



User's Manual

FUEL SEMI-TRAILER

All the people responsible for any works performed with the use of Stokota vehicles should get familiarized with the content of this user's manual.

The producer of the vehicle shall not be held liable for the losses and damages resulting from improper use of both the vehicle and its equipment. All the recommendations included in this user's manual should be strictly followed.

The user should get familiarized with all the warnings, notes and instructions before the first drive!

Being familiarized and following user's manual instructions concerning operation, maintenance, care and service shall make it possible to avoid defects and shall be the guarantee of failure-free and safe operation.

Complete technical documentation should be kept in driver's cab or other place available for him.

If, which is rather little likely, any problems with equipment appear, you should follow the instructions described in Stokota warranty procedure included in this user's manual before commencing any repair works.

You should check in your warranty schedule whether the tanker is subject to defined warranty period and, making use of contact details, notify as quickly as possible the Service and Warranty Department. It shall give you the instructions concerning activities that should be performed in order to solve the problem as quickly as possible.

STOKOTA shall not acknowledge the extended OEM (Original Equipment Manufacturer) warranties. They are offered beyond the standard Stokota warranty and are subject to deliverer's conditions.

This user's manual is for instruction purposes only and cannot be perceived as legally binding or full

vehicle (tanker) operation or service guide.

All original parts, such as brake system, suspension, loading and unloading devices etc. are installed according to their manufacturer's recommendations. The manufacturer is responsible for functionality and maintenance of the equipment. STOKOTA shall not be liable for wrong information delivered by the manufacturer, either in oral or in written form. STOKOTA recommends to read and understand completely the user's manual issued by the manufacturer before starting operation or maintenance of the appliances.

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Dear Customer,

Thank you for choosing a STOKOTA product we hope you are satisfied with your new tanker.

At STOKOTA we make every effort to ensure that we have fulfilled your requirements as fully as is possible.

This manual is intended to provide you with guidelines for getting the best out of the equipment you have purchased. Should you have any queries regarding your new vehicle we have included contact numbers for your after-sales services including technical, service and repair and warranty departments.

When used in conjunction with the maintenance, operational and safety instructions your tanker should give you many years of successful operation. Looking after your vehicle will ensure a minimum of downtime and an extended service life thus providing good return on your investment.

STOKOTA is a high quality producer leading our industry in innovation, certification standards and manufacturing excellence.

We regard the relationship we have with our customers as extremely important both before and after you have purchased from us.

We also appreciate your feedback about our products and organisation, if you have any comments we are always ready to listen, please do not hesitate to contact us if there is anything we can be of help with.

TABLE OF CONTENTS

Warranty procedure.....	8
General Information.....	11
Safety	18
Drive and stand.....	22
Loading and unloading	30
Standard activities.	31
Tanker top loading.....	31
Tanker bottom loading	31
Unloading.	32
Electrical system	33
Removal of Shock Absorber.....	40
Removal of trailing arm.....	40
Air Bag.....	40
Re-assembly of components.....	41



Air Bag	41
Shock Absorber	41
Restraint Cables	42
AIR CONTROL SYSTEM	42
Air Leaks	42
FUNCTION AND OPERATION OF VALVES	43
Pressure Protection Valve	43
Suspension Air Tank	43
Maintenance	43
General information	44
Maintenance	44
DOUBLE CHECK VALVE	45
Maintenance	45
General information	45
LIFT AXLES	45
Summary	45
Maintenance	45



SERVICING	45
Bellows (or brake chamber on later models)	45
BRAKE SYSTEM.....	46
DESCRIPTION OF OPERATION	46
Brake Coupling.....	47
Maintenance.....	47
RELAY EMERGENCY VALVE (if fitted)	47
Maintenance.....	47
General information.....	48
LOAD SENSING VALVE	48
LOAD SENSING VALVE FOR AIR SUSPENSION (if fitted)	48
Maintenance.....	48
General information.....	48
ANTI-SKID BRAKE SYSTEMS	49
DRIVERS ROUTINE CHECKS.....	55
Pre service Inspection.....	55
VEHICLE WASHING/CLEANING/CARE	64



VEHICLE WASHING MATERIALS	65
COMMON PROBLEMS CAUSED BY IMPROPER WASHING	66

Warranty procedure





Details concerning semi-trailer warranty conditions are included in appendix attached to vehicle.

Upon identification of service or warranty problems please proceed using the following stages. This will ensure timely attention and prompt financial remuneration.

GENERAL REMARKS

- Identify the nature of the fault and where possible the cause.
- Identify the trailer number. You will find it on a data plate situated at the side of unloading cabinet or on a chassis plate at the kerb side, close to semi-trailer plate. The vehicle number is also stamped on the front part of the front support.
- Identify any available part numbers of defective products and their manufacturer. When in doubt a detailed description of the part and its proximity on the vehicle should enable identification.
- Before enquiring for an authorisation an estimate of the work required should be prepared stating the rate for labour and the time required to complete the work satisfactorily, if replacement parts are included an exact quote for the parts required should also be itemised.
- Where parts are defective and a replacement required an address to

despatch them to must be provided with an appropriate order number.

- STOKOTA, will at its discretion either grant authorisation for the remedial work to be carried out instruct one of its agents to perform such a task. This decision is exclusively the responsibility of the management at STOKOTA.
- Where the decision has been taken to send a STOKOTA Service engineer or another appointed agent. If the warranty claim is rejected either by STOKOTA or one of its suppliers the total sum of the travel, labour and the cost of any replacement parts will be charged under the normal trading conditions to the initiator of the claim.
- When the work is completed a full warranty report (please fill **WARRANTY CLAIM SHEET**) must be filed with the invoice. This must be completed on a STOKOTA warranty report form and attached to any invoices.
- Once the authorisation has been obtained the work may commence and once completed the agreed invoice total may be levied. If under investigation the agreed amount of the authorisation is exceeded a further authorisation should be obtained.
- Any defective parts should be retained and clearly identified for either inspection or return to

STOKOTA. These parts should be clearly and accurately marked with the authorisation number and the trailer identification number. Replacement of parts or payment of any related invoices cannot be guaranteed unless the above systems are adhered to in a timely manner.

- Within warranty period you cannot repair or replace the elements of vehicle equipment on your own.

PROCEDURE

STEP 1: Check if estimated costs are up to or above 200 EURO,

- Warranty repair claims that have a value below 200 EUR can be applied for after the costs (repairs) have been made already. The warranty claim will be then assessed by STOKOTA, and if the claim is correct, it will be accepted. It is however advisable to contact STOKOTA before the repair is being done.
- Warranty repair claims of which the (estimated) cost is above 200 EUR, must be reported to, and must be approved by, STOKOTA before works can start
- Send the STOKOTA warranty claim sheet (with attachments), and if the claim is correct, approval for repair will be send to you.
-

STEP 2: repair (in case of repairs above 200 EUR) and request for invoicing with the exact value of the repair.

STEP 3: approval for invoicing from STOKOTA and the invoicing itself.

The invoice must include the following data: - tanker identification number (for tank vehicles), chassis VIN number.

This WARRANTY CLAIM SHEET must be attached to the invoice (including approval for invoicing given by STOKOTA on page 2 of this file).

In case the above conditions are not met, STOKOTA reserves the right to reject warranty claims.

In the event of any warranty queries the following contacts should be used:

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General Information



The chassis number and model code will be found on the manufacturer's plate secured near the landing legs or coupler plate. It is essential that this information be quoted on all correspondence and in the event of any warranty or service problem.

Dimensions, weights and volumes

See: technical documentation

Loading parameters:

This information is also included on a plate situated on a box for fittings:

- Maximum number of chambers loaded at the same time - 4
- Maximum loading pressure - 6 bar
- Optical overloading sensors - 5 wired

Tank

The tank is a welded construction made of aluminum alloy, completed on both sides with end caps welded into it.

Steering system while loading and unloading the tanker

This system is intended to control the opening and closing of the bottom and vapor valves. The system is powered with compressed air from brake system through additional air tank. The air goes through the air preparation unit (filter, improver, pressure regulator) and is supplied to particular elements of the system. The system is steered with steering units situated in the box for fittings. The axle lift system and is also powered with the air from the bottom valves steering system container.

Fumes exhausting system

This system limits to a large extent the emission of product vapors into the atmosphere while loading and unloading the tanker. The system consists of:

- pneumatically operated vapor valves with anti-fire fuses,
- bleeder valve with anti-fire fuse,
- vapor collector assembly, which goes through the inner part of the tank and is led out in the box for fittings.

The bleeder valve, blocked with anti-fire fuse, joins tanker compartments with the atmosphere.

Brake system

The brake system consists of:

- main brake pneumatic system
- parking brake system blocking the second axle
- non-slip system ABS
- automatic regulator of braking power
- automatic regulator of brake shoes clearance

Pushing the brake pedal causes the increase of pressure in the main steering conduit and at the outlet of brake valve. The air pressure after modification of its value in braking power controller and ABS modulator is an effective braking pressure which commands on the operating of particular membrane actuators. The pressure modification in braking power regulator consists in the reduction of braking pressure, which occurs in case of appropriate pressure reduction in the bellows, when the tanker is not fully loaded.

Modification of air pressure in the ABS modulator consists in rising or lowering the brake pressure up to the value at which the braked wheels are not blocked. The magnetic sensors mounted on the wheels of the middle axle are the elements controlling whether the wheels blockade has not occurred yet.

Wheels and steering system

The tanker is based on a driving unit which consists of three axles situated on pneumatic suspension. The brackets and air bellows are mounted to the aluminium frame, and the rocker arms with axles are mounted to them.

