WA

Trucknology Generation A (TGA)

2003 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12

Maintenance Manual
WA 74* (3.)

81.99197– 4442

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Trucknology Generation A (TGA)

–englisch–

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We reserve the right to make modifications in the course of further development. Due to the large number of types, the figures in this Maintenance Manual are not always identical to the situation in your vehicle; they merely present a representation of one sample variant.

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Highline

The **Maintenance Manual** includes details of the maintenance type and a description of maintenance work. For details of special bodies and attachments as well as additional equipment, please refer to the service documentation provided by the manufacturer concerned.

Maintenance work must be carried out properly and at the specified intervals in order to ensure constant vehicle availability, road safety and a long vehicle service life. Recommended maintenance work which requires specialist knowledge may only be carried out by qualified personnel.

You will find a detailed explanation of the MAN maintenance system and the intervals at which the various services are due, depending on the maintenance group, in the current "Maintenance Recommendations and Recommended Service Products" booklet.

Confirmation that maintenance work has been performed correctly and at the specified intervals is to be entered in the "Maintenance Record" together with the relevant details.

In the event of claims under warranty, evidence must be brought that proper maintenance was carried out at the specified intervals, that approved or recommended service products were used and that genuine MAN spare parts were installed. Therefore, we would ask

the vehicle owner
: to always have the maintenance work carried out only in authorised service centres and

the staff of the service centres
: to follow the instructions and recommendations given in this Maintenance Manual.

GENERAL INSTRUCTIONS

- Always fit new seals and gaskets to replace ones that have worked loose

Note: Non-damaged valve cover and intake seals made from aluminium/elastomers can be reused.

- Use a torque wrench to tighten connections for which a tightening torque has been specified
- Clean removed parts before refitting them. Check them for damage if the instructions do not recommend that you should renew them
- Fit new hose lines if the outer jacket is damaged or has become brittle. This also applies if the hose fittings are damaged or if the hose is coming out of its fittings
- The specialist staff responsible must determine the cause of malfunctions, incorrect settings and damage, even if the rectification of such problems does not form part of the maintenance work

MAINTENANCE WORK

Checking correct functioning

- Check that the equipment, unit or device is in an operational condition
- The functional check also includes a test drive

Checking the setting/play

- Measure the actual value. Check whether the actual value is within the specified tolerance band. Repair or renew the component concerned if it is out of tolerance.

Checking for wear

- Determine the degree of wear. Repair or renew the component concerned if the wear limit indicated has been reached.

Checking condition

- Check the appearance of the object, e.g. by looking for leaks, rust, cracks, pitting, deformation, damage and dirt

Checking firm seating

- Check fastenings and connections for signs of loosened screws or bolts, e.g. cracks in the paint, truncations and rust
- Tighten any screw or bolt connections which have become loose
- Check that slotted/castellated nuts have their locking elements fitted
- If the locking element has come loose or is missing, unscrew the slotted/castellated nut and tighten it again. Fit a new cotter pin and, if necessary, apply marking paint
- Fit new self-locking connections if the old ones have come loose or are damaged. Tighten the new connections and, if necessary, apply marking paint

Checking for leaks

- Check housing joins, lines and connections
- Tighten any connections which have come loose
- Depressurise the system before re-tightening a leaking screwed connection
- Immediately fit new hydraulic hoses if you notice damage or porosity on the old ones
- Immediately repair major leaks involving continuous oil or fluid loss

Checking oil and fluid levels

- Park the vehicle on a flat, level surface
- Check the engine oil level with the engine cold if possible. However, always wait at least 15 minutes after stopping the engine (deviations between measurements with the engine hot and cold are possible and to be expected). The only reliable method of establishing the oil level is with the engine cold after the vehicle has been parked on a flat, level surface for several hours.
- Do not top up the engine oil until the oil level has fallen to the bottom "MIN" mark on the dipstick. Never top up with oil so the level exceeds the "MAX" mark. This merely causes oil to be pumped through the engine vents and is uneconomical.
- If a retarder and automatic gearbox are fitted, perform the main oil level check at operating temperature.
  Refer to the instructions in the work descriptions!
- Do not check the oil level in the manual gearbox and driven axle immediately after completing a journey. Wait until the gearbox oil has cooled down
- If you can see that a unit is losing oil or fluid, check the unit in question frequently and determine the cause of the leak

Changing oil and fluid

- Park the vehicle on a flat, level surface
- Drain the oil whilst it is warm
- Use a suitable container to collect the escaping oil or fluid
- Clean the screw plugs and fit new seals
- Do not use contaminated service products
- The decisive factors in obtaining the exact oil quantity are correctly filling the oil and properly performing the subsequent oil level check
- The specified fill quantities apply to oil or fluid changes and not to complete refills, e.g. after maintenance work

Lubricating

- Clean the lubrication points before lubricating, if necessary
- Clean the lubricating nipples before lubricating
- Fit new lubricating nipples if the existing ones are damaged
- Wipe off excess grease after lubricating

Special points in the text

Refers to working and operating procedures which must be followed exactly so as not to endanger service personnel and in order to avoid general damage or irreparable damage to the vehicle and its components.

Note about work descriptions

Units and systems may be installed in many different configurations. Consequently, it is not always possible to illustrate the exact surroundings of the working area.

NOTES ON SAFETY

Always secure the vehicle to prevent it from rolling away before starting any maintenance work:

- Apply the parking brake and, if necessary, use wheel chocks (applying the retarder does not hold the vehicle when it is parked)
- Power-actuated parts and attachments must be secured against unintended movement

When the cab is tilted:

Danger of accidents!
Refer to the Operator's Manual for tilting and lowering the cab!

- Keep the area around the cab clear
- No-one is allowed to be between the cab and the chassis whilst the cab is being tilted
- Never lean on the vehicle whilst the cab is being tilted
- Always tilt the cab forwards past the tilting point to its final position
- Use the door arrester when the cab is tilted with the door open

Before starting the engine:

Danger of accidents!
Danger of accidents when starting the engine with a gear engaged!

- Apply the parking brake and shift the gearbox to neutral

Maintenance work when the engine is running:

- Parts of the engine, cooling system and gearbox become hot during operation – risk of burns
- Do not touch any rotating parts on the free ends of shafts, keep your distance, watch out for rotating fans
- Ensure adequate ventilation if you are working in enclosed spaces

When changing oil or fluid:

- Note the temperature of the oil or fluid – if it is hot from operation there is a risk of burns
- Carefully open caps if the systems and components are pressurised
- Do not change oil or fluid whilst the engine is running

Cleaning

Danger to life!
Stop the engine and switch off the ignition before washing the vehicle if the vehicle has a high-voltage (above 24 V) electrical system.

- Do not use inflammable liquids or toxic substances for cleaning
- Vacuum up the dust from cleaning wheel brakes or wet it, collect it and dispose of it

Connecting up/disconnecting at measuring and test connections:

- Only when the engine is switched off and the measuring point is depressurised

Raising and jacking up the vehicle:

- Locate the jack or support at the designated jacking points so that it cannot slip
- Do not start to work under the raised vehicle until it has been secured against rolling or sliding away, tipping over or dropping

If the vehicle has ECAS:

- Do not switch on the ignition whilst the vehicle is raised as this will activate the level control system
- After switching the ignition off, wait for up to 10 minutes before raising the vehicle

Stopping the engine in emergencies (only when vehicle is at a standstill):

- Apply the parking brake
- Engage a high gear
- Apply the service brakes and, **taking great care**, slowly engage the clutch and stall the engine (not possible with an automatic gearbox) or activate the emergency off switch (special equipment)

Service products

- Avoid unnecessary contact with service products
- Do not inhale harmful gases and vapours
- Wear a breathing mask or use an extractor when working in a dusty environment

Air-conditioning system

Health risk!
Refrigerant fluids and vapours represent a health hazard!

- Avoid any contact with them!
- Wear protective glasses and gloves!
  Obtain immediate medical assistance from a doctor if refrigerant contacts your skin or gets into your eyes.
- Do not drain gaseous refrigerants in enclosed areas. Danger of suffocation!
- Pump out refrigerants using a disposal system!
- Never perform soldering or welding work, etc. on parts of the system or near to it, even if the refrigerant has been drained. Danger of explosion and intoxication!
- Do not clean parts of the system using a steam cleaner!
- Always have work on the refrigerant circuit performed in an authorised MAN Service workshop!
- The use of propane-butane refrigerants in MAN vehicles is prohibited
- The air-conditioning system is filled with CFC-free refrigerant R 134a
- Please observe national regulations in non-EU countries

Electrical system

When carrying out maintenance on batteries:

- Batteries contain corrosive acid, so be careful when touching them
- Avoid short-circuits
- Charging batteries gives rise to an explosive oxyhydrogen gas mixture. Do not use naked flames

If the engine is running:

- Do not undo/remove any connection cables on the alternator or any battery terminal posts
- Do not disconnect the battery master switch

If using an external power source:

- 220 V consumers (external power source) are only allowed to be connected to the vehicle via overcurrent circuit breakers in the building

Wheel nuts

- In new vehicles/after changing a wheel, retighten the wheel nuts after driving approx. 50 km, then check them every day to make sure they are firmly seated and have the correct tightening torque. Retighten them if necessary. Continue doing this until final tightness is assured

Special bodies and attachments

If the vehicle has a special body or attachment, comply with the notes on safety provided by the relevant manufacturer. For further action to be taken, consult the general accident prevention regulations.

Limited liability for accessories

In your own interests, you are recommended to use only accessories expressly approved by MAN and genuine MAN parts.
The reliability, safety and suitability of these parts and accessories have been determined specifically for MAN vehicles. Despite constant market observation, we cannot judge the aspects of other products, nor can we accept responsibility for them – even if they have been approved or authorised by an official body.

ENVIRONMENTAL PROTECTION

Used oil (engine oil, gearbox oil, etc.)

Take care to dispose of used engine oil properly.
Used engine oil can damage groundwater quality.

Therefore, never pour used oil onto the ground, into water or down the drains or sewers. Failure to comply with these instructions can lead to prosecution.
Collect and dispose of used oil carefully. Contact the point of sale, supplier or your local authority for information about collection depots.

Extract from "Information on dealing with used engine oil", The Mineral Oil Traders' Association (MINERALÖLWIRTSCHAFTSVERBAND e.V.), Steindamm 71, D–20099 Hamburg)

Filter cartridges, elements and box-type filters, desiccant cartridges
Filter elements, cartridges and box-type filters (oil and fuel filters, desiccant cartridges for the air dryer) are classified as hazardous waste materials and must be disposed of properly.
Please follow the instructions issued by the relevant local authority.

Coolant
Treat undiluted antifreeze as hazardous waste. Follow the instructions issued by the relevant local authority when disposing of used coolant (mixture of antifreeze and water).

Starter batteries (applicable to the EU)
Starter batteries contain pollutants; they must therefore be returned to the manufacturer to be correctly disposed of. Vendors of starter batteries (dealers) are obliged to charge a deposit which is refunded when the battery is returned.

Never dispose of used batteries in the domestic refuse!
Please observe the national regulations in non-EU countries.

Cleaning the vehicle
- Use detergents which do not affect the groundwater
- Wash the vehicle over an oil separator
- The use of high-pressure cleaners is prohibited on and around all lubrication points

TGA TRUCKS
CHECKLIST FOR MAINTENANCE WORK

Customer	Licence plate number	Job no.
	Vehicle type	Acceptance date
Customer signature	Vehicle ident. no.	Service consultant signature
	Current mileage/km	

Tick oil changes that are due	**Enter oil specification**	✓	**Tick service that is due**	✓	**Enter estimated remaining life (km or date)**
Engine ☐			✧ First service ☐		Brake
Gearbox ☐			❍ S6 ☐		Clutch
Driven axle(s) ☐			❑ S12 ☐		**Omitted if the statutory safety**
Transfer case ☐			Winter service ☐		**inspection (SP) is performed**
					General technical safety
					Brake technical safety
					Miscellaneous
Torque converter/ clutch system (WSK) Separate oil circuit ☐					Separate job ☐

Tick additional work that is due every time the oil is changed	✓	**Tick service that is due**	**After max. km**	**Years**		✓
Engine: Renew engine oil filter element ☐ Renew fuel filter element ☐ Clean fuel pre-cleaner filter ☐		Renew air dryer desiccant cartridge	–	2	☐	
ZF 16 S gearbox with Intarder Renew filter element ☐		Renew air filter element	200,000	2	☐	
ZF ASTRONIC gearbox with Intarder Renew filter element ☐		Change coolant and renew pressure-relief valve	500,000	4	☐	
Eaton 8309 gearbox Clean oil drain strainer ☐		**1st steering inspection** Steering on front axle(s)	500,000	4	☐	
ZF 5/6 HP 500/600 automatic gearbox Renew filter element ☐		Steering on rear axle	500,000	4	☐	
Axle/gearbox with 500,000 km interval Renew breather ☐		Each subsequent steering inspection	200,000	2	☐	
Torque converter/clutch system (WSK) Clean filter element ☐						

Checklist pages 1 - 4: Tick work that has been completed (✓)!

Maintenance system ... Operator's Manual
Service products ..... Recommended Service Products
Fill quantities ..... Operator's Manual
Maintenance Manual
Maintenance work ..... Maintenance Manual
Confirmation ..... Maintenance Record
Filing of checklist ..... File with job

Perform a brief test drive and check the brakes after completing work!

Antifreeze checked ..... °C
Oil drain plugs tightened ..... ☐
Oil topped up, oil level checked ..... ☐
Wheel nuts tightened ..... ☐
Vehicle operational ..... ☐

.....
Job completed on (date)

.....
Job completed by

OPERATION-SPECIFIC WORK

SYSTEM DIAGNOSIS:	E	S 6	S 12
Read out fault memory (using MAN-cats II)	✧	❍	❑
Read out the remaining brake and clutch life (using MAN-cats II)	✧	❍	❑
CHECKING AND ADJUSTMENT WORK:			
Retighten cylinder head bolts (for D28 engine with bolts tightened by angle) [1] Minimum mileage 1,000 km, maximum 20,000 km	✧		
Retighten pressure flange collar nut for nozzle holder (for D28 4-valve engine) [1]	✧		
Check valve clearance and adjust if necessary [2]	✧		❑
Poly-V-belts: Check condition			❑
Air dryer: If there is water in the air tank, drain it off and fit a new desiccant cartridge			❑
Air-conditioning system: Check refrigerant level and dryer, refill and fit new dryer if necessary [3]			❑
CHECK: Fluid level			
Gearbox			❑
Torque converter and clutch system (WSK), separate oil circuit			❑
Transfer case			❑
Power take-off NMV			❑
Driven axle(s)			❑
Hydraulic pump, cab tilt mechanism			❑
Air-conditioning system, refrigerant [3]			❑
RENEW:			
Air inlet, heating/ventilation/air-conditioning system: Dust filter (renew more often if dirt build-up is heavy)			❑
Auxiliary air and/or water heater: Fuel supply filter			❑
Separ fuel pre-filter: Filter element			❑

LUBRICATION SERVICE

LUBRICATE USING AN OIL CAN OR GREASE Linkages, cables, joints, bearings, hinges, catches **Check** that the **lubrication points connected** to the central lubrication system are correctly supplied. **Lubricate** those lubrication points **not connected** to the central lubrication system.	E	S 6	S 12
Trailer/fifth wheel coupling [4]		❍	❑
Spare wheel hoist cable		❍	❑
Tipper body: Bearing points		❍	❑
Central lubrication system: Lubricant reservoir and lubricant supply		❍	❑
Brake camshaft (planetary axle with drum brake) [4]		❍	❑
Slack adjuster (planetary axle with drum brake) [4]		❍	❑
Supporting structure for swap body: Main bearing journal thread, centring roller support			❑
Cab tilt mechanism: Locking mechanism			❑
Oil change, ZF NMV power take-off with oil filter			❑
Oil change, tipper hydraulics (first oil change after approx. 1500 tipping operations)			❑

[1] Omitted in the case of common-rail engine D2876 LF 12/13 and D0836 LF 41/44
[2] Omitted during first service in the case of all D28 engines
[3] Have refrigerant topped up or have refrigerant changed and new dryer fitted (by a refrigerant expert only)
[4] For vehicles without central lubrication system only

GENERAL TECHNICAL SAFETY

May be omitted if maintenance and statutory safety inspection are performed by MAN Service at the same time.			
CHECK: Condition, correct functioning, effectiveness, leak-tightness, routing, damage, corrosion, chafing	**E**	**S 6**	**S 12**
Engine, gearbox, retarder, driven axles, shock absorbers (visual inspection)	✧	❍	❑
Check steering system, incl. sealing bellows on ball joints	✧	❍	❑
Trailing axle steering	✧	❍	❑
Leading axle steering	✧	❍	❑
Check air suspension system for cracks, particularly rolling air bellows		❍	❑
Trailer/fifth wheel coupling and fifth wheel plate		❍	❑
Steering knuckles, also check end play			❑
CHECK: Firm seating, secureness			
Wheel nuts (observe tightening torque)	✧	❍	❑
Spring U-bolts, spring mounting bolts	✧	❍	❑
Steering, steering linkage, drop arm nut, steering mounting	✧	❍	❑
Spare wheel bracket and mounting	✧	❍	❑
Roof spoiler/aeropackage/supporting structure	✧	❍	❑

BRAKE TECHNICAL SAFETY

May be omitted if maintenance and statutory safety inspection are performed by MAN Service at the same time.			
CHECK: Brake system	**E**	**S 6**	**S 12**
Condition, leak-tightness, routing, damage, corrosion, chafing, pad/lining and brake disc/brake drum wear, functional check (including slack adjuster) and effectiveness test		❍	❑

PREVENTIVE INSPECTION

CHECK: Condition, correct functioning, effectiveness, leak-tightness, routing, damage, corrosion, chafing	**E**	**S 6**	**S 12**
Cooling and heating system, radiator insect screen; also dirt in air-conditioning condenser and fins in water cooler and intercooler	✧	❍	❑
Cable connections, fastenings and routing: Battery, starter, alternator, earthing point	✧	❍	❑
Cab: Tilting and locking mechanism, hydraulic system	✧		❑
Intake/exhaust system/exhaust gas recirculation system	✧		❑
Fuel system, incl. auxiliary air and/or water heater	✧		❑
Locking function, steering/starter lock		❍	❑
Tipper system		❍	❑
Central lubrication pump setting		❍	❑
Cab mounts, incl. air suspension			❑
Propshaft			❑
Air-conditioning system: Equipment fixtures, refrigerant line ports [1)]			❑
Leaf suspension: Check that intermediate rubber layer is fitted			❑
CHECK: Firm seating, secureness			
Nuts and bolts: Engine, gearbox, axles, chassis, body mounting	✧		
Retighten cooling system hose clamps (omitted in the case of spring clamps in the charge air area)	✧		
Trailer/fifth wheel coupling and fifth wheel plate	✧		

[1)] Must be checked by refrigerant expert

CHECKS AND MINOR MAINTENANCE JOBS

CHECK: Fluid level	**E**	**S 6**	**S 12**
Engine oil (dipstick)		❍	❑
Hydraulic power steering (dipstick)		❍	❑
Hydraulic trailing axle steering (dipstick)		❍	❑
Cooling/heating system, incl. min. antifreeze/anti-corrosion protection concentration (level in tank)		❍	❑
Hydraulic clutch and gear shift actuator (level in tank)		❍	❑
Top up windscreen washers and headlight cleaning system		❍	❑
Batteries		❍	❑
CHECK: Display			
Engine oil level: Read off from display	✧	❍	❑
Remaining brake/clutch life: Read off date or mileage/km from display [1)]	✧	❍	❑
Fault memory: Read off entries from display [1)]	✧	❍	❑
Tyres: Condition and inflation pressure, including spare wheel	✧	❍	❑

[1)] Omitted if data has been read out using MAN-cats II

WINTER SERVICE ❄

Windscreen washers, headlight cleaning system: Add antifreeze	❑
Cooling and heating system: Check antifreeze and top up if necessary	❑
Check headlights and adjust if necessary	❑
Lubricate door lock cylinders (spray 09.15014-0024)	❑
Check correct functioning and condition of auxiliary air and/or water heater	❑
Check function and condition of traction chain	❑
Batteries: Check acid strength	❑

Maintenance work for reconditioned engine (E service only): Maintenance work for the reconditioned engine is integrated in the normal maintenance rhythm of the vehicle after this maintenance work has been performed.

Work, maintenance points	**Type E (A)**
CHECK: Condition, correct functioning, effectiveness, leak-tightness, routing, damage, corrosion, chafing	
Engine	☐
Clutch	☐
Intake/exhaust system	☐
Cooling and heating system	☐
Fuel system	☐
Cable connections and fixtures: Battery, starter, alternator, earthing point	☐
Steering system	☐
CHECK: Firm seating, secureness	
Nuts and bolts: Engine	☐
Retighten cooling system hose clamps (omitted in the case of spring clamps in the charge air area)	☐
CHECKING AND ADJUSTMENT WORK:	
Retighten cylinder head bolts (for D28 engine with bolts tightened by angle) Minimum mileage 1,000 km, maximum 20,000 km	☐
Retighten pressure flange collar nut for nozzle holder (for D28 4-valve engine) [1)]	☐
Check valve clearance and adjust if necessary [2)]	☐
CHANGE OIL	
Engine, also change filter	☐
LUBRICATE USING AN OIL CAN OR GREASE: Linkages, cables, joints, bearings, hinges	☐

[1)] Omitted in the case of common-rail engine D2876 LF 12/13 and D0836 LF 41/44

[2)] Omitted during first service in the case of all D28 engines

TECHNICAL DATA

ENGINES

Engine model – common rail (EURO 3)	**D0836 LF 41**	**D0836 LF 44**	**D2876 LF 12**	**D2876 LF 13**
Rated output [1] (KW/hp) at engine speed (rpm)	206/280 2400	240/326 2400	353/480 1900	390/530 1900
Peak torque (Nm) at engine speed (rpm)	1100 1200-1750	1250 1200-1800	2300 1000-1300	2400 1000-1400
Valve clearance with engine cold (mm): Intake valve bridge/rocker arm Exahust valve bridge/rocker arm Exhaust valve bridge/EVB counter-holder	 0.50 0.50 0.50/0.35		 0.50 0.60 0.40	
Oil pressure with engine at operating temperature (bar): At idling speed At rated engine speed Operating limit at idling speed	 1.2-1.5 4.0-5.0 1.0			
Firing sequence	1–5–3–6–2–4			

Engine model (EURO 3)	**D2866 LF 26**	**D2866 LF 27**	**D2866 LF 28**	**D2876 LF 04**	**D2876 LF 05**
Rated output [1] (KW/hp) at engine speed (rpm)	228/310 1800-1900	265/360 1800-1900	301/410 1900	338/460 1700-1900	375/510 1900
Peak torque (Nm) at engine speed (rpm)	1500 900-1300	1700 900-1400	1850 900-1300	2100 900-1300	2300 1000-1300
Valve clearance with engine cold (mm): Intake valve bridge/rocker arm Exahust valve bridge/rocker arm Exhaust valve bridge/EVB counter-holder	 0.50 0.60 0.40				
Oil pressure with engine at operating temperature (bar): At idling speed At rated engine speed Operating limit at idling speed	 1.2-1.5 4.0-5.0 1.0				
Firing sequence	1–5–3–6–2–4				

Engine model (EURO 2)	**D2866 LF 36**	**D2866 LF 37**	**D2866 LF 32**	**D2876 LF 07**
Rated output [1] (KW/hp) at engine speed (rpm)	228/310 1700-1900	265/360 1800-1900	301/410 1800-1900	338/460 1800-1900
Peak torque (Nm) at engine speed (rpm)	1500 900-1300	1700 900-1300	1850 900-1300	2100 900-1300
Valve clearance with engine cold (mm): Intake valve bridge/rocker arm Exahust valve bridge/rocker arm Exhaust valve bridge/EVB counter-holder	 0.50 0.60 0.40			
Oil pressure with engine at operating temperature (bar): At idling speed At rated engine speed Operating limit at idling speed	 1.2-1.5 4.0-5.0 1.0			
Firing sequence	1–5–3–6–2–4			

[1] to ISO 1585–88/195 EEC

POLY-V BELTS
V-belt tension .....Set using gauge
D2866 and D2876
Designation
with refrigerant compressor ..... 8 K 1376 SK 534
without refrigerant compressor .. 8 K 880 SK 534
D0836
Designation.....8 PK 1275

BRAKE SYSTEM (pressures in bar)

	ECAM	Air dryer
– Shut-off pressure:	12.5 ±0.3	12.5 ± 0.2
– Operating range:	2.0 -0.3	1.3 +0.7
– Reservoir pressures:		
Circuit 1	12.5 ±0.3	12.5 ± 0.2
Circuit 2	12.5 ±0.3	12.5 ± 0.2
Circuit 3	8.5 -0.5	8.5 -0.4
Circuit 4	10.0 ±0.3	10.0 ± 0.3
– Air suspension:	12.5 ±0.3	12.5 ± 0.2
– Operating pressure:		
Service brake system	≤ 10.0	≤ 10.0
Parking brake system	8.5 -0.5	8.5 -0.4
Trailer brake	8.5 -0.5	8.5 -0.4

Engine brake
Electro-pneumatically-operated engine brake valve.

Wheel brake
Disc brake:
Note: Always use brake pads of the same quality on front and rear axle(s).

Brake pad wear limit.....4 mm
Note: The *warning limit* is:
4 mm remaining pad per pad. The "brake pads" indication is on the driver's display, see Operator's Manual.
The *absolute wear limit* is:
2 mm – renew the brake pads immediately!

Brake disc wear limit .....37 mm

Drum brake
Brake lining thickness (wear limit)
.....min. 5 mm
Clearance between lining and brake drum, gap .....0.7 mm

AXLES
All axles are fitted with disc brakes and an electrical wear indicator.
The wheel bearings are lubricated with high-temperature grease and require no maintenance.

Front axle, trailing axle
VP – 09 .....Driven planetary axle (AP) with disc brake
VOK – 08 .....Non-driven front axle with offset axle housing; with air or leaf suspension
NO – 08.....Lifting trailing axle with air suspension; axle housing configured as tubular axle
NOL – 08.....Lifting, steering trailing axle with air suspension; axle housing configured as tubular axle
Max. play on steering knuckle
VOK– 08, NOL– 08 .....0.4 mm

Rear axle
HY – 1350 .....Driven hypoid axle with twin tyres, with and without transverse lock
HP – 1352 .....Driven planetary axle with twin tyres, with and without transverse lock
HPD – 1382...Through-drive planetary axle with twin tyres, with and without transverse lock
H9 – .....Planetary axle (AP) with twin tyres, with and without transverse lock
HD9 – .....Planetary axle (AP) with tandem axle and interaxle differential lock in power divider on 1st rear axle

FILL QUANTITIES (approx. change quantities in litres)
The most accurate method of establishing the exact oil or fluid fill quantity always involves filling the unit correctly and properly checking the oil or fluid level.

Fuel tank, depending on vehicle type
- Steel 220/300/400
- Aluminium 250/300/330/400/450/480/580/590/600/700/710/780/800/910
- Plastic 30

Combination tank (aluminium) 200/400

Engine with oil filter
- D2866 / D2876 – green dipstick
  - Total oil quantity 42.0
  - Dipstick "Max – Min" 6.0
- D2866 / D2876 – red dipstick
  - Total oil quantity 33.0
  - Dipstick "Max – Min" 6.0
- D0836
  - Total oil quantity 27.5
  - Dipstick "Max – Min" 5.0

Cooling system including heating
without Intarder
- D2866, D2876 and D0836 ..... 50.0

with Intarder
- D2866, D2876 and D0836 ..... 58.0

with PriTarder
- D2876 ..... 52.0
- Ensure that the coolant composition is as specified in order to prevent PriTarder damage!

Rear axle
HY – 1350:
- Centre drive 14.5
- Wheel hub ..... 2 x 100 g grease

HP – 1352 ..... 15.8
- Centre drive 12.0
- Planetary drive ..... 2 x 1.9

HPD – 1382:
- Centre drive/through-drive 14.5
- Planetary drive ..... 2 x 1.9

HDY – 1175 ..... 15.4
- Centre drive/through-drive 14.0
- Planetary drive ..... 2 x 0.7

H9 – 1180 / 1380 ..... 16.0
- Centre drive 9.0
- Planetary drive ..... 2 x 3.5

HD9 – 1180/1380 ..... 20.0
- Centre drive 11.0
- Transfer drive 2.0
- Planetary drive ..... 2 x 3.5

Front axle
VA 9 – 0950 ..... 9.2
- Centre drive 6.0
- Planetary drive ..... 2 x 1.5
- Steering knuckle ..... 2 x 0.05

VP – 09 ..... 9.2
- Centre drive 6.0
- Planetary drive ..... 2 x 1.5
- Steering knuckle ..... 2 x 0.05

Transfer case G 172 / 173
- with permanent front-axle drive 5.8
- with non-permanently engaged front-axle drive .. 7.0

Power steering ..... approx. 4.0

Power steering with emergency steering pump ..... approx. 6.0

Hydraulically steering trailing axle
..... approx. 4.5 to 6.0

Hydraulically steering leading axle
..... approx. 4.0 to 6.0

Windscreen washers 15.0

Headlight cleaning system 10.0

Gearbox
MAN TipMatic automated manual gearbox
- ZF – Astronic 12 AS 2301 ..... 11.0
- ZF – Astronic 12 AS 2301 + Intarder 12.0

MAN ComfortShift manual gearbox
- ZF 16 S 151 ..... 8.0
- ZF 16 S 151 OD/DD 9.0
- ZF 16 S 151 + Intarder ..... 11.0 [1)]
- ZF 16 S 181 ..... 10.0
- ZF 16 S 181 + Intarder 12.0
- ZF 16 S 221 ..... 10.0 [1)]
- ZF 16 S 221 + Intarder ..... 12.0 [1)]

[1)] with separately mounted heat exchanger
..... approx. +2.0

Automatic gearbox
(the dipstick gives the most accurate measurement)
- ZF – 5/6 HP ..... 12.0 to 17.0
- with additional oil filter ..... approx. +4.0 to 5.0

Eaton manual gearbox
- Eaton FSO 8309 ..... approx. 8.5

Power take-off
- NMV ..... approx. 2.0
- NH ..... approx. 0.5
- Eaton 2900 ..... approx. 1.0

Air-conditioning system ..... approx. 0.95 kg

Power take-off

NMV ..... approx. 2.0
NH ..... approx. 0.5
Eaton 2900 ..... approx. 1.0

Air-conditioning system ..... approx. 0.95 kg

BULBS (24 V)

Headlights (H7)
- Headlight low beam ..... 70 W
- Headlight high beam ..... 70 W
- Parking lights ..... 4 W

Turn indicators ..... 21 W
Brake lamps ..... 21 W
Tail lights ..... 10 W
Marker lights ..... 5 W
Fog lamps/additional high-beam headlights (H3) ..... 70 W
Priority vehicle light ..... 70 W
Reversing lights ..... 21 W
Driver's area ceiling lights ..... 21 and 10 W
Entry lights ..... 5 W
Outline lights ..... 5 W
Interior lighting, bunks ..... (12V) 6 W (Sofitte)
Gas discharge (special equipment) D2R
Side marker light (SML) ..... LED

TYRES AND INFLATION PRESSURE
All the vehicle's tyres must correspond to the entry in the vehicle's registration certificate/data sheet (size, speed index, load index).

Always refer to the documentation provided by the tyre manufacturer for the exact tyre inflation pressures!
The tyre inflation pressure charts below only indicate an overview of the tyre inflation pressures.

Tyre inflation pressure (in bar with tyres cold) **Single tyres**

Axle load (kg)	6300	6400	6500	6600	6700	6800	7100	7500	8000	8500	9000
Tyres											
12 R 22,5	7.5	7.5	7.75	7.75	8.0	8.0	8.5	–	–	–	–
13 R 22,5 / K	6.5	6.75	6.75	7.0	7.0	7.25	7.5	8.0	–	–	–
13 R 22,5 / L	6.5	6.75	6.75	7.0	7.0	7.0	7.5	8.0	8.5	–	–
285/60 R 22,5	9.0	–	–	–	–	–	–	–	–	–	–
295/60 R 22,5	8.75	9.0	9.0	–	–	–	–	–	–	–	–
305/60 R 22,5	8.5	8.5	8.75	8.75	9.0	–	–	–	–	–	–
315/60 R 22,5	8.0	8.0	8.0	8.25	8.25	8.25	9.0	–	–	–	–
385/65 R 22,5	–	–	–	6.5	6.5	6.75	7.0	7.5	8.0	8.5	9.0
275/70 R 22,5	9.0	–	–	–	–	–	–	–	–	–	–
305/70 R 22,5	8.0	8.0	8.25	8.25	8.5	–	–	–	–	–	–
315/70 R 22,5	7.5	7.5	7.75	7.75	8.0	8.25	8.5	9.0	–	–	–
295/80 R 22,5	7.5	7.5	7.75	7.75	8.0	8.25	8.5	–	–	–	–
315/80 R 22,5	7.0	7.25	7.25	7.5	7.5	7.75	8.0	8.5	–	–	–

Tyre inflation pressure (in bar with tyres cold) **Twin tyres**

Axle load (kg)	9000	9500	10000	11000	11300	11500	12000	13000
Tyres								
12 R 22,5	5.75	6.25	6.75	7.25	7.5	7.75	8.0	–
13 R 22,5 / K	–	5.5	5.75	6.5	6.75	6.75	7.25	7.75
13 R 22,5 / L	5.5	5.75	6.25	6.75	7.0	7.25	7.5	8.25
285/60 R 22,5	–	7.0	7.5	8.0	8.25	8.5	9.0	–
295/60 R 22,5	–	7.0	7.5	8.25	8.5	8.5	9.0	–
305/60 R 22,5	–	–	7.25	8.0	8.25	8.25	8.5	–
315/60 R 22,5	–	–	–	7.25	7.5	7.75	8.0	–
385/65 R 22,5	–	–	–	–	–	–	–	–
275/70 R 22,5	–	–	7.75	8.0	8.25	8.5	–	–
305/70 R 22,5	–	–	6.5	7.0	7.25	7.5	7.75	–
315/70 R 22,5	–	–	–	6.75	7.0	7.25	7.5	8.25
295/80 R 22,5	–	–	6.5	7.25	7.5	7.75	8.0	–
315/80 R 22,5	–	–	–	6.5	6.5	6.75	7.0	7.75

TIGHTENING TORQUES in Nm

D2866/76 engine
2nd retightening of cylinder head bolts ..... 90°
Cylinder head cover 22
Retightening of pressure flange collar nut for nozzle holder (for D28 4-valve engine) [1] ..... 90°
Lock nut on valve adjustment screw 45
Oil drain plug 80
Oil filter cover 25
Fuel filter cover 25
[1] omitted in case of common-rail engine D2876 LF 12/13

Cooling system
Entire cooling system [1,2]:
Standard part M3259 (belt width 12 mm)..... 5.0 Nm
Breather line on expansion tank:
Standard part M7.751-30 (belt width 9 mm).... 3.5 Nm

[1] also see Service Information 33900b dated 08.07.2002
[2] with the exception of breather line on expansion tank

Drain plug
on radiator ..... 4 +1
on ZF–Intarder 35
on Voith retarder 20

Poly-V-belts
Collar bolts (WAF13) 35
Spring damper element (WAF17) 43
Spring damper element (WAF13) 22
Tensioner (WAF10) 50
Mounting bolt (WAF22) 150
Fan 45
Cable clamp 22
Fan clutch 45

D28 / D08 fuel system
Housing cover
Pre-cleaner 25
Main filter 25
Separ pre-filter 15
Hand pump plunger ..... 4 ±2

Rear axle
HY – 1350:
Oil filler and checking plug 70
Oil drain plug 70
HP – 1352 / HPD – 1382:
Axle centre drive/power divider
Oil filler and checking plug ..... 100±10
Oil drain plug ..... 100±10
Planetary hub drive
Oil filler, checking and drain plug 95
HD/HD9 – 13120:
Axle centre drive/power divider
Oil filler and checking plug 70
Oil drain plug 70
Planetary hub drive
M45x1.5 Aluminium cover 180
M45x1.5 Sheet-steel cover 325
Oil drain plug M24x1.5 80

Front axle
VP – 09:
Axle centre drive
Oil filler and checking plug ..... 100±10
Oil drain plug ..... 100±10
Planetary hub drive
Oil filler, checking and drain plug 95

Transfer case G 172 / 173
Oil filler plug 80
Oil drain plug 80

Wheel nuts (including aluminium wheels)
Disc wheel
Hub centring ..... 575 ± 25
Stud centring ..... 475 ± 25

U-bolts
U-bolt distinguishing features (hot-formed or cold-formed), see section 7.20 "CHASSIS".

	U-bolts	
Thread	**Hot-formed**	**Cold-formed**
M 14 x 1.5	185	165
M 16 x 1.5	210	225
M 18 x 2	280	330
M 20 x 2	400	440
M 24 x 2	680	800
M 27 x 2 [1]	900	1000

[1] U-bolt 06.46115.XXXX (M27x2) only with ENKO® lock nut 81.90685.0400

Air dryer
Desiccant cartridge:
Bosch 25
Knorr 25
Wabco 15

MAN TipMatic (ZF 12 AS …)
Oil filler and checking plug 60
Oil drain plug (M 24) 60
Oil drain plug with magnetic stopper (M 38) 120
Breather 10

MAN TipMatic with Intarder (ZF 12 AS …)
Oil filler and checking plug 60
Oil drain plug (M 24) 60
Oil drain plug with magnetic stopper (M 38) 120
Intarder – oil filter mounting bolts 23
Breather 10

MAN ComfortShift (ZF 16 S …)
Oil filler and checking plug 60
Oil drain plug (M 24) 60
Oil drain plug with magnetic stopper (M 38) 120
Intarder-oil filter mounting bolt 23
Breather 10

MAN ComfortShift with Intarder (ZF 16 S …)
Oil filler and checking plug 60
Oil drain plug (M 24) 60
Oil drain plug with magnetic stopper (M 38) 120
Intarder-oil filter mounting bolt 23
Breather 10

MAN ComfortShift with NMV (ZF 16 S …)
Oil filler and checking plug 60
Oil filler plug, NMV 60
Oil drain plug (M 24) 60
Oil drain plug with magnetic stopper (M 38) 120
Intarder-oil filter mounting bolts 23
Breather 10

Eaton FSO 8309 manual gearbox
Oil filler and checking plug ..... 20 – 27
Oil drain plug ..... 20 – 27
Breather ..... 16 – 22

ZF – 5/6 HP ... automatic gearbox
Oil drain plug 50
Oil filter cover 25

Breather for semilifetime oil fill
Mounting bolt, breather 22
Screw-in coupling:
on gearbox ..... 4 – 5
on axle ..... 4 – 5
on breather ..... 4 – 5

For further details regarding tightening torques, refer to Works Standard M 3059, relevant Repair Manual or brochure "SD 200".

REFERENCE TORQUES

Tightening torques to Works Standard M 3059
With the exception of subordinate or tacking connections, screw connections without specially prescribed tightening torques should always be tightened using standard workshop torque wrenches or precision nut runners.
The tightening torques applied should not differ from the specified settings by more than ±15%.

Note on using the tables
- For strength pairings other than those given, use the tightening torque for the part in the lower strength class (e.g. bolt in strength class 8.8, nut in strength class 10; the tightening torque is determined from the 8.8/8 column).
- When tightening a part with a slot onto a part with a round hole, work from the side with the round hole.
- **Important note regarding collars with ribbed head contact surface (e.g. Verbus Ripp):**
  - Wherever possible, always tighten (to the applicable torque for the component concerned) on the side of the harder material when tightening soft components against hard ones.
  - Only use ribbed locking bolts in conjunction with steel washers on slots or components made from light alloy.
  - When re-assembling (e.g. following repairs), always use new bolts or nuts on the tightening side.
  - When tightening galvanised ribbed locking bolts onto components made from nodular cast iron (GGG) or from less hard materials, increase the settings indicated by approx. 15%.
- Under certain circumstances (e.g. unfavourable surface pairing with very low coefficient of friction), the bolt may tear or the nut thread may be damaged when tightening galvanised bolts. In such cases, reduce the tightening torque as necessary; however, the tightening torque must not be below 85% of the reference value.

Bolts/nuts with external or internal hexagon heads, collarless or flangeless head:

	Strength classes (bolt/nut) in Nm		
Nominal thread size x pitch	**8.8/8**	**10.9/10**	**12.9/12**
M 4	2.5	4.0	4.5
M 5	5.0	7.5	9.0
M 6	9.0	13.0	15.0
M 7	14.0	20.0	25.0
M 8	22.0	30.0	35.0
M 8 x 1	23.0	35.0	40.0
M 10	45.0	65.0	75.0
M 10 x 1.25	45.0	65.0	75.0
M 10 x 1	50.0	70.0	85.0
M 12	75.0	105.0	125.0
M 12 x 1.5	75.0	110.0	130.0
M 12 x 1.25	80.0	115.0	135.0
M 14	115.0	170.0	200.0
M 14 x 1.5	125.0	185.0	215.0
M 16	180.0	260.0	310.0
M 16 x 1.5	190.0	280.0	330.0
M 18	260.0	370.0	430.0
M 18 x 2	270.0	390.0	450.0
M 18 x 1.5	290.0	410.0	480.0
M 20	360.0	520.0	600.0
M 20 x 2	380.0	540.0	630.0
M 20 x 1.5	400.0	570.0	670.0
M 22	490.0	700.0	820.0
M 22 x 2	510.0	730.0	860.0
M 22 x 1.5	540.0	770.0	900.0
M 24	620.0	890.0	1040.0
M 24 x 2	680.0	960.0	1130.0
M 24 x 1.5	740.0	1030.0	1220.0

Bolt/nut with collar or flange head:

Thread	Smooth	Toothed or ribbed **Phosphated – black**				Ribbed **Galvanised – yellow**	
	10.9/10	100/10		12.9/12		10.9/10	
	Nm	Nm [1]	Nm [2]	Nm [1]	Nm [2]	Nm [1] [3]	Nm [1] [3]
M 5	9	10	11	–	–	8	11
M 6	15	17	19	–	–	14	19
M 8	35	40	45	–	–	33	45
M 8 x 1	40	–	–	–	–	–	–
M 10	75	85	95	–	–	70	95
M 10 x 1.25	75	–	–	–	–	–	–
M 10 x 1	85	–	–	–	–	–	–
M 12	115	–	–	150	170	–	–
M 12 x 1.5	120	150	170	–	–	120	150
M 12 x 1.25	125	–	–	–	–	–	–
M 14	175	–	–	260	320	–	–
M 14 x 1.5	190	260	320	–	–	210	280
M 16	280	–	–	360	425	–	–
M 16 x 1.5	300	360	425	–	–	270	370
M 18	380	–	–	–	–	–	–
M 18 x 2	400	–	–	520 [4]	520 [4]	–	–
M 18 x 1.5	420	–	–	550 [4]	550 [4]	–	–
M 20	540	–	–	–	–	–	–
M 20 x 2	560	–	–	–	–	–	–
M 20 x 1.5	590	–	–	–	–	–	–
M 22 x 2	740	–	–	–	–	–	–
M 22 x 1.5	780	–	–	–	–	–	–

[1] Value for tightening onto harder component materials such as C 45, quenched and tempered materials, cast iron (GG, GTS) as well as for nodular cast iron (GGG) for diameter M 12 or less.

[2] Value for tightening onto less hard component materials such as chassis and chassis attachments (QSTE 340, QSTE 420, ST 2 K 60) and soft component materials such as body panels (ST 12, ST 13, ST 14), attachments made of ST 37 as well as for nodular cast iron (GGG) for diameter M 14 or greater.

[3] When tightening galvanised ribbed locking bolts/nuts onto nodular cast iron, the values for tightening onto harder component materials always apply.

[4] Applies to ribbed locking bolts (serrated) only

REFERENCE TORQUES

Table from Works Standard M3059–1
Nominal assembly tightening torques M_A [Nm] and preload forces F_V [kN] for connections with ribbed (Rippen type) or toothed (Durlok type, for M18 thread sizes only) contact surface with flange head or collar. Desired total coefficient of friction $\mu_{total} = 0.11$

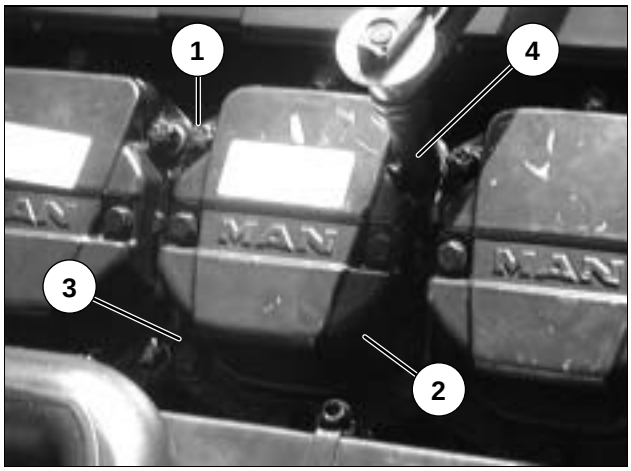
Thread size	**Preload force** $F_{V\,max}$ [kN]	**FK 10.9/10** Dacromet (silver–grey/bluish[1)])		**FK 10.9/10** Galvanised (yellow)		**FK 12.9/12** Phosphated (black)		**FK 10.9/10** Phosphated (black)
		Material group						
		1 (hard)	2 (soft)	1 (hard)	2 (soft)	1 (hard)	2 (soft)	
M 5	10	8	11	8	11	–	–	Special design. Values currently not defined
M 6	14	14	19	14	19	–	–	
M 8	26	33	45	33	45	–	–	
M 10	41	70	95	70	95	–	–	
M 12	70	–	–	–	–	150	170	
M 12 x 1.5	66	110	137	120	150	–	–	
M 14	96	–	–	–	–	260	320	
M 14 x 1.5	95,5	200	310	210	280	–	–	
M 16	132	–	–	–	–	360	425	
M 16 x 1.5	129	290	380	270	370	–	–	
M 18 x 2	174	To be determined or indicated in the technical documents				520 [2)]	520 [2)]	
M 18 x 1.5	187					550 [2)]	550 [2)]	

1) Bluish colour, for the purpose of indicating sliding compound treatment to MAN 183
2) Values apply to Durlok version only

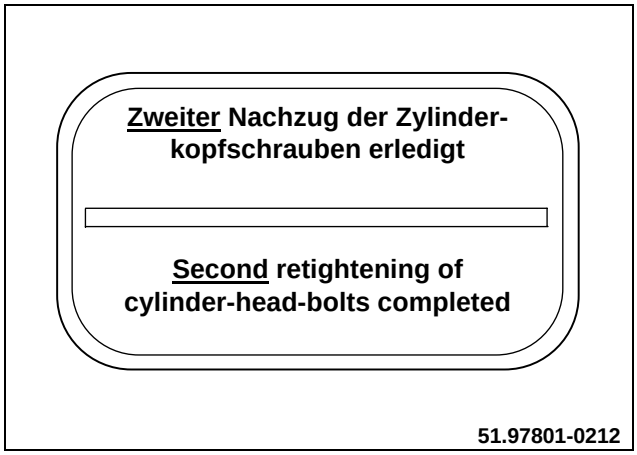
ENGINE (D2866 LF 26, 27, 28, 32, 36, 37; D2876 LF 04, 05, 07;

CYLINDER HEAD BOLTS

Retightening cylinder head bolts in accordance with the tightening diagram
The 2nd retightening shown here is part of the first service (E).
– **Do not** loosen the cylinder head bolts beforehand
– Only retighten the four bolts indicated
– The engine temperature is not important



- Stop the engine
- Tilt the cab
- Retighten the cylinder head bolts by 90° (¼ turn) in accordance with the tightening diagram (sequence ①, ②, ③, ④)
- Then check the valve clearance and adjust it if necessary
- After retightening the cylinder head bolts, remove the old adhesive label (MAN no. 51.97801-0211) and, in its place, affix the adhesive label containing the text opposite (MAN no. 51.97801-0212)
- Lower the cab



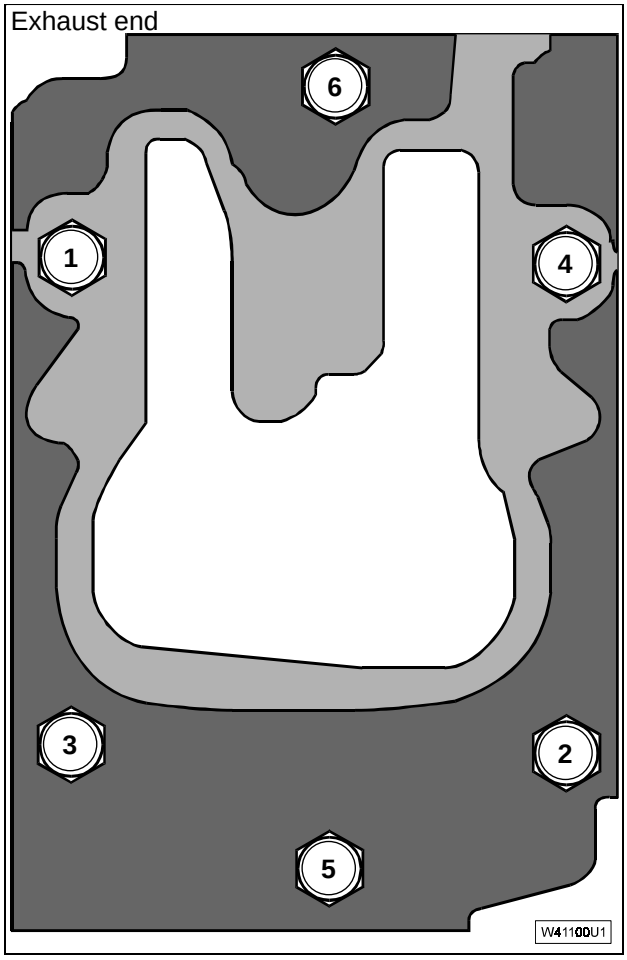
D28 ENGINE – retightening for newly delivered vehicles or new and reconditioned engines
Distinguishing feature: **No** "First retightening of cylinder head bolts completed" adhesive label on one of the valve covers.

In the case of the engines with modified cylinder liners, first retightening of the cylinder head bolts no longer takes place at the factory.
The "First retightening of cylinder head bolts completed" adhesive label is therefore omitted.

However, the cylinder head bolts must be retightened during the next appropriate service, after 1000 km at the earliest and after 45,000 km at the latest. Also see Service Information "124000 – D28 cylinder head" dated 10.03.2003.

- Retighten the bolts tightened by angle by 90° (¼ turn), without loosening them, in accordance with the tightening diagram (sequence ① to ⑥)

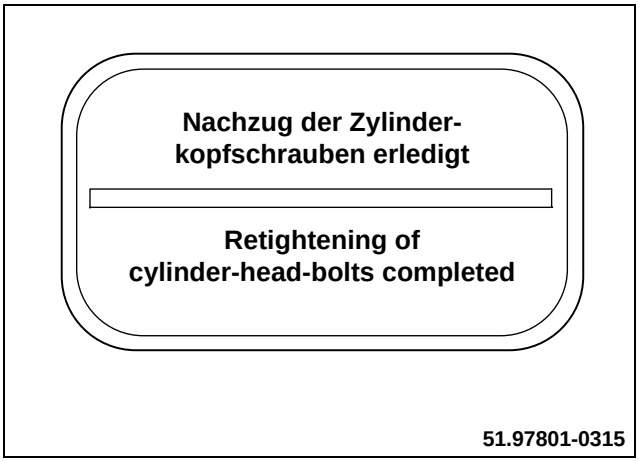
See figure on the right for tightening diagram.



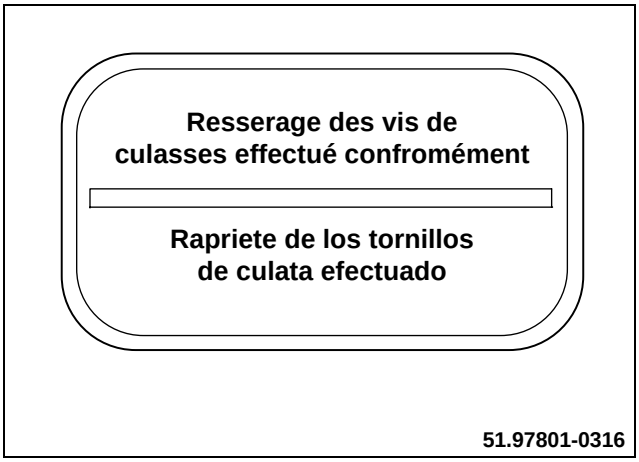
After retightening is complete:

- Affix adhesive label MAN no. 51.97801-0315 (German/English) onto one of the valve covers

or



- Affix adhesive label MAN no. 51.97801-0316 (French/Spanish) onto one of the valve covers



D2866 LF 26/27/28/32/36/37
D2876 LF 04/05/07/12/13
FOUR-VALVE – WITHOUT EVB

Engines with 4-valve cylinder heads **without EVB** are indicated by the plate opposite on one of the valve covers.

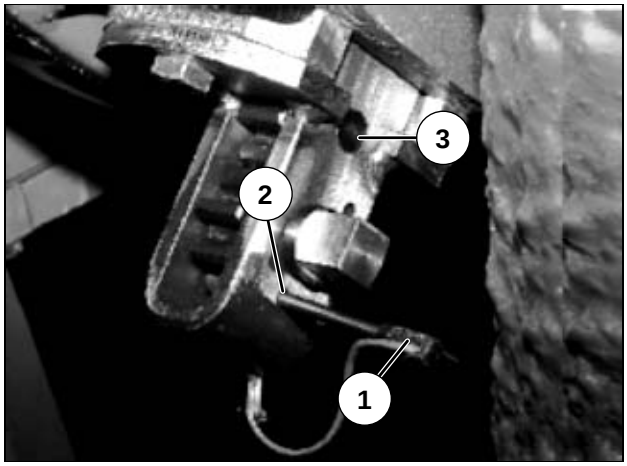
Ventilspiel / Valve Lash	
Einlass / Intake	0.5 mm
Auslass / Exhaust	0.6 mm

VALVE CLEARANCE

Checking (engine no more than lukewarm)
- Stop the engine
- Tilt the cab

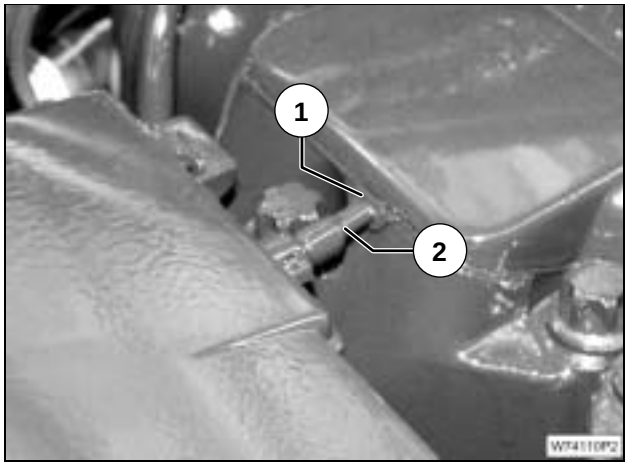
Fitting the engine barring gear
- Remove the cover from the flywheel housing
- Fit the engine barring gear, MAN no. 80.99626-6008

This engine barring gear allows the flywheel to be blocked with pin ① in the desired position using hole ② or ③.
- Attach the gear ratchet, MAN no. 80.99627-0001



Removing the cylinder head cover
- Unscrew and remove the mounting bolts
- Remove the cylinder head cover and the cylinder head cover gasket

Note (D2866 LF 26/27/28/32/36/37
D2876 LF 04/05/07):
Handle the gasket ① at the passage for the connecting cable ② for the needle movement sensor (NBF) with care.



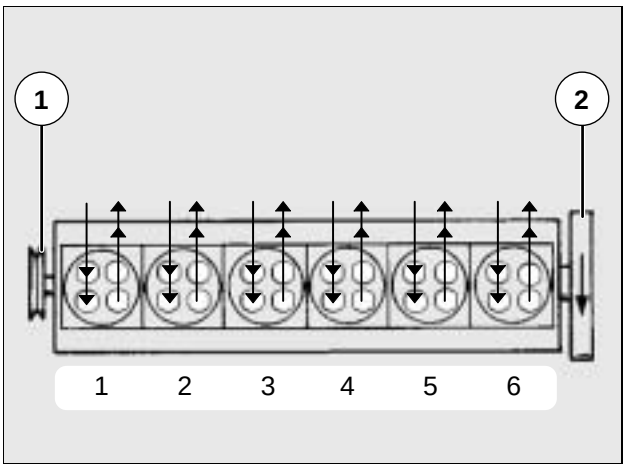
Note (D2876 LF 12/13):
Handle the injector cable passage (→) with care.

Cylinder order and valve arrangement
- Cylinder order: 1 to 6
- Firing sequence: 1 – 5 – 3 – 6 – 2 – 4
- The 1st cylinder is at the fan end.

1 Fan end
2 Gearbox end (power output)

Intake valves

Exhaust valves



- Move the piston of the cylinder requiring adjustment to ignition TDC. To do this:
  Use the engine barring gear to turn the flywheel until the rocker arms on the cylinder concerned have been relieved; the flywheel can be blocked in this position.

The rocker arms of the synchronous cylinder are then in overlap.

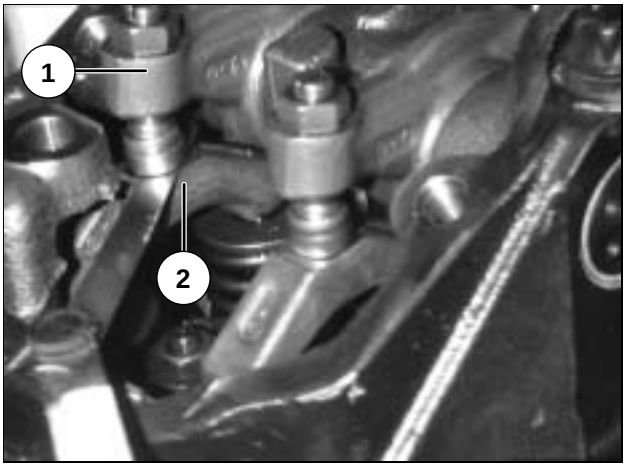
Rocker arm in overlap on cylinder:	1	5	3	6	2	4
Rocker arm relieved, check/ adjust valve clearance on cylinder:	6	2	4	1	5	3

The two intake valves are actuated by a rocker arm ① via a bridge ② as are the two exhaust valves.

Desired valve clearance:
Intake valve bridge/rocker arm ..... 0.50 mm
Exhaust valve bridge/rocker arm ..... 0.60 mm

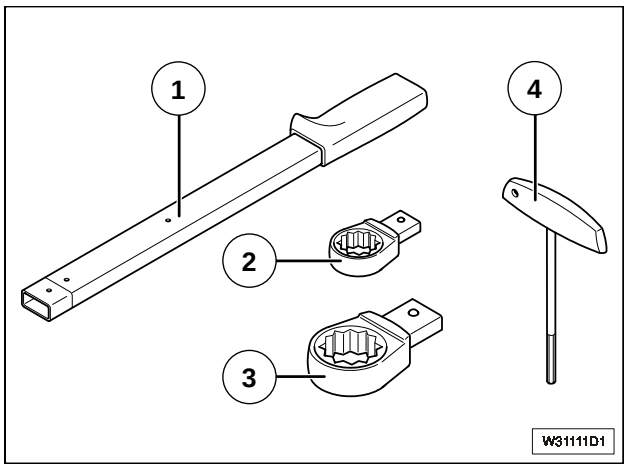
- Insert a feeler gauge between rocker arm ① and bridge ②

You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



Adjusting (with the engine **cold**)
The piston of the cylinder which requires adjustment must be at ignition TDC.

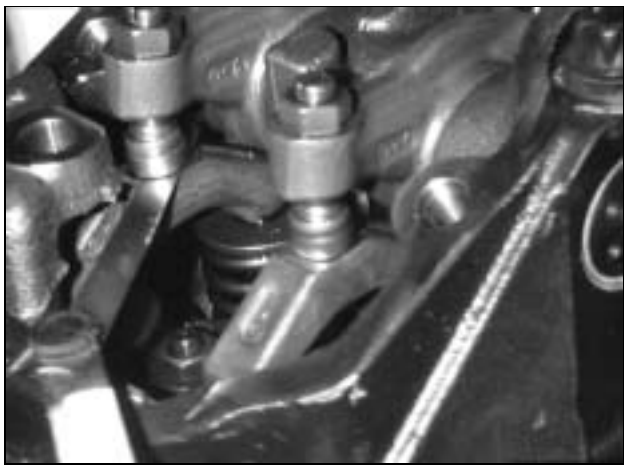
Note: Use valve setting key to adjust the valves.
1 Torque wrench
MAN no. 08.06450-0006
2 Valve setting key WAF 14
MAN no. 08.06455-0029
3 Valve setting key WAF 21
MAN no. 08.06455-0030
4 Hexagon socket screw wrench
MAN no. 08.06125-9035



- Undo the lock nut on the rocker arm using the valve setting key

Desired valve clearance:
Intake valve bridge/rocker arm.....0.50 mm
Exhaust valve bridge/rocker arm .....0.60 mm

- Use valve setting key to turn the adjuster screw until the feeler gauge can be moved between the rocker arm and the bridge with little resistance
- Tighten the lock nut
- Re-check the valve clearance and adjust if necessary



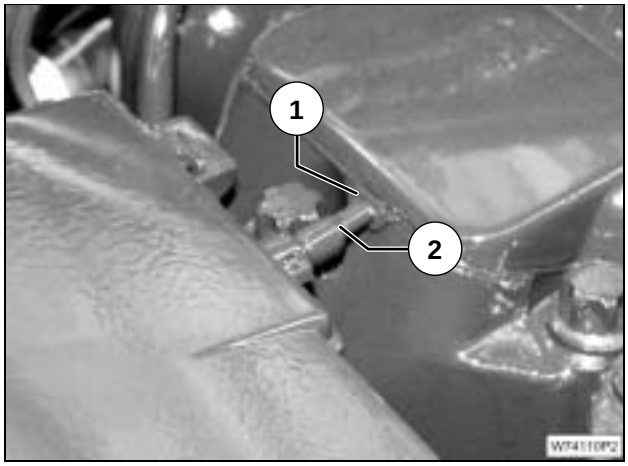
Tightening torque
Valve adjuster screw lock nut .....45 Nm

Fitting the cylinder head cover

Note: Non-damaged valve cover and intake seals made from aluminium/elastomers can be reused.

- Fit the cylinder head cover gasket (elastomer) onto the cylinder head cover
- Fit the cylinder head cover

Note (D2866 LF 26/27/28/32/36/37
D2876 LF 04/05/07):
Ensure that the gasket ① at the passage for the connecting cable ② for the needle movement sensor (NBF) is seated correctly.

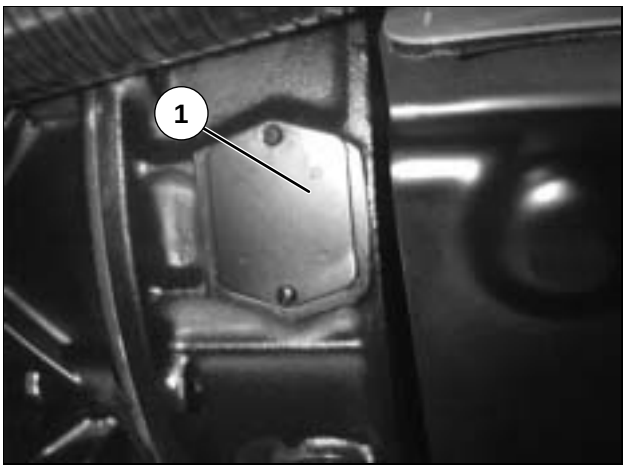


Note (D2876 LF 12/13):
Ensure that the injector cable passage (→) is seated correctly.

Tightening torque
Cylinder head cover .....22 Nm

Removing the engine barring gear

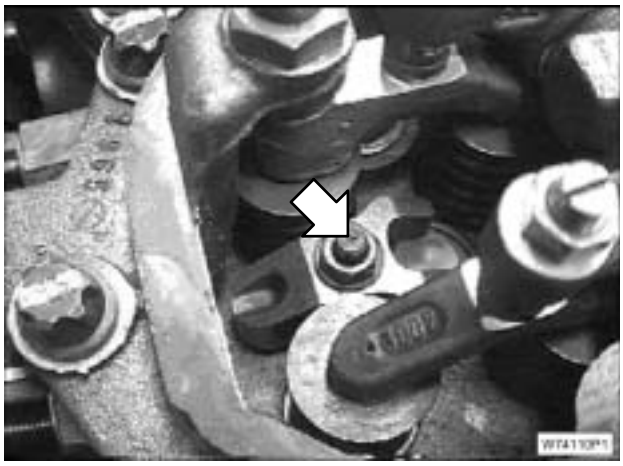
- Unscrew the engine barring gear
- Screw the cover ① onto the flywheel housing and tighten it
- Lower the cab



Pressure flange nuts for injector nozzle holders

Retightening (omitted in the case of D2876 LF 12/13) During the first service (E service), retighten the pressure flange nuts for the injector nozzles (→) by 90°, referring to SI 95500 "Injector nozzle".

After retightening the pressure flange nuts, affix a yellow-coloured dot next to the adhesive label for cylinder head bolt retightening. Affix this coloured dot following all first services performed up until the end of 2003. There is no need to affix the coloured dot after this date.



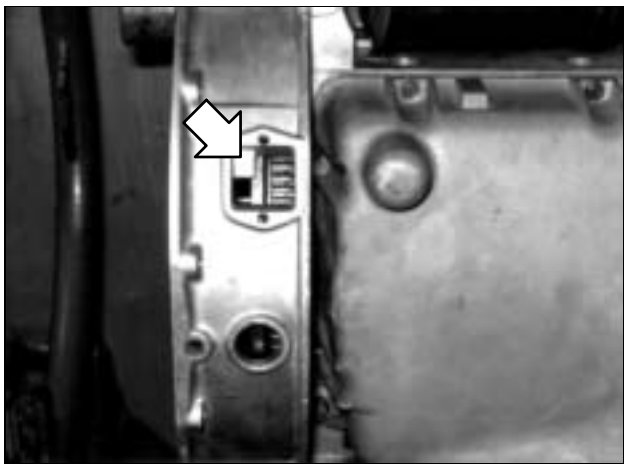
CHECKING THE VALVE CLEARANCE (alternative method)

Alternative method for adjusting valve clearance in D2866 And D2876 engines
This alternative method enables all valves to be checked and adjusted in just two crankshaft positions. The method described here can be used as an alternative to the usual method already described.

Adjustment

- Fit the engine barring gear on the flywheel housing (→) (see page 1)
- Turn the crankshaft until it reaches the nearest TDC position so that either cylinder 1 or cylinder 6 is at ignition TDC
- 6 valves can be adjusted in this position
- Then turn the engine 1 more revolution so it reaches TDC again
- The remaining 6 valves can now be adjusted

Cylinder 1 or cylinder 6 must be exactly at the TDC mark.

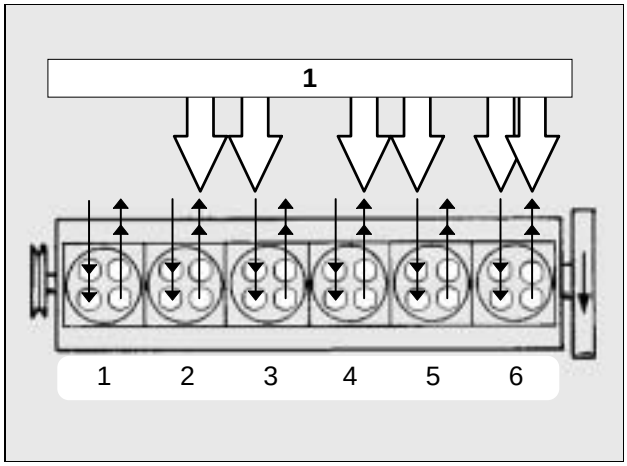


If cylinder 6 is at ignition TDC (= cylinder 1 in overlap), adjust:

- ⇩ Exhaust valves and ⇩ intake valves **1**

Intake valves

Exhaust valves



If cylinder 1 is at ignition TDC (= cylinder 6 in overlap), adjust:

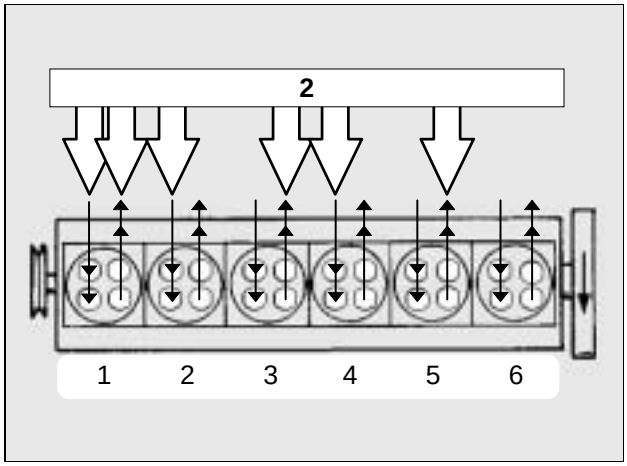
- ⇩ Exhaust valves and ⇩ intake valves **2**

Intake valves

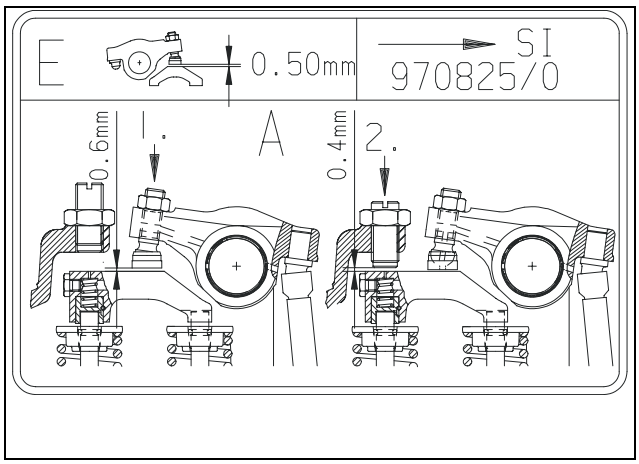
Exhaust valves

- Remove the engine barring gear

Fit the cover on the flywheel housing.



FOUR-VALVE – WITH EVB
D2866 LF 26/27/28/32/36/37 and
D2876 LF 04/05/07/12/13
Engines with 4-valve cylinder heads **and EVB** (**E**xhaust **V**alve **B**rake) are indicated by the plate opposite on one of the valve covers.



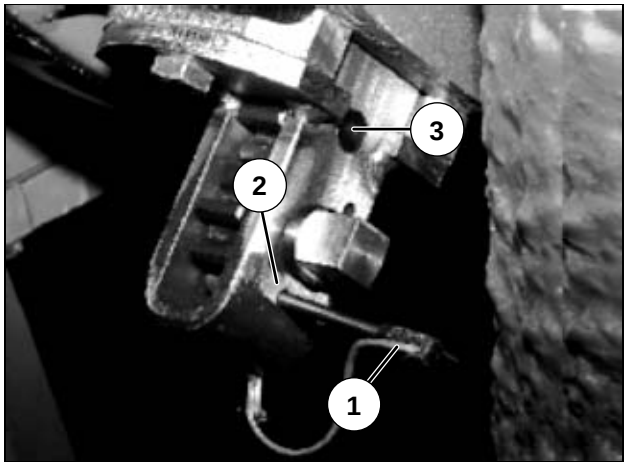
Valve clearance for checking/adjustment:
E = intake valve bridge/rocker arm
D2866 LF; D2876 LF.....0.50 mm
A1 = exhaust valve bridge/rocker arm
D2866 LF; D2876 LF.....0.60 mm
A2 = exhaust valve bridge/counter-holder
D2866 LF; D2876 LF.....0.40 mm

VALVE CLEARANCE

Checking (engine no more than lukewarm)
- Stop the engine
- Tilt the cab

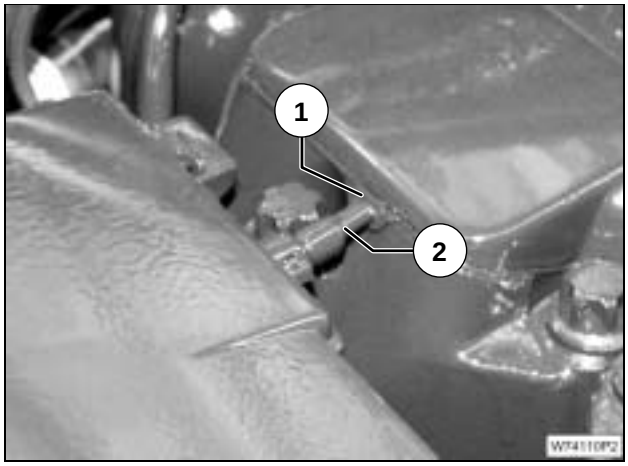
Fitting the engine barring gear
- Remove the cover from the flywheel housing
- Fit the engine barring gear, MAN no. 80.99626-6008

This engine barring gear allows the flywheel to be blocked with pin ① in the desired position using hole ② or ③.
- Attach the gear ratchet, MAN no. 80.99627-0001



Removing the cylinder head cover
- Unscrew and remove the mounting bolts
- Remove the cylinder head cover and the cylinder head gasket

Note (D2866 LF 26/27/28/32/36/37
D2876 LF 04/05/07):
Handle the gasket ① at the passage for the connecting cable ② for the needle movement sensor (NBF) with care.



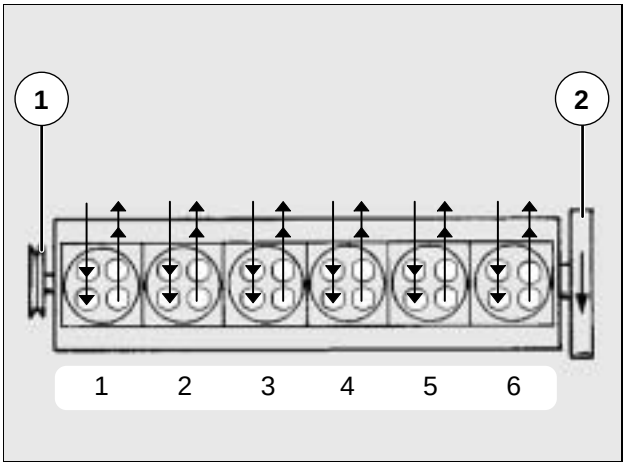
Note (D2876 LF 12/13):
Handle the injector cable passage (→) with care.

