Axle and Suspension
VN (4)
Section 6

Introduction

This document provides information on axle and suspension applications in Volvo vehicles.

Note: We have attempted to cover as much information as possible. However, this information does not cover all the unique variations that a vehicle may present. Note that illustrations are typical but may not reflect all the variations of assembly.

All data provided is based on information that was current at time of release. However, **this information is subject to change without notice**.

Contents:

Front Axle

VN (4) Front Axle Options

Manufacturer	Axle Model	Axle Drop	Weight Rating	Hub Type	Sales Code	SWB (<190) Inner Wheel-cut	SWB (<190) Outer Wheel-cut	MWB (191–230) Inner Wheel-cut	MWB (191–230) Outer Wheel-cut	LWB (<231) Inner Wheel-cut	LWB (<231) Outer Wheel-cut
Meritor (FATYPME)	MFS12-E122	3.5”	12,000 lbs.	Basic	370508	50	35.8	50	38.6	50	38.6
				Basic							
				Basic							
				Basic							
		3.5”	12,500 lbs.	Basic	370509	50	31.5	45	35.3	45	35.3
				Basic							
				Basic							
				Basic							
	MFS13122	3.5”	13,200 lbs.	Basic	370510	50	31.5	45	35.3	45	35.3
				Basic							
				Basic							
				Basic							
Dana (FATYPMD)	E-1252IR	3.5” and 3.74”	12,000 lbs.	Basic	370505	50	34.9	50	37.7	50	37.7
		3.5” and 3.74”	12,500 lbs.	Basic	370506						
	E-1322IL	3.5”, 3.74” and 5.0”	13,200 lbs.	Basic	370507						
Volvo (FATYPM-V)	VF13	3.5”(-Double Drop)	12,000 lbs.	Basic and Unitized	370501	50	34.7	50	36.6	50	37.9
			12,500 lbs.		370502						
	VF14		13,200 lbs.		370503						
			14,600 lbs.		370504						

Notes:

- The Dana Spicer Axle is a CE options.
- The Dana Spicer Axle can only be used with the VOAS Rear Suspension.

Notes

Rear Suspension

The ECS (Electronically Controlled Suspension) system is an electronically controlled leveling system for heavy duty trucks. The ECS system uses the electronic level sensors, pressure sensors, solenoid valves and air bellows to adjust the height and axle load on the vehicle.

The level of the vehicle is measured by the level sensors, which provide information to the ECS system. The ECS system compares the current level with expected values and adjusts the level by inflating or deflating air from the suspension air springs. This provides greater driver comfort and equipment protection off-highway, where other air suspensions cannot be used.

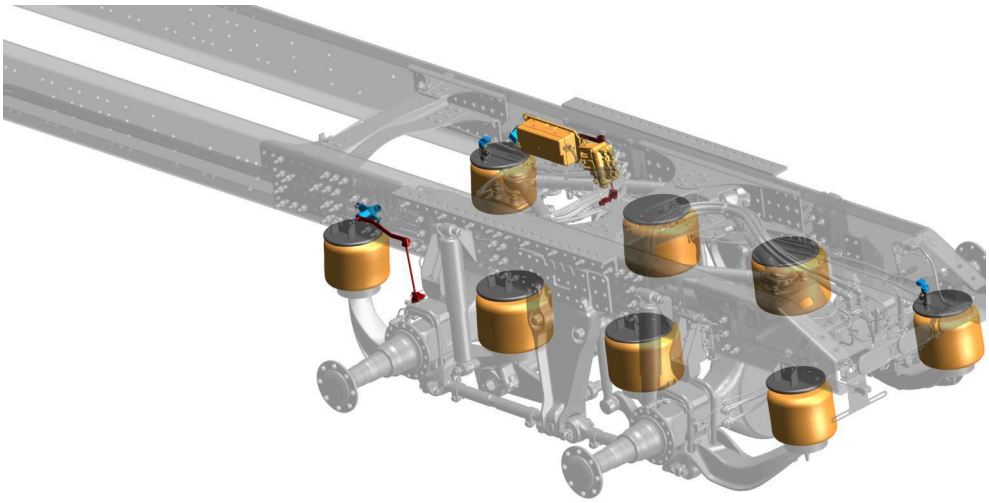
Vehicles equipped with an air ride suspension absorb the variations in road conditions with an air spring and the assistance of a Z shaped leaf spring and air spring members. The air suspension provides a smooth ride whether the vehicle is loaded or unloaded. It also reduces wear on tires and chassis.

The air springs are mounted to the Z leaf springs via a crossmember and attached to the frame on top. The Z spring mounts to the axle housing, spring hanger bracket and the radius leaf spring.

For GRAS suspension, the air spring members are used and they are mounted to the air springs, the axle and the reaction rods.

Volvo Group GRAS (Global Rear Air Suspension) Suspension (VGR)

Rear suspension installation – Volvo Group GRAS Suspension (RSI-VGR) 6*4



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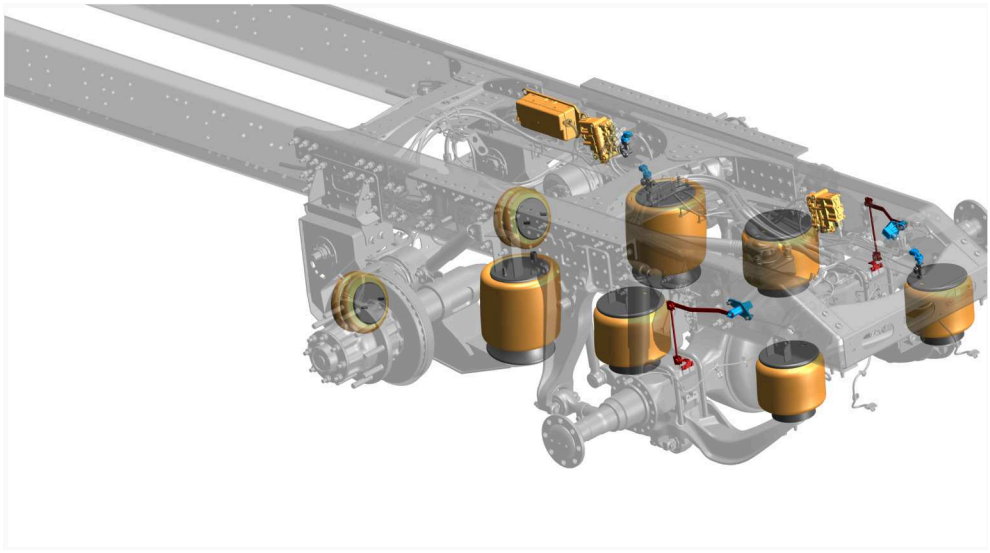
Rear suspension installation – Volvo Group GRAS Suspension (RSI-VGR) 6*2



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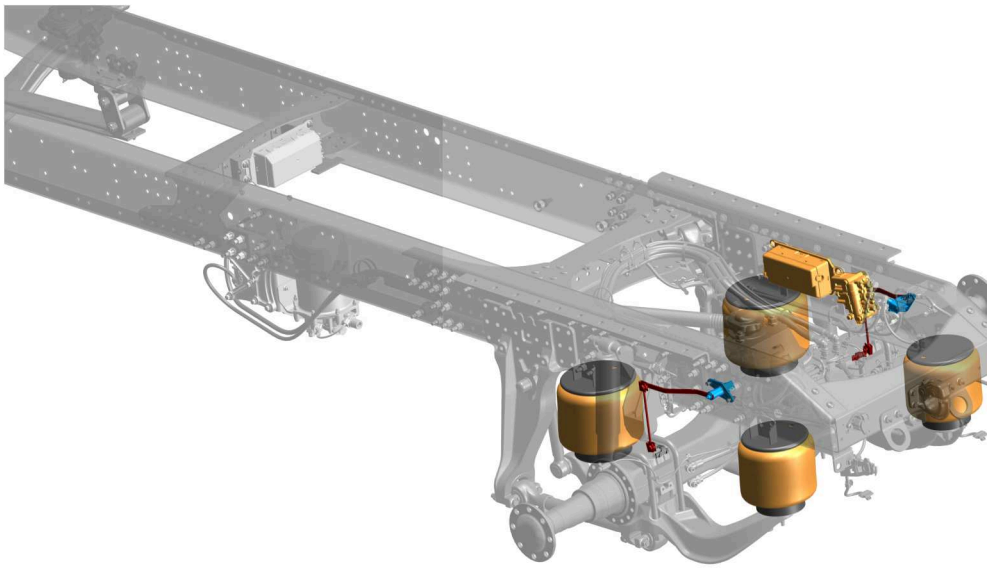
Rear suspension installation – Volvo Group GRAS Suspension (RSI-VGR) 4*2



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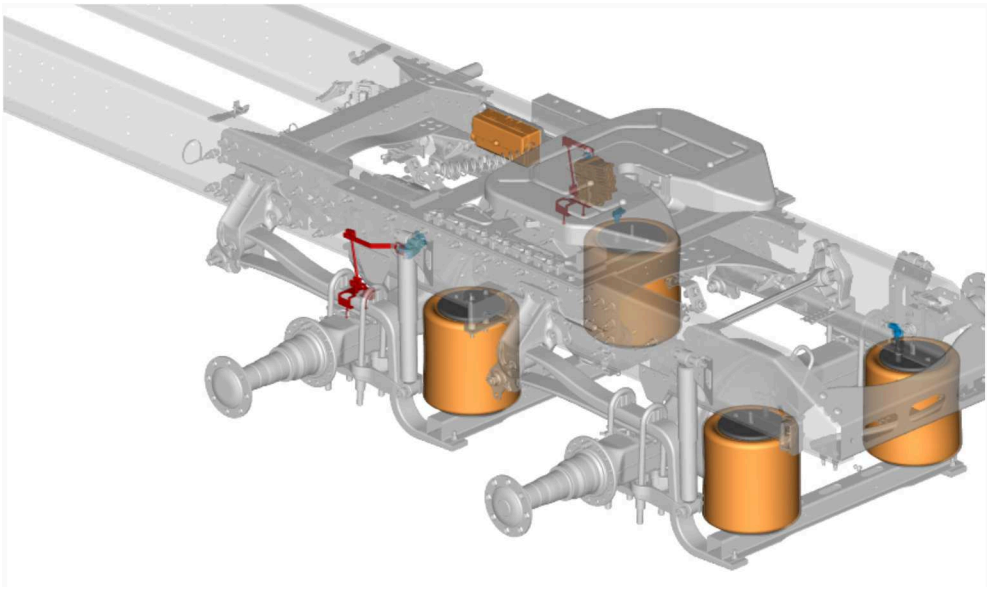
Rear suspension installation – Volvo Group VOAS Suspension (RSI-VAS) 6*4



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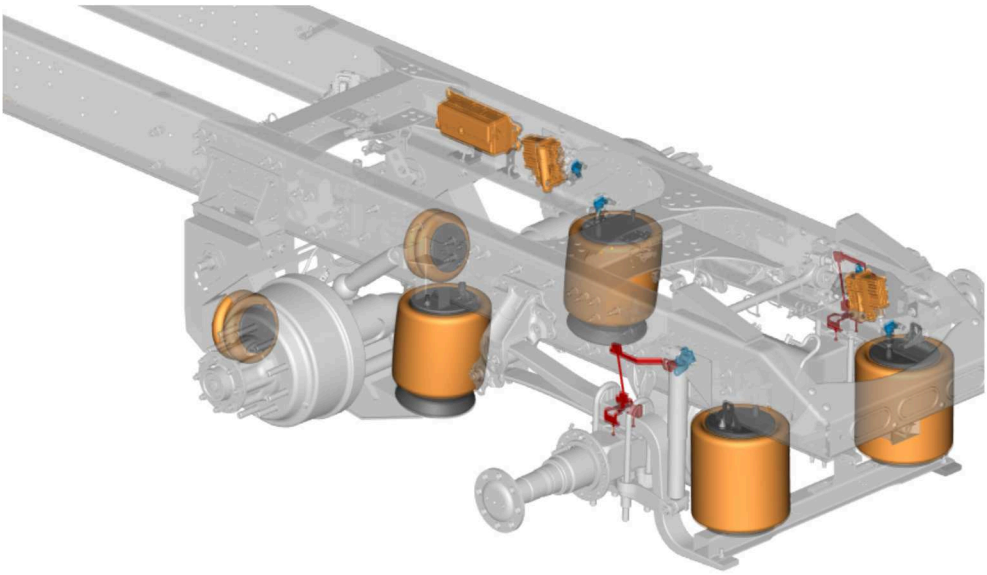
Rear suspension installation – Volvo Group VOAS Suspension (RSI-VAS) 6*2



