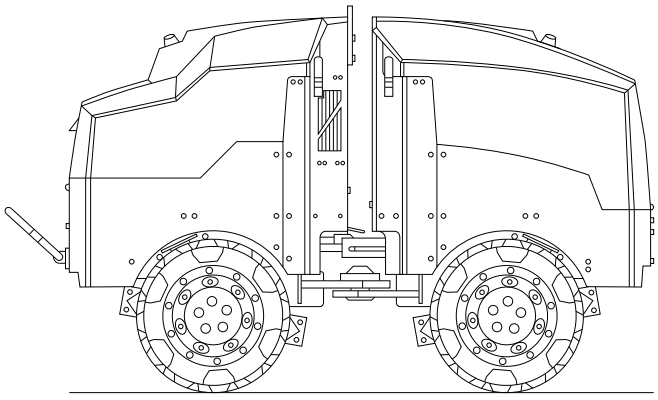
AMMANN

Operating manual

Rammax 1575

Yanmar



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Rammax 1575
Trench roller

Yanmar Tier 4f

Operating manual

Edition 05/2015 EN
From Serial No. 5570002
Translation of Original Operating Manual

Preface

Information, specifications, and recommended operation and maintenance instructions contained in this publication are basic and final information at the time of the printing of this publication. Printer's errors, technical modifications, and modifications of figures are reserved. All dimensions and weights are approximate and, therefore, not binding.

Ammann Czech Republic a.s. reserves the right to perform modifications without obligation to inform the machine user. If you identify any differences between the machine operated by you and the information contained in this publication, contact Discount-equipment.

SYMBOLS OF THE SAFETY NOTICES:

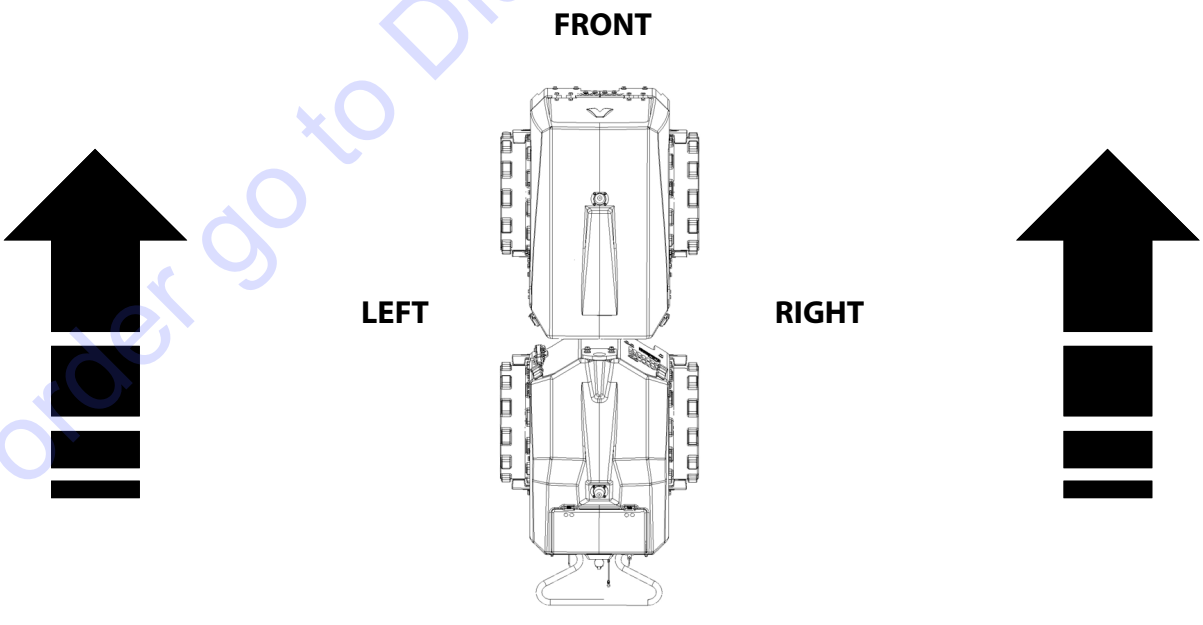
The notice warns of a serious risk of personal injury or other personal hazards.

The notice warns of possible damages to the machine or its parts.

The notice warns of the necessity of environmental protection.

! NOTICE !

As used in this operating manual, the terms „right“, „left“, „front“ and „rear“ indicate the sides of the machine moving forward.



Content

Content

1. SPECIFICATION MANUAL

Rammax 1575
(Yanmar Tier 4f)

1.1. Basic Data

Machine description

The Rammax 1575 trench roller is a roller specially designed for trench compacting. The unlimited side clearance of the roller drums allows compacting in very narrow, tight trenches right up to the trench walls.

Machine application

The wet, clayey soils found in sewer construction, pipeline construction, road foundations and construction backfilling, etc., are the areas of application for this modern trench roller. In hazardous construction site applications, it is possible for the operator to control the machine from a safe distance with no personal risk.

Only use the Rammax 1575 roller for driving on and compacting of non-cohesive (loose) materials.

The machines are intended for operation in conditions of the following types according to ČSN IEC 721-2-1 (038900): WT, WDr, MWDr (i.e. mild, warm dry, hot dry with a limited temperature range of from -15 °C (5 °F) to +45 °C (113 °F).

The machine that complies with the requirements as to health protection and safety is identified with a name plate with CE marking.

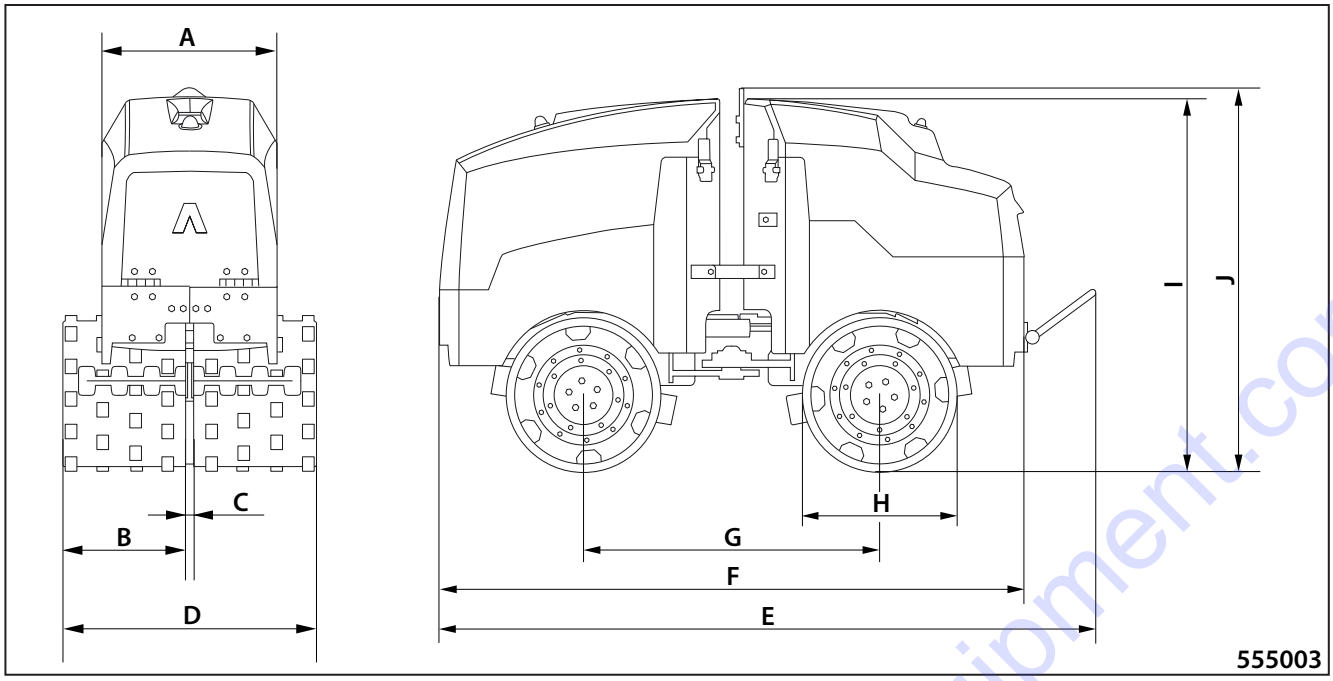
1 - Name – always mentioned only in the English version
2 - Type
3 - Serial number
4 - Operating weight
5 - Maximum weight
6 - Rated power
7 - Version
8 - Shipping weight
9 - Front axle load
10 - Rear axle load
11 - Year of manufacture