Cylinder order and valve arrangement
- Cylinder order: 1 to 6
- The 1st cylinder is at the fan end
- Firing sequence: 1 – 5 – 3 – 6 – 2 – 4

1 Fan end
2 Gearbox end (power output)

Intake valves

Exhaust valves



- Move the piston of the cylinder requiring adjustment to ignition TDC. To do this:
  Use the engine barring gear to turn the flywheel until the rocker arms on the cylinder concerned have been relieved; the flywheel can be blocked in this position.

The rocker arms of the synchronous cylinder are then in overlap.

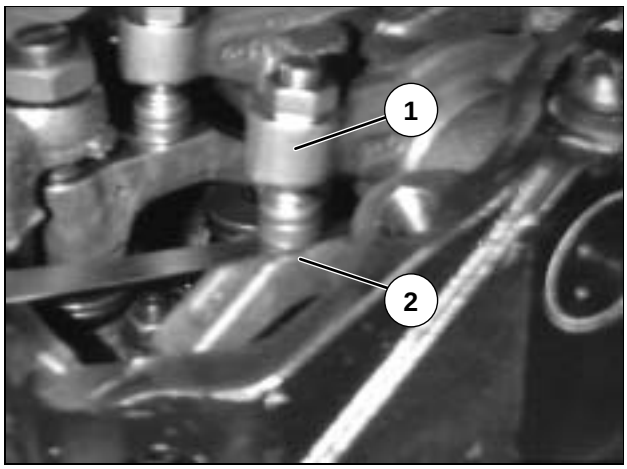
Rocker arm in overlap on cylinder:	1	5	3	6	2	4
Rocker arm relieved, check/ adjust valve clearance on cylinder:	6	2	4	1	5	3

The valve bridge must be pushed down as far as the stop during all checks. Make sure that the valve bridge and the contact surface of the adjuster screws are not tilted, otherwise the feeler gauge will jam and a false reading will be obtained.

Intake valves
Desired valve clearance:
Intake valve bridge/rocker arm
D2866 LF; D2876 LF .....0.50 mm

- Use the feeler gauge to measure the clearance between the rocker arm ① and the bridge ②

You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



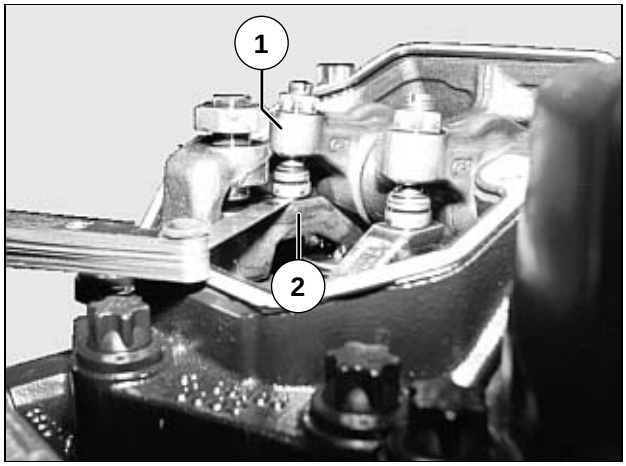
Exhaust valves (with EVB)

- Pull the foot on the adjusting screw upwards so that the remaining oil can escape

Desired valve clearance:
Exhaust valve bridge/rocker arm
D2866 LF; D2876 LF .....0.60 mm

- Use the feeler gauge to measure the clearance between the rocker arm ① and the bridge ②

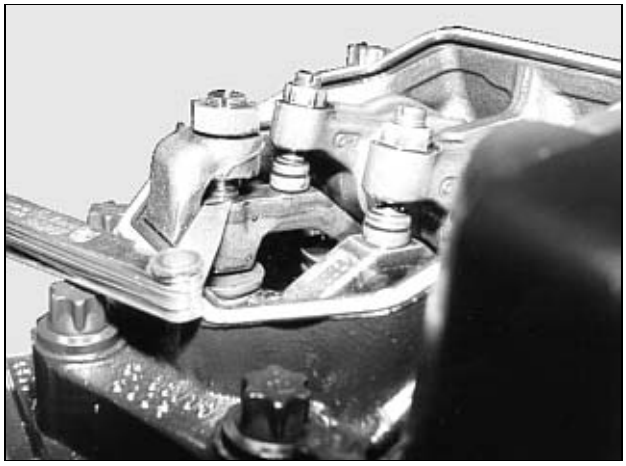
You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



Desired valve clearance (EVB):
Exhaust valve bridge/counter-holder
D2866 LF; D2876 LF .....0.40 mm

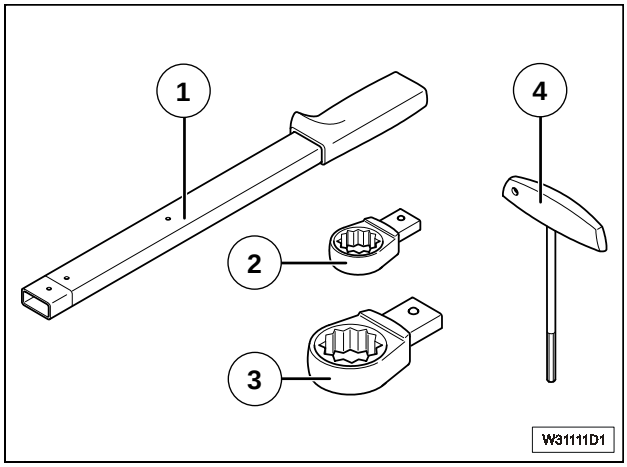
- Use the feeler gauge to measure the clearance between the counter-holder ③ and the bridge ②

You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



Adjusting (with the engine **cold**)
The piston of the cylinder which requires adjustment must be at ignition TDC.

Note: Use valve setting key to adjust the valves.
1 Torque wrench
MAN no. 08.06450-0006
2 Valve setting key WAF 14
MAN no. 08.06455-0029
3 Valve setting key WAF 21
MAN no. 08.06455-0030
4 Hexagon socket screw wrench
MAN no. 08.06125-9035

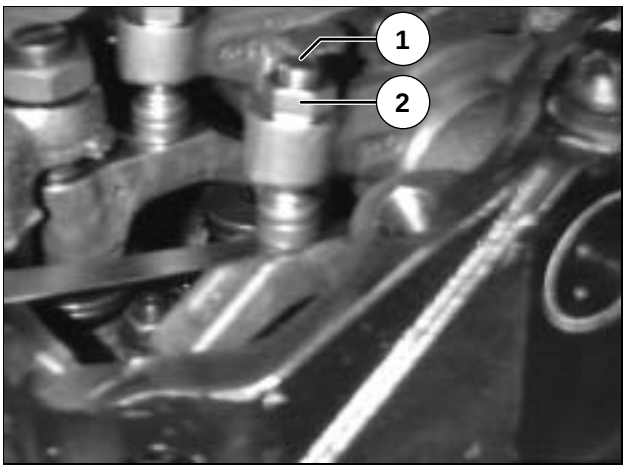


Intake valves

- Undo lock nut ② on the rocker arm using the valve setting key

Desired valve clearance:
Intake valve bridge/rocker arm
D2866 LF; D2876 LF ..... 0.50 mm

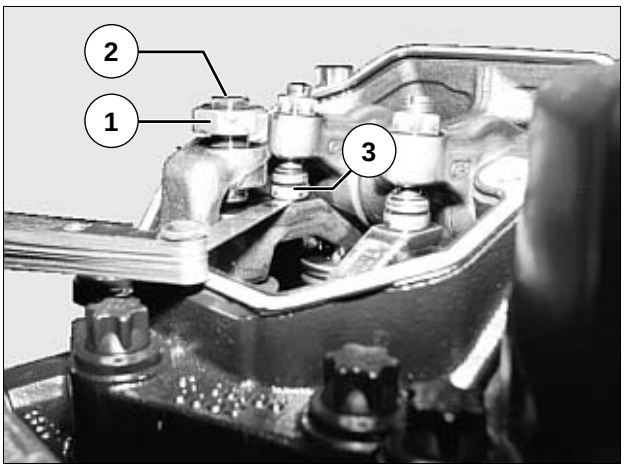
- Use valve setting key to turn adjuster screw ① until the feeler gauge can be moved between the rocker arm and the bridge with little resistance
- Tighten the lock nut
- Re-check the valve clearance and adjust if necessary



Tightening torque
Valve adjuster screw lock nut ..... 45 Nm

Exhaust valves (with EVB)
Desired valve clearance:
Exhaust valve bridge/rocker arm
D2866 LF; D2876 LF ..... 0.60 mm
Exhaust valve bridge/counter-holder
D2866 LF; D2876 LF ..... 0.40 mm

- Use the valve setting key to undo the lock nut ① and unscrew the adjuster screw ② in the counter-holder until the contact surface of the adjuster screw disappears in the counter-holder ③
- Use the valve setting key to undo lock nut ① and unscrew adjuster screw ② until the feeler gauge can be inserted between the valve bridge and the adjuster screw
- Screw in the adjuster screw ② until the piston ③ reaches the stop and the feeler gauge clamps (so that the remaining oil is forced out of the ball socket)
- Turn back adjuster screw ② but only far enough to enable the feeler gauge to be moved between the rocker arm and the bridge with little resistance
- Tighten lock nut ①



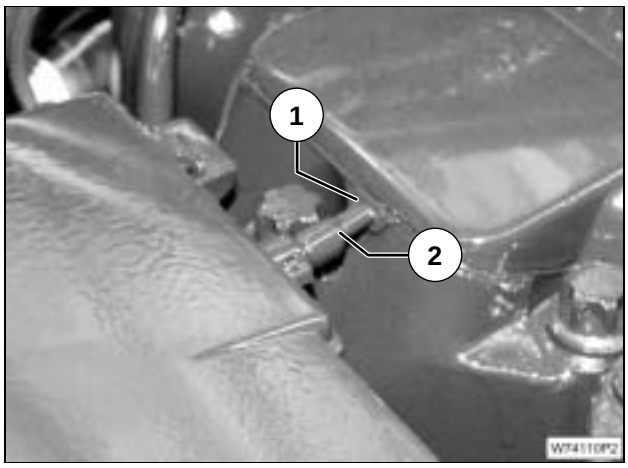
Tightening torque
Lock nut for valve adjuster screw ..... 45 Nm

- Screw in adjuster screw ② so that the feeler gauge can still be inserted between the counter-holder and the bridge
- Insert the feeler gauge and screw in adjuster screw ② until the piston reaches the stop and the feeler gauge clamps
- Turn back adjuster screw ② but only far enough to enable the feeler gauge to be pulled out with little resistance
- Tighten lock nut ①

Tightening torque
Lock nut and valve adjuster screw..... 45 Nm

Double check: There must be play on the push rod!

Fitting the cylinder head cover



Note: Non-damaged valve cover and intake seals made from aluminium/elastomers can be reused.

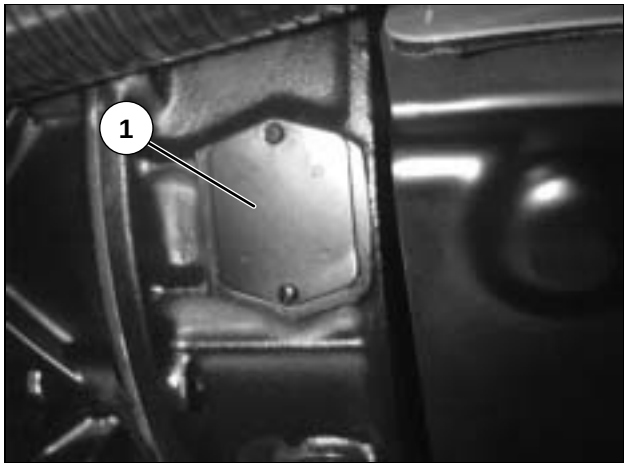
- Fit the cylinder head cover gasket (elastomer) onto the cylinder head cover
- Fit the cylinder head cover

Note (D2866 LF 26/27/28/32/36/37
D2876 LF 04/05/07):
Ensure that the gasket ① at the passage for the connecting cable ② for the needle movement sensor (NBF) is seated correctly.

Note (D2876 LF 12/13):
Ensure that the injector cable passage (→) is seated correctly.

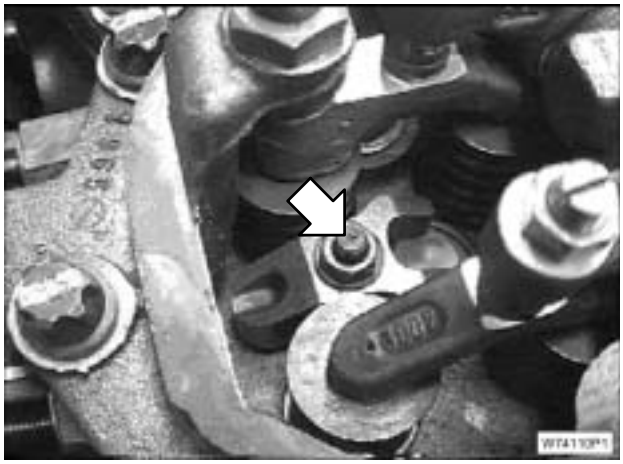
Tightening torque
Cylinder head cover ..... 22 Nm

Removing the engine barring gear



- Unscrew the engine barring gear
- Screw cover ① onto the flywheel housing and tighten it
- Lower the cab

Pressure flange nuts for injector nozzle holders



Retightening (omitted in case of D2876 LF 12/13)
Retighten the pressure flange nuts (→) by 90° during the first service, referring to SI 95500 "Injector nozzle".

After retightening the pressure flange nuts, affix a yellow-coloured dot next to the adhesive label for cylinder head bolt retightening. Affix this coloured dot following all first services performed up until the end of 2003. There is no need to affix the coloured dot after this date.

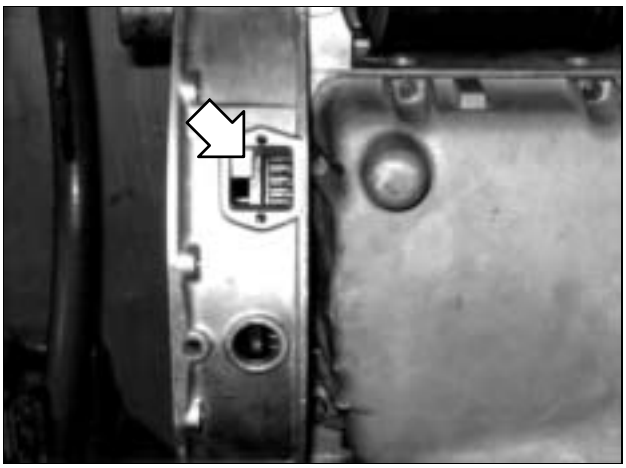
CHECKING THE VALVE CLEARANCE (alternative method)

Alternative method for adjusting valve clearance in D2866 and D2876 engines
This alternative method enables all valves to be checked and adjusted in just two crankshaft positions. The method described here can be used as an alternative to the usual method already described.

Adjustment

- Fit the engine barring gear on the flywheel housing (→) (see page 1)
- Turn the crankshaft until it reaches the nearest TDC position so that either cylinder 1 or cylinder 6 is at ignition TDC
- 6 valves can be adjusted in this position
- Then turn the engine 1 more revolution so it reaches TDC again
- The remaining 6 valves can now be adjusted

Cylinder 1 or cylinder 6 must be exactly at the TDC mark.

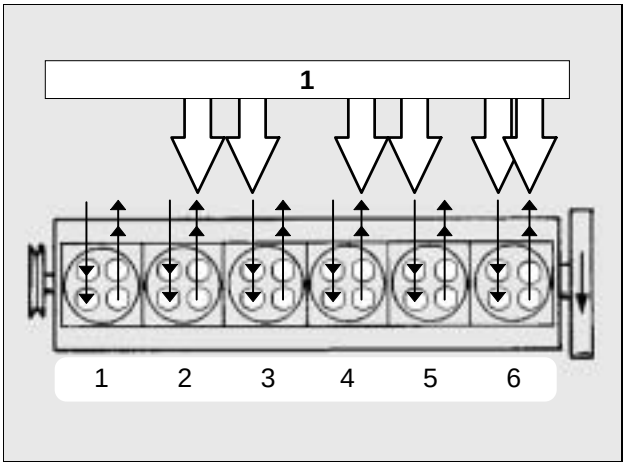


If cylinder 6 is at ignition TDC (= cylinder 1 in overlap), adjust:

- ⇩ Exhaust valves and ⇩ intake valves **1**

Intake valves

Exhaust valves

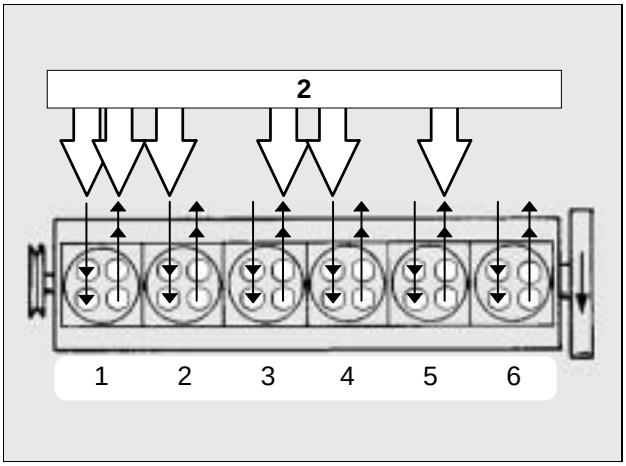


If cylinder 1 is at ignition TDC (= cylinder 6 in overlap), adjust:

- ⇩ Exhaust valves and ⇩ intake valves **2**

Intake valves

Exhaust valves



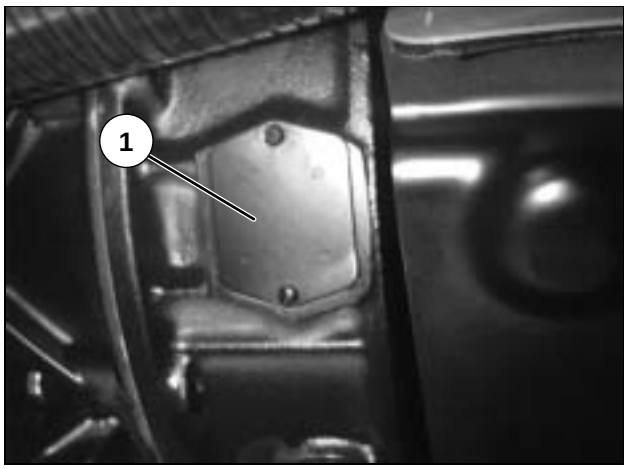
- Remove the engine barring gear

Fit the cover on the flywheel housing.

FOUR-VALVE – WITH EVB (D0836 LF 41, 44)

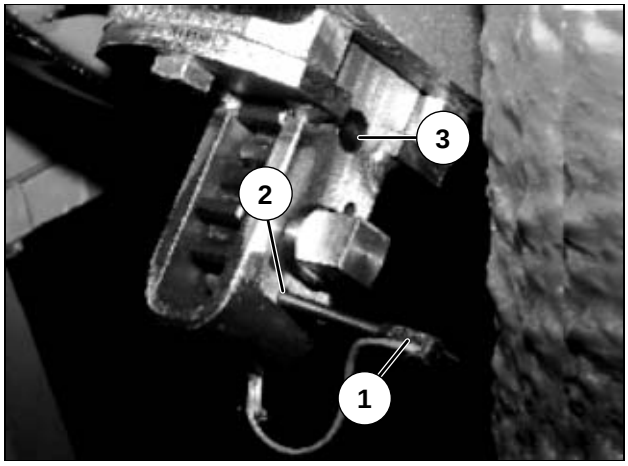
EVB = Exhaust **V**alve **B**rake

CHECKING THE VALVE CLEARANCE (engine no more than lukewarm)
- Stop the engine
- Tilt the cab
- Remove the cover ① from the flywheel housing

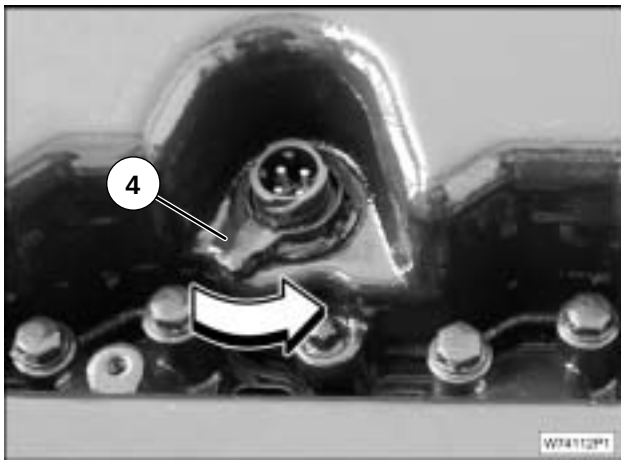


Fitting the engine barring gear
- Fit the engine barring gear, MAN no. 80.99626-6008

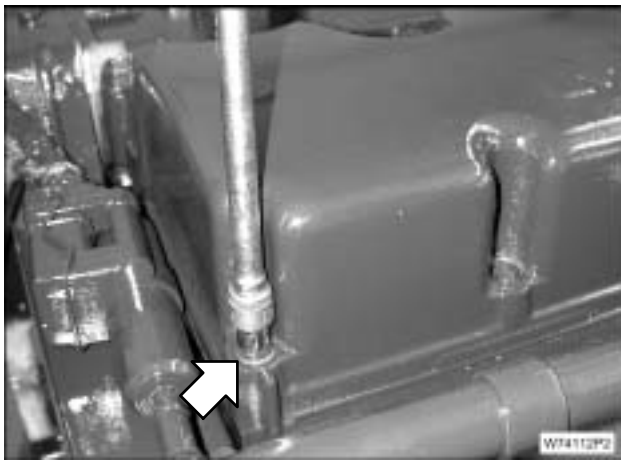
This engine barring gear allows the flywheel to be blocked with pin ① in the desired position using hole ② or ③.
- Attach the gear ratchet, MAN no. 80.99627-0001



Removing the cylinder head cover
- Remove the plug for the injector
- Turn (→) and remove the lock ④



- Unscrew and remove the mounting bolts (→) from the cylinder head cover
- Remove the cylinder head cover with gasket

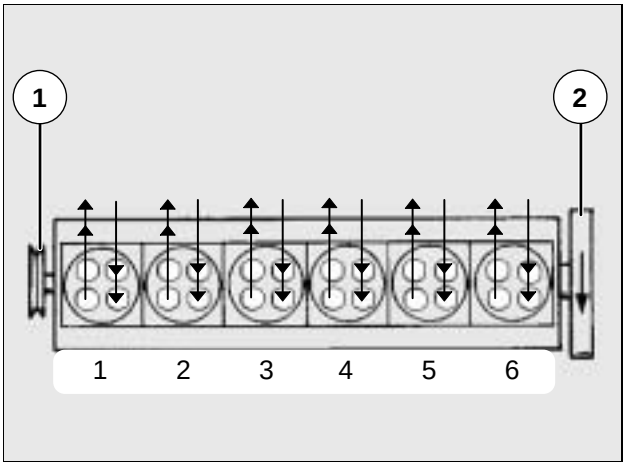


Cylinder order and valve arrangement
- Cylinder order: 1 to 6
- The 1st cylinder is at the fan end
- Firing sequence: 1 – 5 – 3 – 6 – 2 – 4

1 Fan end
2 Gearbox end (power output)

Intake valves

Exhaust valves

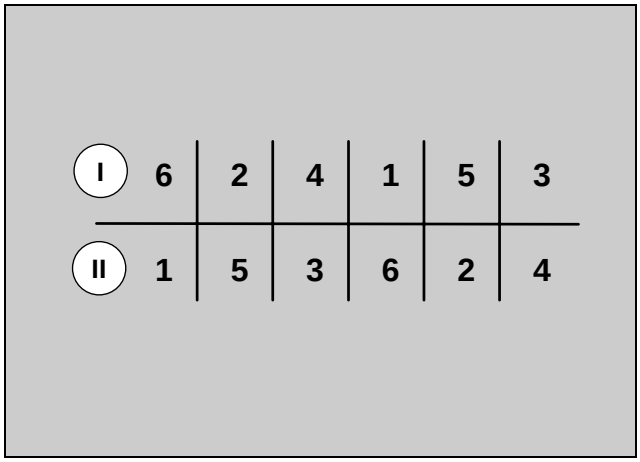


- Move the piston of the cylinder requiring adjustment to ignition TDC. To do this:
  Use the engine barring gear to turn the flywheel until the valves on the cylinder concerned have been relieved; the flywheel can be blocked in this position.

The rocker arms of the synchronous cylinder are then in overlap.

Ⓘ Valves in overlap, cylinder:

Ⓘⓘ Check/set valve clearance, cylinder:

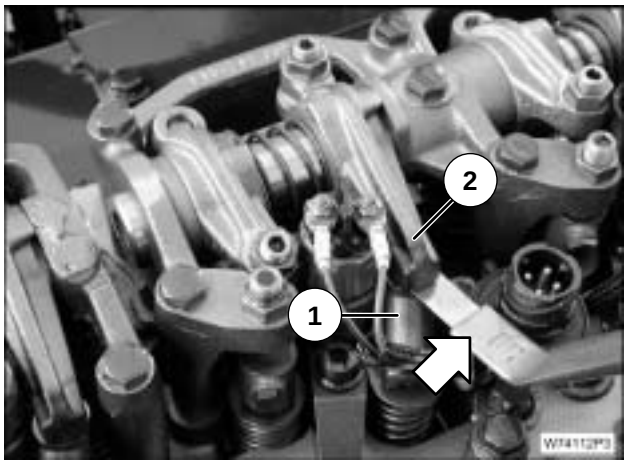


Valve clearance (with the engine **cold**)
Intake valve ..... 0.50 mm
Exhaust valve ..... 0.50 mm
Counter-holder EVB ..... 0.35 mm

Intake valve
Desired valve clearance:
Intake valve ..... 0.50 mm

- Insert the feeler gauge (↗) between rocker arm ② and valve bridge ①.

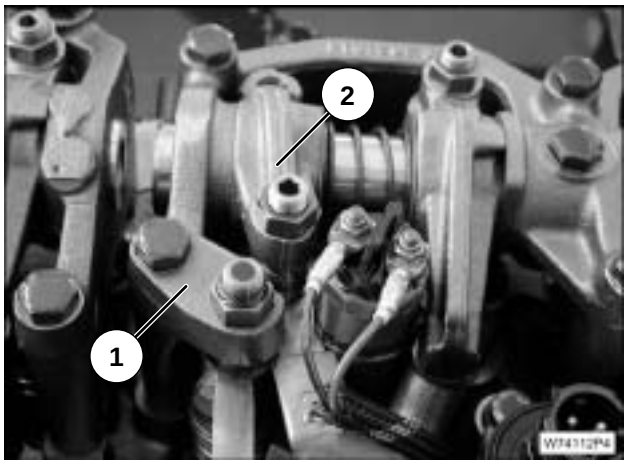
You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



Exhaust valve with EVB
Desired valve clearance:
Exhaust valve/rocker arm ..... 0.50 mm
Counter-holder EVB ..... 0.35 mm

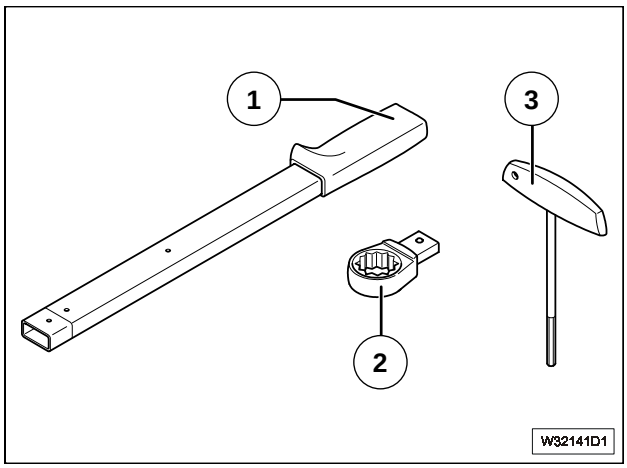
- Use the feeler gauge to measure the clearance between the rocker arm ② and the valve bridge
- Use the feeler gauge to measure the clearance between the counter-holder ① and the valve bridge

You must be able to move the feeler gauge with little resistance.
Adjust the valve clearance if the desired value is not obtained.



ADJUSTING THE VALVE CLEARANCE (with the engine **cold**)
The piston of the cylinder which requires adjustment must be at ignition TDC.

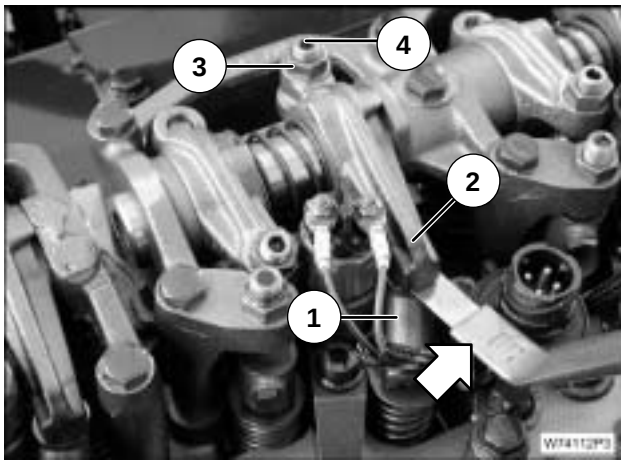
Note: The new valve setting key can be used to adjust the valves.
1 Torque wrench
MAN no. 08.06450-0006
2 Insert ring
MAN no. 08.06455-0029
3 Hexagon socket screw wrench
MAN no. 08.06125-9035



Intake valves
- Insert the feeler gauge (↗) between rocker arm ② and valve bridge ①
- Undo lock nut ③ on the rocker arm using the valve setting key
- Use the valve setting key to turn the adjuster screw ④ until the feeler gauge can be moved with little resistance

Desired valve clearance:
Intake valve .....0.50 mm
- Tighten the lock nut
- Re-check the valve clearance and adjust if necessary

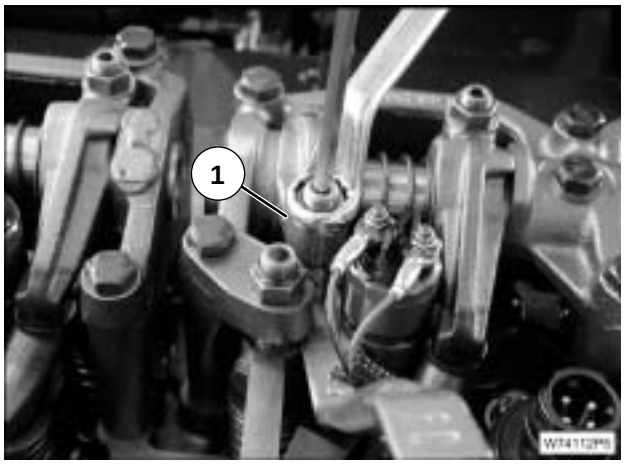
Tightening torque
Lock nut for valve adjuster screw..... 45 Nm



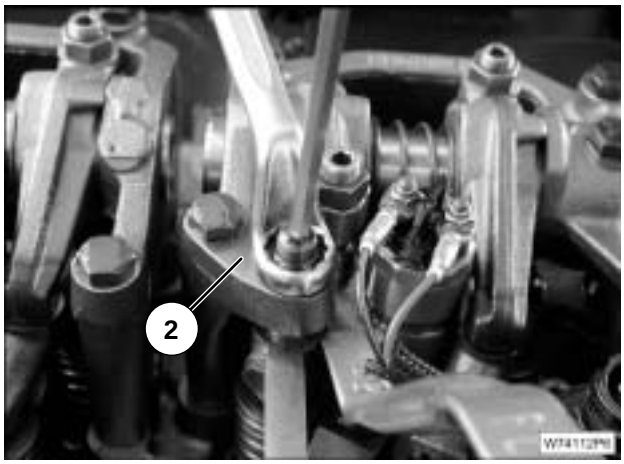
Exhaust valve with EVB
- Insert the feeler gauge between rocker arm ① and the valve bridge
- Undo the lock nut on the rocker arm using the valve setting key
- Use the valve setting key to turn the adjuster screw until the feeler gauge can be moved with little resistance

Desired valve clearance:
Exhaust valve/rocker arm .....0.50 mm
- Tighten the lock nut
- Re-check the valve clearance and adjust if necessary
- Insert the feeler gauge between counter-holder ② and the valve bridge
- Undo the lock nut on the rocker arm using the valve setting key
- Use the valve setting key to turn the adjuster screw until the feeler gauge can be moved with little resistance

Desired valve clearance:
Counter-holder EVB.....0.35 mm
- Tighten the lock nut
- Re-check the valve clearance and adjust if necessary



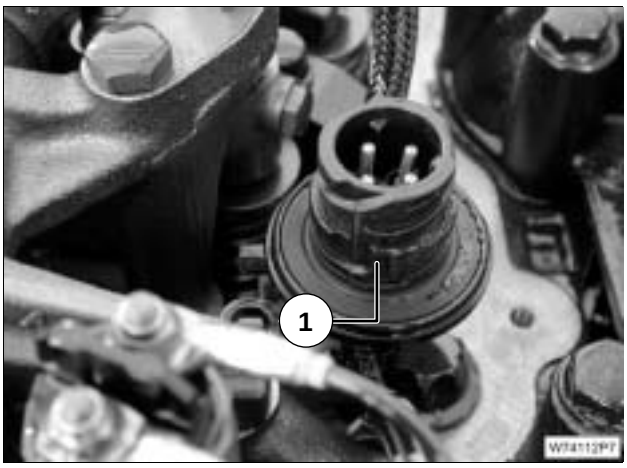
Tightening torque
Lock nut for valve adjuster screw..... 45 Nm

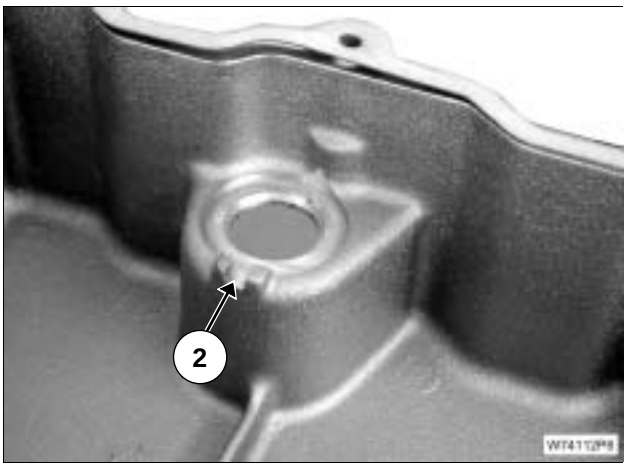


Double check: There must be play on the push rod!

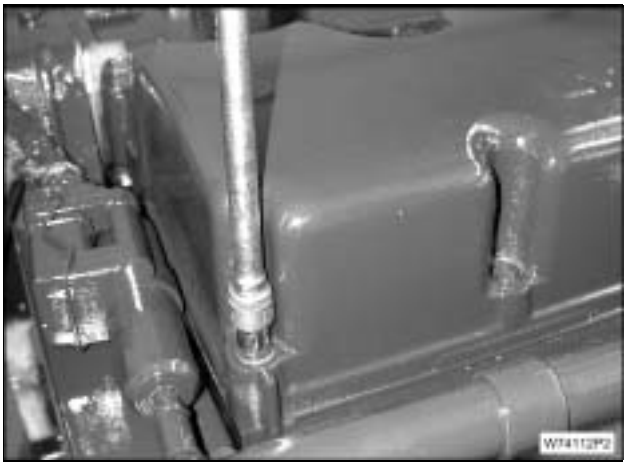
Fitting the cylinder head cover
When fitting the cylinder head cover with gasket, ensure that the injector plug lug ① is seated in the lock ② for the cylinder head cover (inside).

- Fitting of the cylinder head cover is a reversal of the removal procedure



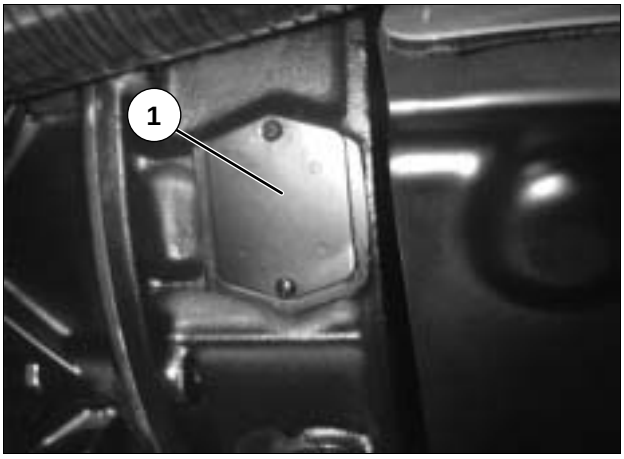


Tightening torque
Mounting bolts for cylinder head cover ..... 12 Nm



Removing the engine barring gear

- Unscrew the engine barring gear
- Screw cover ① onto the flywheel housing and tighten it
- Lower the cab



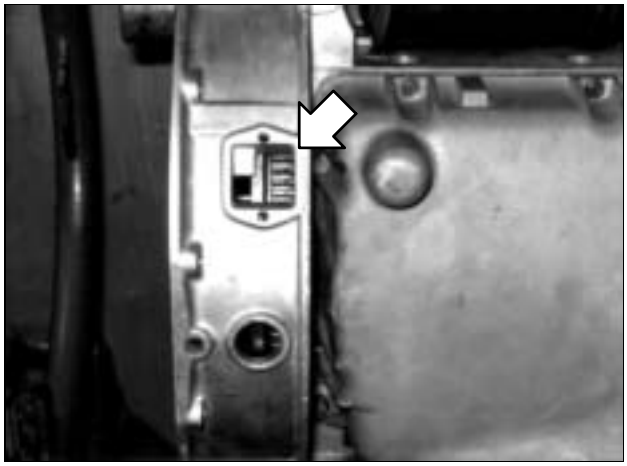
CHECKING THE VALVE CLEARANCE (alternative method)

Alternative method for adjusting valve clearance in D 0836 engines
This alternative method enables all valves to be checked and adjusted in just two crankshaft positions. The method described here can be used as an alternative to the usual method already described.

Adjustment

- Fit the engine barring gear on the flywheel housing (→) (see page 1)
- Turn the crankshaft until it reaches the nearest TDC position so that either cylinder 1 or cylinder 6 is at ignition TDC
- 6 valves can be adjusted in this position
- Then turn the engine 1 more revolution so it reaches TDC again
- The remaining 6 valves can now be adjusted

Cylinder 1 or cylinder 6 must be exactly at the TDC mark.

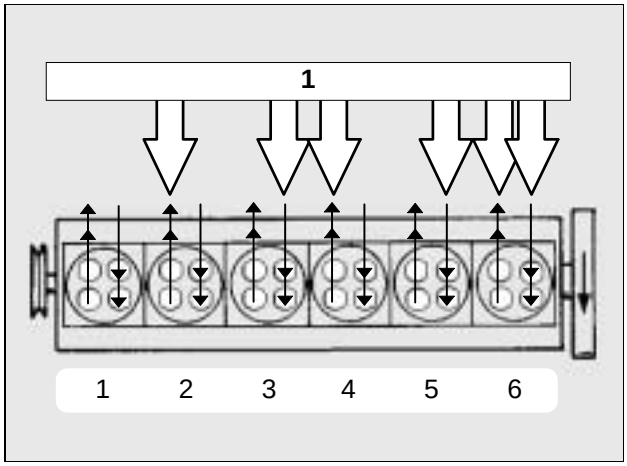


If cylinder 6 is at ignition TDC (= cylinder 1 in overlap), adjust:

- ⇩ Exhaust valves and ⇩ intake valves **1**

Intake valves

Exhaust valves

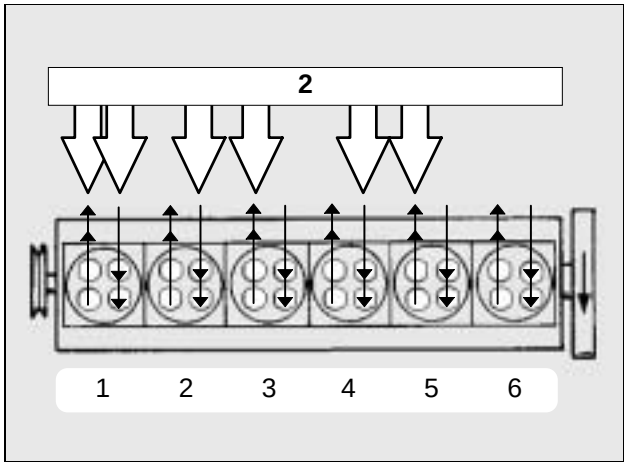


If cylinder 1 is at ignition TDC (= cylinder 6 in overlap), adjust:

- ⇩ Exhaust valves and ⇩ intake valves **2**

Intake valves

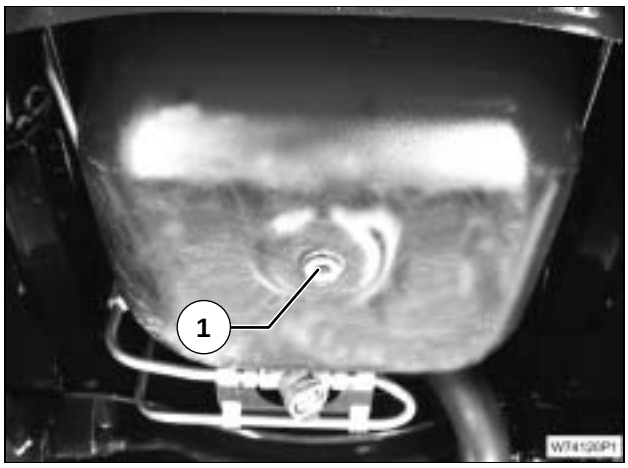
Exhaust valves



- Remove the engine barring gear

Fit the cover on the flywheel housing.

CHANGING ENGINE OIL AND FITTING A NEW FILTER



- Park the vehicle on a flat, level surface
- Switch off the ignition

Draining the oil (with engine at operating temperature)

Note: A new oil filter is also fitted each time the engine oil is changed.

When the oil is changed, you may notice that a quantity of used oil (0.3 litres when ECAS is at normal level and vehicle is parked on the flat) remains in the oil sump overflow area. This is due to the shape of the oil sump. The actual quantity depends on how far the vehicle is lowered at the rear.
If ECAS is fitted, you should raise the rear of the vehicle as far as possible when changing the oil so that all of the used oil can flow out.

Note: **The vehicle must be standing on a flat, level surface** when the oil level is measured! If necessary, switch ECAS (electronically controlled air suspension) to the normal level, see sections 3.00 and 3.10/3.11 "ECAS" in the Operator's Manual
The engine oil level falls when the rear axle is lowered and rises when the rear axle is raised.

- Tilt the cab
- Put an oil pan or similar underneath
- Unscrew the oil drain plug ① at the oil sump (example illustrated)

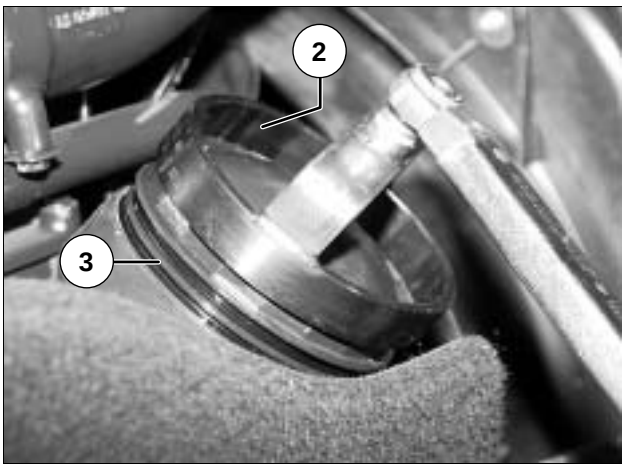
You must comply with the notes on safety regarding the treatment of used oil and the disposal of oil filter elements, see section 0.50 "NOTES ON SAFETY AND ENVIRONMENTAL PROTECTION"!

Drain the used oil from the oil sump drain hole

Fitting a new oil filter element

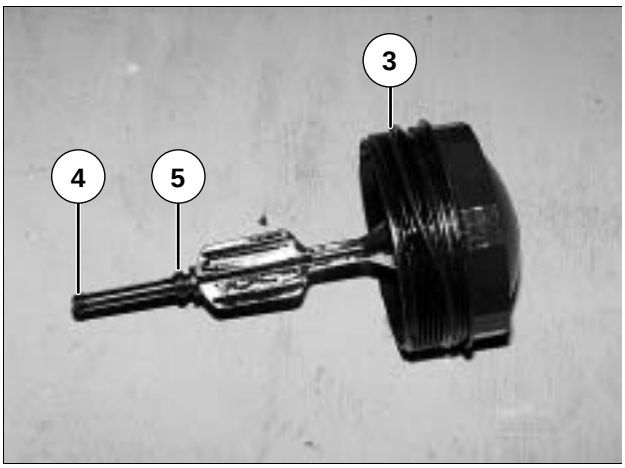
– **The oil filter cover is made of plastic.**
– **Do not exceed the specified torque.**
– **Only use genuine MAN parts.**

- Undo the oil filter cover using special tool ② (MAN no. 80.99606–0508) until sealing ring ③ becomes visible
- Do not pull out the oil filter cover and oil filter element **until the used oil has drained out of the oil filter bowl**
- Pull the filter element off the cover



- Renew sealing rings ③, ④ and ⑤

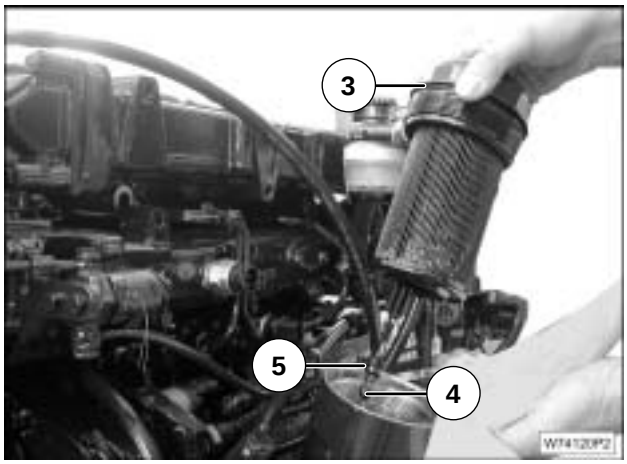
Danger of engine damage!
You must make sure sealing ring ③ is seated correctly!



- Insert the new filter element
- Insert and tighten oil filter cover and filter element

Tightening torque
Oil filter cover..... 25 Nm

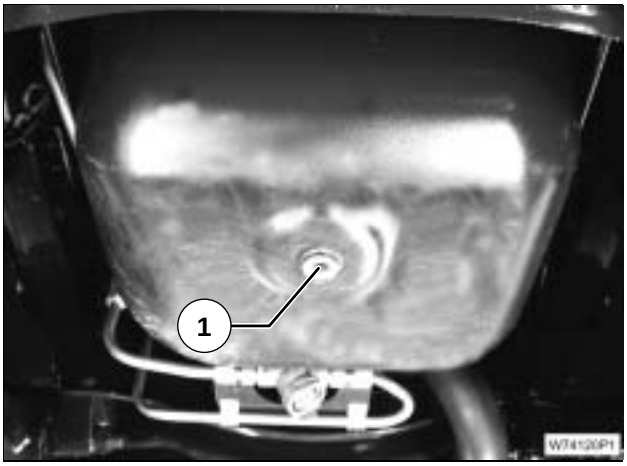
Engine D0836 LF
(example illustrated for oil filter cover with oil filter element)



Filling with engine oil

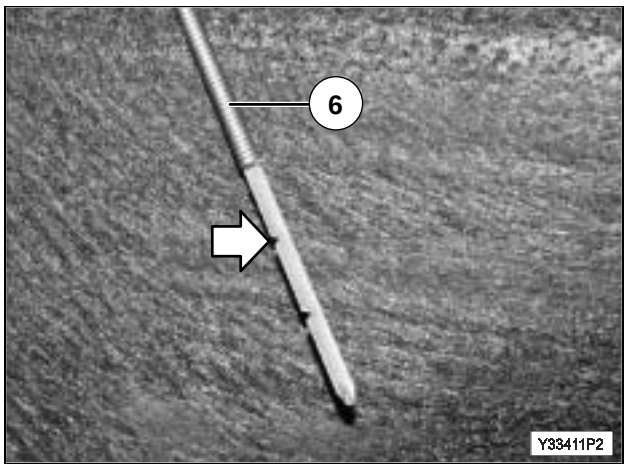
- After fitting a new sealing ring, insert and tighten the oil drain plug ① (example illustrated) on the oil sump

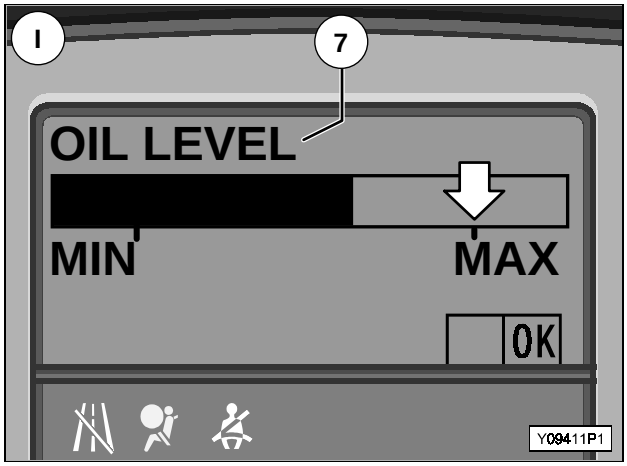
Tightening torque
Oil drain plug ..... 80 Nm

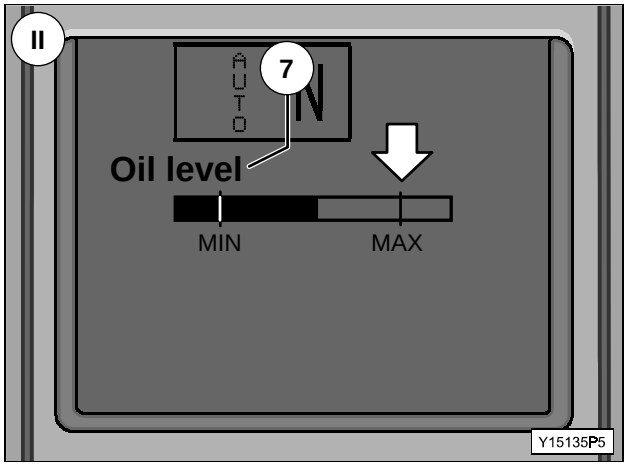


Fire risk!
Always clean the noise shield before refitting it if it is removed to carry out any work.
Do not leave any cleaning wool, cloths etc. lying in the noise shield!

Danger of engine damage!
- **Only used MAN-approved engine oils, see "MAINTENANCE RECOMMENDATIONS AND RECOMMENDED SERVICE PRODUCTS" booklet.**
  Do not overfill!
- **Never fill the oil past the MAX mark (→) on dipstick ⑥ or on the MAX indicator on the "OIL LEVEL" gauge ⑦ on the driver's display (Baseline figure Ⅰ or Highline figure Ⅱ).**
  This merely causes oil to be pumped through the engine vents and is uneconomical.

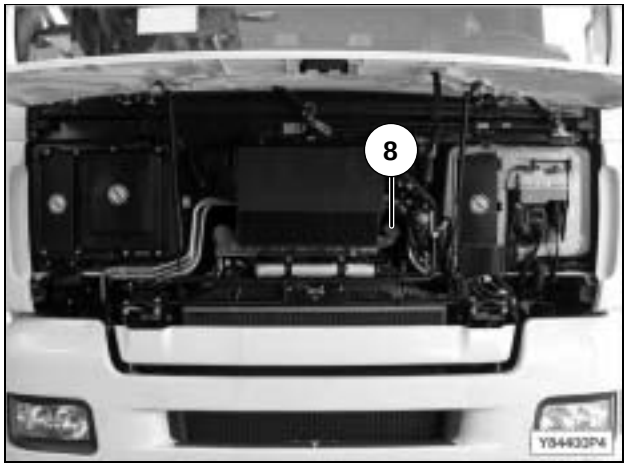






- Lower the cab
- Open the front flap
- Pour in the engine oil through filler neck ⑧

The oil levels indicated on the driver's display and the dipstick may be different. You should therefore proceed as described on the following pages.



Engine oil fill quantity and specification
see ....."Maintenance Recommendations and Recommended Service Products“ booklet

Checking the engine oil level
Refer to Service Information (83900a dated 25.10.2002) and the instructions for measuring the oil level on page 1.20 - 1!

The oil level is measured every 10 seconds when the ignition is switched on. This measured value is stored and can be called up on the driver's display. If the engine is started and stopped, there is then a delay to allow the engine oil to flow back into the oil sump. The length of this delay depends on the engine oil temperature, see "Delay" table on page 1.20 - 5.

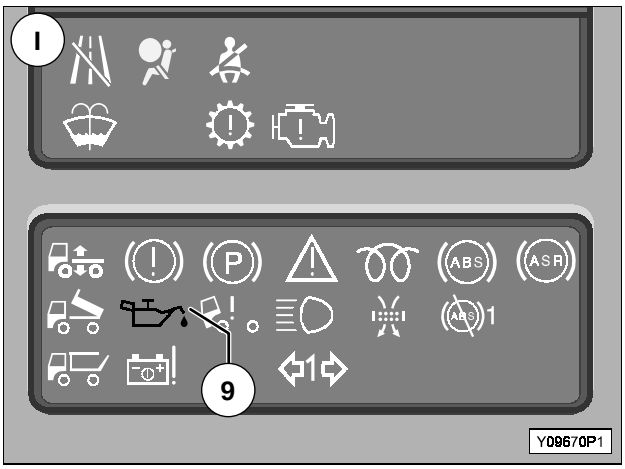
The vehicle must be standing on a flat, level surface when the oil level is measured!

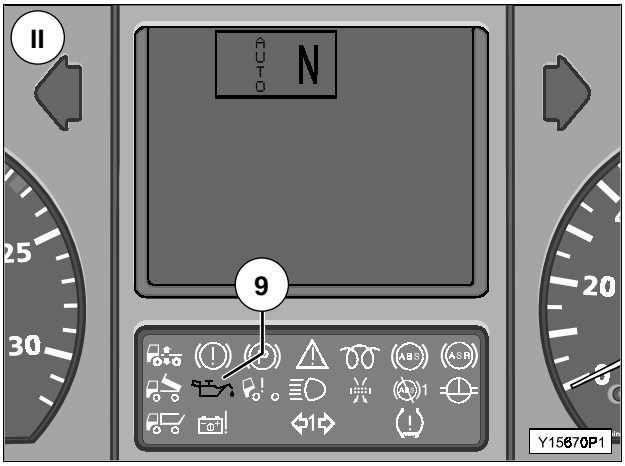
- Switch on the ignition
- Call up the engine oil level using the menu on the driver's display (see Operator's Manual for "Menu structure". Check the oil level and correct as necessary
- Start the engine and run it at idling speed until oil pressure check lamp ⑨ on the panel of check lamps goes out (Baseline figure Ⅰ and Highline figure Ⅱ)

Danger of engine damage!
Never run the engine at high revs or under load until the minimum oil pressure has been reached.

- Stop the engine
- Switch off the ignition

Note: After the engine has been running, there will be up to 2 to 5 litres of engine oil in the engine block, depending on viscosity, engine oil temperature and time. This oil flows back into the oil sump after the engine is stopped.
The time the oil takes to flow back into the sump depends heavily on the viscosity and the temperature. The correct oil level can only be measured once all the oil in the engine has flowed back into the oil sump.
The "Delay" table (page 1.20 - 5) indicates the delay required before the correct oil level can be ascertained. This delay depends on the engine oil temperature at the time the engine is stopped.





The following **delays** apply when measuring the oil level after stopping the engine:

Oil temperature (in °C)	**Delay** (in minutes)
-40	180
0	90
+20	45
+50	5
+80	4
+110	3

- Call up the oil temperature ⑩ using the driver's display menu (Baseline figure Ⅰ and Highline figure Ⅱ; special equipment; see Operator's Manual for "Menu structure")
- Tilt the cab
- Use the "Delay" table (see above) to ascertain the required delay. You must wait this length of time so that all the oil can collect in the sump. You can then measure the correct engine oil level
- Pull out dipstick ⑥, check the engine oil level and correct it as necessary

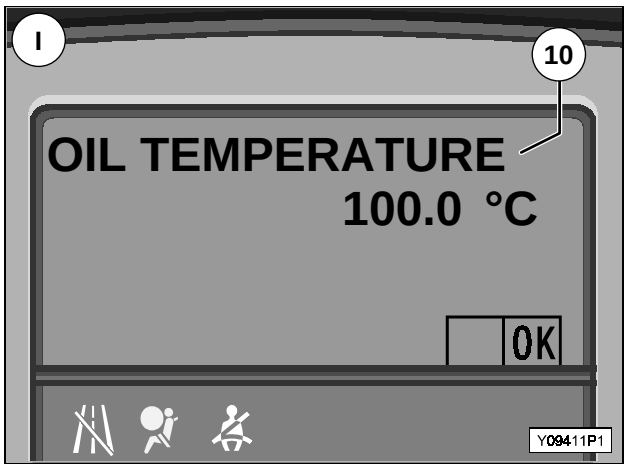
The oil level must be between the top and bottom marks (notches, →) on the dipstick.

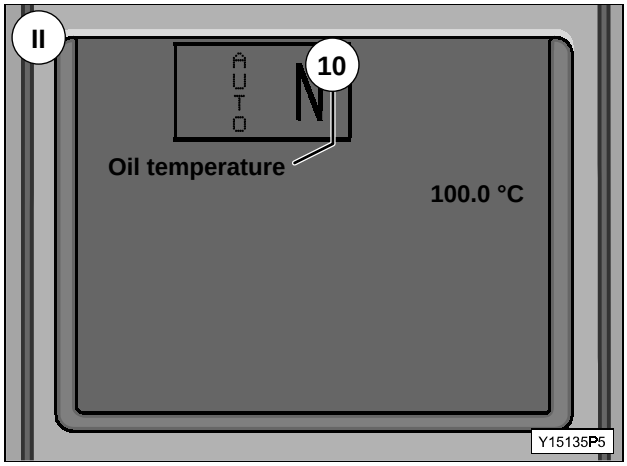
Top-up quantity
Between MIN and MAX marks on the dipstick, see "MAINTENANCE RECOMMENDATIONS AND RECOMMENDED SERVICE PRODUCTS" booklet.

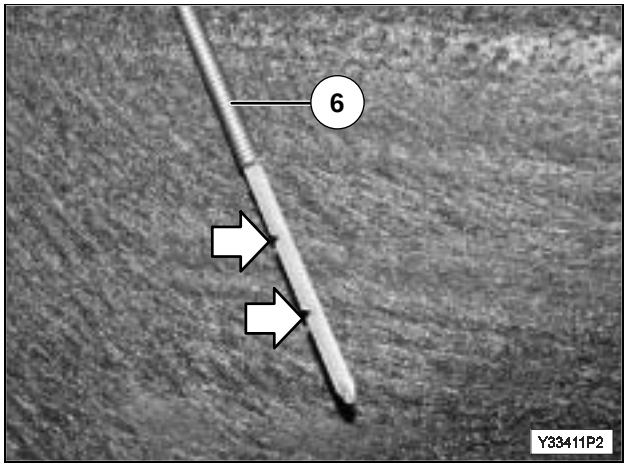
- Check the engine and the oil filter housing for leaks
- Lower the cab
- After 15 minutes, call up the engine oil level on the driver's display menu, check the level and correct it again as necessary
  Do not overfill!

Note: The oil levels indicated on the driver's display and the dipstick should be about the same, although slight differences (approx. 2 litres) are possible.
The levels indicated on the dipstick and the driver's display may differ by about ± 5 mm.

– **Differences in levels measured with the engine hot and cold are normal.**
– **The only totally reliable method of establishing the oil level is with the engine cold after the vehicle has been parked on a flat, level surface for several hours.**
– **Never top up with oil so the level exceeds the MAX mark on the driver's display or on the dipstick.**
This merely causes oil to be pumped through the engine vents and is uneconomical.







TOPPING UP THE ENGINE OIL

- Switch off the ignition
- Open the front flap

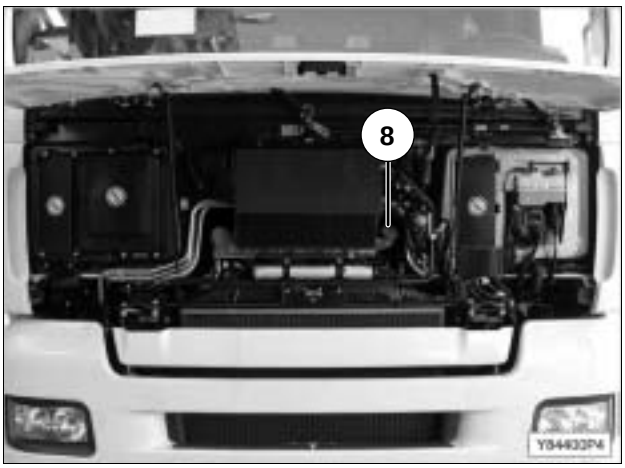
Danger of engine damage!
– **Only used MAN-approved engine oils, see "TECHNICAL DATA" section and/or "MAINTENANCE RECOMMENDATIONS AND RECOMMENDED SERVICE PRODUCTS" booklet.**

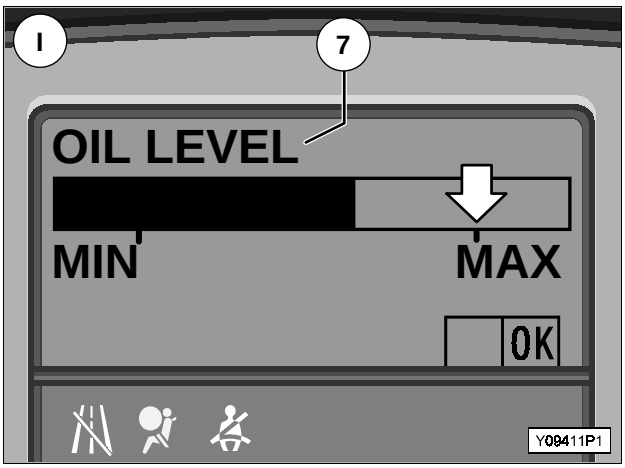
Do not overfill!
– **There is absolutely no need to top up to the MAX mark continuously.**
– **Never fill the oil past the MAX indicator (↓) on the driver's display (Baseline figure ① or Highline figure ②).**
This merely causes oil to be pumped through the engine vents and is uneconomical.

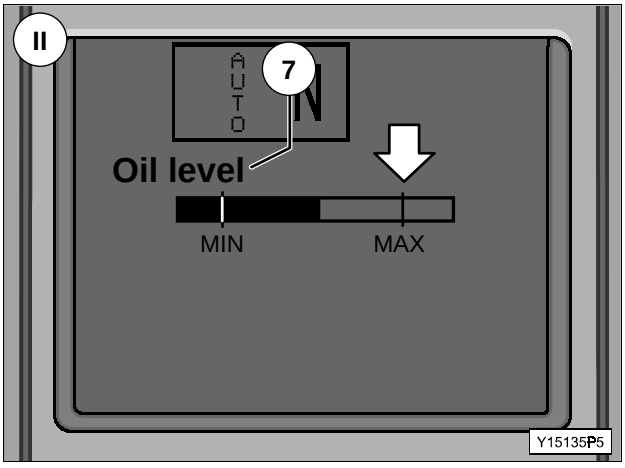
- Top up the oil to the correct level through filler neck ⑧
- Call up the engine oil level ⑦ using the menu on the driver's display, check the oil level and correct as necessary (see Operator's Manual for "Menu structure")

Note: The new oil level will only be indicated correctly if you wait the specified time between turning off the ignition and turning it back on again, see "Delay" table on page 1.20 - 5.

Top-up quantity
Between MIN and MAX marks, see "MAINTENANCE RECOMMENDATIONS AND RECOMMENDED SERVICE PRODUCTS" booklet.







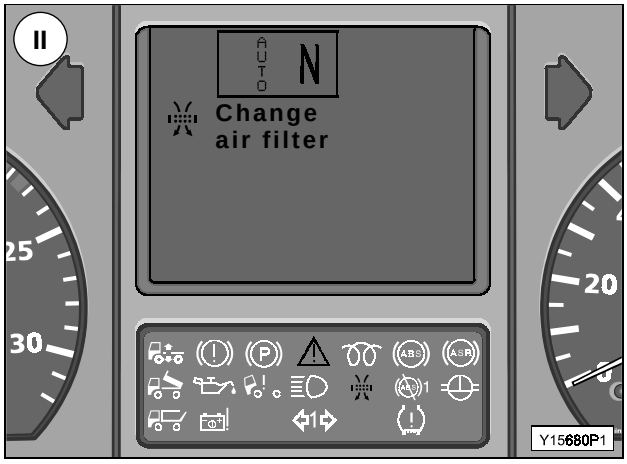
DRY AIR FILTER

FILTER ELEMENT

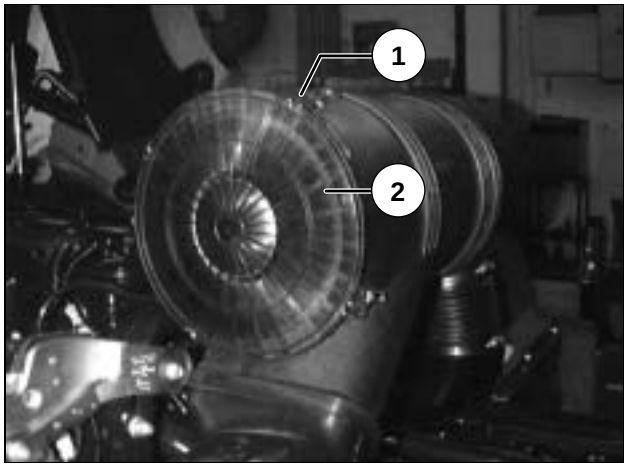
A dirty air filter is indicated on the driver's display by the "Change air filter" message (Baseline figure ① and Highline figure ②).

Note: Change the filter at least every 2 years or 200,000 km, whichever comes first, or when the driver's display indicates the time interval or the mileage.

Danger of engine damage!
- **Do not fit a new filter element unless the engine is stopped.**
- **Unnecessary filter servicing reduces the effectiveness of the filter.**
- **Ensure cleanliness when changing the filter.**
- **There must be no dirt on the clean air side!**

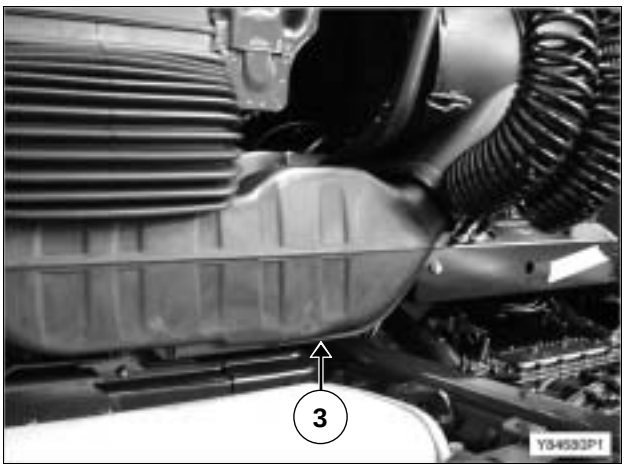


Removing the filter element
- Stop the engine
- Tilt the cab
- Unfasten all 4 clips ① on the air filter housing
- Remove filter cover ②
- Grasp the filter element by the surrounding protective cover only and pull it out of the housing

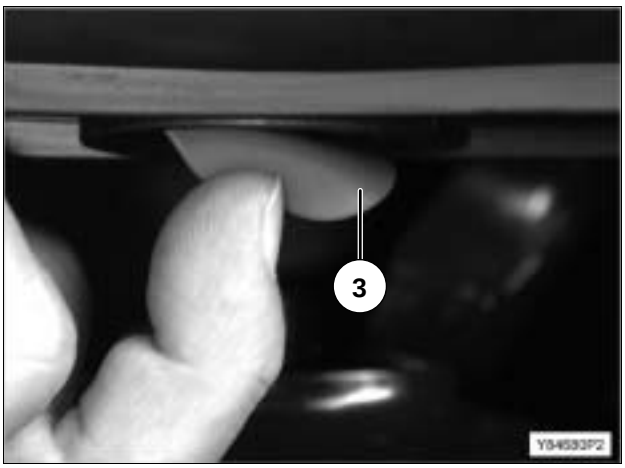


Checking the water drain valve
Water drain valve ③ is located upstream of the air filter at the lowest point of the crude air pipe.

Danger of engine damage!
Regularly clean and check the functioning of water drain valve ③ as there may be water in the crude air pipe when the drain valve is closed.
This causes water to be sucked in, resulting in engine damage!



- Use your hand to check the water drain valve ③ for free passage
- Clean the valve if it is blocked



Installing the filter element

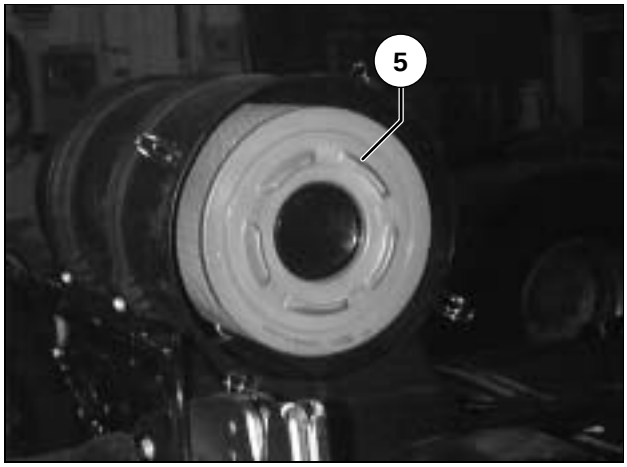
- Clean the air filter housing and cover

Danger of engine damage!
Never blow out the air filter housing with compressed air!

Using genuine filter elements is the only way to ensure that particles can not enter the clean air system.
The filter element must be radially positioned against the contact surface ④ of the clean air pipe so that it forms an air-tight seal (radial seal).
Do not use standard cartridges which offer axial sealing.

- Insert new filter element ⑤ into the centre of the filter housing from the left-hand side of the vehicle until the stop is reached

Make sure the filter element is not tilted and that the seals on the end of the element are seated over the clean air pipe.

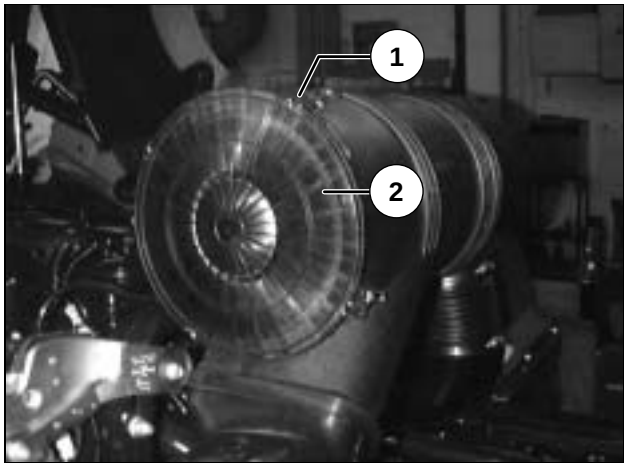


- Check that the filter element is correctly positioned in the housing

However, the filter element must be pushed right into the end of the bowl, otherwise the housing filter cover cannot be closed or, if it is forced closed, this may push in the filter cartridge.

Note: Never force the air filter housing closed. If in doubt, recheck the filter element to make sure it is correctly seated.

- Fit the filter cover ② and fasten the clips ① one by one, working diagonally across



Danger of engine damage!
- **Unfiltered air can get into the engine if the filter cover or the filter element are not fitted correctly.**
- **Check that all fasteners on the intake system are sealed. Retighten the clamps if necessary.**
- **Do not over-tighten the worm screws.**

- Lower the cab

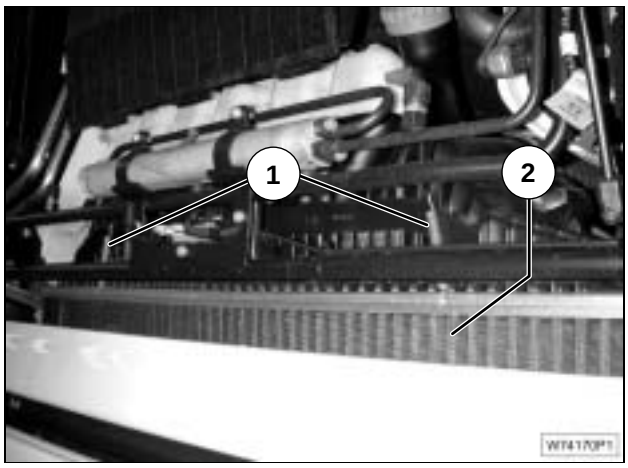
COOLING AND HEATING SYSTEM

CONDITION, CORRECT FUNCTIONING AND LEAK-TIGHTNESS

Testing

- Check the condition and leak-tightness of the coolant lines
- Check the condition and leak-tightness of the radiator, intercooler and air-conditioning condenser

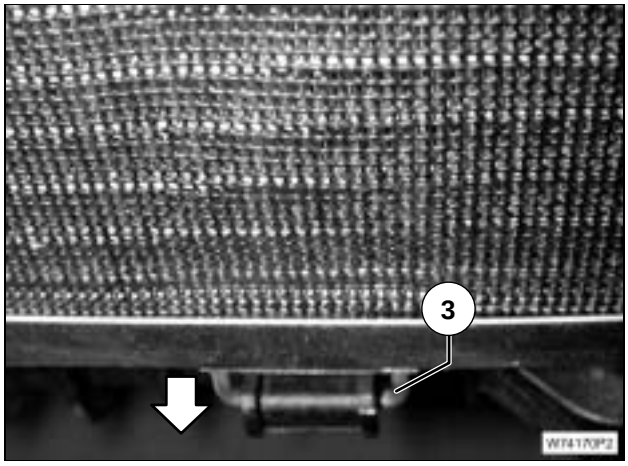
Clean the insect screen, radiator fins and condenser (special equipment, see section 8.90) if there is a heavy build-up of dirt.