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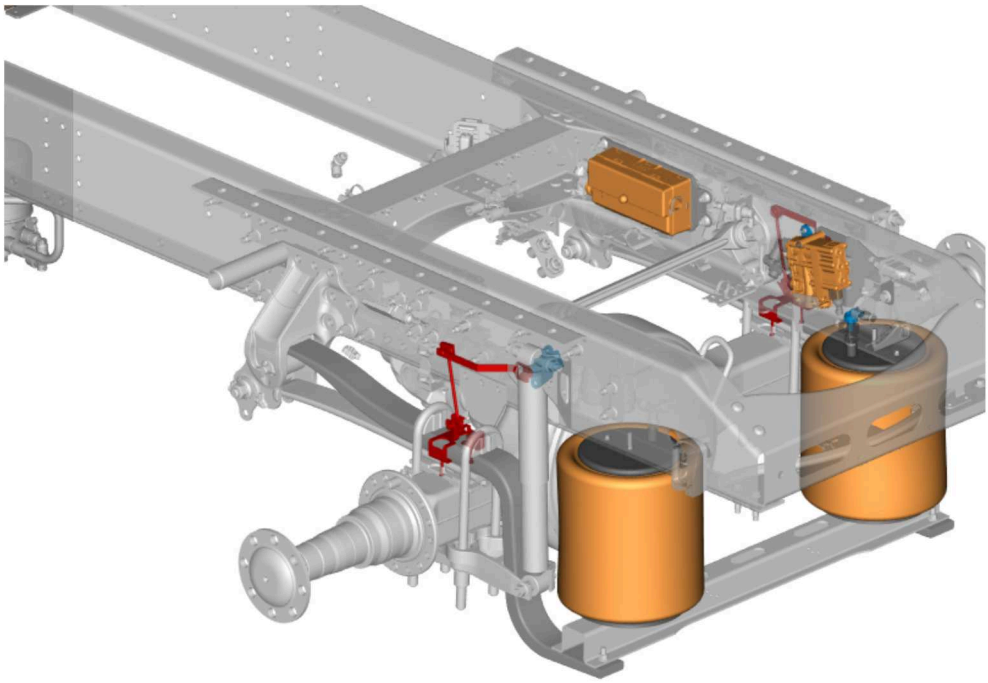
Rear suspension installation – Volvo Group VOAS Suspension (RSI-VAS) 4*2



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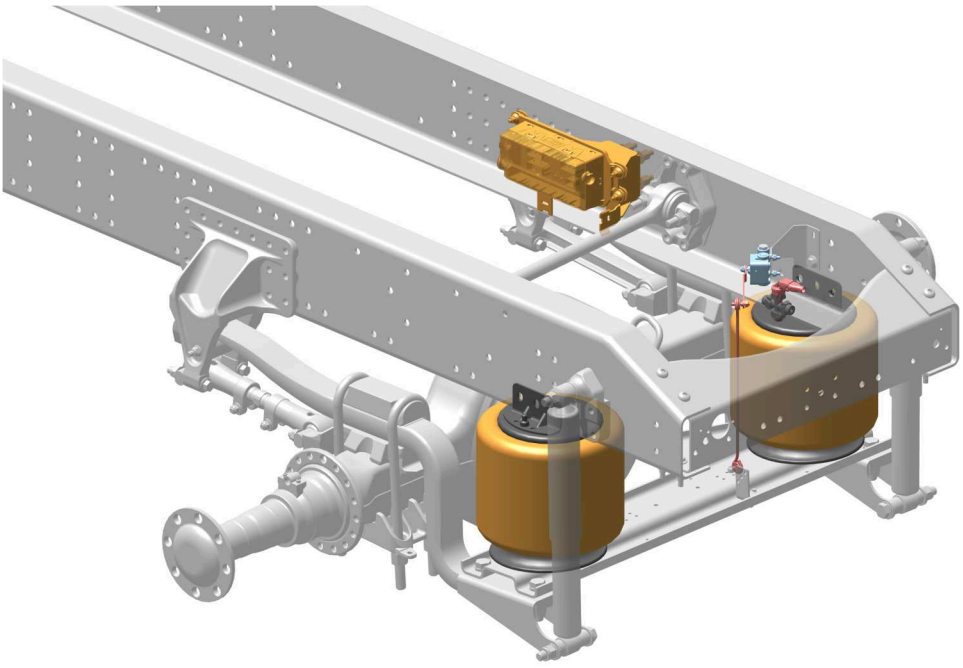
The design of the Air-Ride Suspension has been refined by Volvo Trucks North America. The result of this refinement process is the Volvo Optimized Air Suspension. This new suspension is a rear air suspension with improved ride characteristics and increased durability.

CAUTION

The Volvo Optimized Air Suspension is set at the factory. Changing the ride height will affect the driveshaft angles and may cause driveline vibration and/or shorten component life.
Ride height adjustments must be performed in accordance with all documented service procedures.

Hendrickson HAS (Hendrickson Air Suspension) Suspension (HAS)

Rear suspension installation – Hendrickson HAS Suspension (RSI-HAS) 4*2



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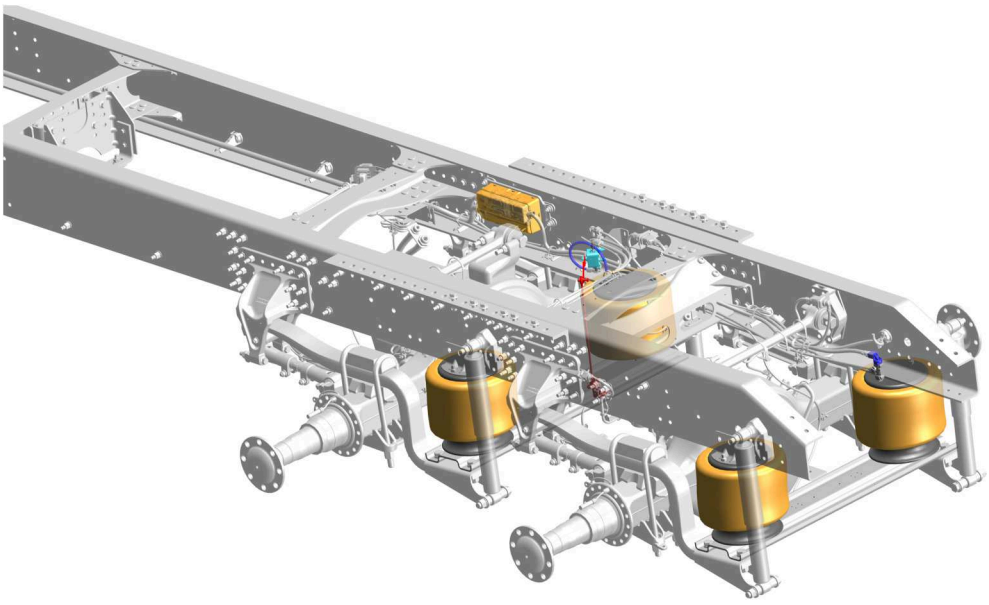
Rear suspension installation – Hendrickson HAS Suspension (RSI-HAS) 6*4



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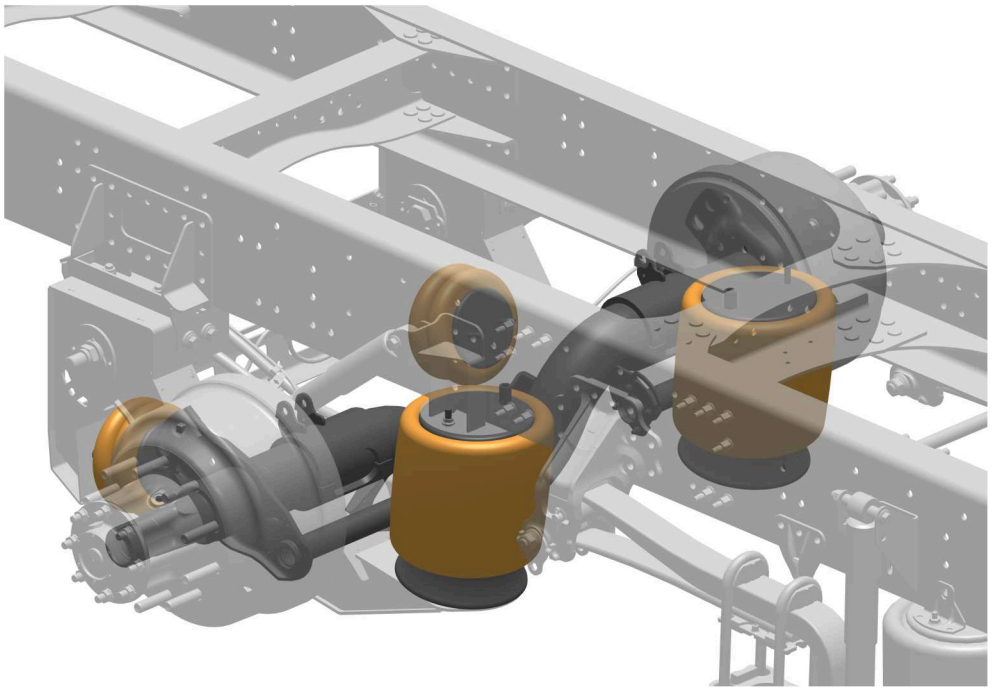
The Hendrickson HAS air suspension is designed for up to 25% off-highway use. It features thicker main support members and premium longitudinal torque rods to handle rough off-highway bumps and shocks. It also is approved for use with an auxiliary lift axle.

Auxiliary Pusher Axle Manufacture, Link (PAM-LINK AUX)

Rear Suspension Installation – PAM-LINK (Auxiliary Pusher Axle Manufacture, Link) 6*2 (RSI-VGR / RSI-VAS)



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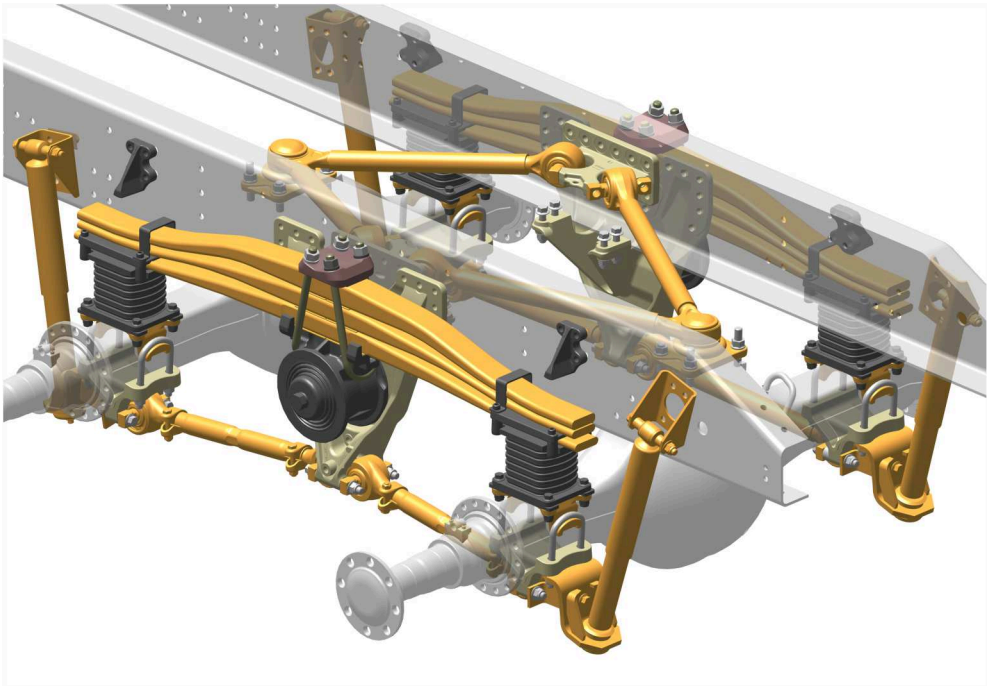
Rear suspension installation – Volvo Group B-RIDE (VTL) 6*4