Name plate location

1 - Name plate
2 - Machine frame number

Engine name plate location

1.2. Dimension Chart



mm (in)		A	B	C	D	E	F	G	H	I	J
RAMMAX 1575 T4 final	**640**	601	302	36	640	2227	1980	1000	525	1282	1317
		(23,7)	(11,9)	(1,4)	(25,2)	(87,7)	(78,0)	(39,4)	(20,7)	(50,5)	(51,9)
	850	601	407	36	850	2227	1980	1000	525	1282	1317
		(23,7)	(16,0)	(1,4)	(33,5)	(87,7)	(78,0)	(39,4)	(20,7)	(50,5)	(51,9)

1.3. Technical Data

		Rammax 1575	
		640	850
Dimension			
Drum width	(mm)	640	850
Weight			
Operating weight of CECE	kg	1400	1450
Driving characteristics			
Outside / inside turning radius	mm	2190/1540	2290/1440
Large / small amplitude	mm	0,6/1,1	
Climbing ability with vibration	%	40	
Climbing ability	%	50	
Angle of steering	°	+-30	
Oscillation angle	°	+-7	
Vibration frequency	Hz	40	
Engine			
Power according to ISO 3046/1	kW (HP)	14,6 (20)	
Manufacturer		Yanmar	
Type		3TNV80F-SPAMM	
Working speed (RPM)	min^{-1} (RPM)	2400	
Engines complies with emission regulations		U.S. EPA Tier 4 Final	
Working speed	m/min	25	
Transport speed	m/min	45	
Fluid capacities			
Hydraulic system	l (gal US)	16 (4,23)	
Fuel	l (gal US)	28 (7,4)	
Engine oil	l	3,4	
Cooling system	l	1,2	
Noise and vibration emissions			
Declared value of sound pressure *	dB (A)	71	
Guaranteed sound power level **	dB (A)	101	
Optional equipment			
Safety bar			
Drum extension set			
Scrapers			
Service set after 500 engine hours			
Cover tarpaulin			

* measured according the EN 500-4

** measured according the DIRECTIVE 2000/14/EC

Notes

Notes

2. OPERATION MANUAL

Rammax 1575
(Yanmar Tier 4f)

2.1.1. Safety Measures during Machine Operation

Safety measures given in the individual chapters of Enginering Documentation supplied with the Machine shall be added with Safety Precautions in force within a respective country that uses the Machine at workplace with regard to work organization, work process and personnel involved.

2.1.1.1. Compaction Work Commencement

- Constructional Supplier (Machine User) is liable to issue instructions for driver and maintenance before compaction work is started, that will include requirements on work safety provision during Machine operation.

- He must verify and mark:
  - utility lines
  - underground areas (direction, depth)
  - seepage or escape of hazardous materials
  - soil bearing capacity, slope of travelling plane
  - other obstractions incl. their removal.

  He must make Machine driver, who will carry out earth work, familiar with these conditions.

- He must specify Code of Practice (C.O.P.) part of which is work procedure for a given work operation and this work procedure will specify inter alia:
  - measures when working under extraordinary conditions (work within protective zones, within extreme slopes, etc.)
  - precautions for any natural disaster hazards
  - requirements on work performance while observing job safety principles
  - technical and organizational measures to secure safety of personnel, workplace and environment.

  He must make Machine driver evidently familiar with the Code of Practice.

2.1.1.2. Work Safety Secured by User

- User shall promptly communicate any damage to the utility lines to their operator, and at same time he make measures to prevent unauthorized persons from entering endangered area.
- He must ensure an employee does not work alone at a workplace. Another worker must always be in sight and within an ear-shot, who in case of accident will provide or call for help unless another effective form of monitoring or communication exists.

2.1.1.3. Assurance of safety measures by the operator

- The operator must ensure that the machine is operated only under conditions and only for purposes it is technically capable of according to the conditions set by the manufacturer and the respective standards.
- The operator must ensure using the machine in such a way and in such worksites where there is no risk of hazardous transmitting of vibrations and damage to nearby buildings etc.
- The operator must ensure regular inspection of operation and technical conditions, regular maintenance of the machine in intervals specified in the manuals for lubrication and maintenance. If the technical condition of the machine does not meet requirements to such an extent that it poses a risk to safety of operations, persons and property, or damages and harms the environment, the machine must be put out of service until the defects are removed.
- He must specify who is allowed to carry out operation, maintenance and repairs of the machine as well as what activities can be carried out during the operation, maintenance and repair of the machine.
- Every person who drives the machine or performs maintenance and service of the machine must be familiarised with instructions stipulated in the operation manual of the machine.
- The operator must ensure that the fire extinguisher is checked on regular basis.
- The operator must ensure that the „Operation manual" is available at the designated place in the machine.
- The operator must ensure continuous supervision by an appointed person during machine operation on public roads, and he is especially liable for releasing instructions to ensure health protection and work safety.
- The operator must ensure removal of spilled hazardous materials (fuel, oil, cooling liquid, brake fluid, etc.) from the places of spillage, depending on their nature, so as to avoid their adverse impact on the environment, safety of operation and human health.

2.1.2. Requirements on qualification of operating personnel

- The machine can only be driven by a person who has been trained according to ISO 7130 and other local and national instructions and standards specified for drivers of this group of machines.