Accessories situated in the manhole cover

The manhole cover of each compartment is equipped with the following appliances:

- anti-fire fuse securing against burning flame getting into the tanker compartment
- vapour valve securing against the emission of vapours of transported products into the atmosphere, keeping at the same time the over- and negative pressure in a tanker compartment as well as limiting the leak of the transported product when the tanker turns over. The vapour valve is opened pneumatically in the moment of turning on the pneumatic system of bottom valves steering. Besides, the above valve opens automatically

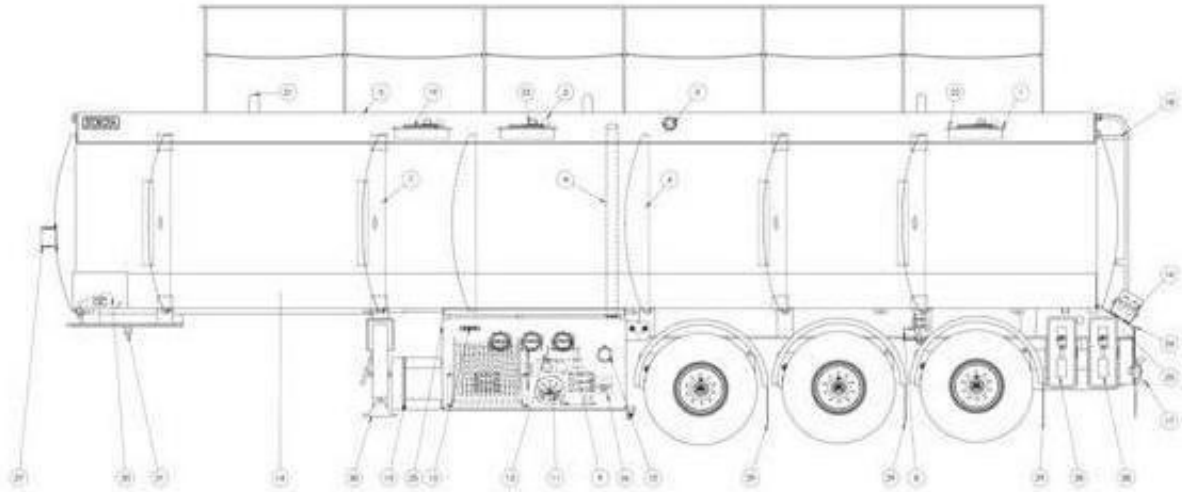
when the following pressure conditions appear in the compartment :

1. overpressure
2. negative pressure

- filler opening through which the tanker can be top loaded
- level sensor securing the compartment against overloading when it is bottom loaded.



PRINCIPAL TANK COMPONENTS



www.stokota.com
VEHICLE EQUIPMENT
Drawing no. 1

1. Manhole cover:

Locking safety lid incorporating vent valve. These are normally set at 100mb-pressure rating and 20mb vacuum rating.

2. Sequential vent valve:

Fitted to each compartment. These open automatically during loading and unloading operations. Each valve is connected via a hose to the offside coaming and them to the vapour recovery connection situated to the near side of the tanker.

3. Coaming vent valve or Smart vent:

Mounted to the offside coaming vapour recovery line. Fitted to vent tank when discharging.

4. Vent pipe:

Internal pipe extending through the tank from the coaming/ roll over protection to the vapour recovery connection.

5. Coaming:

Fitted to the top of the tank, to protect the manholes and fittings in case of a tank rollover and as an escape route for product vapour during bottom loading.

6. Division:

Fitted to divide tank into separate compartments. Current maximum capacity of compartment permitted by law is 7500 litres unless baffles are fitted.

7. Internal baffle:

Baffles have to be fitted when compartment capacity is bigger that 7500l

8. Foot valve:

Fitted to each compartment sump. Can be pressure balanced or non-pressure balanced. Operated pneumatically from the knobs fitted in the cabinet.

9. API coupling:

Universal industry standard coupling for compartment bottom loading and discharge. Operation may be pneumatically or manually operated dependant on type. There is also either a digital display for SDS (Sealed Delivery System) or a sight glass positioned on the side or behind the coupling. This is to detect the presence of product in the discharge pipe. The API can be replaced by ball valve if no bottom loading is required.

10. Vapour recovery connection:

For connecting vapour recovery hose to terminal or retail facility during loading operation. For the tanker equipped with top loading possibilities only this valve is not fitted.

11. Pump (when fitted):

Mounted in the cabinet with discharge equipment. Hydraulically driven from the tractor unit.

12. Manifold (when fitted):

Connects to all the compartment discharge pipes. Fits between the foot valves and the API coupling. Enables all the compartments to be pump or measured discharged without connecting hoses from the API coupling and the pump suction coupling. The manifold system is controlled from the knobs fitted in cabinet.

13. Operating knobs:

Normally situated in the discharge cabinet. These knobs are used as the pneumatic controls for operation of the foot valves / API / manifold during loading and unloading operations.

14. Hose racks:

Racks to stow hoses.

15. Side-guard:

Fitted to comply with current legislation.

16. Wheel chocks:

Two wheel chocks are provided (if ADR) to provide immobilisation when required.

17. Under-run protection:

Fitted to the rear of the tank to protect the vessel in the event of a rear impact in compliance with current legislation.

18. Ladder and platform (if fitted):

Gives access to the top of the tank.

19. Dip sticks:

Mounted either in the lid or adjacent to the lid. Can be used for checking the level of the liquid in the compartments.

20 Meter:

Includes ticket printout facility that may be situated in the vehicle cab. The meter display is situated in the control cabinet. Can be used on hose reel and bulk discharge.

21. Rollover protection (if fitted):

Used to prevent damage to man lid and tank top equipment in the event that the tank should overturn..

22. Manlid:

Used for tank top filling and access for inspection of compartment either bolted or lockable. Pressure venting above 250MB. Multiple latching and housing sequential vent valves for vapour recovery.

23. Product grade indicators (if fitted):

Used to identify product type in each compartment.

24. Hazchem board:

Hazardous product code display board.

25. Emergency stops:

Usually found at rear and offside of vehicle, also on top if

specified. Used to close bottom valves immediately in emergency situations.

26. High level cut off socket (if fitted):

Optic socket used for overfill prevention during bottom loading.

27. Connection plate:

Plate used as the base for pneumatic, electric and hydraulic connections.

28. Fire extinguisher box:

Fire extinguisher box with fire extinguisher – capacity 12kg.

29. PVC mudguard with mud flaps

30. Landing legs:

They are used in order to support the vehicle for the time of getting off the tractor and parking.

31. Main pin:

Pin used for connecting the vehicle with truck tractor.

Safety



Using the appliance according to intended use.

Vehicles manufactured by STOKOTA sp. z o.o. are designed and made according to valid technical standards, taking into consideration applicable regulations of traffic code. Operations other than for intended use can be a threat to life and health of the user and third parties, and also permanent damage to the vehicle and other material losses.

Using the appliance according to intended use means following the regulations and guidelines included in this user's manual, operation and maintenance instructions delivered by subcontractors and following traffic code regulations.

In case there is intention to introduce any changes to the vehicle or its construction, it is necessary to contact one of STOKOTA plants or service points. Mounting additional equipment in the semi-trailer can only be done after prior consultation with the service point.

Non-compliance with the principles causes loss of warranty.

Alignment of the combination

In order to use the appliance according to intended use you have to perform alignment of tractor and semi-trailer combination. Overloading the vehicle may lead to overheating the brakes of tractor or semi trailer/trailer. The results of overloading the brakes can be: decrease of braking efficiency, bigger wear of linings and/or brake plates, as well as damage to wheel or axle bearings. For optimal distribution of braking forces In the whole tractor and semi-trailer combination it is required to perform alignment of brake system when the tanker is loaded, after short operation time (up to 5 000 km or 14 days), after receiving the vehicle and during every change of the tractor. Non-compliance with the above principles and lack of tractor alignment causes loss of warranty and loss of entitlement for claims of indemnity against STOKOTA sp. z o.o.

Using the appliance for other than intended use

Every use beyond the standards is recognized as misuse, for example transport of other products than those complying with tanker design. Using the appliance for other than intended use is also exceeding acceptable load, speed, axle and support load as well as dimensions.



All power-driven vehicles are potentially dangerous, especially articulated vehicles, due to their weight and size. Drivers and mechanics should be always aware of that. Politeness, reasonable methods of driving the vehicle, following the Traffic Code and conforming to speed limits is required for safety. Using appropriate tools in the garage and quick reaction on alarming signs or sounds can decrease the risk of danger.

It is essential to check and maintain tyres, brake and electric system regularly, as well as repair failures immediately.

Apart from the above, there are special precautions, that have to be taken in case of different kind of vehicles. It is always required to meet the following requirements:

All tankers

When reversing, ensure that there is no one behind the vehicle that may be unaware of the manoeuvre. When working underneath a vehicle ensure it cannot be moved. (Remove the ignition key or place a warning notice in the cab).

When working underneath an uncoupled tanker, prevent inadvertent coupling up, by placing an obstruction (pallet, toolbox etc.) in front of the trailer.

When jacking up a tanker always ensure that jacks are correctly located and cannot slip, and that the tanker is properly supported by stands before working under it

No one must operate the tank without training or an acceptable understanding of the correct operating procedures.

A visual inspection of all equipment, safety devices, and working areas must be performed before each trip to ensure personal and operational safety that the vehicle is legally compliant and to correct potential or actual hazards.

Proper operation of the tanker primary braking system is essential for safe operation of the vehicle. A functional system check is necessary each time the vehicle is put into service.

The vehicle should not be used if any of the following conditions exist:

- There is damage or defects on or to the lighting fixtures, wiring or

electrical conduits or any lights are inoperable.