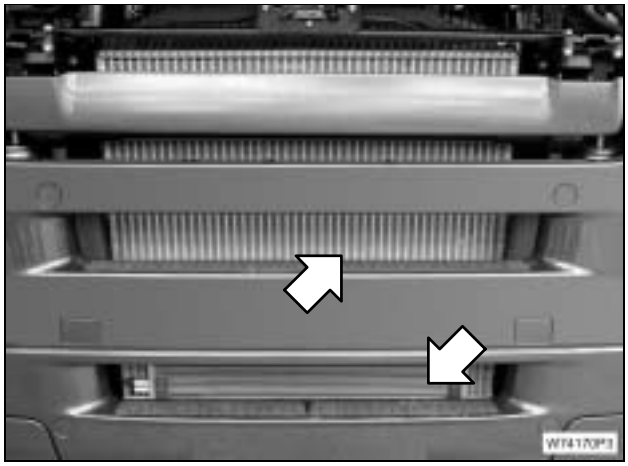
INSECT SCREEN AND RADIATOR FINS

Cleaning

- Stop the engine and open the front flap
- Remove the insect screen by first unclipping the springs ① using pliers whilst holding the insect screen ② steady
- Then unclip the insect screen at the left and right bottom lug ③ (↓)
- Pull the insect screen upwards to remove it and then clean it



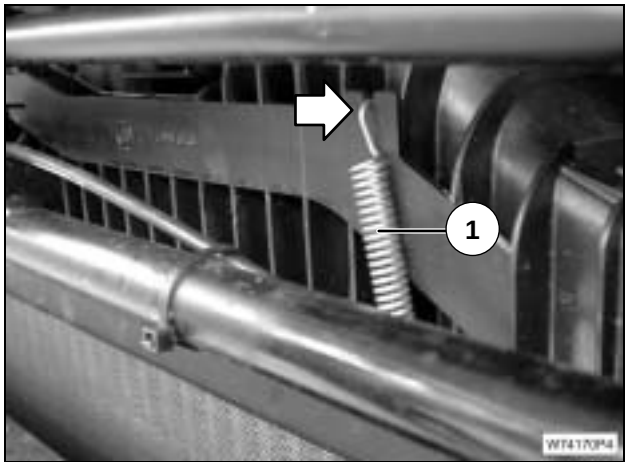
– **Do not direct the water jet at the heating/ventilation intake opening!**
– **Close the fresh air flaps for the heating system!**
– **Do not use high-pressure cleaners!**
– **Steam cleaners may be used.**



- Clean the dirty fins (←) on the radiator, intercooler and air-conditioning condenser using a solution of water and P3–Begesol cleaning additive (MAN no. 09.21002-0248) mixed 1:1
- Use a spray gun to spray the cleaning fluid straight at the fins and make the spray jet as concentrated as possible
- Leave to act for about 5 minutes
- Flush out with a concentrated jet of tap water

Repeat the procedure if the fins are very dirty!

Note: Ensure that the insect screen is installed the correct way round as the springs ① cannot be turned. The figure opposite shows the correct attachment position (→) for the springs ①.



- Reinstall the insect screen (reversal of the removal procedure)

TIGHTENING COOLING SYSTEM HOSE CLAMPS
Retighten the cooling system hose clamps during the running-in service.

Tightening torques [1)]
Entire cooling system [2)]:
Standard part M3259 (belt width 12 mm) .... 5.0 Nm
Breather line on expansion tank:
Standard part M7.751-30 (belt width 9 mm).. 3.5 Nm

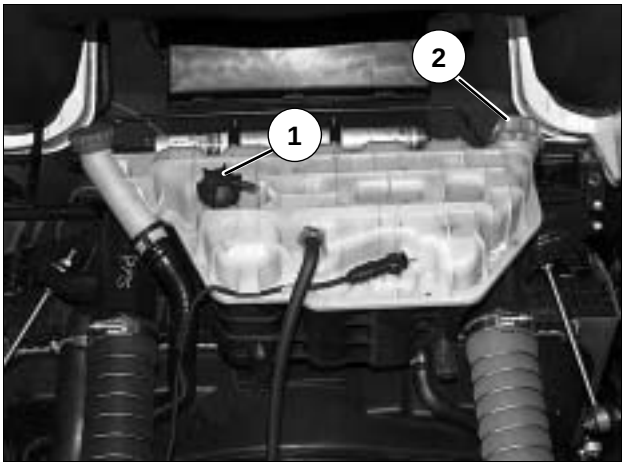
[1)] also see Service Information 33900b dated 08.07.2002
[2)] with the exception of breather line on expansion tank

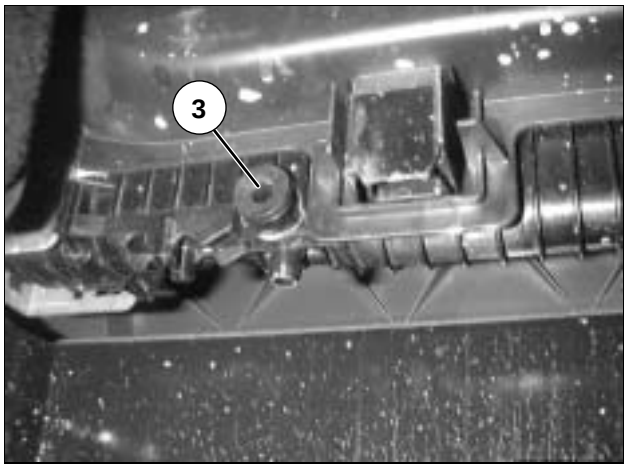
CHANGING THE COOLANT
The following must be changed every 500,000 km or 4 years as specified in the "Checklist for maintenance work" section:
– Coolant
– Pressure-relief valve ①, see page 6

Dispose of used coolant in the correct manner; refer to section 0.50 "Environmental protection".

Danger of scalding!
– **Only open filler neck screw cap ② when the engine is cool or the cooling system is depressurised; otherwise, there is a risk of scalding!**
– **Carefully open the pressure-relief valve ①. Allow the excess pressure to escape and then close it again.**

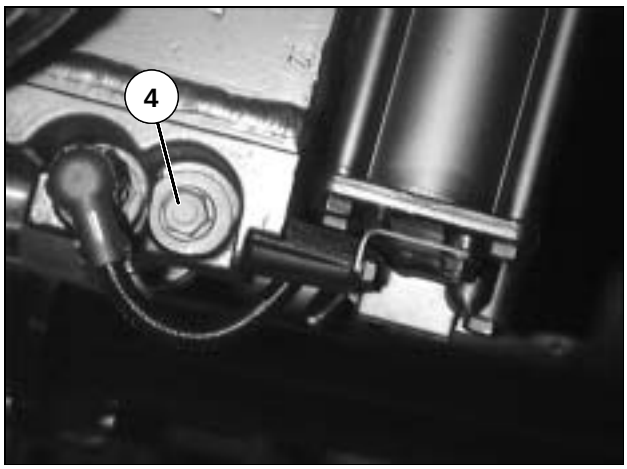
- Set the vehicle heating to full power
- Stop the engine
- Tilt the cab





Draining the coolant
- Collect the coolant in suitable containers and dispose of it in the correct manner
- Screw off the cap ② on the filler neck
- Unscrew the drain plugs ③ and ④
- Open the temperature control lever, do **not** pull hoses off the cab
- Drain all the coolant
- Screw in and tighten the drain plugs ③ and ④
- Lower the cab

Tightening torques
Drain plug ③ on radiator ..... 4 - 5 Nm
Drain plug ④ on ZF-Intarder..... 35 Nm



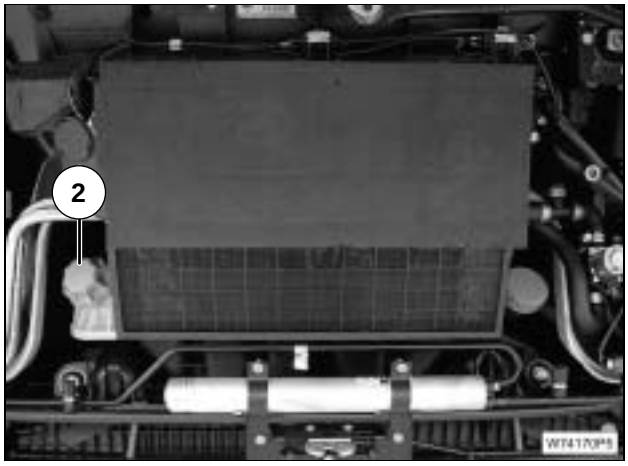
Filling with coolant

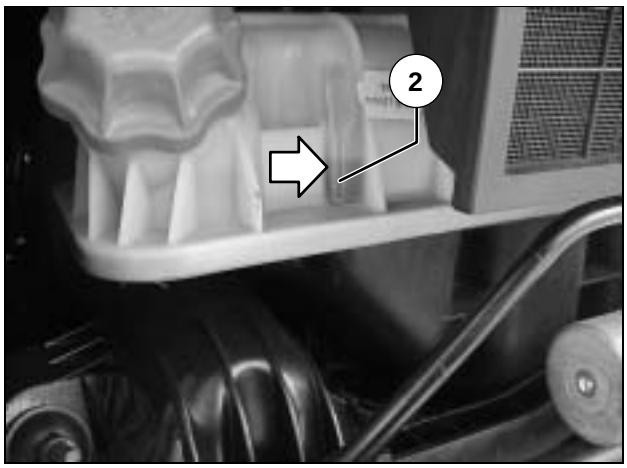
Coolant fill quantity and specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet or section 0.70, "Technical data"

- Make sure the coolant is of a sufficient concentration, see page 4 and 5
- Slowly pour in the coolant through the filler neck ② until it overflows
- Plug the filler neck
- Start the engine and let it run at idling speed for about 5 minutes
- Check the cooling and heating system for leaks
- Stop the engine
- Check the coolant level shown on the tank viewing window ②

When the engine is cold, the coolant level should be slightly lower than the middle of the viewing window (→).

- Correct the coolant level if necessary
- Re-check the coolant level after max. 5 hours driving (see page 7) and top up the coolant if necessary



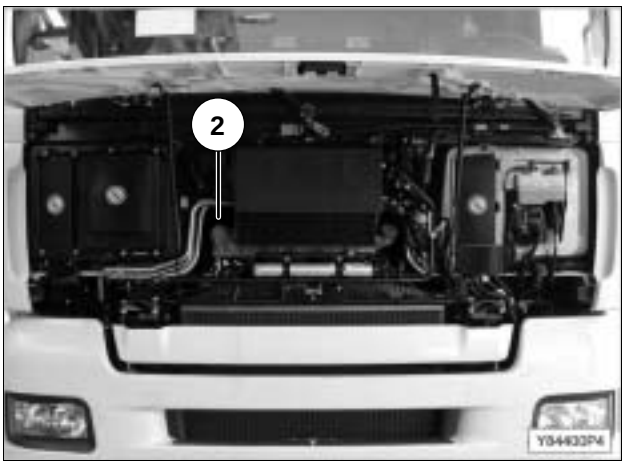


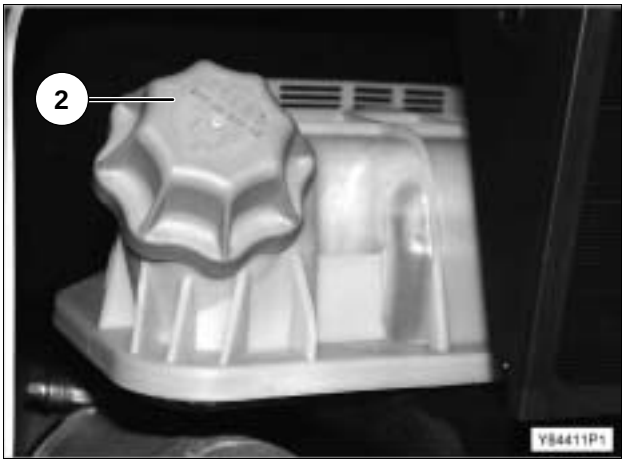
COOLANT MIXING RATIO

Vehicle with PriTarder:
In the case of the PriTarder, the coolant composition deviates from the MAN standard and is 50% tap water and 50% BASF–Glysantin G48. The composition does not depend on the application temperature.
Failure to ensure the correct coolant composition will almost certainly lead to PriTarder damage.

Check the concentration of the coolant before the onset of cold weather and increase it if necessary. The coolant is a mixture of water and anti-freeze with corrosion protection (to Works Standard MAN 324).

Note: In the case of individual applications for which the use of antifreeze is not a specified requirement (e.g. in the tropics), always ensure that a corrosion protection agent is used (as per Works Standard MAN 248). The change interval for this coolant depends on the type of corrosion protection agent used, see page 5.





Checking the antifreeze (to MAN 324)
- Warm up the engine
- Stop the engine
- Open the front flap

Danger of scalding!
– **Only open filler neck screw cap ② when the engine is cool or the cooling system is depressurised; otherwise, there is a risk of scalding!**

- Open the cap ② on the filler neck
- Use a hydrometer to take a sample of coolant and read off the coolant density indicated by the float

The antifreeze must offer protection down to at least -25 °C.

Mixtures of antifreeze MAN 324 and corrosion protection agent MAN 248 are not permitted.

If the antifreeze check reveals less effective protection than this, e.g. only down to -10 °C, drain some coolant and top up the system with undiluted antifreeze as indicated in the mixing table.
- Close the cap on the filler neck
- Perform a test run

Make sure the engine reaches its operating temperature, i.e. the thermostat must have opened fully on at least one occasion.
- Use a hydrometer to recheck the coolant density and correct if necessary

Mixing table:

Outside air temperature down to ...	Antifreeze	Water
-27 °C.....	40% by volume..	60% by volume
-31 °C.....	45% by volume..	55% by volume
-37 °C.....	50% by volume..	50% by volume

Checking the corrosion protection agent (to MAN 248)

In the case of individual applications for which the use of antifreeze is not a specified requirement (e.g. in the tropics, stationary engines), always ensure that a corrosion protection to MAN 248 is used.

Mixtures of antifreeze MAN 324 and corrosion protection agent MAN 248 are not permitted.

Drain all the coolant when changing from antifreeze to corrosion protection agent or vice versa. It is not necessary to flush the system.

The following corrosion protection agents are currently approved by MAN:

- Fleetguard DCA II Fluid
- Texaco Havoline XLI (ETX 6282)

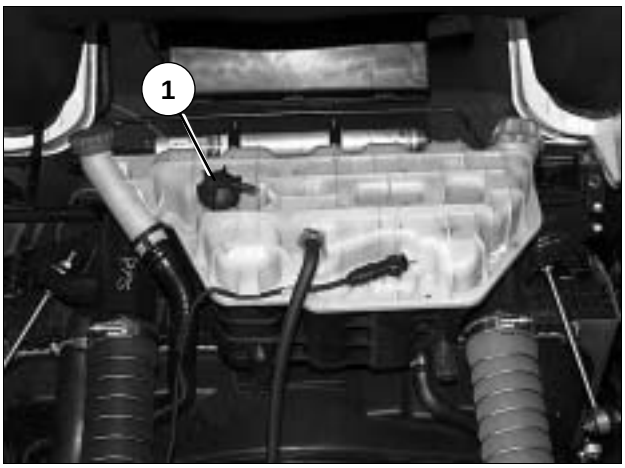
In the case of **Fleetguard DCA II Fluid**, the following applies:

- Change all the coolant after 1 year or 1500 operating hours, whichever comes first.
- Check the concentration of Fleetguard DCA II Fluid using Fleetguard–Test–Kit 3300–846 S every 300 operating hours.
- Ensure the concentration is between 0.8 and 1.5 DCA II units per 4 litres of water, equivalent to 240 to 450 ml of fluid to 10 litres of water (2.4 to 4.5% by volume).

In the case of **Texaco Havoline XLI (ETX 6282)**, the following applies:

- Change all the coolant after 2 years or 3000 operating hours, whichever comes first.
- Check that the concentration is 10% by volume using a refractometer.

PRESSURE-RELIEF VALVE ON THE EXPANSION TANK



Renewing

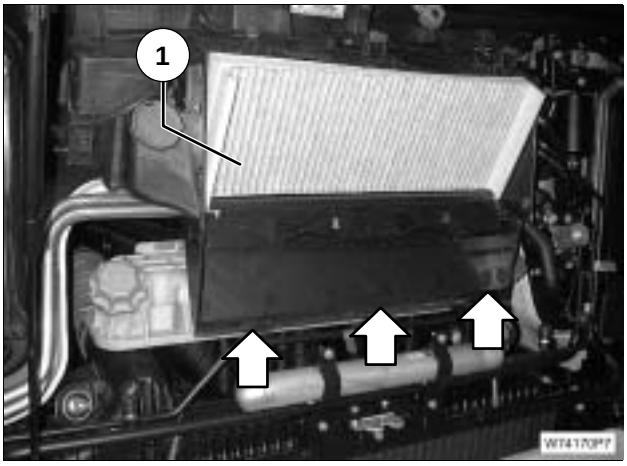
The following must be changed every 500,000 km or 4 years as specified in the "Checklist for maintenance work" section:
– Pressure-relief valve ①
– Coolant, see page 2

Danger of scalding!
Carefully open pressure-relief valve ① and release the excess pressure.

- Stop the engine
- Tilt the cab
- Fit a new pressure-relief valve ①
- Lower the cab

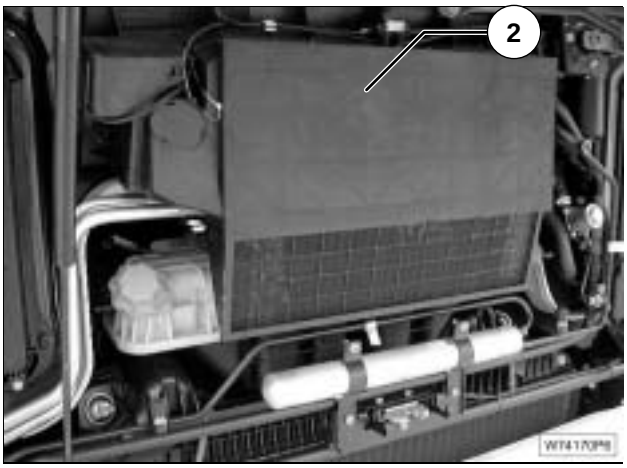
AIR INLET FOR HEATING / VENTILATION / AIR-CONDITIONING SYSTEM:

DUST FILTER



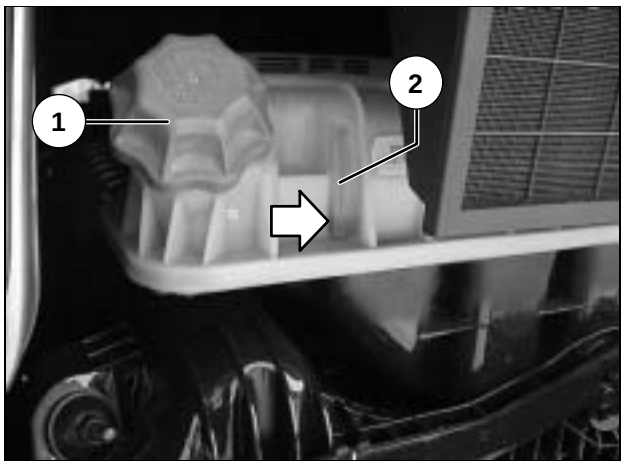
Renewing

- Stop the engine
- Open the front flap
- Unfasten the retaining clips at the bottom of the cover ① (↑)
- Lift and remove the cover



- Take out the filter ② and insert a new filter
- Fit the cover
- Close the front flap

COOLANT LEVEL



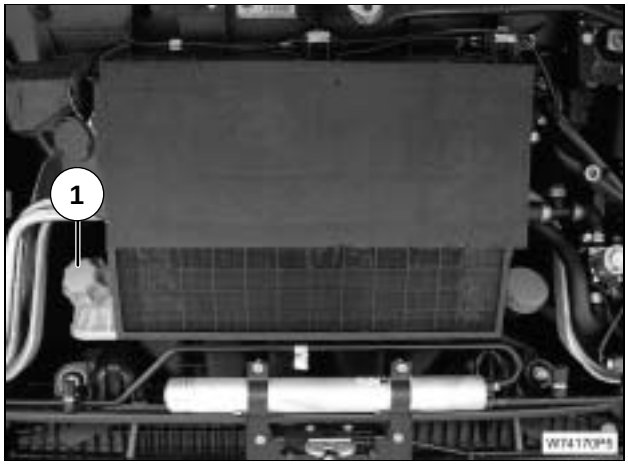
Checking

- Stop the engine
- Open the front flap
- Check the coolant level shown on the tank viewing window ②

When the engine is cold, the coolant level should be slightly lower than the middle of the viewing window (→).

- If necessary, slowly top up the coolant through filler neck ①

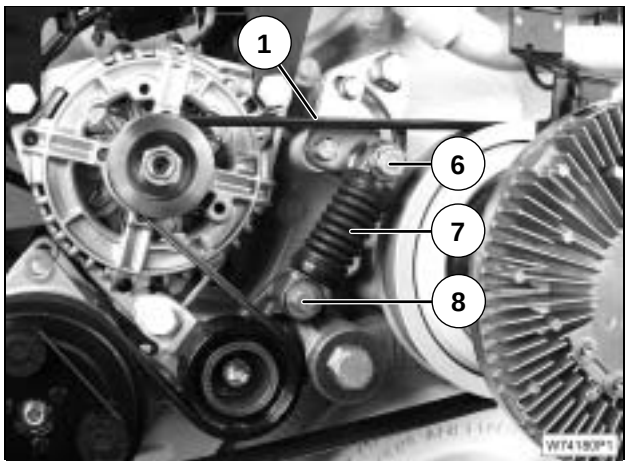
TOPPING UP THE COOLANT



Danger of scalding!
Only open the filler neck screw cap ① once the engine has cooled down. Otherwise, there is a risk of scalding! Carefully open the screw cap. Allow the excess pressure to escape before screwing off the cap.

- Carefully open the screw cap ①
- If the engine is at operating temperature, slowly top up to desired level with warm coolant if possible
- Make sure the coolant is of a sufficient concentration, see page 4 and 5
- Screw on the cap
- Close the front flap

POLY-V-BELTS D2876/66 LF
(example illustrated, with ducted fan removed)



CONDITION

Checking

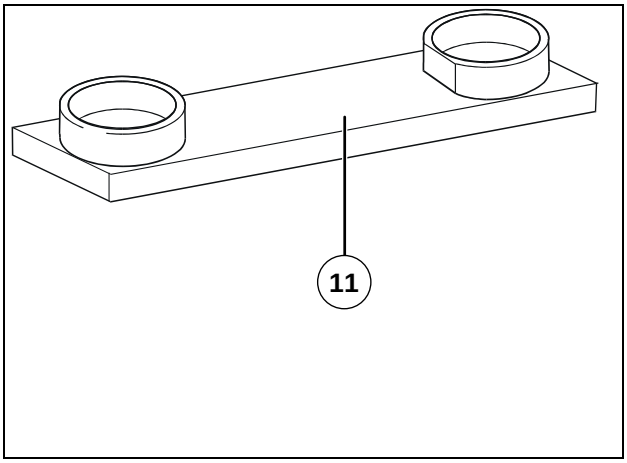
- Check the poly-V-belts ① for cracks, oily patches, vitrification and wear

Renew poly-V-belts that are damaged or worn.

- Visually inspect the spring damper element ⑦ for oil leaks when untensioned

Have any leaks repaired immediately by a MAN Service workshop.

TENSION



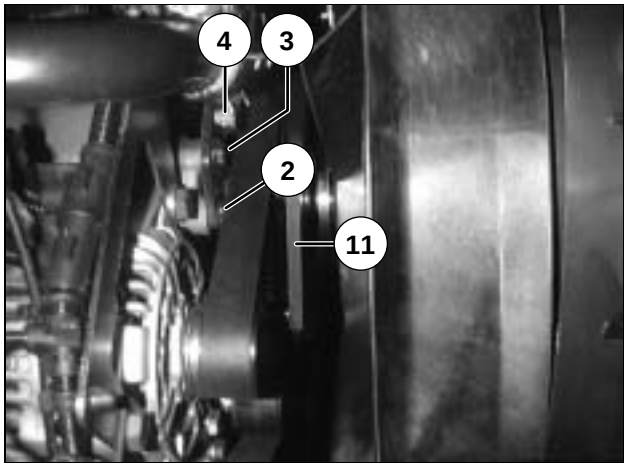
Checking

- Stop the engine
- Tilt the cab
- Place setting gauge ⑪ (MAN no. 80.99607-6014) over the bolt heads ⑥ and ⑧ of the spring damper element ⑦

If it is possible to place the setting gauge ⑪ over the bolt heads ⑥ and ⑧ without using force, this indicates that the automatic V-belt tensioner has the correct pretension.

- Tension poly-V-belts if necessary

Tensioning (basic setting)
The automatic V-belt tensioner consists of a spring damper element ⑦ and requires a basic setting.

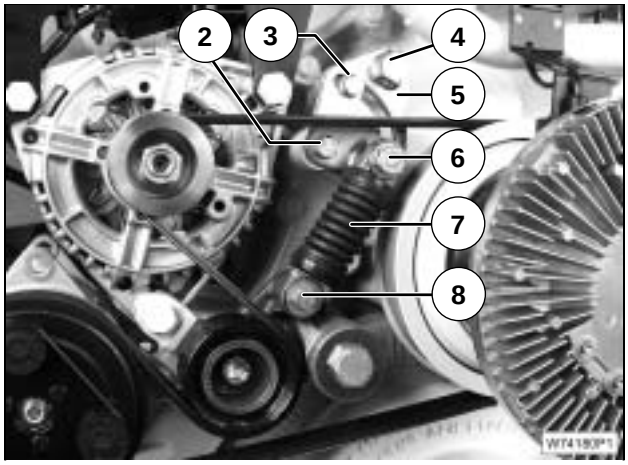


- **Firmly hold** the counter-holder ④ using a ring spanner (size 19) and note the rotation direction of the eccentric plate ⑤ (risk of crushing)!

It is vital that slackening and tensioning of the spring damper be performed slowly in order to prevent accidents (risk of crushing) and damage to the spring damper element ⑦.

- Undo size-13 collar bolts ② and ③ on the eccentric plate ⑤, making absolutely sure that the counter-holder ④ is held firmly
- Undo mounting bolts ⑧ and ⑥ on the spring damper element ⑦, making absolutely sure that the counter-holder ④ is held firmly and released slowly
- Use the size-19 ring spanner to increase the pretension of the spring damper element ⑦ on the counter-holder ④ until it is possible to place the setting gauge ⑪ onto the bolt heads ⑥ and ⑧
- Then tighten mounting bolts ② and ③ by hand
- Remove the setting gauge ⑪

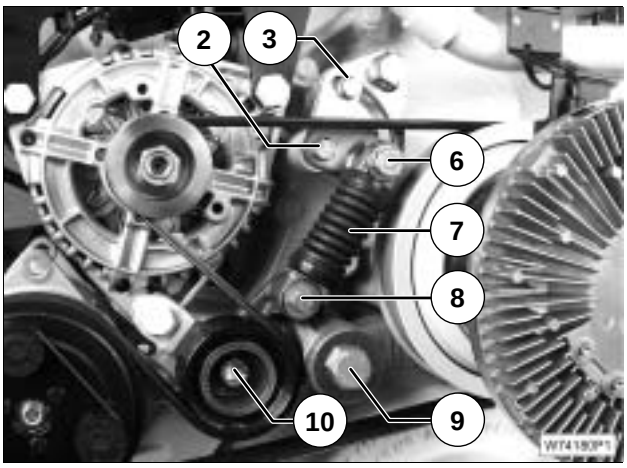
It must be possible to pull off the setting gauge without using force. Retension poly-V-belts if necessary



- Tighten mounting bolts ⑥ and ⑧ on the spring damper element ⑦
- Tighten collar bolts ② and ③
- Check the tightening torque of mounting bolts ⑨ and ⑩

Tightening torques

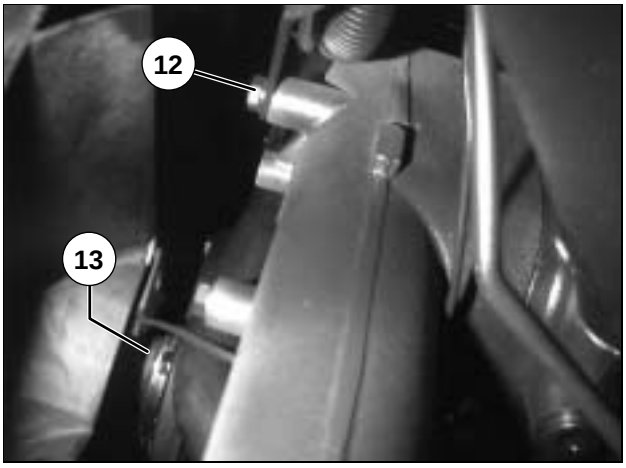
Collar bolts (size 13) ② and ③ ..... 35 Nm
Spring damper element (size 17) ⑥ ..... 43 Nm
Spring damper element (size 13) ⑧ ..... 22 Nm
Mounting bolt (size 22) ⑨ ..... 150 Nm
Mounting bolt (size 10) ⑩ ..... 50 Nm



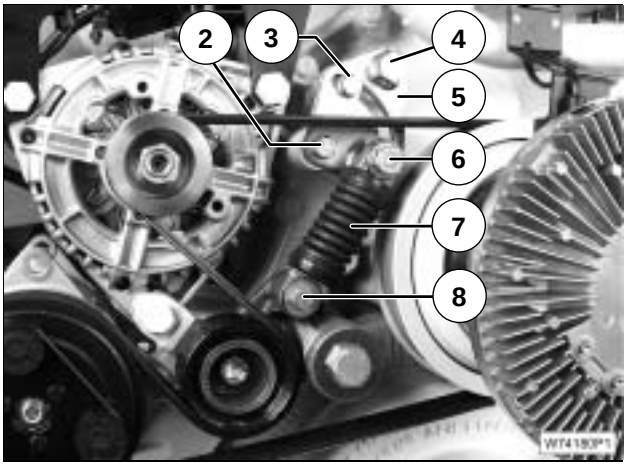
RENEWING

- Undo the mounting bolt ⑫ for the cable clamp
- Undo the mounting bolts ⑬ for the fan clutch
- **Firmly hold** the counter-holder ④ using a ring spanner (size 19) and note the rotation direction of the eccentric plate ⑤ (risk of crushing)!

It is vital that slackening and tensioning of the spring damper be performed slowly in order to prevent accidents (risk of crushing) and damage to the spring damper element ⑦.



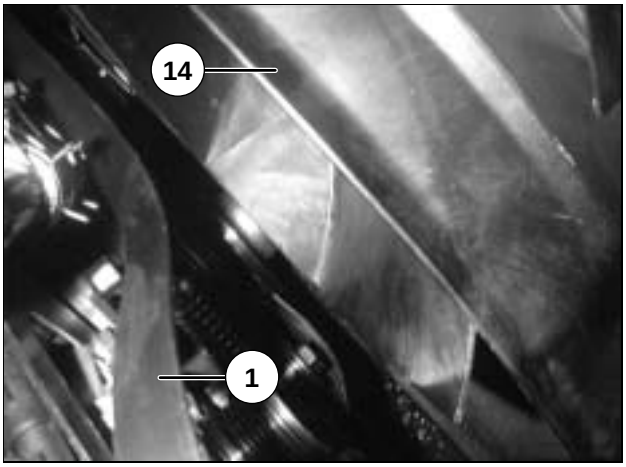
- Undo mounting bolts ②, ③, ⑧ and ⑥, making sure that the counter-holder ④ is held firmly and released slowly



- Press the fan clutch ⑭ towards the radiator
- Feed the poly-V-belt ① through the gap at the fan flange and remove it
- Check the spring damper element ⑦ for oil leaks

Have any leaks repaired immediately by a MAN Service workshop.

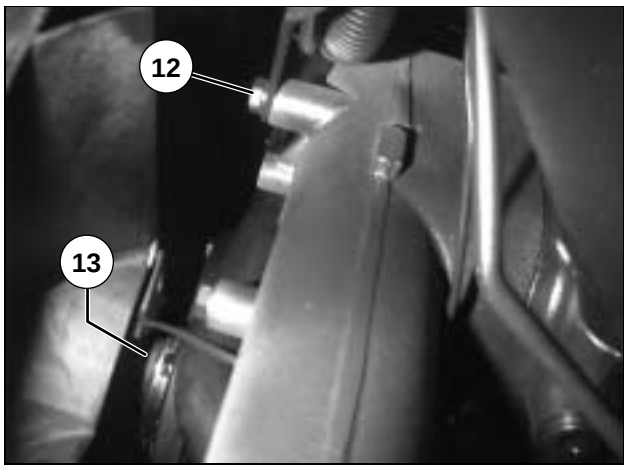
- Fit a new poly-V-belt



- Insert and tighten the mounting bolts ⑬ for the fan clutch
- Insert and tighten the mounting bolt ⑫ for the cable clamp
- Tension the poly-V-belt (see page 1)

Tightening torques
Cable clamp ⑫ ..... 22 Nm
Fan clutch ⑬ ..... 45 Nm

- Lower the cab

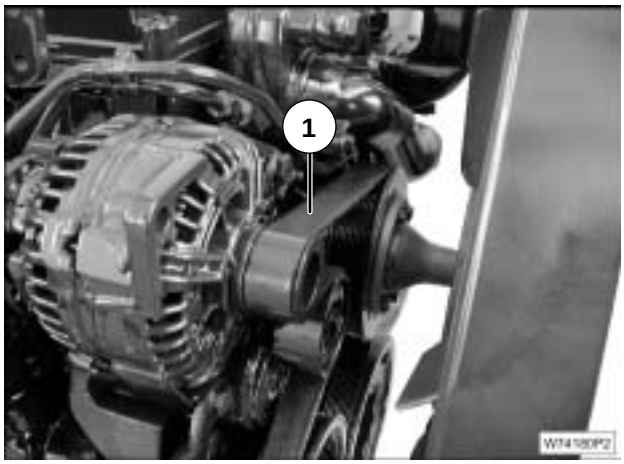


POLY-V-BELT D0836 LF

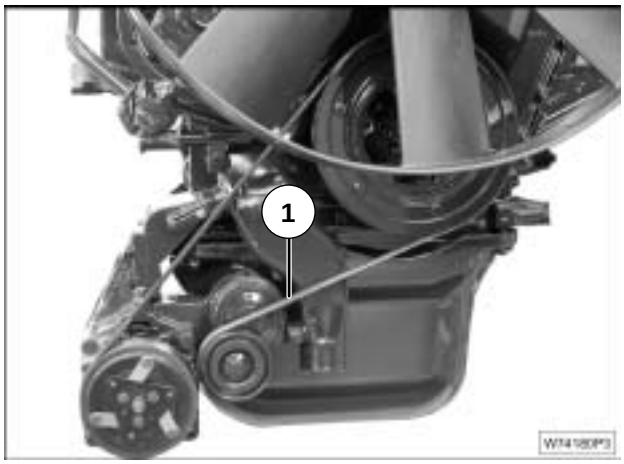
TENSION
The poly-V-belt is retensioned automatically.

CHECKING CONDITION
- Check the poly-V-belts ① for cracks, oily patches, vitrification and wear

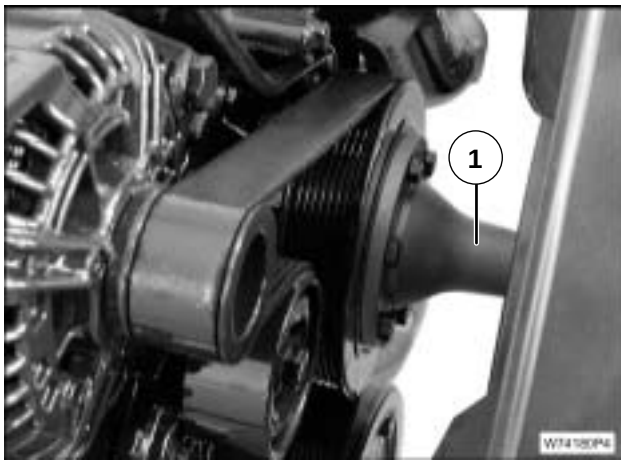
Renew poly-V-belts that are damaged or worn.
Have any leaks repaired immediately by a MAN Service workshop.



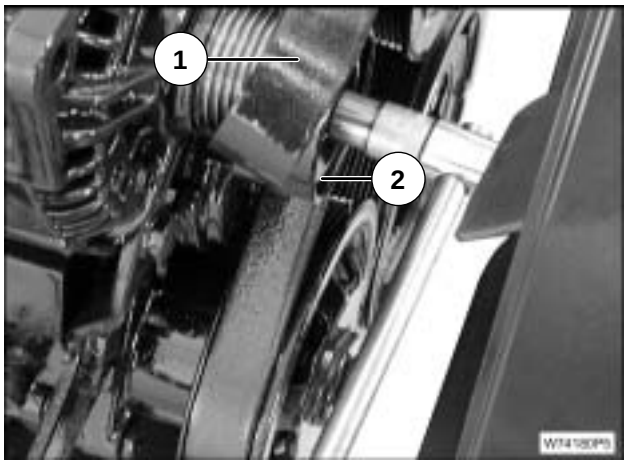
Example illustrated for D0836 LF engine with air-conditioning system



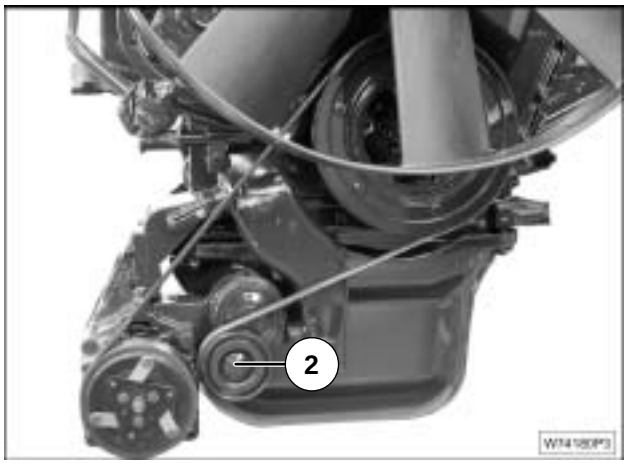
RENEWING
- Remove the casing fan ①



- Push the tensioning pulley ② downwards
- Remove the poly-V-belt ①



Example illustrated for D0836 LF engine with air-conditioning system



- Poly-V-belt installation is a reversal of the removal procedure.

FUEL SYSTEM

Always ensure complete cleanliness when performing work on the fuel system!

Checking

- Visually inspect the condition of the fuel system (damage and corrosion)
- Renew any defective parts
- Visually check the fuel system lines and ports for leaks, particularly near components which reach high temperatures during operation, e.g. injection pump, injection nozzle, flame start system, auxiliary heater, exhaust
- Immediately repair any leaks found

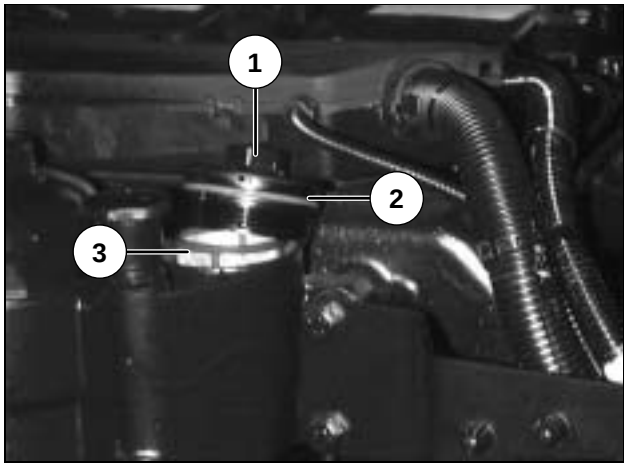
FUEL SERVICE CENTRE: PRE-CLEANER STRAINER FILTER

Cleaning

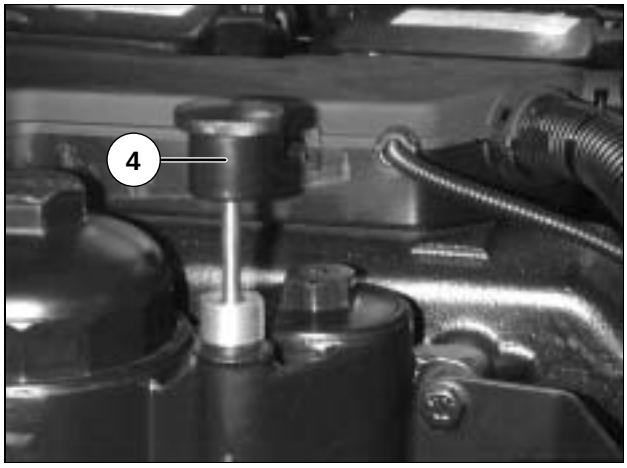
- Stop the engine
- Tilt the cab
- Screw off the housing cover ① using a ring spanner, socket or special tool
- Remove and clean the cover and strainer insert ③
- Fit a new sealing ring ②
- Screw in and tighten the strainer insert and cover

Tightening torque

Housing cover ..... 25 Nm



- Bleed the fuel system
- Lower the cab



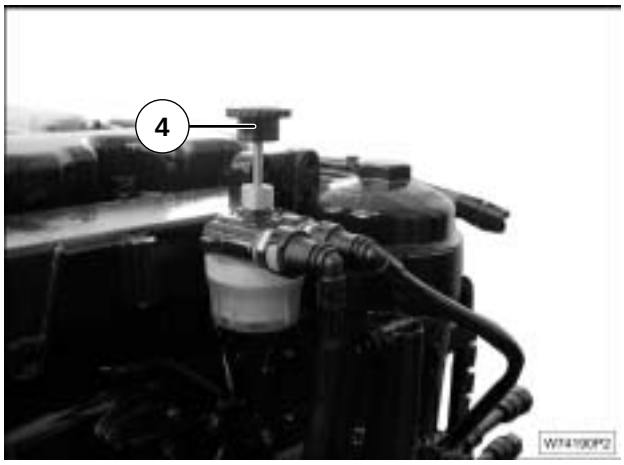
Bleeding the fuel system

- Unscrew hand pump plunger ④
- Pump the plunger until the overflow valve opens
- Push down the hand pump plunger and screw it firmly closed

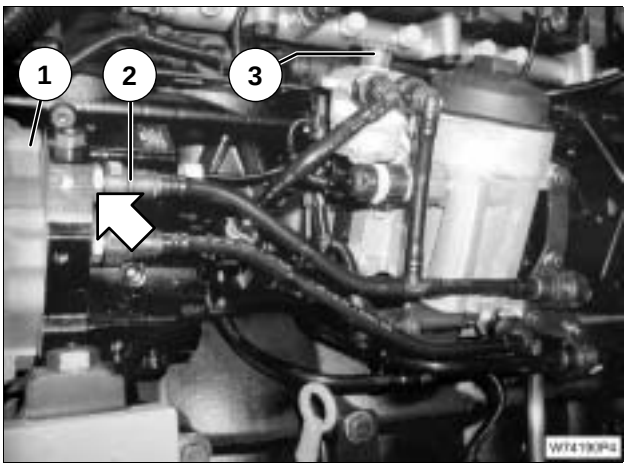
Tightening torque

Plunger ..... 4 Nm

Example illustrated for CR engine D0836



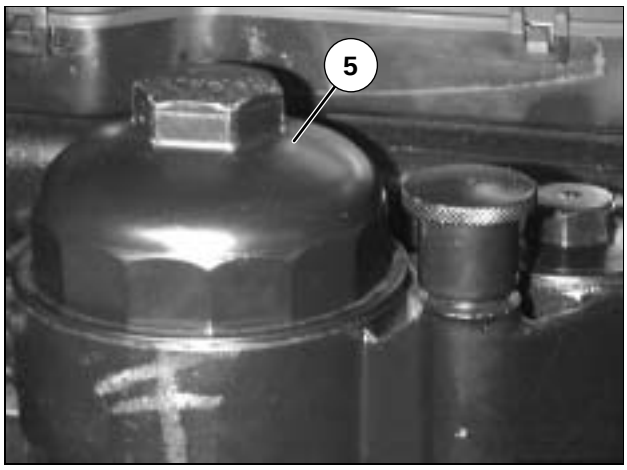
Bleeding the common-rail fuel system
(D2876LF12/13)
Also see Service Information 121700 "Fuel system" dated 11.03.2003.



Important information!
- People with pacemakers must stay at least 20 cm away from the running engine.
- All work on components of the common-rail system must be performed by specially trained personnel only.
- Before starting work, the engine must remain stationary for at least 1 minute to enable depressurisation of the rail (pressure pipe). Check depressurisation of the rail using MAN-Cats if necessary.
- Ensure absolute cleanliness in all work and at all times (e.g. wash your hands, wear clean work clothes). Avoid moisture and humidity at all times.
- Always renew high-pressure lines and pressure pipe connections once they have been undone.
- Only use the "protective covering set" special tool (MAN no. 81.96002–6005) once!
- A jet of fuel can cut through the skin!
- Risk of fire due to fuel atomisation!
- Avoid standing near the running engine.
- Never undo the screwed connections on the fuel high-pressure side whilst the engine is running (injection line from the high-pressure pump to/on the rail and on the cylinder head to the injector).
- Do not touch the live parts at the injector electrical connection whilst the engine is running.

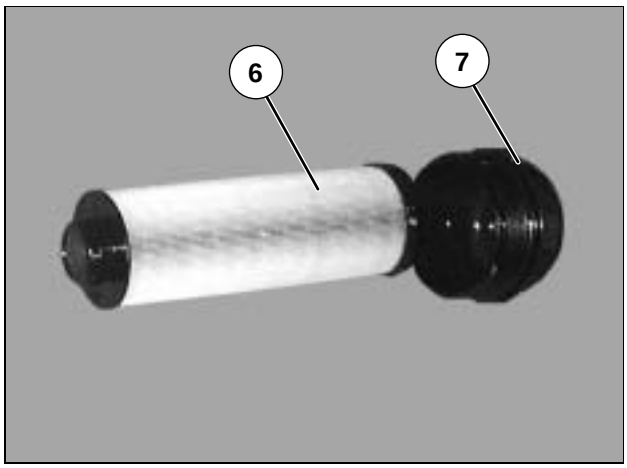
- Pull off the return line ② on the high-pressure pump ①
- Plug the return line using stopper, use protective covering set (MAN no. 81.96002–6005)
- Unscrew the hand pump plunger ③
- Operate the hand pump until fuel emerges at the high-pressure pump connection (↖) for the return line
- Remove the stopper from the line
- Re-connect the return line
- Check that the common-rail fuel system is leak-tight

MAIN FILTER ELEMENT

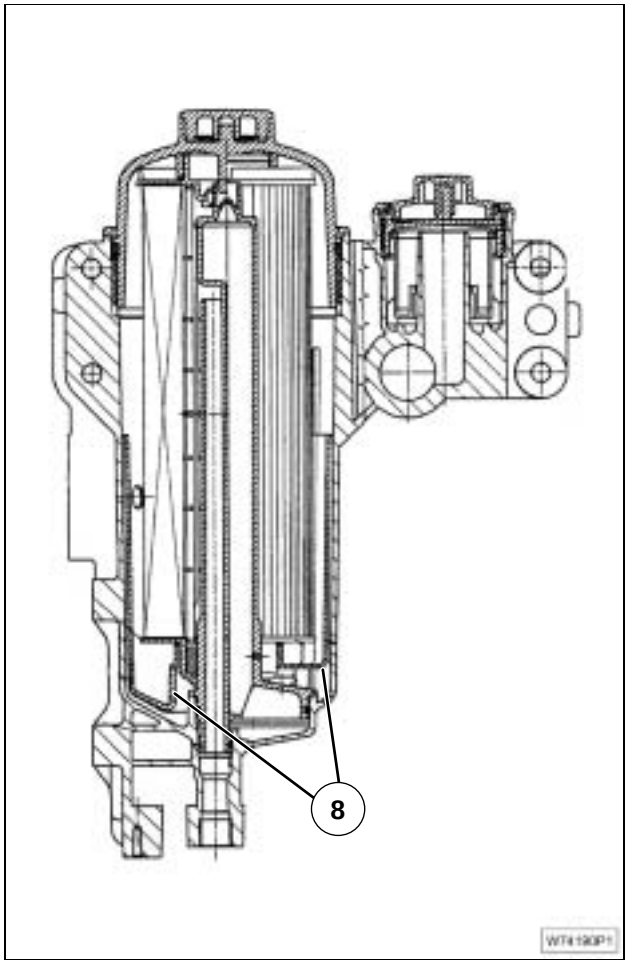


Renewing

- Stop the engine
- Tilt the cab
- Screw off the housing cover ⑤ using a ring spanner, socket or special tool
- Pull out the cover and filter element, but only once the fuel in the filter bowl has flowed back into the fuel tank



- Pull filter element ⑥ off the cover
- Pull off sealing ring ⑦



- Pull out the dirt bowl ⑧ and dispose of condensed water and impurities in the correct manner
- Clean and reinsert the dirt bowl ⑧
- Clean the cover if necessary
- Fit a new sealing ring
- Fit a new filter element, noting the different filter elements for CR engines and NON-CR engines (CR = Common Rail)
- Screw in and tighten the filter element and cover

Tightening torque
Housing cover .....25 Nm

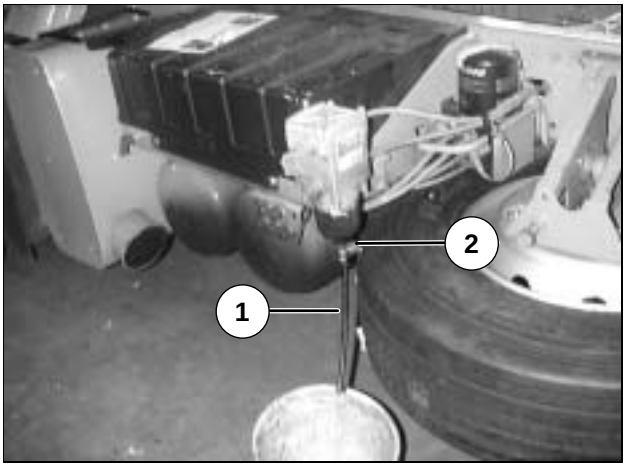
- Bleed the fuel system
- Lower the cab

Example illustrated for CR engine D0836

SEPAR FUEL PRE-FILTER

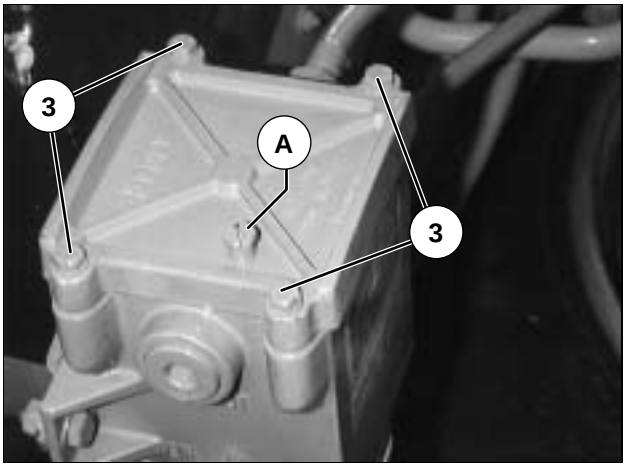
Flushing the filter

The fuel level in the fuel tank must be higher than the stopcock ②.



- Stop the engine
- Remove hose ① and bracket (MAN no.: 81.12540-6004) from the vehicle tool kit and screw it onto the drain cock fitting
- Put a collecting container underneath
- Open the bleed screw Ⓐ
- Open the stopcock ②
- Drain the condensation and impurities and dispose of them in the correct manner

Note: The fuel tank must be at least half full in order to drain the condensation. There is a drainage point on the underside of the tank.

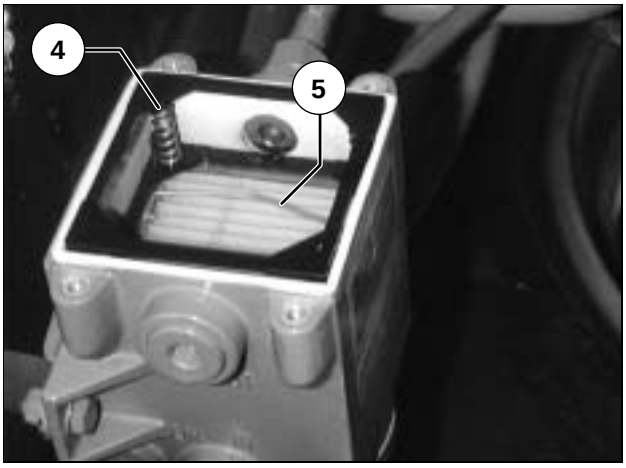


- Close the bleed screw Ⓐ
- Close stopcock ②
- Pull off the hose ①

Renew filter element

Only fit RME-resistant filter elements and seals marked "FPM".

- Stop the engine
- Unscrew the mounting bolts ③
- Remove the cover



- Remove the spring housing ④
- Renew the filter element ⑤
- Insert the spring housing
- Renew the cover gasket
- Fit the cover and tighten the bolts

Tightening torque

Mounting bolts ..... 15 Nm

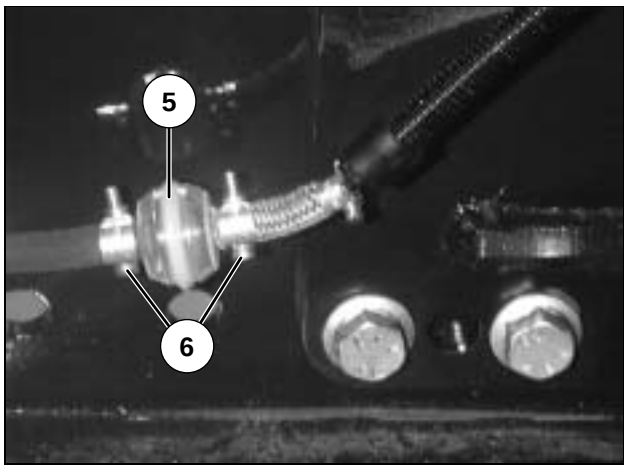
- Check the filter for leaks
- Bleed the fuel system if necessary (see Operator's Manual)

AUXILIARY HEATER

Renewing the fuel supply filter

The fuel filter for the auxiliary heater is located in the chassis frame between the cab and the fuel tank.

- Stop the engine
- Put a collecting container underneath
- Undo the hose clamps ⑥
- Fit a new filter ⑤
- Tighten the hose clamps
- If necessary, switch on the auxiliary heater several times until it starts working correctly



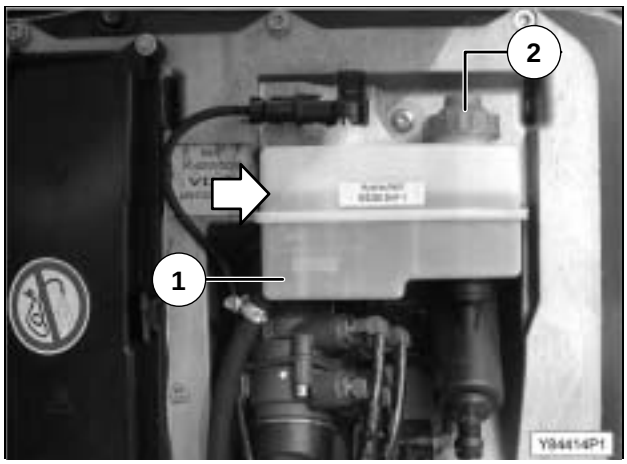
CLUTCH

FLUID LEVEL

Checking

- Park the vehicle on a flat, level surface
- Stop the engine
- Open the front flap
- Check the fluid level (→) in the expansion tank ①

Make sure the fluid level (→) in the expansion tank is visible between the top MAX and bottom MIN marks. If there is not enough fluid, find out why and rectify the problem.



- Top up the fluid to the correct level through filler hole ②
- Close the front flap

Specification

Clutch fluid .....see "Maintenance Recommendations and Recommended Service Products" booklet

CORRECT FUNCTIONING

Checking

- Start the engine and let it run at idling speed
- Fully depress the clutch pedal
- Slowly engage reverse gear after about 5 seconds

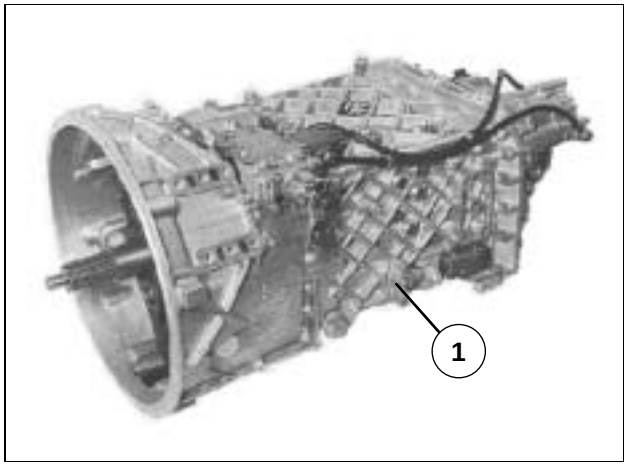
If reverse gear can be engaged without any gearshift noise (grating), this indicates that the clutch is separating completely.

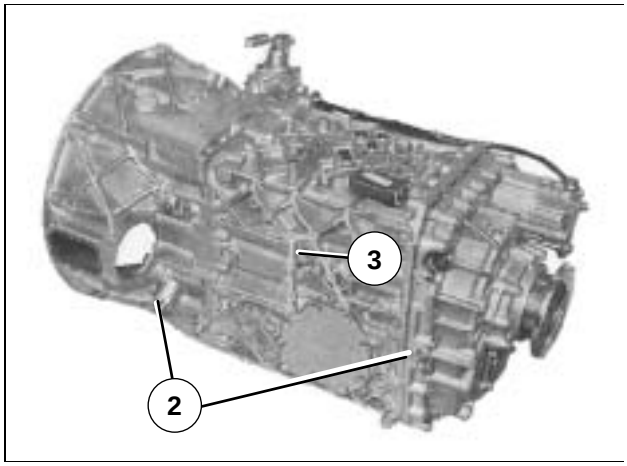
WEAR

Checking

Clutch adjustment is automatic.
Read out the remaining clutch life using MAN-cats II.

MAN ComfortShift MANUAL GEARBOX
(ZF 16 S …)
16-speed manual gearbox with range-change and integrated splitter group





OIL LEVEL

Checking (with gearbox **cold**, <40 °C)
Do not check the oil level immediately after driving (incorrect reading). Only check once the gearbox has cooled down.

Note: Check the gearbox for leaks each time you check the oil.

- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove oil filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torque
Oil filler plug ① ..... 60 Nm

OIL CHANGE (with the gearbox at **operating temperature**)
Change the oil after a long drive whilst the gearbox oil is still at operating temperature and has low viscosity.

Note: In vehicles with semilifetime oil fill, always renew the breather when changing the gearbox oil, see section 2.49.

Draining the oil
- Put an oil pan or similar underneath

Danger of burns!
Touching the gearbox or the gearbox oil can cause burns!

- Unscrew oil drain plug ② and ③ and drain all the used oil
- Clean the magnetic stoppers on the oil drain plugs ② and renew all the sealing rings

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

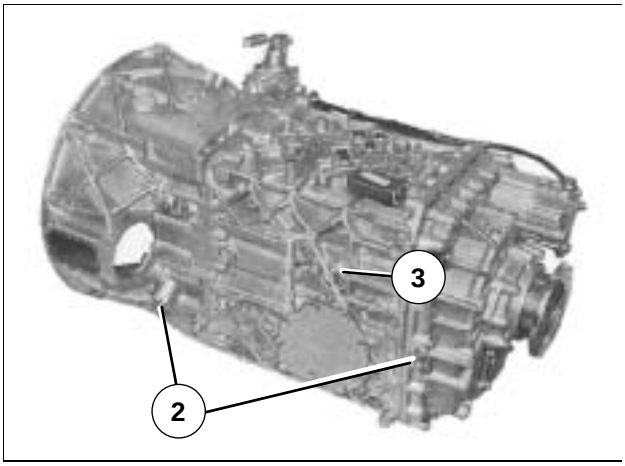
Gearbox oil specification
see ..... "Maintenance Recommendations and Recommended Service Products" booklet

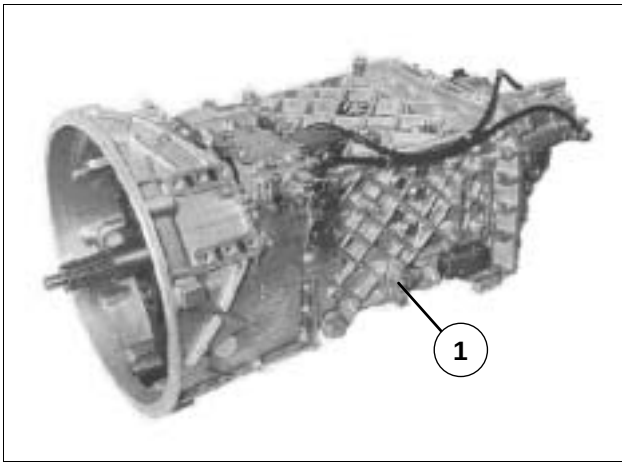
Gearbox oil fill quantity
see ..... Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

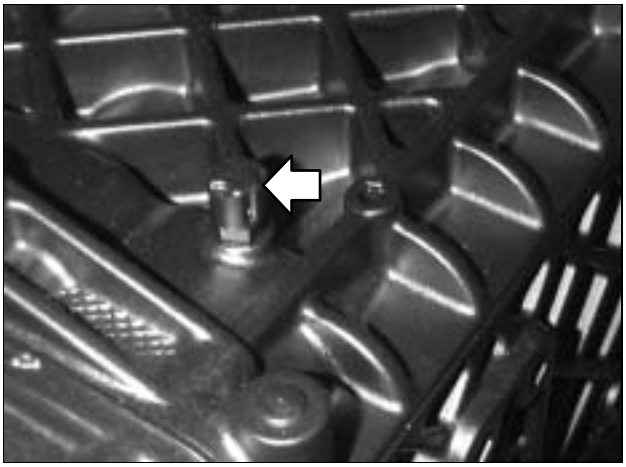
Danger of damage!
Ensure that the thread for the oil drain plug in the gearbox housing is absolutely clean!

- Fit a new sealing ring on oil drain plugs ③, screw them in and tighten them
- Unscrew and remove oil filler plug ①
- Pour in oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torques
Oil filler plug ① ..... 60 Nm
Oil drain plugs ② ..... 120 Nm
Oil drain plug ③ ..... 60 Nm







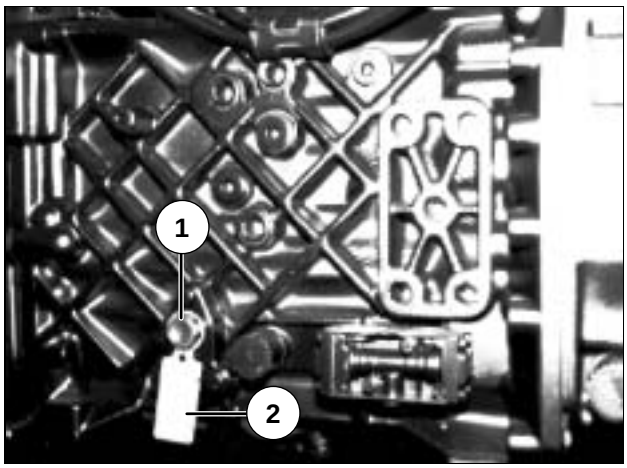
GEARBOX BREATHER
Note: The following procedure does not apply to vehicles with semilifetime oil fill.

Correct functioning of the breather valve must be guaranteed at all times.

Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.
- In the event of dirt build-up, clean the outside of breather (→) on the top of the gearbox

Note: Do not use high-pressure cleaners to clean the breather.

MAN ComfortShift MANUAL GEARBOX with INTARDER (ZF 16 S ...)
16-speed manual gearbox with range-change, integrated splitter group and integrated retarder system (Intarder)



OIL LEVEL

Checking (with gearbox oil **cold**, <40 °C)
Do **not** operate the Intarder immediately before stopping the vehicle to check the oil level. This ensures that the correct quantity of oil is set in the gearbox.
Do not check the oil level immediately after driving (incorrect reading). Only check once the gearbox has cooled down.

Note: Each time you check the oil, also check the gearbox, Intarder, oil/water heat exchanger and their coolant pipes for possible leaks.

- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove oil filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

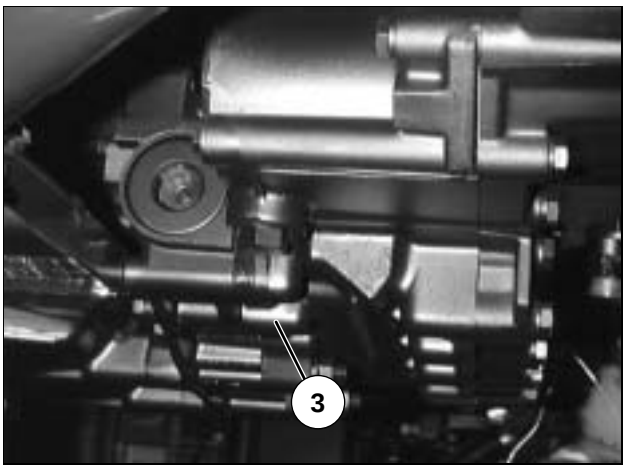
Note: There is an oil change notice ② on the oil filler plug ①. Do **not** remove this notice from the oil filler plug.

- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

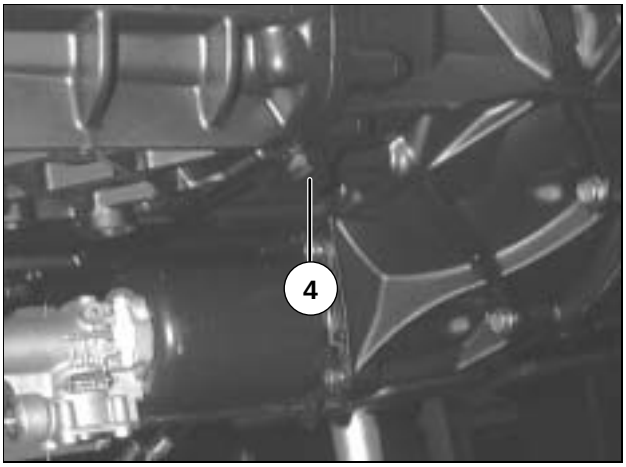
Tightening torque
Oil filler plug ① ..... 60 Nm

OIL CHANGE (with the gearbox at **operating temperature**)
Do **not** operate the Intarder immediately before stopping the vehicle to change the oil! This ensures that the correct oil drain quantity is set in the gearbox.

Note: Each time you change the oil, renew the oil filter (see below) and, in the case of vehicles with semilifetime oil fill, renew the breather, see section 2.49.



Draining the oil
- Put an oil pan or similar underneath
- Unscrew oil drain plugs ③ and ④ and drain all the oil
- Clean the magnetic stoppers on the oil drain plugs and renew all the sealing rings

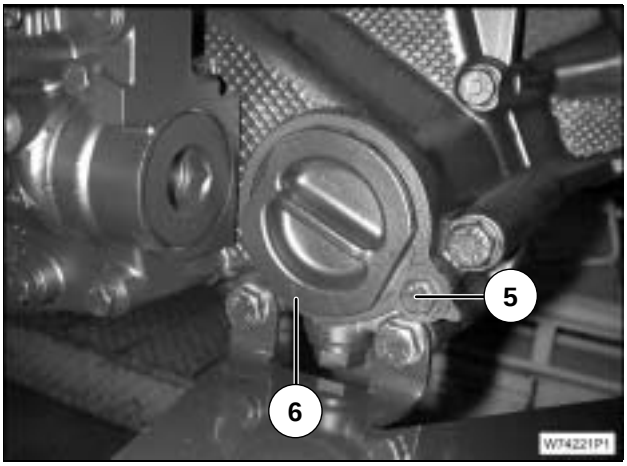


Fitting a new oil filter element (**each** time the oil is changed)
- Put an oil pan or similar underneath
- Unscrew and remove mounting bolt ⑤

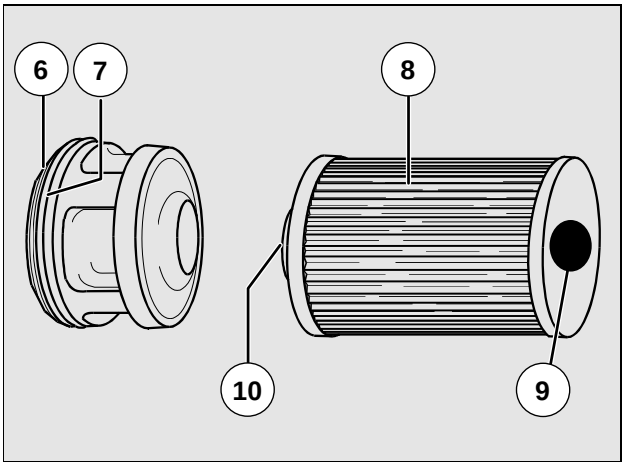
Danger of burns!
There is still oil in the filter housing.

- Pull the filter cover ⑥ with attached filter ⑧ out of the fixture
- Pull the filter element ⑧ off the filter cover ⑥
- Remove the magnetic disc ⑨ from the used filter, clean it and affix it to the new filter using grease

Note: Fit a magnetic disc ⑨ if one is not already fitted.

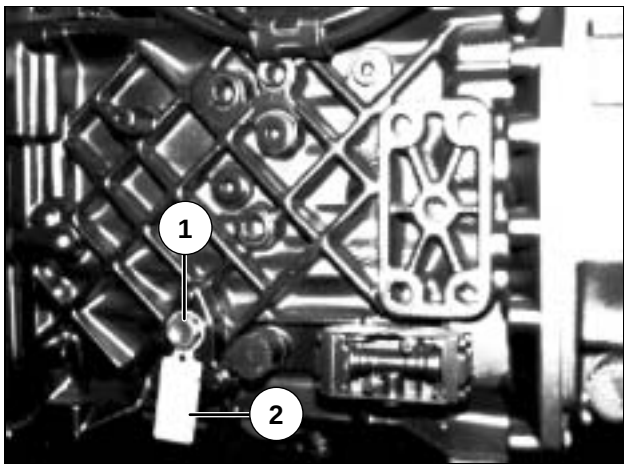


- Renew the O-ring ⑦ on the filter cover and apply grease
- Apply grease on the O-ring ⑩ on the new filter element
- Place a new filter element ⑧ onto the filter cover ⑥
- Screw in and tighten the filter cover mounting bolt ⑤



Tightening torque
Oil filter mounting bolt ⑤ ..... 23 Nm

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.



Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

Danger of damage!
Ensure that the thread for the oil drain plug ② in the gearbox housing is absolutely clean!

- Fit new seals on the oil drain plugs, screw them in and tighten them
- Unscrew and remove oil filler plug ①
- Pour in oil through the filler and checking hole until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Note: There is an oil change notice ② on the oil filler plug ①. Do **not** remove this notice from the oil filler plug.

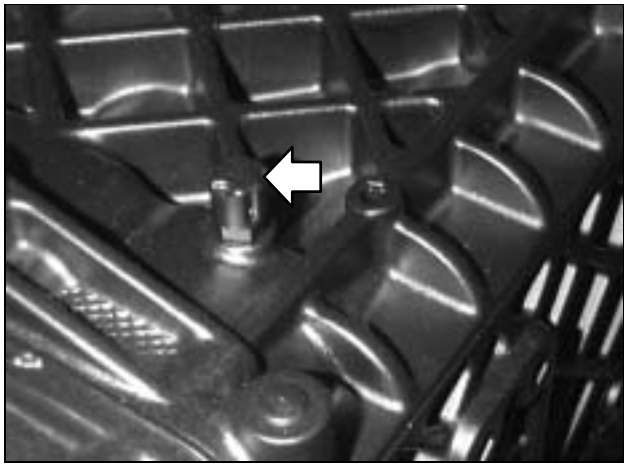
- Perform a short test drive and check for correct functioning of the Intarder
- Before completing the test drive, switch off the Intarder and bring the vehicle to a standstill **without** activating the Intarder

After the test drive:
- Recheck the oil level as described under "Checking the oil level". If necessary, top up with oil until the oil starts to overflow

Tightening torques
Oil filler plug ①.....60 Nm
Oil drain plug ③.....60 Nm
Oil drain plug ④.....120 Nm

GEARBOX BREATHER
Note: The following procedure does not apply to vehicles with semilifetime oil fill.

Correct functioning of the breather valve must be guaranteed at all times.



Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.
- In the event of dirt build-up, clean the outside of breather (→) on the top of the gearbox

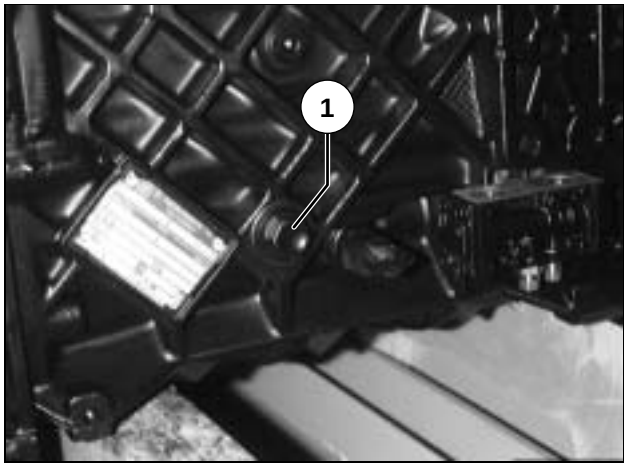
Note: Do not use high-pressure cleaners to clean the breather.

MAN ComfortShift MANUAL GEARBOX with POWER TAKE-OFF (NMV 221)
16-speed manual gearbox and flange-mounted engine-dependent power take-off NMV 221. The manual gearbox and the engine-dependent power take-off share the same oil circuit.

OIL LEVEL

Checking (with gearbox oil **cold**, <40 °C)
Do not check the oil level immediately after driving (incorrect reading). Only check once the gearbox has cooled down.

Note: Check the gearbox for leaks each time you check the oil.



- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove oil filler plug ①

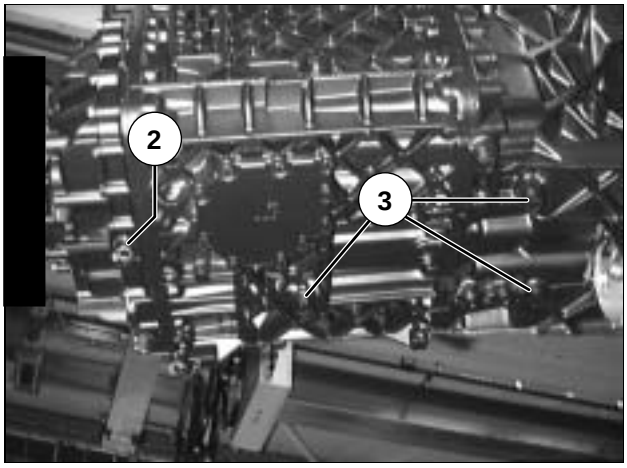
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torque
Oil filler plug ① ..... 60 Nm

OIL CHANGE (with the gearbox at **operating temperature**)
Change the oil after a long drive whilst the gearbox oil is still at operating temperature and has low viscosity.

Note: Each time you change the oil, renew the oil filter (see next page) and, in the case of vehicles with semilifetime oil fill, renew the breather, see section 2.49.