2.1.3. Driver's obligations

- Prior to start of the machine operation, the driver is obliged to study instructions stated in the documentation supplied together with the machine, especially with safety precautions. The driver is obliged to observe such instructions very strictly. The same applies to personnel appointed with maintenance, adjustment and repairs of the machine. (In case you do not understand some parts of the manuals, contact Discount-equipment.)
- The driver must only drive the machine if he is fully familiarized with all its functions, operating and control elements and if he knows exactly how to operate the machine.
- The driver is obliged to follow the safety symbols placed on the machine and keep them legible.
- Before starting the work, the driver must get familiar with the worksite environment, i.e. with obstructions, gradients, utility lines, with necessary types of workplace protections with respect to the surroundings (noise, vibrations, etc.).
- When a risk to health or life of persons or a risk to property is detected, or in the case of defect of the technical equipment or if symptoms of such risks are found during operation, the driver, unless he is able to remove such risks on his own, must stop the work and secure the machine against incidental start, report the case to the person in charge and notify all persons exposed to the detected risk.
- Prior to starting the machine operation, the driver is obliged to acquaint himself with records and operational deviations found during the previous working shift.
- Prior to starting work, the driver is obliged to inspect the machine and accessories, to check its controls, communication and safety equipment and to make sure that they are functional in accordance with the manual. When the driver detects a defect that might endanger the safety of work and that he is not able to repair, he must not put the machine into operation and must report such defect to the worker in charge.
- When the driver detects a defect during operation, he must stop the machine immediately and secure it against incidental start.
- During operation, the driver must observe the function of the machine and to record any detected defects into the log of operation.
- The driver must maintain the log of operation, which is designed for keeping records on the machine take-over and hand-over between individual drivers and on defects occurring and repairs carried out during operation as well as for recording major events occurring during a working shift.
- Prior to starting the machine operation, the driver must check the function of the brakes and the steering.
- Before the engine is started, the controls must be in their zero positions and no persons are allowed to stay within dangerous reach of the machine.
- The driver must signal every machine start with the acoustic or light signal, always before the engine is started.
- After issuing the warning alarm, the driver may only start the machine when all workers have left the endangered area. During operation of the machine it is necessary to follow safety instructions and not to carry out any activity that might jeopardise work safety. The driver must be fully engaged in driving the machine.
- The driver must comply with technological procedures of works or instructions of the worker in charge.
- When rolling the machine on the worksite, the driver must adjust the driving speed to terrain conditions, to the type of work performed and to weather conditions. The driver must always watch the passage clearance to prevent collision with any obstacle.
- In case the driver finishes or interrupts the machine operation and leaves the machine, he must take safety measures to prevent any unauthorized use of the machine and incidental start. The driver must remove the key from the ignition box, lock the cab and disconnect the wiring using the disconnector.
- When the operation is completed, park the machine at a suitable parking place (flat with sufficient bearing capacity) to ensure stability of the machine; the machine must not interfere with traffic roads, must not be exposed to falling objects (rocks), and must be protected against any natural risks of another kind (floods, landslides, etc.).
- When the machine is abandoned on traffic roads, measures must be taken according to corresponding traffic rules. The machine must be marked properly.
- After finishing the work with the machine, all defects, damage to the machine and any repairs made must be recorded in the log of operations. When drivers take turns, the driver is obliged to inform the following driver about any observed issues.
- The driver must use personal protective equipment fit for the work performed - work clothes, working shoes, helmet, gloves and safety glasses.
- The driver must keep the machine equipped with specified accessories and equipment.
- Keep the machine clean.
- Keep the machine free of oil contaminants and inflammable materials.
- If the machine comes into contact with high voltage, observe the following principles:
  - try to leave the hazardous zone with the machine
  - warn the others to keep off and not touch the machine.

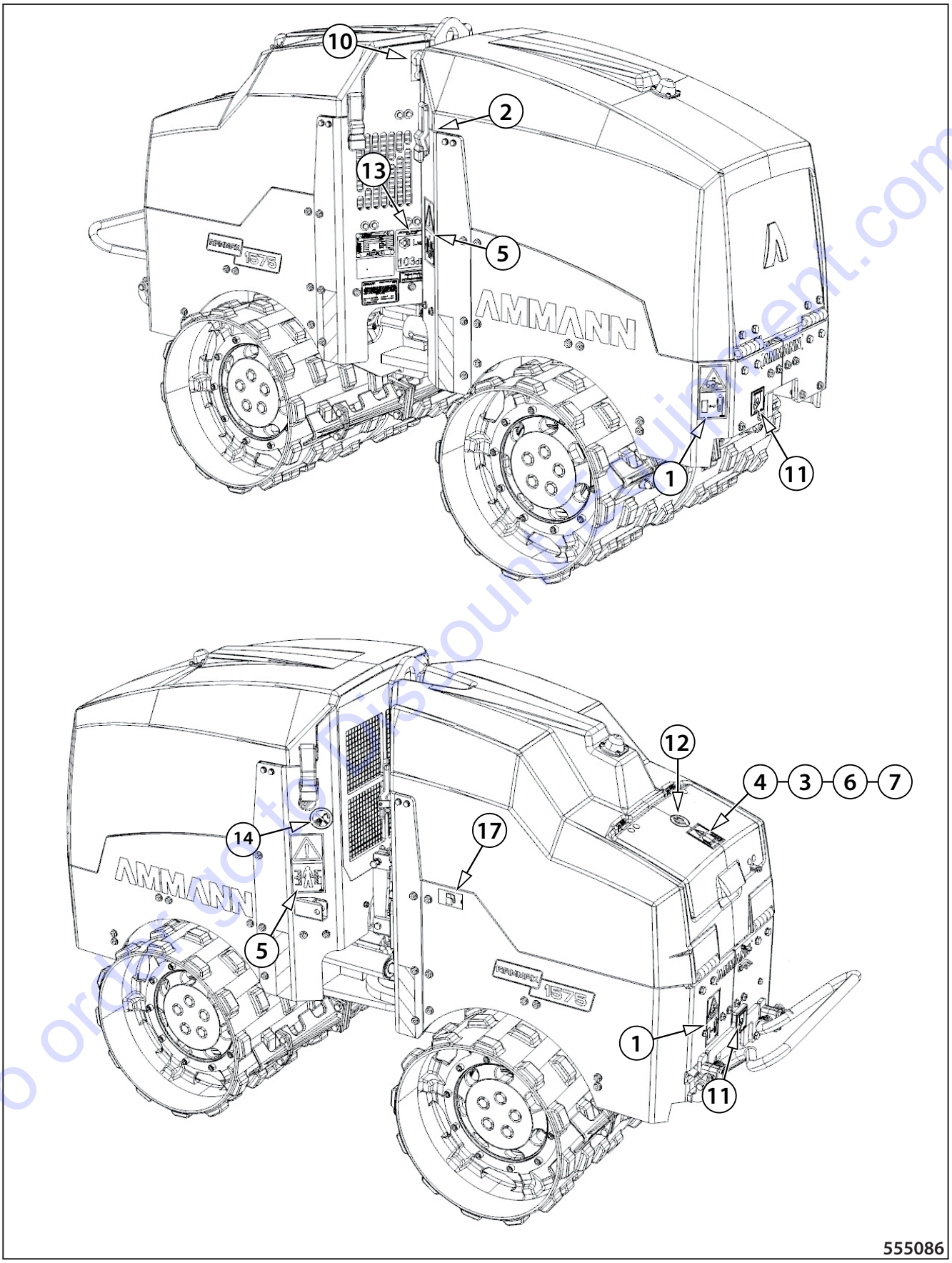
2.1.3. Forbidden activities – safety and guarantee

It is prohibited:

