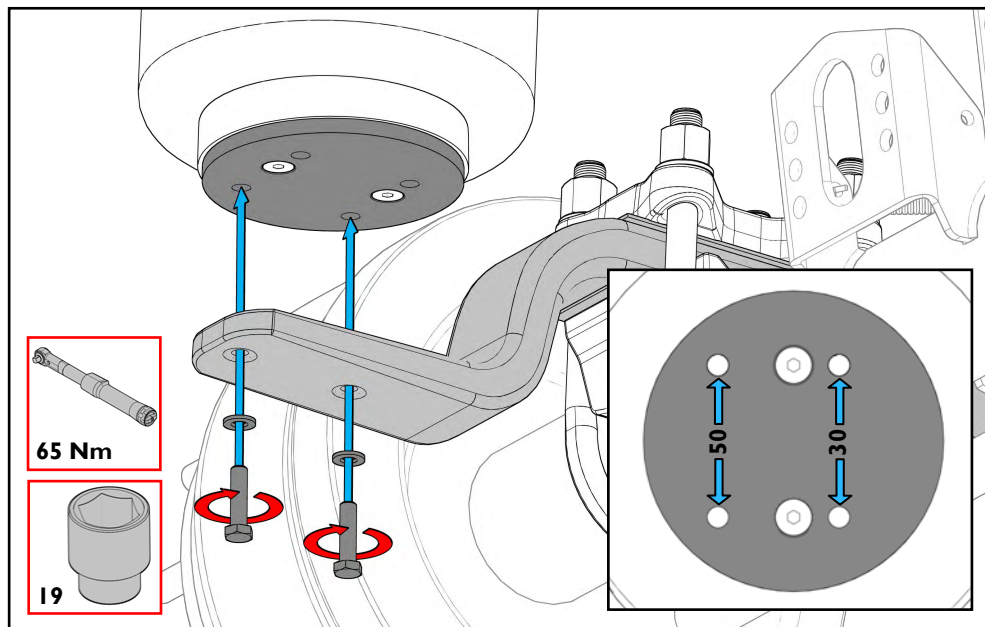


15.1b Air spring Ø300 Offset 30 or 50mm

Finally mount the support plate with the Ø300 air spring to the trailing arm with the M12 bolts. Tighten to torque according the instructions.

The illustration shows an assembly that creates an air spring offset of 50mm using the outer most holes of the support plate. The other holes create an offset of 30mm.

See tightening instructions: Section 10

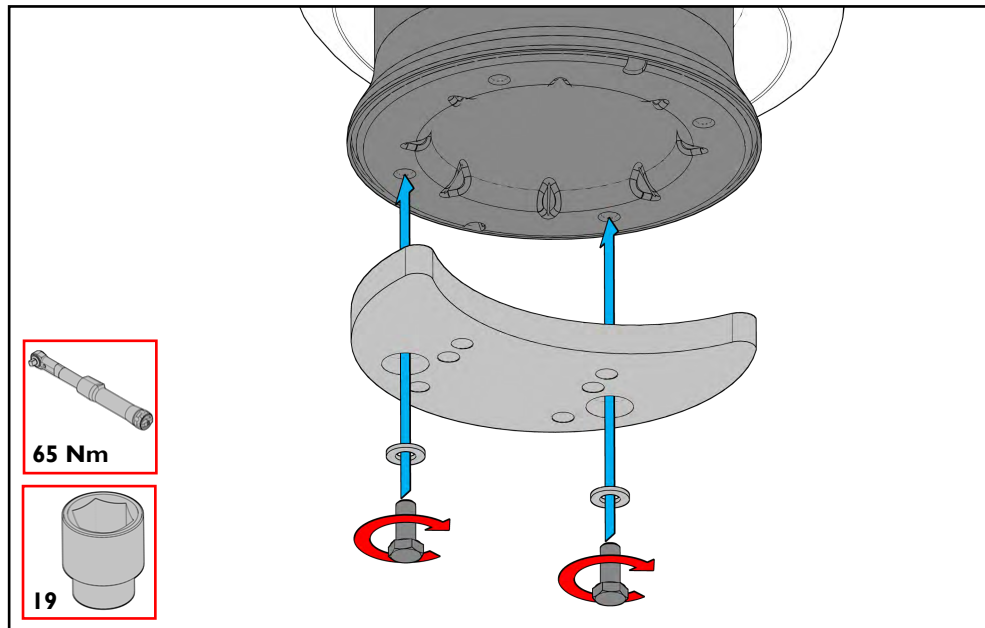


15. Other used air spring options

15.2a Air spring Ø350 Offset 30 or 50 or 95mm

First mount the Ø350 air spring to the support plate with the M12 bolts. Make sure the studs on top of the air spring are on the correct side. Tighten to torque according to the instructions.