Draining the oil

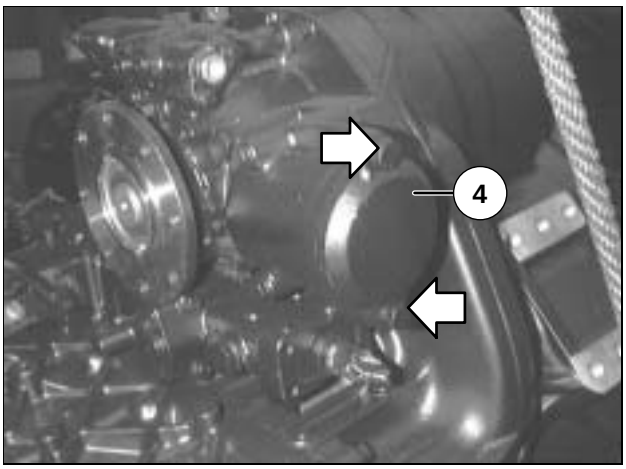
- Put an oil pan or similar underneath
- Unscrew and remove oil drain plugs ② and ③ and drain all the oil
- Clean the magnetic stopper on oil drain plug ② and renew all the sealing rings
- Take out the used filter and insert a new one

Fitting a new oil filter element (**each** time the oil is changed)

- Put an oil pan or similar underneath
- Unscrew and remove the mounting bolts (→) from the filter cover ④

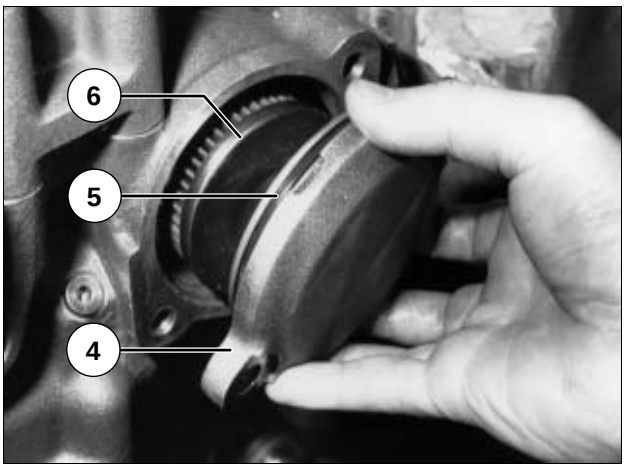
Danger of burns!
There is still oil in the filter housing.

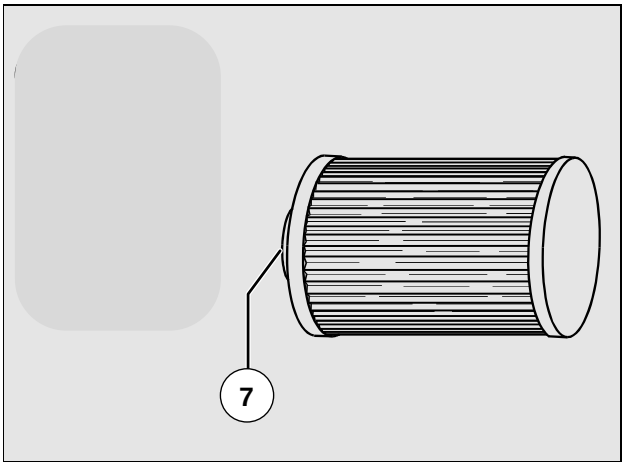
- Pull off the filter cover ④ and remove the filter element ⑥



- Renew the O-ring ⑤ on the filter cover ④ and apply grease
- Apply grease on the O-ring ⑦ on the new filter element
- Insert the filter cover and filter element into the filter aperture and slide it in as far as the stop
- Screw in and tighten the filter cover mounting bolts (→)

Tightening torque
Mounting bolts for filter cover ④ ..... 23 Nm





Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

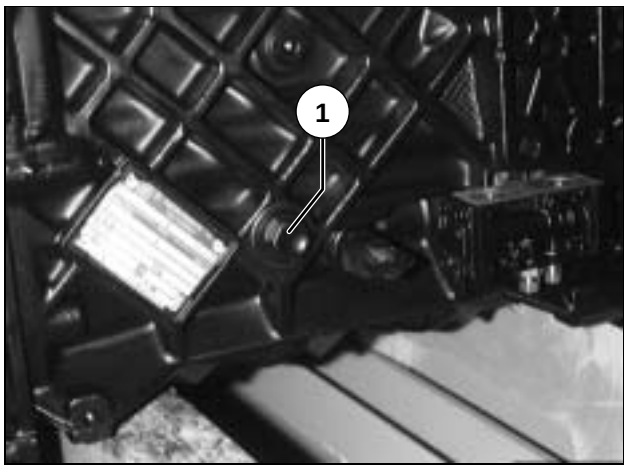
Danger of damage!
Ensure that the thread for the oil drain plug ② in the gearbox housing is absolutely clean!

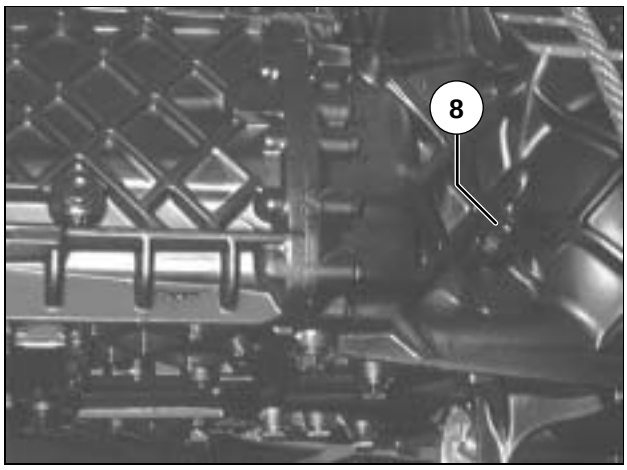
- Fit new sealing rings on oil filler plugs ② and ③ (see page 1), screw them in and tighten them
- Unscrew and remove oil filler plug ① and ⑪
- Pour in oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Pour in approx. 2 litres of oil through filler hole ⑧

Note: Filler hole ⑧ is not a checking hole.

- Let the engine run at idling speed for about 3 minutes (gearbox in neutral, clutch engaged)
- Stop the engine and pour in more oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torques
Oil filler plug ①..... 60 Nm
Oil drain plug ② ..... 120 Nm
Oil drain plugs ③ ..... 60 Nm
Oil filler plug ⑧..... 60 Nm



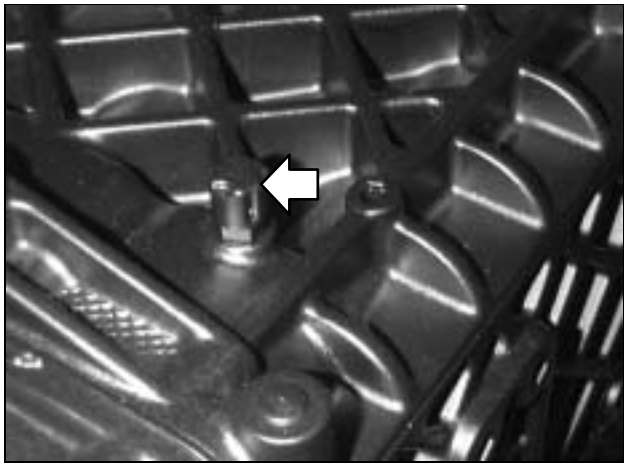


GEARBOX BREATHER
Note: The following procedure does not apply to vehicles with semilifetime oil fill.

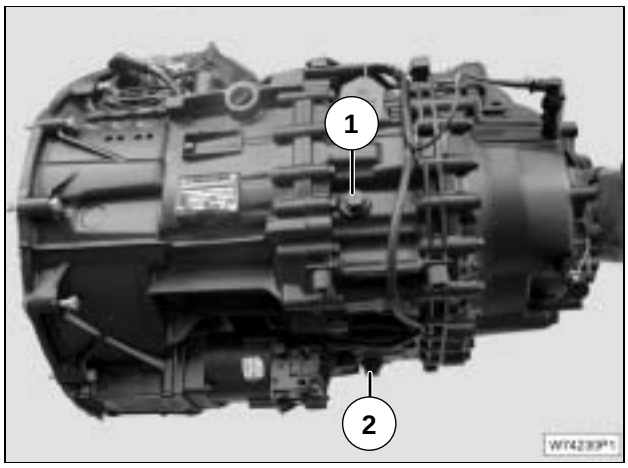
Correct functioning of the breather valve must be guaranteed at all times.

Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.
- In the event of dirt build-up, clean the outside of breather (→) on the top of the gearbox

Note: Do not use high-pressure cleaners to clean the breather.



MAN TipMatic AUTOMATIC GEARBOX
(ZF ASTRONIC 12 AS …)
The ZF ASTRONIC gearboxes are manual gearboxes with a fully automatic shift system. This means the gears are shifted electro-pneumatically and there is no need for the driver to use the clutch (no clutch pedal). The gearbox can be operated in either automatic mode or manual mode (see Operator's Manual).



OIL LEVEL

Checking (with gearbox oil **cold**, <40 °C)
Do not check the oil level immediately after driving (incorrect reading). Only check once the gearbox has cooled down.

Note: Check the gearbox for leaks each time you check the oil.

- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove the oil filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torque
Oil filler plug ①..... 60 Nm

OIL CHANGE (with the gearbox at **operating temperature**)
Change the oil after a long drive whilst the gearbox oil is still at operating temperature and has low viscosity.

Note: In vehicles with semilifetime oil fill, always renew the breather when changing the gearbox oil, see section 2.49.

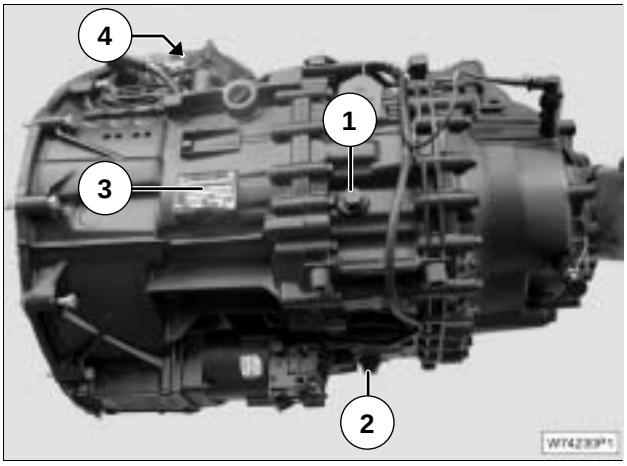
Draining the oil

- Put an oil pan or similar underneath
- Unscrew and remove the oil drain plug ② and drain all the oil
- Clean the magnetic stopper on the oil drain plug ② and fit a new sealing ring

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Gearbox oil specification
see ..... "Maintenance Recommendations and Recommended Service Products" booklet

Gearbox oil fill quantity
see ..... Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.



Danger of damage!
Ensure that the thread for the oil drain plug ② in the gearbox housing is absolutely clean!

- Fit new seals on the oil drain plugs, screw them in and tighten them
- Unscrew and remove oil filler plug ①
- Pour in oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torques
Oil filler plug ① ..... 60 Nm
Oil drain plugs ② and ③ ..... 60 Nm

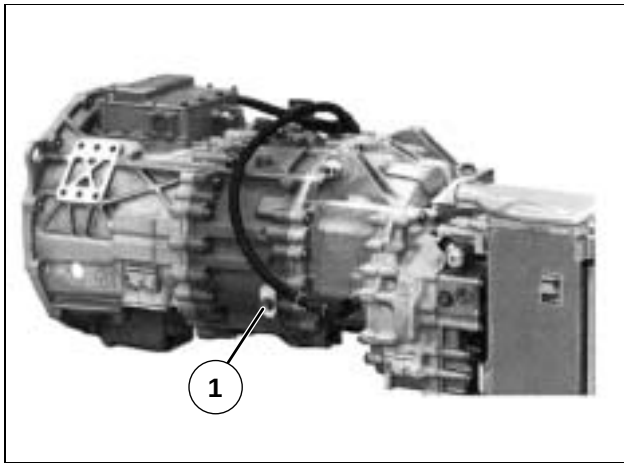
GEARBOX BREATHER (not illustrated)
Note: The following procedure does not apply to vehicles with semilifetime oil fill.

Correct functioning of the breather valve must be guaranteed at all times.

Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.
- In the event of dirt build-up, clean the outside of breather ④ on the top of the gearbox

Note: Do not use high-pressure cleaners to clean the breather.

MAN TipMatic AUTOMATIC GEARBOX with INTARDER (ZF 12 AS ...)
The ZF ASTRONIC gearboxes are manual gearboxes with a fully automatic shift system. This means the gears are shifted electro-pneumatically and there is no need for the driver to use the clutch (no clutch pedal). The gearbox can be operated in either automatic mode or manual mode (see Operator's Manual).



OIL LEVEL

Checking (with gearbox oil **cold**, <40 °C)
Do **not** operate the Intarder immediately before stopping the vehicle to check the oil level. This ensures that the correct quantity of oil is set in the gearbox.
Do not check the oil level immediately after driving (incorrect reading). Only check once the gearbox has cooled down.

Note: Each time you check the oil, also check the gearbox, Intarder, oil/water heat exchanger and their coolant pipes for possible leaks.

- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove oil filler plug ①

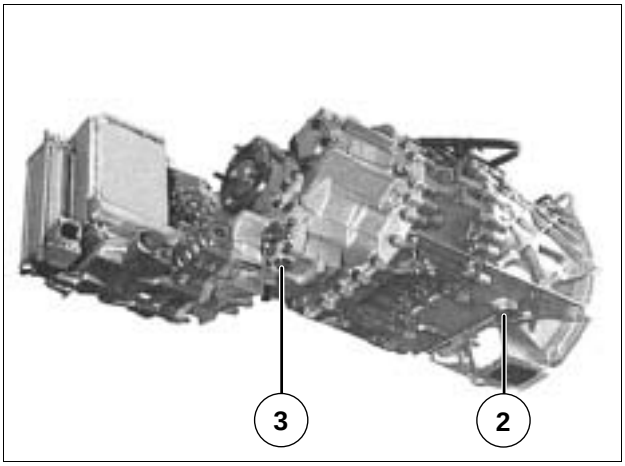
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

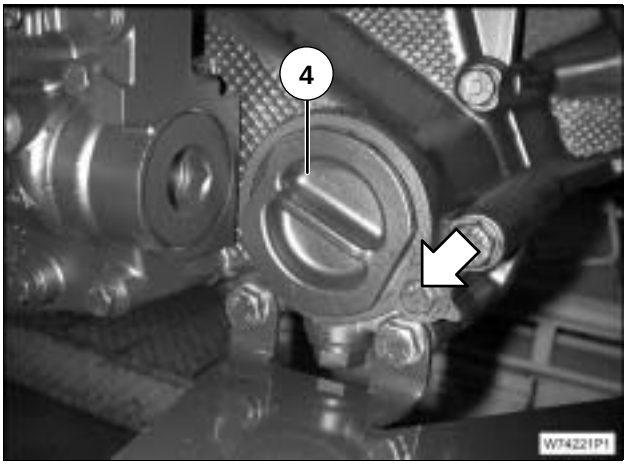
Tightening torque
Oil filler plug ① ..... 60 Nm

OIL CHANGE (with the gearbox at **operating temperature**)
Do **not** operate the Intarder immediately before stopping the vehicle to change the oil! This ensures that the correct oil drain quantity is set in the gearbox.

Note: Each time you change the oil, renew the oil filter (see below) and, in the case of vehicles with semilifetime oil fill, renew the breather, see section 2.49.



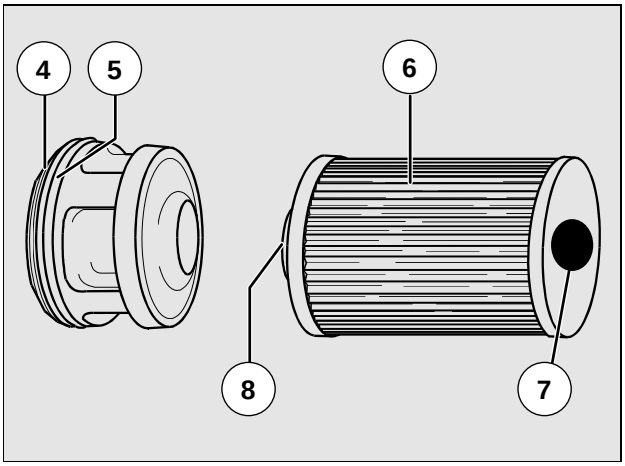
Draining the oil
- Unscrew and remove oil drain plugs ② (gearbox drainage point) and ③ (Intarder housing drainage point) and drain all the oil
- Clean the magnetic stoppers on the oil drain plugs and renew all the sealing rings
- Take out the used filter and insert a new one



Fitting a new oil filter element (**each** time the oil is changed)
- Put an oil pan or similar underneath
- Unscrew and remove mounting bolt (→)

Danger of burns!
There is still oil in the filter housing.

- Pull the filter cover ④ with attached filter ⑥ out of the fixture



- Pull the filter element ⑥ off the filter cover ④
- Remove the magnetic disc ⑦ from the used filter, clean it and affix it to the new filter using grease

Note: Fit a magnetic disc ⑦ if one is not already fitted.

- Renew the O-ring ⑤ on the filter cover and apply grease
- Apply grease on the O-ring ⑧ on the new filter element
- Place new filter element ⑥ onto the filter cover ④
- Insert the filter cover and filter element into the filter aperture and slide it in as far as the stop
- Screw in and tighten the filter cover mounting bolt (→)

Tightening torque
Mounting bolt (→) for filter cover ..... 23 Nm

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

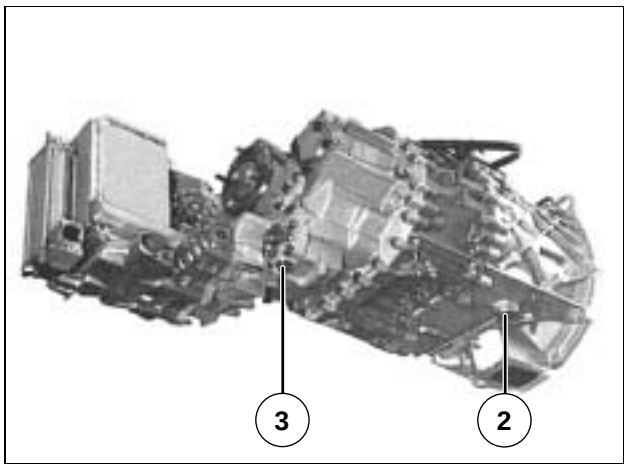
Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

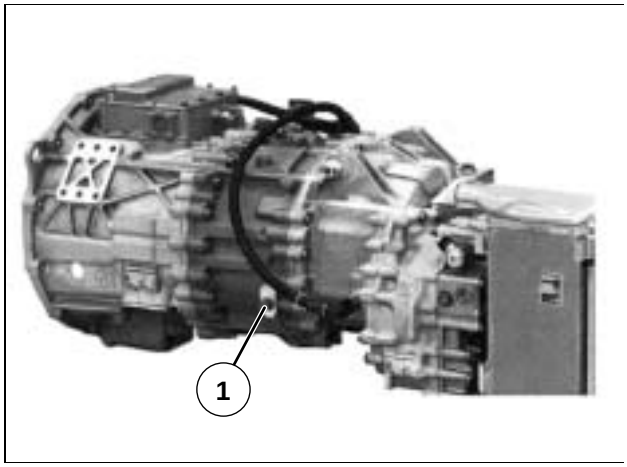
Danger of damage!
Ensure that the thread for the oil drain plug in the gearbox and Intarder housing is absolutely clean!

- Fit new sealing rings on the oil drain plugs (gearbox drainage point ② and Intarder housing drainage point ③), screw them in and tighten them
- Unscrew and remove oil filler plug ①
- Pour in oil through the filler and checking hole until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug
- Perform a short test drive and check for correct functioning of the Intarder
- Before completing the test drive, switch off the Intarder and bring the vehicle to a standstill **without** activating the Intarder

After the test drive:
- Recheck the oil level as described under "Checking the oil level". If necessary, top up with oil until the oil starts to overflow

Tightening torques
Oil drain plug ② and ③ ..... 60 Nm
Oil filler plug ① ..... 60 Nm



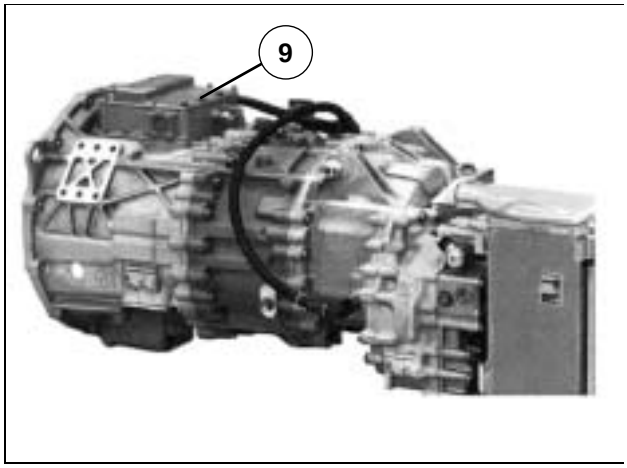


GEARBOX BREATHER
Note: The following procedure does not apply to vehicles with semilifetime oil fill.

Correct functioning of the breather valve must be guaranteed at all times.

Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.
- In the event of dirt build-up, clean the outside of breather ⑨ on the top of the gearbox

Note: Do not use high-pressure cleaners to clean the breather.



EATON FSO 8309 MANUAL GEARBOX

9-speed manual gearbox

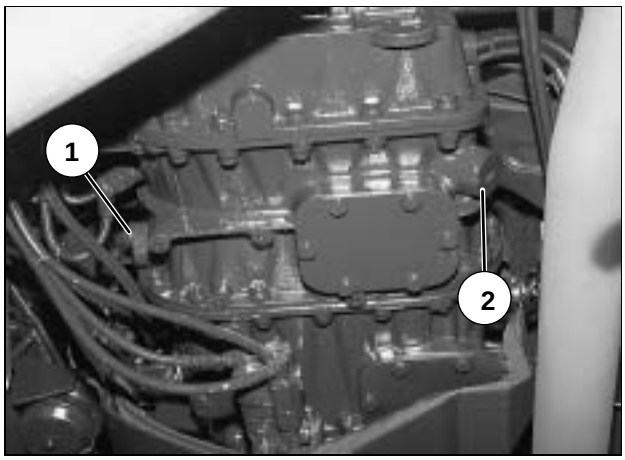
CHECKING THE OIL LEVEL (with vehicle parked on a flat, level surface and **cold** gearbox oil <40 °C)

- Unscrew and remove oil filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Screw in and tighten the oil filler plug

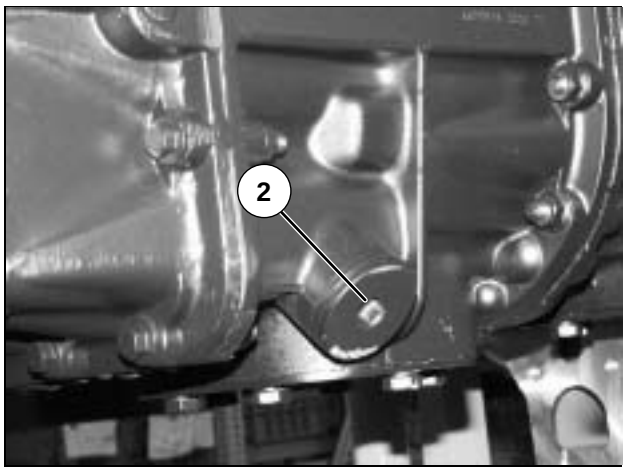
Tightening torque
Oil filler plug ① ..... 20 – 27 Nm



CHANGING THE OIL (with the gearbox at **operating temperature**)

Draining the oil

- Unscrew oil drain plug ② and drain all the used oil
- Clean the oil drain plug's oil screen ②



Filling with oil
Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Danger of damage!
Ensure that the thread for the oil drain plug ② in the gearbox housing is absolutely clean!

- Fit a new sealing ring on the oil drain plug ②, screw it in and tighten it
- Unscrew oil filler plug ①
- Pour in oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Screw in and tighten the oil filler plug

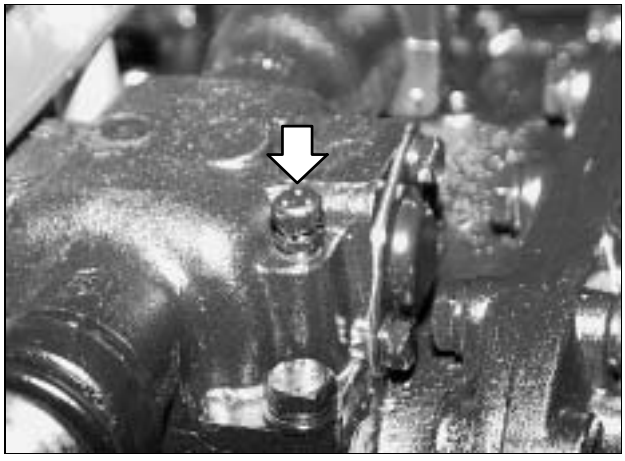
Tightening torques
Oil filler plug ① ..... 20 – 27 Nm
Oil drain plug ② ..... 20 – 27 Nm

GEARBOX BREATHER
Correct functioning of the breather valve must be guaranteed at all times.

Cleaning
The breather must be kept clean. Make sure the plastic cap is removed.

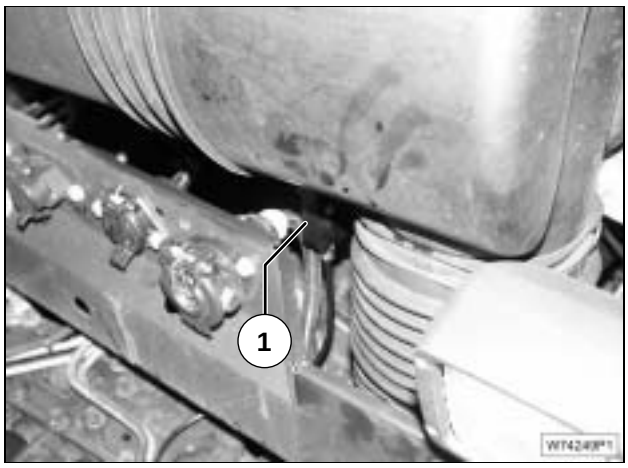
- In the event of dirt build-up, clean the outside of breather (↓) on the top of the gearbox

Note: Do not use high-pressure cleaners to clean the breather.



BREATHER FOR SEMILIFETIME OIL FILL

The breather and the PA pipelines (PA = **p**oly**a**mide (plastic), 6x1 M3230) with connection system 203 (VOSS) must be renewed when changing the oil in the gearbox and/or driven axle.



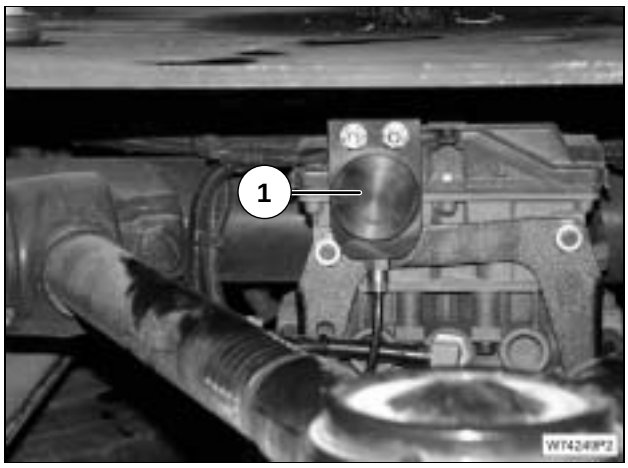
INSTALLATION POSITION

Gearbox:

– Breather ① below the air filter housing

Axle:

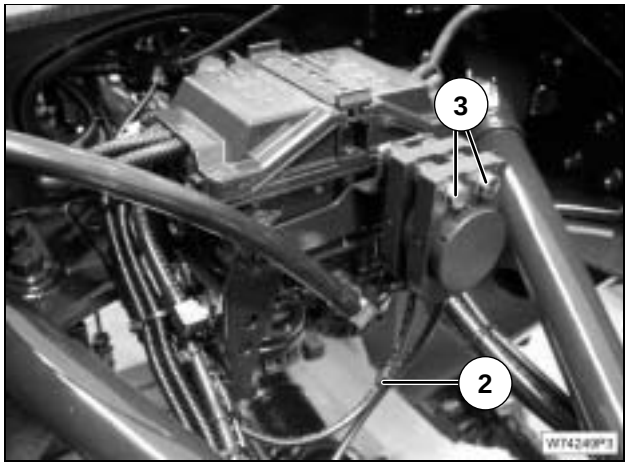
– Breather ① above the driven axle



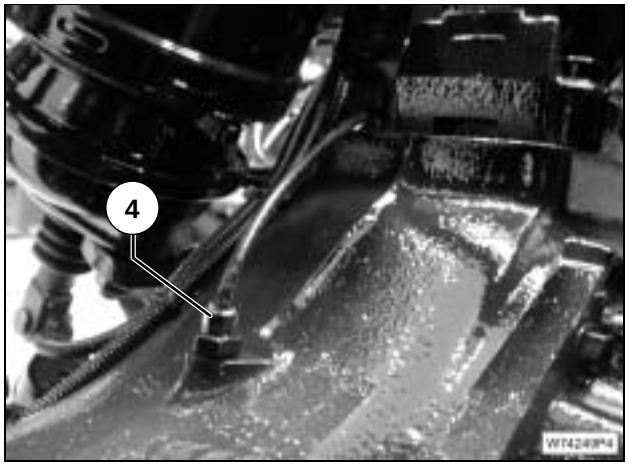
RENEWING

Removing

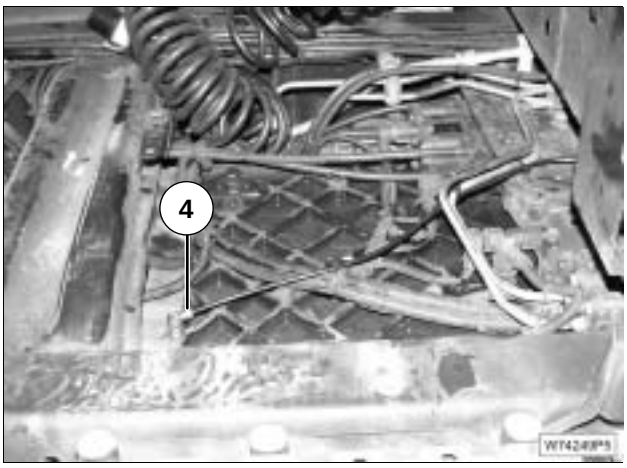
- Mark the routing of the PA pipelines and the position of the plastic fasteners
- Remove all the fasteners ②
- Undo the mounting bolts ③ on the breather (illustrated example: axle)



- Unscrew the connection system union screw ④ on the axle housing



- Unscrew the connection system union screw ④ on the gearbox (example illustrated: gearbox)
- Remove the breather and PA pipeline with connection system



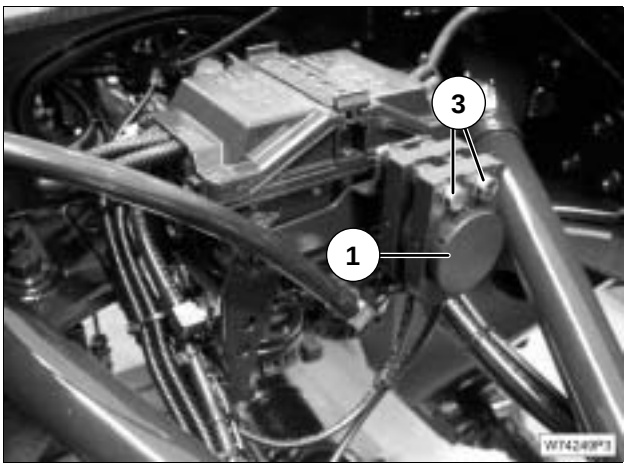
Installing

Incorrectly installed plug connections can cause complete failure of the connection!

- Clean the breather connecting point
- Mount the new breather ① for the gearbox or axle (example illustrated: axle)

Note: The connection system is an integral part of the breather.

Tightening torque
Breather mounting bolts ③ ..... 22 Nm

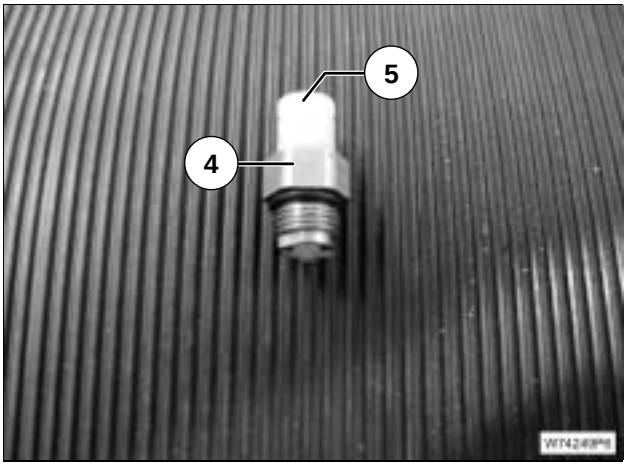


- Clean the gearbox or axle connection bore

Pay particular attention to paint residue in the area of the sealing chamfer and remove if necessary.

- Insert the new connection system into the gearbox or axle connection bore and tighten by hand
- Then tighten the union screw ④ to the specified torque

Do not remove the plastic cap (assembly stopper) ⑤ from the connection system until just before mounting the PA pipes.



Tightening torques
Union screw ④ for connection system 203
on gearbox ..... 4 – 5 Nm
on axle ..... 4 – 5 Nm

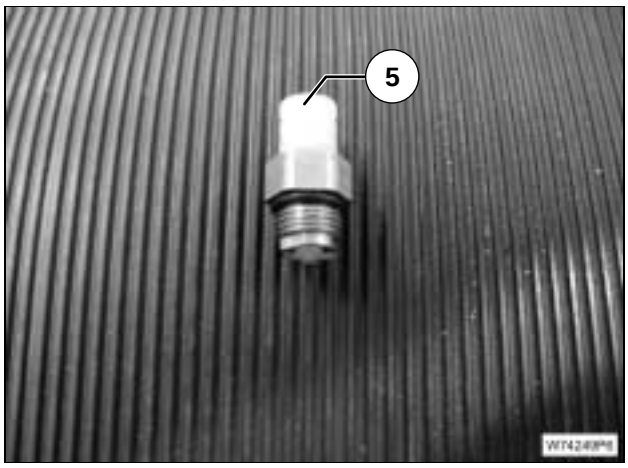
- Measure the length of the old PA pipeline and add to this the insert depth of the plug connection (19.5 mm)

Take extreme care when measuring the line as cold conditions cause the PA pipeline to shrink (by approx. 1 cm per 1 m line length at -40 °C).

• Cut the new PA pipeline to the desired size
Only use a plastic cutting shears (MAN no. 08.02350-9004) for cutting the pipeline to size. This is the only tool that ensures the clean and perpendicular cut that is necessary for successful assembly. It is not necessary to rework the cut, e.g. deburring on the inside and outside.

• Mark the required connection insert depth (19.5 mm) on the PA pipeline that is to be fitted
This enables an immediate visual check for ensuring correct PA pipeline assembly.

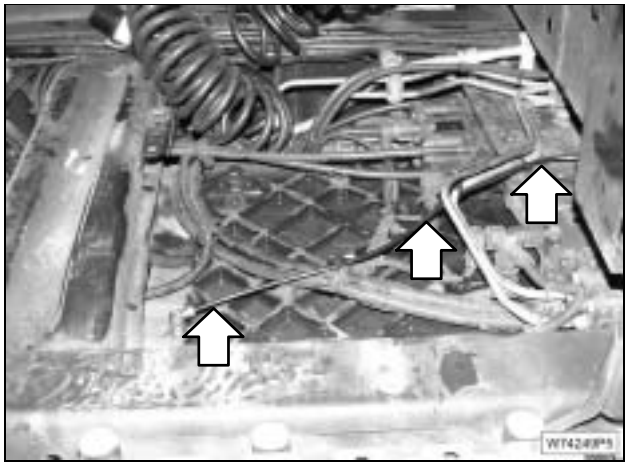
– **Do not heat the PA pipeline when routing it under any circumstances!**
– **Keep the PA pipelines well away from any sources of heat.**



- Route the PA pipeline so that it is free from kinks, chafing and tension. Observe the marks made whilst removing the components
- Remove the connection system plastic cap (assembly stopper) concerned ⑤ from the gearbox or axle breather
- Press the clean PA pipeline (without paint residue or similar) into the plug connection until the stop is reached. You must overcome the resistance provided by the round rings and the toothed ring within the connection system.
- Briefly pull back the PA pipeline so that the holding edges running around the inside of the plug connection engage in the PA pipeline jacket

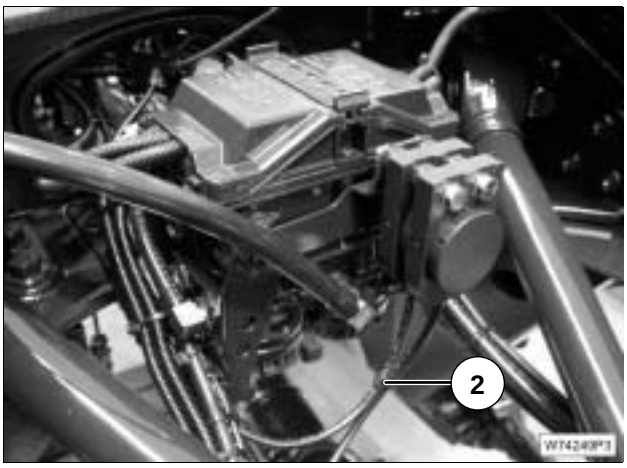
Check the "insert depth" mark on the PA pipeline!

In the case of the gearbox, ensure that the PA pipeline rises (↑) in addition to checking that it is free from kinks, chafing and tension!

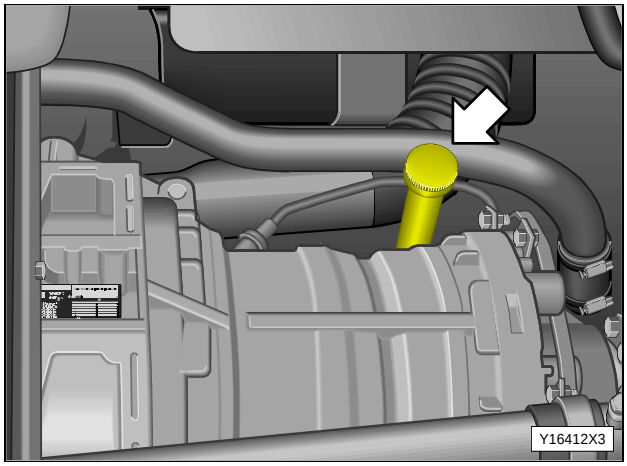


- **PA pipelines must be fastened using plastic fasteners.**
- **When mounting the PA pipes, ensure that the pipe fasteners prevent the PA pipelines from turning.**
- **The maximum distance between the fasteners is 500 to 800 mm.**
- **Do not freely "suspend" pipe connections in PA pipelines!**

- Fit all the plastic fasteners ②, observing the marks made during removal



ZF – 5/6 HP ... AUTOMATIC GEARBOX



CHECKING THE OIL LEVEL

General requirements for the oil level check with gearbox oil cold or hot:

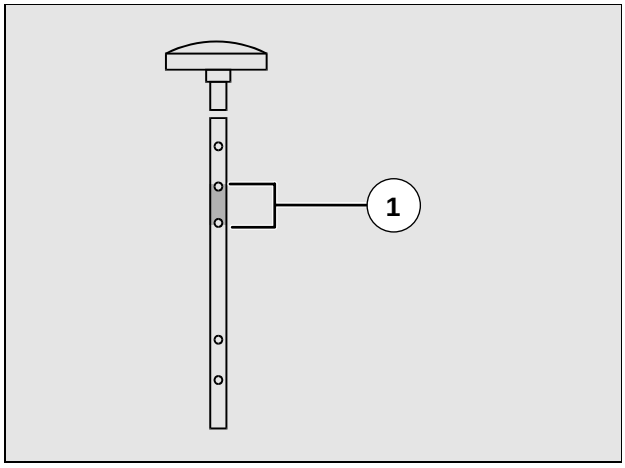
- Park the vehicle on a flat, level surface
- Apply the parking brake
- Shift the gearbox to neutral "N"

Note: Check the gearbox for leaks each time you check the oil.

Main oil level check – at operating temperature

Checking the gearbox oil level when the oil is hot (80 to 90 °C) and the engine idling is the **most accurate method**; the best time to perform the check is after a journey has been completed.

The idling speed should be set between 500 and 700 rpm. It must never be below 450 rpm!



- Run the engine at idling speed
- Check the oil level on the dipstick (→)

After approx. 2 minutes, the oil level must be within the "warm zone 80 to 90 °C" markings ①, add fresh oil as necessary.

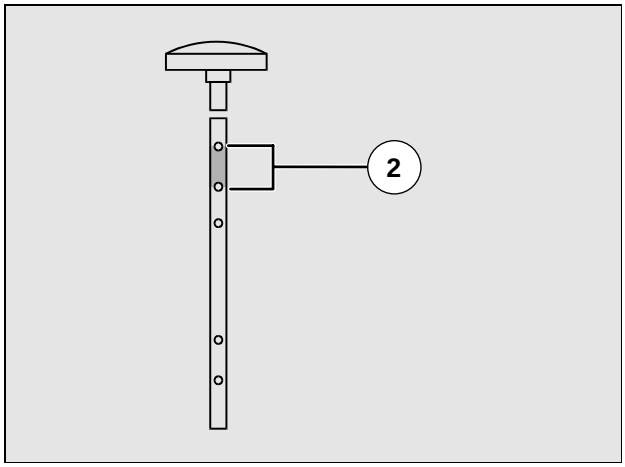
Preliminary oil level check

This oil level measurement is taken with the gearbox oil cold under the following exceptional circumstances:

- After an oil or filter change
- After repairs to the gearbox in the vehicle: e.g. removal of the oil sump, hydraulic control or oil cooler etc.
- If the vehicle has not been used for some time or when taking possession of another vehicle
- When a gearbox is operated for the first time

The main oil level check must then always be performed at operating temperature!

The preliminary oil level check involves a 2-step process:
1.) Check before starting the engine
2.) Check after starting the engine

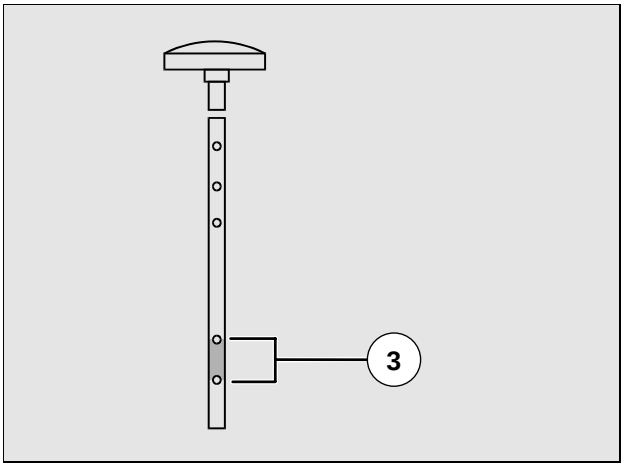


1. Check before starting the engine

- Check the oil level on the dipstick (→)

The oil level must be within or above the "standstill zone n_{eng}=0" ② markings.
Do not drain any oil if the level is higher than this!

2. Check after starting the engine



Gearbox damage!
After a cold start at sub-zero temperatures, the dipstick must be immersed in the oil to a depth of at least 10 mm. You must not run the gearbox warm unless this is the case.

- Run the engine at idling speed for about 3 to 5 minutes
- Then check the oil level on the dipstick (→)

The oil level must be within the "cold zone 30 °C" markings ③.

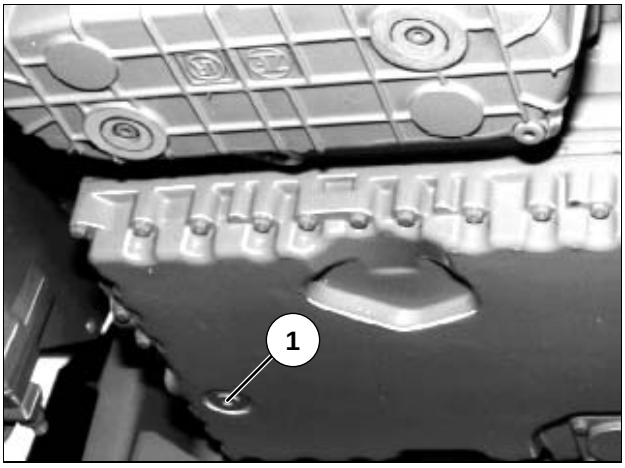
- The main oil level check must then be performed at operating temperature, see page 1!

OIL AND FILTER CHANGE
(only when the gearbox is at **operating temperature**)
Do **not** operate the retarder immediately before stopping the vehicle to change the oil! This ensures that the correct oil drain quantity is set in the gearbox.

Note: A new oil filter is also fitted each time the engine oil is changed.

Draining the oil

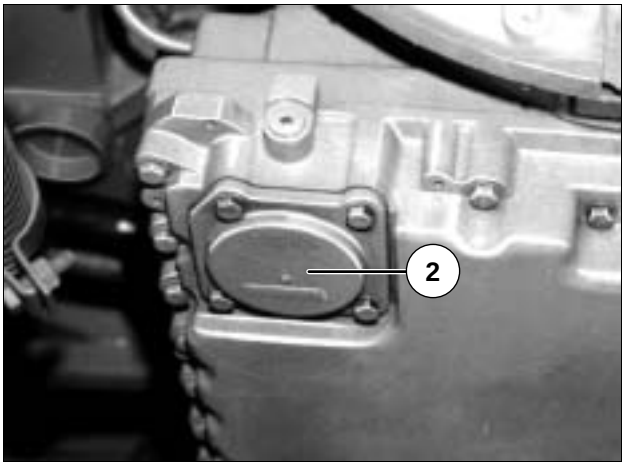
- Stop the engine
- Put an oil pan or similar underneath



Danger of burns!
Touching the parts or the gearbox oil can cause burns.

- Unscrew and remove screw plug ① from the oil sump

Fitting a new filter element (**each time** the oil is changed)

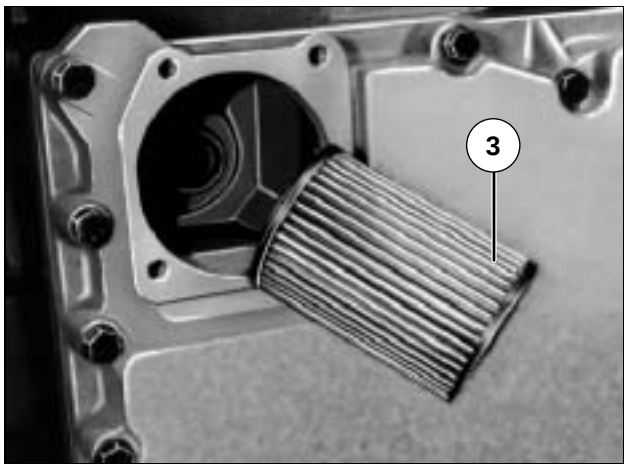


Danger of burns!
There is still oil in the filter element.

- Remove filter cover ②
- Drain all the oil

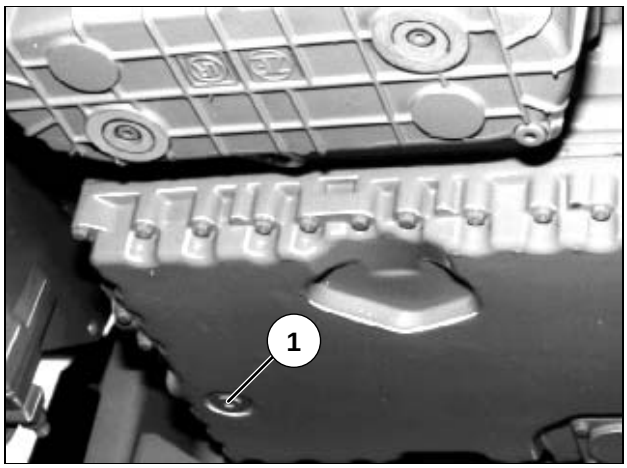
- Pull the filter element ③ with sealing ring off the suction pipe in the filter housing
- Apply grease to the outside of the new sealing ring
- Insert the new filter element
- Fit the filter cover

Tightening torque
Filter cover mounting bolts ..... 25 Nm



Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.
- Screw in and tighten screw plug ①

Tightening torque
Screw plug ..... 50 Nm

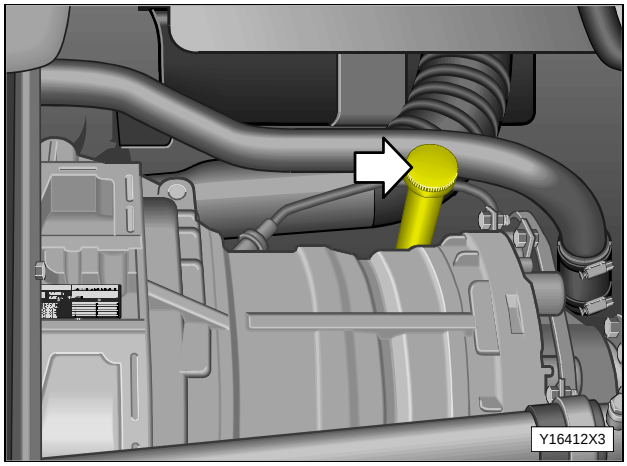


- Pull out the dipstick (→)
- Initially pour in at least 12 litres of oil through the filler neck

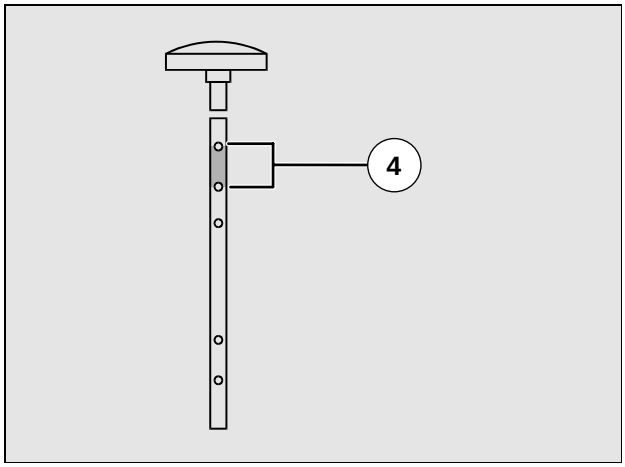
Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

Oil change quantity ..... 15 to 17 litres



- Then keep filling with oil until it reaches the "standstill zone" ④, see "Preliminary oil level check" on page 1
- Perform the preliminary oil level check, see page 1
- Top up the oil as necessary
- Then perform the main oil level check, see page 1



G 172 / 173 TRANSFER CASE

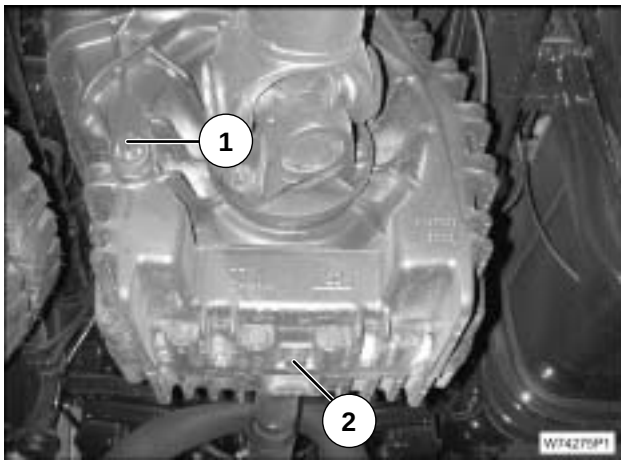
OIL LEVEL

Checking (with gearbox oil **cold**, <40 °C)
Do not check the oil level immediately after driving (incorrect reading).
Only check once the gearbox has cooled down.

Note: Check the gearbox for leaks each time you check the oil.

- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove oil filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary (see "Maintenance Recommendations and Recommended Service Products" booklet for oil specification).



- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torque
Oil filler plug ①..... 80 Nm

CHANGING THE OIL (with gearbox at **operating temperature**)
Change the oil after a long drive whilst the gearbox oil is still at operating temperature and has low viscosity.

Draining the oil
- Put an oil pan or similar underneath

Danger of burns!
Touching the gearbox or the gearbox oil can cause burns!

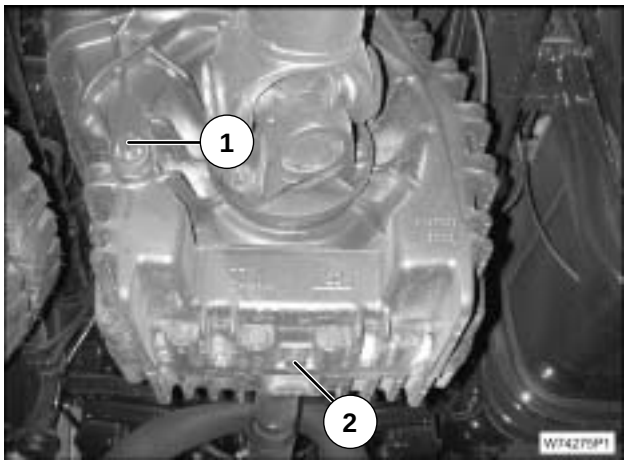
- Unscrew and remove oil drain plug ② and drain all the used oil
- Clean the magnetic stopper on the oil drain plug and fit a new sealing ring

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products“ booklet

Gearbox oil fill quantity
see .....Type plate, "Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

Danger of damage!
Ensure that the thread for the oil drain plug in the gearbox housing is absolutely clean!



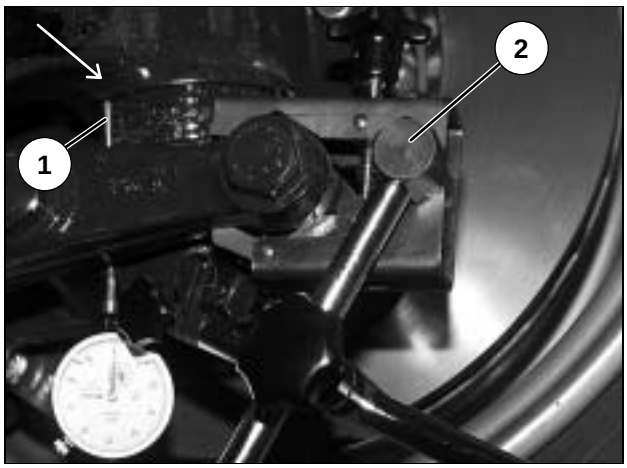
- Fit a new sealing ring on the oil drain plug ②, screw it in and tighten it
- Unscrew and remove oil filler plug ①
- Pour in oil through filler and checking hole ① until it reaches the bottom edge of the hole or starts flowing out of the hole
- Fit a new sealing ring on the oil filler plug
- Screw in and tighten the oil filler plug

Tightening torques

Oil filler plug ① ..... 80 Nm
Oil drain plug ② ..... 80 Nm

FRONT AXLE STEERING KNUCKLE

END PLAY



Checking

- Secure the vehicle to prevent it from rolling away
- Firmly attach bracket ② for the dial gauge on both sides of the track rod arm
- Fit the dial gauge so that tracer ① is centrally positioned on the free bottom edge (↓) of the axle stub

Note: The distance between the bracket attachment and the dial gauge tracer must be as short as possible.

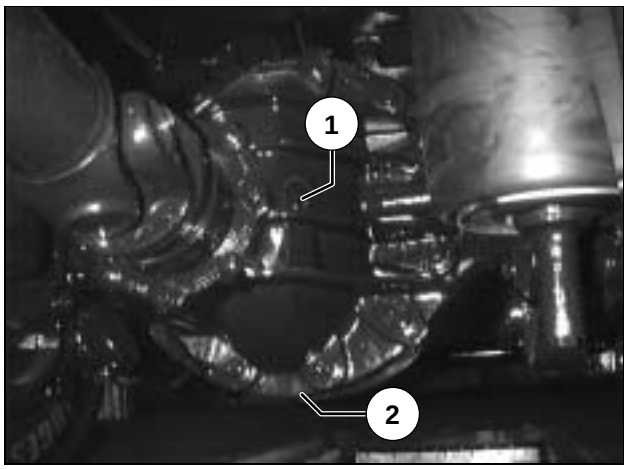
- Raise the front axle
- Zero the dial gauge needle
- Lower the front axle
- Read off the value from the dial gauge

Max. permitted play: 0.4 mm

Note: If the end play is greater than 0.4 mm, disassemble the steering knuckle and renew any parts which are damaged or defective.

- Remove the measuring equipment

HYPOID REAR AXLE HY – 1350



Checking condition, correct functioning, effectiveness, leak-tightness, routing, damage, corrosion, chafing

OIL LEVEL

Checking

- Park the vehicle on a flat, level surface
- Unscrew and remove checking and filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Screw in and tighten the checking and filler plug

Tightening torque

Checking and filler plug ① ..... 70 Nm

OIL CHANGE

Note: In vehicles with semilifetime oil fill, always renew the breather when changing the oil, see section 2.49.

Draining the oil

- Park the vehicle on a flat, level surface
- Collect the oil in suitable containers and dispose of it in the correct manner
- Unscrew and remove drain plug ②
- Drain the oil

Filling with oil

Oil fill quantity and specification

see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Screw in and tighten the oil drain plug ②
- Unscrew and remove checking and filler plug ①
- Pour in oil through the checking and filler hole until the oil overflows
- Screw in and tighten the checking and filler plug

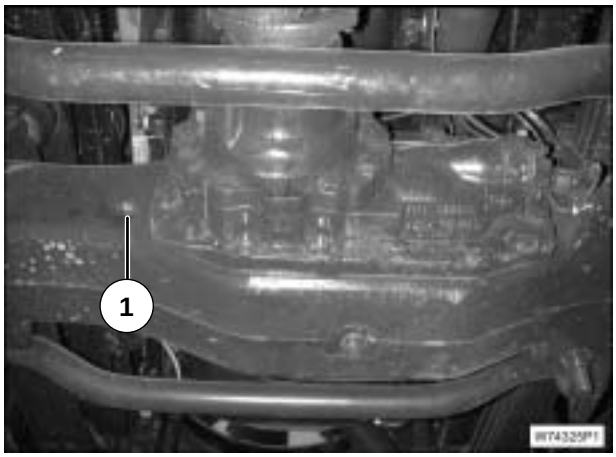
Tightening torques

Checking and filler plug ① ..... 70 Nm
Oil drain plug ② ..... 70 Nm

DRIVEN FRONT AXLE VP – 09

AXLE CENTRE DRIVE

OIL LEVEL



Checking
- Park the vehicle on a flat, level surface
- Stop the engine
- Put an oil pan or similar underneath
- Unscrew and remove checking and filler plug ①

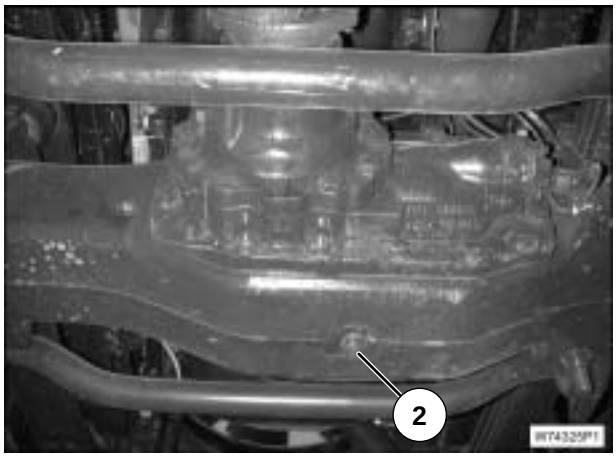
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary (see "Maintenance Recommendations and Recommended Service Products" booklet for oil specification).

- Screw in and tighten the checking and filler plug

Tightening torque
Checking and filler plug ① ..... 100 Nm

CHANGING THE OIL (with gearbox at **operating temperature**)
Change the oil after a long drive whilst the gearbox oil is still at operating temperature and has low viscosity.

Draining the oil
- Put an oil pan or similar underneath



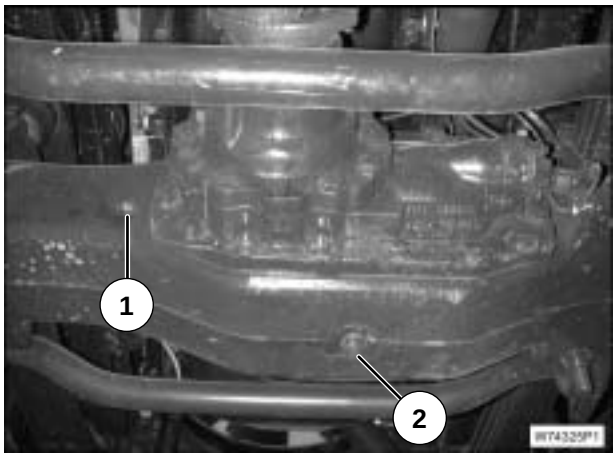
Danger of burns!
Touching the gearbox or the gearbox oil can cause burns!

- Unscrew and remove the oil drain plug ②
- Drain all the used oil
- Clean the magnetic stopper on the oil drain plugs

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Gearbox oil specification
see ....."Maintenance Recommendations and Recommended Service Products“ booklet

Gearbox oil fill quantity
see ....."Technical Data" or "Maintenance Recommendations and Recommended Service Products" booklet.

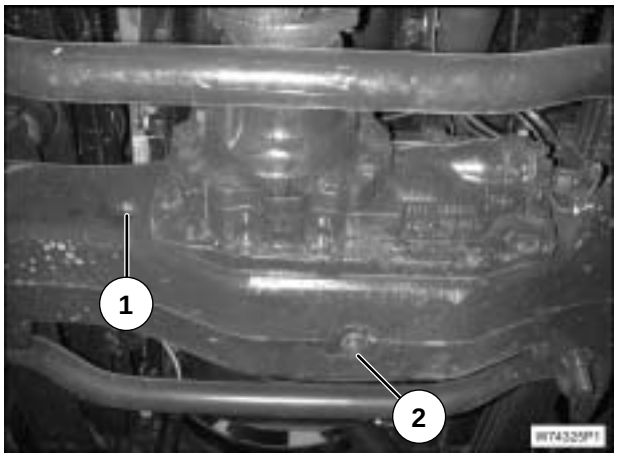


Danger of damage!
Ensure that the thread for the oil drain plug in the gearbox housing is absolutely clean!

- Screw in and tighten the oil drain plug ②
- Unscrew and remove checking and filler plug ①

- Pour in 6 litres of oil through the checking and filler hole ①
- Screw in and tighten the checking and filler plug

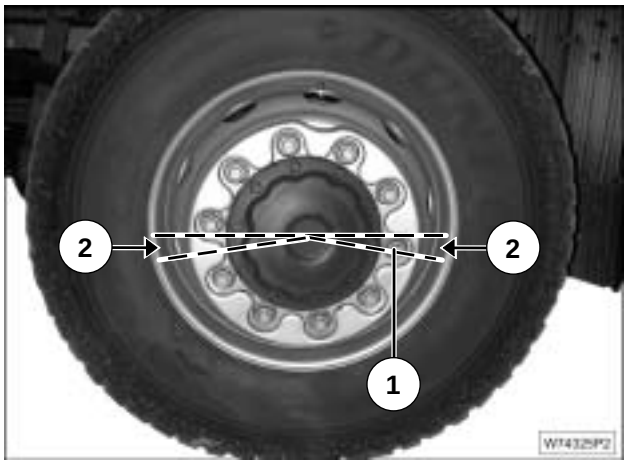
Tightening torque
Checking and filler plug ① ..... 100 Nm
Oil drain plug ② ..... 100 Nm



PLANETARY HUB DRIVE (example illustrated)

OIL LEVEL

Checking
- Park the vehicle on a flat, level surface
- Ensure that the checking plug ① is approx. 7° ② lower than the horizontal centre line (both sides are possible)

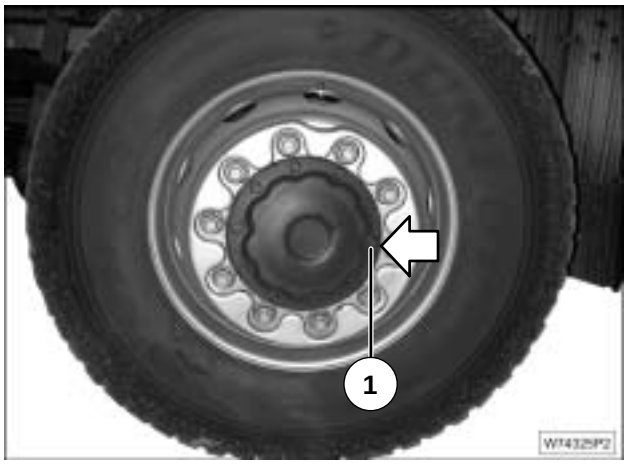


- Unscrew the checking plug ①

The oil level must reach the bottom edge of the checking plug. Top up the oil until it overflows, if necessary.

- Screw in and tighten the checking plug

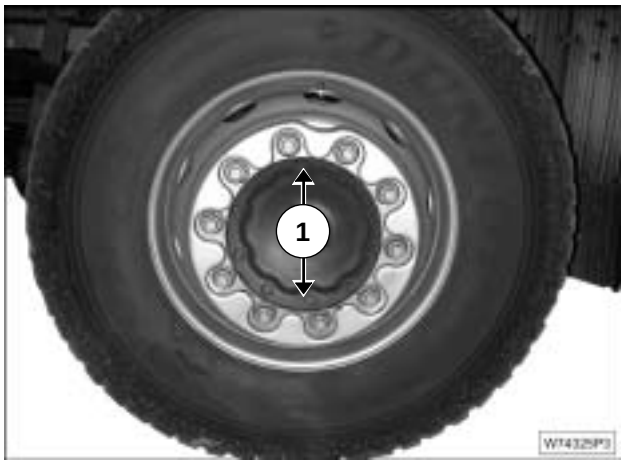
Tightening torque
Checking plug ..... 95 Nm



OIL CHANGE

Draining the oil

- Park the vehicle on a flat, level surface and align the checking/filler plugs ① vertically (⇳)
- Attach the oil drain chute, MAN no. 80.99629-0001
- Unscrew and remove checking/filler plugs ①
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner



Filling with oil

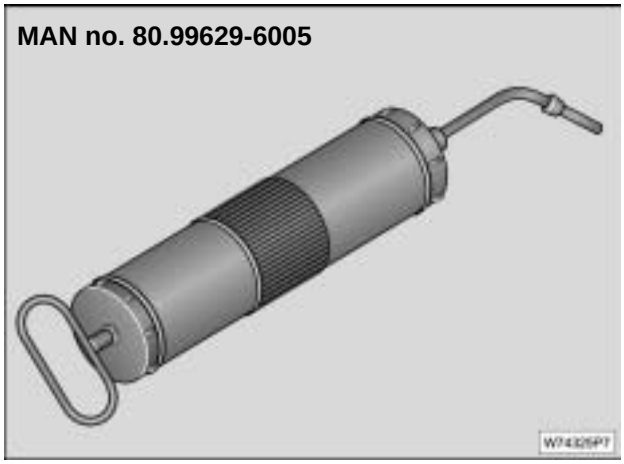
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely. When filling with oil, use measuring cup (MAN no. 80.99629-0030) and universal hand pump (MAN no. 80.99629-6005).

Oil fill quantity and specification

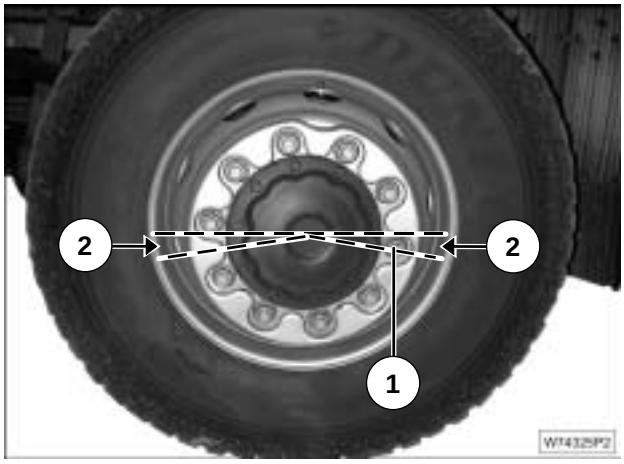
see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

MAN no. 80.99629-0030

MAN no. 80.99629-6005



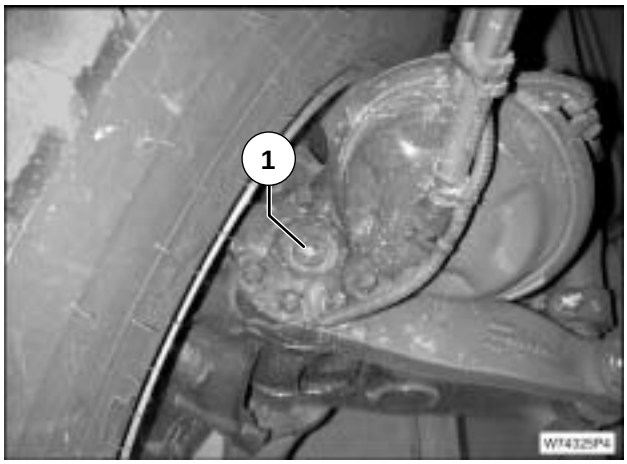
- Ensure that the checking plug ① is approx. 7° ② lower than the horizontal centre line (both sides are possible)
- Use the universal hand pump to fill with the specified quantity of oil until oil overflows
- Screw in and tighten the checking/filler plugs ①



Tightening torques

Checking/filler plugs..... 95 Nm

STEERING KNUCKLE BEARINGS



Checking the oil level

- Unscrew and remove screw plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up oil, if necessary (see "Maintenance Recommendations and Recommended Service Products" booklet for oil specification).

- Screw in the screw plugs

Checking play

- Apply the parking brake
- Raise the front axle and relieve the steering knuckle of load
- Shake the wheel to check the play between the axle beam end and the steering knuckle

Check the steering knuckle bearings checked if there is considerable play.

PLANETARY REAR AXLE HP – 1352

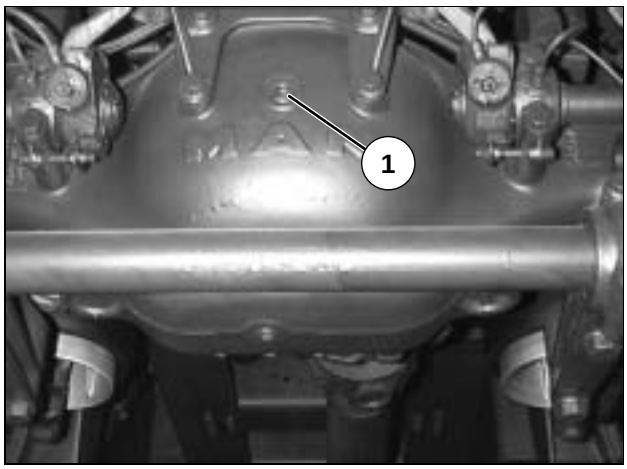
AXLE CENTRE DRIVE

OIL LEVEL

Checking
- Park the vehicle on a flat, level surface
- Unscrew checking and filler plug ①

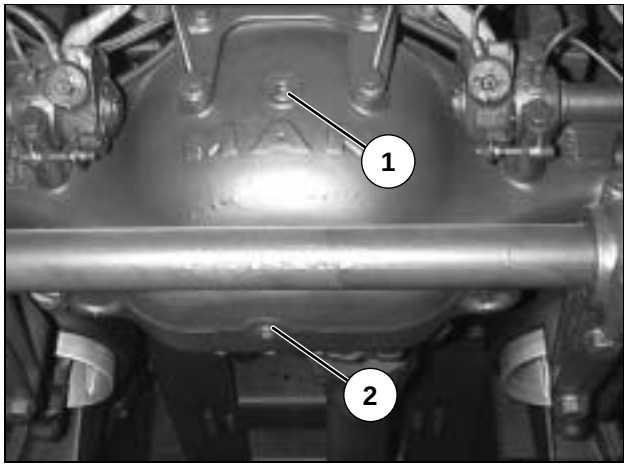
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.
- Screw in and tighten the checking and filler plug

Tightening torque
Checking and filler plug ① ..... 100±10 Nm



OIL CHANGE

Draining the oil
- Park the vehicle on a flat, level surface
- Collect the oil in suitable containers and dispose of it in the correct manner
- Unscrew drain plug ②
- Drain the oil



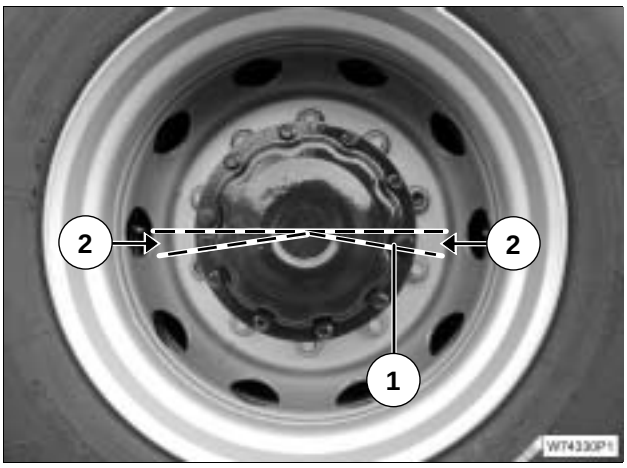
Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Oil fill quantity and specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Screw in and tighten the oil drain plug ②
- Unscrew checking and filler plug ①
- Pour in oil through the checking and filler hole until the oil overflows
- Screw in and tighten the checking and filler plug

Tightening torques
Checking and filler plug ① ..... 100±10 Nm
Oil drain plug ② ..... 100±10 Nm

PLANETARY HUB DRIVE (example illustrated)

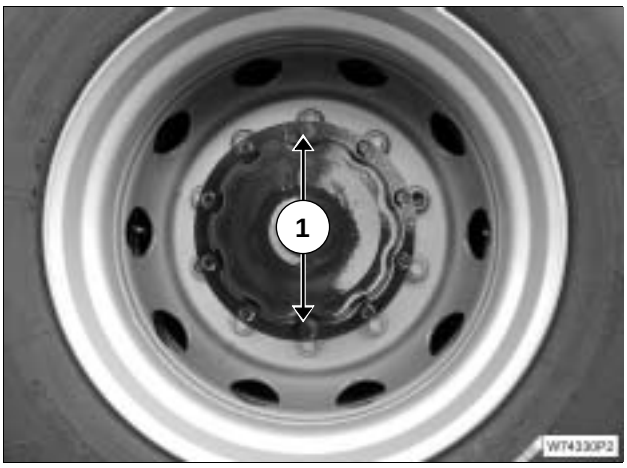


OIL LEVEL

Checking
- Park the vehicle on a flat, level surface and ensure the checking plugs ① are approx. 7° ② lower in relation to the horizontal centre line (both sides possible)
- Unscrew the checking plug ①

The oil level must reach the bottom edge of the checking plug. Top up the oil until it overflows, if necessary.
- Screw in and tighten the checking plug

Tightening torque
Checking/filler plug 95Nm



OIL CHANGE

Draining the oil
- Park the vehicle on a flat, level surface and align the checking/filler plugs ① vertically (⇳)
- Attach the oil drain chute, MAN no. 80.99629-0001
- Unscrew checking/filler plugs ①
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely. When filling with oil, use measuring cup (MAN no. 80.99629-0030) and universal hand pump (MAN no. 80.99629-6005).