T7217939

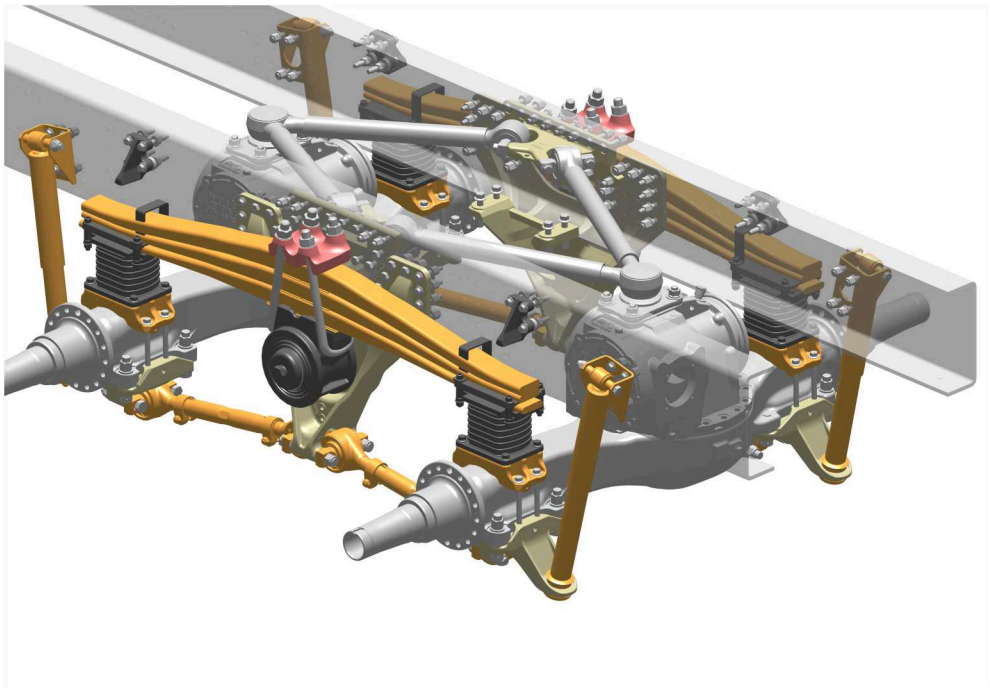
The rear suspension system has a set of leaf springs fixed onto the spring cradle with the U-bolts and a top plate. The suspension is available with two, three or five leaf springs. The leaf springs are mounted on the rubber springs and are fixed to the axle with the upper and lower seats through the U-bolts. The leaf spring assembly is fixed to the chassis frame with the bogie anchorage. The spring cradle helps the spring leaves to displace angularly with respect to the cradle axis. This keeps the axles loaded equally under uneven ground surfaces.

The suspension has shock absorbers on the first and second rear axles. The shock absorbers are fixed to the chassis frame and lower seats through brackets. The bump stop restricts the upward movement of the leaf springs beyond the allowable limit. The suspension is designed with upper V-stays and lower reaction rods. This results in a parallelogram suspension that keeps the first and second rear axles at the same pinion angle through the articulating range.

The B ride suspension is optimized for ride comfort and stability.

Volvo Group T-RIDE (RSI-VTL)

Rear suspension installation – Volvo Group T-RIDE (VTL) 6*4



T7219547

The rear suspension system has a set of leaf springs fixed onto the spring cradle with the U-bolts and a top plate. The suspension is available with two, three or five leaf springs. The leaf springs are mounted on the rubber springs and are fixed to the axle with the upper and lower seats through the U-bolts. The leaf spring assembly is fixed to the chassis frame with the bogie anchorage. The spring cradle helps the spring leaves to displace angularly with respect to the cradle axis. This keeps the axles loaded equally under uneven ground surfaces.

The suspension has shock absorbers on the first and second rear axles. The shock absorbers are fixed to the chassis frame and lower seats through brackets. The bump stop restricts the upward movement of the leaf springs beyond the allowable limit. The suspension is designed with upper V-stays and lower reaction rods. This results in a parallelogram suspension that keeps the first and second rear axles at the same pinion angle through the articulating range.

The T ride suspension is optimized for load-carrying capacity and durability, mainly in heavy trucks and trailers.

Specifications

Rear suspension installation – Volvo Group GRAS suspension (RSI-VGR)

Model	4*2			6*2			6*4							
Capacity (lb)	23,000			23,000			40,000						46,000	
Load Distribu-tion	NA			40–60			50–50							
Spring Type	Air													
Transverse Torque Rod	STANDARD													
Rear Shock Absorbers	STANDARD													
GCW (in Tons)	45	52	57	45	52	57	36	50	50	57	57	36	73	73
GVW (in lbs)	32,000	35,920	54,320	32,000	35,920	54,320	52,350	52,350	52,350	52,350	52,350	52,350	59,220	58,620
Vehicle Models	VN (4)													
Axle Models	RS-23-160/ 161,MS-23-16*	S23-175	17XHE	RS-23-160/161, MS-23-16*	S23-175	17XHE	MT-40-14XHE	D40-155 AD-VAN-TEK	D40-156 ADVAN-TEK	MT-40-A14*C	MT-40-A14*D	MT-40-14XHE	RT-46-164EH	RT-46-160/ 164 MT-46-16*

Note: The GCW and GVW capacities provided are for reference only. Actual capacities may vary depending on the unique chassis configuration. For unique chassis information, kindly contact your authorized Volvo dealer.

Note: The vehicle load distribution depends on both front and rear axle configurations and variants.

Rear suspension installation – Volvo Group VOAS suspension (RSI-VAS)

Model	4*2		6*2		6*4						
Capacity (lb)	23,000		23,000		40,000		40,000		46,000		
Load Distribu-tion	NA		40–60		50–50						
Spring Type	Air										
Transverse Torque Rod	STANDARD										
Rear Shock Absorbers	STANDARD										
GCW (in Tons)	52	57	52	57	36	57	73	57	73	68	73
GVW (in lbs)	34,700	54,320	35,920	54,320	52,350	52,350	52,350	52,350	59,220	57,750	58,620
Vehicle Models	VN (4)										
Axle Models	S23-175	17XHE	S23-175	17XHE	MT-40-14XHE	MT-40-A14*C, MT-40-A14*D	MT-40-14XHE	MT-40-A14*G, MT-40-A14*H	RT-46-164EH	S440/ S462	RT-46-160/164 MT-46-16*

Note: The GCW and GVW capacities provided are for reference only. Actual capacities may vary depending on the unique chassis configuration. For unique chassis information, kindly contact your authorized Volvo dealer.

Note: The vehicle load distribution depends on both front and rear axle configurations and variants.

Rear suspension installation – Hendrickson HAS suspension (RSI-HAS)

Model	4*2				6*4					
Capacity (lb)	23,000				38,000	40,000	44,000	46,000	46,000	40,000
Load Distribu-tion	NA				50-50					
Spring Type	Air									
Transverse Torque Rod	STANDARD									
Rear Shock Absorbers	STANDARD									
GCW (in Tons)	34	45	52	57	68	68	68	68	73	57
GVW (in lbs)	34,600	32,000	35,920	54,320	58,620	58,500	58,620	57,750	58,620	52,350
Vehicle Models	PR (4) and AN (4)									
Axle Models	RA23R	RS-23-160/161, MS-23-16*	S23-175	17XHE	SB38/S38R	SB38/S40	S440	S440/S462	RT-46-160/164 MT-46-16*	MT-40-A14*D

Note: The GCW and GVW capacities provided are for reference only. Actual capacities may vary depending on the unique chassis configuration. For unique chassis information, kindly contact your authorized Volvo dealer.

Note: The vehicle load distribution depends on both front and rear axle configurations and variants.

Rear suspension installation – Volvo Group B-RIDE and T-RIDE Suspension (RSI-VTL)

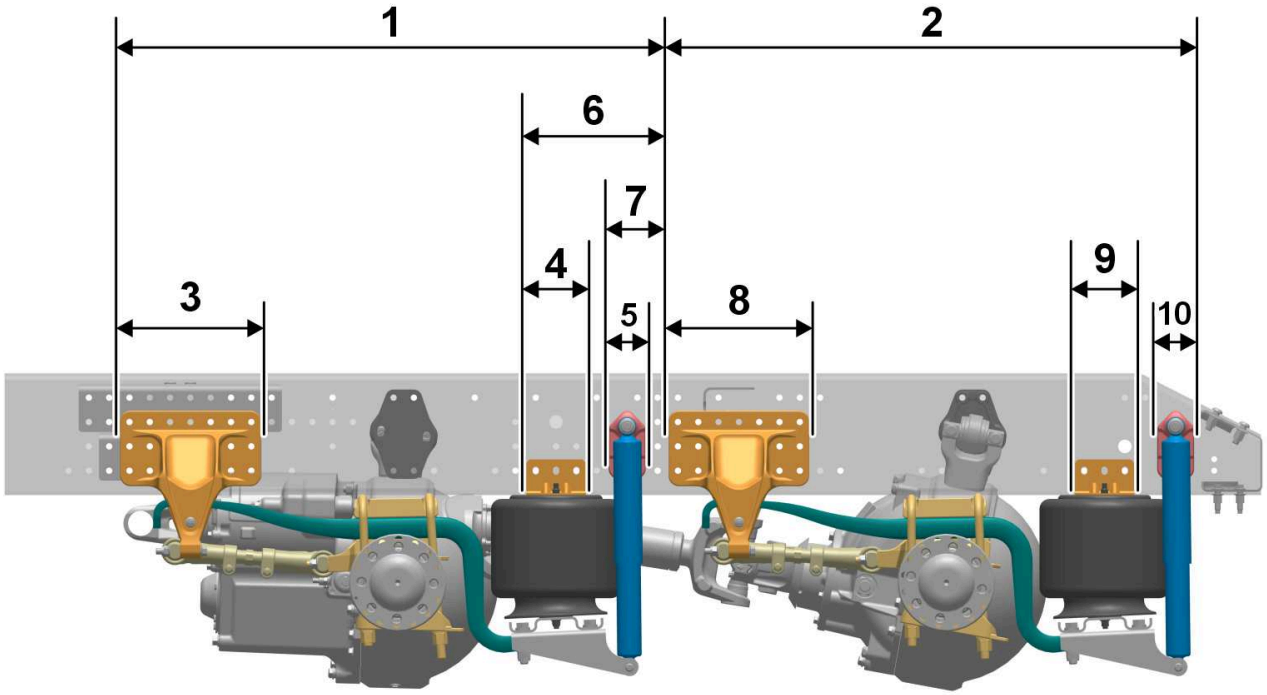
Model	6*4	
Capacity (lb)	40,000	46,000
Load Distribution	50-50	
Spring Type	Leaf	
Transverse Torque Rod	STANDARD	
Rear Shock Absorbers	STANDARD	
GCW (in Tons)	57	73
GVW (in lbs)	52000, 64350, 76850, 89850, 103070, 116630, 130510, 144510, 158830, 173430	58000, 70350, 82850, 95850, 109070, 122630, 136510, 150510, 164830, 179430
Vehicle Models	VN (4)	
Axle Models	MT-40-A14*D, MT-40-A14*G, MT-40-A14*H	RT-46-160

Note: The GCW and GVW capacities provided are for reference only. Actual capacities may vary depending on the unique chassis configuration. For unique chassis information, kindly contact your authorized Volvo dealer.

Note: The vehicle load distribution depends on both front and rear axle configurations and variants.

Notes

Hendrickson HAS Air Suspension



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Hendrickson HAS Air, Side view

Bogie Spread: HAS Air, Side View

SL No.	Bogie Spread, HAS, mm (in.)	
	1350 (53)	1500 (59)
1	1350	1500
2	1291	1291
3	346	346
4	146	146
5	91	91
6	350	500
7	150	300
8	346	346
9	146	146
10	91	91

Notes

Center Bushings

The use of rubber or bronze bushings is dependent on a variety of factors dictated by the operating conditions and geographic location of the vehicle. These factors can be determined only by the experience of the operator. In the absence of this experience, use these general guidelines:

Guidelines for Rubber or Bronze Bushing Applications

A 34,000 Rubber — standard 34K bushing offered by the truck manufacturer. It is an economical bushing, requiring no maintenance and providing satisfactory life for a variety of applications.

B 34,000 Bronze — this bushing can provide extended service life for tight cornering conditions. Proper preventive maintenance is required.

C 38,000 Rubber — this bushing, although no longer used for new vehicle production, is a highly economical 38K - rated bushing. It requires no maintenance and provides satisfactory life for its application.

D 40–46,000 Rubber — this high confinement bushing is the standard 40K bushing offered. It provides excellent service life for a variety of applications without required maintenance. Also used up to 46K with transverse rods.

E 8–52,000 Bronze — this is the standard release bushing provided at manufacture. It provides long life in severe service applications, and requires proper preventive maintenance.

F 46–52,000 Rubber — this fully bonded bushing requires the use of transverse rods at these ratings. It needs no maintenance, yet provides long life in severe service. Use of this bushing slightly reduces the available diagonal articulation.