See tightening instructions: Section 10

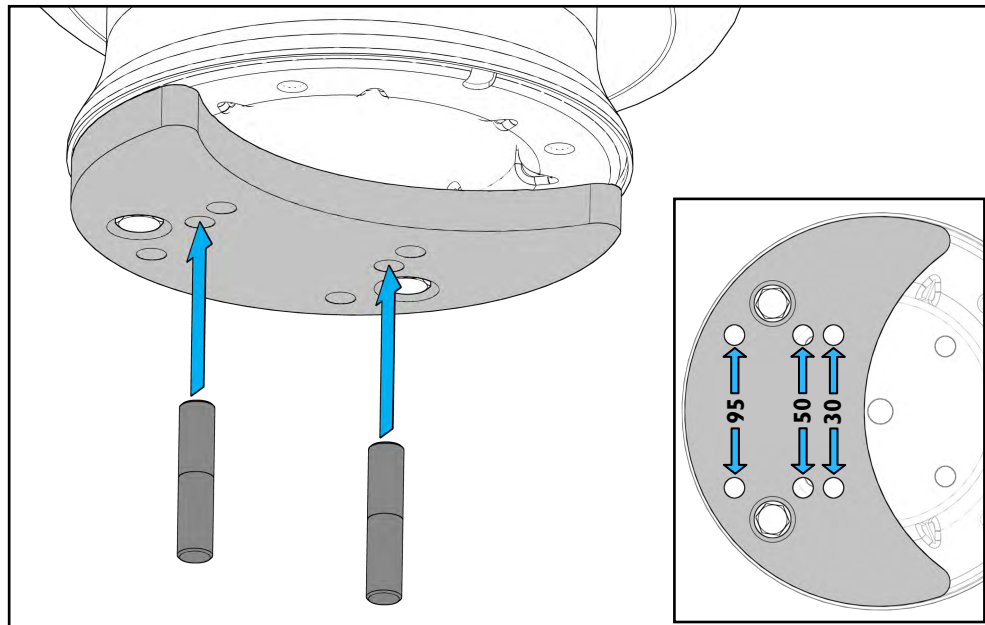


15.2b Air spring Ø350 Offset 30 or 50 or 95mm

Hand tighten the M16 studs in the support plate until it is fastened.

The support plate is suitable for multiple air spring offsets. Offset 30, 50 or 95mm. Choose the correct holes for the correct air spring offset.

Make sure the short threaded side goes in the support plate.

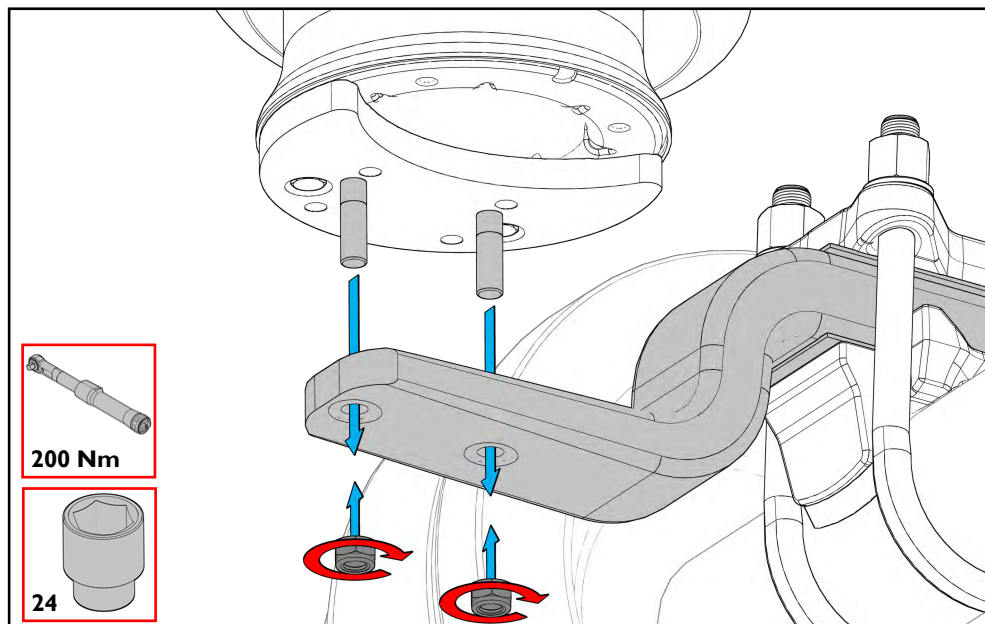


15.2c Air spring Ø350 Offset 30 or 50 or 95mm

Finally mount the complete support plate with Ø350 air spring on the trailing arm. Tighten the locknuts to torque according to the instructions.