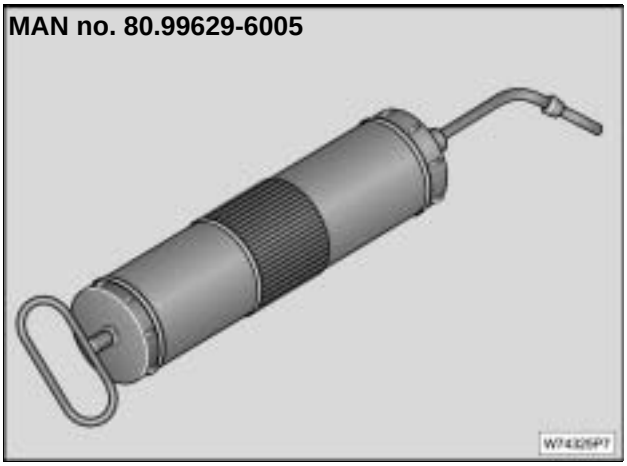
MAN no. 80.99629-0030

Oil fill quantity and specification
see ..... "Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Ensure that the checking plug ① is approx. 7° ② lower in relation to the horizontal centre line (both sides are possible) — see top figure —

- Use the universal hand pump to fill with the specified quantity of oil until oil overflows
- Screw in and tighten the checking plug

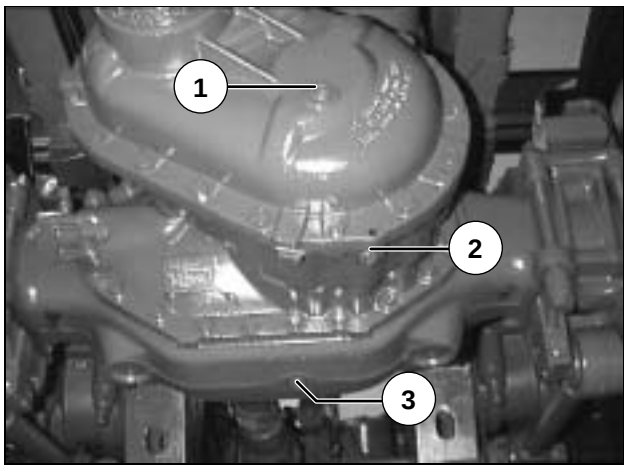
MAN no. 80.99629-6005



Tightening torques
Checking/filler plug ..... 95 Nm

- Screw in and tighten the checking/filler plugs ①

PLANETARY REAR AXLE HPD – 1382

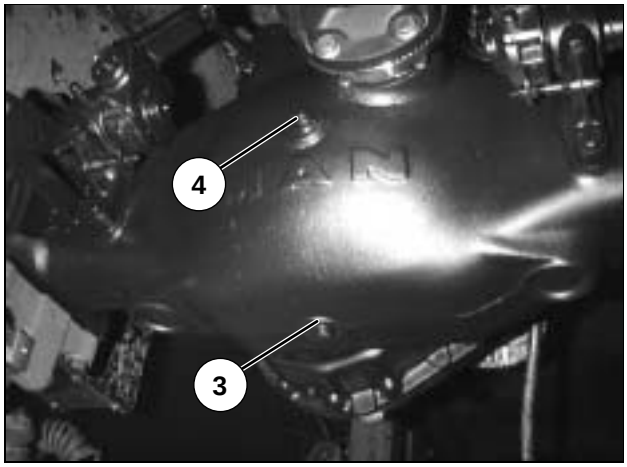


POWER DIVIDER

In vehicles with two driven rear axles, the centre housing of the 1st rear axle is combined with a power divider which sends the drive to the 2nd rear axle via a propshaft.

1 Power divider filler hole
2 Power divider drain hole
3 Axle centre drive drain hole
4 Axle centre drive **and** power divider filler and checking hole

OIL LEVEL



Checking

- Park the vehicle on a flat, level surface
- Unscrew the checking and filler plug ④ from the axle centre drive

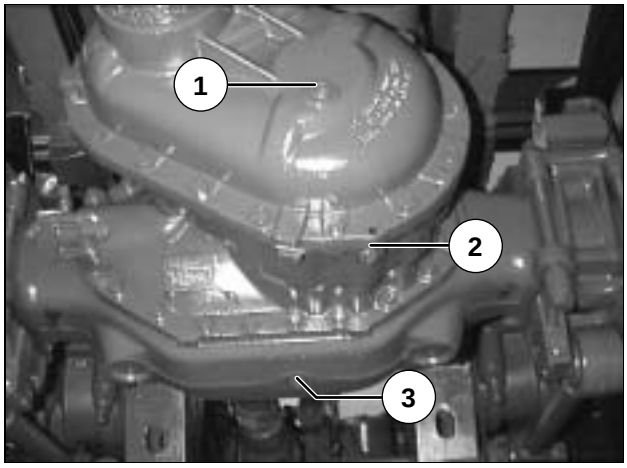
The oil must reach the bottom edge of the checking and filler hole. Top up at filler hole ① until oil overflows at ④ if necessary.

- Screw in and tighten the oil filler plug

Tightening torques

Oil filler plug ① ..... 100±10 Nm
Checking and filler plug ④ ..... 100±10 Nm

OIL CHANGE



Draining the oil

- Park the vehicle on a flat, level surface
- Unscrew oil drain plugs ② and ③
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner

Tightening torque

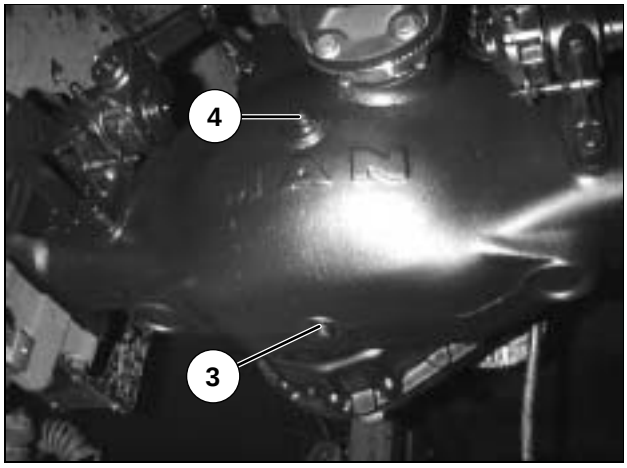
Oil drain plugs ② and ③ ..... 70 Nm

Filling with oil

The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

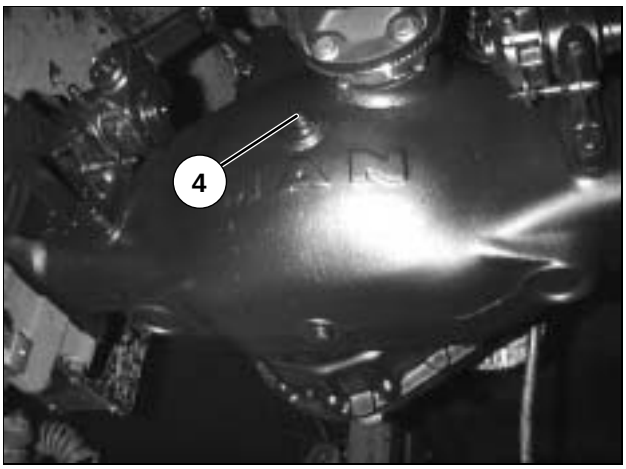
Oil fill quantity and specification

see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".



- Screw in and tighten the drain plugs
- Unscrew oil filler plug ①
- Unscrew checking and filler plug ④

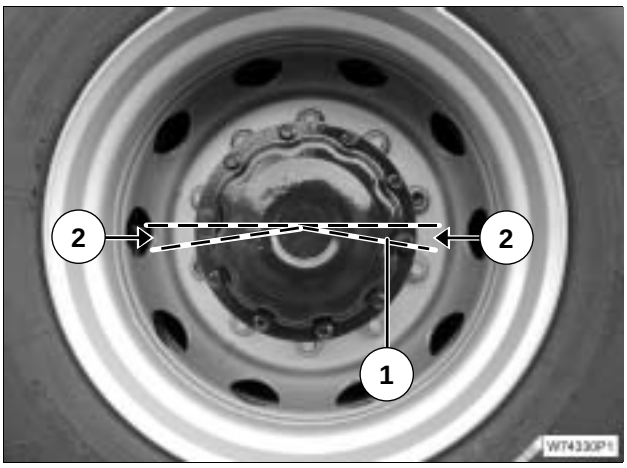
- Pour approx. 80% of the desired quantity through checking and filler hole ④ on the axle centre drive



Then:
- Pour the rest of the oil into power divider filler hole ① until the oil overflows at the filler and checking hole ④ on the axle centre drive
- Screw in and tighten the checking and filler plugs

Tightening torques
Oil filler plug ① (see page 1) ..... 100±10 Nm
Checking and filler plug ④..... 100±10 Nm

PLANETARY HUB DRIVE (example illustrated)

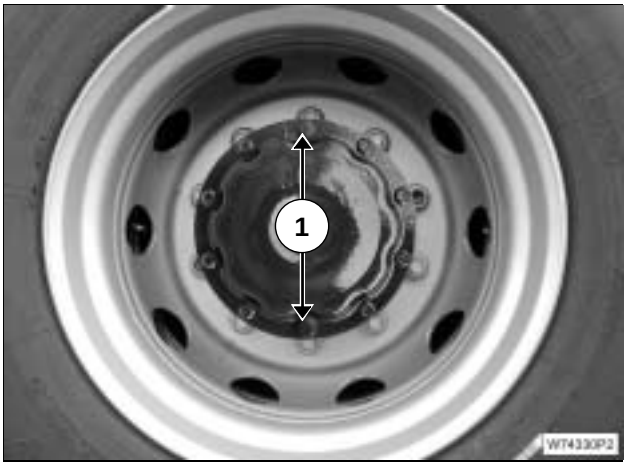


OIL LEVEL

Checking
- Park the vehicle on a flat, level surface and ensure the checking plugs ① are approx. 7° ② lower in relation to the horizontal centre line (both sides possible)
- Unscrew the checking plug ①

The oil level must reach the bottom edge of the checking plug. Top up the oil until it overflows, if necessary.
- Screw in and tighten the checking plug

Tightening torque
Checking/filler plug ..... 95 Nm

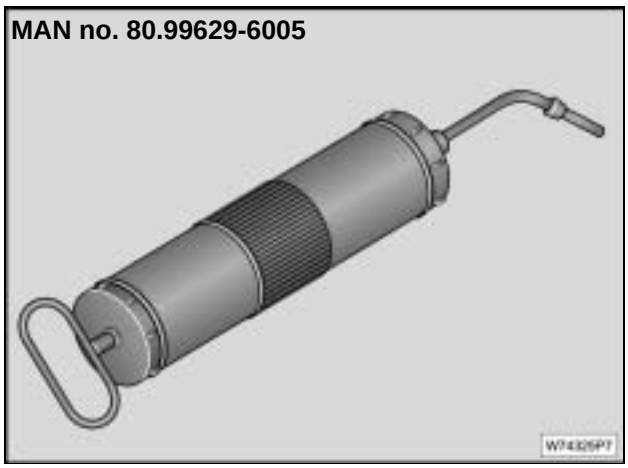


OIL CHANGE

Draining the oil
- Park the vehicle on a flat, level surface and align the checking/filler plugs ① vertically (⇳)
- Attach the oil drain chute, MAN no. 80.99629-0001
- Unscrew checking/filler plugs ①
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner

Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely. When filling with oil, use measuring cup MAN no. 80.99629-0030 and — see next page —

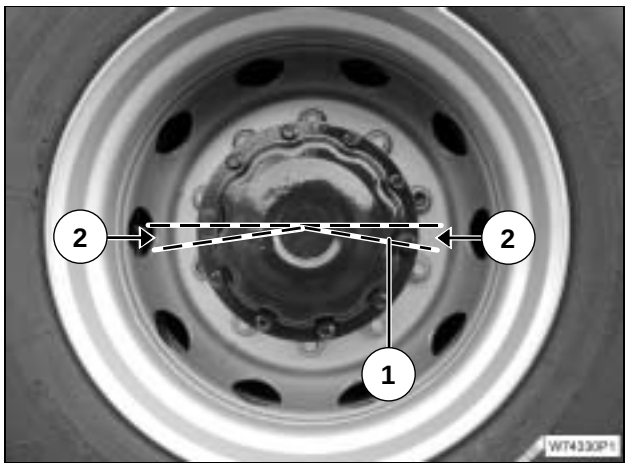
Universal hand pump (MAN no. 80.99629-6005).



Oil fill quantity and specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Ensure that the checking plug ① is approx. 7° ② lower in relation to the horizontal centre line (both sides are possible)

- Use the universal hand pump to fill with the specified quantity of oil until oil overflows
- Screw in and tighten the checking plug



Tightening torques
Checking/filler plugs..... 95 Nm

PLANETARY REAR AXLE H9 – 13120

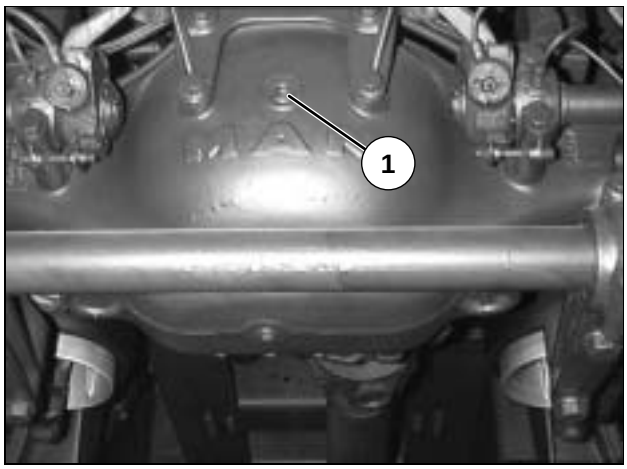
AXLE CENTRE DRIVE

OIL LEVEL

Checking
- Park the vehicle on a flat, level surface
- Unscrew checking and filler plug ①

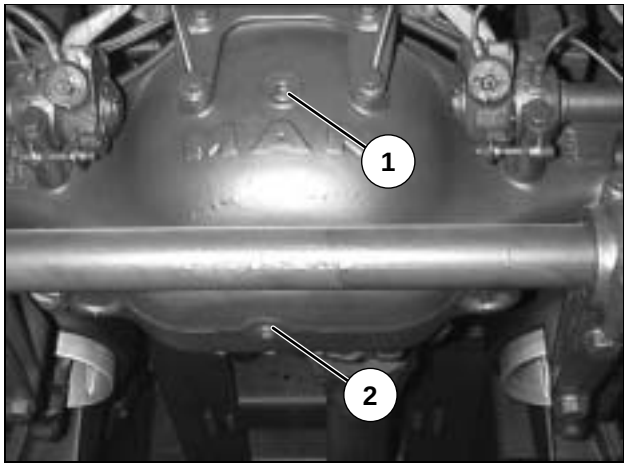
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.
- Screw in and tighten the checking and filler plug

Tightening torque
Checking and filler plug ① ..... 70 Nm



OIL CHANGE

Draining the oil
- Park the vehicle on a flat, level surface
- Collect the oil in suitable containers and dispose of it in the correct manner
- Unscrew drain plug ②
- Drain the oil



Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Oil fill quantity and specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Screw in and tighten the oil drain plug ②
- Unscrew checking and filler plug ①
- Pour in oil through the checking and filler hole until the oil overflows
- Screw in and tighten the checking and filler plug

Tightening torques
Checking and filler plug ① ..... 70 Nm
Oil drain plug ② ..... 70 Nm

PLANETARY HUB DRIVE

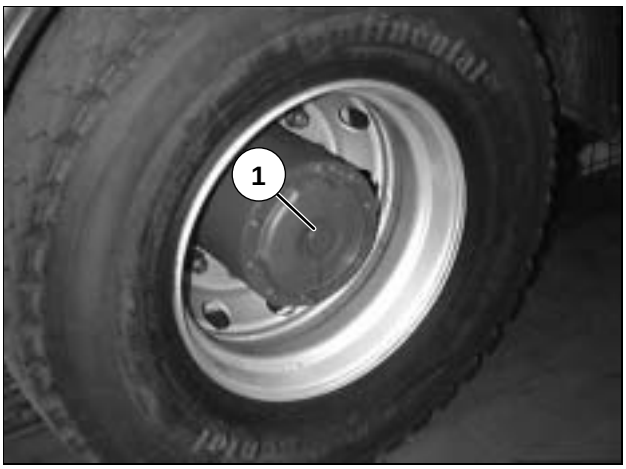
OIL LEVEL

Checking

- Park the vehicle on a flat, level surface
- Unscrew checking and filler plug ①

The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.

- Fit a new sealing ring on the checking and filler plug
- Screw in and tighten the checking and filler plug



Tightening torque

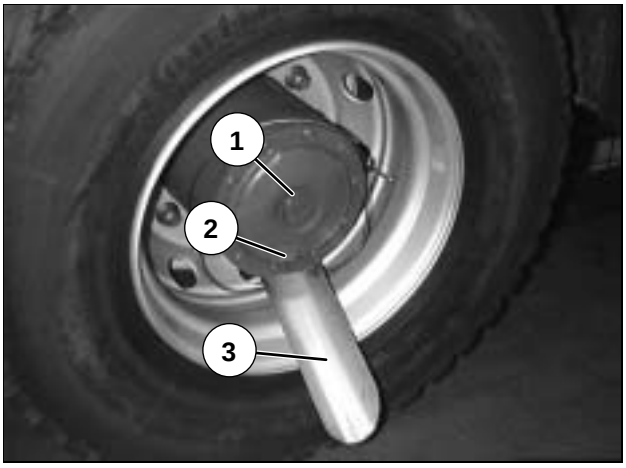
Checking and filler plug ①

M45x1,5 Aluminium cover ..... 180 Nm
M45x1.5 Sheet-steel cover..... 325 Nm

OIL CHANGE

Draining the oil

- Park the vehicle on a flat, level surface
- Align the oil drain plug ② at its lowest point and fit oil drain chute ③ MAN no. 80.99629-0001
- Unscrew the oil drain plug
- Unscrew and remove checking and filler plug ①
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner

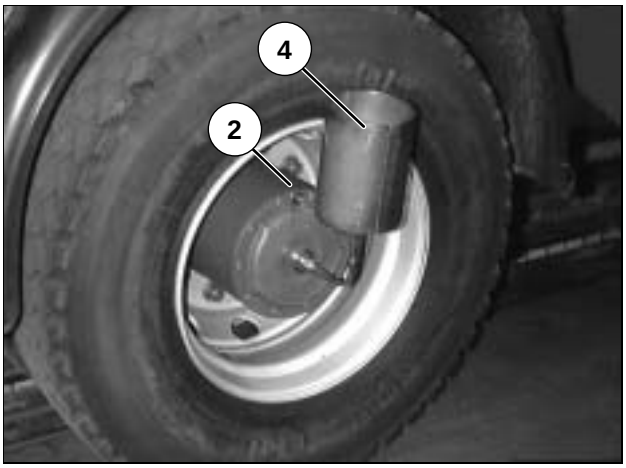


Filling with oil

The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Oil fill quantity and specification

see ..... "Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".



- Align drain hole ② at its highest point to allow better ventilation
- Insert oil fill funnel ④ MAN part no. 80.99629-0003 into the filler hole
- Pour in the specified quantity of oil through the oil fill funnel until the oil starts to overflow
- Screw off the oil fill funnel
- Renew the sealing rings on the checking and filler plug and the oil drain plug
- Screw in and tighten the checking and filler plug and the oil drain plug

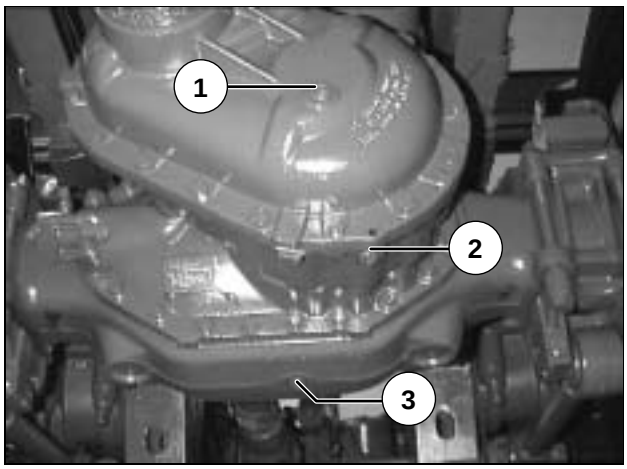
Tightening torques

Oil drain plug ② ..... 80 Nm

PLANETARY REAR AXLE HD9

POWER DIVIDER

In vehicles with two driven rear axles, the centre housing of the 1st rear axle is combined with a power divider which sends the drive to the 2nd rear axle via a propshaft.



1 Power divider filler hole
2 Power divider drain hole
3 Axle centre drive drain hole
4 Axle centre drive **and** power divider filler and checking hole

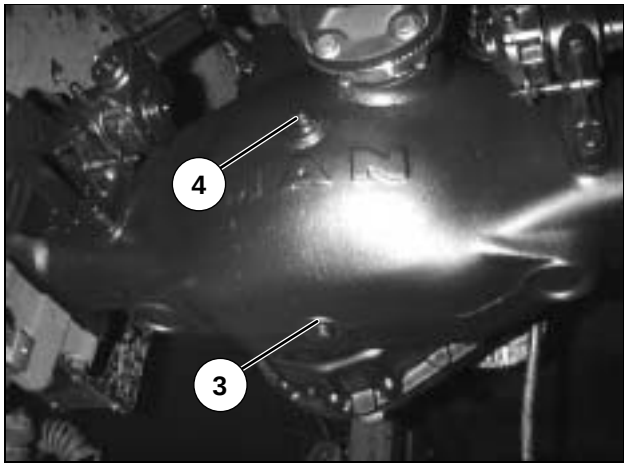
OIL LEVEL

Checking

- Park the vehicle on a flat, level surface
- Unscrew the checking and filler plug ④ from the axle centre drive

The oil must reach the bottom edge of the checking and filler hole. Top up at filler hole ① until oil overflows at ④ if necessary.

- Screw in and tighten the oil filler plug



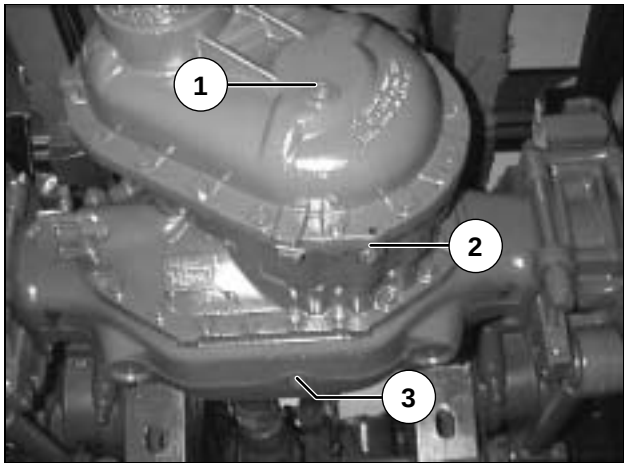
Tightening torques

Oil filler plug ① ..... 70 Nm
Checking and filler plug ④ ..... 70 Nm

OIL CHANGE

Draining the oil

- Park the vehicle on a flat, level surface
- Unscrew oil drain plugs ② and ③
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner



Tightening torque

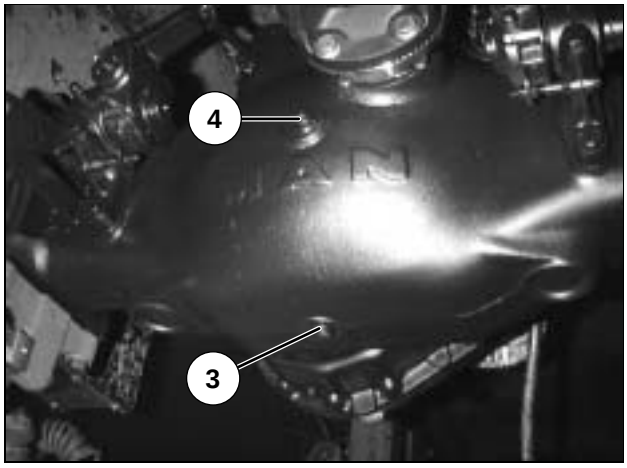
Oil drain plugs ② and ③ ..... 70 Nm

Filling with oil

The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Oil fill quantity and specification

see ....."Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".



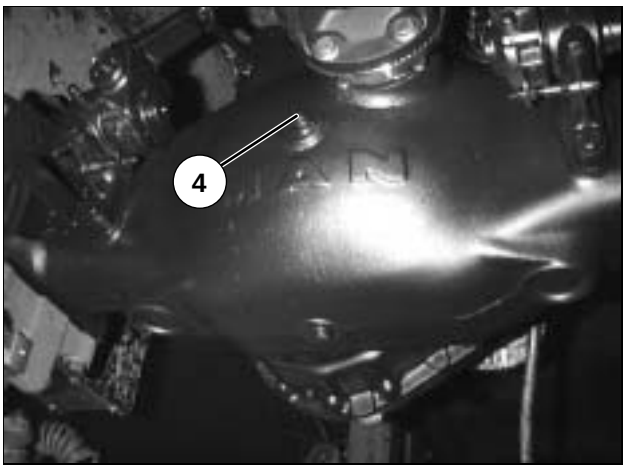
- Screw in and tighten the drain plugs
- Unscrew oil filler plug ①
- Unscrew checking and filler plug ④

- Pour approx. 80% of the desired quantity through checking and filler hole ④ on the axle centre drive

Then:

- Pour the rest of the oil into power divider filler hole ① until the oil overflows at the filler and checking hole ④ on the axle centre drive
- Screw in and tighten the checking and filler plugs

Tightening torques
Oil filler plug ① (see page 1) ..... 70 Nm
Checking and filler plug ④..... 70 Nm



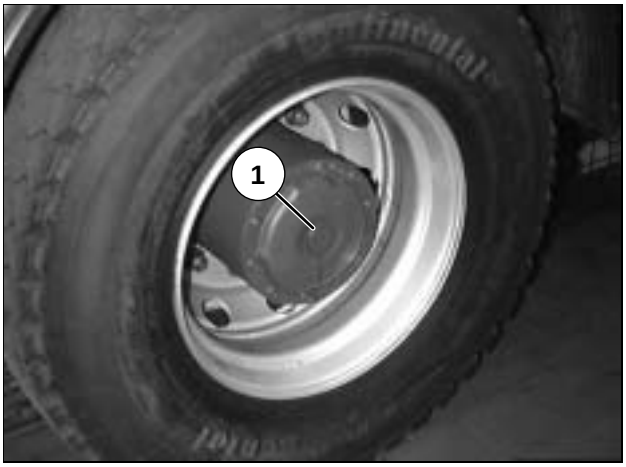
PLANETARY HUB DRIVE

OIL LEVEL

Checking
- Park the vehicle on a flat, level surface
- Unscrew checking and filler plug ①

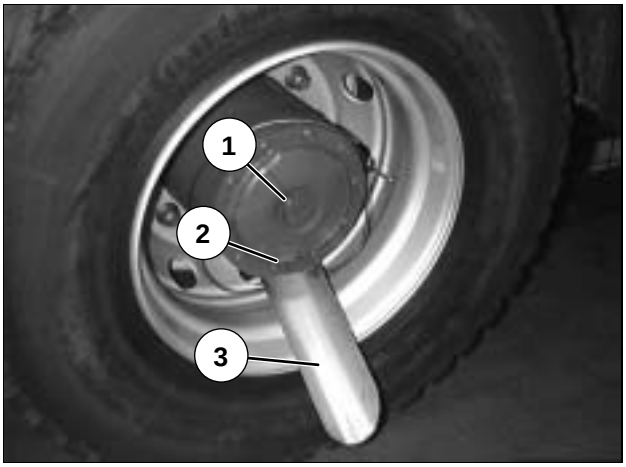
The oil must reach the bottom edge of the checking and filler hole. Top up until oil overflows, if necessary.
- Fit a new sealing ring on the checking and filler plug
- Screw in and tighten the checking and filler plug

Tightening torque
Checking and filler plug ①
M45x1,5 Aluminium cover ..... 180 Nm
M45x1.5 Sheet-steel cover..... 325 Nm



OIL CHANGE

Draining the oil
- Park the vehicle on a flat, level surface
- Align the oil drain plug ② at its lowest point and fit oil drain chute ③ MAN no. 80.99629-0001
- Unscrew the oil drain plug
- Unscrew checking and filler plug ①
- Drain all the oil
- Collect the oil in suitable containers and dispose of it in the correct manner

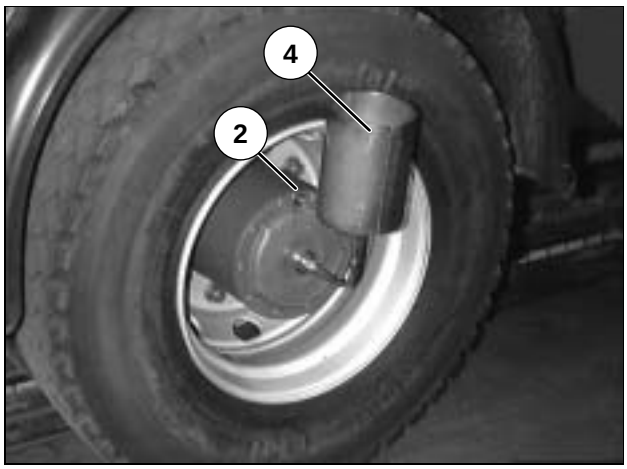


Filling with oil
The decisive factors in obtaining the required oil quantity are filling the oil correctly and performing the oil level check precisely.

Oil fill quantity and specification
see ..... "Maintenance Recommendations and Recommended Service Products" booklet, fill quantities are listed in section 0.70, "Technical Data".

- Align drain hole ② at its highest point to allow better ventilation

- Insert oil fill funnel ④ MAN part no. 80.99629-0003 into the filler hole
- Pour in the specified quantity of oil through the oil fill funnel until the oil starts to overflow
- Screw off the oil fill funnel
- Renew the sealing rings on the checking and filler plug and the oil drain plug
- Screw in and tighten the checking and filler plug and the oil drain plug



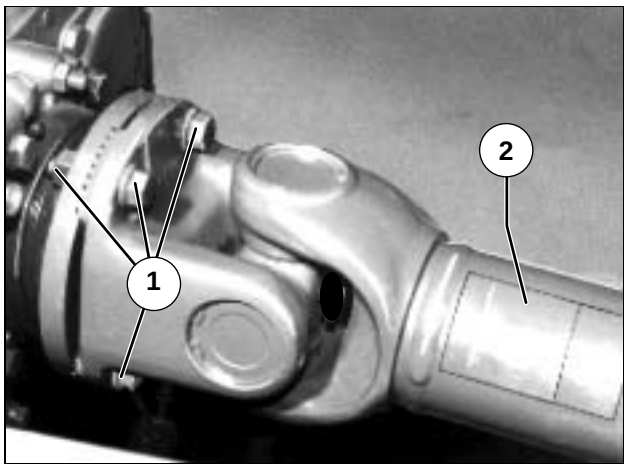
Tightening torques

Checking and filler plug ①
- M45x1,5 Aluminium cover ..... 180 Nm
- M45x1.5 Sheet-steel cover ..... 325 Nm

Oil drain plug ② ..... 80 Nm

PROPSHAFTS

The propshafts are maintenance-free, i.e. the universal joints and sliding sections do not require lubrication.



PROPSHAFT FLANGE

Checking condition and firm seating

- Check that all screw connections ① on the propshaft flanges are firmly seated

BALANCING PLATE(S)

Checking condition and firm seating

- Check that balancing plate(s) ② is/are fitted and firmly seated

SLIDING SECTION AND UNIVERSAL JOINT

Checking condition and firm seating

- Apply alternating loads to the sliding sections and universal joints to check they are free from play

BEARING BUSHES

Checking condition and firm seating

- Check for damage to the seals on the bearing bushes and on the sliding section
- Check that none of the bearing bush retaining rings are missing
- Check the bearing bushes for signs of overheating (changes in colour or shape)

INTERMEDIATE BEARING

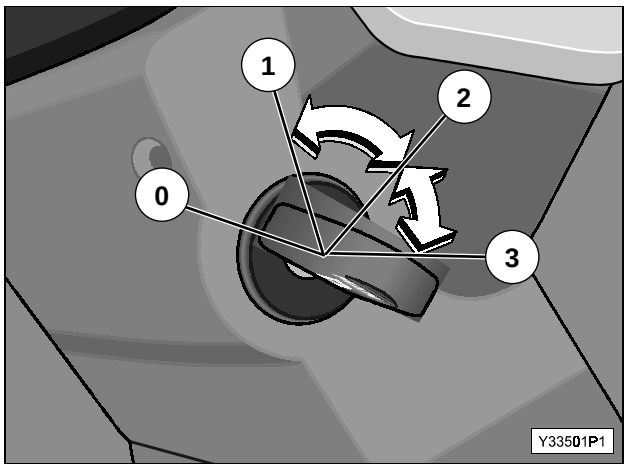
Checking condition and firm seating

- Check the screwed connection on the intermediate bearing
- Check the rubber element for damage

STEERING SYSTEM

STEERING / STARTER LOCK

LOCKING FUNCTION OF STEERING / STARTER LOCK



Checking (with vehicle at a **standstill**)
- Apply the parking brake
- Stop the engine
- Turn the ignition key to position "0"
- Turn the steering wheel approx. half a revolution to the left and to the right

The steering/starter lock must not engage (lock)

The locking pin in the steering/starter lock mechanism must not engage until the ignition key has been removed; fit a new steering/starter lock if it does.

Key position
0 Insert or remove the key, stop the engine
1 Ignition on, activate battery master switch
2 Driving position
3 Start position

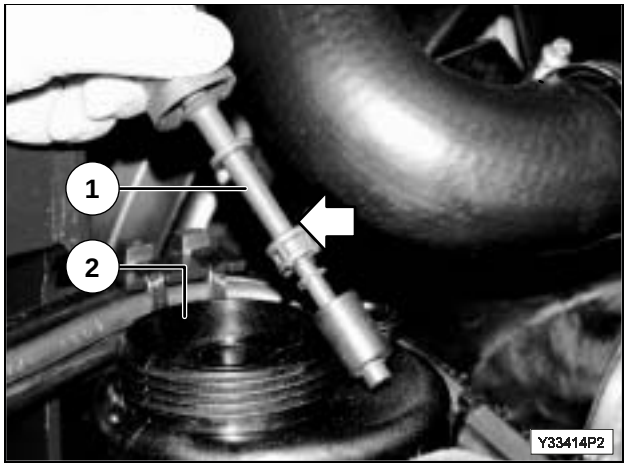
POWER STEERING SYSTEM

Inspect the ZF power steering system according to the instructions given by the manufacturer (also see Repair Manual "L 0").
- Check all screwed connections in the steering system for leaks
- Make sure that the hydraulic lines and hose lines are correctly routed
- Renew any hydraulic lines or hose lines which have suffered damage or chafing (hydraulic hose lines must not be used if 10 years have elapsed since their date of manufacture)

FLUID LEVEL

Checking
- Park the vehicle on a flat, level surface
- Tilt the cab
- Remove the dipstick ① and check the fluid level

The fluid level must reach the upper dipstick mark (→) when the engine is not running.
- Top up the fluid to the correct level through filler hole ②, if necessary



Check the system for leaks if the fluid needs to be topped up.

Hydraulic oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Rear axle steering system

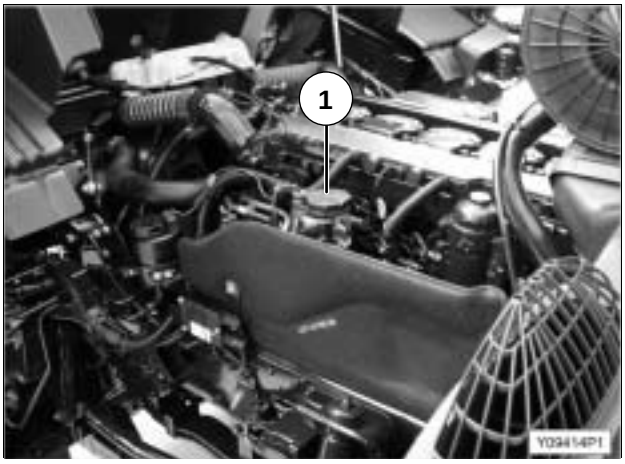
Testing

- Park the vehicle on a flat, level surface with the steering in straight-ahead position
- Tilt the cab
- Check the fluid level in the oil reservoir ①

The fluid level must be 1 to 2 cm above the upper mark on the transparent oil reservoir ①.

- Top up the fluid to the correct level through the oil reservoir filler hole, if necessary

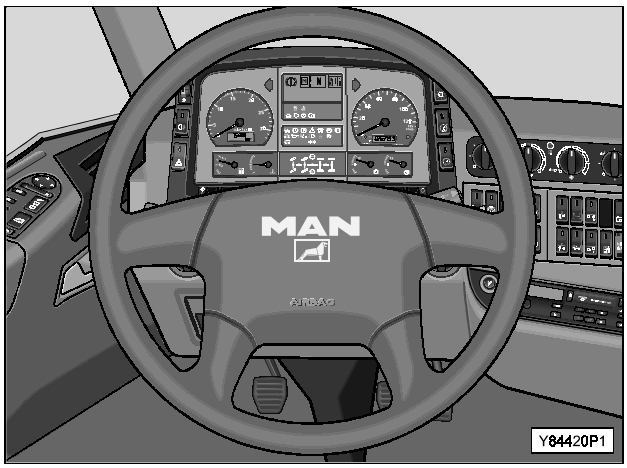
Check the system for leaks if the fluid needs to be topped up.



Hydraulic oil specification

see ..... "Maintenance Recommendations and Recommended Service Products“ booklet

STEERING PLAY



Checking

- Run the engine at idling speed
- Turn the steering wheel approx. 40 mm

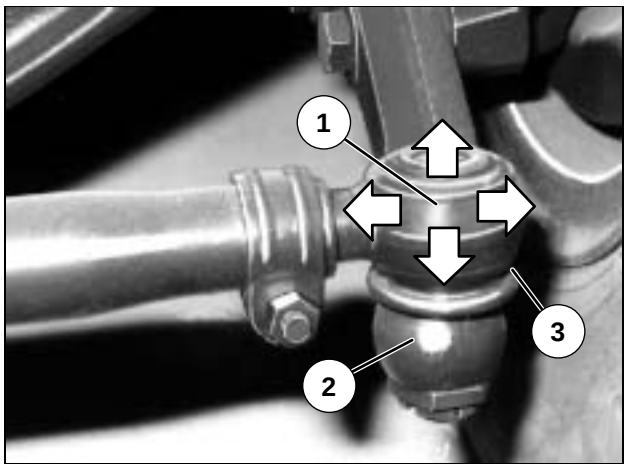
The steered wheels must visibly move.

DRAG LINKS AND TRACK RODS

Checking condition

- Check the drag links and track rods for deformation

BALL JOINTS



Checking play

Check when the vehicle is ready to drive, i.e. do not raise the front axle.

With the wheels in straight-ahead position:

- Get someone to move the steering wheel back and forth
- Whilst they are doing this, grasp the ball head ① and steering arm ② from above

When the steering wheel is moved back and forth, the max. permitted radial play (⇔) on the ball head is 0.25 mm whilst the max. permitted axial play (⇳) is 2.0 mm. If in doubt, press against the ball head using an assembly lever and measure the play using a slide gauge.

Under no circumstances must there be any play when the ball head is pushed and pulled by hand.

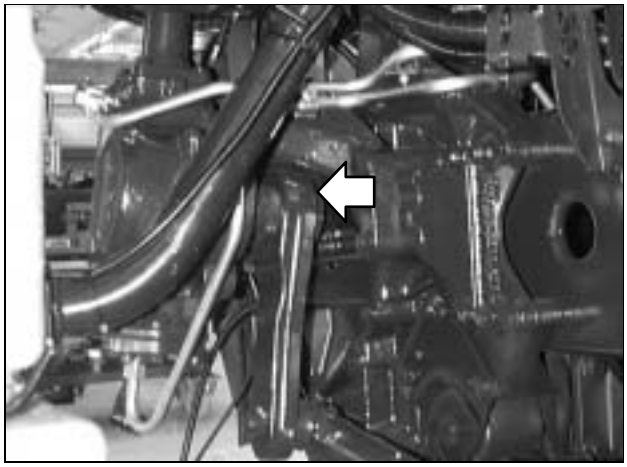
Note: We recommend having the front axle optically measured if the tyres are abnormally worn.

SEALING BELLOWS

Checking

- Check the sealing bellows ③ for damage
- Renew sealing bellows or ball joints that are damaged

DROP ARM NUT



Checking firm seating

- Check that the drop arm nut (←) is firmly seated

COMPRESSED AIR SYSTEM

AIR DRYER

Checking correct functioning and effectiveness
Drain all the reservoir tanks when checking with the compressed air system charged.

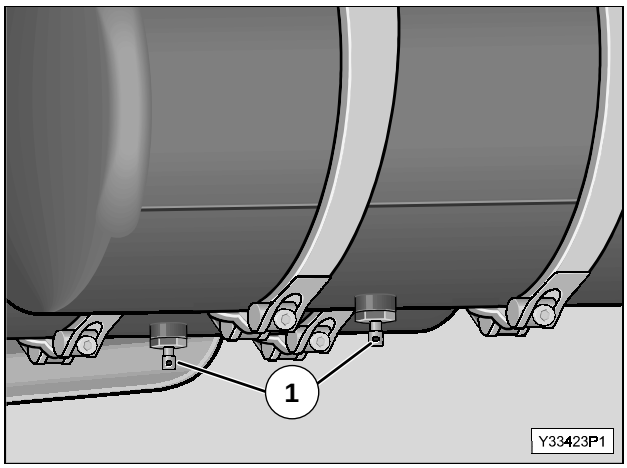
Danger of accidents!
Use a suitable tool to actuate the drain valve.
– Protect your eyes and hands!

- Charge the compressed air system
- Push the valve poppet ① to the side on all compressed air reservoirs

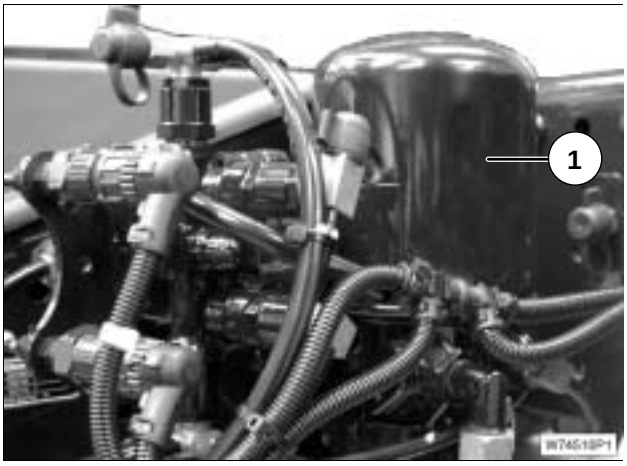
Only air must emerge.

Note: If **condensation** emerges, drain all the tanks and check the system again a few days later. If condensation is still present, replace the granulate cartridge or have the air dryer / ECAM inspected at a MAN Service workshop. Have the system checked at a MAN Service workshop if there are **oil deposits.**

A new granulate cartridge must be fitted every 2 years.



AIR DRYER GRANULATE CARTRIDGE
(example illustrated)



Changing

Danger of accidents!
The granulate cartridge ① may only be changed in depressurised state. A blow-off noise must be heard.

- Switch on the ignition
- Leave the engine running until you hear the pressure regulator blow off (start of air dryer regeneration phase)
- Then stop the engine immediately
- Clean off any dirt on and around the air dryer

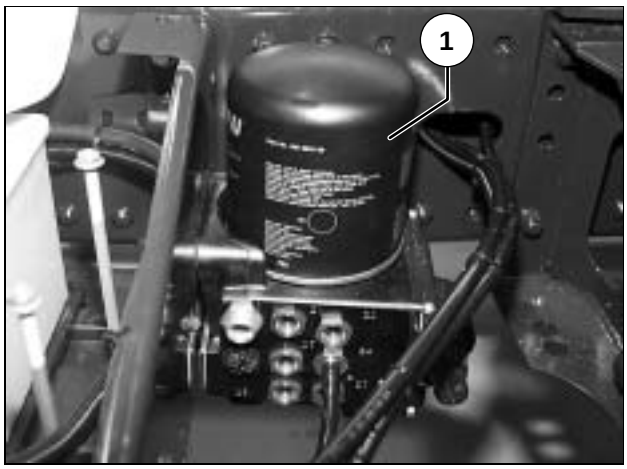
Danger of accidents!
Residual pressure in the granulate cartridge and line between air compressor and air dryer!

- Screw granulate cartridge ① off the housing by turning it anticlockwise, using a strap wrench if required
- Clean the housing using a clean, dry and lint-free cloth. Make sure no impurities get into the clean air zone (bore in middle of housing)
- Treat used granulate cartridges as hazardous waste (also see "Notes on safety and environmental protection" section)
- Lightly oil the seal on the new granulate cartridge
- Screw on the new granulate cartridge by hand until the seal makes contact
- Then tighten one more complete turn by hand

Tightening torque
Desiccant cartridge:
Bosch..... 25 Nm
Knorr..... 25 Nm
Wabco ..... 15 Nm

- Charge the compressed air system and check the air dryer for leaks around granulate cartridge seal

ECAM GRANULATE CARTRIDGE
(example illustrated)



Changing

Danger of accidents!
The granulate cartridge ① may only be changed in depressurised state. A blow-off noise must be heard.

- Switch on the ignition
- Leave the engine running until you hear the pressure regulator blow off (start of air dryer regeneration phase)
- Then stop the engine immediately
- Clean off any dirt on and around the ECAM system

Danger of accidents!
Residual pressure in the granulate cartridge and line between air compressor and air dryer!

- Screw granulate cartridge ① (example illustrated) off the housing by turning it anticlockwise, using a strap wrench if required
- Clean the housing using a clean, dry and lint-free cloth. Make sure no impurities get into the clean air zone (bore in middle of housing)
- Treat used granulate cartridges as hazardous waste (also see "Notes on safety and environmental protection" section)
- Lightly oil the seal on the new granulate cartridge
- Screw on the new granulate cartridge by hand until the seal makes contact
- Then tighten one more complete turn by hand

Tightening torque
Desiccant cartridge:
Bosch ..... 25 Nm
Knorr ..... 25 Nm
Wabco ..... 15 Nm

- Charge the compressed air system and check the ECAM system for leaks around the granulate cartridge seal

BRAKE TECHNICAL SAFETY

Visually inspect the brake system for:
– Condition
– Leak-tightness (also see display gauges on the instrument panel)
– Routing
– Damage
– Corrosion
– Chafing
– extreme dirt build-up (e.g. silencer)

Checking correct functioning and effectiveness of the brake system
Following the completion of all work on the brake system:
- Check for correct functioning and effectiveness of the system on a roller test rig (dynamometer)

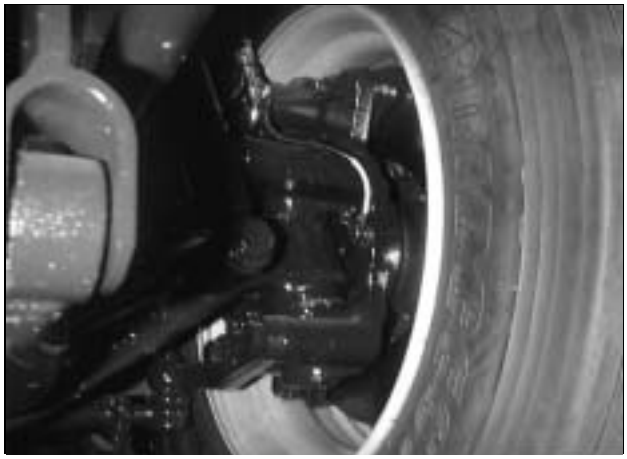
Note: The function and effectiveness check must include the service brakes, the engine brake and the retarder/Intarder.

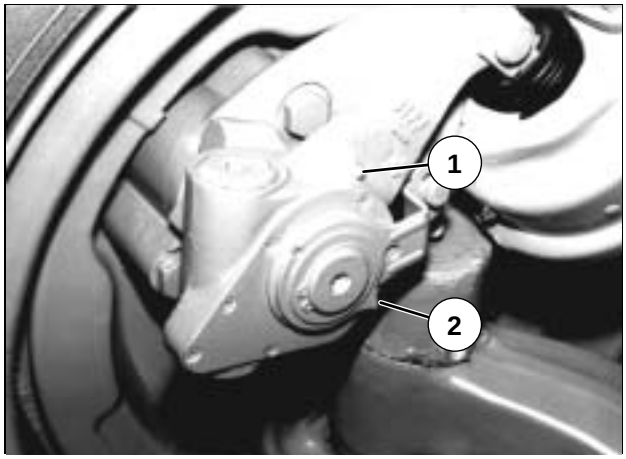
DISC BRAKE

Checking pad and disc wear
- Check the brake pads and brake discs for wear

Brake pad:
The warning limit is 4 mm remaining pad per pad. The "brake pads" indication is on the driver's display, see Operator's Manual.
The absolute wear limit is 2 mm – renew the brake pads immediately!

Brake disc:
The minimum thickness of the brake disc is 37 mm.





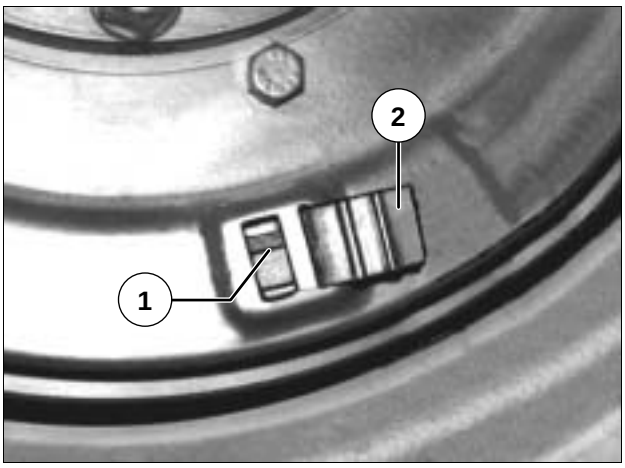
Checking brake lining wear
- Check the brake lining wear on all the wheel brakes

Fit new brake linings if the pointer ② of the check disc is pointing towards the check mark ① on the brake lever.

- Pull out the end plugs ② on the wheel brake protection plates from the observation hole
- Check the brake lining wear on the wear edge ①

Fit new brake linings when the wear edge is reached.

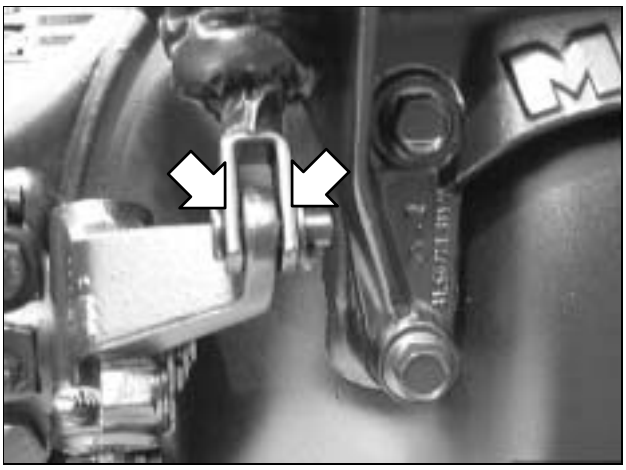
Brake lining wear limit..... At least 5 mm
Clearance between lining and brake drum, gap..... 0,7 mm



GREASING

Yoke end/brake lever connection

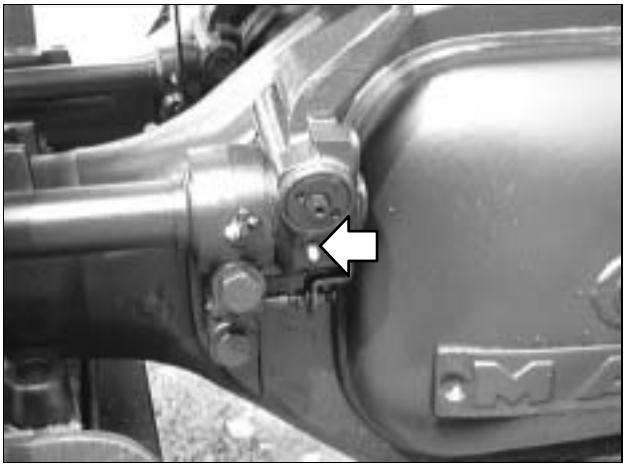
- Grease the yoke end/brake lever connection (→) with multipurpose grease



LUBRICATING

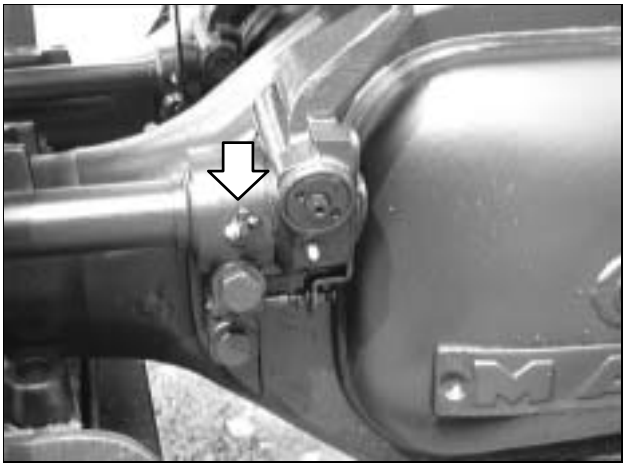
Slack adjuster

- Lubricate the slack adjuster via the lubricating nipple (→)



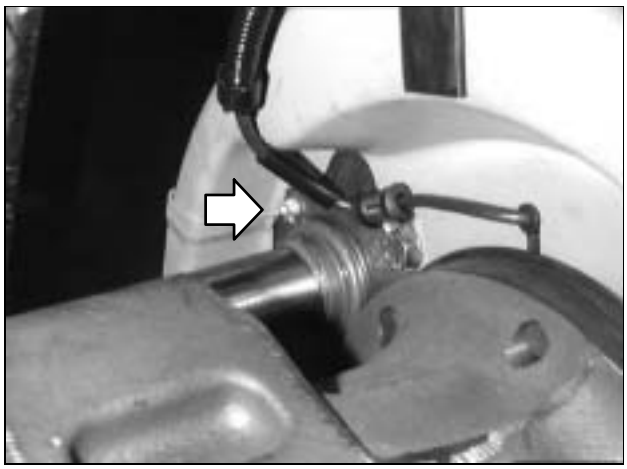
Brake shaft bearing on slack adjuster

- Lubricate the brake shaft bearings via the lubricating nipple (→)



Brake shaft bearing on wheel brake section

- Lubricate the brake shaft bearings via the lubricating nipple (→) using a **grease gun**



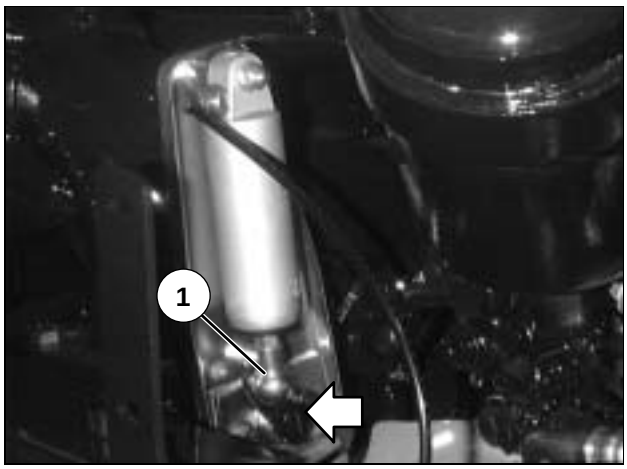
ENGINE BRAKE

BUTTERFLY

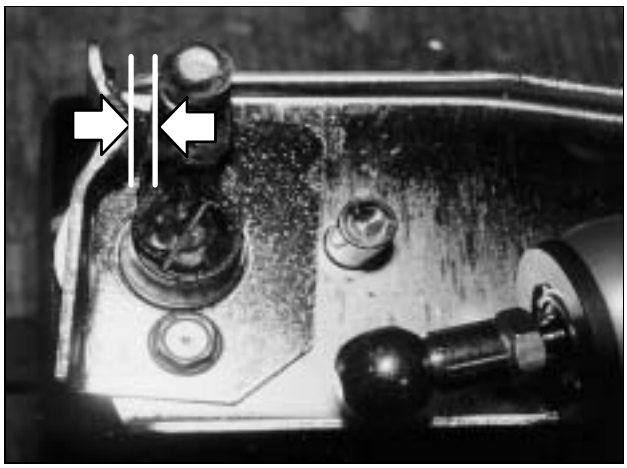
Checking correct functioning
Perform the check with the compressed air system charged whilst driving.
- Operate the engine brake

The operating lever of the compressed air cylinder must be pushed outwards up to the stop.
The notch (→) on the shaft is perpendicular to the exhaust pipe.

Note: The ball joint ① with plastic insert is maintenance-free.



Checking the gap setting of the engine brake valve (example illustrated)
- Detach the actuating cylinder for the engine brake valve
- Close the engine brake valve by hand
- Check the gap (→ ←)
- Re-attach the actuating cylinder for the engine brake valve

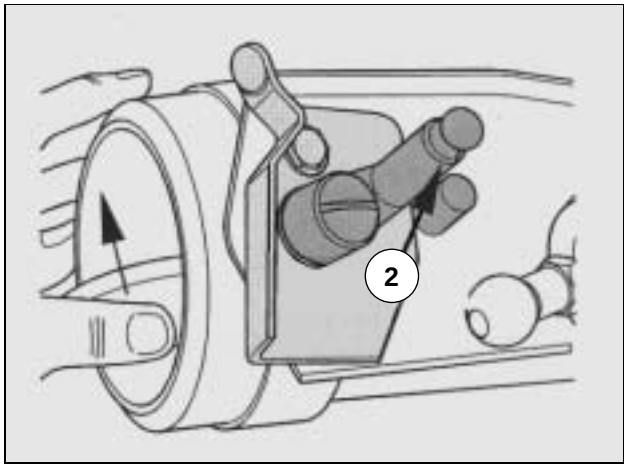


Correct the gap, see SI 96 09 19/1 – supplement.

Settings for:
D28 in-line injection pump with/without EVB
Gap .....2.6 to 3.0 mm
D28 in-line injection pump with EVB ec
own valve, no gap setting
→ software

D28 Common Rail with/without EVB
Gap .....3.6 to 4.0 mm
D28 Common Rail with EVB ec
own valve, no gap setting
→ software

D0836 Common Rail without EVB
own valve, no gap setting
→ Rigid valve
D0836 Common Rail with EVB
own valve .....2.3 to 2.5 mm

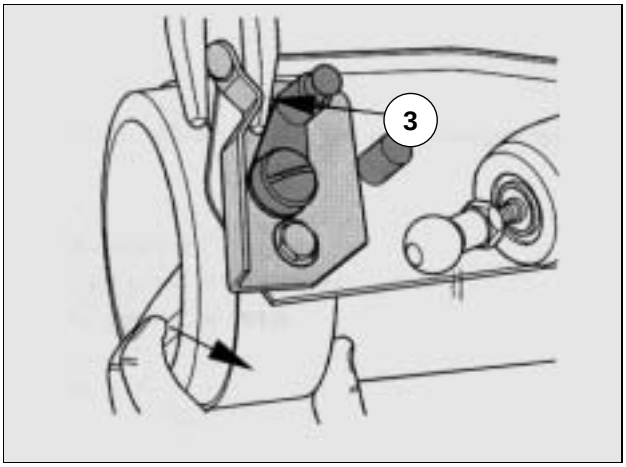


Gap too large:
Reduce torsion bar spring pretension.

To do this, open the valve by hand and, **by feeling**, press the torsion bar against the "**open**" stop ②.

Gap too small:
Increase torsion bar spring pretension.

To do this, place an object (e.g. pliers) between the "**closed**" stop ③ and the valve lever.
Close the valve by hand and, **by feeling**, "**over**press" the torsion bar spring against the stop.



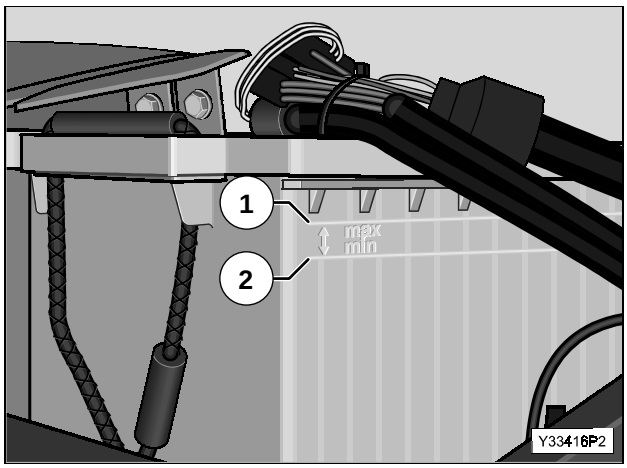
BATTERIES

ELECTROLYTE LEVEL

Checking

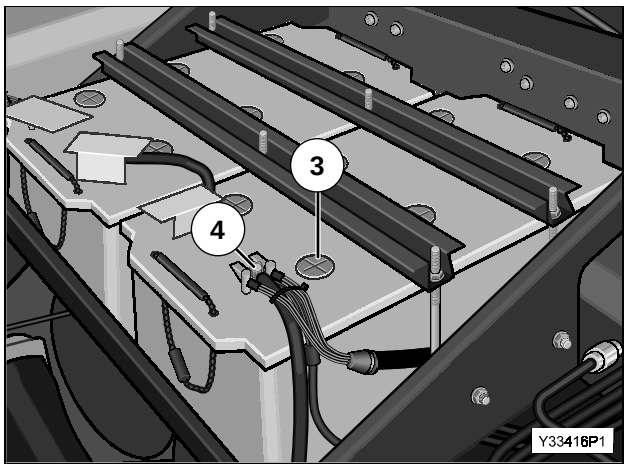
- Remove the battery box cover (open 2 quarter-turn locks)
- Shine a light through the batteries from the side and check the electrolyte level

The level of the electrolyte in each cell should be between the MAX/MIN marks on the side ①/② or 10 to 15 mm above the top edge of the plate.



- Unscrew and remove all cell plugs ③ if there is heavy dirt build-up (does not apply in the case of fully maintenance-free batteries)

Top up with distilled water only if the level has fallen to the MIN mark ②.



TERMINALS

Checking firm seating and condition

- Check that the battery terminals ④ are firmly seated and, if necessary, retighten them
- Clean the battery terminals on the battery terminal posts using a brass brush and apply acid-proof grease

CHARGE LEVEL

Checking

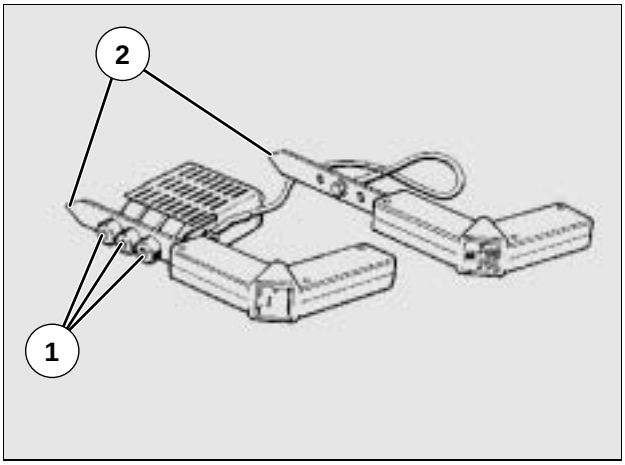
- Check the battery charge using an acid tester

The acid strength should be 1.28 g/cc at 20 °C when the battery is fully charged. If the acid strength is less than this, then the battery needs recharging.

CHECKING THE NO-LOAD VOLTAGE

- Disconnect the battery terminal at the negative terminal post
- Switch off all 3 resistors ① on the battery tester
- Attach battery tester test prods ② to the battery terminal posts (ensure correct polarity when attaching the tester – swap over the polarity if the red warning light comes on)

The voltage being applied is displayed after 5 seconds. The display remains active for about 10 seconds.
Recharge the battery if the voltage is below 11 V.
Install a new battery if a subsequent test shows the voltage is still below 11 V.



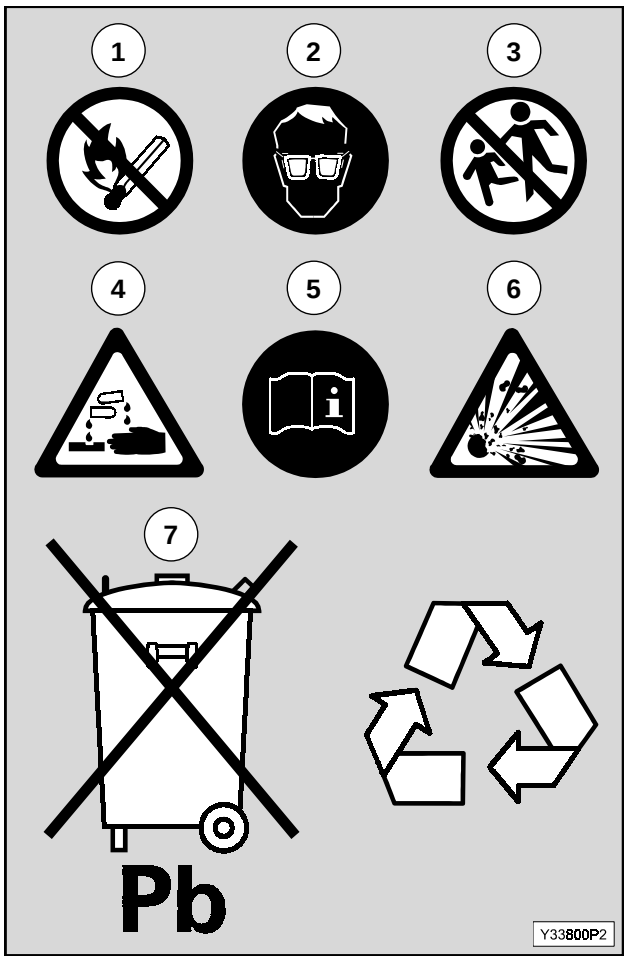
CHECKING THE LOAD VOLTAGE

- Disconnect the battery terminal at the negative terminal post
- Switch on all 3 resistors ① on the battery tester
- Attach the battery tester test prods to the battery terminal posts

Recharge the battery if the voltage is below 10 V.
Install a new battery if a subsequent test shows the voltage is still below 10 V.

Note: Only use batteries of the same type in a bank of batteries. These batteries must have all been manufactured within the same 12 month period.

NOTES ON SAFETY WHEN HANDLING BATTERIES



1 Risk of explosion! –
Keep away sources of fire, sparks and naked flames. Do not smoke!
Take care not to generate any sparks when connecting and disconnecting electrical consumers or measuring devices directly on the battery terminals.
Before connecting or disconnecting the batteries, switch off any consumers which are directly connected to the batteries (terminal 30). Such consumers include the EC monitoring device (tachograph), interior lighting, etc. Switch them off by removing the corresponding fuse from the central electrical system.
Remove the earth connection first.
Take care to avoid short circuits due to incorrect polarity or working with open-end spanners.
Do not remove terminal covers unless really necessary.
Fit the earth strap last when reconnecting.

2 Wear goggles or a protective face mask!

3 Keep children away from acid and batteries!

4 Risk of injury! –
Batteries contain corrosive acid.
Wear suitable protective clothing as well as acid-resistant protective gloves and eye protection. Do not tip batteries; acid may emerge from vent holes.

5 Follow the instructions in the Operator's Manual and documentation provided by the battery manufacturer.

6 Risk of explosion! –

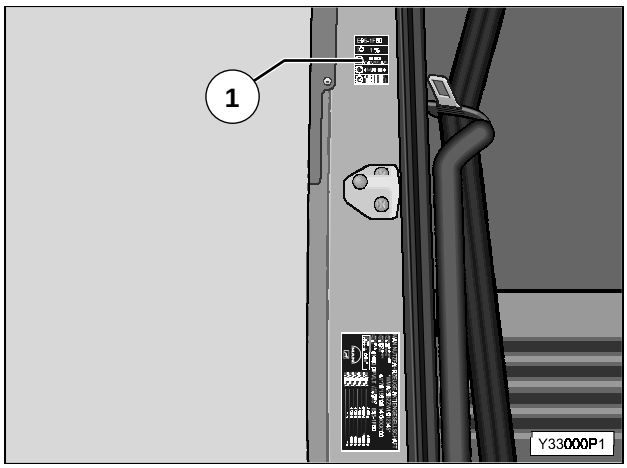
Take particular care after long journeys or after charging the batteries with a battery charger. A mixture of highly explosive oxyhydrogen gas may form. Ensure adequate ventilation!

7 Batteries contain pollutants and must therefore be disposed of correctly!

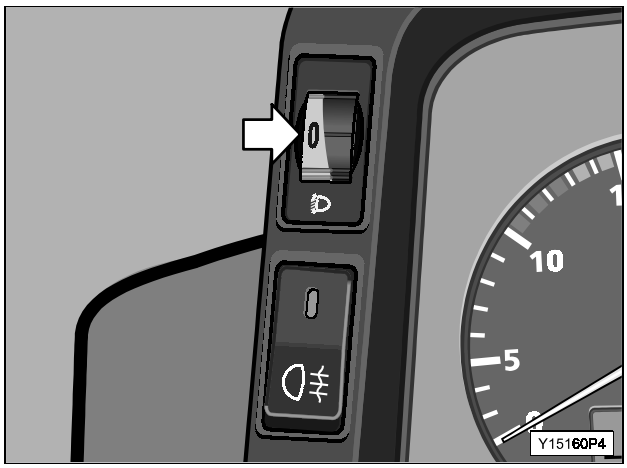
HEADLIGHTS

ADJUSTMENT

General information
The vehicle and the setting instrument must be standing on a flat, level surface. Only check and adjust the headlight settings when the vehicle is unladen and the tyres have been inflated to the specified pressure.
When adjusting the headlights, also refer to the headlight setting plate ① (co-driver side) and the "Headlight beam adjustment" table MAN no. 81.25000-8358 (also see Operator's Manual).
Use the Torx T20 tool for all adjustment work.

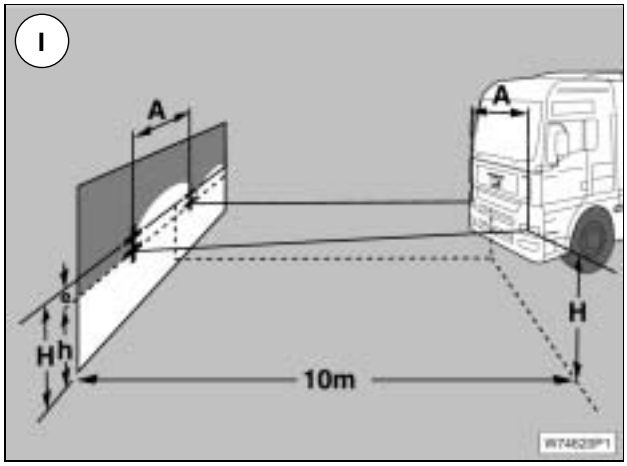


Checking (general description)
- In the case of vehicles with **manual headlight beam adjustment,** the adjuster must be in position "**0**" (→), see Operator's Manual for setting.
- In the case of vehicles with **automatic headlight beam adjustment** (LWR) and xenon headlights, the adjustment feature must be deactivated using MAN-Cats before adjusting the headlights (position "0").



Checking/adjustment can be performed using an optical setting instrument (see the operating instructions provided by the manufacturer concerned) or a white screen (wall) positioned 10 m away and parallel to the front of the vehicle.

The following general description is based on a left-hand drive vehicle with asymmetrical driving lights.

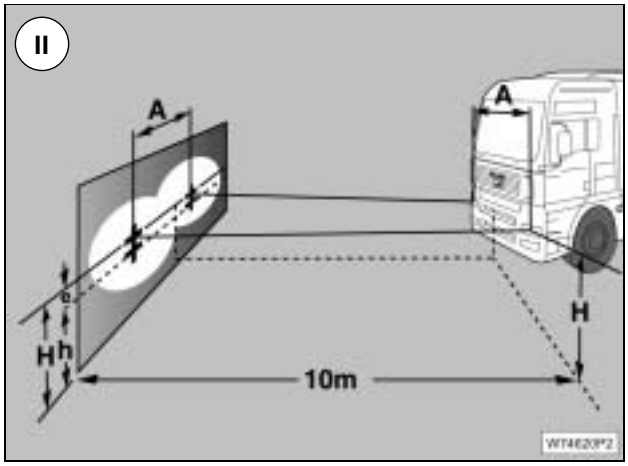


Key to diagrams:
Figure **I** = Headlight low beam
Figure **II** = Headlight high beam

H = Height of the middle of the headlight above the ground in mm

h = Height of the separating line on the screen (wall) above the ground in mm

e = H minus h
Setting (e) for vehicles with leaf suspension:
Headlight = see adhesive label ① inside the right-hand door next to the type plate, indicated in % (1% = 100 mm, 1.5% = 150 mm, 2% = 200 mm, etc.)
Fog lamps = 400 mm
Setting (e) for vehicles with air suspension:
Headlights = 100 mm
Fog lamps = 200 mm

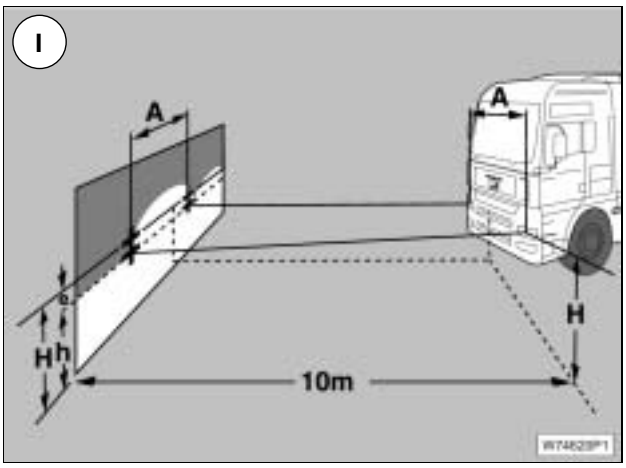


A = Headlight centre-to-centre distance

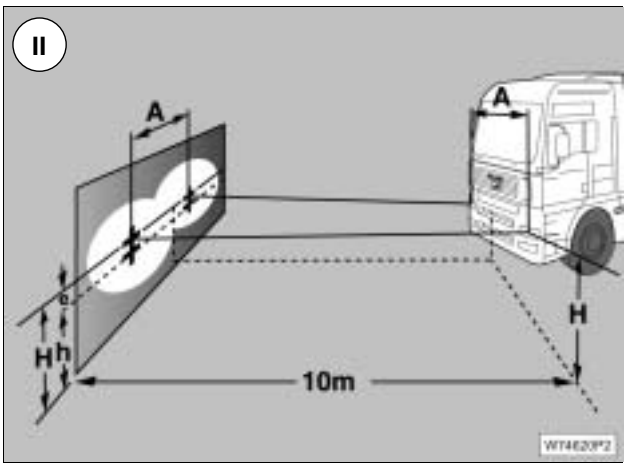
For asymmetrical headlight low beam (see Figure I)**:**

Side setting
The "kink" on the line where light meets dark should be on the vertical which runs through the setting cross.