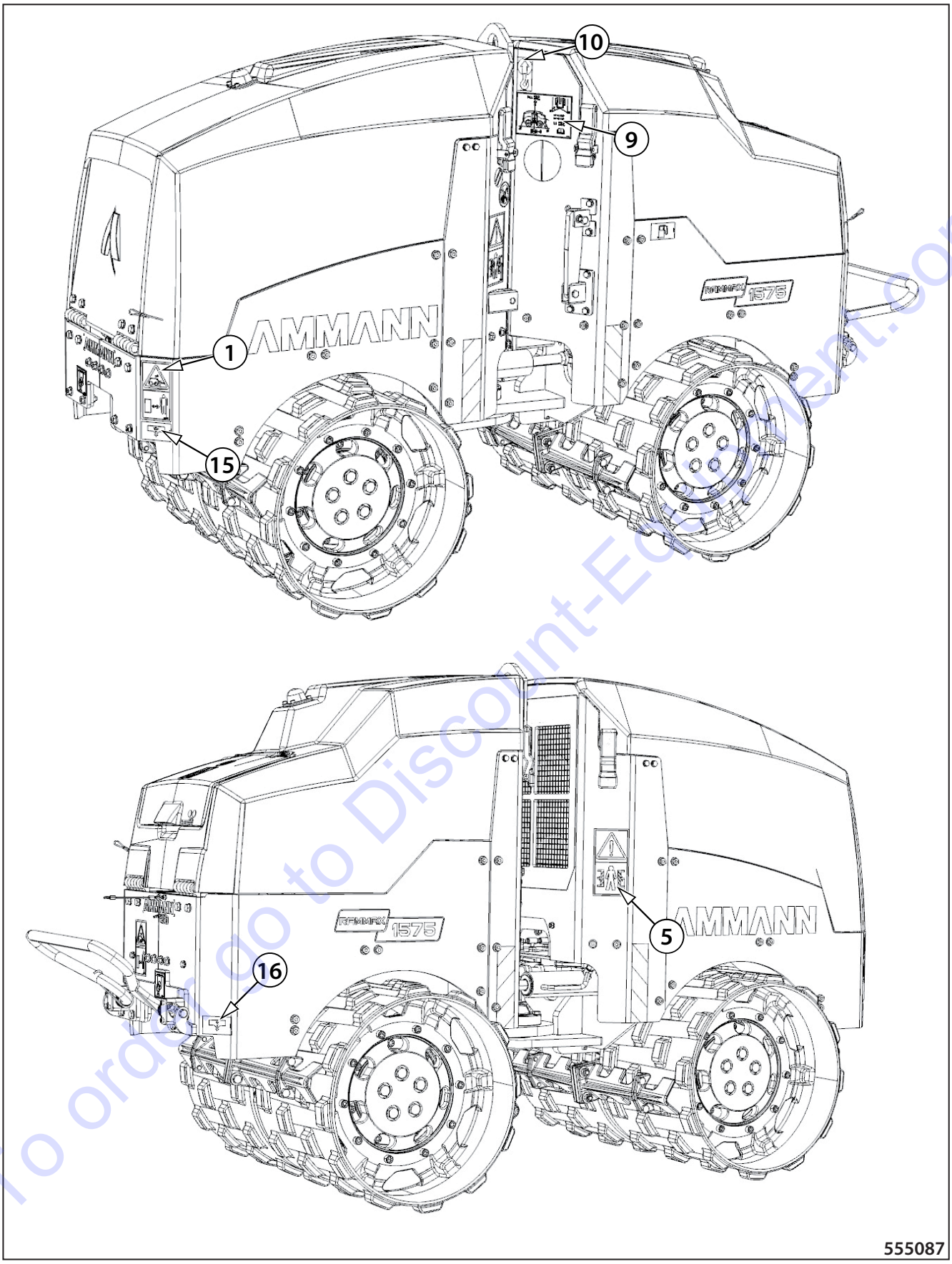
- To use the machine in a case of an obvious defect.
- To use the machine when the level of any operating fluid is low.
- To repair the engine without authorization – except common changes of operating fluids and filters, only an authorized service organization is allowed to intervene in the engine, including the peripheral components of the engine (for example, the alternator, the starter, the thermostat, the electrical installation of the engine.
- To operate the machine in explosive atmosphere and underground.
- To use the machine under the influence of alcohol or drugs.
- To use the machine if its operation might pose risk to its technical condition, to safety (life, health) of persons, to facilities or objects or to road traffic and its fluency.
- To put the machine into operation and use it when other persons are within its hazardous reach – the exception is training of a driver by an instructor.
- To put the machine into operation and use the machine when any of its safety devices has been removed or is damaged.
- To drive the machine and use it for compacting at such slopes where the machine stability would be breached (overturning). The stated machine static stability is reduced by dynamic effects of driving.
- To drive the machine and use it for compacting at such slope angles where there is hazard of soil breaking off under the machine or a risk of a loss of adhesion and uncontrolled skidding.
- To control the machine in any other way than stated in operation manual.
- To drive and compact with vibration in such a distance from the slope edge or trenches where there is a hazard of landslide or shoulder breaking off with the machine.
- To drive and compact with vibration in such a distance from walls, cuts and slopes where their collapse could occur and the machine could be buried under.
- To compact with vibration in such a distance from buildings, facilities or equipment, within which risk of their damage due to vibration could occur due to the transmission of vibrations.
- To move and transport persons on the machine.
- To operate the machine with the bonnet lifted off.
- To operate the machine if there are other machines or means of transport within its hazardous reach, except those that operate in mutual cooperation with the machine.
- To operate the machine at a place that is not seen from the driver's stand and where hazard to people or property could occur unless work safety is ensured by another way, e.g. with mediate signalling by a duly instructed person.
- To operate the machine in a protected zone of electric lines or substations.
- Do not cross electric cables if they are not properly protected against mechanical damage.
- To operate the machine at reduced visibility or at night, unless the machine's working area and the workplace are sufficiently illuminated.
- To sit on the railing or on the outside parts of the machine when driving.
- To leave the machine unattended – to move away from the machine without having prevented its misuse.
- To disable safety, protective or locking systems or alter their parameters.
- To use the machine with leaking oil, fuel, cooling liquid or other fillings.
- To start the engine in a different way than specified in the operation manual.
- To lay materials or other objects on the machine.
- To remove dirt while the machine is running.
- To perform maintenance, cleaning or repairs when the machine is not secured against spontaneous move or accidental start and when contact of a person with moving parts of the machine is not excluded.
- To touch moving parts of the machine with the human body or objects and tools held in hands.
- To smoke or handle a naked flame when checking or pumping fuels, exchanging or refilling oils, lubricating the machine and inspecting or refilling the accumulator.
- To carry rags saturated from inflammable materials and inflammable liquids in unbound/loose vessels on the machine (in the engine space).
- To run the engine inside a closed area. Exhaust fumes are dangerous to life.
- To perform any adjustments on the machine without the prior consent of the manufacturer.
- To move electrical conductors.
- To use other than original spare parts.
- To intervene in the electrical and electronic units in any manner.
- To fill the hydraulic circuit during the guarantee period in a different way than using the hydraulic unit.

Breaching these provisions can influence the evaluation of a possible complaint and effect of the machine guarantee period.

2.1.4. Safety notices and signs applied on the machine



2.1. Major Safety Precautions



1 Runover hazard


555073

Keep clear of machine, runover hazard.

2 Injury hazard


1212577

Risk of injury: There is a risk of injury! Do not touch rotating parts of the machine while the engine is running. There is a risk of burns. Do not touch hot parts of the machine unless you make sure that they have cooled down sufficiently.