The illustration shows an assembly that creates an air spring offset of 50mm using the middle tapped holes of the support plate.

See tightening instructions: Section 10

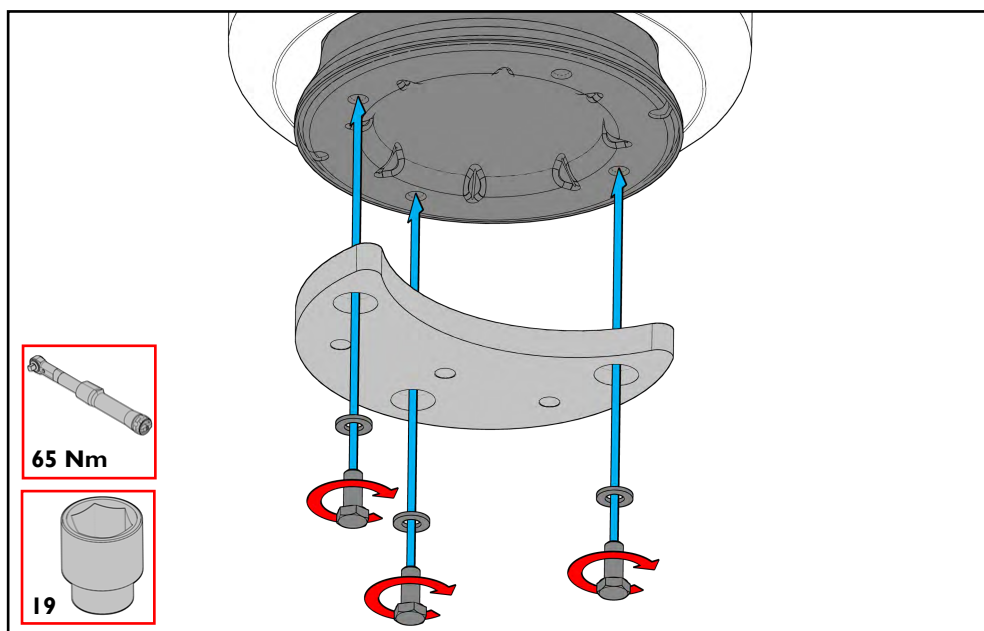


15. Other used air spring options

15.3a Air spring Ø350 Offset 56mm

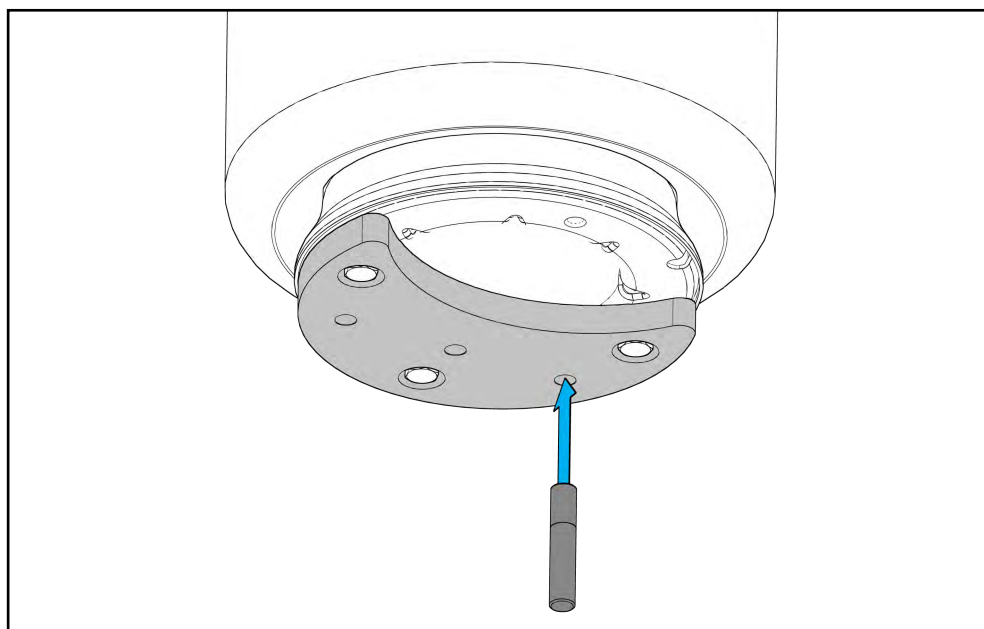
First mount the Ø350 air spring to the support plate with the M12 bolts. Make sure the studs on top of the air spring are on the correct side. Tighten to torque according the instructions.