Transverse Rod Applications

Transverse rods are mandatory for the following applications:

- All Walking Beam Series Suspensions, up to and including 23,600 kg (52,000 lb) capacity with axle spacing 1524 mm (60 in) or greater.
- All Walking Beam Series Suspensions, up to and including 23,600 kg (52,000 lb) capacity when used on front-end loader refuse packers (except with 40,000 lb suspension with bronze center bushings).
- All Air-Ride Series Suspensions.
- All HN Series Suspensions.
- All Walking Beam Series Suspensions with capacities of 20,000 – 23,600 kgs (44,000 – 52,000 lbs) when using rubber equalizing beam center bushings, regardless of axle spacing.

Transverse rods also are recommended where it is necessary to restrict the lateral movement of axles to prevent interference of tires, brakes, axle housings, and other components with the frame, body, or suspension components. This must be determined by the vehicle manufacturer prior to vehicle assembly.

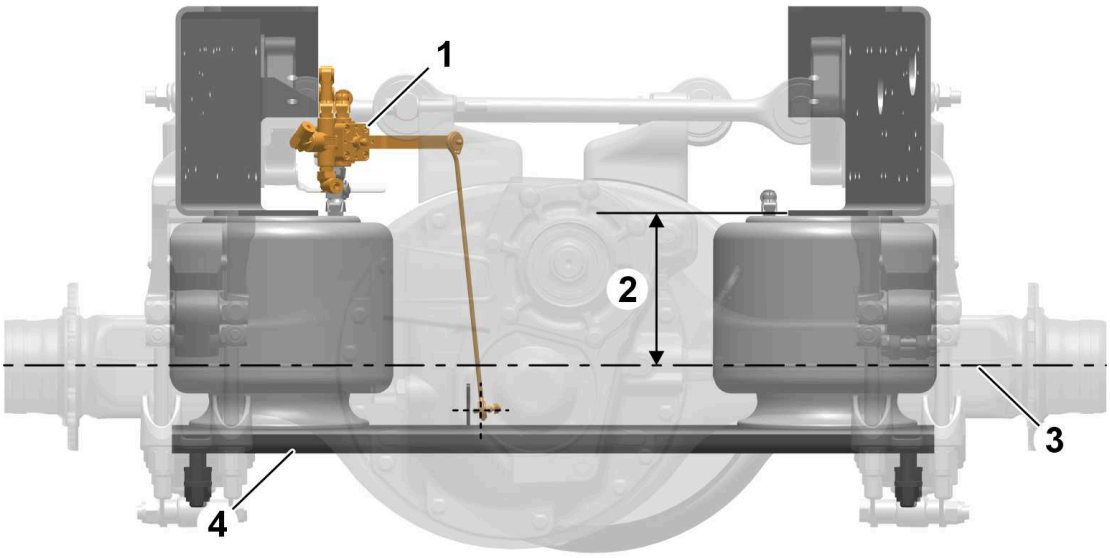
Note: When transverse rods are used, the equalizing beam center bushing must be rubber. This may require changing from bronze center bushings (which are standard with some suspensions) to maintain the rating. A vehicle equipped with transverse rods may experience some reduction in suspension articulation or increased lateral stiffness and resistance to turning, especially with radial ply tires.

Air System

A height control valve (1) — or leveling valve — regulates the air supply to the air springs. The valve is mounted inside the frame rail with a rod connecting the lever on the valve to air spring support crossbeam (4). Air is supplied to the suspension to the “B” system air tank. As weight is applied to the vehicle, the frame is forced downward so that the rod linkage forces the lever on the height control valve upward, allowing air pressure to flow through the valve and into the air spring.

As weight is removed from the vehicle, the frame rises and the lever on the control valve is pulled down, releasing air from the air spring. A dash-mounted control switch allows the operator to raise or lower the suspension when connecting or disconnecting from a trailer.

For details on switch function, see “Electric Switch Functions”, page 21 .



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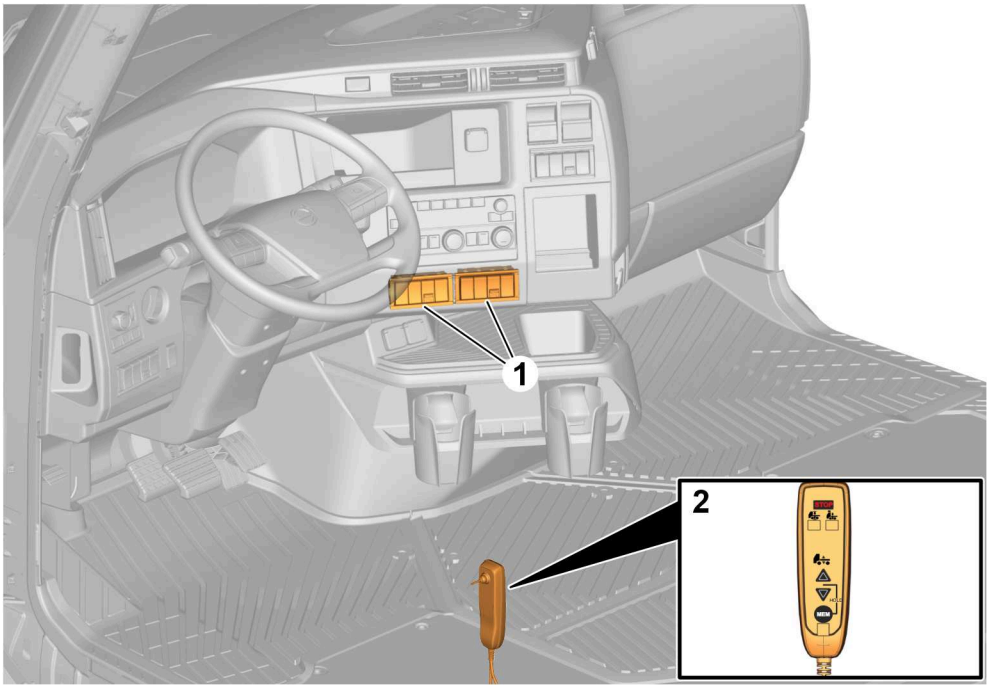
Air System

1 Leveling Valve
2 Ride Height
3 Axle Centerline
4 Crossbeam (Pedestal Plate)

Electric Switch Functions



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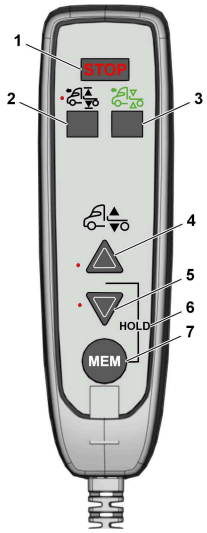
Dash-mounted control switches

The suspension system is controlled by the following switches and remote control (optional):

Switch	Switch Function
 T3201388	Ride height recall switch (Momentary switch)
 T3201389	Ride height recall switch (Stable switch)

 T3201390	Loading level adjustment switch (Momentary switch)
 T3201409	Air suspension dump switch
 T3201391	ECS traction mode switch
 T3201392	Alternative load distribution switch

Remote control ECS (Electronically Controlled Suspension) (Optional)



T3201402

1 STOP button
2 Ride-height adjust button
3 Ride-height recall button
4 Level raising button
5 Level lowering button
6 Hold function
7 Memory button

By operating the remote control ECS, the ECS system inflates or deflates the suspension air springs to increase or decrease the rear ride height.

Notes

Air Suspension Ride Height

Procedure:

⚠ DANGER

Do not attempt to repair or service this vehicle without sufficient training, the correct service literature, and the proper tools. Failure to follow this could make the vehicle unsafe and lead to serious personal injury or death.

⚠ CAUTION

The air suspension is set at the factory. Changing the ride height will affect the driveshaft angles and may cause driveline vibration and/or shorten component life. **Ride height adjustments must be performed in accordance with all documented service procedures.**

Note: After a suspension component replacement an alignment should be performed.

Note: Use special tool **J-44544**.

This document provides procedures for adjusting the air suspension.

1. Prepare the vehicle for the ride height calculation as follows:

- Park the vehicle on a level surface (the front wheels must be pointed straight ahead).
- Free and center all suspension joints by slowly moving the vehicle back and forth twice without using the brake. When coming to a complete stop, make sure the brakes (parking and service) are applied.
- Place the gear lever in neutral.
- Chock the wheels.

Note: Measurements must be performed on an unloaded vehicle.

2. Check all tires for proper inflation. Adjust tire air pressure to tire manufacturer's specifications.

3. Using the dash mounted rear suspension air dump switch release the air in the rear air spring, or disconnect the leveling rod from the leveling valve so that the pressure is released from the air springs.

⚠ WARNING

Avoid personal injury. BEFORE releasing air pressure from air springs, BE SURE neither your hand nor another persons hand, etc., is in a position where it could be pinched between components when the frame/suspension drops.

4. Start the engine and allow the air system to attain normal operating pressure of 827 kPa (120 psi). Turn off the engine.

5. Fill the rear air springs with air using the dash mounted switch or reconnect the actuator rod to the load leveling valve lever.

Ensure the air system is at normal operating pressure of 827 kPa (120 psi).

6. Measure the size of the frame.

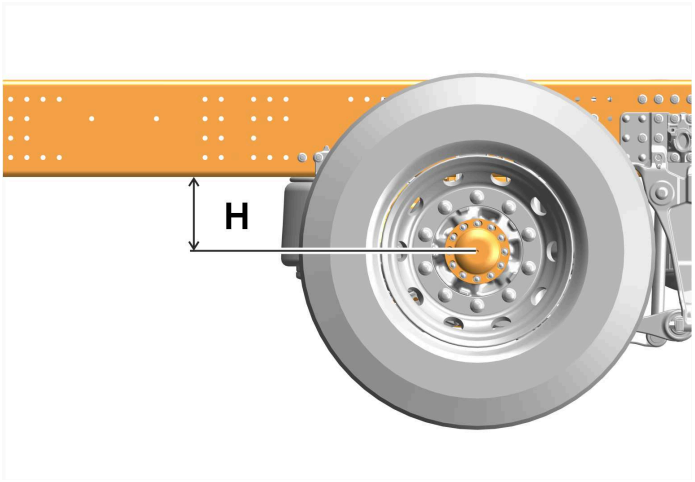
7. Measure the distance from the floor to the center of the axle.

8. Measure the distance from the bottom edge of the frame to the floor.

9. The difference in the two measurements is the ride height. Verify that the vehicle is at the correct ride height per Table A.

Note: The ride height measurement is dependent on frame size.

Ride height



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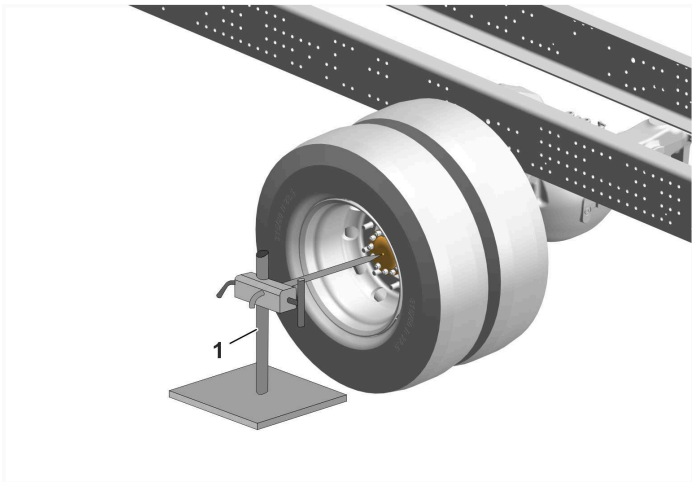
H. Ride height

The ride height (H) is measured from the center of the first driving axle hub to the bottom of the frame.

Note: The air springs must be filled to the correct pressure before measuring the ride height.

Procedure to measure ride height



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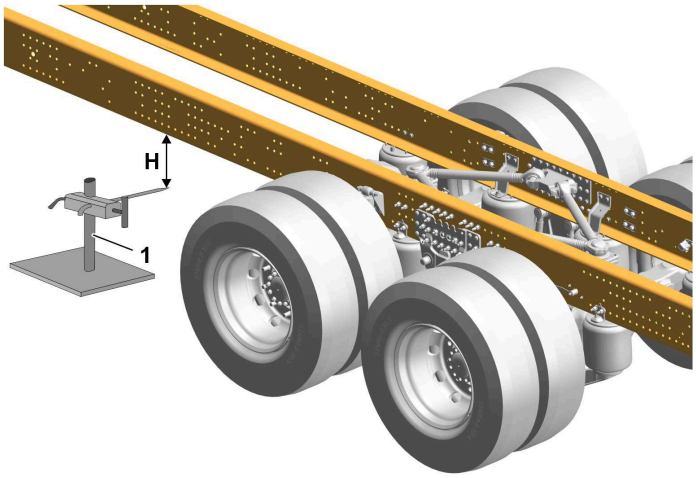
1. Tool

Place the tool (1) near the first drive axle and position the pointer to the centre of the axle hub.