3 Machine overturning


1244596

Do not start the machine that has turned over.

4 Read Operation manual


1118436

Get familiar with operation and maintenance of the machine from the Operation Manual!

5 Hazardous area


1191374

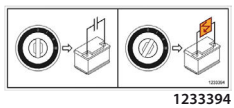
Keep clear of machine, there is a risk of being squeezed between the front and rear frame of the machine.

6 Close the cover

3-39672

The cover must be closed when the machine is controlled by remote control or parked.

7 Ignition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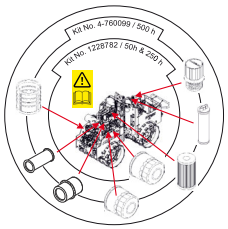
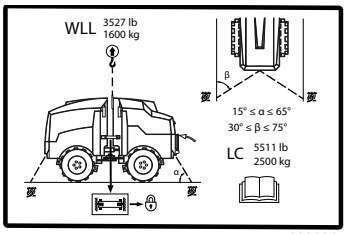
8 Service sets



3815

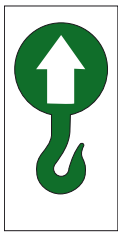
9 Lifting diagram



1233029

To lift the machine, use binding means of sufficient loading capacity according to the Machine loading chapter. Before lifting, lock the articulation of the machine.

10 Lifting lug


410988

To lift, suspend the machine on these lugs only.

11 Tying lug


3048bz

Use only these lugs to tie the machine during transport.

12 Ear protection


555071

Dangerous noise level! Use ear protection.

13 Guaranteed acoustic power level

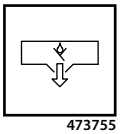
3038bz

14 Washing the machine by water


10334819

Dangerous situation. Prevent water from entering the electric and electronic parts of the machine as it could result in damage to the equipment and injury of persons. Read Operation Manual!

15 Engine oil draining plug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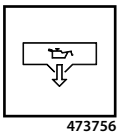
16 Hydraulic oil draining plug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17 Fuel tank

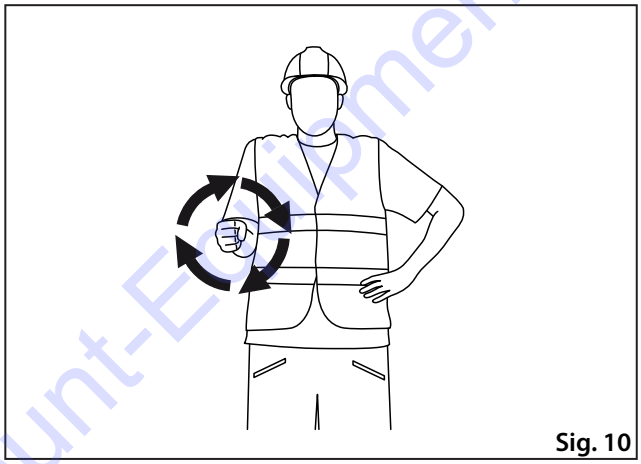

478679

2.1.5. Hand signals

- Signals given by an assistant operator if the driver cannot see the travelling or working area or machine work devices.
- The following principles must be observed:
  - Only a limited number of signals must be used for communication purposes.
  - The signals must be easily distinguishable to prevent confusion.
  - Hand signals can only be used in case the environmental conditions support clear communication between persons.
  - Hand signals must be as similar as possible to intuitive movements.
  - One-hand signals can be given by any hand.

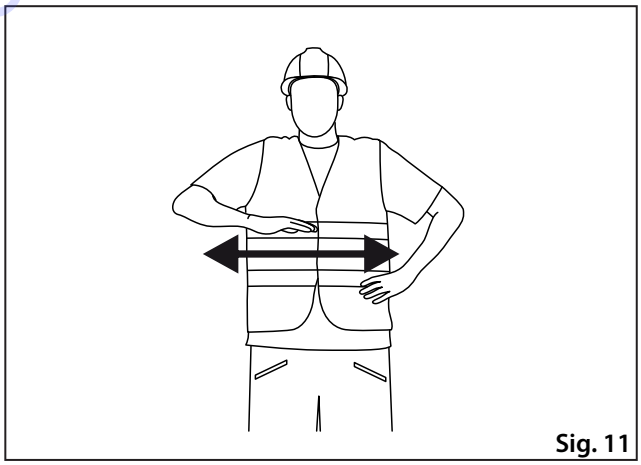
EXAMPLES OF COMMUNICATION SIGNALS:

Engine start



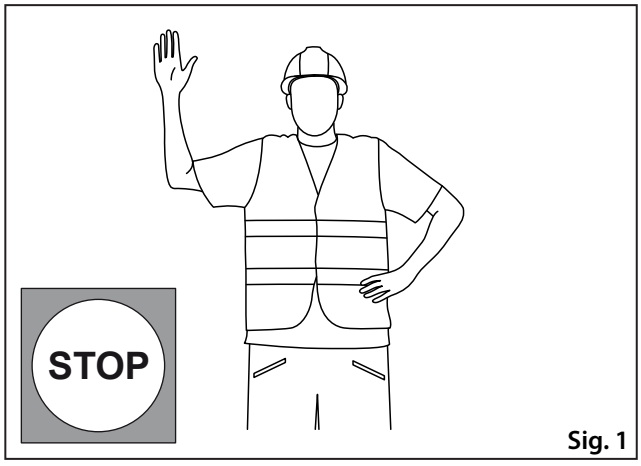
Sig. 10

Engine stop



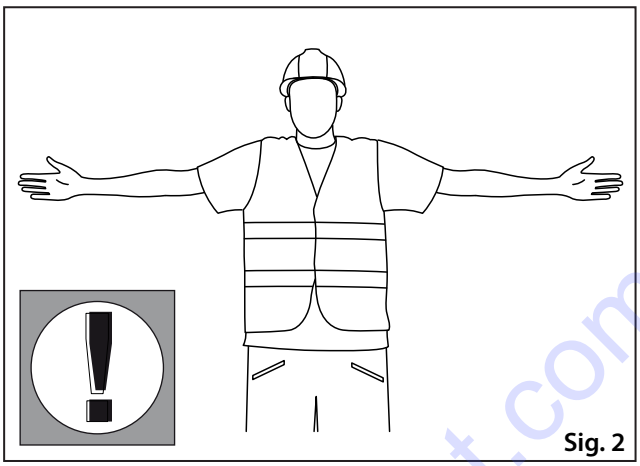
Sig. 11

Stop



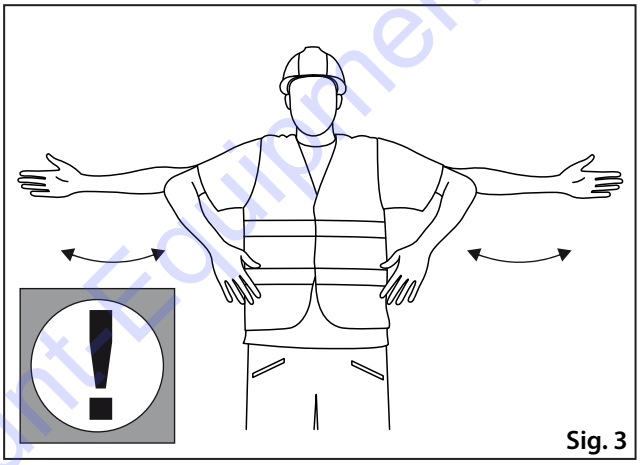
Sig. 1

Watch out



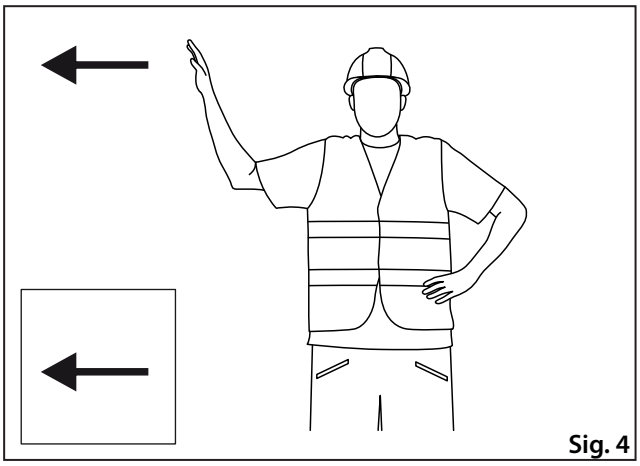
Sig. 2

Watch out, danger



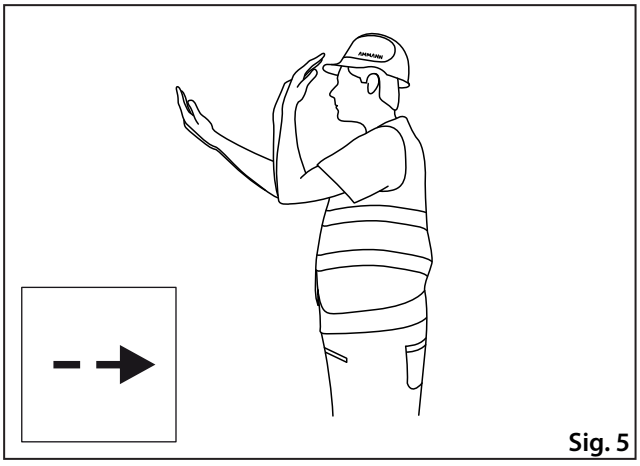
Sig. 3

Driving



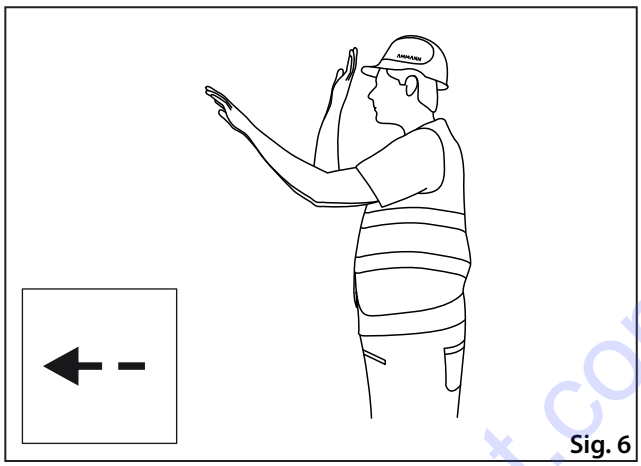
Sig. 4

Slow driving forward - towards me



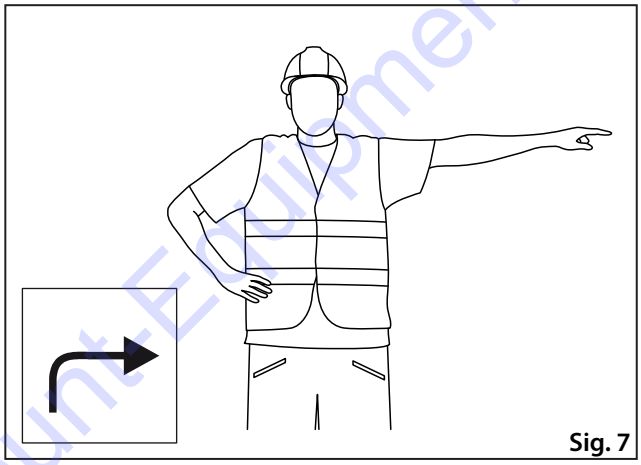
Sig. 5

Slow driving backward - away from me



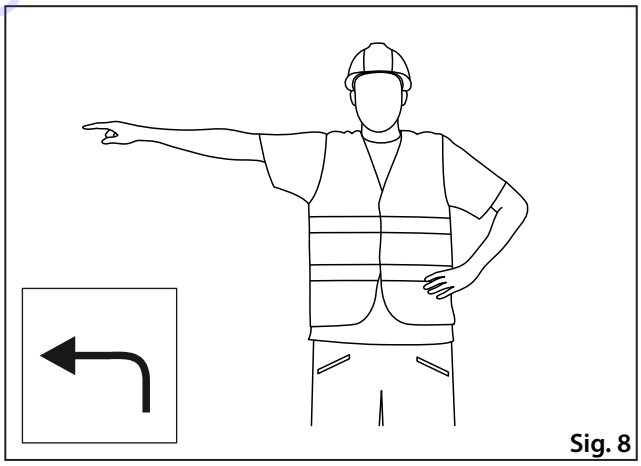
Sig. 6

Driving to the right



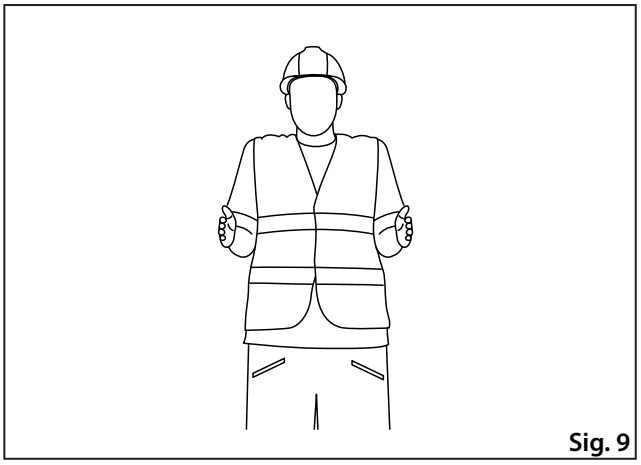
Sig. 7

Driving to the left



Sig. 8

Short-distance driving



Sig. 9

2.2. Environmental and hygienic principles

2.2.1. Hygienic principles

When operating and storing the machines, the user is obliged to observe general principles of health and environmental protection, and laws and regulations relating to the given issues and in force within the territory where the machine is used.

- Petroleum products, cooling system fillings, battery fillings and coating compounds, including solvents, are materials harmful to health. Workers coming into contact with these products during machine operation or maintenance are obliged to follow general principles of their own health protection and comply with safety and hygienic manuals by manufacturers of these products.