See tightening instructions: Section 10



15.3b Air spring Ø350 Offset 56mm

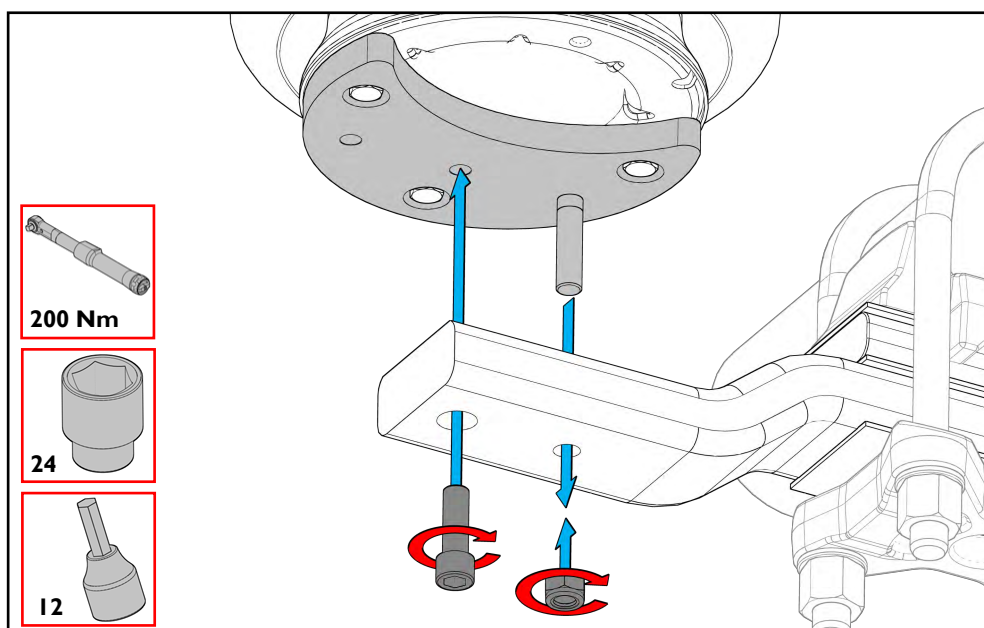
Hand tighten the M16 stud in the hole closest to the axle of support plate until it is fastened. Vehicle lefthand side is drawn. Make sure the short threaded side goes in the support plate.



15.3c Air spring Ø350 Offset 56mm

Finally mount the complete support plate with Ø350 air spring on the trailing arm. Tighten the locknut and M16 allen bolt to torque according the instructions.