- Leaking or malfunctioning of discharge, pneumatic, hydraulic equipment.
- Damage to the tractor or tanker, including, but not limited to, damage to the tank vessel.
- Inoperative or defective braking system.
- Inoperative or missing vents – Extensive shell damage can occur if the design pressure is exceeded or a vacuum is created.
- Changed indicators of wheel unscrewing (suggesting nut loosening).

Failure to correct or repair any of these conditions could result in potential damage to the tank, serious personal injury or infringement of the law.

Always engage parking brake and connect earthing before loading or unloading.

Never leave the tanker unattended during loading or unloading.

Failure to correct or repair any of these conditions could result in extensive damage to the tank and serious personal injury. Tractor unit must be in line with the trailer.

Tanker must be on firm and level ground. The vehicle must always be driven sensibly and within the law, road conditions may also adversely affect the handling in extreme conditions. Unsafe and dangerous driving may result in serious injury or vehicle damage.

Partial loading of the tank will change the driving characteristics. Extra care must be taken to allow for surge.

Report any defects to employer at once.

Be aware of location of fire extinguishers.

Do not alter or modify any of the equipment or components without the agreement of STOKOTA. Failure to do so may result in injury and may affect the tanker warranty.

Do not load beyond the maximum Gross Vehicle Weight as specified on the chassis plate. It is the operator's responsibility to ensure that they comply with current regulations at all times. Overloading is illegal, unsafe, and will reduce the life of your tank and the components fitted to it. It may also result in instability and poor braking performance. Never exceed the maximum Gross Vehicle Weight as specified on the chassis plate.

Do not enter the tanker before the tank has been degassed and cleaned.

After cleaning the tank, keep the manholes and foot valves open until the tank has cooled, and fully drained.

Drive and stand





We advise that the following checks should be made before driving:

- Check if fifth wheel coupling pin and fifth wheel coupling are in good condition;
- Put enough grease into fifth wheel coupling;
- Check that the fifth wheel is correctly engaged. Test by pulling the tractor slightly with the trailer handbrake on. If a safety lock is fitted to the fifth wheel check that it is engaged;
- Before connecting the air susies to the trailer ensure that all couplings are clean and securely mounted. After coupling, make sure the connections are tight. Susies should long enough to allow 90⁰ turns without over stretching or fouling on bodywork;
- Before connecting the electrical susies to the trailer, check that both plug and socket are clean and securely mounted and that there are no signs of fraying or cuts in the susie. After connection check that all circuits are functioning correctly. Replace any blown bulbs or broken lenses;
- Ensure that antistatic belt situated at discharge box touches the ground. If not – slack the fixing, pull the belt out for appropriate length and tighten up;
- Check the condition of wheels, tyres, rims, tread bar, ensure that there are no foreign matters (nails, stones) in tyres;
- Check the pressure in tyres;
- Check tightening torque of wheel mounting bolts, never drive with loose or missing wheel nuts. Check location of wheel nut unscrewing indicators;
- Check the number plate – it should be firmly fixed into its holder, it should be clean and not damaged. The figures should not be obscured in any way. **It is illegal to use chalked on numbers;**
- Raise and secure landing legs;
- Ensure that mudwings, flaps etc. are firmly fitted;
- Ensure that discharge box is closed;
- Ensure that the cabinets are closed;
- Put pneumatic suspension into drive position.
- Secure all movable elements – wedges, spare wheel, fire extinguishers etc.;
- After coupling up ensure that the handbrake is off. If a mechanical handbrake is fitted see that the wire rope is slack. If spring brakes are fitted, release the brakes by pulling out the button;
- If the trailer is fitted with air suspension, ensure the air bags are fully inflated to the correct ride height before moving off. If the suspension has been dumped or has lost air for any reason, then the air bags will not inflate until after the brake circuit has been fully charged. **Driving with air bags partly deflated will damage them;**
- Ensure the raise valve is in the drive position.
- Start driving only when the brake working pressure is achieved;
- Do not exceed allowable total weight.
- Ensure that toolbox is closed and weight of equipment not exceed 10 kg.

Exceeding allowable inclination angles leads to vehicle damage. While driving on a rutted area, pay attention to allowable semi-trailer inclination angle in the place where the fifth



wheel coupling joins with the bolt, inclination angles pursuant to DIN ISO 1726:

- 6 degrees in the front;
- 7 degrees at the back;
- 3 degrees at the side;
keeping semi-trailer torsion angle against the tractor under 25 degrees.

ATTENTION!

Overlapping back of the semi-trailer is dangerous. It can cause accident and lead to body injuries or property damage. Back of the semi-trailer equipped with torsional axle overlaps to the side more than back of the semi-trailer with stationary axles.

Vehicle coupling and release.

The procedure of coupling and releasing the semi-trailer is a potentially dangerous activity and special attention must be paid while doing it. When the semitrailer is coupled or released from the tractor, there is risk of heavy injuries or fatal accidents. Never stand between the vehicle and semi-trailer. Beware that nobody stands on the work platform of the tractor.

Before coupling activate parking brake of the semi-trailer (pull out the red button on the brake panel).



Truck tractor coupling must be placed about 50mm above the semi-trailer coupling plate.

Ensure that closing point of tractor coupling is in position for coupling. If not, put it in such position (coupling operations are described in documentation of tractor producer).

Taking special care move with truck tractor under the coupling so that the hitch bolt falls into coupling holder.

After coupling check whether there is enough place between the driver's cab and semi-trailer, remove wedges from under the wheels (provided that they were used), raise and secure landing legs, connect the tractor cables to semi-trailer connectors.

Prior to releasing, slightly reverse the tractor in order to relieve the coupling mechanism. Put on the parking brake in the tractor and semi-trailer. Pull out the landing legs in order to support the semi-trailer. Disconnect and secure the cables joining the vehicles. Open the coupling lock and carefully move the tractor back from the semitrailer. It is forbidden to release the tanker with load or with only one end compartment filled.

Landing legs operations

In order to lower the legs, take the crank out of the holder. Ensure that the ground in the place of lowering the landing legs is not quaggy. If it is, apply the base that prevents landing legs from subsidence. Set the crank in appropriate position and turn round to lower the legs until they stand firmly on the ground. Secure the crank.

Before moving off make sure that the tractor is correctly coupled with semi-trailer, raise the landing legs to maximum level and secure the crank in the holder.



Panel of brakes and diagnostic connections



Red button is for parking brake. In order to brake, pull the button out and push it in order to release.

Venting of the emergency brake system while disconnecting the installation causes automatic blocking of semitrailer brakes.

For manoeuvre purposes, the brakes must be released through pushing the black button of release valve. Pneumatic robo cylinders of the brakes are fully vented, which makes the braking mechanisms of the wheels release. Pulling out the button of release valve causes new aeration of pneumatic robo cylinders of the brakes and blocking the wheels by blocking mechanisms. Launching the release valve several times reduces pressure in air containers and decreases braking force. Upon following connection of braking system emergency cable, the release valve is automatically set in working position.



Diagnostic connections



Diagnostic connections are situated on parking brake panel or very close to it.

From the right:

- Control connection of compressed air in containers;
- Control connection for braking cylinders;
- Control connection for air shock absorbers (suspension bellows);
- Diagnostic connection EBS (blue) – if it is fitted.

Raising and lowering the chassis.



ATTENTION! It is forbidden to exceed driving height, it may cause damage to the vehicle, tyres, negatively influence braking power. You should drive with the lever in middle position (drive).

Lever in “drive” position must be in the middle and pulled out.

In order to move the lever to „raise” position, push it and turn it anticlockwise. When you achieve the needed height, put the lever into starting position.

In order to move the lever to „lower” position, push it and turn it clockwise. When you achieve the needed height, put the lever into starting position.

Wheels and tyres

Pressure in tyres.

Required tyre pressure values are described in manuals attached by tyre producer.

Pressure must be checked at least every two weeks and adjusted if necessary.

Control of pressure level in tyres should be performed before their warming up (before drive or after long break).

Too high or too low pressure in tyres causes shortening of their service life and worsens driving qualities.

Semi-trailer can be (depending on construction and equipment) provided with spare wheel mounted at the back under the tread plate or on the bracket suspended at one side of the vehicle.

Follow traffic regulations while taking out or putting in the spare wheels as well as during maintenance and checking technical condition of



wheel holders. Spare wheel should be secured with two mechanisms that are efficient and function notwithstanding from each other. It is recommended to wear a warning vest during work.

Raising the vehicle in order to change the wheel.

Special attention must be paid while changing the wheel:

- Use rims and tyres of regulatory dimensions;
- Choose the right load and speed capacity indicator.
- Follow direction of wheel rotation;
- Secure the vehicle against rolling down by means of wedges situated at both sides of a wheel (at vehicle side opposite the replaced wheel);
- Properly and safely mount the jack – put it on a hard, non-quaggy surface under the axle pipe, as far as possible from the vehicle axle;
- Carefully take out the wheel well from fixing screws;
- Oil threads slightly before the next screwing the wheel. Do not use grease with addition of disulphide molybdenum (MoS₂);

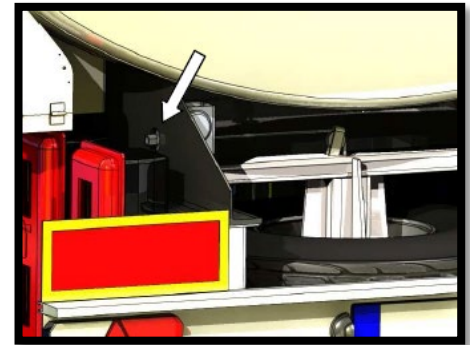
- Wheel nuts should always be screwed down in criss-cross pattern, follow the recommended tightening torques;
- Screw down the wheel nuts after about 1 hour of operating, and then every 100-200 manhours.