  In particular we draw your attention to the following:

  - Protect your eyes and skin while working with the batteries
  - Protect your skin while working with petroleum products, coating compositions and coolants
  - Wash your hands properly after finishing the work and before the meal, treat the hands with appropriate reparation cream
  - When handling cooling systems, please follow the instructions given in the manuals delivered with the machine.
- Always store petroleum products, coolants and batter fluids, coating compounds, incl. organic solvents, as well as cleaning and preserving agents in their original and properly labelled packages. These materials are not allowed to be stored in unlabelled bottles or in any other vessels considering the possible risk of confusion. Possible confusion with foodstuffs or beverages is very dangerous.
- In case of accidental contact with skin, mucosa and eyes or inhalation of vapours, immediately apply the first aid. In case of accidental ingestion of these products, seek medical help immediately.
- When operating the machine that is not provided with a cab or when the cab windows are open, always use ear protectors of suitable type and version.

2.2.2. Ecological principles

- The fillings of individual systems of the machine and some of its parts become hazardous waste for the environment when discarded.

  This category of waste products includes in particular:

  - Organic as well as synthetic lubricating materials, oil or fuels
  - Coolants
  - Battery media and batteries
  - Cleaning and preservative agents
  - All dismounted filters and filter cartridges
  - All used and discarded hydraulic or fuel hoses, rubber--metals and other parts of the machine contaminated by the above mentioned products.

After the stated materials and parts are discarded, they must be handled in accordance with the respective national regulations on environmental protection and in accordance with the health protection regulations.

2.3. Machine preservation and storage

2.3.1 Short-term preservation and storage for a period of 1–2 months

- Wash and clean the entire machine carefully. Before parking the machine for preservation and storage, please warm up the engine to its operating temperature while running. Park the machine on solid, flat surface at a safe place with no risk of natural disaster (floods, landslides, fire, etc.) for the machine.
- In addition:
  - Repair damaged coating
  - Lubricate all lubrication points
  - Confirm that water fillings have been drained
  - Check that the coolant has the required antifreezing specification
  - Check charging of the accumulators and recharge them if necessary
  - Apply preservative grease over the chrome-coated surfaces of piston rods
  - We recommend you to protect the machine against corrosion by spraying the preservation agent, especially on places with a risk of corrosion.

2.3.2. Preservation and storage for a period longer than 2 months

- For machine shutdown, the same principles are applicable as for the short-term preservation.
- In addition it is recommended to:
  - Dismantle the accumulators, check their condition, and store in a cool, dry room (recharge the accumulators regularly)
  - Support the drum frame so that the shock-absorbing system shows minimal sag
  - Protect the rubber elements by coating with special preservative agent.
  - Blind the suction and exhaust pipe of the engine with double PE foil and tighten it carefully with sealing tape.
  - protect the headlamps, external back mirrors and other elements of external wiring through spraying a special agent and wrapping into PE foil
  - Preserve the engine according to the manufacturer's manual – place a visible mark that the engine is preserved.
- Always put the start/stop switch on the infrared transmitter to the stop position.

After 6 months we recommend you to inspect the condition of preservation and renew if required.

Never start the engine during the storage!

When the machine is stored under field conditions, check that the parking place is not exposed to danger of flooding due to floods and that there is no other type of danger in this area (landslip etc.)!

Before restoring operation of the machine, wash off the preservation agents using high pressure stream of hot water with common degreasers while observing the operation manual and the ecological principles.

Remove the preservation film and wash the machine at places provided with intercepting sumps to trap the rinsing water as well as deconserving agents.

2.3.3. Putting the machine into operation after storage

- Check that some parts of the machine have not been damaged during storage and are not missing.

Remove preservation agents before putting the machine into operation:

Wash off the preservation agents using high pressure stream of hot water with common degreasers while observing the operation manual and the ecological principles.

Carry out removing of the preservation agents and washing the machine at places provided with intercepting sumps to trap the rinsing water as well as deconserving agents.

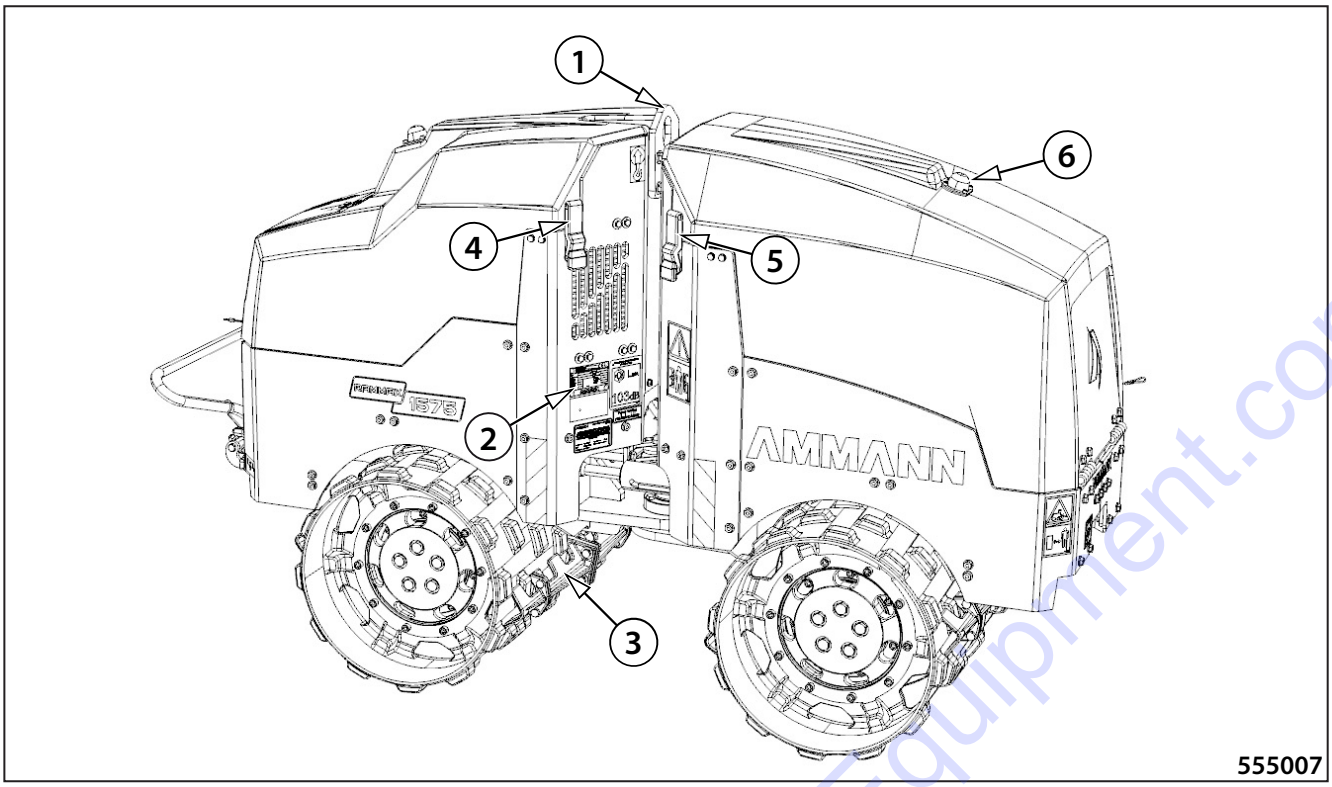
- Prepare the engine for operation according to the manual from the manufacturer.