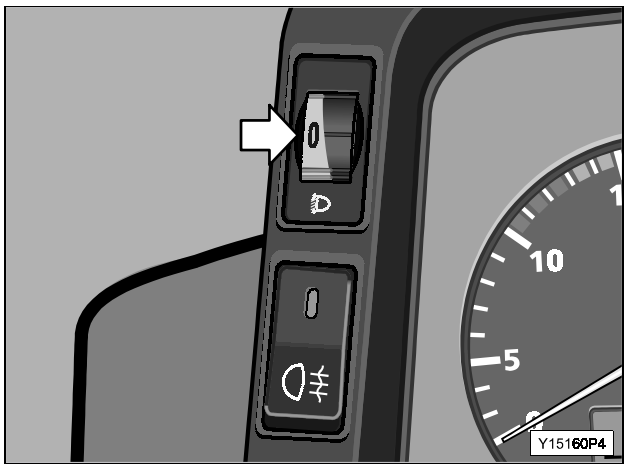
Height setting
The point where light meets dark should touch the separating line (height **h**) to the left of the lower setting cross.



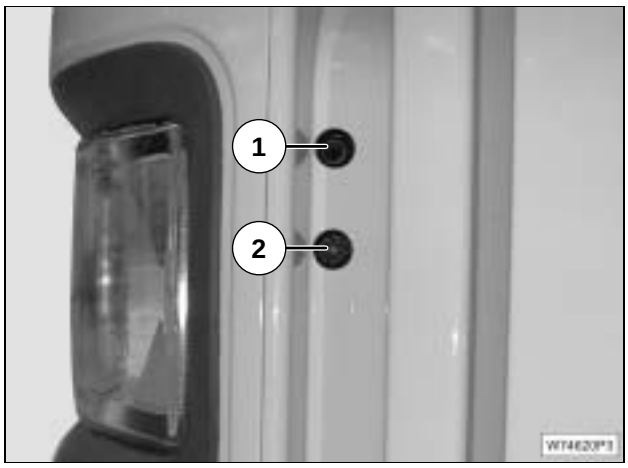
For headlight high beam (see Figure II)**:**
The high beam "hotspot" (centre) should be positioned on the upper setting cross.



Adjusting main headlights
(Figure shows left main headlight)
Move the headlight adjuster (see operating instructions provided by manufacturer concerned) to the "basic headlight setting" as indicated on the "Headlight beam adjustment" table (see Operator's Manual/MAN no. 81.25000-8358).



– In the case of vehicles with **manual headlight beam adjustment,** the adjuster must be in position "**0**" (→), see Operator's Manual for setting.
– In the case of vehicles with **automatic headlight beam adjustment** (LWR) and xenon headlights, the adjustment feature must be deactivated using MAN-Cats before adjusting the headlights (position "0").



Always make sure the headlights are set to low beam before adjusting. If the low beam setting is correct, the high beam setting will be correct too.

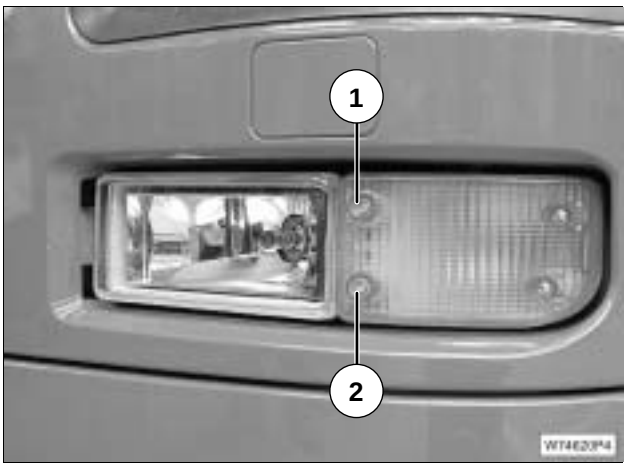
Height setting – down
• Turn the upper adjusting screw ① anti-clockwise
One revolution moves the line where light meets dark (LD line) in the headlight adjuster downwards by 0.4° and to the right by 0.3°.
• Then perform a counter correction by turning the lower adjusting screw ② clockwise
One revolution is equivalent to a counter correction of 0.3°.
– Adjustment by 0.4° downwards

Height setting – up
• Turn the upper adjusting screw ① clockwise
One revolution moves the line where light meets dark (LD line) in the headlight adjuster upwards by 0.4° and to the right by 0.3°.
• Then perform a counter correction by turning the lower adjusting screw ② anti-clockwise
One revolution is equivalent to a counter correction of 0.3°.
– Adjustment by 0.4° upwards

Side setting – to the left (left/right side)
• Turn the lower adjusting screw ② anti-clockwise/ clockwise
One revolution moves the headlight to the left by 0.3°.
– Adjustment by 0.3° to the left

Side setting – to the right (left/right side)
• Turn the lower adjusting screw ② clockwise/anti-clockwise
One revolution moves the headlight to the right by 0.3°.
– Adjustment by 0.3° to the right

Adjusting the auxiliary headlights
Move the headlight adjuster to the "basic headlight setting" as indicated on the "Headlight beam adjustment" table (see Operator's Manual/MAN no. 81.25000-8358).



After turning one of the adjusting screws ① or ② two turns, adjust using the second screw.

Height setting – up
Adjust the height (horizontal axis) with the fog lights on.
- Turn the lower adjusting screw ② clockwise

One revolution moves the auxiliary headlight upwards by 1.0°.
– Adjustment by 1.0° upwards

Height setting – down
Adjust the height (horizontal axis) with the fog lights on.
- Turn the lower adjusting screw ② anti-clockwise

One revolution moves the auxiliary headlight downwards by 1.0°.
– Adjustment by 1.0° downwards

Side setting – to the left
Adjust the side setting (vertical axis) with headlight high beam on.
- Turn the upper adjusting screw ① and the lower adjusting screw ② clockwise one after the other

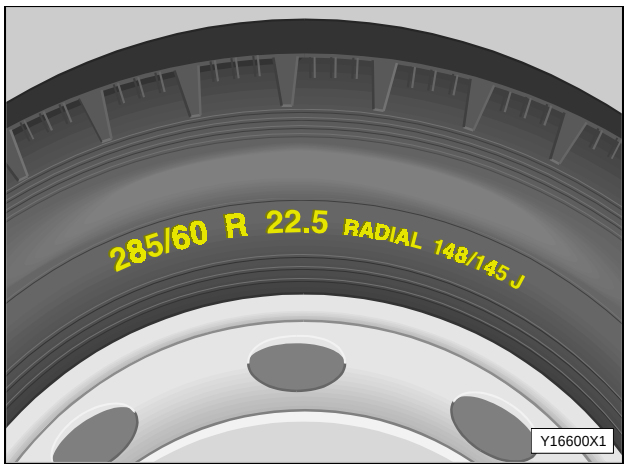
After two revolutions per adjusting screw, the auxiliary headlight is moved approx. 0.75° to the left.
– Adjustment by approx. 0.75° to the left

Side setting – to the right
Adjust the side setting (vertical axis) with headlight high beam on.
- Turn the upper adjusting screw ① and the lower adjusting screw ② anti-clockwise one after the other

After two revolutions per adjusting screw, the auxiliary headlight is moved approx. 0.75° to the right.
– Adjustment by approx. 0.75° to the right

TYRES

The particular design top speed and permitted axle load limit vary. In view of this, tyres of various qualities may be needed on the individual axles (see the entry on the vehicle documents/data sheet).

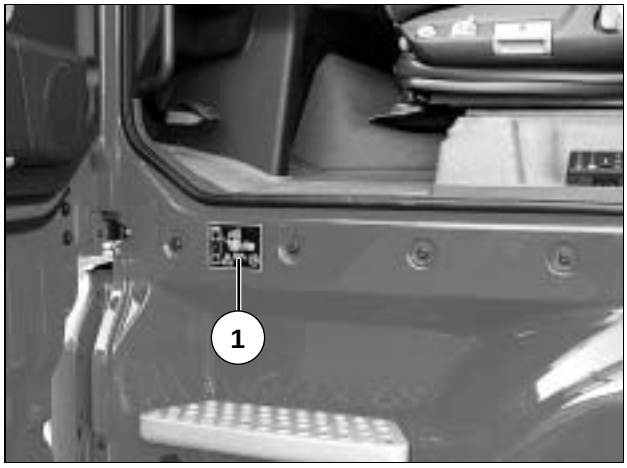


Danger of accidents!

- **Depending on the tyre manufacturer and tyre tread, tyres which have the same nominal size have widely differing diameters and widths. Therefore, make sure there is enough clearance available when using the spare wheel, changing to different tyres and buying replacements, etc. Clearance may also be severely restricted due to the vehicle body. No liability is accepted for damage caused by insufficient clearance.**
- **If the spare wheel is constantly in use, make sure that the tyre is of the specified quality! All the vehicle's tyres must correspond to the entry on the vehicle data sheet.**

Tyres for all-wheel drive vehicles!

- If the vehicle has all-wheel drive, always use tyres of the same design, size (rolling circumference), tread configuration and make.
- The rolling circumference of the tyres on the front and rear axles should not differ by more than 2%. Otherwise this will cause stresses in the driveline when the front axle/permanent all-wheel drive is engaged and the interaxle differential is locked. This causes a substantial reduction in active safety and driving dynamics, and the tyres can be expected to wear at an accelerated rate.

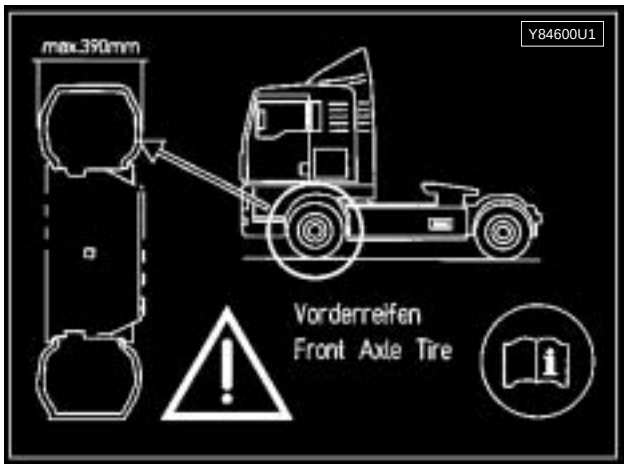


Changing to different tyres

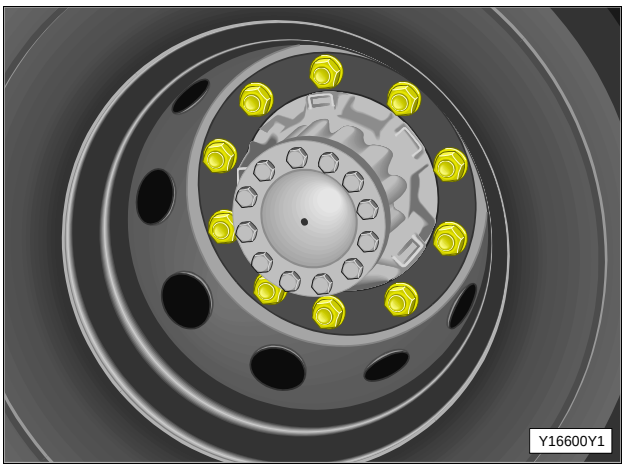
Also see Operator's Manual!

- Plate ① is located in the entrance area

- **If 385/65 R 22.5 tyres are fitted on the front axle of a vehicle with full air suspension, these tyres must not exceed a maximum width of 390 mm.**
- **If you change from 315/70 R 22.5 or smaller tyres to 315/80 R 22.5 or larger tyres, you must use intermediate rings or wider wheel flanges.**
- **Please contact your MAN Service workshop beforehand.**



TYRE INFLATION PRESSURE AND CONDITION



Checking (with tyres cold)

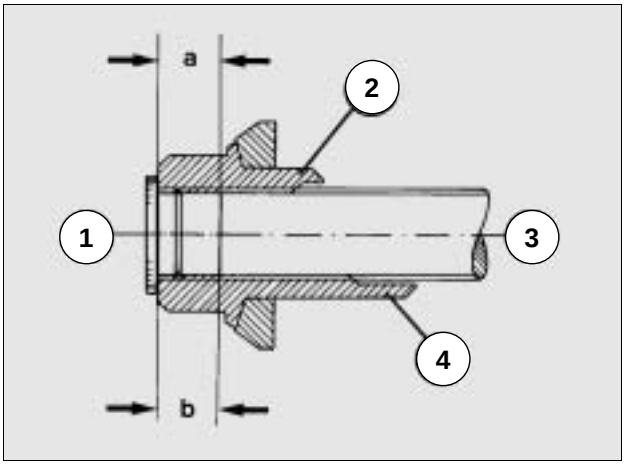
- Check the inflation pressure of all tyres including the spare tyre (see the "TECHNICAL DATA" section or the tyre manufacturer documentation)
- Check the condition of the tyres, tread wear and the depth of tread
- Check for objects wedged in the tread and between twin tyres
- Check for external damage

RETIGHTENING THE WHEEL NUTS

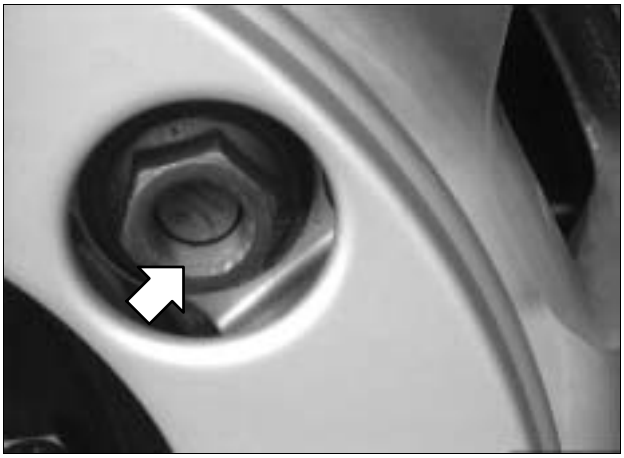
Tightening

On disc wheels
Check that the wheel nuts are firmly seated and tightened to the correct torque (work diagonally across)

Tightening torques
Wheel nuts on disc wheels (including aluminium wheels):
Hub centring .....575 ± 25 Nm
Stud centring .....475 ± 25 Nm



Note: On aluminium wheels, part of the nut thread remains visible when wheel stud ③ is inserted into the wheel nut (② for single tyres, ④ for twin tyres), assuming the wheel has been correctly fitted and when stopper ① has been removed (dimension "a" or dimension "b").



Distance (a) – single tyres: ..... approx. 10 mm
Distance (b) – twin tyres:
Planetary axle ..... approx. 20 mm
Hypoid axle ..... approx. 15 mm

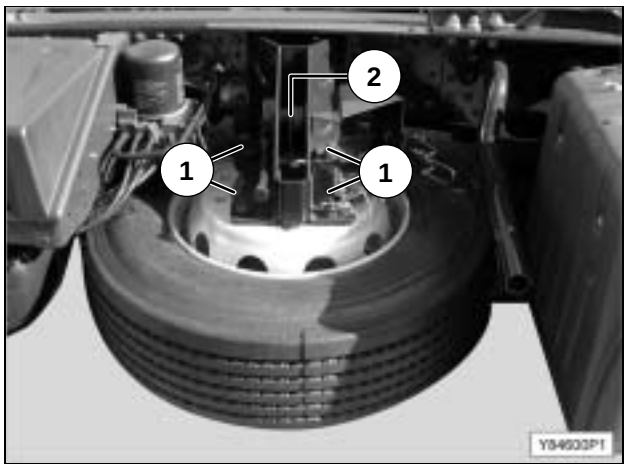
SPARE WHEEL MOUNTING

- Check that the spare wheel mounting nuts ① are firmly seated

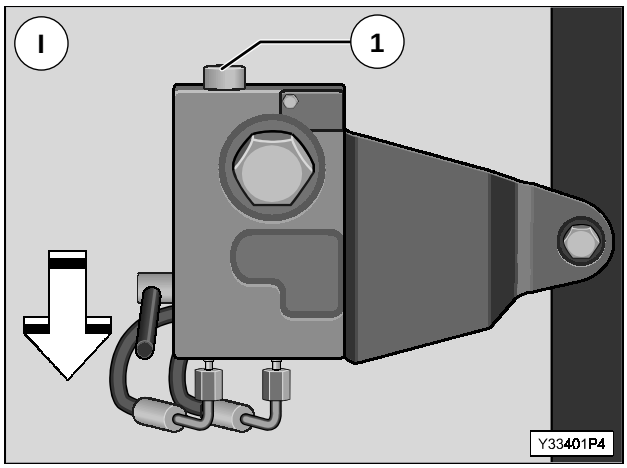
Risk of injury if cable is frayed!
Renew defective cables immediately

- Check the hoist and spare wheel mounting
- Check the winch cable ②

Note: Do not oil or grease the winch cable, to prevent excessive dirt build-up.



CAB
Figure **I** = Hydraulic cab tilt mechanism
Figure **II** = Electric cab tilt mechanism

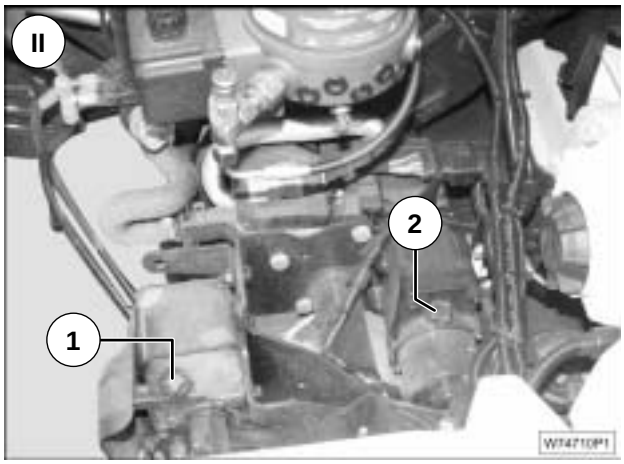


HYDRAULIC SYSTEM, OIL LEVEL
The hydraulic system for the cab is maintenance-free – only check/top up if necessary.

Checking
- Stop the vehicle

Vehicle with hydraulic cab tilt mechanism (Figure **I**):
- Unscrew the oil reservoir filler plug ①

Vehicle with electric cab tilt mechanism (Figure **II**):
Note: Filler plug ① for mechanical cab tilt mechanism and filler plug ② for electric cab tilt mechanism.
- Unscrew filler plugs ① and ② for the oil reservoirs



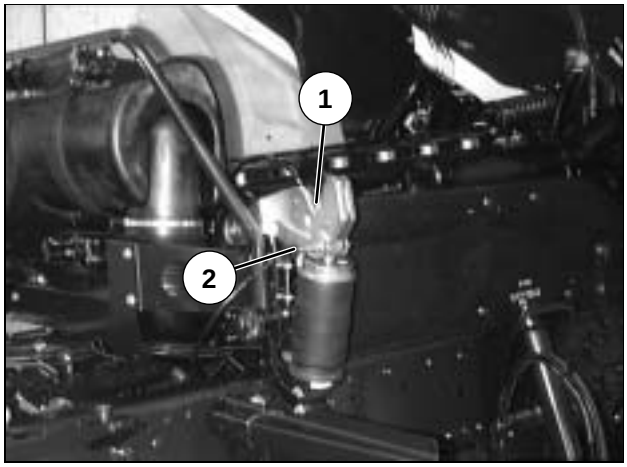
- Check the oil level

The oil level must be at the top edge of the housing.
- Screw the checking and filler plug(s) ① (or ① and ②) back in

Have the cab tilt mechanism checked at a MAN Service workshop if the oil level is too low.

Hydraulic oil specification
see ....."Maintenance Recommendations and Recommended Service Products" booklet

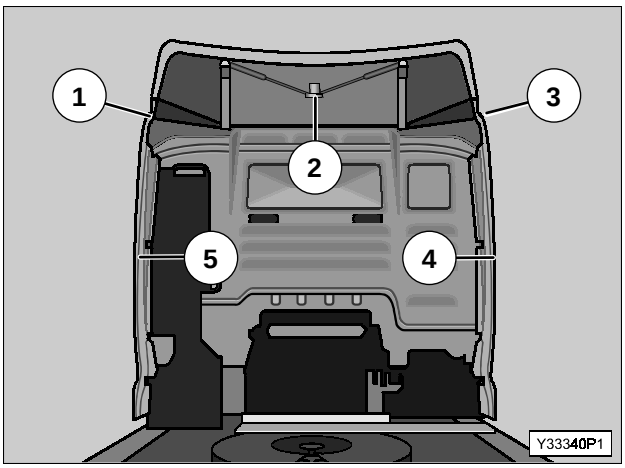
TILTING AND LOCKING MECHANISM



Lubricating and checking
- Lubricate locking mechanism ① with the cab tilted
- Check that non-contacting switch ② is firmly seated and remove any dirt
- Lower the cab

When the cab is lowered to the driving position, the locking mechanism must audibly engage on both sides.

ROOF SPOILER / AERODYNAMIC PACKAGE



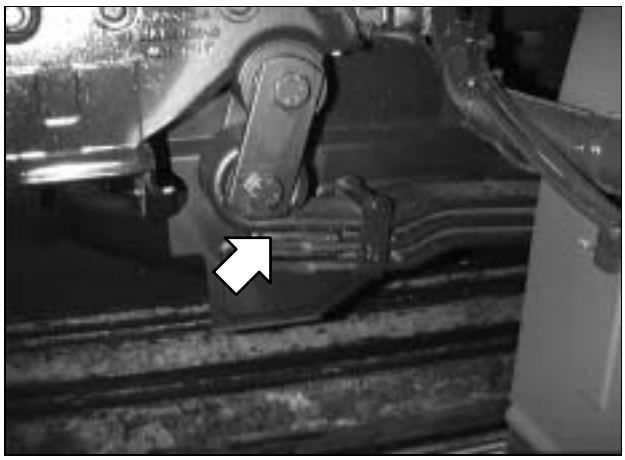
Checking
– Firm seating
– Secureness

1 Left spoiler attachment
2 Height-adjustable roof spoiler
3 Right spoiler attachment
4 Right pivoting side shutter
5 Left pivoting side shutter

Danger of accidents!
– **Make sure you are on a suitable surface with enough grip when carrying out maintenance or adjustment work!**
– **Do not exceed the legally permitted vehicle height when performing adjustment work!**
– **Refer to the Operator's Manual!**

CHASSIS

LEAF SUSPENSION



Checking condition and firm seating of the spring assemblies

- Relieve the springs
- Check the spring assembly for damage
- Check that the spring anchors are firmly seated
- Check the suspension bearings for wear
- Check the intermediate rubber mounts (→) of the parabolic springs for wear

Cleaning the spring assemblies

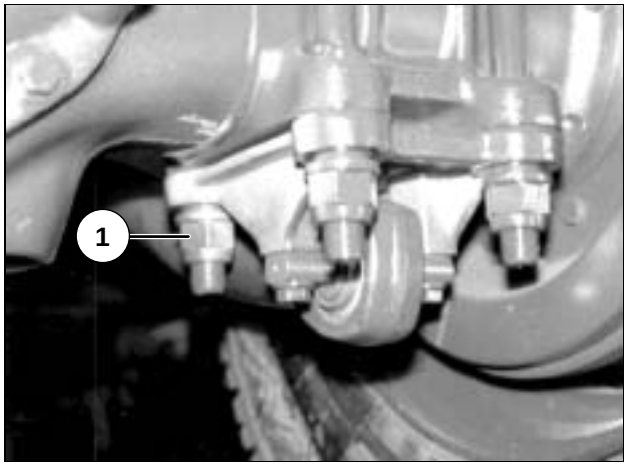
Do not use steam cleaners, water or cleaning additives.

- Dry-clean the springs
- If layered trapezoidal springs are fitted, spray the cleaned spring assembly with acid-free spray oil or lubricate it using acid-free multipurpose grease

Note: Do not spray or grease parabolic springs.

Checking firm seating of spring U-bolts and spring mountings

Only use spring U-bolts and spring mountings of the same design on the vehicle. Mixing of designs is not allowed.

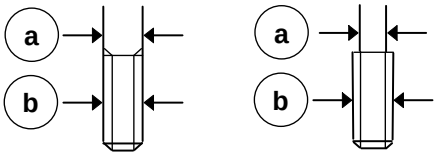


- Check that the 4 mounting nuts ① on the front and rear axles are firmly seated under axle load

U-bolt tightening torques

Do not use different types of U-bolt on the same vehicle (i.e. one "cold-formed" U-bolt as shown on the left and one "hot-formed" U-bolt as shown on the right).

U-bolt distinguishing feature:



	U-bolt	
	Hot-formed	**Cold-formed**
Thread	∅ a = ∅ b	∅ a < ∅ b
M 14 x 1.5	185 Nm	165 Nm
M 16 x 1.5	210 Nm	225 Nm
M 18 x 2	280 Nm	330 Nm
M 20 x 2	400 Nm	440 Nm
M 24 x 2	680 Nm	800 Nm
M 27 x 2 [1)]	900 Nm	1000 Nm

[1)] U-bolt 06.46115.XXXX (M27x2) only with ENKO® lock nut 81.90685.0400

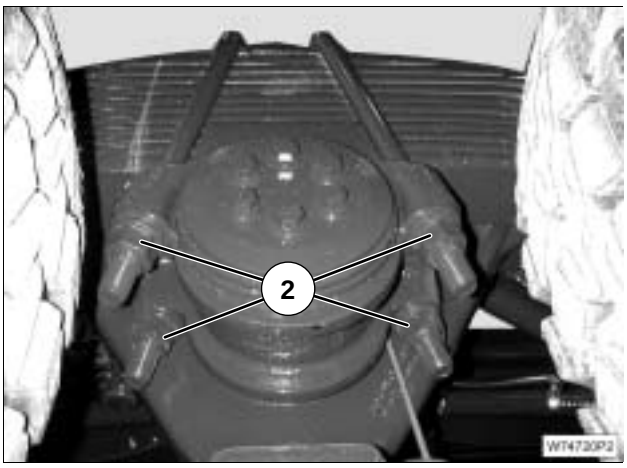
Tandem axle (parabola/trapezium)

- Check that the 4 lock nuts ② on the tandem axle with leaf suspension (parabola/trapezium) are firmly seated under axle load

Tightening torques

M 27 x 2 [1] ..... 1000 Nm

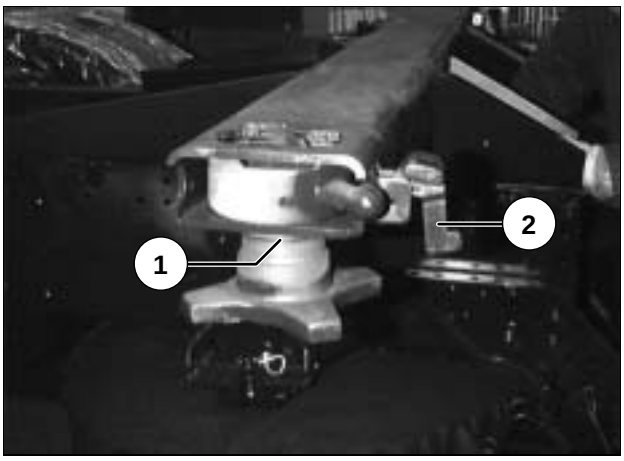
[1] Only with ENKO® lock nut 81.90685.0400 and U-bolt 06.46115.XXXX.



SUPPORTING STRUCTURE FOR SWAP BODY

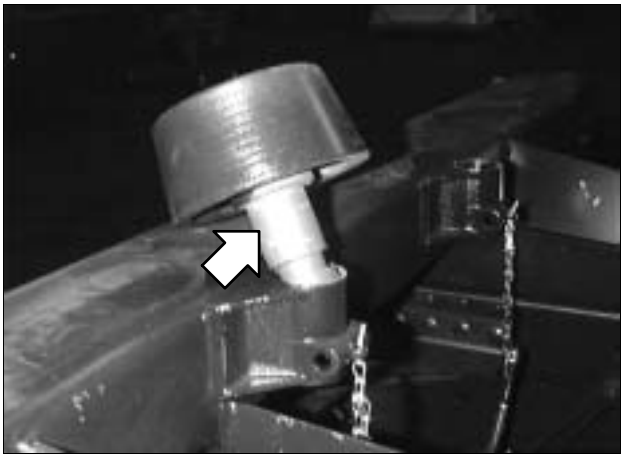
Lubricating the centre pin ends

- Grease the centre pin end thread ① and drop-lock mount ②



Lubricating the centring rollers

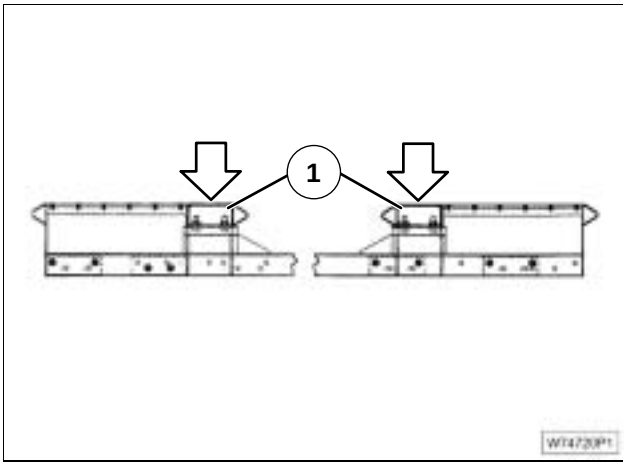
- Grease the bearings (→) of the four centring rollers



Checking the centre support wear supports

- Check the cross members ① (side view illustrated) for contact traces (↓)

Replace the wear support if there is approx. 2 to 3 mm of wear.



AIR SUSPENSION

Checking air bellows for correct functioning

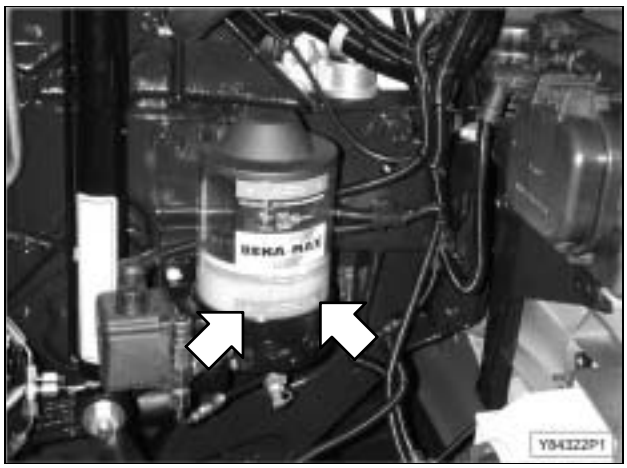
- Start the engine

There should be no body lean on a flat, level surface when the air bellows are inflated.

Checking the condition of the air bellows

- Check all the air bellows for signs of chafing, cracks, dirt and ageing
- Remove any sand or gravel which has collected

BEKA-MAX CENTRAL LUBRICATION SYSTEM
Pump type EP-2000



LUBRICANT LEVEL

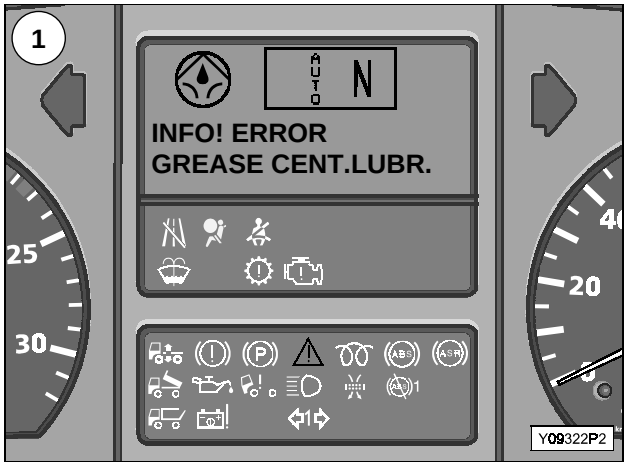
Checking

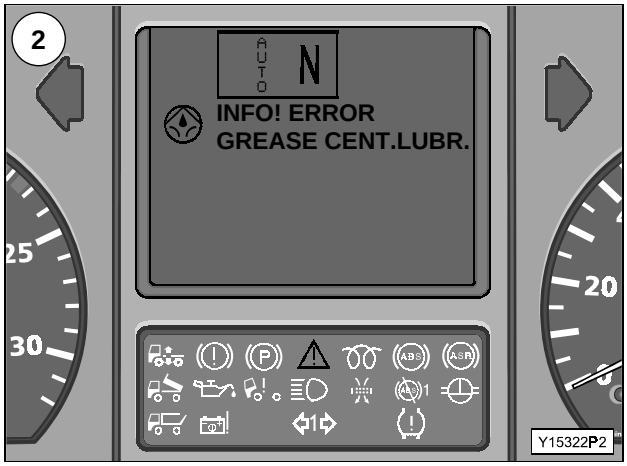
- Check the lubricant level in the transparent tank

The lubricant needs topping up if the level has fallen to the MIN mark (→).

If the tank is empty, the driver's display also indicates the "central lubrication" symbol and the text "INFO ERROR GREASE CENT.LUBR.".

– Baseline Figure ①
– Highline Figure ②





LUBRICANT TANK

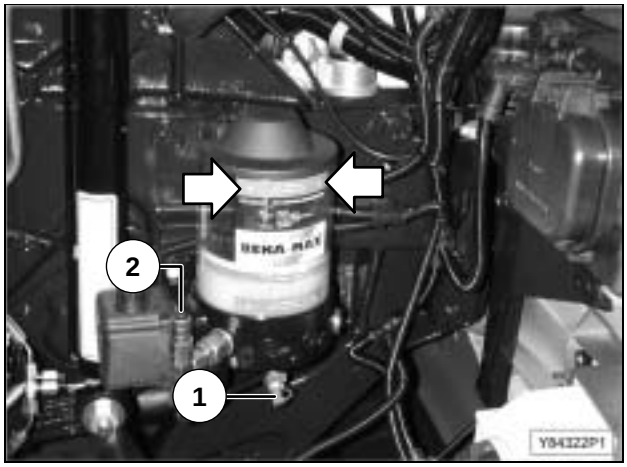
Filling

Lubricant specification

see ....."Maintenance Recommendations and Recommended Service Products" booklet

- Tilt the cab, see Operator's Manual section 4.01 or 4.02
- Remove protective cap ① from the filling nipple
- Clean the filling nipple
- Use a grease gun to fill up the tank to the MAX mark (→)
- Fit the protective cap on the filling nipple

Note: There is a fault in the system if lubricant emerges at the pressure-relief valve.
Have the central lubrication system checked at a MAN Service workshop.



CORRECT FUNCTIONING

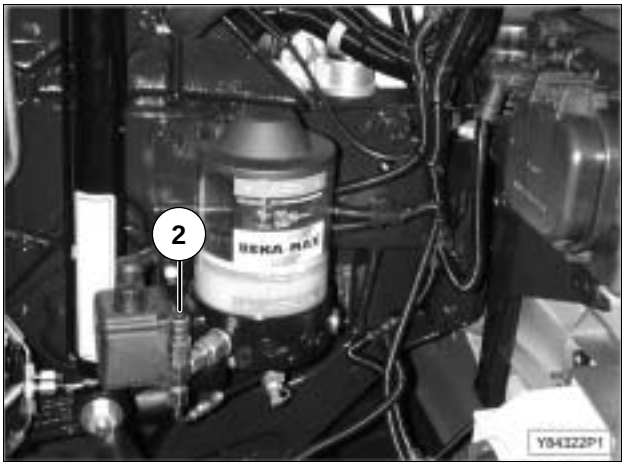
Checking

In between times, lubrication can be manually triggered using the switch (→) on the dashboard, providing that the ignition is switched on. When the rocker switch is pressed, a signal sounds for 1 second and the display indicates that the central lubrication system is operating.

- Trigger a lubrication cycle
- Check the lubrication points
- Ensure that lubricant actually does emerge at all the lubrication points

If a lubrication point is blocked, lubricant will emerge at the central lubrication pump pressure-relief valve ②.

- See troubleshooting chart on next page



If too much or too little lubricant is being used for each lubrication cycle, this quantity can be changed by a MAN Service workshop using the on-board computer at any time.

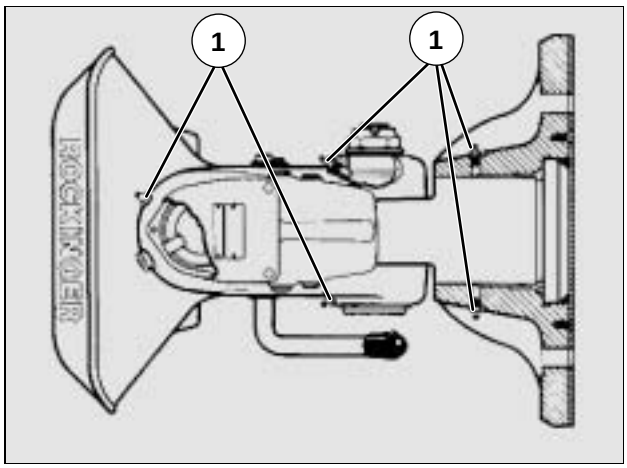
If the lubrication points are dry or over-greased, you may need to change the interval time (in hours = h) or the number of central lubrication pump strokes to suit the vehicle application.
Adjustments are made by the on-board computer.

Vehicle designation	Interval time (h)	Revolutions of pump
Semitrailer tractor (LHD and RHD): 4x2/4x4 4x2 (AP axle) 6x4/6x6 6x4/6x6 (AP axle)	5	20
Vehicle (LHD and RHD) with trailer coupling (= single lubrication point)	5	15
Vehicle (LHD and RHD) 6x4/6x6 (3 AP axles) 6x6/8x4/8x8 (4 AP axles)	5	8
Vehicle (LHD and RHD) 4x2/4x4 (AP xles)	5	4

TROUBLESHOOTING CHART, "FAULT – CAUSE – REMEDY"

FAULT	CAUSE	REMEDY
Grease emerging at pressure-relief valve	One or more lubrication points are blocked and not taking any grease	Unblock and clean lubrication points. Press through lubrication points using a grease gun
	Distributor blocked	Fit a new distributor
	Distributor outlet incorrectly closed	Rectify the distributor
	Lines squashed	Fit new lines
Too much grease at one or more lubrication points	Incorrect distributor dosage	Correct distributor dosage
No grease rings on any of the lubrication points	System blocked	See "Grease emerging at pressure relief valve"
	Pump not delivering, although pump motor is turning	Fit a new pump element
	Air in pump element intake area	Unscrew pump element, wait until air has emerged and screw pump element back in
	Number of pump strokes too low	Increase number of pump strokes
	Interval time too long	Reduce interval time
	Burst in main line to distributor	Fit new line
No grease rings on one of the lubrication points	Corresponding lubrication line burst or leaking	Fit new line
	Screw connection not leak-tight	Tighten or renew screw connection

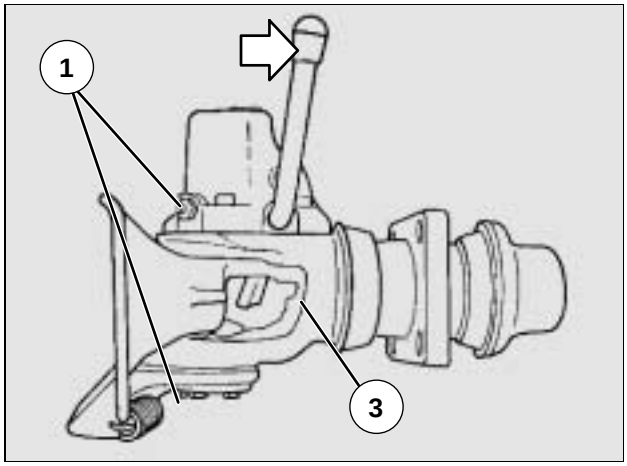
ROCKINGER TRAILER COUPLING
Type 42 G 250 (folding)
Type 56 E
Type 400 G 150 A/B
Type 400 G 150
Type 263 G 150
Type 430 G 150 A
Type 500 G 61 A



CLEANING
Do not use high-pressure cleaners to clean the trailer coupling. Re-grease the trailer coupling each time after cleaning.
- Clean the coupling pin

LUBRICATING
Always open the trailer coupling before lubricating. Make sure the coupling pin (hand lever →) is in its raised position in order to prevent excess lubrication.

Type 56 E
- Lubricate the coupling mechanism via lubricating nipples ① (top picture)
- Open the coupling
- Operate the hand lever several times in order to disperse the grease
- Grease the coupling pin



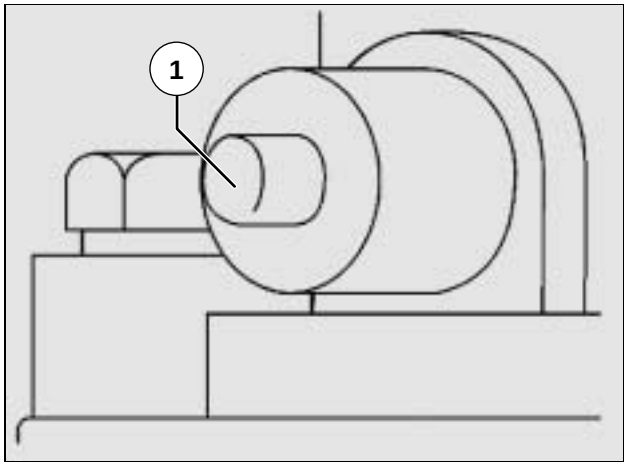
Type 42, 400, 263, 430, 500
- Lubricate the coupling mechanism via the lubricating nipples and, in the case of type 42, also via lubricating nipple ③
- Operate the hand lever several times in order to disperse the grease
- Grease the coupling pin
- Thoroughly grease the lower bush/supporting ring if centre axle trailers are used

Lubricant
see ....."Maintenance Recommendations and Recommended Service Products" booklet

Danger of accidents!
Refer to the Operator's Manual!

Checking
- Close the coupling

The check pin ① must **not jut out from the guide bushing** once the trailer is coupled up.



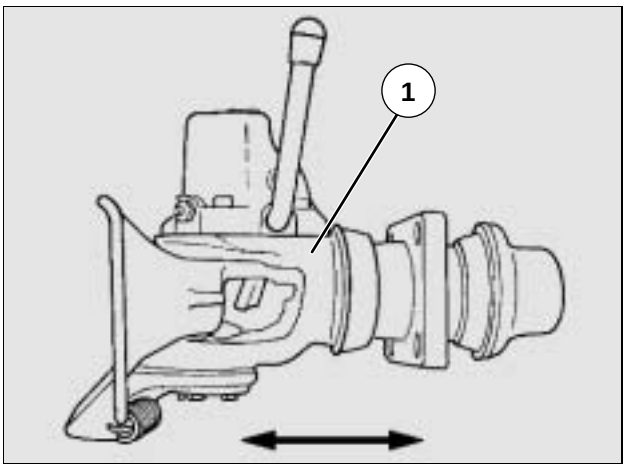
Danger of accidents!
If the check pin juts out from the guide bushing, this indicates that the coupling is not closed and not secure.
Check the coupling, clean any dirt off the lower bushing and, if necessary, repair the coupling.

WEAR

Checking the longitudinal play on the mount

- Grasp the coupling head ① (not the jaw "bell") with both hands and vigorously move it back and forth.

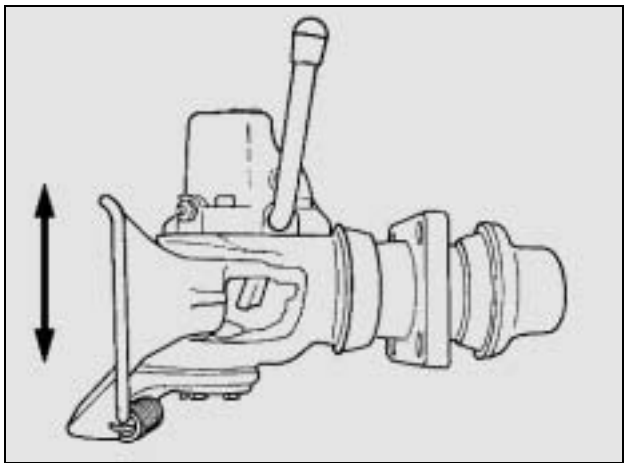
There must be no longitudinal play.



Checking the vertical play on the mount

- Open the coupling until the hand lever engages
- Position the metal bar against the top of the jaw and the bottom of the coupling body (not on the lower bushing)
- Push the metal bar upwards and observe the vertical play on the coupling

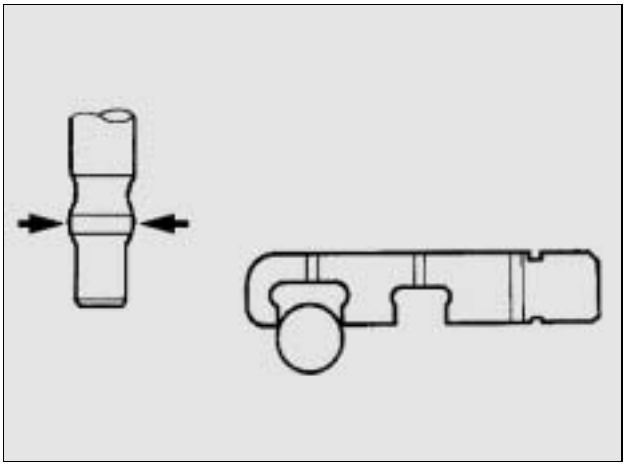
The vertical play must be no more than 3 mm, measured on the coupling head (coupling pin centre axis).
Otherwise the coupling needs to be repaired.



Checking the coupling pin

For 40 mm pin couplings:
Diameter ..... min. 36.5 mm
For 50 mm pin couplings:
Diameter ..... min. 46 mm

A new coupling pin must be fitted if the diameters are any smaller than this.



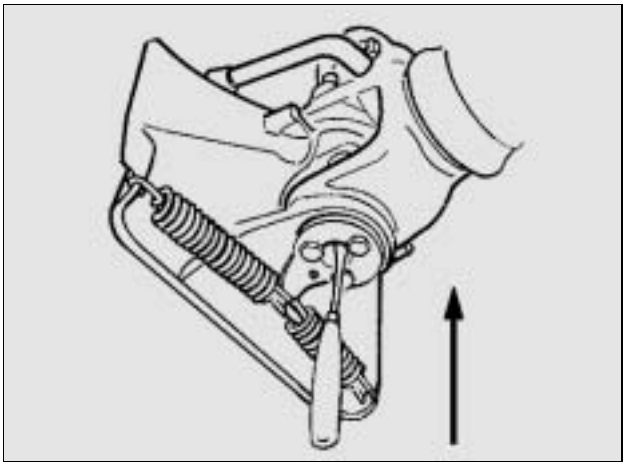
Checking the vertical play on the coupling pin

Always make sure the coupling is closed before performing this check.

- Use a suitable tool to push up the coupling pin from below

Vertical play (type 263/42) ..... 4.0 mm
Vertical play (type 400/430/500) ..... max. 2 mm

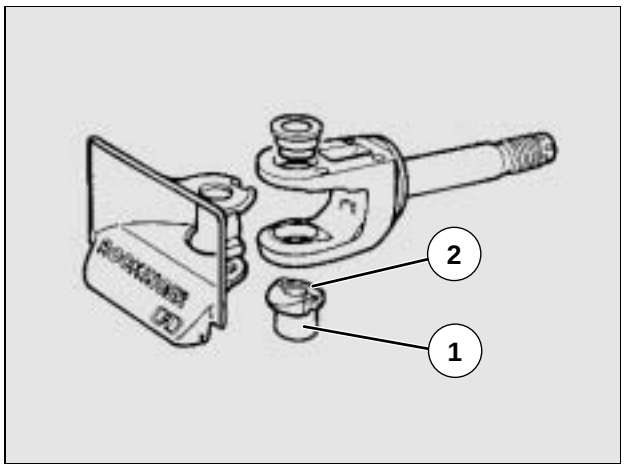
Repair the coupling if the play is any greater than above.



Checking the lower bushing

- Measure the wear on bushing ① using a gauge or slide caliper

For 40 mm pin couplings:
Permitted inside diameter ..... max. 31.5 mm
For 50 mm pin couplings (except type 56):
Permitted inside diameter ..... max. 35.9 mm



Checking the supporting ring

(types 400, 430, 500)
Fit a new supporting ring ② for the drawbar eye if, as a result of wear, the drawbar eye can touch the lower bushing or the coupling pin (type 400, 430, 500) is no longer released by the drawbar eye.

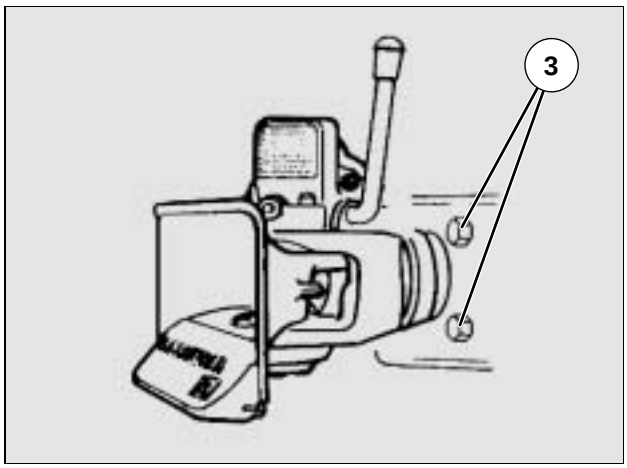
CONDITION AND FIRM SEATING

Checking

- Check the mounting bolts ③

Tightening torques

Mounting bolts ③ (M20)..... 590 Nm
For type 56 E:
Mounting bolts (M16) ..... 270 Nm



Checking the rubber spring preload

- Turn the coupling head to the left and right by hand

It must only be possible to turn the coupling head by hand if considerable force is applied.

Note: Axial coupling torque min. 100 Nm

Checking the jaw

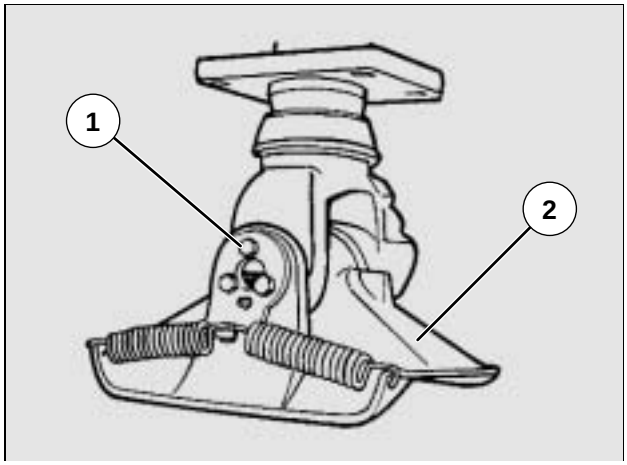
- Close the coupling
- Lightly press the jaw to the left or right
- Open the coupling (hand lever in 2nd fixed position, type 42, 263)
- Release the jaw

The release lever/locking pin must lock the jaw in centre position.
Adjust the centre position if this is not the case.

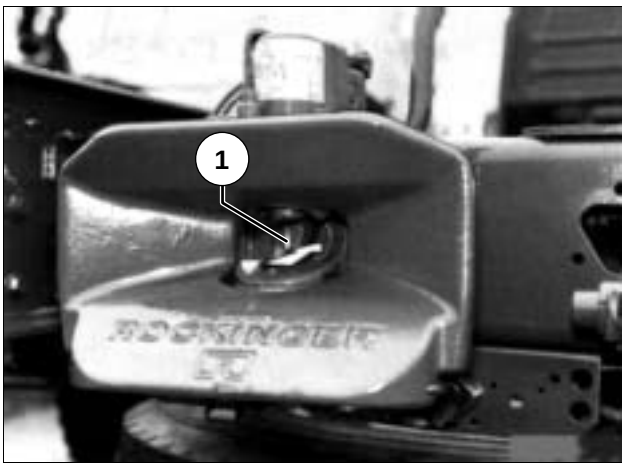
- Open the coupling (hand lever in 1st or 2nd fixed position, type 42, 263)
- Loosen bolts ① on the bottom section
- Push jaw ② to the right and left until the release lever/locking pin engages
- Re-tighten the bolts
- Push the hand lever (type 42, 263) into the 2nd fixed position to engage the coupling

Tightening torques

For types 263, 42 ..... approx. 49 Nm
For types 400, 430, 500 ..... 30 Nm
For type 56 E ..... 58 Nm



PLAY-FREE TRAILER COUPLING
(type 430)



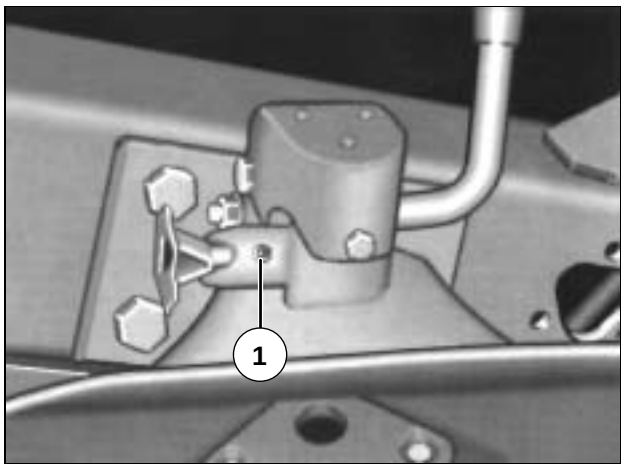
Checking correct functioning of the hydraulic system
The trailer coupling remains fully safe to operate even if the pressure fails or if the hydraulic system is not working; only the play-free function is lost in such instances.

Risk of accidents if incorrectly checked!

- Switch on the ignition
- Ensure that the compressed air system is charged
- Open the coupling
- Use a **suitable** tool (carefully guide it past the coupling pin ①) to push back the pressure pin (→) as far as the stop
- Close the coupling

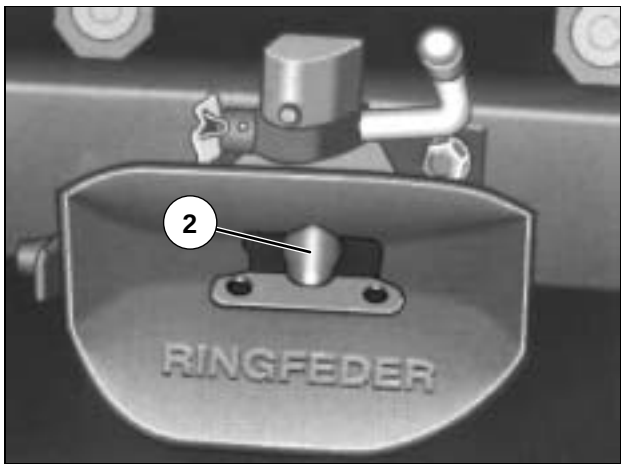
The pressure pin must now move towards the coupling pin. It must not be possible to push it back using a small amount of force.

RINGFEDER TRAILER COUPLING
Type 86 G 150 (version A)
Type 88 G 150 (version A – Switzerland)
Type 95 G 150 (version A)
Type 98 G 150 (version A – Switzerland)
Type 865 (version A)
Type 92 CX (version A)
Type 100
Type 100 A (100t)



CLEANING
Do not use high-pressure cleaners to clean the trailer coupling. Re-grease the trailer coupling each time after cleaning.

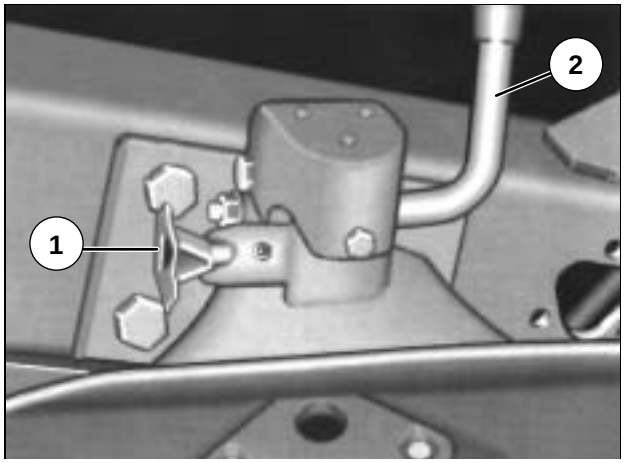
LUBRICATING
- Lubricate the coupling mechanism via lubricating nipple ①
- Open the coupling
- Operate the hand lever several times in order to disperse the grease
- Clean and grease coupling pin ②



Lubricant
see ....."Maintenance Recommendations and Recommended Service Products" booklet

CORRECT FUNCTIONING

Danger of accidents!
Refer to the Operator's Manual!

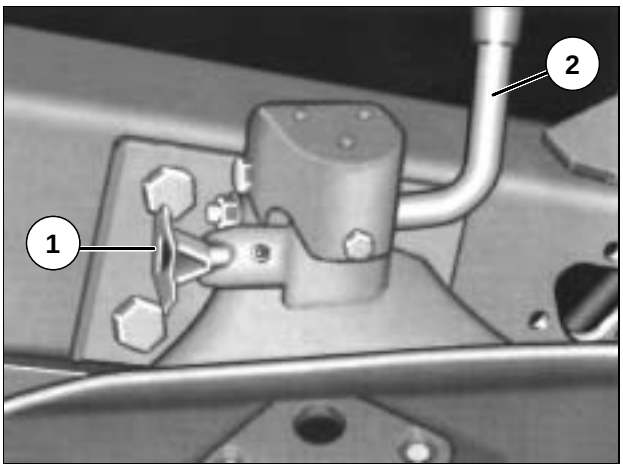


Checking the hand lever
- Turn safety ① anticlockwise a quarter turn, then pull it out and allow it to engage in the outer lock
- Push hand lever ② upwards until it engages

It must be possible to operate the hand lever using a normal amount of force. If the lever is too easy to operate, this indicates that the closing spring is worn out or broken and needs renewing.

Checking after hitching up
The hand lever ② must be in its bottom-most position. The safety ① must be fully engaged (inner lock-in position).

If the safety ① is not fully engaged, this means that the coupling is not closed and secure. Keep repeating the hitching up process until the safety is engaged in the inner lock-in position, which means that the coupling is closed and secure. If the safety does not engage, check the coupling and repair it if necessary.



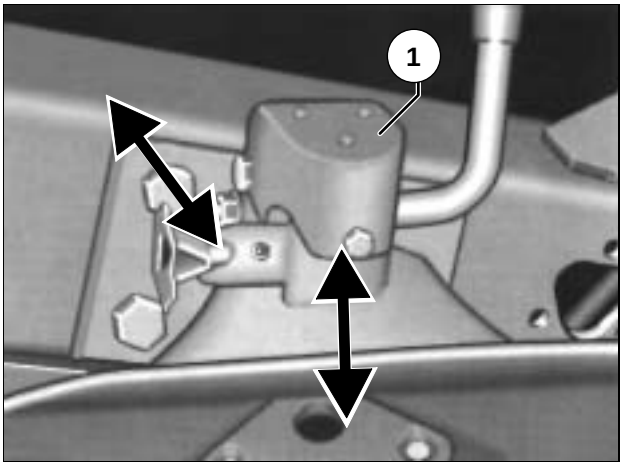
WEAR

Checking the longitudinal play on the mount
- Grasp the coupling head ① (not the jaw "bell") with both hands and vigorously move it back and forth.

There must be no longitudinal play.

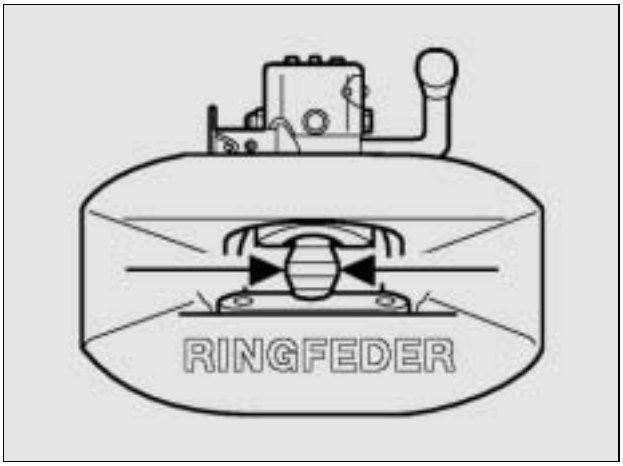
Checking the vertical play on the mount
- Open the coupling (hand lever up)
- Position the metal bar against the top of the jaw and the bottom of the coupling body (not on the lower bushing)
- Push the metal bar upwards and observe the movement of the coupling

The maximum permitted vertical play is 3 mm (or 5 mm for type 95 / 98) measured on the coupling head (coupling pin axis). If this limit is exceeded, immediately have the vertical play corrected at a MAN Service workshop.



Checking the coupling pin
For 40 mm pin couplings:
Diameter ..... min. 36.5 mm
For 50 mm pin couplings:
Diameter ..... min. 46 mm (FRG 47.2 mm)

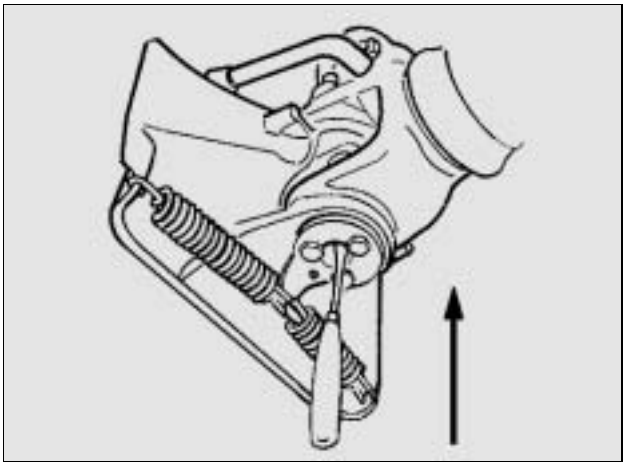
A new coupling pin must be fitted if the diameters are any smaller than this.



Checking the vertical play on the coupling pin
Only check when the coupling is closed.
- Use a suitable tool to push up the coupling pin from below

Vertical play ..... max. 4.0 mm

Repair the coupling if the play is any greater than above.



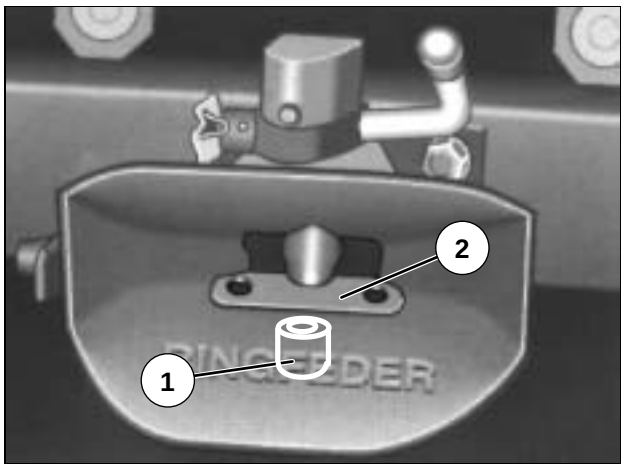
Checking the lower bushing

- Measure the wear on bushing ① using a gauge or slide caliper

For 40 mm pin couplings:
Permitted inside diameter ..... max. 31.2 mm
For 50 mm pin couplings:
Permitted inside diameter ..... max. 36.2 mm

Checking the wear plate

A new wear plate ② needs to be fitted if the wear exceeds 4 mm.



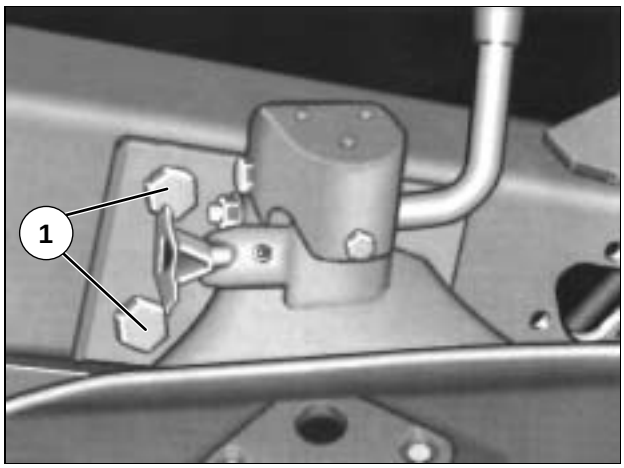
CONDITION AND FIRM SEATING

Checking

- Check the mounting bolts ①

Tightening torques

For types 86 G 150, 88 G 150, 865 A, 92CX:
Mounting bolts (M20) ..... 590 Nm
For types 95 G 150, 98 G 150:
Mounting bolts (M20) ..... 410 Nm
For type 100, 864:
Mounting bolts (M16) ..... 270 Nm



Checking the axial preload on the rubber springs

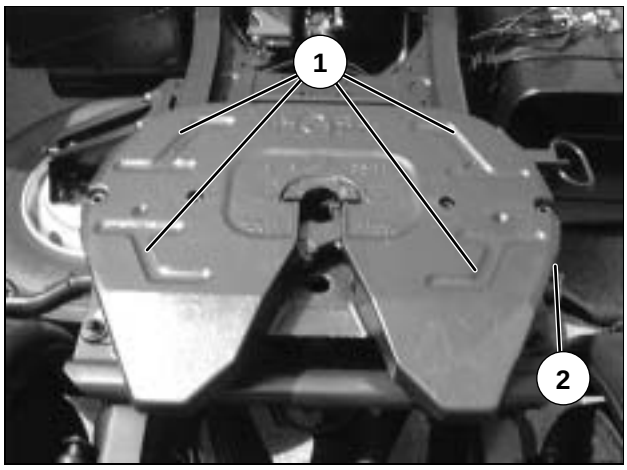
In new condition, the axial coupling torque is min..... 100 Nm

- Turn the coupling head to the left and right by hand

It must only be possible to turn the coupling head by hand if considerable force is applied.

FISCHER FIFTH WHEEL COUPLING

GF SK-S 36–20 / 150 mm
GF SK-S 36–20 W / 150 mm
GF SK-S 36–20 / 250 mm
GF SK-S 36–20 W / 250 mm
GF SK-S 36–20 / 185 mm
GF SK-S 36–20 W / 185 mm
GF SK-HD 38–36
GF HD 38–36 / 2“ / 190 mm
GF HD 38–36 / 3,5“ / 190 mm



CLEANING

Always re-grease the fifth wheel coupling after cleaning and servicing.

- Clean the fifth wheel plate and the semitrailer plate
- Clean the locking mechanism if it is very dirty

Lubricant

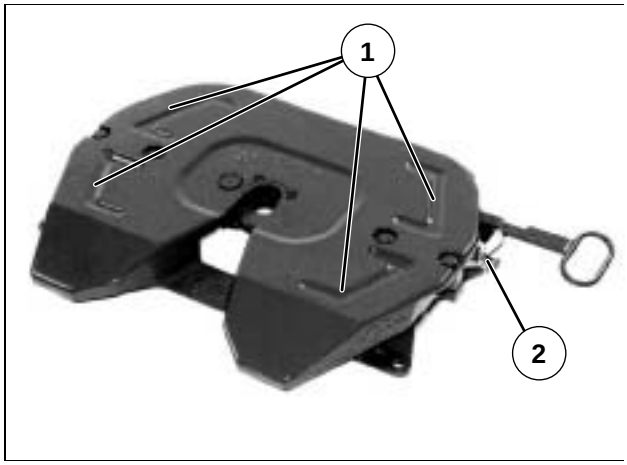
see ....."Maintenance Recommendations and Recommended Service Products" booklet

LUBRICATING (SK-S 36–20/SK-S 36–22)

- Grease the fifth wheel plate, semitrailer plate, locking components, kingpin contact areas, kingpin and locking mechanism
- Completely pack the lubricating grooves ① in the fifth wheel plate with grease

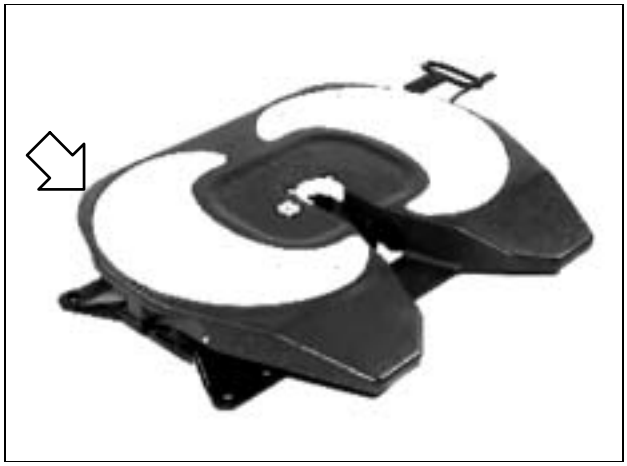
Fifth wheel couplings without central lubrication:

- Also lubricate the lock and the wear ring via lubricating nipple ② on the edge of the plate



LUBRICATING (SK-S 36–20W)

The lubrication point for the lock is on the edge of the plate (→). The lubrication cycle can only be performed when the semitrailer is hitched up.



CONDITION

Checking

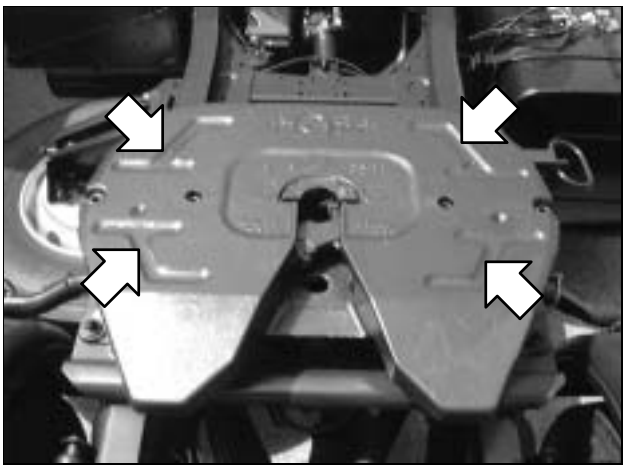
- Check that the fifth wheel coupling is firmly seated
- Check the fifth wheel plate and the semitrailer plate for cracks, flatness and wear
- Check the kingpin for perpendicularity, damage, wear and firm seating
- Check the locking mechanism for ease of movement, deformation and corrosion
- Check the lubricating lines for leak-tightness and correct routing
- Check the thrust blocks for damage and firm seating
- Check the mounting elements (mounting plate and vehicle subframe) for damage and firm seating

Note: Always use genuine parts from the manufacturer when renewing damaged or defective parts.

WEAR

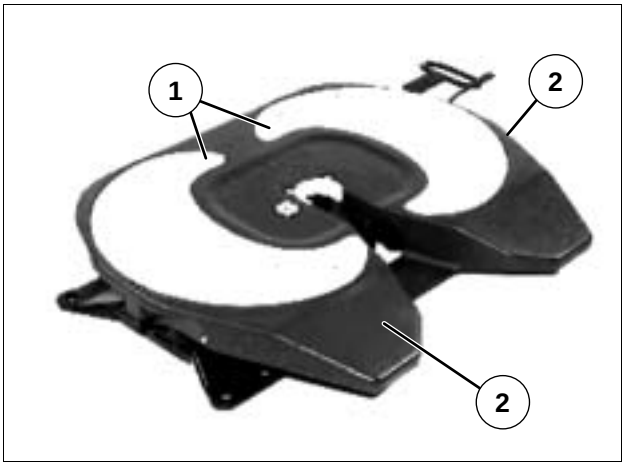
Checking the coupling plate

Fit a new fifth wheel plate if the existing one has worn down as far as the base of the lubricating grooves (→). Check the semitrailer plate!



SK-S 36–20 W

If scoring occurs on ① or the sliding plates have worn down to the mounting bolts, it is imperative that both sliding plates be renewed. Wear on protective edge ② has no negative effects on coupling operation and lifetime.



SK–S 36–22

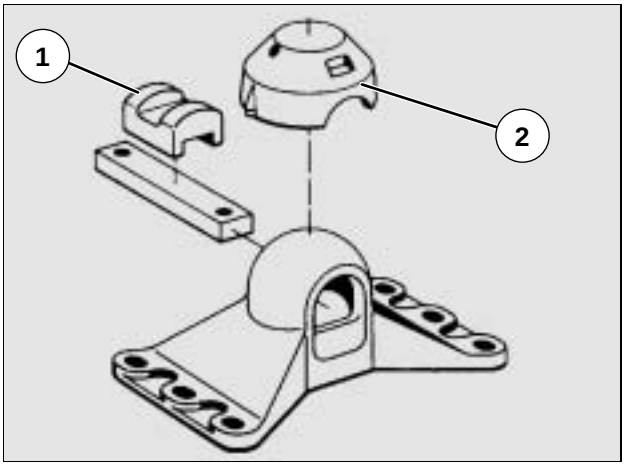
Mount

1 Rubber damper

Fit a new rubber damper if the existing one shows clear signs of wear.

2 Plastic mount

Fit a new mount if the lubricating groove has worn away or if the longitudinal play is max. 5 mm.