ATTENTION!
Spare wheel is heavy. While replacing the spare wheel there is risk of squashing fingers, hands and feet. It is recommended to ask somebody for help.

Wheel mounted at the back.

In that case the wheel is mounted at the back, under the tank. It is protected with tread plate. In order to replace the wheel, screw out the wing screws fastening the plate and then take it off. Screw out with a wrench two screws fastening the wheel. Put the crank wrench into the lift seat and lower to the ground by rotating it. Take out the wheel from under the vehicle. Screw out and take off the wheel to be replaced. Ensure that the spare wheel has appropriate pressure, mount it with nuts on the wheel hub, screwing them with appropriate tightening torque. Put

damaged wheel under the vehicle, raise with the lift to the spare wheel support and screw down to it with screws. Put and screw down the covering plate of the rear overhang.



Wheel mounted at the side.

In this case the wheel is mounted under the chassis frame at one of the vehicle sides. In order to replace the wheel, screw out with a wrench two screws fastening the wheel. Put the crank wrench into the lift seat and lower to the ground by rotating it.

Screw out and take off the wheel to be replaced. Ensure that the spare wheel has appropriate pressure, mount it with nuts on the wheel hub, screwing them with tightening torque of 570-630 Nm. Put damaged wheel under the vehicle, raise with the lift to the spare wheel support and screw down to it with screws.



Driving with empty or partially loaded compartments

Transport of products in the tanker with some empty compartments is possible, however in such case there is different

distribution of pressure on the trailer and axles, and the tanker traction properties deteriorate.

Driving with partially loaded chambers (i.e. loaded to the quantity that is smaller than the permissible load) is possible without limits.

The driver is only required to be more careful while driving because the liquid movements in the compartments may cause deterioration of traction properties.

Driving without the load

A discharged tanker can only be driven when it is sealed the same way as the loaded tanker.

A tanker after discharging poses the same threat as the filled one, because in the compartments there is much product vapour which forms an explosive mixture with air.

Operating the lift-up and torsion axles - OPTION

Tanker without the load (or partially loaded) can move on two axles, i.e. when the first axle is lifted. It doesn't cause significant changes of tanker traction properties, but reduces turning resistance and tyre wear.

Pneumatic controller of first axle lifting is situated next to the vapours return connection. If the tanker is empty or partially loaded, the first axle can be lifted or lowered by pushing or pulling out the band of controlling unit.

While loading the tanker, due to weighting (exceeding the set value of air pressure in the cushions) the axle is automatically lowered. It can be lifted again only after the tanker is drained.

Torsion axle acts automatically, it sets maximum at the angle of 12°, causing significant reduction of tyre wear and reduction of axle torsion stress, particularly during manoeuvres with loaded tanker.

Torsion axle is automatically blocked in the position "straight" when the reverse



gear in driver's cab is on. If the truck is not equipped with additional electric circuit of third axle blocking in position "straight" during reverse drive, the axle must be blocked, i.e. the electro-pneumatic valve must be closed manually.

Lever of torsion axle hand blocking is situated at the back part of the tanker.

Loading and unloading



Due to big number of possible configurations of loading and unloading, only basic information is included in this manual. Details concerning loading and unloading procedures are included in the appendix attached to the manual.

Unloading and loading the semitrailer are simple activities, however they need attention and following safety procedures.

In case there are different kinds of fuel in particular compartments it is obligatory to pay special attention while opening the valves. Improper operations may cause mixing of different kinds of fuel.

Attention. Before loading, apply parking brake of semi-trailer.

Standard activities.

Tanker top loading

Top loading of the tanker is performed through the inlet cover. The procedure of top loading should look as follows:

- Ground the semitrailer tanker with loading station with the use of electric wires situated on the station or in the semitrailer tanker (reel). In the semitrailer the grounding should be mounted to the rods situated on a chassis frame at the back of both sides of the vehicle or to the rods situated on the frame of the supports;
- climb the ladder;

- Put the rail into on-position (if the vehicle is equipped with the rail);
- Open the inlet cover in two stages, making it possible for the pressure inside the chamber align with atmospheric pressure. Failing to perform this action may cause hitting the tanker operator with the cover;
- Put the loading pipe in the manhole;
- Perform loading according to the instructions situated on filling terminal;
- Particular chamber can be loaded maximum up to 96% of its capacity;
- After loading of particular chamber repeat the activities for the next chamber;
- After loading the semitrailer tanker perform the above activities in reverse order.

Tanker bottom loading

Bottom loading of the tanker can be performed only in a semitrailer that is destined for that and has permission to transport this kind of load and is described in a Certificate issued by Transport Technical Supervision. The process of loading is a simple activity and does not require special qualifications from the operating staff.

Bottom loading should be performed in a following way:

- Ground the semitrailer tanker using appropriate connections of loading station and semitrailer tanker;

- Open the cover of bottom loading box (the power supply of installation controlling bottom valves and gas pendulum valves turns off automatically);
- Connect necessary hoses and load the tanker according to guidelines included in appendix attached to the vehicle;
- After loading perform the above activities in reverse order.

Each compartment can be filled maximum to the capacity described on plates fitted to manhole cover and above the API's. During drive vapor hose must be disconnected from coupling. If not – breathe valve is closed, it can damage the tank.

Unloading.

Attention. Before unloading, apply parking brake of semi-trailer.

Draining the tanker must start from the chamber that is farther from the cab.

Unloading through API connections or measurement system (option).

The procedure of unloading should look as follows:

- the tanker semitrailer should be earthed with the use of appropriate connection units both on the part of tanker semitrailer and the station where the tanker unloading is performed;
- Open the cover of bottom loading box (the power supply of installation controlling bottom valves and gas pendulum valves turns off automatically);
- Connect necessary hoses and unload the tanker according to guidelines included in appendix attached to the vehicle;
- During draining the operator cannot leave the draining area, until all discharging activities are completed;
- After unloading perform the above activities in reverse order.

In case of draining through collector at the same time it is possible to discharge only one type of medium. Failing to comply with this principle makes them mix in the collector at simultaneous discharge of different products.

Electrical system



All tankers are fitted with insulated return wiring – chassis return is not used.

NEVER EARTH TO CHASSIS.

Electrical installation of the tanker is a direct current installation with the voltage of 24 V. The lighting of the tanker, ABS system and electronic counter are supplied with this voltage. The installation is led in aluminum and plastic pipes and is joined with truck installation through joining sockets situated on a plate at the front end cap of the container.

Antielectrostatic installation consists of a system of electrical cables joining the main subunits of the tanker, providing the flow of static charges into the ground through:

- antielectrostatic strip (for disposal of charges during driving)
- reeled grounding cable with pliers and 4 permanent grounding pins (for disposal of charges during loading and unloading the tanker)

The standard system incorporates 15 pin socket mounted at the front of the tanker.

The wiring up of the sockets depends on customer's requirements and is largely governed by the way the tractor units are wired. Below there is a standard wiring diagram used for vehicles without special requirements.

Very little maintenance is required other than ensuring cleanliness of all contacts and checking that the wiring and cables are not chafed or frayed. Check that the cover is always properly fitted into its housing, to ensure a waterproof seal.



Connection sockets on the front plate - 15-pin socket ISO 12098.

PIN No.:	Colour :	Function:
1	Yellow	left indicator
2	Green	right indicator
3	Blue	rear fog light
4	White 2,5	common return
5	Black	left rear position light
6	Brown	right rear position light
7	Red 2,5	stop light
8	Grey	reversing light
9	Brown-blue 2,5	Special function
10	Brown-red	Special function
11	Yellow-black	Special function
12	Pink	Special function
13	White-black	common return
14	Violet	Special function
15	Orange	Special function



15-pin socket ISO 12098



Inspection, service and maintenance



At least once a year an expert must perform technical inspection of the vehicle.

During maintenance operations it is obligatory to obey health and safety regulations as well as environment protection regulations.

Before commencing any maintenance work it is obligatory to turn off the engine and lock the vehicle.

Damaged fifth wheel coupling or coupling bolt should be replaced, not repaired.

Vehicle components that are damaged or out of order should be replaced with original spare parts.

Within warranty period it is forbidden to repair or replace the vehicle components by one's own.

Special attention must be paid to the period of low temperatures, when water cannot accumulate in tanker components, e.g. in drainage pipes. Freezing water may damage them.

Lubrication:

Fifth wheel coupling, coupling plate, bolt. Lubricate the coupling plate and coupling bolt, as well as top part of

fifth wheel coupling plate, real wear parts and abrasive ring with permanent plastic lubricant with addition of molybdenum or graphite. Carefully grease the lubricating slots of coupling plate. Especially before the first coupling of the semitrailer or directly after lubrication, the closing mechanism of fifth wheel coupling must stand in drive position.

Bearings of forwarding pumps must be lubricated every 100 manhours or every 3 months.

Axles, landing legs:

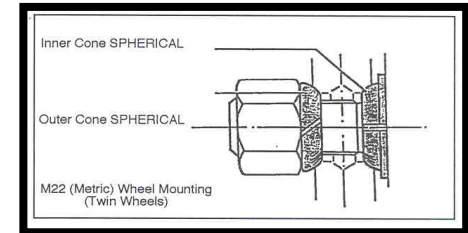
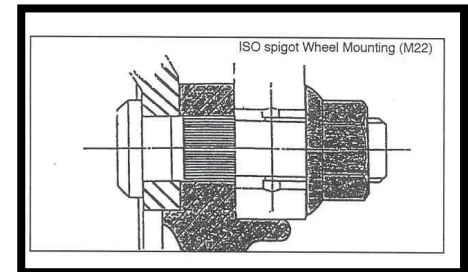
According to producer's documentation.