Note: The vehicle must be on level ground.



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H. Ride height
1. Tool

Move and position the tool (1) between the drive axles and below the frame. Measure the ride height (H) from the tip of the pointer to the bottom of the frame.

Table A – Frame Height and Ride Height measurements for **RSI-VGR**, **RSI-VAS** and **RSI-HAS**

Ride height – Volvo Group GRAS Suspension (RSI-VGR)

Rear suspension height	Frame height (B) variant	Ride height (H)
		Loaded/Unloaded
RSH-STD	FRAME266	9.33±0.19 in (237±5 mm)
	FRAME300	8.66±0.19 in (220±5 mm)
RSH-HIG	FRAME266	10.51±0.19 in (267±5 mm)
	FRAME300	9.84±0.19 in (250±5 mm)

Ride height – Volvo Group VOAS Suspension (RSI-VAS) (Mechanical controlled)

Rear suspension height	Frame height (B) variant	Ride height (H)	
		Loaded	Unloaded
RSH-LOW	FRAME266	6.29±0.19 in (160±5 mm)	6.69±0.19 in (170±5 mm)
RSH-STD	FRAME266 FRAME300	7.59±0.19 in (193±5 mm)	7.99±0.19 in (203±5 mm)
RSH-HIG	FRAME266 FRAME300	9.05±0.19 in (230±5 mm)	9.44±0.19 in (240±5 mm)
		8.38±0.19 in (213±5 mm)	8.77±0.19 in (223±5 mm)

Ride height – Volvo Group VOAS Suspension (RSI-VAS) (Electronic controlled)

Rear suspension height	Frame height (B) variant	Ride height (H)
		Loaded/Unloaded
RSH-LOW	FRAME266	6.29 in (160 mm)
RSH-STD	FRAME266 FRAME300	7.59 in (193 mm)
RSH-HIG	FRAME266 FRAME300	8.38 in (213 mm)

Ride height – Hendrickson HAS Suspension (RSI-HAS)

Rear suspension height	Frame height (B) variant	Ride height (H)	
		Loaded	Unloaded
RSH-STD	FRAME266 FRAME300	8.5 in (215.90 mm)	8.66 in (220.20 mm)
		8.50 in (216 mm)	8.62 in (219 mm)
RSH-HIG	FRAME266 FRAME300	9.5 in (241.30 mm)	9.66 in (245.50 mm)
		9.48 in (241 mm)	9.61 in (244.30 mm)
		9.5 in (241.30 mm)	9.61 in (244.30 mm)

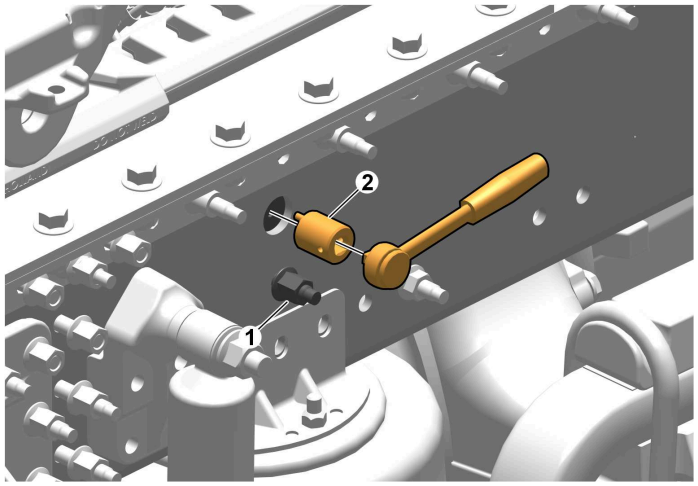
Ride height – Volvo Group B-RIDE and T-RIDE Suspension (RSI-VTL)

Rear suspension height	Frame height (B) variant	Ride height (H)	
		Loaded	Unloaded
RSH-HIG	FRAME266 FRAME300	9.5 in (241.30 mm)	9.66 in (245.50 mm)
		9.48 in (241 mm)	9.61 in (244.30 mm)
		9.5 in (241.30 mm)	9.61 in (244.30 mm)

Note: For vehicles equipped with ECS (Electronically Controlled Suspension), the unloaded ride height is the same as the loaded ride height (use the loaded values for a vehicle that is unloaded) because the ECS automatically adjusts the rear ride height.

10. Adjust the ride height (if required).

11. Loosen the fastener securing the load leveling valve to the frame. Use the ride height adjustment socket wrench to adjust the valve so the ride height is within specification. The suspension ride height is changed by turning the load leveling valve clockwise (to lower) or counter-clockwise (to raise). Tighten the nut securing the load leveling valve to the frame to 175 ± 30 Nm (129± 22 ft-lb).



T7201312

1 Nut

2 **J-44544** tool

12. Re-check the ride height to confirm the accuracy of the leveling valve adjustments.

13. Using the dash mounted rear suspension air dump switch release the air in the rear air spring, or disconnect the leveling rod from the leveling valve so that the pressure is released from the air springs.

WARNING

Avoid personal injury. BEFORE releasing air pressure from air springs, BE SURE neither your hand nor another persons hand, etc., is in a position where it could be pinched between components when the frame/suspension drops.

14. Start the engine and allow the air system to attain normal operating pressure of 827 kPa (120 psi). Turn off the engine.

15. Fill the rear air springs with air using the dash mounted switch or reconnect the actuator rod to the load leveling valve lever.

Ensure the air system is at normal operating pressure of 827 kPa (120 psi).

16. Re-check the ride height.

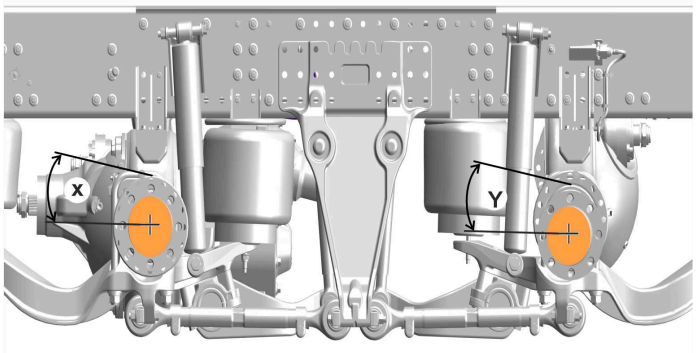
If the ride height measurement is not within the specifications. Check the leveling valve and other suspension components for wear or damage.

17. Apply the parking brake.

18. Remove the wheel chocks.

Notes

Pinion angle



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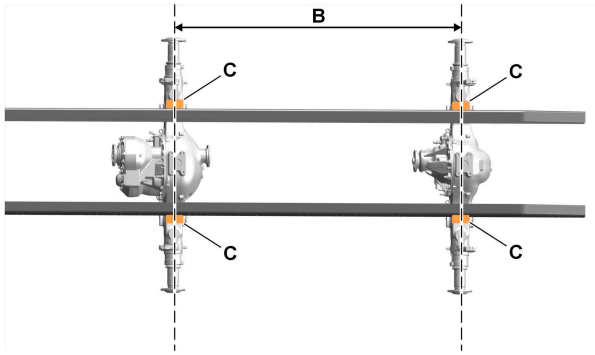


T7201311

X. First drive axle, pinion angle

Y. Second drive axle, pinion angle

B. Bogie spread (distance between the first and second rear drive axles)

C. Area for the axle pinion angle measurement

Rear Suspension Installation – Volvo Group GRAS Suspension (RSI-VGR)

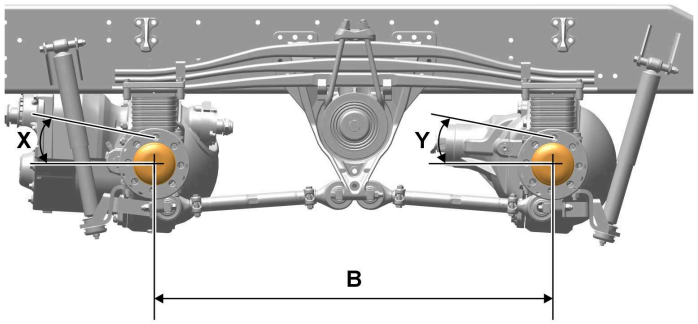
Variant				Pinion angle, first drive axle (X)	Pinion angle, second drive axle (Y)
Rear axle arrangement	Rear axle variant	Rear axle model	Rear suspen-sion height	Loaded/Unloaded	Loaded/Unloaded
RAA11	RSS1052	S23-175	RSH-STD	2.9 ±1°	NA
	RSS1057C	MS-23-17X HE			
RAA21P	RSS1052	S23-175	RSH-STD	2.9 ±1°	NA
	RSS1057C	MS-23-17X HE			
RAA11	RSS1057C	MS-23-17X HE	RSH-HIG	2.65 ±1°	NA
RAA21P	RSS1057C	MS-23-17X HE	RSH-HIG	2.65 ±1°	NA
RAA22	RTS1836A	MT-40-14X HE	RSH-STD	3 ±1°	8 ±1°
			RSH-HIG		
RAA22	RTS1857C	MT-40-14X*C	RSH-STD	2.9 ±1°	3.1 ±1°
	RTS1857G	MT-40-A14*G			
RAA22	RTS1857C	MT-40-14X*C	RSH-HIG	2.9 ±1°	2.9 ±1°
	RTS1857G	MT-40-A14*G			
RAA22	RTS1857D	MT-40-A14*D	RSH-STD	2.9 ±1°	11.15 ±1°
	RTS1857H	MT-40-A14*H			
RAA22	RTS1857D	MT-40-A14*D	RSH-HIG	3.1 ±1°	10.9 ±1°
	RTS1857H	MT-40-A14*H			
	RT2173SM	RT-46-160			
	RT2173M2	RT-46-164			
RAA22	RT2173SM	RT-46-160	RSH-STD	2.9 ±1°	11.1 ±1°
	RT2173M2	RT-46-164			

Rear Suspension Installation – Volvo Group VOAS Suspension (RSI-VAS)

Variant				Pinion angle, first drive axle (X)		Pinion angle, second drive axle (Y)	
Rear axle variant	Rear axle model	Bogie spread variant	Rear suspension height variant	Loaded	Unloaded	Loaded	Unloaded
RTS1857D	MT-40-A14*D	BSR1300	RSH-STD	2.4 ±1°	2.5 ±1°	12.8 ±1°	12.6 ±1°
			RSH-HIG				
RTS1857D	MT-40-A14*D	BSR1500	RSH-STD	2.4 ±1°	2.5 ±1°	11.0 ±1°	10.8 ±1°
			RSH-HIG				
RTS2173SM	RT-46-160	BSR1350	RSH-HIG	3.4 ±1°	3.4 ±1°	11.1 ±1°	11.1 ±1°
RTS2173SM	RT-46-160	BSR1500	RSH-HIG	3.4 ±1°	3.4 ±1°	10.1 ±1°	10.1 ±1°
RTS2173SM	RT-46-160	BSR1300	RSH-STD	2.9 ±1°	2.9 ±1°	12.1 ±1°	12.1 ±1°
RTS2173SM	RT-46-160	BSR1300	RSH-HIG	2.9 ±1°	2.9 ±1°	11.1 ±1°	11.1 ±1°
RSH1857C	MT-40-A14*C	BSR1300	RSH-STD	2.4 ±1°	2.5 ±1°	2.4 ±1°	2.5 ±1°
RSH1857C	MT-40-A14*C	BSR1300	RSH-LOW	2.3 ±1°	2.3 ±1°	5.3 ±1°	5.3 ±1°
RSH1857C	MT-40-A14*C	BSR1500	RSH-STD	2.4 ±1°	2.5 ±1°	2.4 ±1°	2.4 ±1°
RTS1850E	D40-155	BSR1300	RSH-STD	2.9 ±1°	3.0 ±1°	2.9 ±1°	3.0 ±1°
RTS1850F	D40-156						
RTS1836A	MT-40-14X HE	BSR1300	RSH-LOW	2.4 ±1°	2.4 ±1°	8.7 ±1°	8.5 ±1°
RTS1836A	MT-40-14X HE	BSR1300	RSH-STD	2.4 ±1°	2.5 ±1°	9.0 ±1°	8.8 ±1°
RT2173M2	RT-46-164	BSR1300	RSH-HIG	3.4 ±1°	3.4 ±1°	11.6 ±1°	11.6 ±1°
RS1045SM (RAA11/4*2)	RS-23-160/161	NA	NA	2.4 ±1°	2.5 ±1°	NA	NA
RSS1052 (RAA11/4*2)	S23-175	NA	NA	2.4 ±1°	2.4 ±1°	NA	NA
RSS1057C (RAA11/4*2)	MS-23-17X HE						
RS1045SM (RAA21P/6*2)	RS-23-160/161	NA	NA	2.4 ±1°	2.4 ±1°	2.4 ±1°	2.4 ±1°
RSS1052 (RAA21P/6*2)	S23-175	NA	NA	2.4 ±1°	2.5 ±1°	NA	NA
RSS1057C (RAA21P/6*2)	MS-23-17X HE						