SK–S 36–20 and SK-S 36–20 W

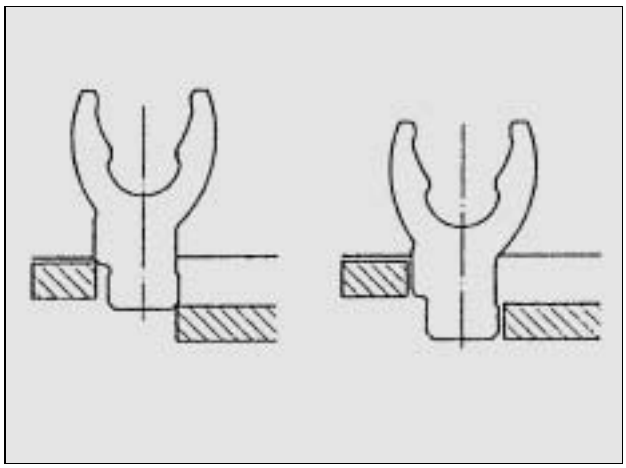
Rubber damper

- Visually check for wear and fit a new one if necessary
- Check that the rubber damper is correctly seated when inserting into the bearing block
- Fit a new bearing insert if there is no longer any gap between the bearing block and the coupling plate

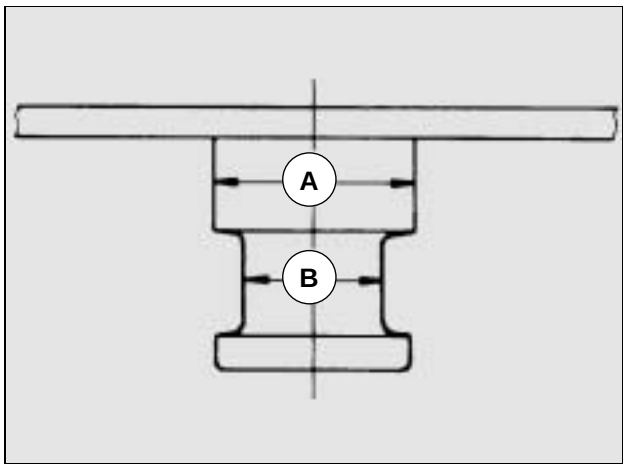
Coupling lock
Check the wear on the lock using a limit gauge (GF no. A 659 920 032).

Proceed as follows if the coupling lock can no longer be readjusted and the limit gauge applied from above slides into the lock (right-hand figure):

- Have new locking components fitted at a MAN Service workshop



Kingpin reference dimensions (A), (B)



2" kingpin:

A : "As new" .....73.0 mm
Reference .....min. 71.0 mm

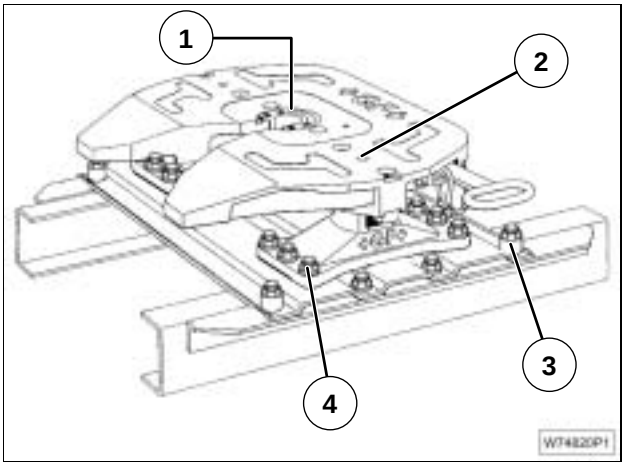
B : "As new" .....50.8 mm
Reference .....min. 49.0 mm

3.5" kingpin:

A : "As new" .....114.0 mm
Reference .....min. 112.0 mm
B : "As new" .....89.0 mm
Reference .....min. 86.0 mm

Fifth wheel plate
A new fifth wheel plate must be fitted if the bearing surface has worn down as far as the base of the lubricating grooves.
Check the semitrailer plate for deformation if the fifth wheel plate is worn on one side.

CHECKING FIRM SEATING



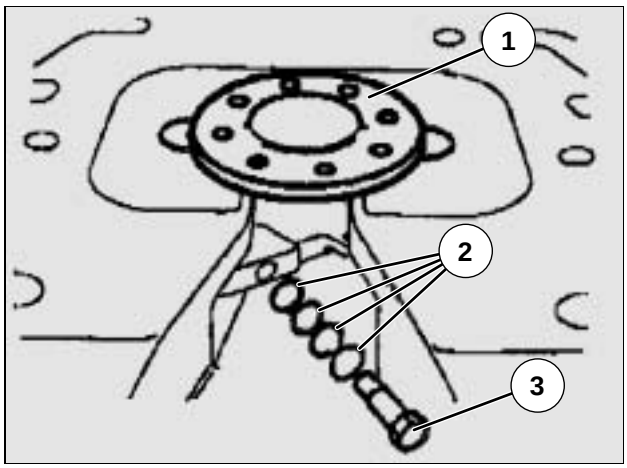
Tightening torques
Bolted connection ① for wear ring..... 46 Nm
Bolted connection ② for bearing blocks ..... 400 Nm

Note: The illustrations show examples of bolted connections for bearing blocks/assembly plate and assembly plate/vehicle subframe.
The assembly plate used, the vehicle subframe and the bolted connections are all standard MAN versions.

Tightening torques
Bolted connection ④ between **bearing blocks** and assembly plate (applies to all types):
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm
Bolted connection ③ between **assembly plate** and vehicle subframe (applies to all types):
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm

ADJUSTING THE LOCK

Note: Adjust the lock so that the play on the kingpin is at least 0.5 mm.
Use a new kingpin to adjust the lock.



SK–S 36–22

Too much longitudinal play = remove shim ②

Too little longitudinal play = add shim ②

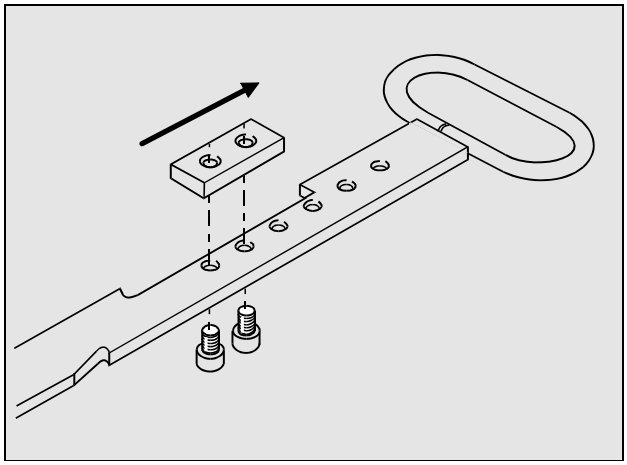
- Open the fifth wheel coupling, insert the kingpin ① and close the fifth wheel coupling
- Unscrew and remove bolt ③ (size 27) on the locking bar; removing or adding a shim adjusts the play by 0.4 mm
- Re-insert the bolt with the remaining shims and tighten it to 180 Nm
- Check the longitudinal play: If there is still too much play after the lock has been adjusted, the only option left is to fit a new wear ring and locking piece

SK–S 36-20

- Unscrew and remove the two hexagon socket bolts (size 6) on the release handle stop (adjuster)

Moving the stop along one hole in the release handle equates to an adjustment of 0.5 mm.

- Tighten the hexagon socket bolts



Tightening torque

Hexagon socket bolts..... 46 Nm

If the lock does not close completely, keep moving the stop (adjuster) back one hole until the play is correct.

Note: As a final check, make sure the lock flap has engaged after hitching up the semitrailer.

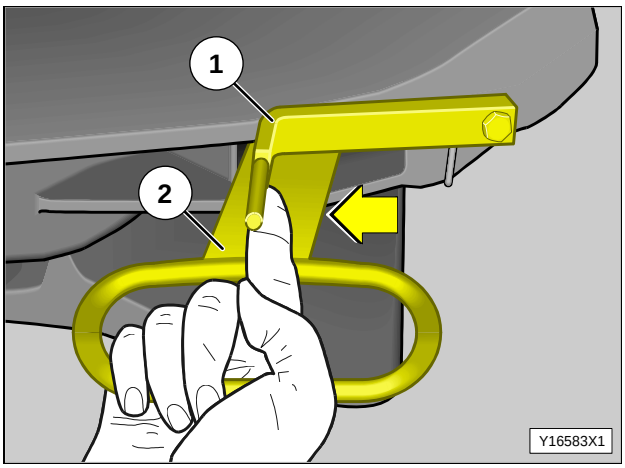
CHECKING CORRECT FUNCTIONING

Danger of accidents!
Refer to the Operator's Manual!

VERSION WITH LOCK FLAP

Opening the lock

- Raise lock flap ①
- At the same time, swivel hand lever ② backwards (←), then pull it outwards and clip its projection onto the edge of the plate



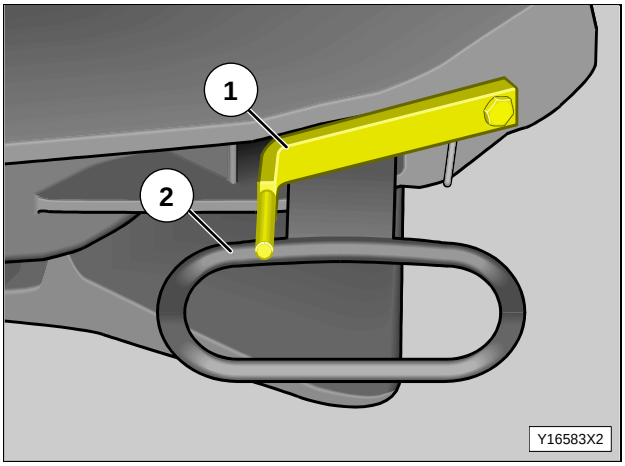
Checking after hitching up

– The lock flap ① must engage at the bottom next to the hand lever ②

The lock flap is in the locked position, the lock is secure.

Danger of accidents!
If the lock flap does not engage, this indicates that the fifth wheel coupling is not correctly closed. Danger of accidents!

- Repeat the hitching up procedure



VERSION WITH RELEASE LEVER

Opening the lock

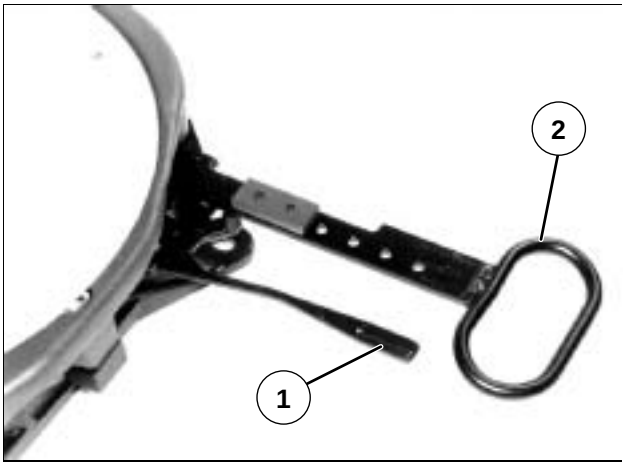
- Push release lever ① downwards
- Move release handle ② backwards, then pull it outwards and attach the recess to the edge of the plate

Checking after hitching up

The release lever ① springs into the closed position automatically. The lock is secure.

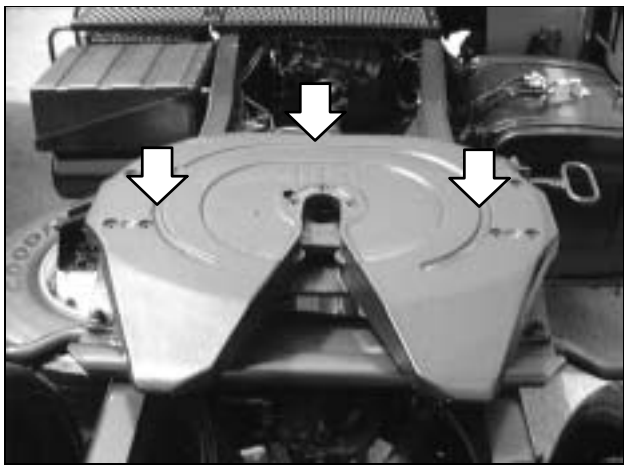
Danger of accidents!
If the release lever does not engaged and the cam is not next to the release handle, this means the fifth wheel coupling is not fully closed. Danger of accidents!

- Repeat the hitching up procedure



JOST FIFTH WHEEL COUPLING

JSK 37C–150–Z4
JSK 37C–185–Z4
JSK 37C–250–Z4
JSK 38C–1–2“
JSK 38C–1–2“–Z4
JSK 38C–1–3,5“
JSK 38C–1–3,5“–Z4
JSK 37C–250W–250
JSK 37C–150W–150
JSK 37C–185W–185
JSK 36 DV



CLEANING

- Clean the fifth wheel plate and the semitrailer plate
- Clean the locking mechanism

Always re-grease the fifth wheel coupling after cleaning and servicing.

Lubricant

see ....."Maintenance Recommendations and Recommended Service Products" booklet

LUBRICATING

- Grease the semitrailer plate, coupling plate, locking components (locking mechanism) and kingpin
- Completely pack the lubricating grooves (→) in the fifth wheel plate (example illustrated) with grease

Fifth wheel coupling without central lubrication:
The lubricating nipples on the fifth wheel coupling plate are only used for additional lubrication required between the maintenance intervals (JSK 38 C 1).

Low-maintenance fifth wheel couplings:

- Lightly grease the semitrailer plate
- Lubricate the locking hook every 10,000 km via the lubrication line on the edge of the plate whilst the semitrailer is hitched up.
- Check the plastic sliding coverings for wear every 25,000 to 50,000 km, depending on the application conditions.

JOST FIFTH WHEEL COUPLING

CONDITION

Checking

- Check that the fifth wheel coupling mounting elements are firmly seated
- Check the fifth wheel coupling and the semitrailer plate for cracks, flatness and wear
- Check the kingpin for perpendicularity, damage, wear and firm seating
- Check the locking mechanism for ease of movement, deformation, wear, cracks and corrosion
- Check the lubricating lines for leak-tightness and correct routing
- Check the thrust blocks (if fitted) for damage and firm seating
- Check the mounting elements (mounting plate and vehicle subframe) for damage and firm seating

Note: Always use genuine parts from the manufacturer when renewing damaged or defective parts.

CHECKING FOR WEAR

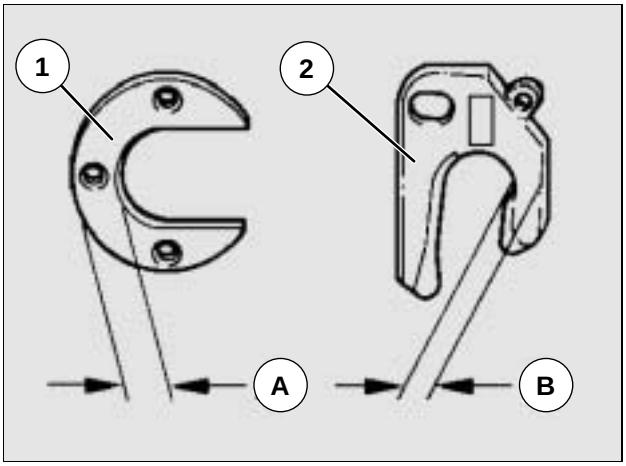
Coupling lock

Wear ring ① reference Ⓐ

JSK 37C:	"As new"	33.5 mm
	Reference	min. 30.5 mm
JSK 38C–1–2":	"As new"	57.5 mm
	Reference	min. 56.0 mm
JSK 38C–1–3.5":	"As new"	37.0 mm
	Reference	min. 35.5 mm

Locking hook ② reference Ⓑ

JSK 37C:	"As new"	19.0 mm
	Reference	min. 17.5 mm
JSK 38C–1–2":	"As new"	57.1 mm
	Reference	min. 55.1 mm
JSK 38C–1–3.5":	"As new"	38.0 mm
	Reference	min. 36.0 mm



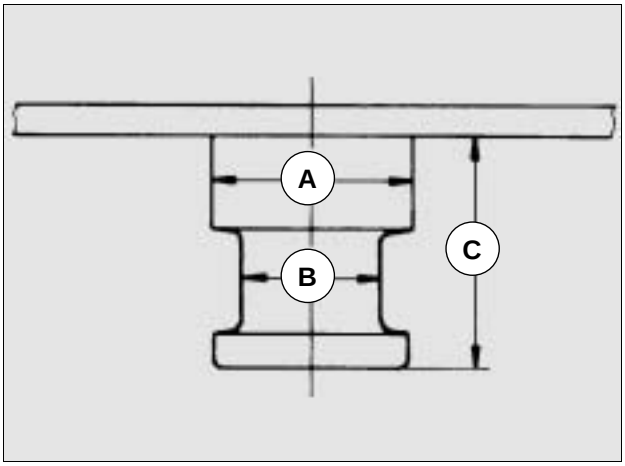
Kingpin reference dimensions Ⓐ, Ⓑ, Ⓒ

2" kingpin:

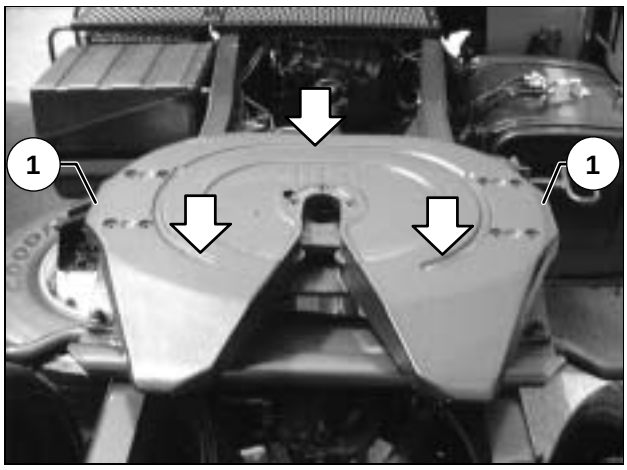
A :	"As new"	73.0 mm
	Reference	min. 71.0 mm
B :	"As new"	50.8 mm
	Reference	min. 49.0 mm
Distance C:		max. 84.0 mm
Distance C:		min. 82.5 mm

3.5" kingpin:

A :	"As new"	114.0 mm
	Reference	min. 112.0 mm
B :	"As new"	89.0 mm
	Reference	min. 86.0 mm
Distance C:		max. 74.0 mm
Distance C:		min. 72.0 mm

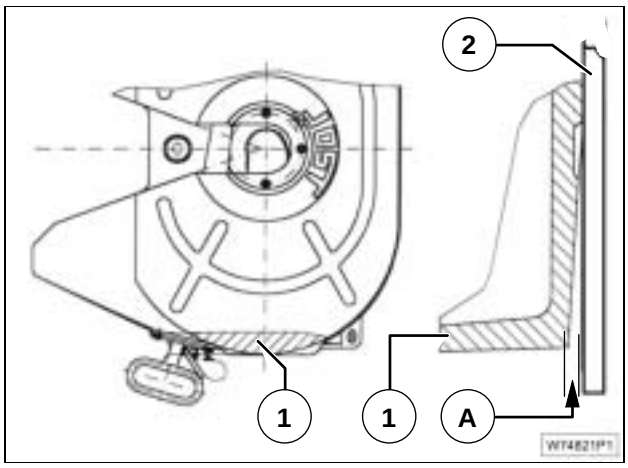


Checking coupling plate for wear
Fit a new fifth wheel coupling (example illustrated) if the top side of the plate has worn down to the lubricating groove depth (→) at any point.

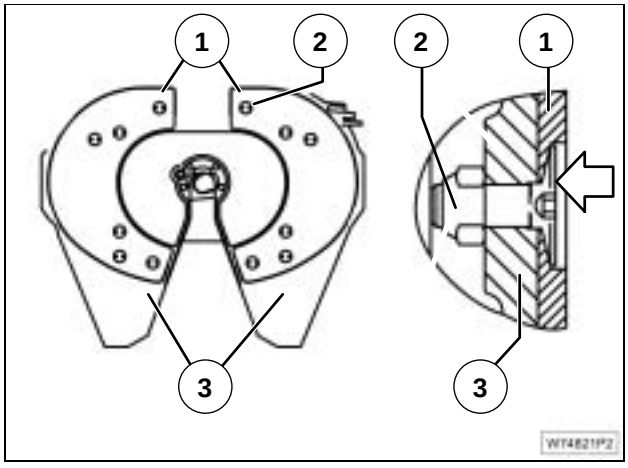


- Use a straight edge ② across the left and right outer areas ① (also see top figure) to measure the material wear (dimension Ⓐ).

Note: Material wear (dimension Ⓐ) of up to approx. 8 mm is permitted in the outer area ① (approx. 50 mm wide) above the bearing points, i.e. up to approx. 3 mm deeper than the lubricating groove base.



Low-maintenance fifth wheel coupling
The sliding coverings ① on the fifth wheel coupling ③ need to be renewed if they have worn down as far as the top side (←) of the mounting bolts ②.



CHECKING FIRM SEATING

Note: The assembly plate used, the vehicle subframe and the bolted connections are all standard MAN versions.

Tightening torques

JSK 37C Ⓐ:
Bolted connection ① for wear ring..... 130 Nm
Bolted connection ② for bearing blocks ..... 160 Nm
Bolted connection between bearing blocks and assembly plate:
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm
Bolted connection between assembly plate and vehicle subframe:
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm

JSK 38C Ⓑ:
Bolted connection ① for wear ring..... 80 Nm

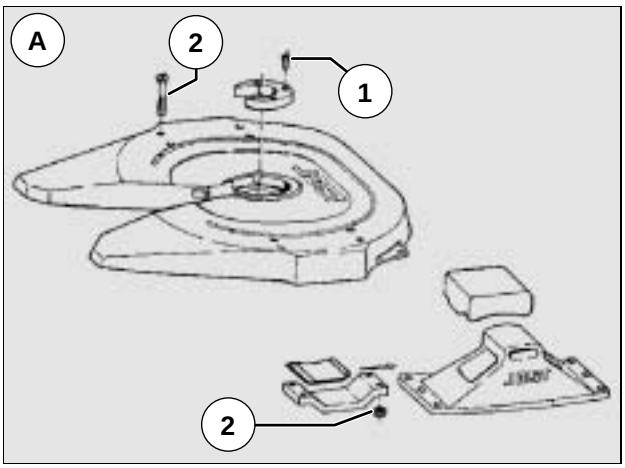
Bolted connection ② for bearing blocks ..... 350 Nm

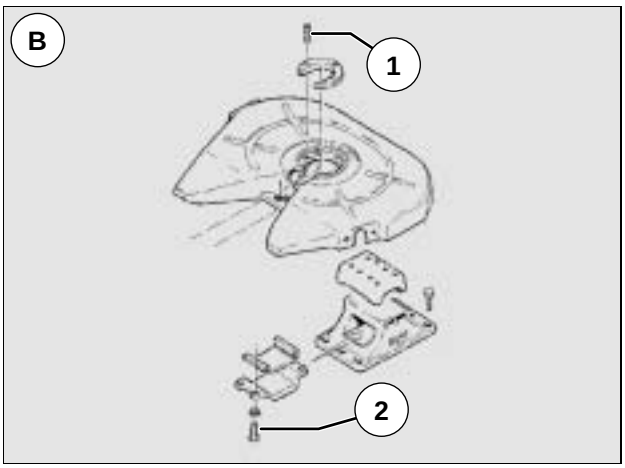
JSK 38G–1 Ⓒ:
Bolted connection ① for wear ring..... 80 Nm
Fastening of rocker ③ to fifth wheel plate via bearing pin ④:
Bolts ⑧ ..... 130 Nm

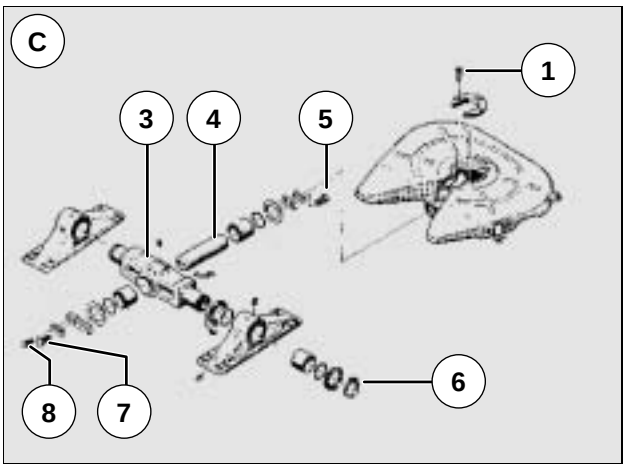
Bolts ⑦ ..... 160 Nm
Bolts ⑤ .....max. 180 Nm
Note: Only tighten bolts ⑤ until the connection starts to grab; however, not more than 180 Nm.

- Check that the retaining rings ⑥ for locking the bearing blocks on rocker ③ are correctly seated

Bolted connection between bearing locks and assembly plate:
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm
Bolted connection between assembly plate and vehicle subframe:
Galvanised bolts/washers (yellowish)..... 370 Nm
Dacromet bolts/washers (matt silver) ..... 290 Nm



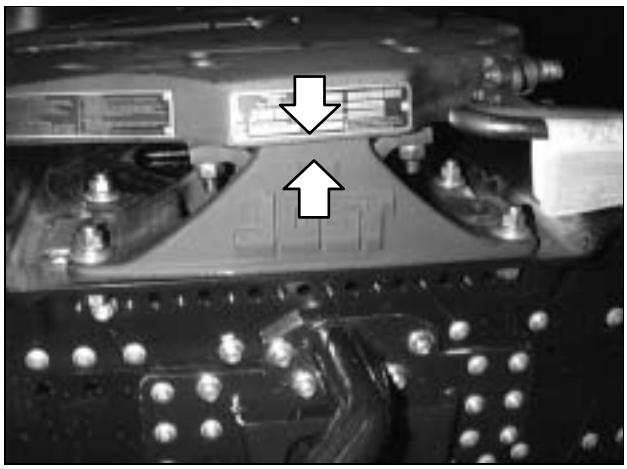




CHECKING MOUNTS

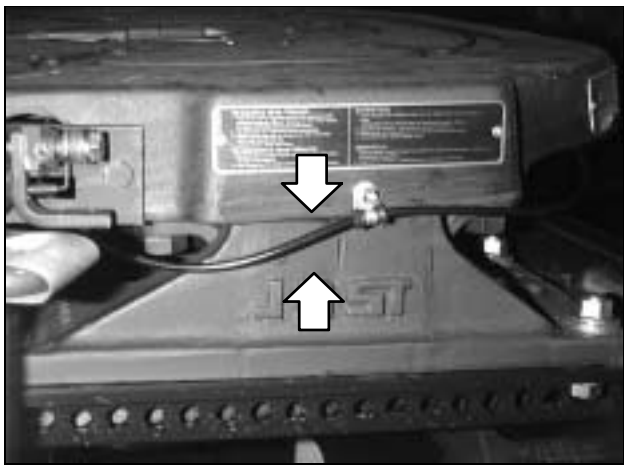
Mount C (JSK 37C)

Vertical wear:
The distance between the fifth wheel coupling plate (↓) and the top edge of the wear mark (↑) or Jost marking (if no wear mark present) must be at least 5 mm when a laden semitrailer is hitched up.
Otherwise, fit new rubber cushioning.



Mount C (JSK 38C–1)

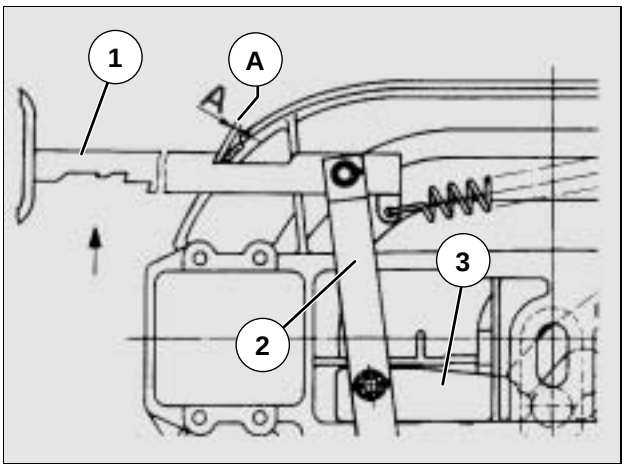
Vertical wear:
The distance between the fifth wheel coupling plate (↓) and the top edge of the Jost marking (↑) must be at least 22 mm when a laden semitrailer is hitched up.
Otherwise, fit new rubber cushioning.



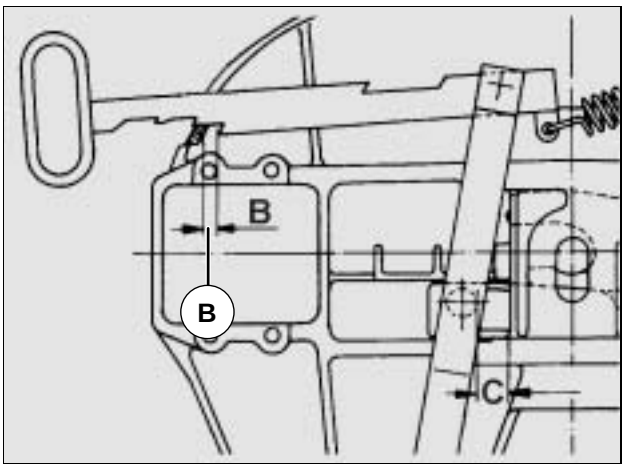
Mount G (JSK 38G–1)

Radial play on the bearing blocks (example illustrated) and in the rocker mount.....max. 4 mm
Longitudinal (axial) play of the coupling plate on the rocker pin .....max. 2 mm

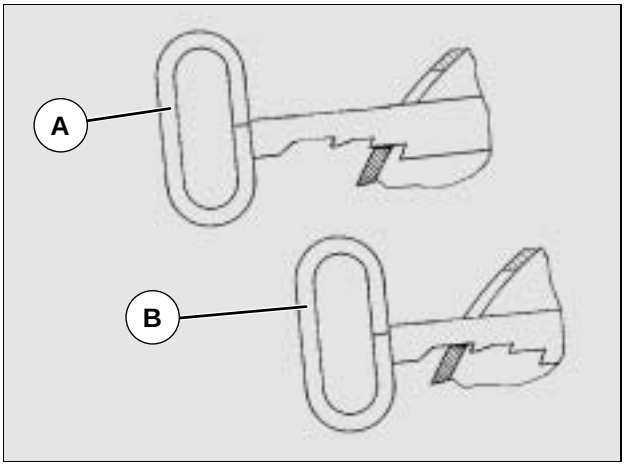
CHECKING THE LOCKING FUNCTION (JSK 37)



Automatic closing
The extending kingpin must cause the securing edge to be raised by:
Dimension Ⓐ ..... min. 6 mm.
Perform the check when the neck of the kingpin (∅ 50.8 mm) presses against locking bar ③ and handle ① is held in the direction indicated by the arrow.
If Ⓐ is less than 6 mm, check the handle, lever ② and the locking bar for deformation and wear.



Checking correct functioning of the safety
In closed position, it must be possible to engage the spring safety hook and the drop-lock must drop of its own accord.
When the fifth wheel coupling is correctly closed, the distance between the safety edge and the plate edge – dimension Ⓑ – must be 10 mm.
If Ⓑ is less than 10 mm, check the locking components, handle and lever for deformation and wear.



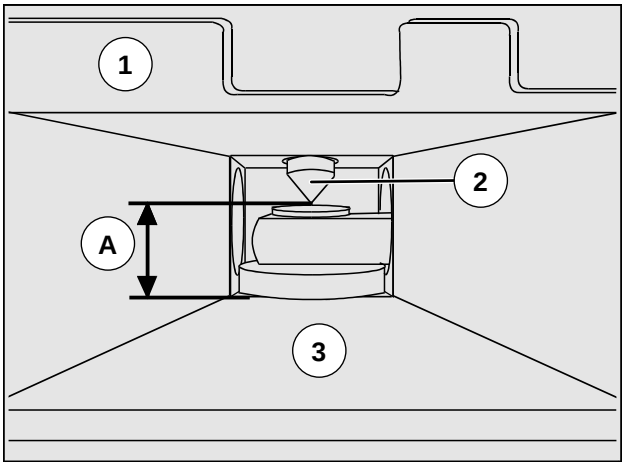
Lock adjustment

Note: Always check the longitudinal play in the lock with the semitrailer hitched up.

"As new" condition (A)
When the kingpin is "as new", it must have 0.3 mm longitudinal play in the lock.

Worn (B)
It is no longer possible to manually adjust the lock if the second control notch engages or if the lever bearing eye is touching the stop protrusion (C = 0 mm; see 2nd picture from the top).

CHECKING THE INTERLOCK (JSK 38)



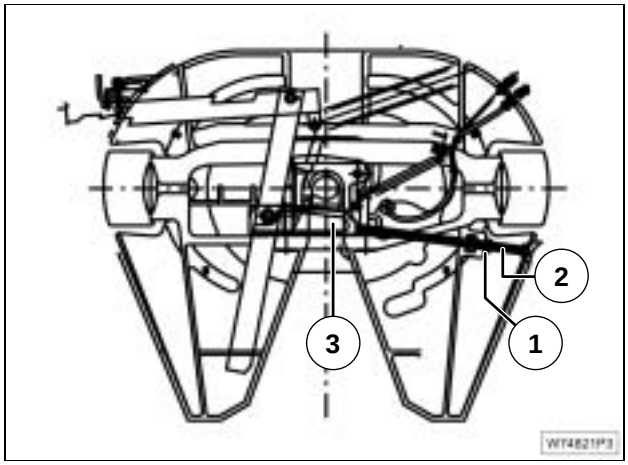
In open position (handle pulled out to its maximum stroke) with the interlock engaged in the lock, the reference dimension must be 65 mm Ⓐ.

1 Fifth wheel coupling shown on assembly table
2 Interlock SK 2405–27
3 Semitrailer plate/assembly table

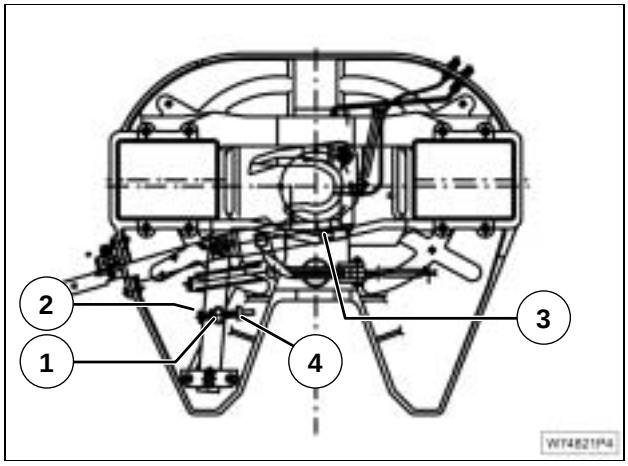
ADJUSTING THE LOCK (JSK 37 AND 38)

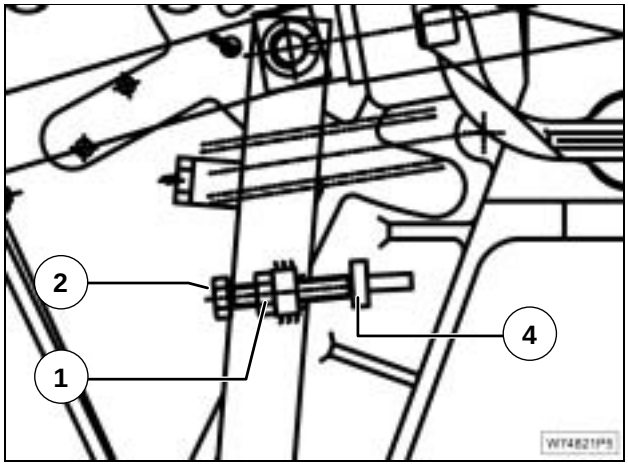
Note: Always adjust using a non-steering semitrailer and a new or unworn kingpin.

The lock adjustment procedure is the same for JSK 37A and JSK 37C fifth wheel couplings. Type JSK 37A is shown (top figure).
The same applies to fifth wheel couplings JSK 38C–1 and JSK 38G–1. Type JSK 38C–1 is shown (bottom figure).



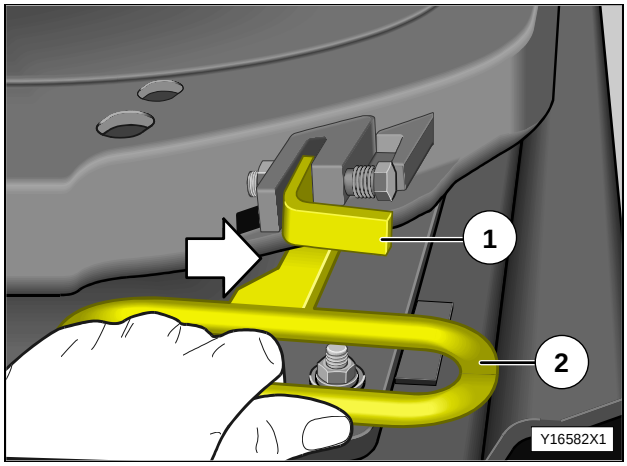
- Park the tractor-trailer unit on flat, level ground so that it is not under strain
- Undo locknut ①
- Unscrew adjusting screw ②
  JSK 37 (top figure): approx. 15 turns
  JSK 38 (bottom figure):
  until screw is no longer at stop ④
- Re-hitch up the semitrailer or tap lightly against the handle in closing direction to move locking bar ③ to its final position
- With the handle released, screw in the adjusting screw until the handle starts to move
- Set basic play of 0.3 mm as follows:
  JSK 37 (top figure):
  Screw in the adjusting screw by a further 1 $^{1}/_{2}$ turns
  JSK 38 (bottom figure):
  Screw in the adjusting screw by a further turn
- Tighten the locknut
- Try moving off with the semitrailer braked; if the play is any greater, it is no longer possible to adjust the lock; fit a new wear ring and locking hook





CHECKING CORRECT FUNCTIONING

Danger of accidents!
Refer to the Operator's Manual!



Opening the lock

- Raise drop-lock ①
- At the same time, move hand lever ② forwards (→), pull it out to the side and attach the notch to the edge of the plate (JSK 37) or pull it out to its maximum stroke (JSK 38)

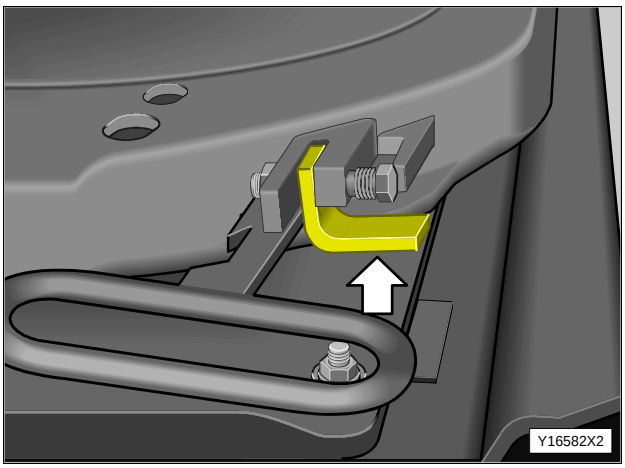
Checking after hitching up

– Drop-lock (→) down in locked position

The lock is secure.

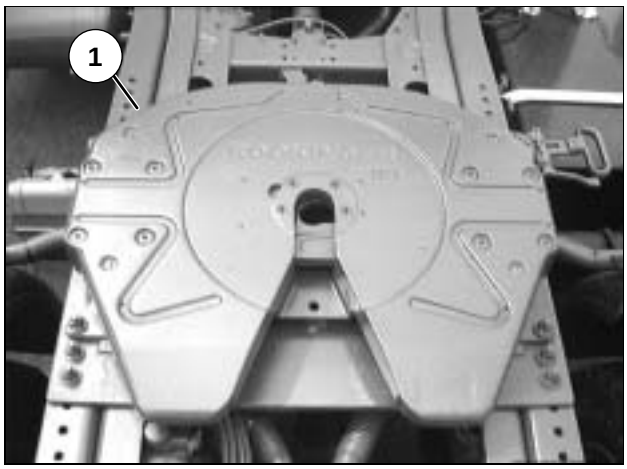
Danger of accidents!
If the drop-lock does not drop down into locked position, this indicates that the fifth wheel coupling is not fully closed.
Risk of accidents!

- Repeat the hitching up procedure.



ROCKINGER FIFTH WHEEL COUPLING

Type 610–150
Type 610–185
Type 610–250



CLEANING

Always re-grease the fifth wheel coupling after cleaning and servicing.

- Clean the fifth wheel plate and the semitrailer plate
- Clean the locking mechanism if it is very dirty

Lubricant

see ....."Maintenance Recommendations and Recommended Service Products" booklet

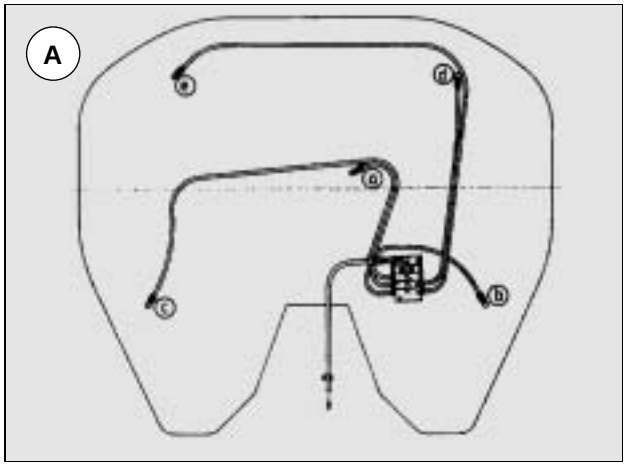
LUBRICATING

- Grease the fifth wheel plate, semitrailer plate, locking components, kingpin contact areas, kingpin and locking mechanism
- Completely pack the lubricating grooves in the fifth wheel plate with grease

Once a semitrailer has been hitched up, the fifth wheel coupling can also be lubricated via 4 lubricating nipples on the bottom of the fifth wheel plate.
Observe grease emerging at the end of the lubricating grooves.
Regularly re-lubricate the coupling lock via lubricating nipple ① on the end face of the fifth wheel coupling.

Lubrication line routing

A Figure for central lubrication systems



CONDITION

Checking

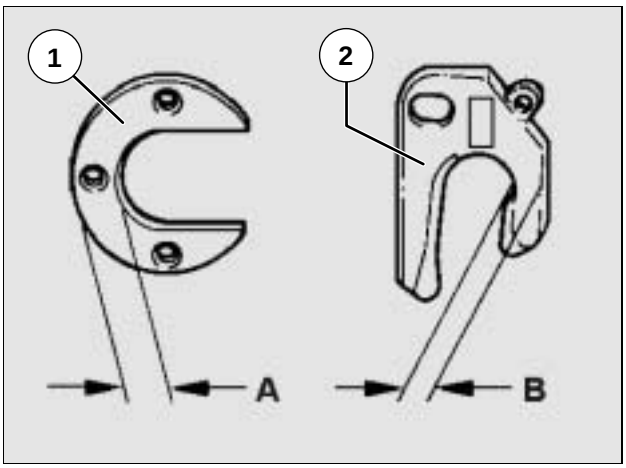
- Check that the fifth wheel coupling is firmly seated
- Check the fifth wheel plate and the semitrailer plate for cracks, flatness and wear
- Check the kingpin for perpendicularity, damage, wear and firm seating
- Check the locking mechanism for ease of movement, deformation and corrosion
- Check the lubricating lines for leak-tightness and correct routing
- Check the thrust blocks for damage and firm seating
- Check the mounting elements (mounting plate and vehicle subframe) for damage and firm seating

Note: Always use genuine parts from the manufacturer when renewing damaged or defective parts.

WEAR

Checking

Wear ring ① reference dimension (A)
"As new" ..... 33.5 mm
Reference ..... min. 30.5 mm
Locking hook ② reference dimension (B)
"As new" ..... 19.0 mm
Reference ..... min. 17.5 mm

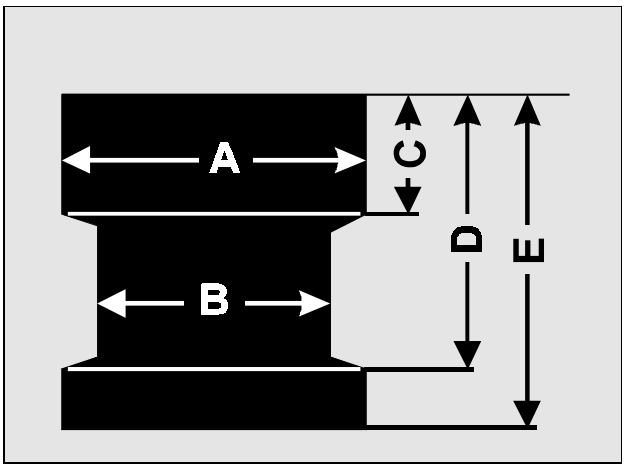


Kingpin

Note: Rockinger gauge no. 58 079

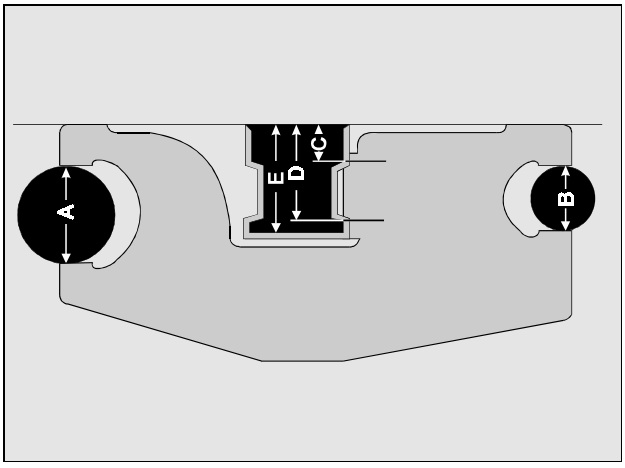
Diameter

A: "As new" ..... 73.0 mm
Reference ..... min. 71.0 mm
B: "As new" ..... 50.8 mm
Reference ..... min. 49.0 mm



Lengths

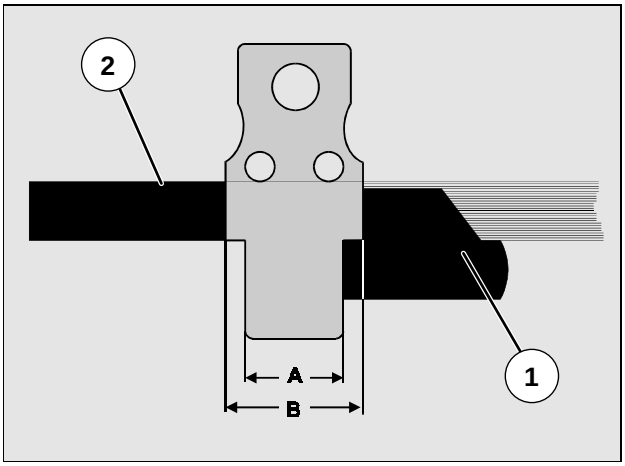
C: "As new" ..... 35.0 mm
Reference ..... min. 33.5 mm
D: "As new" ..... 70.0 mm
Reference ..... max. 71.5 mm
E: "As new" ..... 84.0 mm
Reference ..... min. 82.5 mm



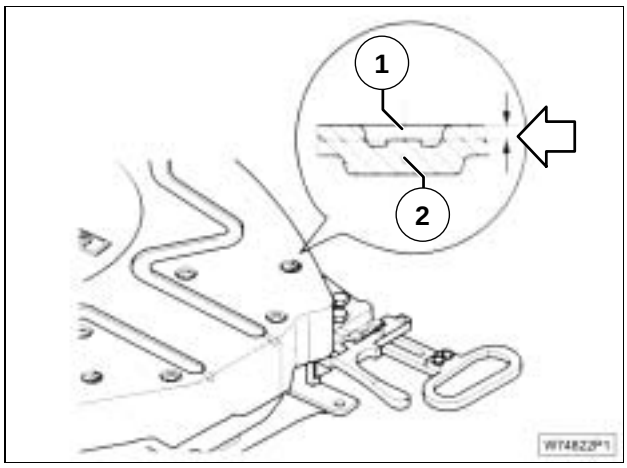
Coupling lock

Note: Rockinger gauge no. 58 080

Check the inside diameter; the gauge must not slide into the closed coupling lock from above.
The largest permitted play on the coupling lock is 2 mm. In this instance, it does not matter how the degree of wear is distributed between the coupling hook ① and the contact radius of the fifth wheel plate ②. As a consequence, the largest possible diameters are
A ..... max. 52.8 mm
B ..... max. 75.0 mm
The wear limits indicated must not be exceeded.



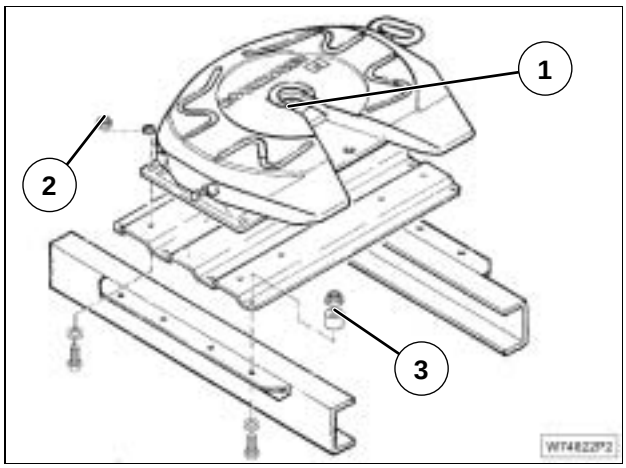
Fifth wheel plate
The fifth wheel plate must be renewed if the 4 wear marks ① are flush (←) with the fifth wheel plate ②. Check the semitrailer plate for deformation if the fifth wheel plate is worn on one side.



FIRM SEATING

Checking
Bolted connection ① for wear ring ..... 86 Nm

Note: The illustrations show examples of bolted connections for bearing blocks/assembly plate and assembly plate/vehicle subframe. The assembly plate used, the vehicle subframe and the bolted connections are all standard MAN versions.



Tightening torques
Bolted connection ② between **bearing blocks** and assembly plate (applies to all types):
Galvanised bolts/washers (yellowish) ..... 370 Nm
Dacromet bolts/washers (matt silver)..... 290 Nm

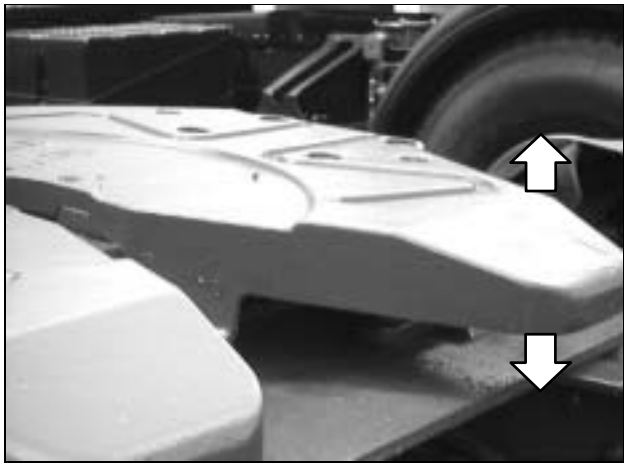
Bolted connection ③ between **assembly plate** and vehicle subframe (applies to all types):
Galvanised bolts/washers (yellowish) ..... 370 Nm
Dacromet bolts/washers (matt silver)..... 290 Nm

MOUNTING

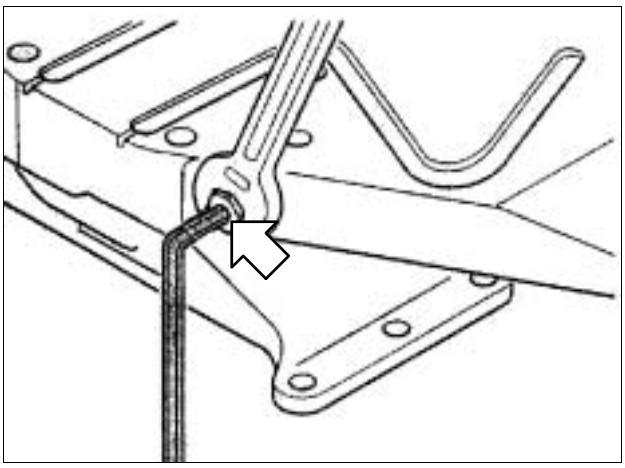
Checking
- Lift the fifth wheel plate in the "tilting" direction; it must be possible to slightly tilt the fifth wheel plate

Angular movement of the fifth wheel coupling:
Rotation about longitudinal axis .....max. ± 3°
Rotation about transverse axis ..... min. ± 15°

New rubber mounts need to be fitted if the values indicated are exceeded.



ADJUSTING THE COUPLING LOCK



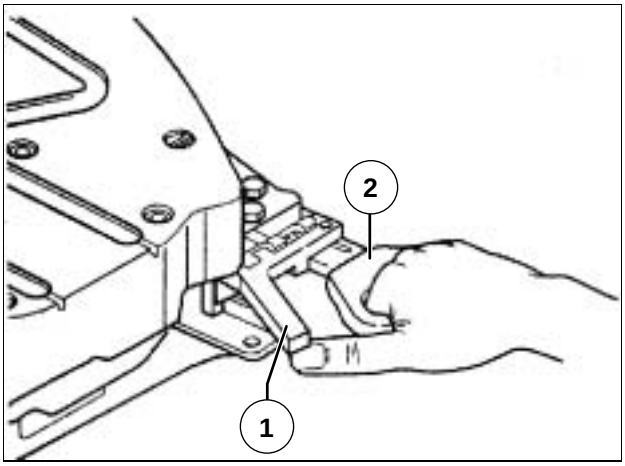
Never adjust the coupling lock using an unevenly worn kingpin as this can give rise to excessively high spread forces in the coupling lock when the vehicle is cornering or manoeuvring.

Note: Use Rockinger gauge no. 58 029 or new kingpin.

Unscrewing the threaded pin (→) makes the coupling lock narrower, screwing it in makes it wider (1 turn adjusts the lock by 0.23 mm).

- Undo the locknut and unscrew the threaded pin (→)
- Close the lock with the gauge inserted; ensure that the gauge or kingpin is perpendicular to the fifth wheel plate
- Screw in the threaded pin until you can start to feel resistance (stop bar/lock wedge contact point)
- Screw in the threaded pin by a further ½ to 1 turn and check the play; then tighten the locknut

CHECKING CORRECT FUNCTIONING



Danger of accidents!
Refer to the Operator's Manual!

Opening the lock

- Push up the locking lever ① and, at the same time, move hand lever ② backwards (←), pull it out to the side and attach to the edge of the plate using the notch

Checking after hitching up

– Locking lever ① must be lying on hand lever ②

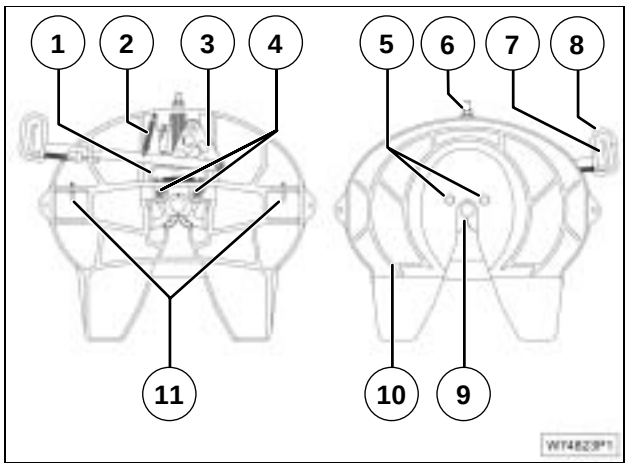
Danger of accidents!
If the locking lever is not lying flat on the hand lever, this means the fifth wheel coupling is not fully closed. Danger of accidents!

- Repeat the hitching up procedure.

HOLLAND EUROPE FIFTH WHEEL COUPLING

Type FW 3510–150–F1
FW 3510–180–F1
FW 3510–200–F1

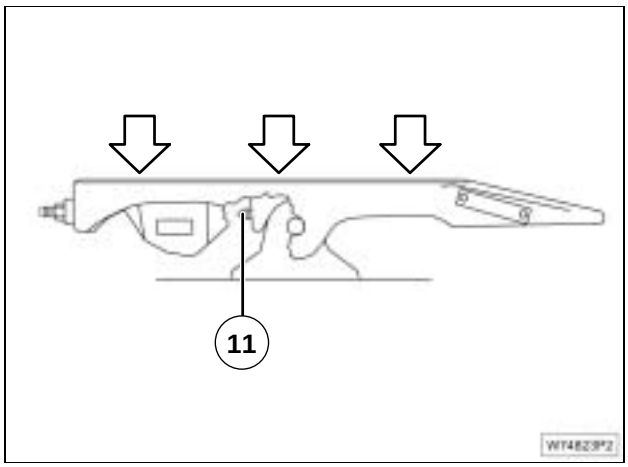
1 Locking clamp
2 Hand lever tension spring
3 Driver plate
4 Locking pin lubricating nipple
5 Locking pin
6 Adjuster screw and nut
7 Operating lever for hand lever lock
8 Hand lever
9 Locking claws
10 Lubrication grooves
11 Bearing block support lubricating nipple



CLEANING

Always re-grease the fifth wheel coupling after cleaning and servicing.

- Clean the fifth wheel plate and the semitrailer plate
- Clean the locking mechanism and all moving parts if there is heavy dirt build-up

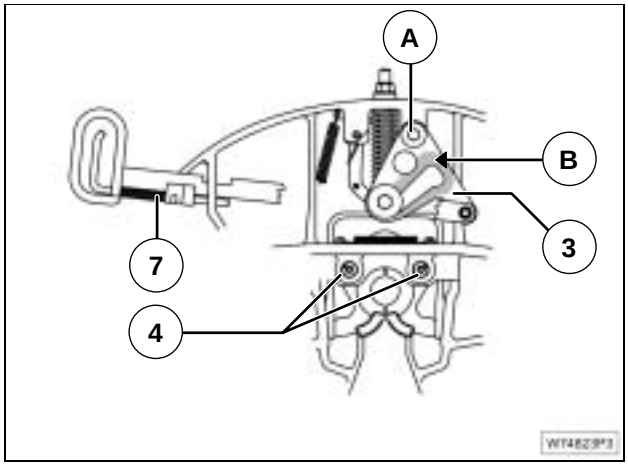


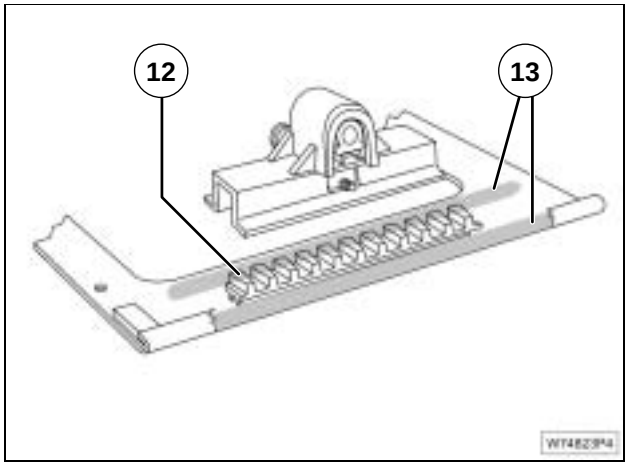
LUBRICATING

Lubricant

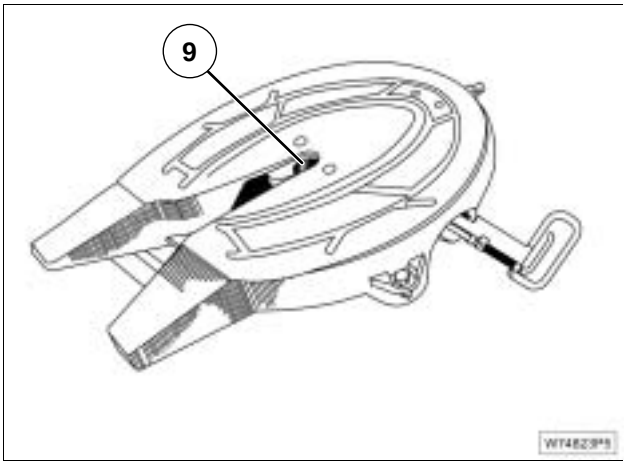
see ....."Maintenance Recommendations and Recommended Service Products" booklet

- Grease the semitrailer plate
- Completely pack the lubricating grooves ⑩ in the fifth wheel plate with grease
- Grease the semitrailer contact surface (↓)
- Lubricate the bearing blocks via the lubricating nipples ⑪ (below the fifth wheel body on the bearing shells), raising the coupling body slightly in order to relieve the bearing blocks during lubrication
- Lubricate the moving parts and the springs on the operating lever ⑦
- Lubricate the locking pin bushes via the two lubricating nipples ④
- Lubricate the pivot Ⓐ and track Ⓑ of the driver plate ③
- In the case of sliding fifth wheel couplings (if fitted) spray the rack ⑫ and the sliding path ⑬ with oil (diesel oil)





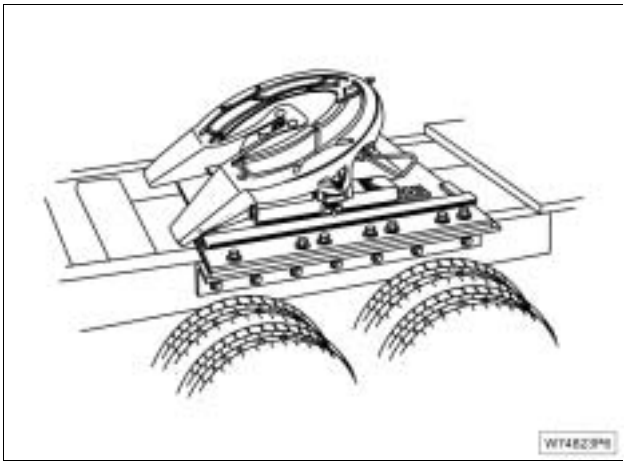
- Lubricate the locking claws ⑨ and area of the body plate (kingpin contact areas)



CHECKING CONDITION

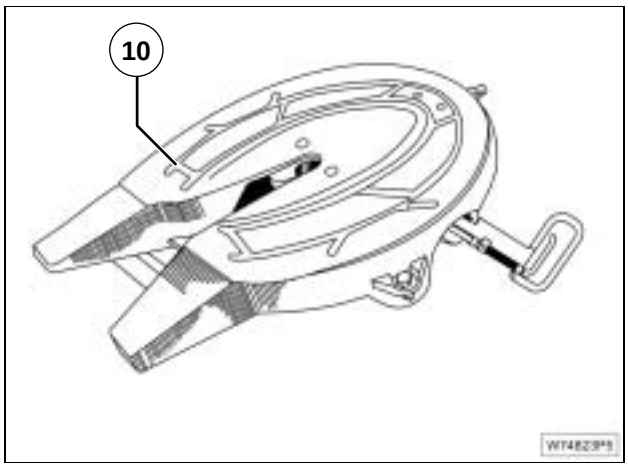
Clean all parts thoroughly before checking them. Check the fifth wheel coupling structure and assembly:

- Check the fifth wheel plate and the semitrailer plate for cracks, flatness and wear (see page 3)
- Replace bent, worn or broken parts
- Check the kingpin for perpendicularity, damage, wear and firm seating (see page 3)
- Check the locking mechanism for ease of movement, deformation and corrosion
- Check the lubricating lines for leak-tightness and correct routing
- Check the thrust blocks (if fitted) for damage and firm seating
- Check the mounting elements (assembly plate and vehicle subframe) for damage and firm seating
- Check the torque of the mounting elements (see page 3)



Note: Always use genuine parts from the manufacturer when renewing damaged or defective parts.

CHECKING FOR WEAR



Fifth wheel coupling plate

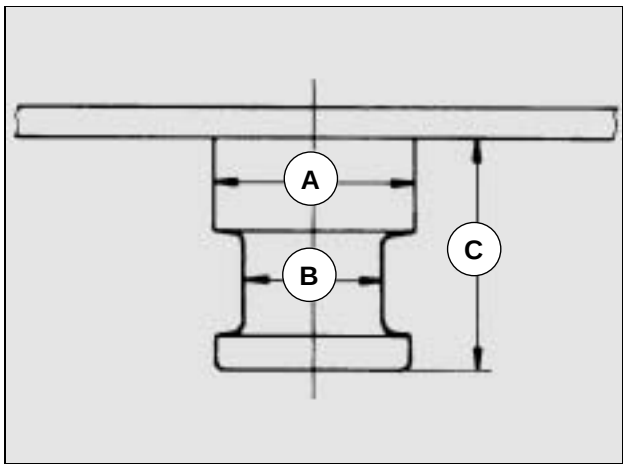
If the distance between the bearing surface and the base of the lubricating grooves ⑩ is still 3.5 mm:

- Renew the fifth wheel coupling plate

If the fifth wheel plate is worn on one side:

- Check the semitrailer plate for deformation

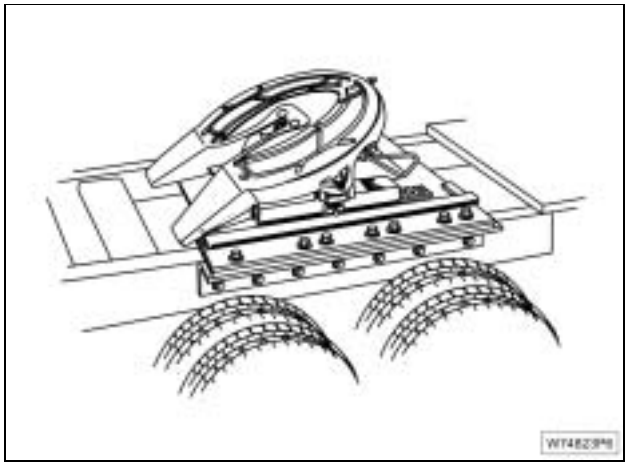
Kingpin



Reference dimensions Ⓐ, Ⓑ, Ⓒ
2" kingpin:

A:	"As new"	73.0 mm
	Reference	min. 71.0 mm
B:	"As new"	50.8 mm
	Reference	min. 49.0 mm
C:	"As new"	max. 84.0 mm
	Reference	min. 82.5 mm

CHECKING FIRM SEATING



Note: The illustrations show examples of bolted connections for bearing blocks/assembly plate and assembly plate/vehicle subframe. The mounting plate used, the vehicle subframe and the bolted connections are all standard MAN versions.

Tightening torques

Bolted connection ① between bearing blocks and assembly plate:
Galvanised bolts/washers (yellowish) ..... 370 Nm
Dacromet bolts/washers (matt silver)..... 290 Nm
Bolted connection ② between assembly plate and vehicle subframe:
Galvanised bolts/washers (yellowish) ..... 370 Nm
Dacromet bolts/washers (matt silver)..... 290 Nm

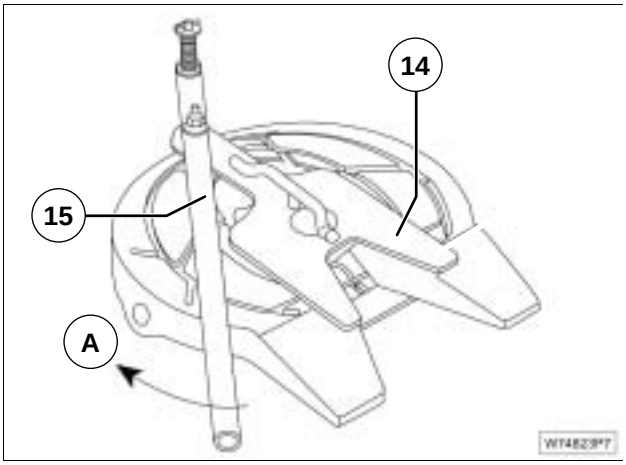
LOCKING MECHANISM

Checking

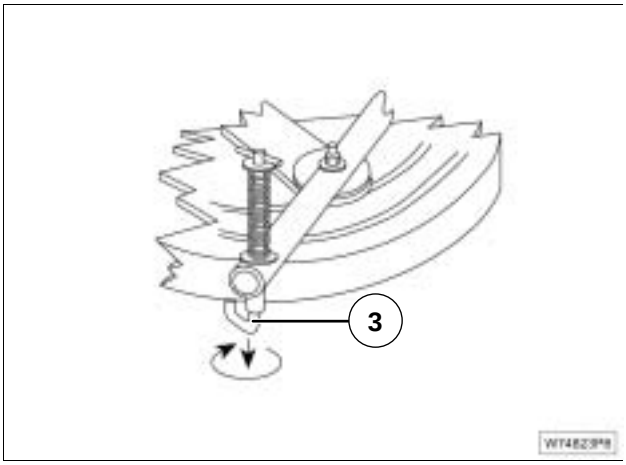
Clean all parts thoroughly before checking them. Check that the fifth wheel coupling functions correctly by closing and opening the locking mechanism.

Note: To do this, use the kingpin lock tester TF–TLN–1000 or TF–TLN–5001 from HOLLAND Europe GmbH.

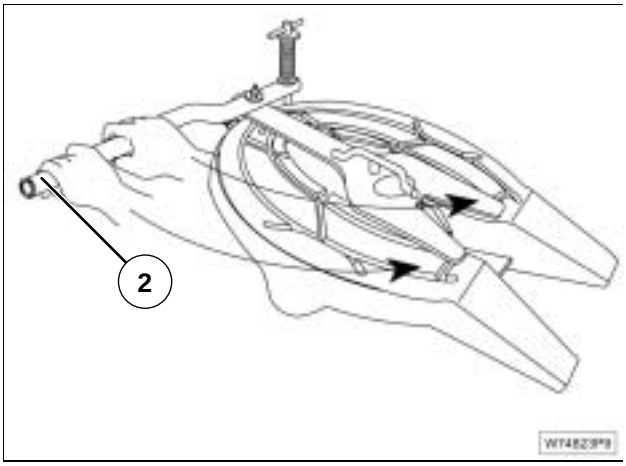
- Place HOLLAND lock tester ⑭ onto the fifth wheel coupling and turn the lever rod ⑮ "upwards" Ⓐ



- Push down the "J" hook ③ and turn it inwards so that it hooks under the fifth wheel coupling

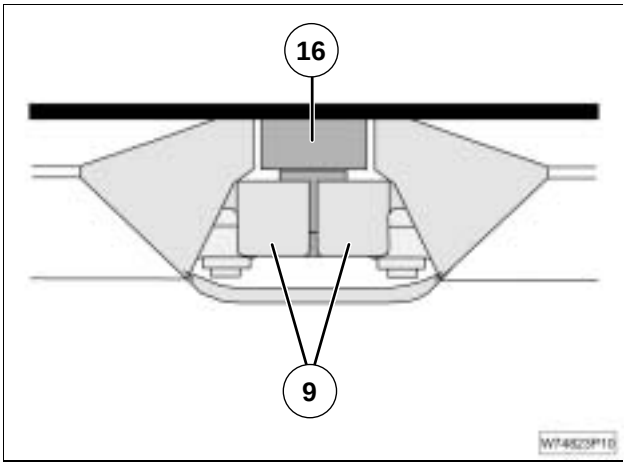


- Pull back the lever rod ② using both hands

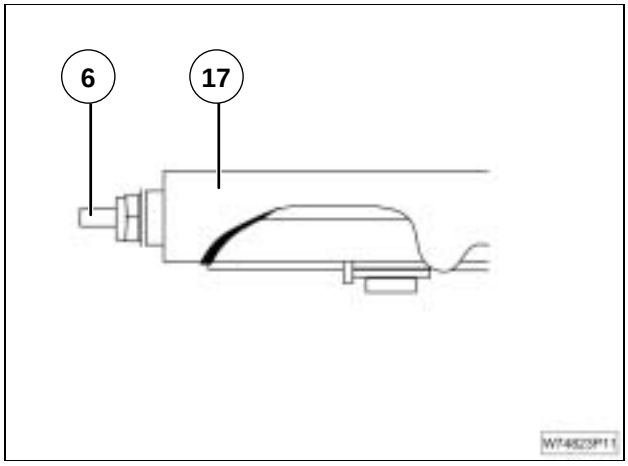


After each test, check to see whether the fifth wheel coupling is correctly locked:

– Locking claws ⑨ enclose the entire kingpin ⑯



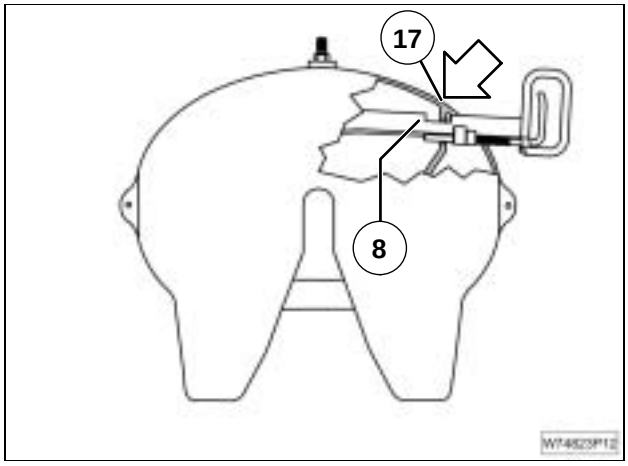
– The nut and washer for the adjuster screw ⑥ are in close contact with the body plate ⑰



– The step on the hand lever ⑧ grips behind the cast rib (↓) on the body plate ⑰

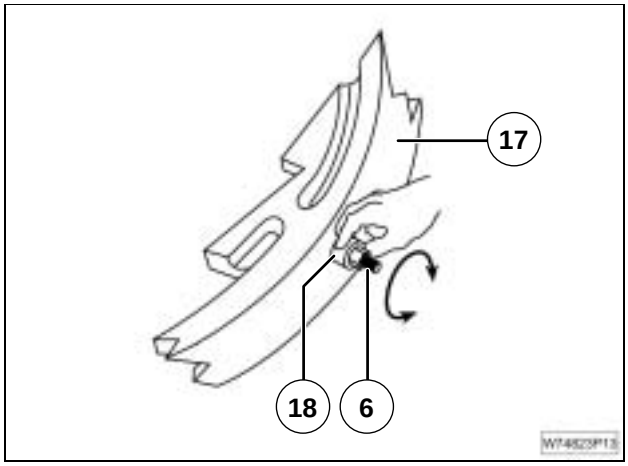
Repeat the procedure if the system does not lock correctly.
Adjust the lock if necessary.

Danger of accidents!
NEVER use a fifth wheel coupling that does not function correctly.