Wheels and tyres:

The standard wheel fixing currently used is the ISO spigot type, though tankers may be supplied with DIN type fixing if requested. In both instances, the screws are right hand treaded on both sides of the axle, and both types use the same spanner (to suit M22 nut). For easy identification, the spigot fixing uses a nut with a large

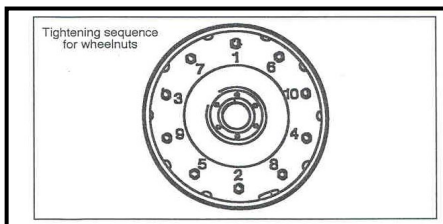
captive washer: the stud holes in the wheel are plain with no chamfers.

The DIN fixing uses a nut with a loose split collar; the stud holes in the wheel have deep rays to suit the washer.



Never fit a DIN wheel to an ISO spigot hub or reversely. Periodically check the stud holes in wheels for ovality or cracking.

Wheel nuts must be tightened to the correct torque, which varies between axle manufacturers, and should be tightened in appropriate sequence – see below.



Standard wheels are factory-painted silver. We do not recommend painting over this finish. No further paint should be applied to either mating surfaces on twin wheels, or on the seating under wheel nuts, since such paint will not adjust to the factory finish and may wear leaving clearances

between surfaces, leading ultimately to loose wheel nuts.

Check and maintain correct tyre pressures.

Avoid spilling diesel fuel, oil or paint on the tyres. Any such contamination should be removed as soon as possible using water and detergent.

Check tyre wear regularly. Uneven wear may indicate incorrect pressures or a defect in the brake or suspension systems.

Any deep cuts or blisters may cause damage to the rubber. The tyre should be removed and examined by a specialist, and then repaired.

Tyres should never be used in an illegal way.

The service life of the tyre is reduced by continuous high speed, harsh cornering, braking, unnecessarily tight turns and also by incorrect tyre pressure and poor road surfaces.

With twin tyres, take care that both tyres are matched for size. Do not mount a new tyre with a worn or re-cut tyre. The diameter of both tyres should be within 6mm. A difference greater than this can result in the larger tyre being overloaded and will cause rapid tyre wear.

Care about rims.

Wash regularly, especially in winter. Do not use brazen valves in case of aluminum rims, owing to corrosion risk. Surfaces of hubs and rims should be clean and plain.

Brake system.

Tankers are fitted as standard with an air operated braking system.

Before moving off, the driver should check the system connections and replace damaged connections and elements. In case of installation with manual draining valve, remove remaining water. Manual procedure is not required in assemblies with automatic drainage.

Air suspension

Summary

An air suspension system comprises two major components; the suspension itself i.e. axle, trailing arm, air bag, mounting bracketry, and the associated air control system-reservoir, piping and control valves.

The benefits air suspension gives, are: an effectively constant drive height, greatly improved stability on

cornering and load equalisation between axles which in turn gives improved braking.

The air control system in its simplest form requires an air supply with sufficient pressure to inflate the air bags with the fully laden tanker (typically 4.5 to 5.0 bar). Air is passed from the supply through a levelling valve, and then into the air bags. With tandem or tri-axle suspensions, all air bags on one side are interconnected; there is no interconnection across the tanker. The air supply is taken from the brake reservoir into a separate suspension reservoir, via a pressure protection valve set at 6 bar. This ensures that the brake system cannot be depleted by the suspension. The function of the levelling valve is to set and maintain the drive height, which is sensed mechanically from the axle beam. Further refinements to the system can include valves that allow the suspension height to be raised or

lowered or fully lowered only (automatic valves).

SUSPENSION MAINTENANCE SCHEDULE

In addition to the normal schedule, the following items specific to air suspension require regular checking.

Every month (6,500 km)

Check and re-torque if necessary all suspension screws.

Every three months (20,000 km)

Check and re-torque if necessary all suspension bolts.

Inspect shock absorbers for oil leakage; replace if necessary, inspect shock absorber bushes; replace if necessary.

Drain air tanks, jack up trailer to allow air bags to stretch full length.

Inspect rubber for cracks or perishing. Clean surface of any dirt or debris which could scratch air bag.

Test all piping joints and air bag connections for leaks using soap solution.

Every year (80,000 km)

Take off trailing arm pivot and inspect bushes and wear pads.

SUSPENSION OPERATIONS

Removal of air bag

Jack up the trailer and ensure it is properly supported on trestles. If the suspension is fitted with a raise/lower valve, this should be used to raise the trailer.

Drain the air tanks to exhaust the air system. This will allow the air bag to stretch.

Disconnect the air supply pipe to the air bag top plate.

With all nuts removed, lift the air bag off the trailing arm and remove it from the stool.

Removal of Shock Absorber

Removal of the shock absorber will normally only be required for renewal, generally caused by worn bushes or leaking oil seals.

Undo and remove upper pilot bolt nut.

Knock out pivot bolt, using hammer and drift.

Undo and remove the two socket head screws holding the lower pivot.

Manoeuvre the shock absorber slightly upwards to allow the lower pivot to clear the spring seat, then radially to allow the upper end of the shock absorber to be withdrawn from the front pedestal.

Removal of trailing arm

The trailing arm will require complete removal only in the unlikely event of a spring breakage.

It should be dropped from the front pedestal during annual inspection in order to allow inspection of the pivot bolt nut.

Push out the pivot bolt.

Undo the four 'U' bolt nuts and knock out the 'U' bolts, and remove the clamp plate and lower shim.

Undo and remove the two bolts securing the lower end of the air bag.

Knock the trailing arm out of the axle seats and from the front pedestal.

Before re-assembling components they should be examined thoroughly for wear and damage.

Air Bag

The bag is constructed of a reinforced woven polyester fabric with a rubber coating.

Surface cracking through constant flexing at its lower end, where it rolls on the piston is perfectly normal. Slight abrasions are also quite acceptable.

Only if the polyester cords are cut or damaged, should the air bag be changed. Inside the top of the air bag is a hard rubber bump stop. Should this become broken (due to running the trailer with the suspension deflated), internal damage to the air bag can be caused by loose fragments lodging in the bottom of the air bag, chafing the bag as it rolls on the piston. Presence of these loose fragments may usually be felt through the walls of the uninflated bag. Should these fragments be felt then the bag should be renewed.

When obtaining replacements ensure the correct bag height is obtained.

Replacement units comprise a complete unit of bag, piston and top plate.

Apart from accident damage or misuse, the service life of a properly maintained air bag can be expected to be five to seven years. Failure is likely

to be caused by debris being trapped between the bag and piston running with the suspension deflated or damage caused by an adjacent tyre burst.

In the event of complete failure of an air bag in service it is possible to drive the vehicle on its bump stops to a repair shop (as slowly as possible - 30 km/hour max).

Re-assembly of components

Refitting components is the reversal of the dismantling instructions given above. Note however, the following points:

Air Bag

When fitting air bags, care must be taken to ensure that the bag is not twisted. Particularly with new bags it may be found, that having positioned the air pipe entry to clear the cut out in the top mounting plate, the holes in the

base of the piston do not line up with those in the trailing arm. In this instance it will be necessary to slacken off the nuts that clamp the piston to the rubber bag.

On some makes of bag, there are four nuts located in the central recess in the underside of the piston; on the other makes there is just the one central nut. Slacken off these nuts, lightly tap the studs upwards to slacken off the clamping plate, rotate the piston to the required position, ensuring that the rubber bag is not twisted and re-tighten the clamp nuts. It will subsequently be necessary to test the air-tightness of this joint with soap solution.

Shock Absorber

Fit the lower pivot first, then with a jack under the axle manoeuvre the upper end of the shock absorber into the pedestal, using the jack, raise the

top eye until it lines up with the pedestal bolt hole. Coat the pivot bolt with copper-based grease before fitting.

Restraint Cables

In normal use, the shock absorbers fitted are robust enough to withstand the loads imposed by an unsupported axle. However, with certain operations where there is the probability of an axle frequently being lifted from the ground, cable restraints should be fitted to relieve the shock absorber of unnecessary strain. Typical situations requiring the use of cable restraints are on Ferry operations, demount body systems and trailers often used with dock-spotters. The restraint is a heavy duty, plastic sheathed steel cable with an eye at each end, which are fitted over a pin welded into the trailer main rail above the axle. Two restraints per axle are fitted. Cable lengths are available to suit difference

suspension ride heights. Cable length is measured from eye centre to eye centre.

If installing new cables ensure they are not twisted and sit cleanly around the axle beam without fouling air chambers or brake hoses. Ensure also that the correct length is fitted; too short a cable restricts axle movement and too long a cable can impose undue strain on both shock absorber and air bag.

AIR CONTROL SYSTEM

Apart from physical damage to components, maintenance of the system may be divided into three areas:

Air leakage of pipe fittings or connections

Checking operation of valves

Checking setting (where applicable) of valves.

Air Leaks

Checking for air leaks may be done using soap solution over pipe connections bubbles will indicate the escape of air, if an 'air leak' is clearly audible it is probably a valve exhausting normally.

Both brake and air suspension systems use polyamide tubing manufactured to DIN 73378.

Apart from piping connections, further possible sources of leakage could be faulty sealing in valve body components and the seal between the rubber air bag and its top plate or piston. Such leaks can usually be found with soap solution though with valves it may be necessary to check the sequence of operation of the suspect valve.

FUNCTION AND OPERATION OF VALVES

Pressure Protection Valve

This valve is always fitted to an air suspension system; it is fitted to the brake tank to the air pipe between the brake and suspension tanks.

Its function is to ensure that the suspension tank is not charged until the brake tank pressure has been reached. Subsequently, should for any reason the brake tank pressure fall below that of the suspension tank, air will be drawn from the suspension tank into the brake tank until pressure between the two has been equalised.