See tightening instructions: Section 10



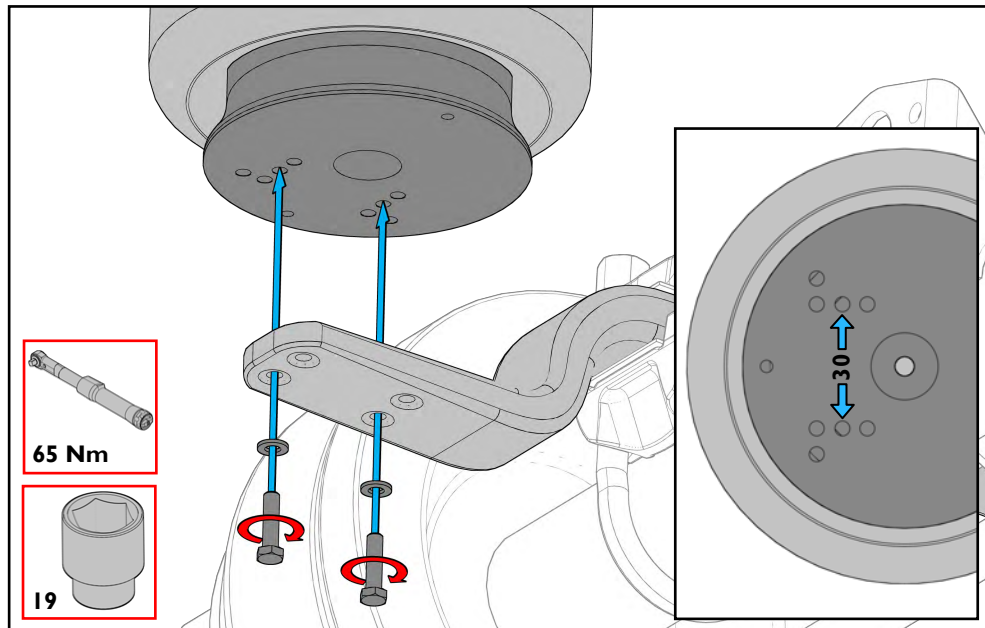
15. Other used air spring options

15.4a Air spring Ø350 - Reinforced 4-hole Trailing arm Offset 30mm

Mount the Ø350 air spring with reinforced piston directly on the trailing arm with the M12 bolts. Tighten to torque according the instructions.

Make sure to use the correct holes in the piston. See the image on the far right. Vehicle lefthand side is drawn.

See tightening instructions: Section 10

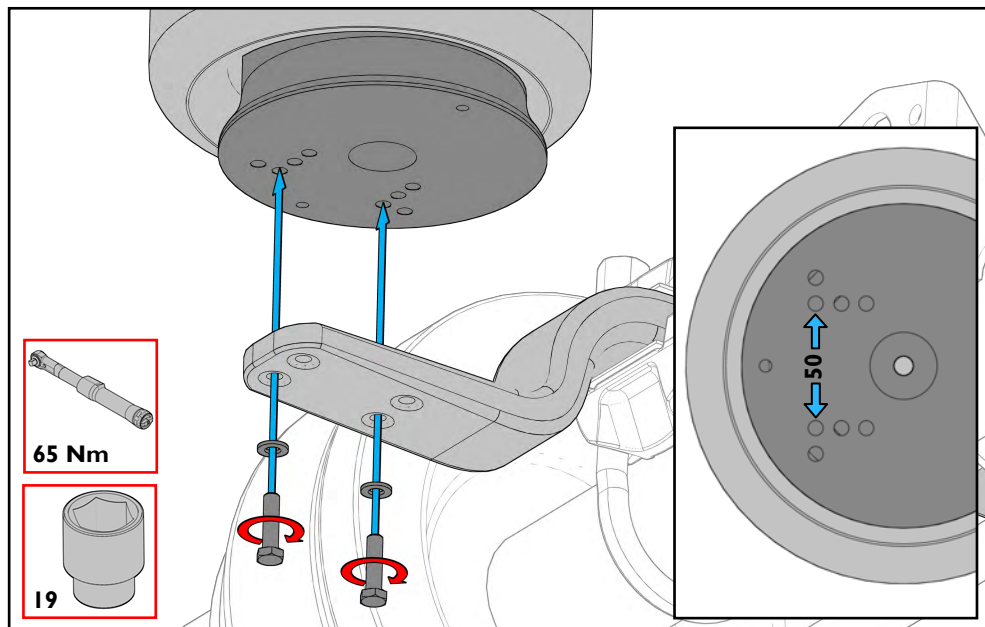


15.4a Air spring Ø350 - Reinforced 4-hole Trailing arm Offset 50mm

Mount the Ø350 air spring with reinforced piston directly on the trailing arm with the M12 bolts. Tighten to torque according the instructions.

Make sure to use the correct holes in the piston. See the image on the far right. Vehicle lefthand side is drawn.