Adjusting

- Close the locking claws with the HOLLAND lock tester
- Turn the rubber bush ⑱ between the adjuster nut ⑥ and the body plate ⑰ back and forth

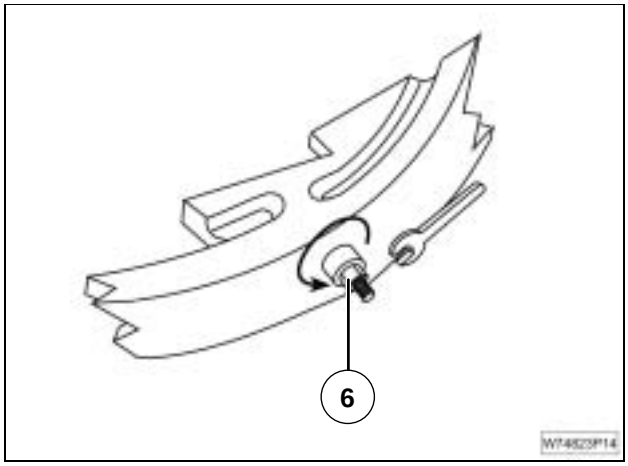


If the rubber bush is stuck fast:

- Turn the adjuster nut ⑥ **clockwise** until the rubber bush is tightly fitted but can still be turned by hand

If the rubber bush is loose:

- Turn the adjuster nut ⑥ **anti-clockwise** until the rubber bush is tightly fitted but can still be turned by hand

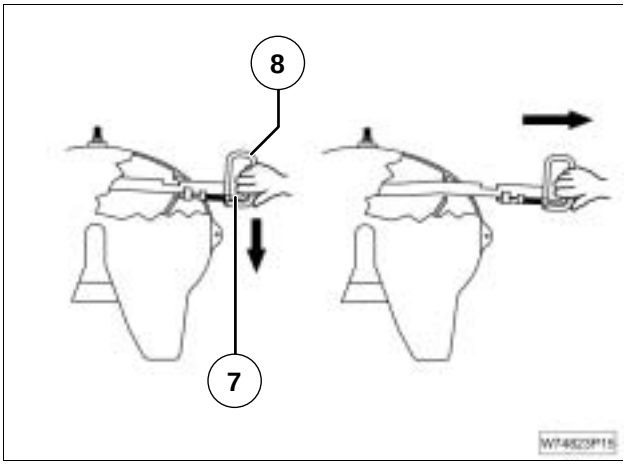


CHECKING CORRECT FUNCTIONING

Danger of accidents!
Refer to the Operator's Manual!

Opening the lock

- Grasp the hand lever ⑧
- Pull the operating lever ⑦
- Push back/to the left (to release the safety)
- Pull out the hand lever



Lock, checking after hitching up

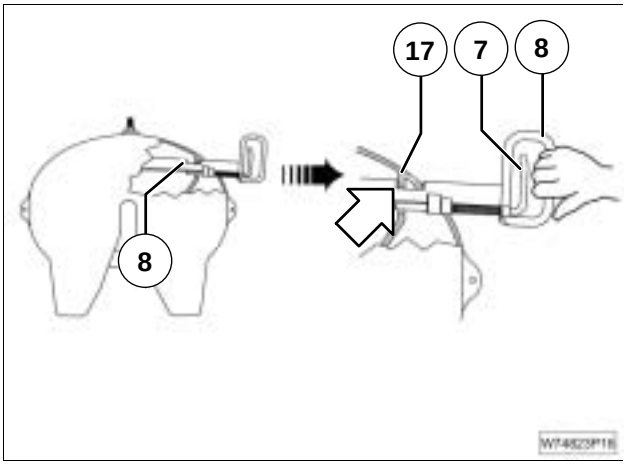
The step on the hand lever ⑧ grips behind the cast rib on the body plate ⑰

- Pull on the hand lever ⑧ **without using** the operating lever ⑦

The hand lever should stop below the cast rib (↑).

Repeat the procedure if the system does not lock correctly.

Danger of accidents!
NEVER use a fifth wheel coupling that does not function correctly.



MEILLER THREE-WAY TIPPER SYSTEM

GENERAL INFORMATION

Danger of accidents!
- **Observe the relevant national work safety and accident prevention regulations.**
- **Before tipping, ensure that there are no bulk goods or freight on the loading area.**
- **Only tip if the vehicle is standing on a flat, level and stable surface.**
- **In the case of 4-axle vehicles, the steering must be in the straight-ahead position to prevent damage to the wheel nut caps when the "Bordmatik" automatic unloading system wall is fully folded down.**
- **Ensure that the insert pins are correctly seated when tipping!**
- **No-one is allowed to stand in the tipper or side wall operating area.**
- **The operator must observe the correct tipping and lowering procedure and not move away from the tipper valve actuator so that immediate action can be taken in an emergency.**
- **Standing or working beneath a non-supported tipper body puts lives at risk and is therefore prohibited!**
- **Always make sure that the safety supports are attached so that they cannot slip!**
- **Do not perform maintenance work unless the engine is stopped.**
- **Do not increase the hydraulic system operating pressure set by the manufacturer.**
- **Follow environmental protection guidelines!**
- **For further details, refer to the "TIPPER OPERATION" section in the Operator's Manual.**

CHECKING CONDITION AND FIRM SEATING

Nuts and bolts

- Check that all nuts and bolts are firmly seated and retighten them if necessary, particularly those on the hydraulic pump, multi-piston hydraulic cylinder, tipper valve, oil tank and pipe clamps
- Check that all the subframe and tipper body fastening elements are firmly seated and retighten them if necessary

Safety rope

- Check the condition and firm attachment of the safety rope on the subframe and tipper body

Renew damaged safety ropes **immediately**!

Hydraulic system

Check the hydraulic system for leaks.

- Check that all hydraulic system screw/bolt connections are firmly seated and retighten them if there are any leaks. Suction line connections must be air-tight to prevent air ingress when a vacuum is formed.
- Renew hydraulic hose lines that have suffered damage or chafing in good time
- Renew leaking seals

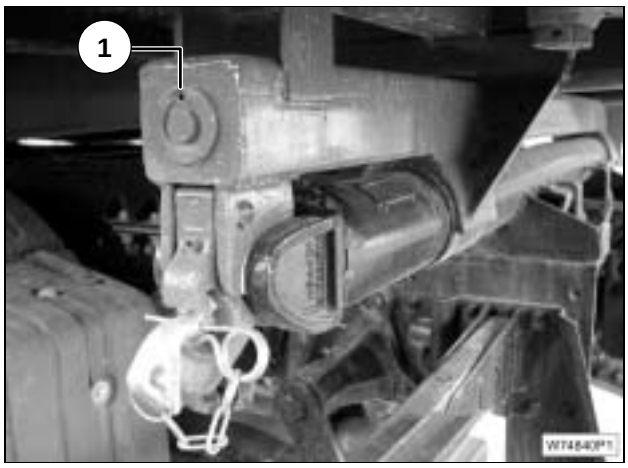
Note: Hydraulic hose lines must not be used if 6 years have elapsed since their date of manufacture.

LUBRICATING

Do not grease the pistons in the multi-piston hydraulic cylinder. Simply wipe the pistons with a dry cloth. Keep the knuckle base area of the press carrier free from heavy dirt build-up in order to ensure continued correct functioning of the press shut-off mechanism.

- Lubricate the bearing points at least once a week, after 250 tipping operations at the latest, using MAN 283 Li–P2 multipurpose grease
- Oil the bearing points of the fittings, rear wall latches and safety supports
- If a central lubrication system is fitted, check for correct functioning of the connected lubricating points.
- Lubricate non-connected lubricating points by hand

TIPPER BODY (examples illustrated)

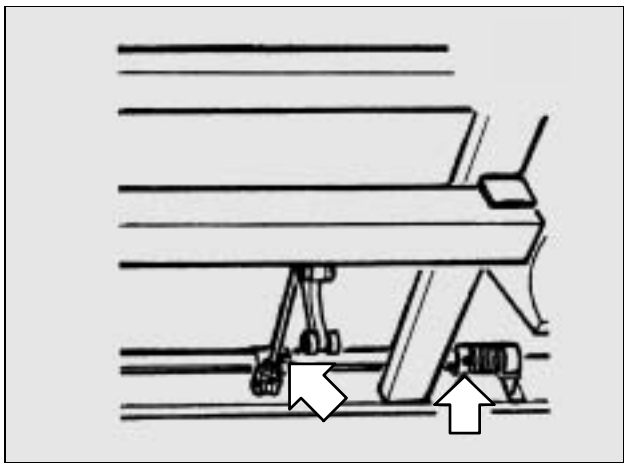


LUBRICATING THE TIPPING BOOM

- Oil the noise level reduction devices via the hole ① (2 x left, 2 x right)
- Oil the bearing points of the fittings
- Oil the bearing points of the rear wall latches
- Oil the bearing points of the body supports

LUBRICATING THE AUTOMATIC SIDE WALL LATCH

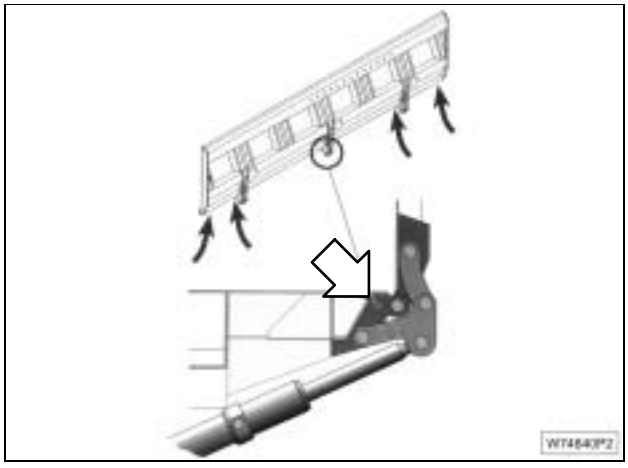
- Lubricate the automatic side wall latches via grease nipple (→)



LUBRICATING THE "BORDMATIK" AUTOMATIC UNLOADING SYSTEM

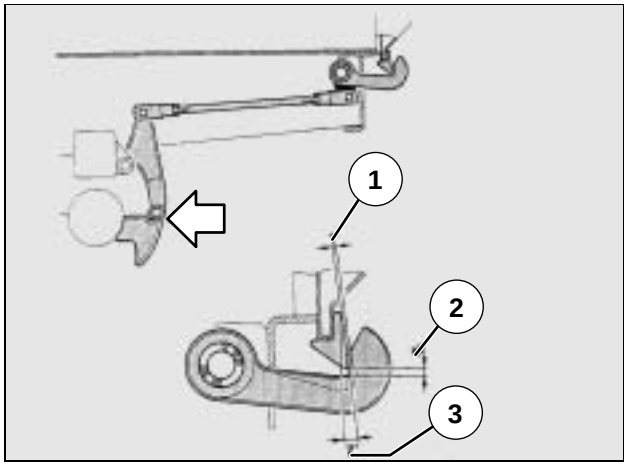
Lubricate the low-maintenance side wall bearing points regularly every 2 months using a silicone oil-based grease (commercially available).
Use a fluorine/silicone oil-based high-temperature grease (commercially available) if transporting bulk goods with high temperatures (e.g. bitumen).

- Lubricate the bearing points of the "Bordmatik" automatic unloading system via lubricating nipple (→)



Only operate the "Bordmatik" automatic unloading system with the hydraulic pump switched on!

CHECKING THE REAR WALL CATCH SETTING



Automatic claw-type lock
If correctly set, the automatic claw-type lock opens the steel rear wall once the tipping angle reaches approx. 5°.

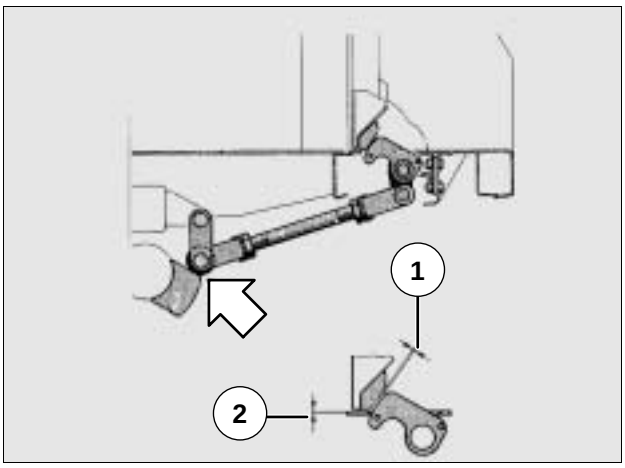
- Check that setting ① = 2 mm, ② = 6 mm and angle ③ = 7°, readjust on the linkage if necessary
- There must be no play between the roller and the cam (→); however, the rollers must still rotate easily
- Check the locking components for clearance and ease of movement

Automatic cam lock
If correctly set, the automatic cam lock opens the steel rear wall once the tipping angle reaches approx. 5°.

- Check that cam play ① = 1 to 3 mm and rear wall play ② = 3 mm, readjust on the linkage if necessary
- There must be no play between the roller and the cam (→); however, the rollers must still rotate easily

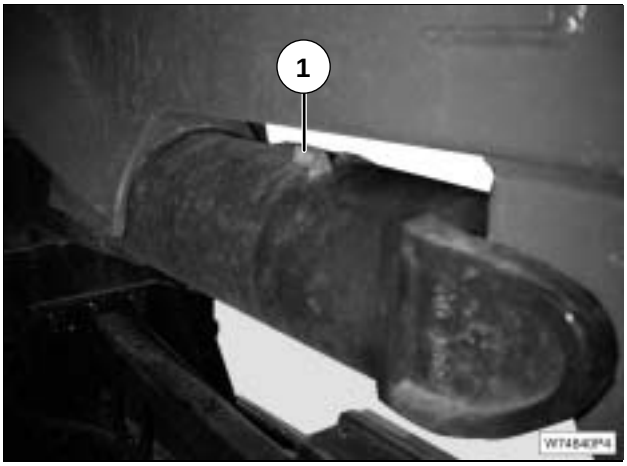
Note: Excessive wear on the cam and cam stop can indicate an incorrect setting!

- Check the locking components for clearance and ease of movement
- Lubricate the shaft bearings and oil the joints



SUBFRAME

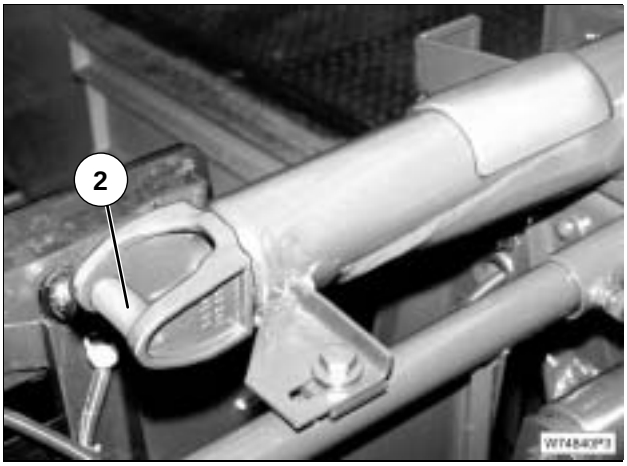
Danger of accidents!
Always use a non-slip support to prop up the raised tipper body when performing any work underneath it.



LUBRICATING THE TIPPING MEMBERS

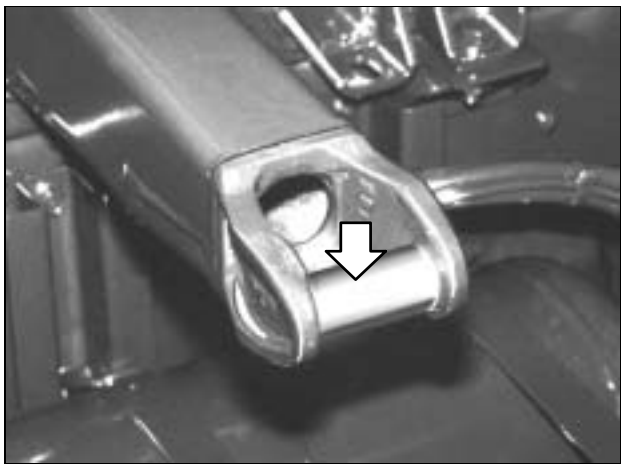
Rear tipping member

- Lubricate the rear tipper shaft bearings via lubricating nipples ① (1 x left, 1 x right)
- Grease the tipper forks ② (1 x left, 1 x right) on the rear tipping member



Front tipping member

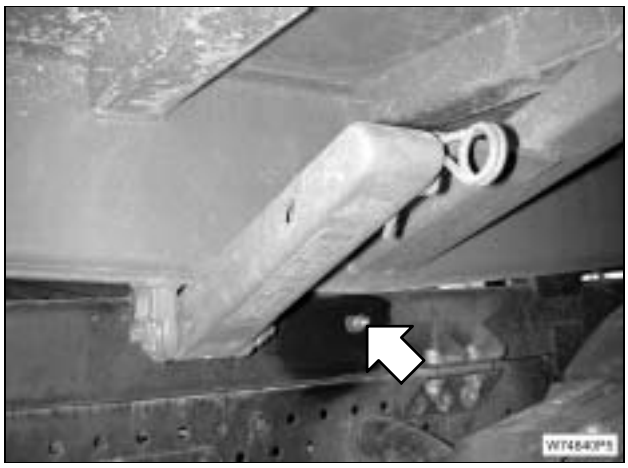
- Grease the tipper forks (↓) (1 x left, 1 x right) on the front tipping member



HYDRAULIC SYSTEM

LUBRICATING THE LOWER HYDRAULIC PRESS BEARINGS

- Lubricate the hydraulic press bearings via the lubricating nipple (←), on the left-hand side as viewed in the direction of travel



LUBRICATING THE SHUT-OFF VALVE LINKAGE SHAFT

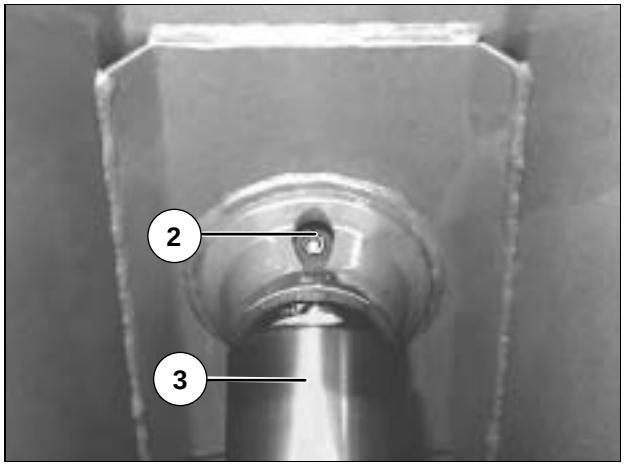
Danger of accidents!
Always use a non-slip support to prop up the raised tipper body when performing any work underneath it.

- Lubricate the shut-off valve linkage shaft via both lubricating nipples (if fitted) ①, maintenance-free in some cases

LUBRICATING THE UPPER HYDRAULIC PRESS BEARINGS

Danger of accidents!
Always use a non-slip support to prop up the raised tipper body when performing any work underneath it.

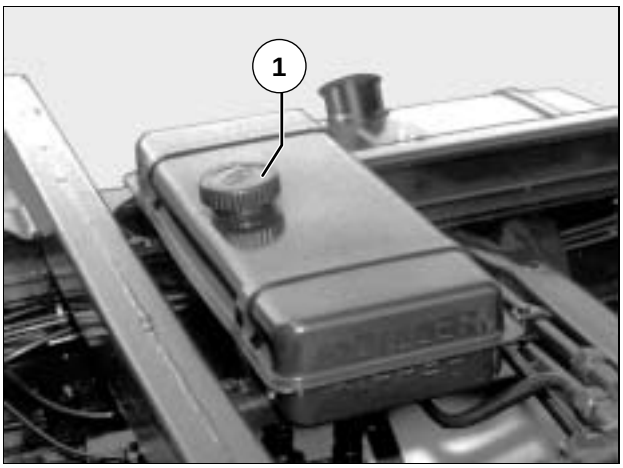
- Lubricate the upper ball head via lubricating nipple (if fitted) ②, maintenance-free in some cases
- Do not grease the hydraulic press piston ③, simply wipe it with a clean, dry cloth (also see page 2)

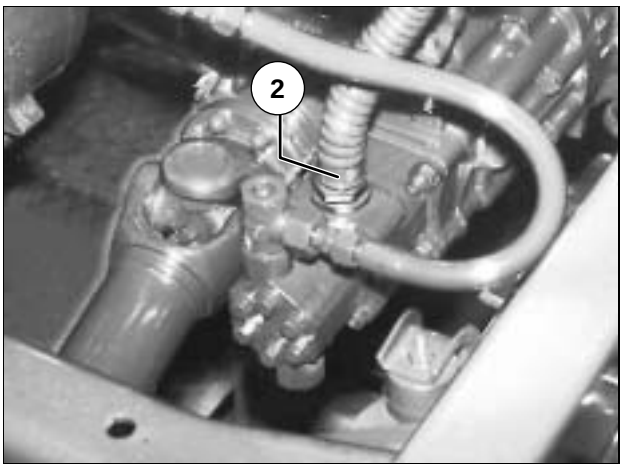


CHANGING HYDRAULIC OIL IN THE TIPPER SYSTEM

Danger of accidents!
Always use a non-slip support to prop up the raised tipper body when performing any work underneath it.

- Raise the tipper body until the side tipper body support can be engaged
- Support the tipper body
- Remove the cover ① from the oil tank
- Close the stopcock beneath the oil tank (by turning the screw anti-clockwise as far as the stop)
- Undo the suction line ② on the tipper pump
- Collect the used oil in a suitable container
- Re-open the stopcock beneath the oil tank (by turning the screw clockwise as far as the stop)
- Allow the remaining oil to drain off until oil no longer flows (insignificant quantity can remain in the system)
- Re-attach the suction line ②





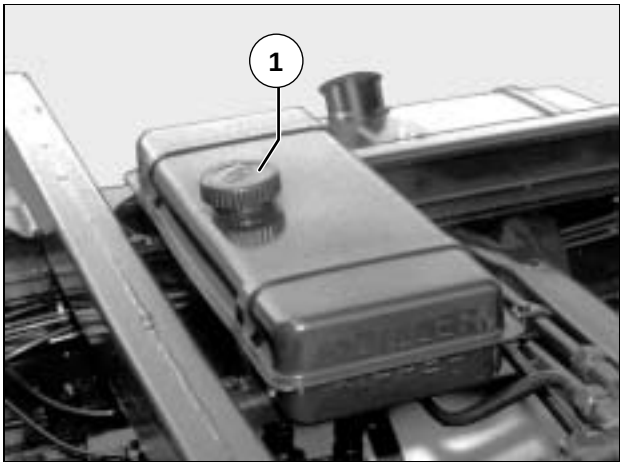
During short operating cycles (e.g. tipper mode), the hydraulic temperature is the same as the ambient temperature. The hydraulic oil temperature does not increase in this instance; therefore, it is very important to choose a hydraulic oil with the correct rated viscosity.

- Fill the oil tank approx. ¾ full with new hydraulic oil, leaving the oil screen in the filler neck whilst doing so

Hydraulic oil fill quantity and specification
see ..... "Maintenance Recommendations and Recommended Service Products" booklet

- With the engine running, switch on the power take-off for the tipper pump and check whether the final tipping angle is reached
- Otherwise, check and correct the oil level as described below

CHECKING THE OIL LEVEL IN THE RESERVOIR
(using metre rule)



Danger of accidents!
Always use a non-slip support to prop up the raised tipper body when performing any work underneath it.

- Park the vehicle on a flat, level surface
- Tip the body fully backwards
- Prop up the body (**danger of accidents**!)
- Switch off the tipper pump power take-off
- Stop the engine
- Remove the cover ① from the oil tank
- Remove the oil screen from the filler neck
- Insert the metre rule until it touches the bottom of the oil tank

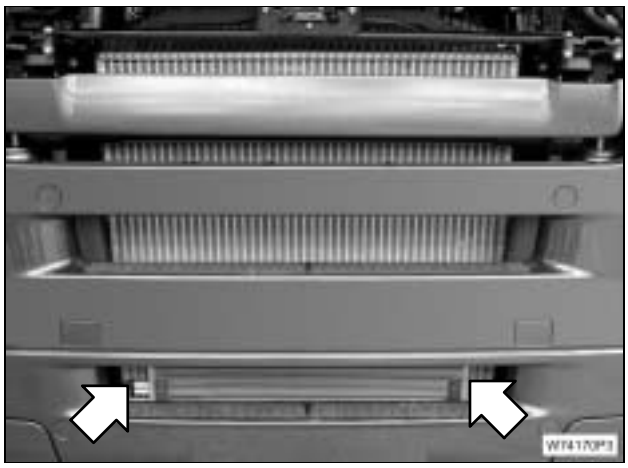
The oil level should be between 4 cm and 5 cm above the bottom of the oil tank.

Note: If the final tipping angle is not reached during this check, top up the oil and repeat the entire procedure several times to flush out any air remaining in the press and lines; make sure you take the necessary safety precautions whilst doing this!
Then check the oil level again.
Extract some of the oil if the oil level is too high.

– **The air channels and air filter disc in the tank cap must be kept clean.**
– **Do not direct the water jet at the tank cap when washing the vehicle.**

BEHR AIR-CONDITIONING SYSTEM
In the event of power loss, have the air-conditioning system checked by an authorised, specialist workshop.

Danger of accidents and injury! Follow the safety instructions in the section entitled "NOTES ON SAFETY AND ENVIRONMENTAL PROTECTION"!



CONDENSER

Cleaning
Regularly clean the condenser (→) to remove dust, insects, foliage etc; otherwise the cooling power will diminish.

- See "COOLING AND HEATING SYSTEM" section
- Blow out the condenser fins (→) using compressed air, depending on how dirty they are
- If the dirt build-up is heavy or greasy, clean the fins using a solution of water and P3–Begesol cleaning additive (MAN part no. 09.21002–0248) mixed 1:1
- Use a spray gun to spray the cleaning fluid straight at the fins and make the spray jet as concentrated as possible
- Leave to act for about 5 minutes
- Flush out with a concentrated jet of tap water

Repeat the procedure if the fins are very dirty!

Condensation drain openings
- Check the condensation drain openings for free water passage/dirt build-up and clean them if necessary

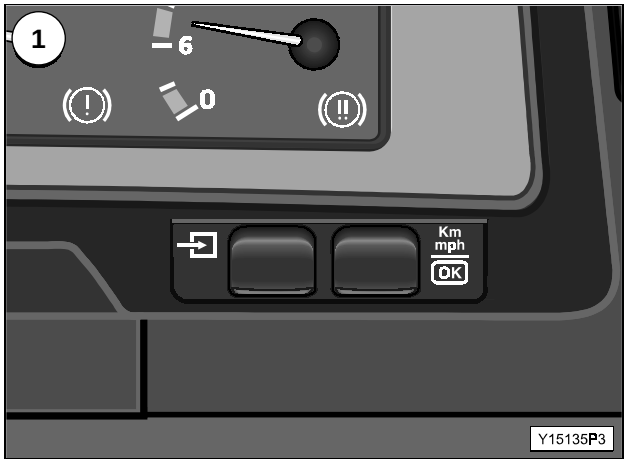
GENERAL INFORMATION ON THE MAINTENANCE SYSTEM (special equipment)
The task of the maintenance system is to recommend maintenance (service) based on an analysis of measured data and/or statutory regulations.
The following systems are available for calculating the service dates:

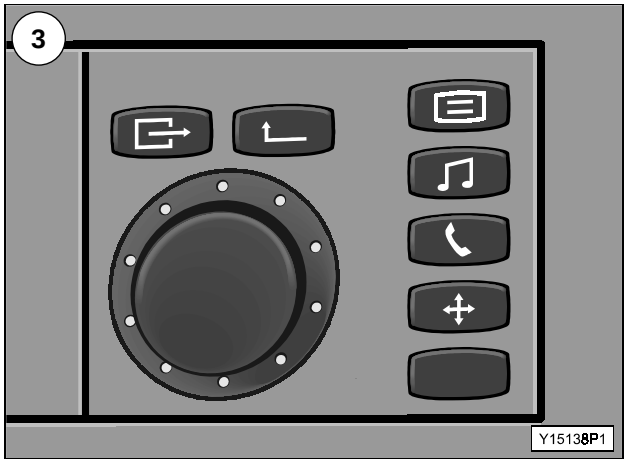
Flexible maintenance system
- The flexible maintenance system allows you to operate each major component until it reaches its maximum permitted mileage.
- In contrast to the time-based maintenance system, this system displays the remaining permitted mileage separately for each major component.
- **New vehicles are already pre-programmed with the time-based maintenance system.**

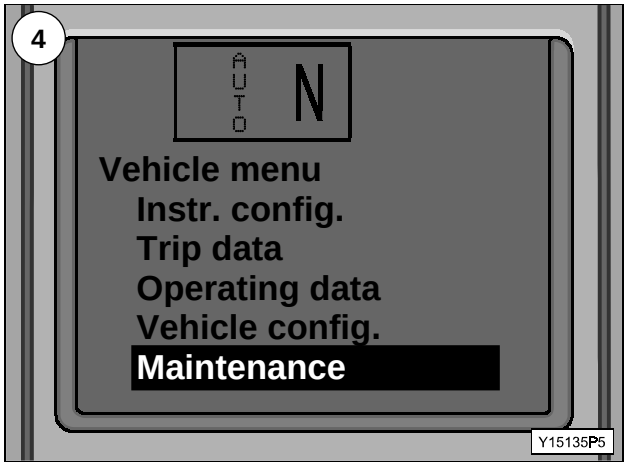
Time-based maintenance system
- The MAN workshop dates and the statutory test/inspection dates coincide so as to reduce the number of visits to the workshop.

Note: Only MAN Service workshops are able to change the setting from the **flexible maintenance system** to the **time-based maintenance system**.
If requested to do so, your MAN Service workshop will switch off the monitoring of individual components/assemblies or the entire system.

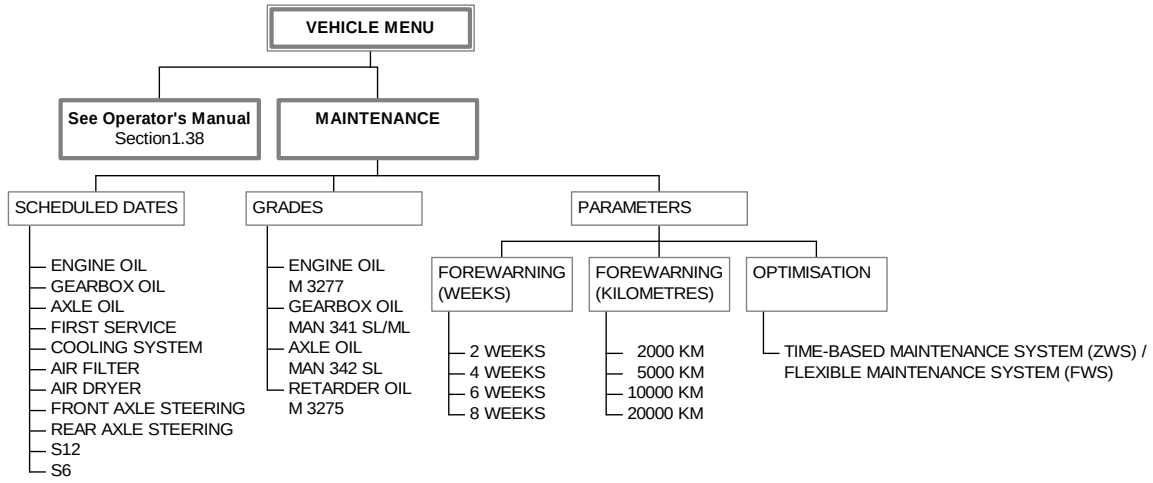
Equipment variants for TGA:
- "**Baseline**", see section 9.01:
  Operated using the buttons on the instrument panel, see Figure ①.
  Indicated on the driver's display, see example illustrated ②.
- "**Highline**", see section 9.02:
  Operated using the rotary/pressure switch and the buttons on the control panel, see Figure ③.
  Indicated on the driver's display, see example illustrated ④.







MENU STRUCTURE for Baseline and Highline
(engine off, vehicle stationary)



"MAINTENANCE" menu item
The "MAINTENANCE" menu item contains the following 3 submenu items:

1. "SCHEDULED DATES":
The menu items listed under "SCHEDULED DATES" depend on the vehicle equipment and the factory pre-settings of the maintenance system.
- Display of all scheduled service dates in chronological order.

2. "GRADES":
- Display of the current oils in the engine, gearbox, axles and retarder.

3. "PARAMETERS":
- "FOREWARNING WKS":
  Setting option in the **flexible maintenance system** and the **time-based maintenance system**, allowing you to specify how many weeks (WKS) in advance of the scheduled service date the "SERVICE DUE" message should appear (see section 9.01 "Baseline" or 9.02 "Highline").
- "FOREWARNING KM":
  Setting option in the **flexible maintenance system**, allowing you to specify how many kilometres (KM) in advance of the scheduled service date the "SERVICE DUE" message should appear (see section 9.01 "Baseline" or 9.02 "Highline").
- "OPTIMISATION":
  Indicates whether the flexible maintenance system (FWS) or time-based maintenance system (ZWS) is active.

MAINTENANCE SYSTEM (BASELINE)

General instructions

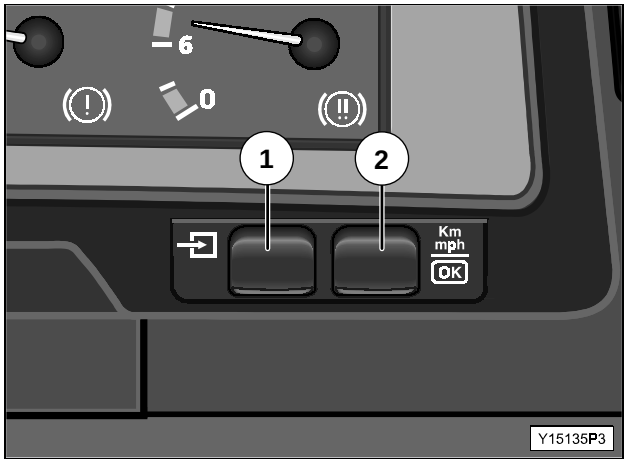
Danger of accidents!
For reasons of road safety, the maintenance system can only be activated when the vehicle is at a standstill.

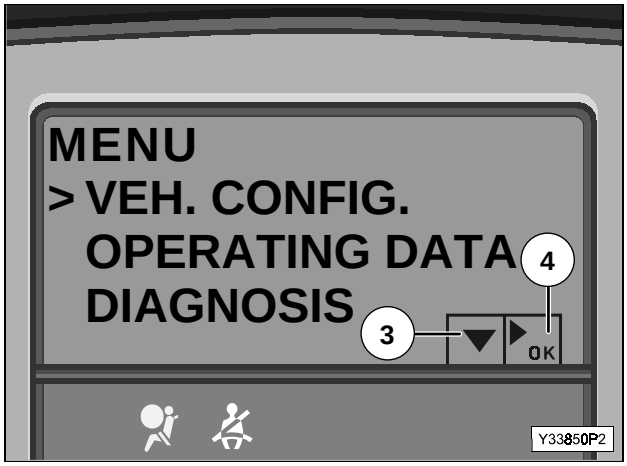
The maintenance system is controlled using the left button ① and the right button ②.
There are two ways of using the buttons:
PRESSING and TOUCHING

- PRESSING = Press and hold
  (duration: more than 3 seconds)
  e.g. in order to call up the menu or to confirm.
- TOUCHING = Briefly press
  (duration: less than 2 seconds)
  e.g. in order to scroll through the menu or to exit the menu.

The functions performed by the left button ① are indicated by the left-hand icon ③ whilst those performed by the right button ② are indicated by the right-hand icon ④ on the driver's display, see the lower table "Icons and button functions".

Note: The maintenance system automatically closes and the starting menu appears on the driver's display if approx. 30 seconds elapse without a button being pressed.





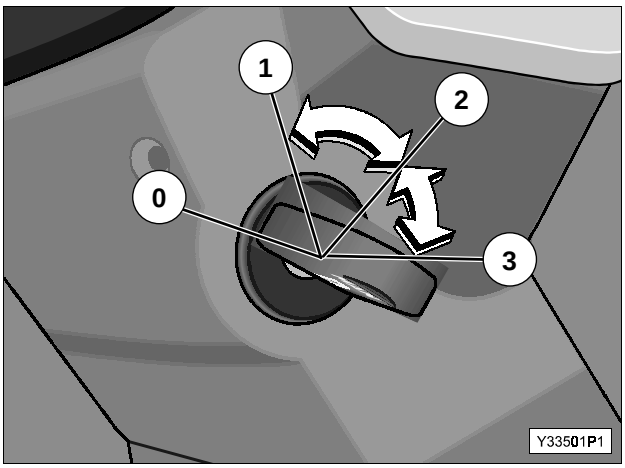
Icons and button functions:

Icons on driver's display		Button	Button actuation (time)	Button function
LEFT ③	RIGHT ④			
▼	–	①	Touch (<2 s)	– Scroll through the menu
↩	–	①	Touch (<2 s)	– Jump back upwards to the first line
□	–	①	–	– Button has no function
–	▶	② Km mph OK	Touch (<2 s)	– Select the menu item
–	OK	② Km mph OK	Touch (<2 s)	– Exit the menu item
–	C	② Km mph OK	Press (>3 s) Touch (<2 s)	– Confirm data selection – Exit the menu item (one menu level higher)
–	▶ OK	② Km mph OK	Press (>3 s) Touch (<2 s)	– One menu level lower – One menu level higher

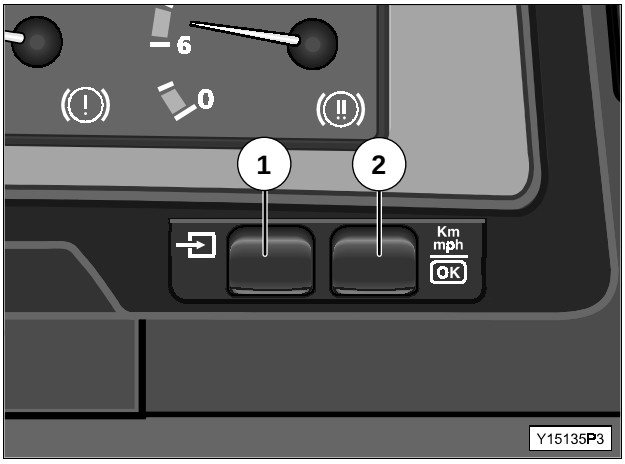
Calling up the vehicle menu

Danger of accidents!
For reasons of road safety, the maintenance system can only be activated when the vehicle is at a standstill.

- Bring the vehicle to a standstill
- Apply the parking brake
- Stop the engine, also see Operator's Manual section 5.11 "STOPPING THE ENGINE"
- Switch on the ignition and turn the ignition key to "drive position" ②, also see Operator's Manual, section 5.10 "STARTING THE ENGINE"



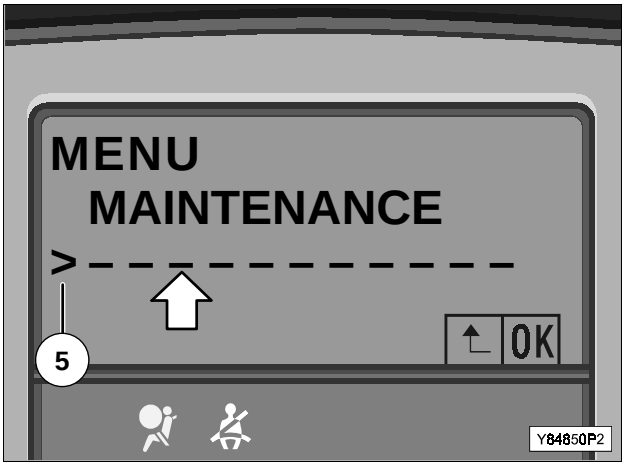
- Press left button ① and hold it down until the menu appears on the driver's display



The message opposite appears on the driver's display. The cursor ⑤ is pointing at the 1st menu item "VEH. CONFIG." in the menu structure (see section 9.00).

Exiting the menu or menu item
(example illustrated)

- Repeatedly touch the left button ① until the cursor ⑤ is pointing at the empty line (↑)
- Touch the right button ②
  Exit the menu or menu item



SCANNING SCHEDULED DATES AND SERVICE

Scanning scheduled service dates

- Call up the menu, see page 2
- Touch the left button ① (see page 2) 4 times

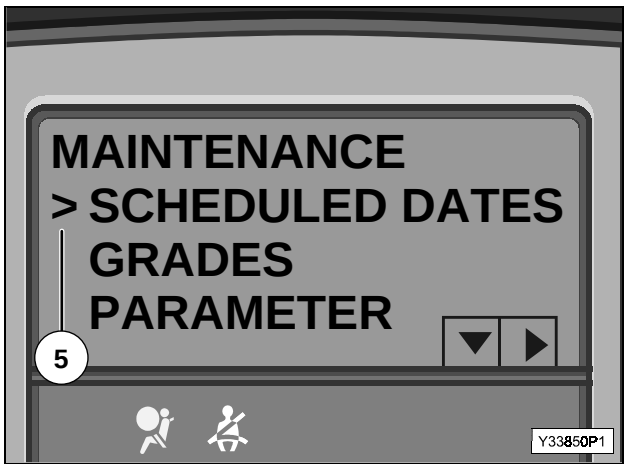
The cursor ⑤ is pointing at the menu item "MAINTENANCE".

- Touch the right button ② (see page 2)

The cursor ⑤ is pointing at the submenu item "SCHEDULED DATES".

- Touch the right button ② (see page 2)

The first scheduled service date appears.



In this example, the first scheduled service date is an engine oil change that is due.

Note: In the **flexible maintenance system**, the display units are either the date or kilometres, depending on when the service is due.
In the **time-based maintenance system**, the display unit is always the date.

– To **call up the next scheduled service date**:

- Touch the left button ①, see page 2

The next scheduled service date after the one that has just been displayed appears on the display.

"S12" (service every 12 months) is displayed in this example.

– To **stop scanning the scheduled service dates** and move one menu level higher:

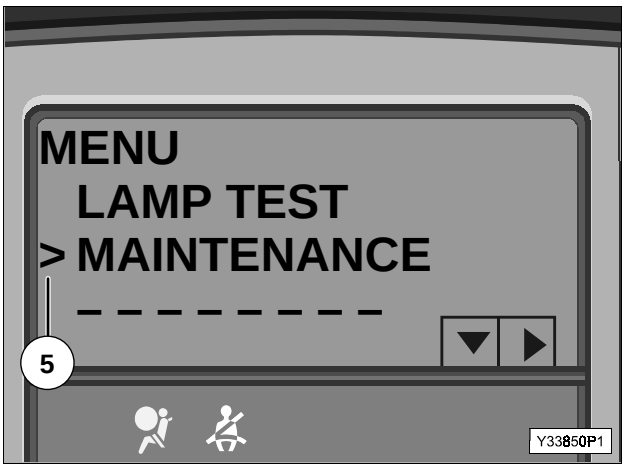
- Touch the right button ②, see page 2

– To **exit** the **menu item "MAINTENANCE"**: see page 2

FOREWARNING FOR SCHEDULED SERVICE DATES ("FOREWARNING")
New vehicles have the "FOREWARNING" for scheduled service dates factory-set at 6 weeks or 5000 km.
This can be changed under the menu item "PARAMETERS/FOREWARNING WKS" or "PARAMETERS/FOREWARNING KM".

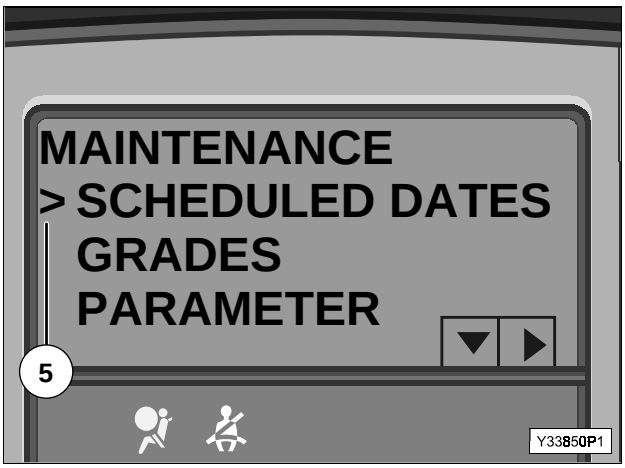
Setting the forewarning
- Call up the menu, see page 2
- Touch the left button ① (see page 2) 4 times

The cursor ⑤ is pointing at the menu item "MAINTENANCE".
- Touch the right button ② (see page 2)



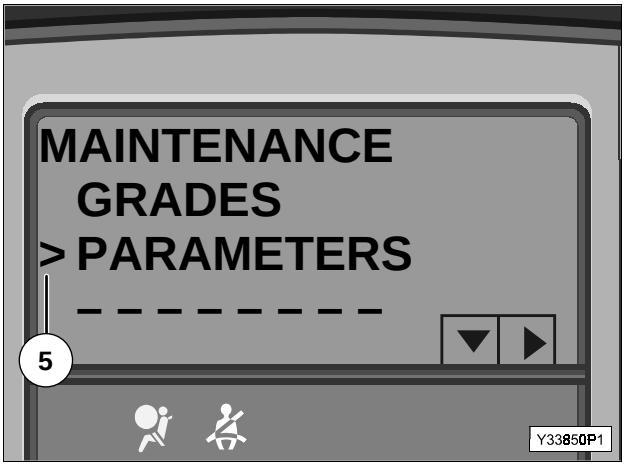
The cursor ⑤ is pointing at the submenu item "SCHEDULED DATES".

- Touch the left button ① (see page 2) 2 times



The cursor ⑤ is pointing at the submenu item "PARAMETERS".

- Touch the right button ② (see page 2)



The cursor ⑤ is pointing at the submenu item "FOREWARNING WKS".
(example illustrated shows the time-based maintenance system)

Note: If the flexible maintenance system has been programmed, "FOREWARNING KM" appears as an additional menu item. The preset value is 5000 km and can be displayed and changed in exactly the same way as "FOREWARNING WKS".

- Touch the right button ② (see page 2)

The message opposite appears on the driver's display.
In this example, the service "FOREWARNING" is set to 4 weeks.

– To **not change the forewarning** specified and move one menu level higher:
- Touch the right button ② (see page 2)

– To **alter the forewarning**:
- Touch the left button ① (see page 2)

An optional forewarning setting will appear (e.g. 6 weeks).

- Keep touching the left button ① (see page 2) until the desired setting appears, also see page 2 "MENU STRUCTURE"

Note: To cancel this action, touch the right button ② (see page 2) or wait about 30 seconds without pressing any button.

The message opposite (e.g. 8 weeks) appears on the driver's display.

Note: To cancel this action, touch the right button ② (see page 2) or wait about 30 seconds without pressing any button.
Use the left button ① to return to the first line (2 weeks), also see page 2 "MENU STRUCTURE".

– To **alter the forewarning**:
- Press the right button ② (see page 2)

The message opposite appears on the driver's display.

Note: To cancel this action, touch the right button ② (see page 2) or wait about 30 seconds without pressing any button.

- To confirm the new forewarning, press the right button ② (see page 2)

The message opposite appears on the driver's display.
The 8-week "FOREWARNING" (example) is now confirmed and set.

- Touch the right button ② (see page 2)

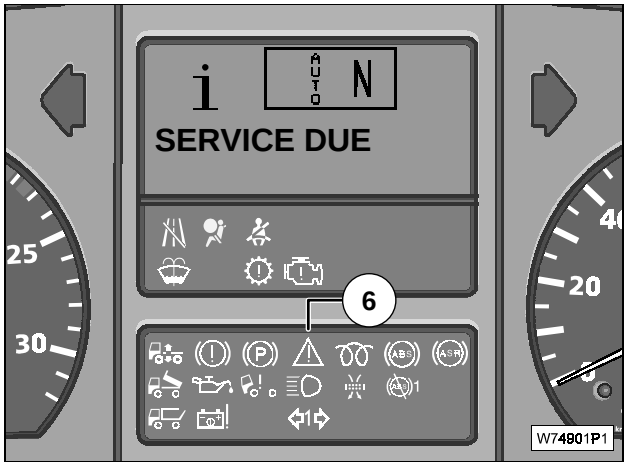
The message opposite appears on the driver's display.
(example illustrated shows the time-based maintenance system)

– To **exit** the **"PARAMETERS"** or **"MAINTENANCE" menu item**:
see page 2

INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS
Also see Operator's Manual, section 1.36 "INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS".

No scheduled date displayed
The scheduled date display is based on time and mileage. This means that dashes (→) may appear on the driver's display if a scheduled service date has just been confirmed.
You will have to drive for some time or miles before you can obtain an initial estimate for the next scheduled service date (date/kilometres).

"SERVICE DUE" display – scheduled service due
This display depends on the programmed "FOREWARNING" setting, see page 4.



Scheduled maintenance or a statutory inspection is due when, with the vehicle at a standstill and the ignition switched on, the "SERVICE DUE" message opposite appears on the driver's display and yellow central warning light ⑥ lights up on the panel of check lamps.

- Call up the scheduled service which is due in the maintenance system (see page 3) and arrange an appointment with a MAN Service workshop

Note: The "SERVICE DUE" display goes out when the vehicle is being driven at more than 3 km/h.
However, if the display does not go out, this means that the service is overdue (see below)!

"SERVICE DUE" display – scheduled service overdue
Scheduled maintenance or a statutory inspection is overdue when, at a vehicle speed of above 3 km/h, the "SERVICE DUE" message opposite still appears on the driver's display and yellow central warning light ⑥ is still illuminated on the panel of check lamps!

The due service must be performed. If the service is not performed, your vehicle operating permit could well be invalidated in certain circumstances!

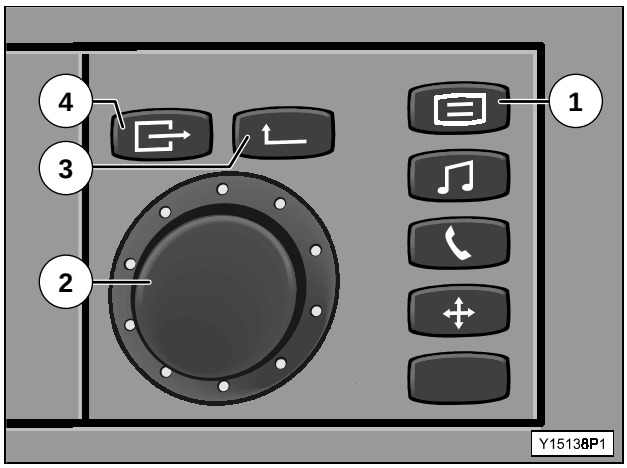
- Call up the scheduled service which is due in the maintenance system (see page 3) and immediately arrange an appointment with a MAN Service workshop

MAINTENANCE SYSTEM (HIGHLINE)

General instructions

Danger of accidents!
For reasons of road safety, the maintenance system can only be activated when the vehicle is at a standstill.

The maintenance system is controlled using the control panel:

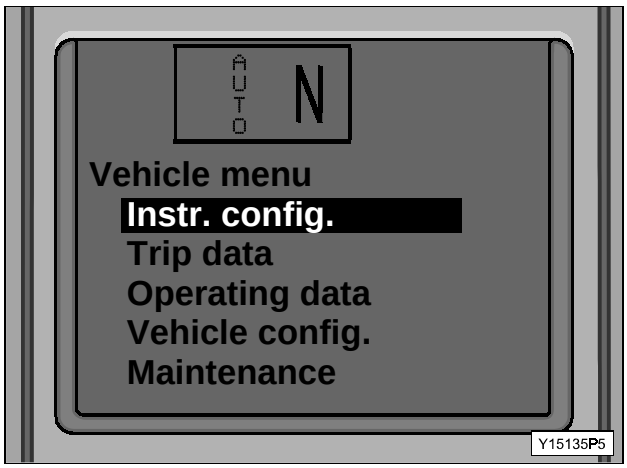


1 "Vehicle menu" button
- **Press** to call up the vehicle menu

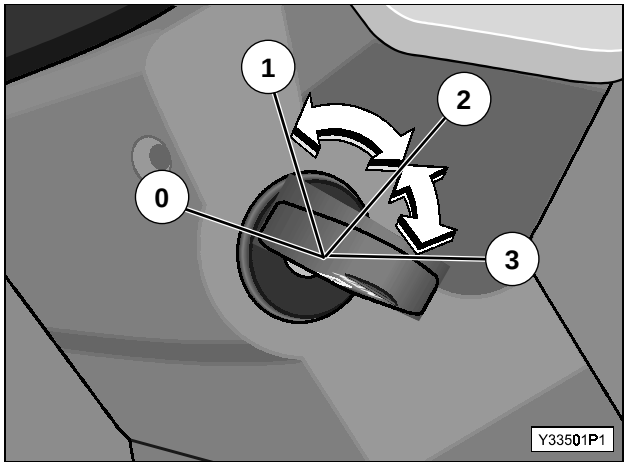
2 Rotary/pressure switch
- **Turn** (anti-clockwise/clockwise) to select a menu item
- **Press** to call up a menu item

3 "Previous menu" button
- **Press** to exit a menu item

4 "Exit menu" button
- **Press** to exit the vehicle menu

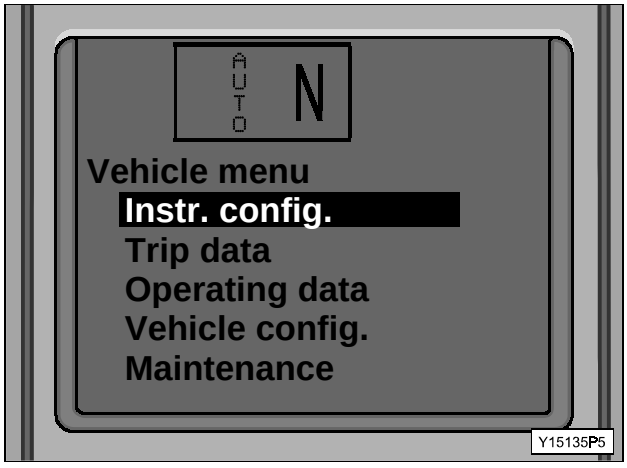


Note: The maintenance system automatically closes and the starting menu appears on the driver's display if approx. 30 seconds elapse without a button being pressed or the rotary/pressure switch being actuated.



CALLING UP THE VEHICLE MENU

- Bring the vehicle to a standstill
- Apply the parking brake
- Stop the engine, also see Operator's Manual section 5.11 "STOPPING THE ENGINE"
- Switch on the ignition and turn the ignition key to "drive position" ②, also see Operator's Manual, section 5.10 "STARTING THE ENGINE"



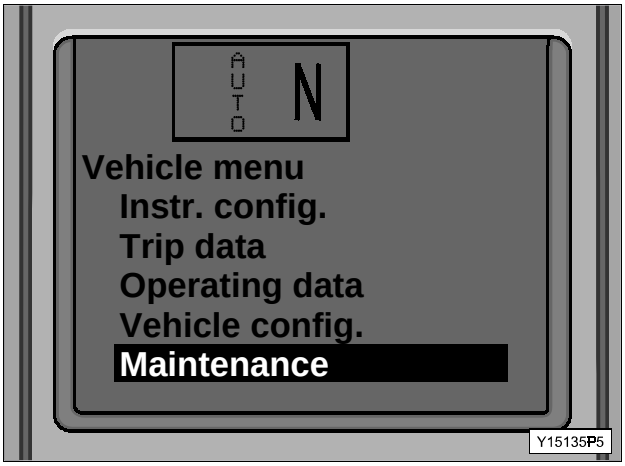
- Press the "Vehicle menu" button ① until the menu appears on the driver's display

The 1st menu item in the menu structure – "INSTR. CONFIG." – is marked (also see section 9.00).

SCANNING SCHEDULED DATES AND SERVICE

Scanning scheduled service dates

- Call up the menu, see page 1
- Turn the rotary/pressure switch ② clockwise until the "MAINTENANCE" menu item is marked
- Press the rotary/pressure switch ②, the "MAINTENANCE" menu item is called up

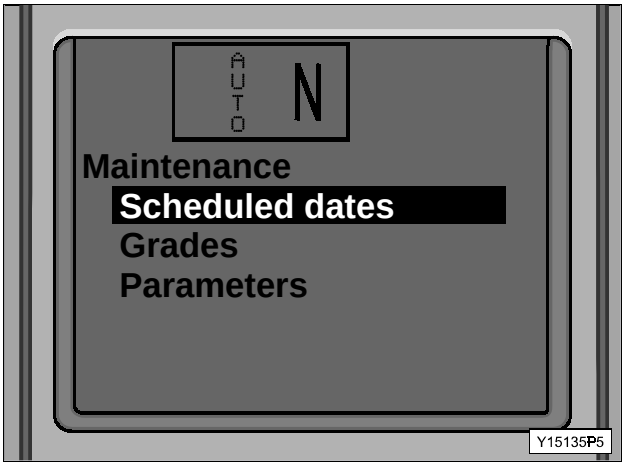


The message opposite appears on the driver's display. The "SCHEDULED DATES" menu item is marked.

- Press the rotary/pressure switch ②, the "SCHEDULED DATES" menu item is called up

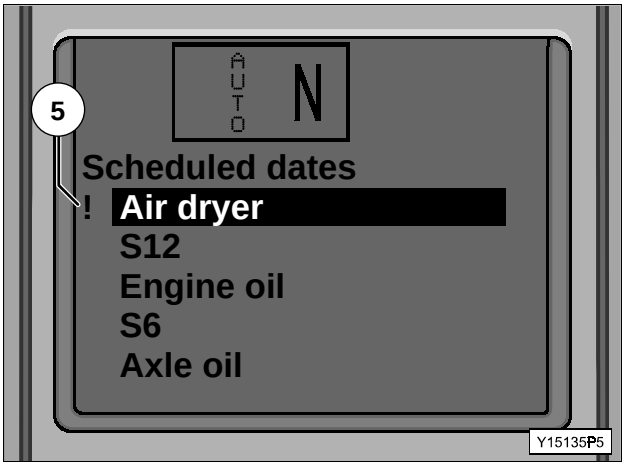
The first scheduled service date appears.

Note: A due/overdue service is indicated by a "!" symbol ⑤.



In this example, the first scheduled service date is a due/overdue date for the air dryer.

Note: In the **flexible maintenance system**, the display units are either the date or kilometres, depending on when the service is due.
In the **time-based maintenance system**, the display unit is always the date.



– To **call up the next scheduled service date**:

- Turn the rotary/pressure switch ② clockwise

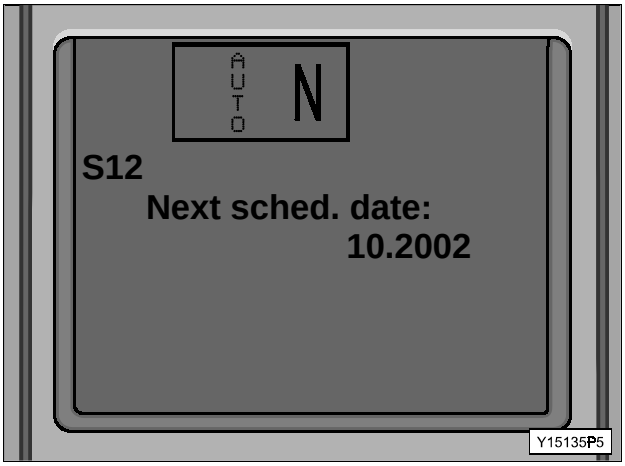
The next scheduled service date after the one that has just been displayed appears on the display. "S12" (service every 12 months) is displayed in this example.

– To **stop scanning the scheduled service dates** and move one menu level higher:

- Press the "Previous menu" button ④ (see page 1)

– To **exit** the **menu item "MAINTENANCE"**:

- Press the "Exit menu" button ④ (see page 1)

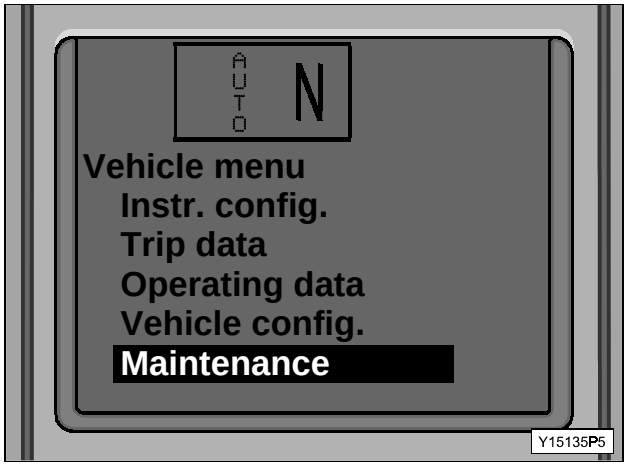


FOREWARNING FOR SCHEDULED SERVICE DATES ("FOREWARNING")

New vehicles have the "FOREWARNING" for scheduled service dates factory-set at 6 weeks or 5000 km.
This can be changed under the menu item "PARAMETERS/FOREWARNING WKS" or "PARAMETERS/FOREWARNING KM".

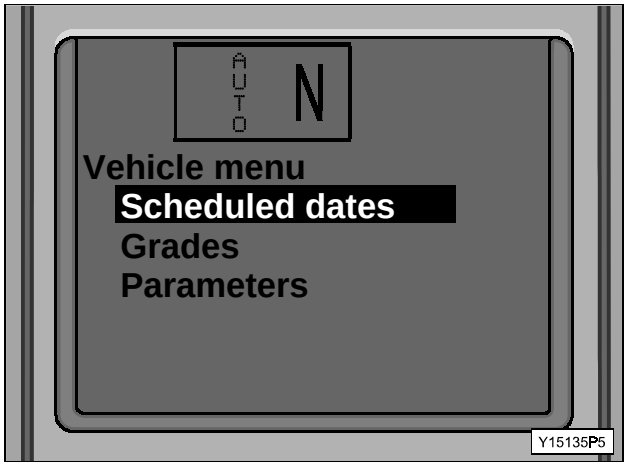
Setting the forewarning

- Call up the menu (see page 1)
- Turn the rotary/pressure switch ② (see page 1) clockwise until the "MAINTENANCE" menu item is marked



- Press the rotary/pressure switch ②, the "MAINTENANCE" menu item is called up

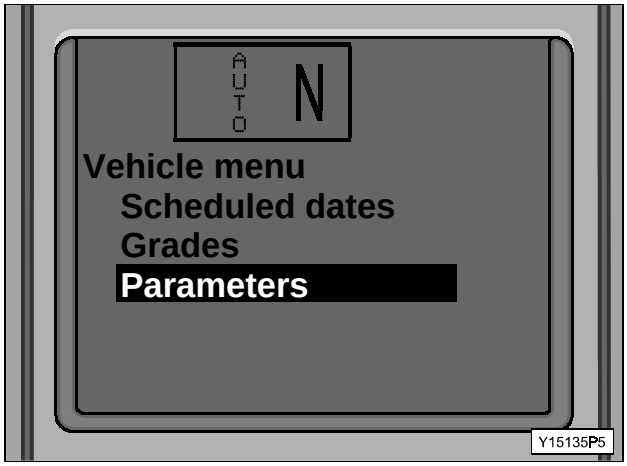
The message opposite appears on the driver's display. The "SCHEDULED DATES" menu item is marked.



- Turn the rotary/pressure switch ② clockwise until the "PARAMETERS" menu item is marked

The message opposite appears on the driver's display. The "PARAMETERS" menu item is marked.

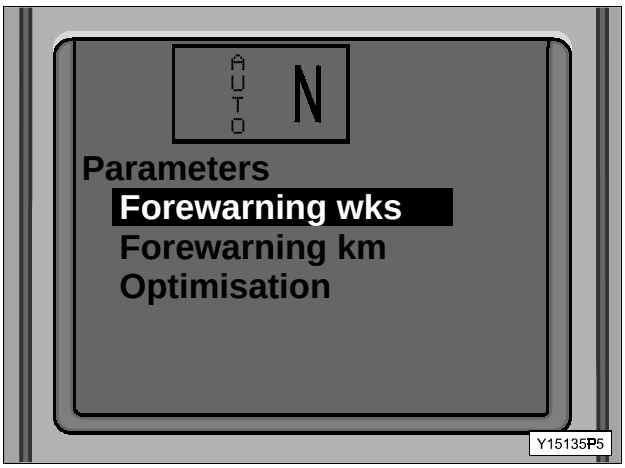
- Press the rotary/pressure switch ②, the "PARAMETERS" menu item is called up



The cursor ⑥ is pointing at the submenu item "FOREWARNING WKS".
(Illustrated example for the flexible maintenance system)

Note: In the **flexible maintenance system**, the display units are the date (wks = weeks) and the kilometres (km = kilometres).
In the **time-based maintenance system**, the display unit is always the date (wks = weeks).

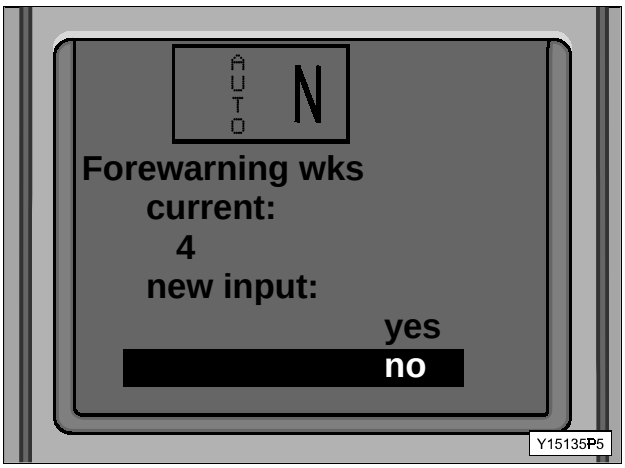
- Press the rotary/pressure switch ②



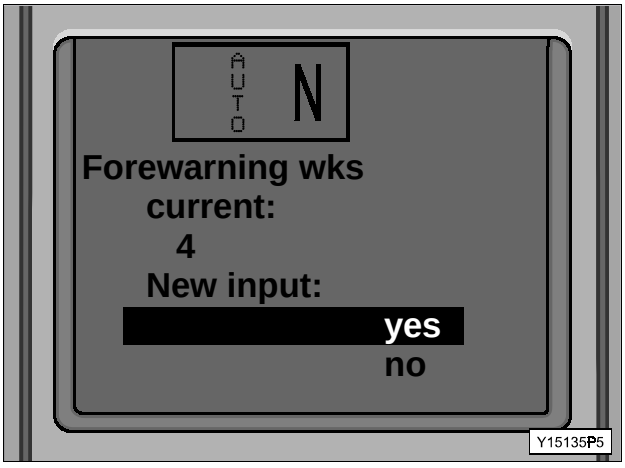
The message opposite appears on the driver's display. The text "no" is marked.
In this example, the service "FOREWARNING" is set to 4 weeks.

– To **not change the forewarning** specified and move one menu level higher:
- Press the rotary/pressure switch ②

or
- Press the "Previous menu" button ③ (see page 1)



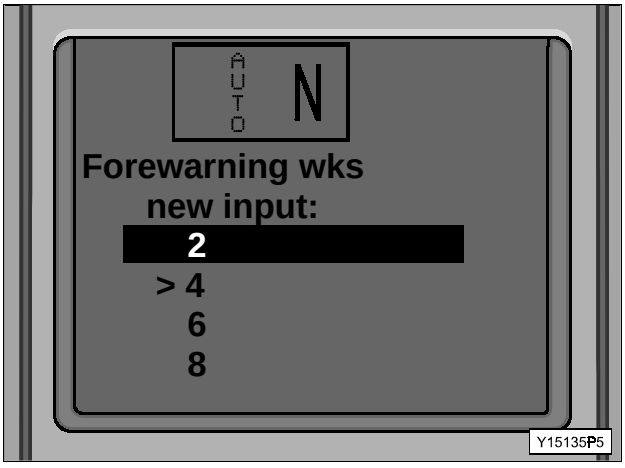
– To **alter the forewarning**:
- Turn the rotary/pressure switch ② until the text "yes" is marked
- Press the rotary/pressure switch ②



The message opposite appears on the driver's display.

Note: Press the "Exit menu " button ④ (see page 1) to cancel this action.
Use the "Previous menu" button ③ to return to the first line (2 weeks), also see page 2 "MENU STRUCTURE".

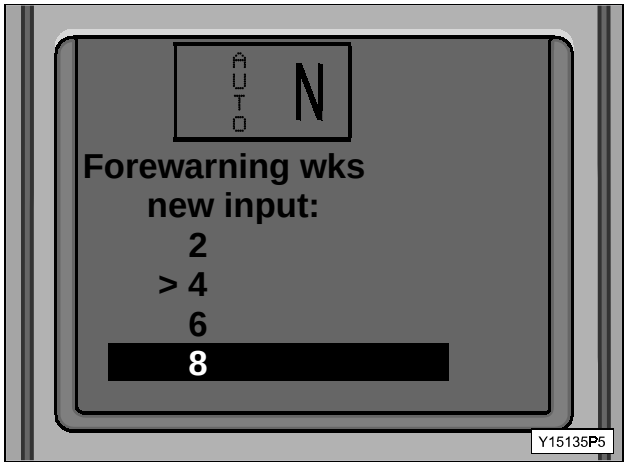
- Turn the rotary/pressure switch ② and select the desired presetting (e.g. 8 weeks)



The message opposite (e.g. 8 weeks) appears on the driver's display.

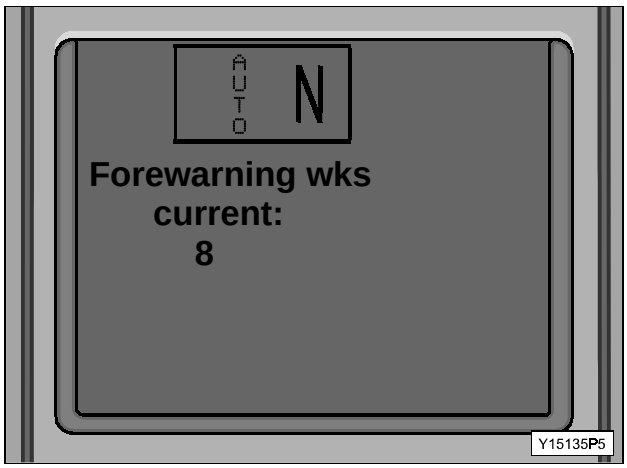
Note: Press the "Previous menu" button ③ or "Exit menu " button ④ (see page 1) to cancel this action.

- Press the rotary/pressure switch ②



The message opposite appears on the driver's display.
The 8-week "FOREWARNING" (example) is now confirmed and set.

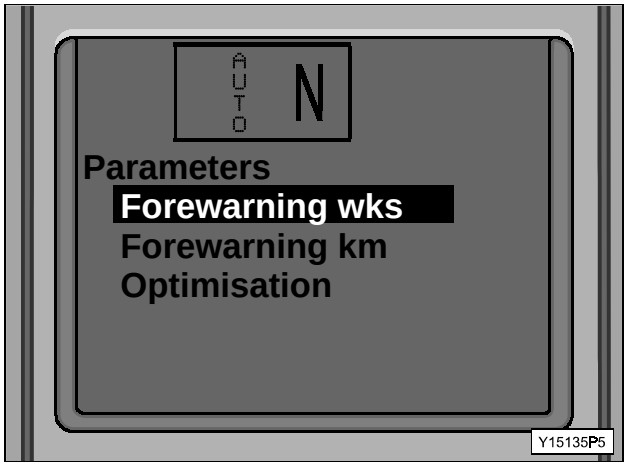
- Press the "Previous menu" button ③ (see page 1)



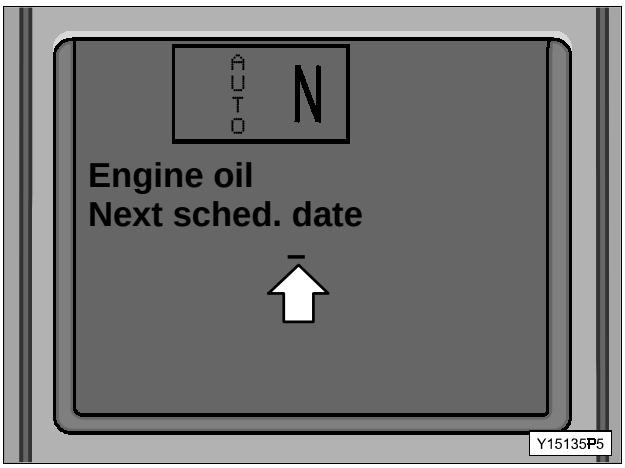
The message opposite appears on the driver's display.
(Illustrated example for the flexible maintenance system)

– To **exit** the **menu item "PARAMETERS"**:

- Press the "Exit menu" button ④ (see page 1)

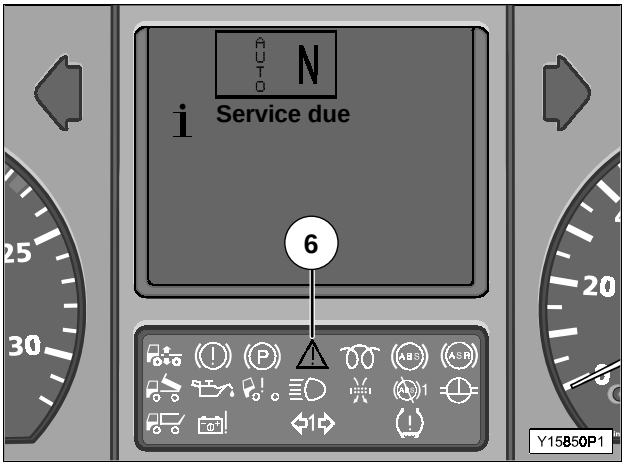


INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS
Also see Operator's Manual, section 1.36 "INDICATIONS ON THE DRIVER'S DISPLAY AND PANEL OF CHECK LAMPS".



No scheduled date displayed
The scheduled date display is based on time and mileage. This means that a dash (→) may appear on the driver's display if a scheduled service date has just been confirmed.
You will have to drive for some time or miles before you can obtain an initial estimate for the next scheduled service date (date/kilometres).

"SERVICE DUE" display – scheduled service due
This display depends on the programmed "FOREWARNING" setting, see page 2.



Scheduled maintenance or a statutory inspection is due when, with the vehicle at a standstill and the ignition switched on, the "SERVICE DUE" message opposite appears on the driver's display and yellow central warning light ⑥ lights up on the panel of check lamps.

- Call up the scheduled service which is due in the maintenance system (see page 2) and arrange an appointment with a MAN Service workshop

Note: The "SERVICE DUE" display goes out when the vehicle is being driven at more than 3 km/h.
However, if the display does not go out, this means that the service is overdue (see below)!

"SERVICE DUE" display – scheduled service overdue
Scheduled maintenance or a statutory inspection is overdue when, at a vehicle speed of above 3 km/h, the "SERVICE DUE" message opposite still appears on the driver's display and yellow central warning light ⑥ is still illuminated on the panel of check lamps!

The due service must be performed. If the service is not performed, your vehicle operating permit could well be invalidated in certain circumstances!

- Call up the scheduled service which is due in the maintenance system (see page 2) and immediately arrange an appointment with a MAN Service workshop

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