The valve must be mounted with direction of airflow (marked by an arrow on the body) from the brake tank to the suspension tank.

The valve is set at the factory; it is adjustable but in normal service, it should not need re-adjustment. Accurate adjustment in situ is difficult; any adjustment should be made on a bench with an accurate gauge.

NB – The set pressure should not be changed.

Suspension Air Tank

On most tankers the suspension air tank will be identical to the brake tank, both being of 60-litre capacity.

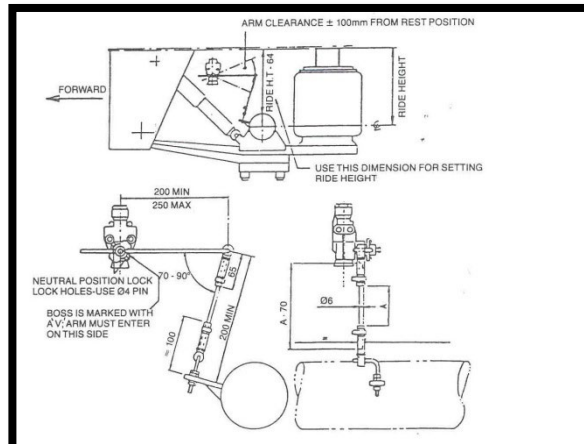
Each tank is fitted with a test connector and manual or auto drain valve. The only maintenance required is to check that all air connections mounting bolts are kept tight and that the tank is drained regularly.

LEVELLING VALVE

The levelling valve sets and maintains a constant ride height for the suspension. Ride height is measured from the axle centre to the underside of the mainrail. It does this by regulating the supply of air to the air bags. A vertical rod fitted to the axle operates the valve spool through a control arm. Note this is not a load-sensing valve though its appearance is similar.

Maintenance

Maintenance consists of checking that the mounting bolts are secure that the air connections



are tight and that the operating lever is correctly set, and securely fixed.

General information

The valve is normally fitted to the left side of rear axle. Ensure that the drop arm is allowed free movement without obstruction from brake shoes etc. For method of mounting, see diagram.

To reset the valve, the procedure is:

Stand (preferably fully laden) on even ground and with the pick up plate at its normal running height (if possible by having the tanker coupled to a tractor unit)

Ensure that both brake and suspension tanks are fully pressurised. If in doubt this can be verified by fitting an air gauge to the suspension tank test point.

Ensure the brakes are off.

Check that the operating lever is correctly fitted. The boss through which it passes is marked by a 'V' or 'dot' (depending on type). The lever must pass through the boss from that end of the hole i.e. the mark is nearest to the drop rod. The level length should be set and the clamp bolt tightened up.

With the suspension at correct ride height the lever should be in the horizontal position.

Disconnect the drop arm.

Remove the air bags by turning the lever downwards until the bags are fully deflated.

Raise the suspensions by moving the lever upwards. When the correct ride height has been obtained lock the lever temporarily in the horizontal position by inserting the 4mm diameter pins (4mm-drill shank for example) into the two holes provided in the valve body.

Connect the drop arm between the axle anchor bracket and the end of the lever. Tighten all nuts and re-check the effective length of the operating lever. Ensure that the angle between the lever and drop arm is between 70° and 90°. If this angle is greater than 90° there is a danger of the linkage reversing itself, on extremes of axle travel should this happen the suspension height will be adversely affected.

Remove the temporary 4mm diameter pins and check operation of the system. Fine adjustment of the ride height may be made using the rod adjustment nut on the lower linkage.

Maintenance

Regular maintenance consists of checking that the mounting bolts and air connections are kept tight and

ensuring the exhaust ports are kept clear of dust or debris.

DOUBLE CHECK VALVE

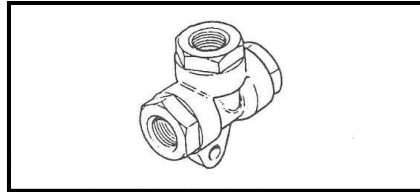
This valve is a simple shuttle valve that feeds a delivery line from one of two alternative sources.

Maintenance

Normal maintenance consists of checking the tightness of pipe connections.

General information

Valve appearance may differ very slightly from the illustration, depending on the type fitted to a particular tanker. Function and general construction however, remain unchanged. The valve should preferably be mounted with its main axis horizontal.



LIFT AXLES Summary

The benefit usually ascribed to a lift axle is a saving in tyre wear. This is more apparent than real, since tyre wear is dependent on axle load so that on an unladen tanker (when the axle is raised) tyre wear is at a minimum. In fact significant savings on tyre wear can be made by attention to tyre pressures and by avoiding excessively tight manoeuvring. The main benefit is in aiding manoeuvrability though in this context a lifting rear axle on a tri-axle tanker decreases the wheelbase by 1.30m compared to a lifting front axle. With a laden tanker, the axle should be

raised only when the vehicle is off the public highway.

Maintenance

Every month (6,500km)

Check all air connections and component mounting bolts for tightness. Check the air bellows for damage.

SERVICING

Bellows (or brake chamber on later models)

To change a bellows/brake chamber:

- Raise the axle
- Support the axle on two support stands
- air the suspension system
- Disconnect the air pipe
- Undo and remove the 4 securing nuts from the upper mounting plate, and then from the lower plate

- Compress the bellows sufficiently to withdraw the securing studs and allow the bellows to be removed
- Before fitting a replacement bellows, ensure the steel centre ring is fitted between the two halves of the bellows
- Fitting the bellows is the reverse of the above procedure
- The securing nuts should be tightened.

Maintenance Every month

Check that all connections are kept tight. Ensure the control (exhaust) port is kept clean and free from debris.

BRAKE SYSTEM

Tankers are fitted as standard with an air operated braking system that conforms to all current EU regulations.

As standard, load sensing and ABS or EBS is fitted.

The brake system comprises 3 main elements.

- Foundation Brake
- Air operating system
- Parking brake

The foundation brake describes the mechanical system fitted at each end of the axle.

This comprises a brake drum or disc brake.

The operating system consists of couplings at the front of the tanker to accept the susies fitted to the tractor unit, a brake tank to store compressed air, a relay valve to direct that air to the brake chambers when required and slack adjusters fitted to the camshaft, turned by the air chamber push rod. To comply with EU regulations the system will also include a load sensing valve to provide braking proportional to the load carried by the tanker.

The parking brake provides a means of preventing the wheels turning when the trailer is stationary and with the tractor unit detached. If the trailer has mechanical suspension the handbrake will normally be of the multi-pull mechanical type is air suspension is fitted, it will use air operated spring brakes.

DESCRIPTION OF OPERATION

Connection of the tractor susies to the tanker provides a source of compressed air to operate the tanker brake system.

With a two-line system, the emergency line (red line) is used to charge the air tank with sufficient compressed air to allow for a number of brake applications without unacceptable loss of pressure. The service line (yellow line) feeds directly into the replay emergency valve (RE

valve), its function is simply to provide a signal to this valve when braking is required

The emergency line is constantly under full air pressure received from the tractor units compressor; as brake applications deplete the amount of air in the tank, so it is replaced through the emergency line. When the emergency line is disconnected the RE valve will apply the brakes, which provides vehicle security when the trailer is parked and the tractor uncoupled and also in the unlikely event of the trailer becoming detached when on the road. A further feature of the RE valve applies the trailer brakes should the pressure in the emergency line fall below that in the air tank (i.e. in the event of a fault developing in the tractor supply).

CAUTION: Any alteration to the braking system may affect its compatibility with the EU requirements,

and its legality and invalidate the trailer warranty. In particular on no account should any of the following be changed:

- Air chamber size
- Slack adjuster length
- Type of brake lining
- Valve with loading sensor

Advice on any problem is always available from the Technical or Service Department at STOKOTA.

SERVICING

Brake Coupling

The couplings are rigidly mounted to the front cross member or bulkhead of the tanker.

Maintenance

See that all couplings are kept clean

Check that connections to the tanker bodywork are kept tight. On

palm couplings inspect the rubber seals and replace if damaged.

RELAY EMERGENCY VALVE (if fitted)

The RE valve performs the following functions:

Provides a check valve in the emergency line charging the air tank

Provides automatic application of the trailer brakes in the event of a rupture in the emergency line, or disconnection of that line

Controls release of air from the air tank to the brake chambers on receipt of a signal in the service line.

Provides an exhaust vent for the air chambers on release of the brakes.

Maintenance

Check that all connections are kept tight

Check that the exhaust port is kept free from dirt.

General information

In order to keep brake response time to a minimum, the RE valve should be fitted as close to the air tank as possible.

Because of the requirement for load sensed braking, it is more convenient to fit a combined RE/load sensing valve as a single unit. Separate RE and LSV's are more commonly fitted where lack of space precludes fitting the larger combination valve, e.g. on trailers fitted with a coil well or on drop deck vans with low ground clearance.

LOAD SENSING VALVE

The function of this valve is to regulate the braking effort in proportion to the load on the trailer or more specifically the load on the axles.

LOAD SENSING VALVE FOR AIR SUSPENSION (if fitted)

This valve senses that axle load from the pressure in the suspension air bag. The valve is piped into the service line between the tanker coupling and the RE valve. A third port is connected to the suspension air bags.

Maintenance

No specific maintenance is required for this valve, other than ensuring all connections are kept tight. Check that the two mounting bolts are secure and that the exhaust port is kept free of dirt and debris.

General information

The valve is normally mounted in the horizontal position

Port 1 is connected to the service line from the trailer coupling and is fitted with a test point.

Port 2 is connected to port 4 of the RE valve. Because the two ports are close there is insufficient room to fit test points to each, accordingly it is normal to fit a test point into port 4 of the RE valve to check the outlet pressure of the load sensing valve.