Rear Suspension Installation – Hendrickson HAS Suspension (RSI-HAS)

Variant				Pinion angle, first drive axle (X)		Pinion angle, second drive axle (Y)	
Rear axle variant	Rear axle model	Bogie spread variant	Rear suspension height variant	Loaded	Unloaded	Loaded	Unloaded
RTS1857D	MT-40-A14*D	BSR1350	RSH-STD	1.07 ±1°	1.46 ±1°	10.88 ±1°	11.19 ±1°
RTS1857D	MT-40-A14*D	BSR1500	RSH-STD	1.069 ±1°	1.4 ±1°	9.38 ±1°	9.7 ±1°
RT2173SM	RT-46-160	BSR1350	RSH-STD	1.07 ±1°	1.46 ±1°	10.89 ±1°	11.2 ±1°
RT2173SM	RT-46-160	BSR1350	RSH-HIG	1.39 ±1°	1.7 ±1°	10.89 ±1°	11.2 ±1°
RTS2173M2	RT-46-164						
RT2173SM	RT-46-160	BSR1500	RSH-STD	1.069 ±1°	1.4 ±1°	10.89 ±1°	11.2 ±1°
RTS2173M2	RT-46-164						
RT2173SM	RT-46-160	BSR1500	RSH-HIG	1.39 ±1°	1.7 ±1°	8.89 ±1°	9.2 ±1°
RTS2173M2	RT-46-164						
RTS2173M2	RT-46-164	BSR1350	RSH-STD	1.07 ±1°	1.46 ±1°	10.89 ±1°	11.2 ±1°



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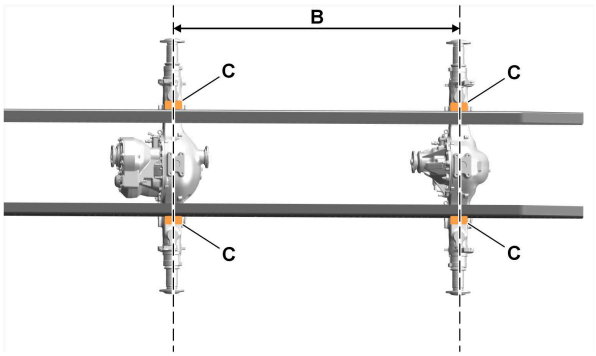


T7201311

(B) Bogie spread (distance between the first and second rear driving axles)

(C) Area for the axle pinion angle measurement

(X) First driving axle, pinion angle

(Y) Second driving axle, pinion angle

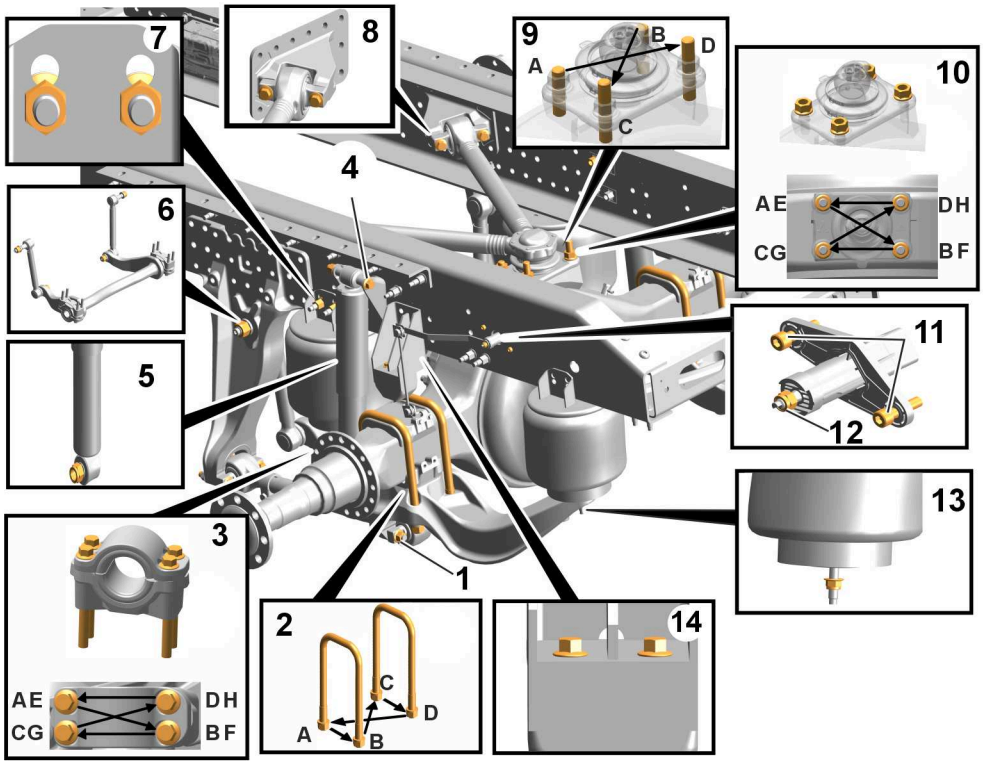
Variant				Pinion angle, first drive axle (X)		Pinion angle, second drive axle (Y)	
Rear axle arrangement	**Rear axle variant**	**Rear axle model**	**Rear suspension height**	**Loaded**	**Unloaded**	**Loaded**	**Unloaded**
RAA22	RTS1857D	MT-40-A14*D	RSH-HIG	3 ±1°	3.1 ±1°	10 ±1°	9.8 ±1°
	RTS1857G	MT-40-A14*D		3 ±1°	3.3 ±1°	3.2 ±1°	3.2 ±1°
	RTS1857H	MT-40-A14*H		3 ±1°	3.1 ±1°	10 ±1°	9.8 ±1°
	RT2173SM	RT-46-160		3 ±1°	3.1 ±1°	10 ±1°	9.8 ±1°

Rear suspension torque specifications

This publication is intended to acquaint and assist maintenance personnel in the preventive maintenance, service, repair and rebuild of the Volvo suspension system.

Volvo Group GRAS Suspension (RSI-VGR)

Rear Suspension Installation – Volvo Group GRAS Suspension 4*2 (RSI-VGR)

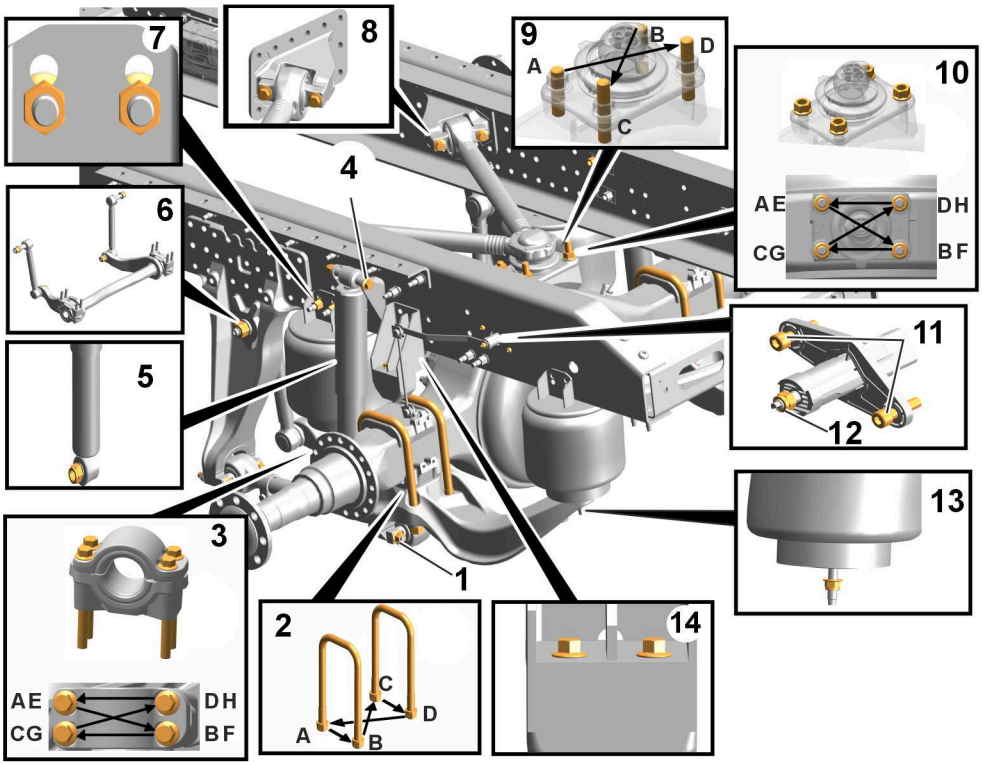


T7202295

Tightening torques

Sl no.	Description			Torque in Nm	Torque in ft-lbs
1	Reaction rod, nut			275 ± 45	202.82 ± 33.19
2	U-bolt, nut	1	Step 1	Tightening sequence: A–D	
				10 – 60	7.37 – 44.25
		2	Step 2	Tightening sequence: A–D	
				100 ± 20	73.75 ± 14.75
		3	Step 3	Tightening sequence: A–D	
				150 ± 30	110.63 ± 22.12
		4	Step 4	Tightening sequence: A–D	
				660 ± 135	486.79 ± 99.57
3	Anti-roll bar, support, screw	1	Step 1	Tightening sequence: A-D	
				275 ± 45	202.82 ± 33.19
		2	Step 2	Tightening sequence: E-H	
				275 ± 45	202.82 ± 33.19
4	Shock absorber, nut (upper)			200 ± 40	147.51 ± 29.50
5	Shock absorber, nut (lower)			430 ± 70	317.15 ± 51.62
6	Link arm/stay, nut			390 ± 40	287.64 ± 29.50
7	Air spring, bracket, nut			175 ± 30	129.07 ± 22.12
8	V-stay, bracket, screw			275 ± 45	202.82 ± 33.19
9	V-stay, stud			Tightening sequence: A–D	
				90 ± 10	66.38 ± 7.37
10	V-stay, nut	1	Step 1	Tightening sequence: A–D	
				310 ± 35	228.64 ± 25.81
		2	Step 2	Tightening sequence: E-H	
				310 ± 35	228.64 ± 25.81
11	Level sensor, chassis, nut			24 ± 4	17.70 ± 2.95
12	Level sensor, arm, nut			15 ± 3	11.06 ± 2.21
13	Air spring, nut			140 ± 25	103.25 ± 18.43
14	Bump stop, screw			50 ± 12	36.87 ± 8.85

Rear Suspension Installation – Volvo Group GRAS Suspension 6*2 Driving axle (RSI-VGR)