See tightening instructions: Section 10

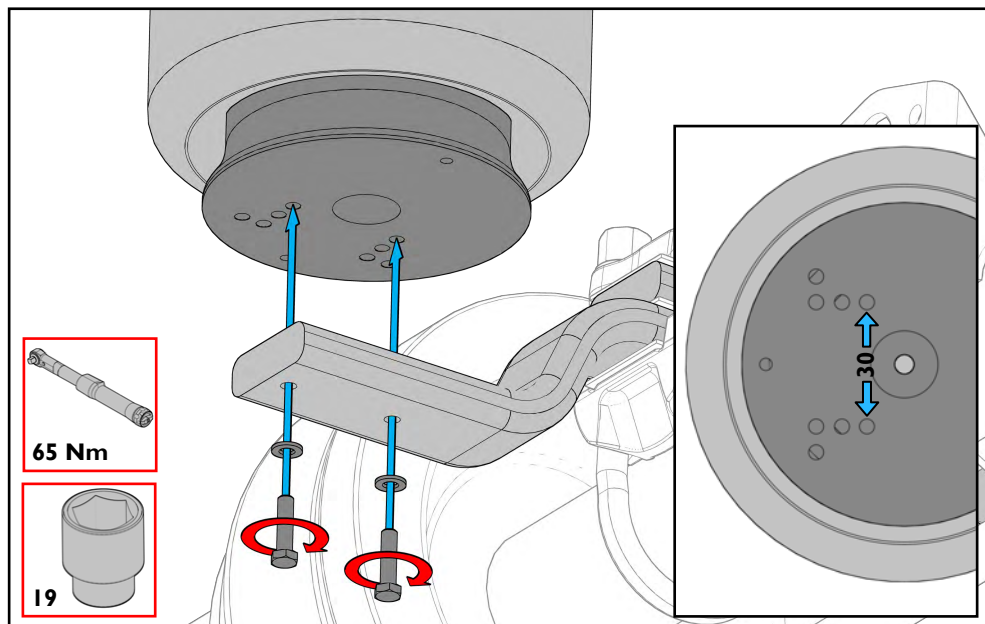


15.4a Air spring Ø350 - Reinforced 2-hole Trailing arm Offset 30mm

Mount the Ø350 air spring with reinforced piston directly on the trailing arm with the M12 bolts. Tighten to torque according the instructions.

Make sure to use the correct holes in the piston. See the image on the far right. Vehicle lefthand side is drawn.

See tightening instructions: Section 10



15. Other used air spring options

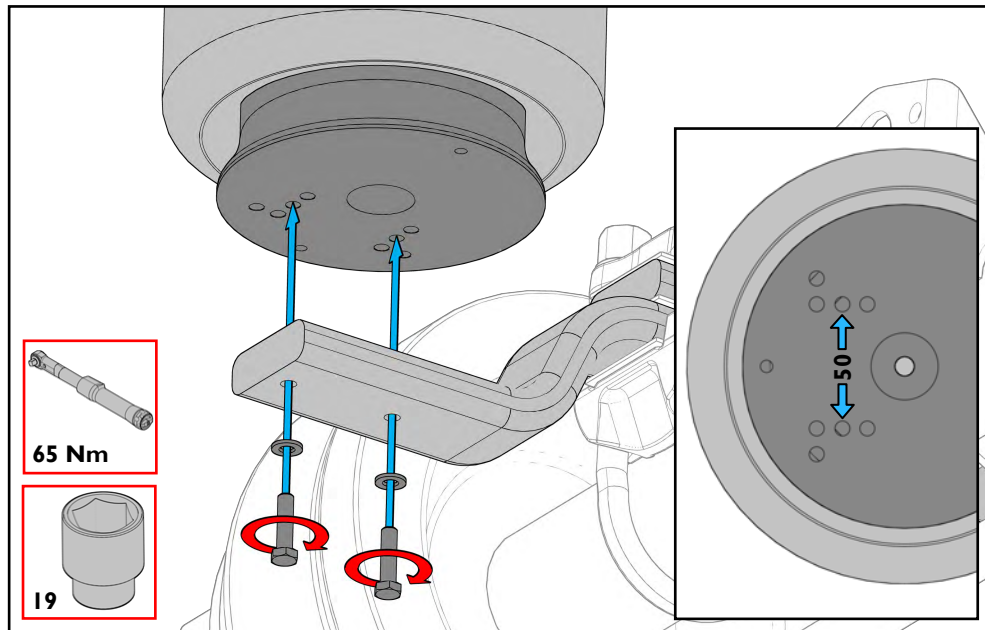
15.4d Air spring Ø350 - Reinforced 2-hole Trailing arm Offset 50mm

Mount the Ø350 air spring with reinforced piston directly on the trailing arm with the M12 bolts. Tighten to torque according to the instructions.

Make sure to use the correct holes in the piston. See the image on the far right.

Vehicle lefthand side is drawn.

See tightening instructions: Section 10



Mounting the air spring with reinforced piston at offset 70mm on the trailing arm with 2 holes is NOT allowed!

Notes

This image shows a full page of white paper with horizontal dashed lines, typical of primary school writing paper. The lines are evenly spaced and run across the width of the page. There are no margins, text, or other markings on the paper.