Port 3 is connected to the suspension air bags. This connection is made through a double check valve fitted between the air bags on each side of the trailer.

Caution: The valve is pre-set at the factory to give the correct load sensing ratio for the trailer. It is not possible to adjust this setting in service. Replacement valves are available but full details of the reference numbers on the maker's plate will be required for identification. To verify correct functioning of the valve, air gauges

fitted to the air bag, valve and RE valve will show conformity with the values stamped upon the data plate fitted to the trailer chassis.

The valve is so designed that even in the event of complete failure of the air suspension system, braking is maintained in the unladen ratio.

ANTI-SKID BRAKE SYSTEMS

All tankers are fitted with a proprietary anti-skid system incorporated into the brakes. Such tankers are instantly recognisable by the small green warning light fitted to the front of the tanker in a position visible from the drivers mirror (ABS system only – with EBS the warning lamp is in the tractor cab).

Principle of Operation

The underlying principle of operation simulates cadence braking by electronic control of the air brake

system. This is done by sensing of the rotational deceleration rate of the road wheel, and detecting the point at which wheel lock-up is imminent. In this state there will be a sudden excessive deceleration rate (followed, should the wheel actually lock up by a zero value). At the point of this deceleration, the air pressure to the brake chambers is reduced and when the rotational deceleration indicates that possibility of lock up has disappeared pressure is re-applied. This sequence of brake modulation continues until the vehicle is stationary.

The system comprises the following main components:

- E.C.U. (Electronic Control Unit)
- Exciter ring and sensor
- Warning lamp

SENSORS AND EXCITER RINGS E.C.U.

This consists of two main items, which individually control the electrical function and the pneumatic function of the system and essentially comprise a microprocessor with its ancillary circuits, together with a relay valve fitted with a memory control unit. The electrical unit and relay valve unit may be mounted separately but for convenience are normally mounted together on a common bracket.

Warning Lamp

Mounted either on the front of the trailer (ABS system) or in the cab (EBS). When mounted on the trailer and also powered through the brake lights, the lens is coloured green. The cab mounted warning lamp is either orange or red.

Power Source

The system requires a separate electrical power source for its operation

System will only operate through the dedicated power cable to ISO 7638. EBS systems cannot be powered from the brake lights.

MAINTENANCE

In the event of a fault occurring in the ECU, it is not repairable and must be changed. The RE valve does not need to be changed.

Every three months

Check system on suitable test set.

Every year

Check system on suitable test set.

Strip and overhaul RE valve

Check electrical connections

Note: Whenever the hub is removed, examine the exciter ring. If it is dented or distorted it should be replaced. Check the sensor for wear and re-adjust.

General information

Anti skid systems by three makers may be encountered on STOKOTA Tankers; WABCO & Haldex. The operations principle is the same with all makes. The system uses two different ECU's depending whether the trailer has mechanical or air suspension. This is not the case with the Haldex System. In order to obtain replacement components it will be necessary to know which make is fitted. The only interchangeable components between the two makes are the exciter rings and the warning lamp.

Electrical Wiring

Anti skid systems are only available on trailers wired for 24 volts.

The wheel sensors send very low voltage signals to the E.C.U. it is therefore necessary that all electrical connections offer minimal resistance. All connections must be kept absolutely clean and tight. Particular attention should also be paid to the seven pin sockets, where a poor connection could generate a resistance high enough to damage a component in the E.C.U.

Any repairs to the two core cable connecting the sensor to the E.C.U. must only be made using correct cables and connectors. Do not do any welding on tanker unless it is uncoupled from the tractor.

Exciter and Sensor

The exciter ring must run true to the sensor; care must be taken not to

dent or distort it during brake or bearing servicing. A damaged exciter must be changed. When servicing clean out the slots in the ring to ensure they are not blocked.

The gap between the exciter and the sensor face is very critical. Should the gap be too great, the anti-skid system will not function (the warning light will stay on).

When hubs or drums/discs have been removed it will be necessary to reset the sensor as follows;

Wipe sensor clean with a dry cloth.

Pull the sensor carefully from its housing, ensuring the cable does not foul brakes, and is not under tension.

On replacing the drum/disc, the exciter ring will push the sensor back in its housing.

E.C.U. and Relay Valve

Two makes of anti-skid may be found on STOKOTA – Wabco, and Haldex.

When replacing an E.C.U. it is necessary to specify which type is required.

Particular attention must be paid to connection of hoses into the correct ports of the RE valve.

FLOW RESTRICTOR

Haldex recommend that annually or at least 160,000km whichever occurs first the valve should be stripped and overhauled, for which a servicing kit is available.

Normal routine maintenance on E.C.U.'s and RE valves consists of ensuring that all electrical and air connections are kept tight and clean and ensuring that the exhaust port in

the bottom of the RE valve is kept clear and free from debris.

Warning Lamp

Maintenance consists of ensuring that all electrical connections are kept clean and tight, and that the electrical cable is kept free from damage and potential 'shorts'.

Should the lamp fail to come on when the ignition is witched on, first check that the bulb has not 'blown' before assuming the anti-skid system has developed a fault.

Test Equipment

Wabco, Haldex and offer a Test Set specifically designed to check their anti-skid systems.

QUICK RELEASE VALVE

This valve accelerates the exhausting of a pair of brake chambers.

Maintenance

Periodically check that the mounting bolts are secure and that the air connections are kept tight.

Ensure the exhaust port (which should be positioned, pointing downwards) is kept free of dirt or debris, which could prevent the diaphragm from seating properly.

General information

Valve appearance may differ slightly depending on the type fitted to a particular tanker. Function and general construction however remain unchanged.

SLACK ADJUSTER

This acts as the operating lever for the air chamber. Two types are commonly fitted – automatic or manual both being adjusted to maintain the correct gap between the brake lining and the drum, despite lining wear; the latter type making this adjustment automatically.

Maintenance

The slack adjusters fitted to STOKOTA tankers are pre-greased for life, and do not require periodical lubrication. Every six months or 40,000 km the push rod stroke should be checked to see that it has not changed appreciably.

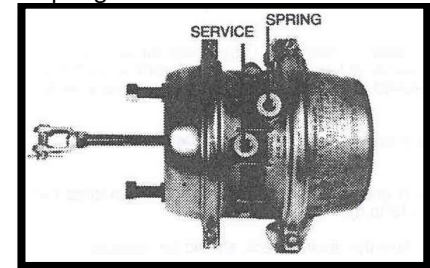
SPRING BRAKES

Spring brakes may be fitted to any tanker; they are almost universally fitted to tankers with air suspension.

Spring brakes comprise two main components

The spring brake chambers, fitted to the axle

The air control circuit to operate the spring brakes.



TYPICAL SPRING BRAKE CHAMBER

PRINCIPLE OF OPERATION

Normal brake chambers are held in the 'off' position by a spring. When

the tanker is parked and the emergency line is disconnected, the relay valve admits air pressure from the brake tank into the chamber behind the diaphragm and applies the brakes. If for any reason the air pressure is drastically reduced (the air tank is drained for example) the return spring will return the diaphragm. If the handbrake has not been applied thus preventing movement of the pushrod the trailer brakes will be released.

A spring brake chamber consists essentially of the standard brake chamber with a second one mounted behind except the second one has a high compression spring behind its diaphragm to hold it 'on'. This chamber requires constant air pressure in front of the diaphragm to hold the brakes 'off' in normal operation.

With normal running a constant air supply is fed down the emergency line through the 'shunt' valve and the

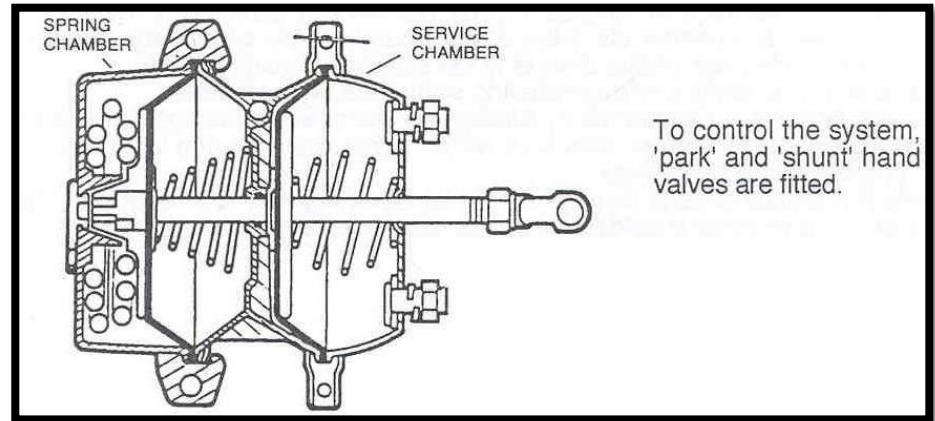
RE valve to feed the brake tank. From the brake tank air is then fed through the 'park' valve into the rear part of the spring brake chamber to compress the spring and hold the brakes off.

When the driver brakes, signal air down the service line triggers the RE

BRAKE MAINTENANCE

Always carry out a functional check of brakes before commencing any journey.

Always maintain at least one



valve to feed air from the brake tank to the service brake chamber to apply the brakes. The spring chamber remains 'off'.

vehicle length behind the vehicle in front.

Always apply brakes early enough to permit gradual smooth deceleration

Always try to avoid emergency stops by anticipating road conditions well in advance

Always take advantage of engine compression by changing down when approaching a down gradient.

Always maintain a safe road speed regardless of terrain.