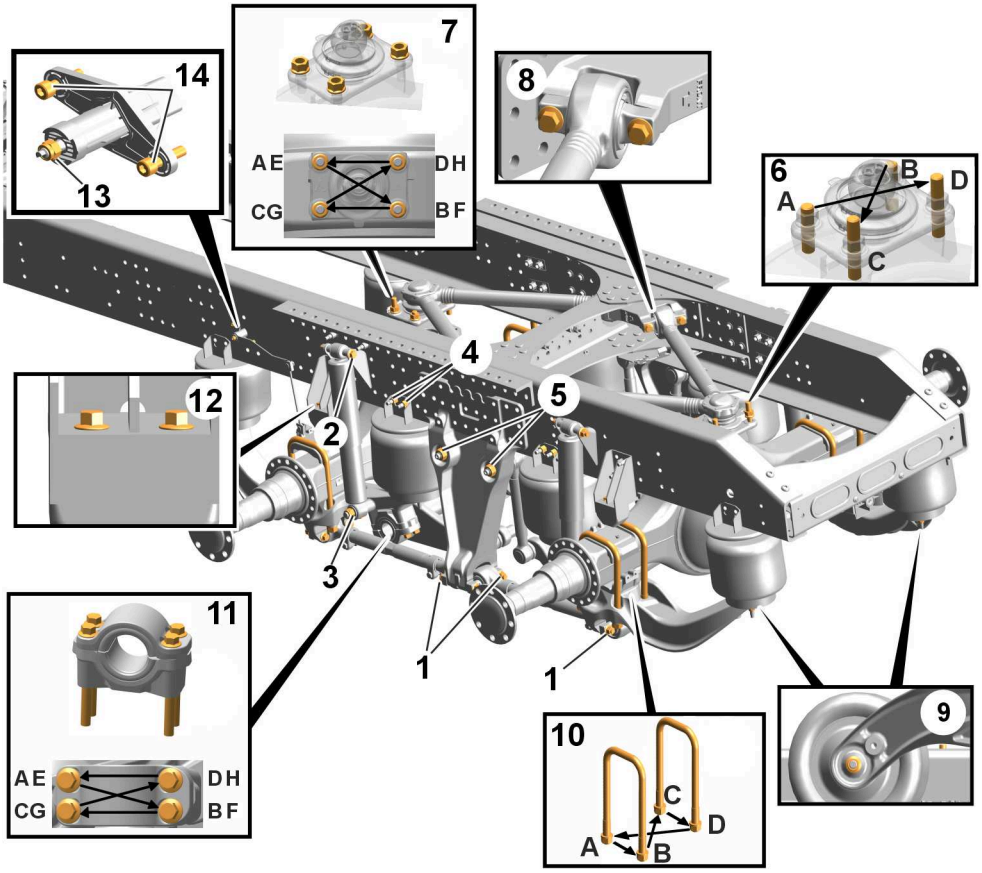


T7202295

Tightening torques

Sl no.	Description			Torque in Nm	Torque in ft-lbs
1	Reaction rod, nut			275±45	202.82±33.19
2	U-bolt, nut	1	Step 1	Tightening sequence: A–D	
				10 – 60	7.37 – 44.25
		2	Step 2	Tightening sequence: A–D	
				100±20	73.75±14.75
		3	Step 3	Tightening sequence: A–D	
				150±30	110.63±22.12
		4	Step 4	Tightening sequence: A–D	
				660±135	486.79±99.57
3	Anti-roll bar, support, screw	1	Step 1	Tightening sequence: A-D	
				275±45	202.82±33.19
		2	Step 2	Tightening sequence: E-H	
				275±45	486.79±33.19
4	Shock absorber, nut (upper)			200±40	147.51±29.50
5	Shock absorber, nut (lower)			430±70	317.15±51.62
6	Link arm/stay, nut			390±40	287.64±29.50
7	Air spring, bracket, nut			175±30	129.07±22.12

8	V-stay, bracket, screw			275±45	202.82±33.19
9	V-stay, stud			Tightening sequence: A–D	
				90±10	66.38±7.37
10	V-stay, nut	1	Step 1	Tightening sequence: A–D	
				310±35	228.64±25.81
		2	Step 2	Tightening sequence: E-H	
				310±35	228.64±25.81
11	Level sensor, chassis, nut			24±4	17.70±2.95
12	Level sensor, arm, nut			15±3	11.06±2.21
13	Air spring, nut			140±25	103.25±18.43
14	Bump stop, screw			48±8	35.40±5.90



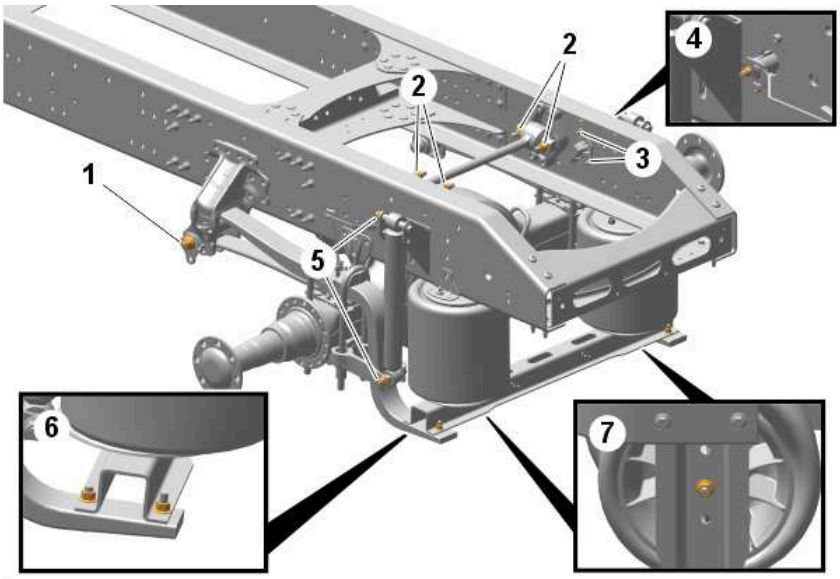
T7202296

Tightening torques

Sl no.	Description			Torque in Nm	Torque in ft-lbs
1	Reaction rod, screw			275±45	202.82±33.19
2	Shock absorber, nut (lower)			430±70	317.15±51.62
3	Shock absorber, nut (upper)			200±40	147.51±29.50
4	Air spring, bracket, nut			175±30	129.07±22.12
5	Link arm/stay, nut			390±40	287.64±29.50
6	V-stay, stud			Tightening sequence: A–D	
				90±10	66.38±7.37
7	V-stay, nut	1	Step 1	Tightening sequence: A–D	
				310±35	228.64±25.81
		2	Step 2	Tightening sequence: E-H	
				310±35	228.64±25.81
8	V-stay, bracket, screw			275±45	202.82±33.19
9	Air spring, nut			140±25	103.25±18.43

10	U-bolt, nut	1	Step 1	Tightening sequence: A–D	
				10 – 60	7.37 – 44.25
		2	Step 2	Tightening sequence: A–D	
				100±20	73.75±14.75
		3	Step 3	Tightening sequence: A–D	
				150±30	110.63±22.12
		4	Step 4	Tightening sequence: A–D	
				660±135	486.79±99.57
11	Anti-roll bar, support, screw	1	Step 1	Tightening sequence: A-D	
				27±45	19.91±33.19
		2	Step 2	Tightening sequence: E-H	
				275±45	202.82±33.19
12	Bump stop, screw			48±8	35.40±5.90
13	Level sensor, arm, nut			15±3	11.06±2.21
14	Level sensor, chassis, nut			24±4	17.70±2.95

Rear suspension installation – Volvo Group VOAS Suspension 4*2 (RSI-VAS)

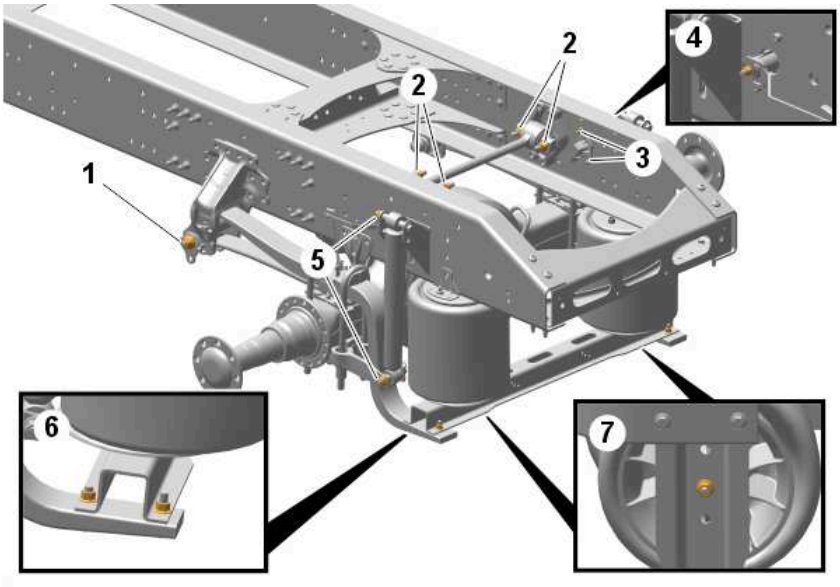


T7206624

Tightening torques

Sl no.	Description	Torque in Nm	Torque in ft-lbs
1	Z leaf spring, nut	680±30	501.54±22.12
2	Reaction rod, nut	275±45	202.82±33.19
3	Level sensor, chassis, nut	24±4	17.70±2.95
4	Level sensor, arm, nut	15±3	11.06±2.21
5	Shock absorber, screw	275±45	202.82±33.19
6	Leaf spring, nut	85±25	62.69±18.43
7	Air spring, nut	40±5	29.50±3.68

Rear suspension installation – Volvo Group VOAS Suspension 6*2 (RSI-VAS)

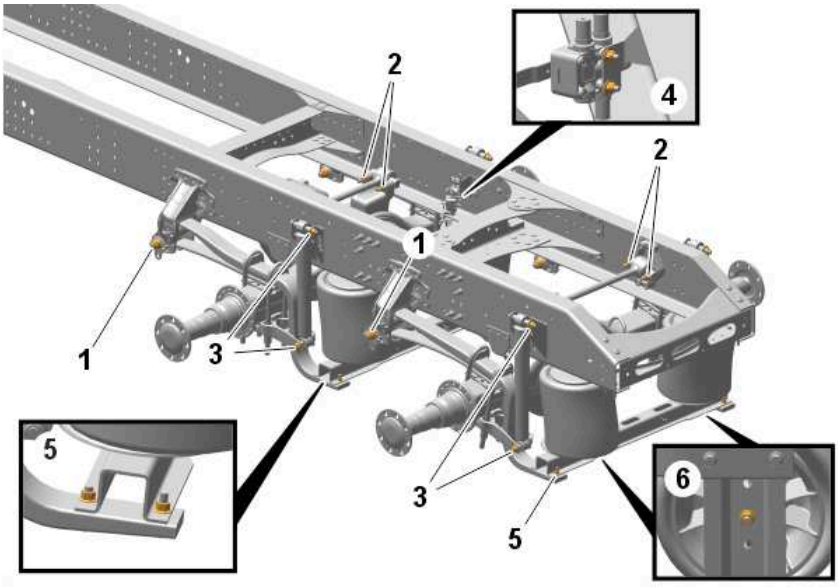


T7206625

Tightening torques

Sl no.	Description	Torque in Nm	Torque in ft-lbs
1	Z leaf spring, nut	680±30	501.54±22.12
2	Reaction rod, nut	275±45	202.82±33.19
3	Level sensor, chassis, nut	24±4	17.70±2.95
4	Level sensor, arm, nut	15±3	11.06±2.21
5	Shock absorber, screw	275±45	202.82±33.19
6	Leaf spring, nut	85±25	62.69±18.43
7	Air spring, nut	40±5	29.50±3.68

Rear suspension installation – Volvo Group VOAS Suspension 6*4 (RSI-VAS)



T7206626

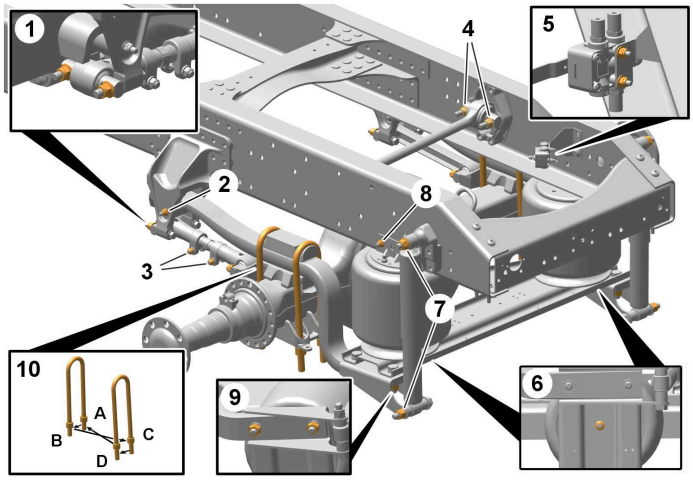
Tightening torques

Sl no.	Description	Torque in Nm	Torque in ft-lbs
1	Leaf spring, nut	680±30	501.54±22.12
2	Reaction rod, nut	275±45	202.82±33.19
3	Shock absorber, screw	275±45	202.82±33.19
4	Level sensor, bracket, nut	10±2.5	7.37±1.84
5	Leaf spring, nut	85±25	62.69±18.43
6	Air spring, nut	40±5	29.50±3.68

Hendrickson HAS Suspension (RSI-HAS)

Note: Note: Use only genuine Hendrickson parts for servicing this suspension system. For service instructions, please visit: **https://www.hendrickson-intl.com/**