DRIVERS ROUTINE CHECKS

Check condition of tyres, air bags etc. Wheel nuts, axle and suspension nuts must be re-torqued as per the following chart:

OPERATION	AFTER FIRST 80KM	DAILY FOR THE FIRST WEEK	WEEKLY FOR THE FIRST 4 WEEKS
TORQUE LOAD WHEEL NUTS	✓	✓	✓
ALL AXLE AND SUSPENSION NUTS			✓

MAINTENANCE CHECKS FOR TANKER

Introduction

The importance of regular inspection and preventive maintenance cannot be over emphasised. Making necessary adjustments, tightening nuts and bolts, and checking airlines and wiring connections as needed, will go far toward avoiding delays on the road. Preventing a service failure, safety related incident. It is the operators' exclusive responsibility for preventative maintenance and is responsible for reporting the need for adjustment or repair, and for performing this as required. A scheduled programme for regular maintenance is suggested as well as a daily vehicle safety check prior to operation.

Pre service Inspection

All units are thoroughly tested and inspected at the factory prior to shipping. As an added precaution, the pre-service inspection items should be double-checked upon tanker entering service.



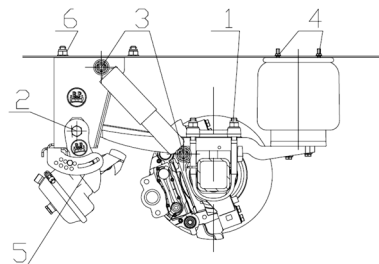
<p>The following listings are for guidance purposes only. For specific maintenance details please refer to the manufacturer's maintenance manual.</p>		Pre-service inspection	Daily	Weekly	Monthly	5000 kilometres	10 k – 25 km	Annually 50,000 km	Refer to manual
<p>It is not the policy of STOKOTA to publish lists of approved lubricants or to guarantee lubricant performance. The responsibility for the quality of any lubricant rests solely with the manufacturer of the lubricant.</p>									
Air system oil reservoir	Check & refill as necessary								
All bolts	Visually check for loose or damaged bolts, check tightness								
Axles	1. Ensure proper alignment with king pin, lubricate camshaft. 2. Check tracking. 3. Check for wear or damage								
Axle U-bolts	Ensure correct torque								
Brakes	1. Ensure proper operation & adjustment. 2. Check & adjust as required, grease camshaft bearing & slack adjusters. 3. Inspect the brake linings, slack adjusters, & air brake chambers. Free up brake shoes & anchor pins. 4. Lubricate, check camshafts & grease fittings on the axle, 5. Check thoroughly, including air chambers, travel, relay and LS (load sensing) valves								
Brake drums/ discs	Remove drums/discs, inspect & clean out dirt. Reline is necessary								
Decals	Check applied correctly								
Fire extinguisher/ spill kit / vehicle tool kit	Check for presence								
Foot valves /API's	1. Check operation. 2. Check bolt torque								
Flanged joints	Ensure correct torque's								
Guard bar / cabinet / interlock	Check operation								
Kingpin	Check bolt torque								
Ladder	Check the bolts are tight, check in safe condition								
Landing legs & bolts	1. Check for tightness. 2. Grease landing legs (if not maintenance free)								
Lights	Ensure proper operation.								
Manlids & vents	Ensure proper operation								
Manhole	1.Check for leaks. 2. Clean & lubricate its locking mechanism								

that several different semi-trailers may be used with the same prime mover in the course of the working day, all of which require checking.

Drivers routine checks and preventative maintenance schedules overlap on weekly tasks, with daily tasks listed under the former, although, it is recognised that the policy of individual operators may differ over responsibility for certain areas.

Both charts are intended purely as guides and may be amended to cover operators' individual requirements, or to comply with laid down procedures.

TABLE OF SCREW TIGHTENING TORQUES



BPW AIRLIGHT II axles			
	Half spring yoke nuts	M22 M24	550 Nm 650 Nm
	Half spring bolt nuts	M24	650 Nm
	Shock absorber fixing nuts	M24 Alu bracket	420 Nm 320 Nm
	Bellows fixing nuts and screws	M12 M16	66 Nm 230-300 Nm
	Axle lifting actuator nuts	M16	180-210 Nm
	Axle lifting lever nuts	M16	230 Nm
	Screws fixing brackets to main members	M16	260 Nm
	Wheel nuts	M22	630 Nm



ROR axles			
	Half spring yoke nuts	M24	800 Nm
	Half spring bolt nuts	M30	1100 Nm
	Shock absorber fixing nuts	M24	500 Nm
	Bellows fixing nuts and screws	M12 top	41 Nm
		M22	60 Nm
		M12 bottom	70 Nm
	Axle lifting actuator nuts	M10	36 Nm
	Axle lifting lever nuts	M16	260 Nm
	Wheel nuts		680/750 Nm

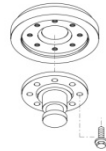
GIGANT axles			
	Half spring yoke nuts	M22	650-700 Nm
	Half spring bolt nuts *	M30	400 Nm + 600-90°
	Shock absorber fixing nuts	M22	Max 350 Nm
	Bellows fixing nuts and screws	M12	75-80 Nm
		M16	170-190 Nm
		M22	Max 350 Nm
	Axle lifting actuator nuts	M16	70-85 Nm
	Axle lifting lever nuts	M22	570-630 Nm
* Checkpoint 1200 Nm			

SAF axles			
	Half spring yoke nuts	M22	650 Nm
	Half spring bolt nuts	M30	400 Nm + 120°
	Shock absorber fixing nuts	M20	600 Nm

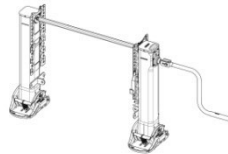


	Bellows fixing nuts and screws	M12 M16 plastic piston M16 steel piston	40 Nm 80 Nm 180 Nm
	Wheel nuts	M22	600 Nm

DAIMLER-BENZ axles			
	Half spring yoke nuts	M22	550 Nm
	Half spring bolt nuts	M22	400 Nm + 180 ^o
	Shock absorber fixing nuts	M20	450 Nm
	Bellows fixing nuts and screws	M12	60 Nm
	Wheel nuts	M22	600 Nm



Kingpin		
GEORG FISHER	KZ601 2"	180 Nm
GEORG FISHER	KZ604 2"	380 Nm
GEORG FISHER	KZ603 3,5"	530 Nm
JOST	KZ1010 2" M14	190 Nm ± 10 Nm
JOST	KZ1012 2" M14	190 Nm ± 10 Nm
JOST	KZ1516 2" M20	500 Nm ± 30 Nm
JOST	KZ1016 3,5" M20	500 Nm ± 30 Nm



Landing legs			
JOST	B 05.01.04.02.06	M16 8.8	190 Nm
ALU LEG LT	LT 650.700	M16	190 Nm



Standard screw tightening torques (for screws not mentioned before)			
Screw size	Torque [Nm]		
	Kl. 8.8	Kl. 10.9	Kl. 12.9
M4	3	4	5
M5	6	9	10
M6	10	14	17
M8	25	35	41
M10	49	69	83
M12	86	120	145
M14	135	190	230
M16	210	295	355
M18	290	405	485
M20	410	580	690
M22	550	780	930
M24	710	1000	1200
M27	1050	1500	1800
M30	1450	2000	2400
M42	2175	3000	3600

VEHICLE WASHING/CLEANING/CARE

Vehicles become dirty in service and require cleaning for a number of reasons.

Dirty vehicles suffer from a greater degree of corrosion, may become more difficult to maintain / use, and gives a poor image to customers.

The table below summarises the major causes of contamination and normal cleaning methods:

CONTAMINATION	CONSISTS OF	REMOVAL METHOD
1. General road dirt and atmospheric fallout	Grit, oil, carbon, unburned fuel, tar, brake dust, bird droppings, tree resins, acid rain, etc.	Washing with proprietary traffic film remover
2. Heavy soiling road vehicles	Mud and clay, etc.	Usually steam cleaning / pressure wash
3. Cargo spillages, unusual spillages	Oils Other substances	Steam cleaning with alkaline wash Specific agents depending on nature of contaminant

Care must be taken when steam-cleaning vehicles fitted with decals or information stickers, as excessive temperatures may result in peeling and damage.

Care should also be taken with vehicles fitted with aluminium wheels to prevent corrosion or premature failure and preserve appearance.

VEHICLE WASHING MATERIALS

The use of abrasive or corrosive materials is not recommended and may result in damage and premature failure of some components, cables, pipes, paint and decal finishes.

Always treat your vehicle with respect.

Do not spray steam water or detergents directly at pneumatic or electrical pipes, cables, valves or junction boxes, lights, grease nipples or pipe gaskets.

g.	MATERIAL	THE RIGHT WAY
	Traffic Film Remover	Detergent with additives but for synthetic paints there should be no added alkaline. Dilution > 100; 1pH 8-9
	Brushes	Soft long bristles kept clean and replaced regularly
	Sponges	Soft and clean
	Buckets	Clean and emptied regularly. Filled with fresh water and detergent for each use
	Pressure Washers	Lance held min 30 cm from paint surface. Dilution set correctly
	Water Temperature	Max 50 ^o c for wash. Ambient for rinse
	Rinses	Plenty of clean water. Do not let detergent dry on paint.

COMMON PROBLEMS CAUSED BY IMPROPER WASHING

g.	PROBLEM	POSSIBLE CAUSES
	Vehicle still dirty after washing	Excessive soiling / infrequent attention Wrong type of detergent Low Temperature Insufficient rinsing – insufficient effort or time used.
	Matt appearance on surface when dry, gloss only restored by polishing	Caustic attack on paint or decal surface. Too much caustic present should be <0.5% caustic. Severe atmospheric or operational conditions.
	Oil or tar residues not removed	Wrong type of cleaner
	Change of colour, streaky appearance	Attack on pigments by strong acids/alkalis

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