4*2

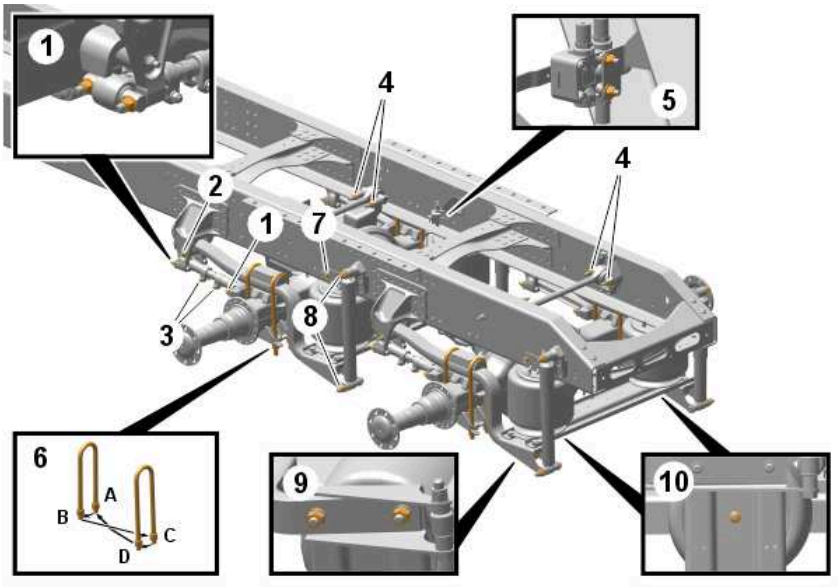


T6213233

Tightening torques

Sl no.	Description			Torque in Nm	Torque in ft-lbs
1	Reaction rod, nut			275±45	202.82±33.19
2	Shackle, nut			85±15	62.69±11.06
3	Reaction rod, clamp, nut			120±20	88.50±14.75
4	Reaction rod, nut			275±45	202.82±33.19
5	Level sensor, bracket, nut			10±2.5	7.37±1.84
6	Air spring, nut			70±14	51.62±10.32
7	Shock absorber, nut			81±14	59.74±10.32
8	Air spring, nut			70±14	51.62±10.32
9	Z leaf spring, nut			450±70	331.90±51.62
10	U-bolt, nut	1	Step 1	Tightening sequence: A–D	
				47	34.66
		2	Step 2	Tightening sequence: A–D	
				135	99.57
		3	Step 3	Tightening sequence: A–D	
				250	184.39
		4	Step 4	Tightening sequence: A–D	
				350	258.14
		5	Step 5	Tightening sequence: A–D	
				575±75	424.09

Rear suspension installation – Hendrickson HAS Suspension 6*4 (RSI-HAS)



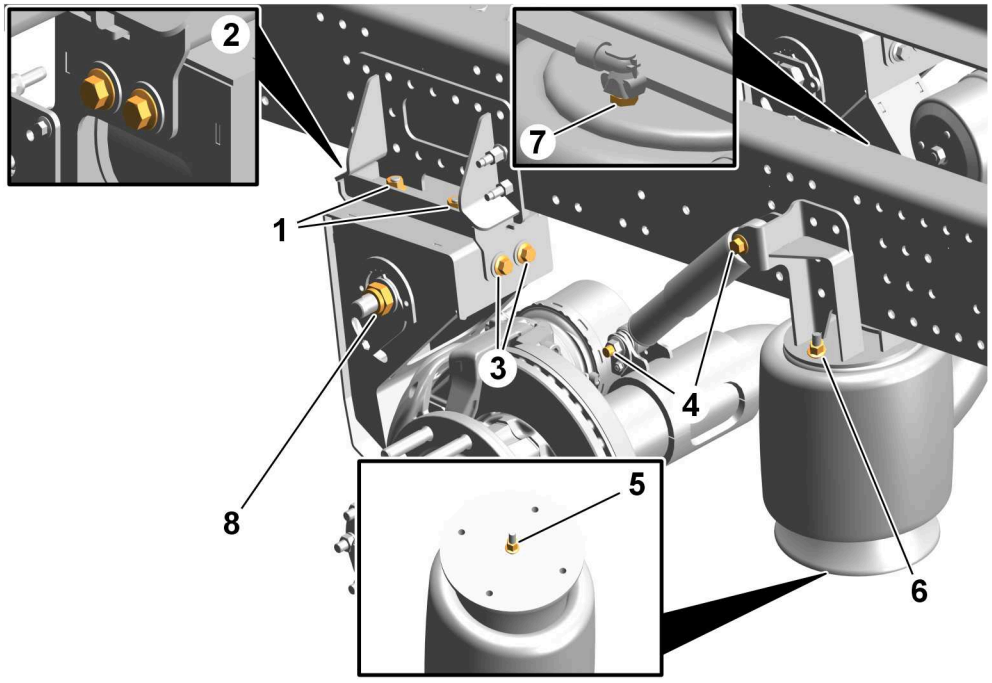
T7206627

Tightening torques

Sl no.	Description	Torque in Nm	Torque in ft-lbs
1	Reaction rod, nut	275±45	202.82±33.19
2	Shackle, nut	85±15	62.69±11.06
3	Reaction rod, clamp, nut	120±20	88.50±14.75
4	Reaction rod, nut	275±45	202.82±33.19
5	Level sensor, bracket, nut	10±2.5	7.37±1.84
6	U-bolt, nut	Tightening sequence: A–D	
		575±75	424.09±55.31
7	Air bellow, nut	70±14	51.62±10.32
8	Shock absorber, nut	81±14	59.74±10.32
9	Leaf spring, nut	430±70	317.15±51.62
10	Air bellow, nut	70±14	51.62±10.32

PAM-LINK (Auxiliary Pusher Axle Manufacture, Link)

Rear Suspension Installation – PAM-LINK (Auxiliary Pusher Axle Manufacture, Link) 6*2 (RSI-VGR / RSI-VAS)



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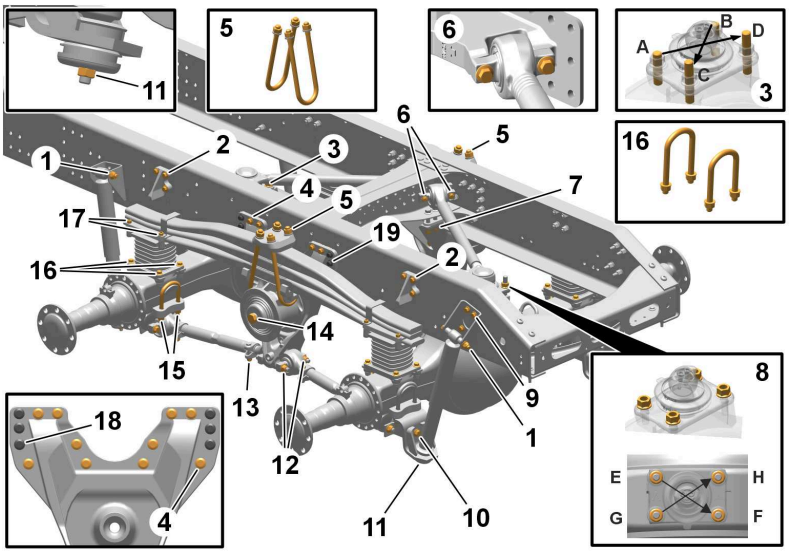
Tightening torques

Sl no.	Description	Torque in Nm	Torque in ft-lbs	Tightening sequence
1	High frame bracket, nut	305^{+14}_{-34}	255^{+10}_{-25}	1
2	High frame bracket, screw	305^{+14}_{-34}	255^{+10}_{-25}	3
3	High frame bracket, screw	305^{+14}_{-34}	255^{+10}_{-25}	2
4	Shock absorber, screw	275±45	202.82±33.19	-
5	Air spring, nut	40±5	30±3	-
6	Air spring, nut	34±7	25±5	-
7	Air spring, nut	61±7	45±5	-
8	Swing arm bolt	860±85	634±63	-

Rear Suspension Installation – Volvo Group B-RIDE Suspension 6*4 (RSI-VTL)



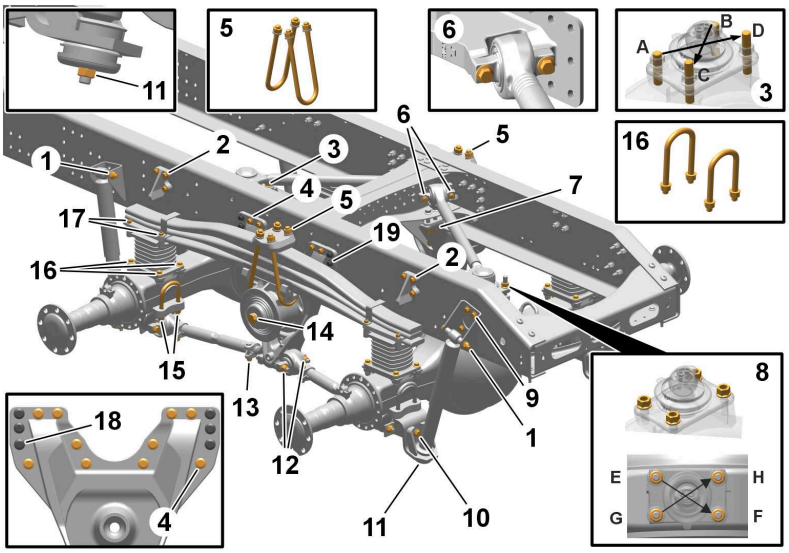
T7217949

Tightening torques

SI no.	Description			Torque in Nm	Torque in ft-lbs
1	Shock absorber, nut (upper)			275±45	202.82±33.19
2	Bump stop, screw			175±30	129.07±22.12
3	V-stay, stud			Tightening sequence: A–D	
				90±10	66.38±7.37
4	Rear spring, anchorage, screw			275±45	202.82±33.19
5	Rear spring, U-bolt, attachment	Step 1	Assembly setting torque	10–60	7.37–44.25
		Step 2	First assembly torque	100±20	73.75±14.75
		Step 3	Second assembly torque	150±30	110.63±22.12
		Step 4	Final assembly torque	450±70	331.90±51.62
6	V-stay, bracket, screw			275±45	202.82±33.19
7	Bogie anchorage, screw			275±45	202.82±33.19
8	V-stay, nut			Tightening sequence: E-H	
				310±35	228.64±25.81
9	Rear shock absorber, bracket, screw			175±30	129.07±22.12
10	Axle lower bracket, screw			275±45	202.82±33.19

11	Shock absorber, nut (lower)			60±10	44.25±7.37
12	Reaction rod, nut			275±45	202.82±33.19
13	Reaction rod, adjustable clamp, nut			70–90	51.62–66.38
14	Rear spring, cradle, bolt			745±35	549.48±25.81
15	U-bolt, axle attachment	Step 1	Assembly setting torque	10–60	7.37–44.25
		Step 2	First assembly torque	100±20	73.75±14.75
		Step 3	Second assembly torque	150±30	110.63±22.12
		Step 4	Final assembly torque	275±45	202.82±33.19
16	Rubber spring, screw			175±35	129.07±25.81
17	Rubber spring plate, screw			85±15	62.69±11.06
18	Rear spring, anchorage, screw			175±30	129.07±22.12

Rear Suspension Installation – Volvo Group T-RIDE Suspension 6*4 (RSI-VTL)



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Sl no.	Description	Torque in Nm	Torque in ft-lbs
1	Shock absorber, nut (upper)	275±45	202.82±33.19
2	Bump stop, screw	175±30	129.07±22.12
3	V-stay, stud	Tightening sequence: A-D	
		90±10	66.38±7.37
4	Rear spring, anchorage, screw	275±45	202.82±33.19
5	Rear spring, U-bolt, attachment	660±75	486.79±55.31
6	V-stay, bracket, screw	490±50	361.40±36.87
7	Bogie anchorage, screw	275±45	202.82±33.19
8	V-stay, nut	Tightening sequence: E-H	
		310±35	228.64±25.81
9	Rear shock absorber, bracket, screw	175±30	129.07±22.12
10	Axle lower bracket, screw	275±45	202.82±33.19
11	Shock absorber, nut (lower)	80±10	59±7.37
12	Reaction rod, screw	275±45	202.82±33.19
13	Reaction rod, adjustable clamp, nut	70–90	51.62–66.38
14	Rear spring, cradle, bolt	745±35	549.48±25.81

15	U-bolt, axle attachment	Step 1	Assembly setting torque	10–60	7.37–44.25
		Step 2	First assembly torque	100±20	73.75±14.75
		Step 3	Second assembly torque	150±30	110.63±22.12
		Step 4	Final assembly torque	450±70	331.90±51.62
16	Rubber spring, screw			175±35	129.07±25.81
17	Rubber spring plate, screw			85±15	62.69±11.06
18	Rear spring, anchorage, screw			175±30	129.07±22.12

Rear Axle Literature

Printed copies of the rear axle literature are no longer available from the axle suppliers. Therefore, Volvo Trucks North America is unable to supply this printed literature to its dealers.

Service manuals for many of the supplier's rear axles are now available from the official web sites Dana Corporation and Meritor.

To review and download rear axle literature, please visit:

https://www.dana.com/resource-library/

www.meritor.com/LOD

Notes

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