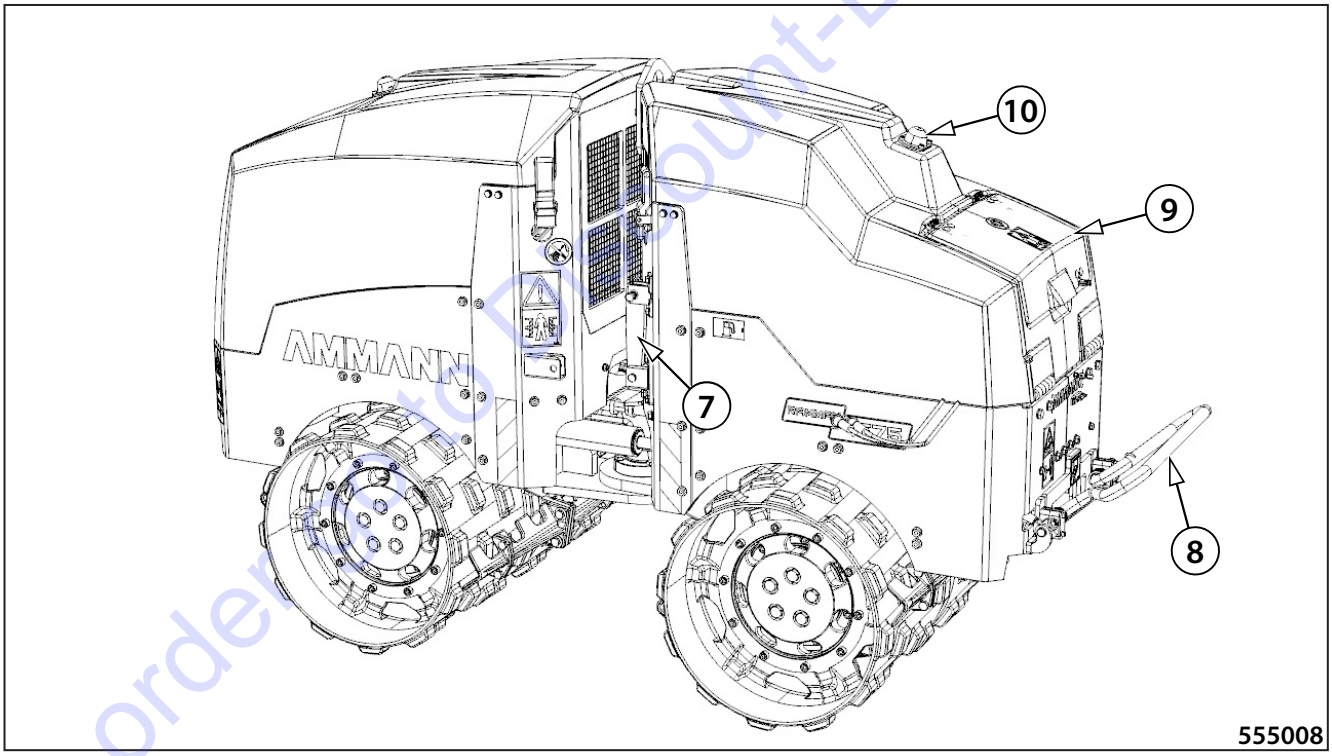
Check the level of operating fluids before you put the machine into operation!

2.4. Disposal of the machine at the end of its service life

- During machine disposal at the end of its service life, the user is obliged to follow national waste treatment and environmental regulations and acts. In these cases, we recommend you to always contact:
  - specialized companies with respective authorization for these activities
  - the machine manufacturer or manufacturer-appointed accredited contracting service organizations.

The manufacturer Ammann shall not be liable for damage to the health of users or environmental damage caused by non-compliance with the above mentioned rules.



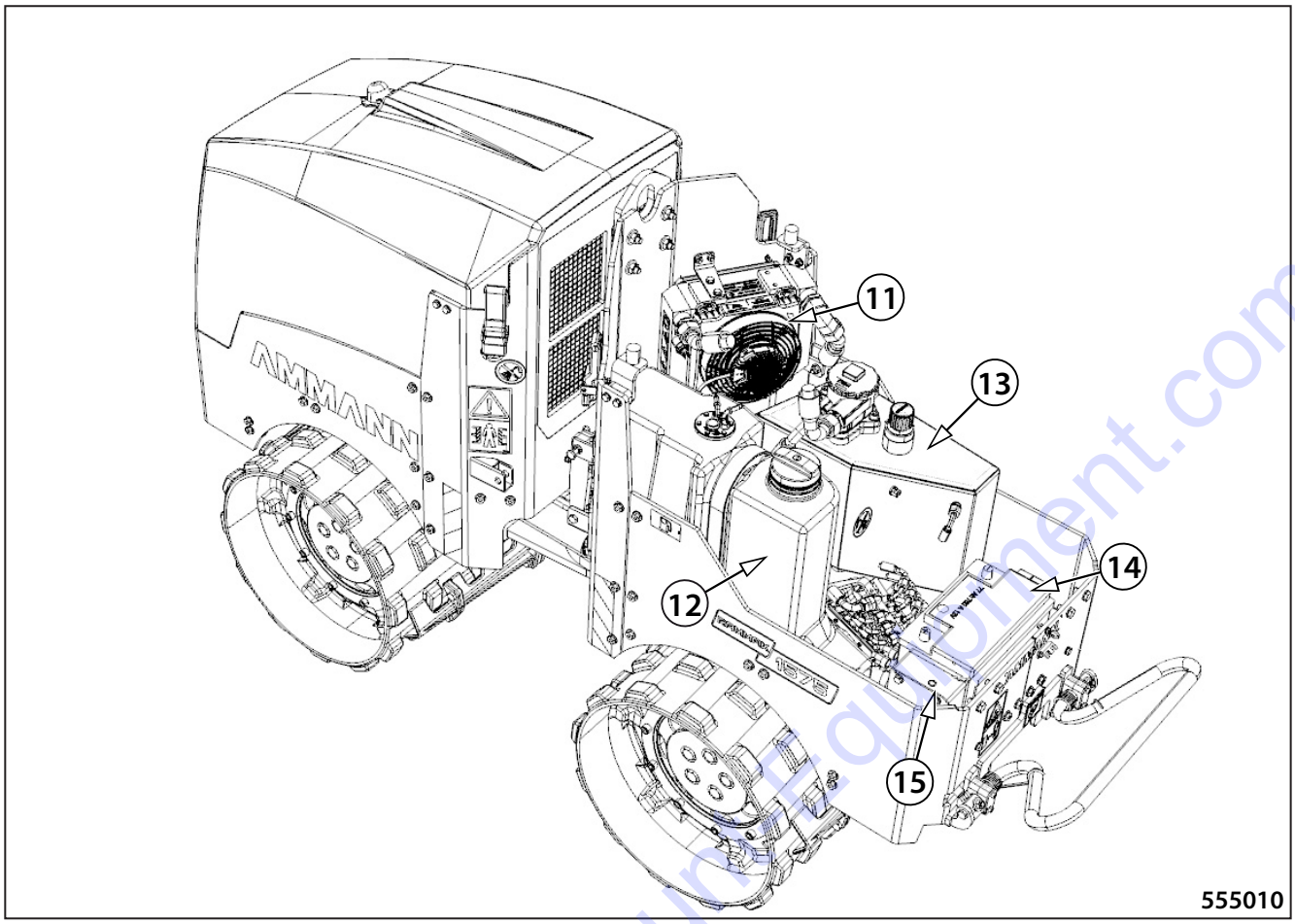


View from the right

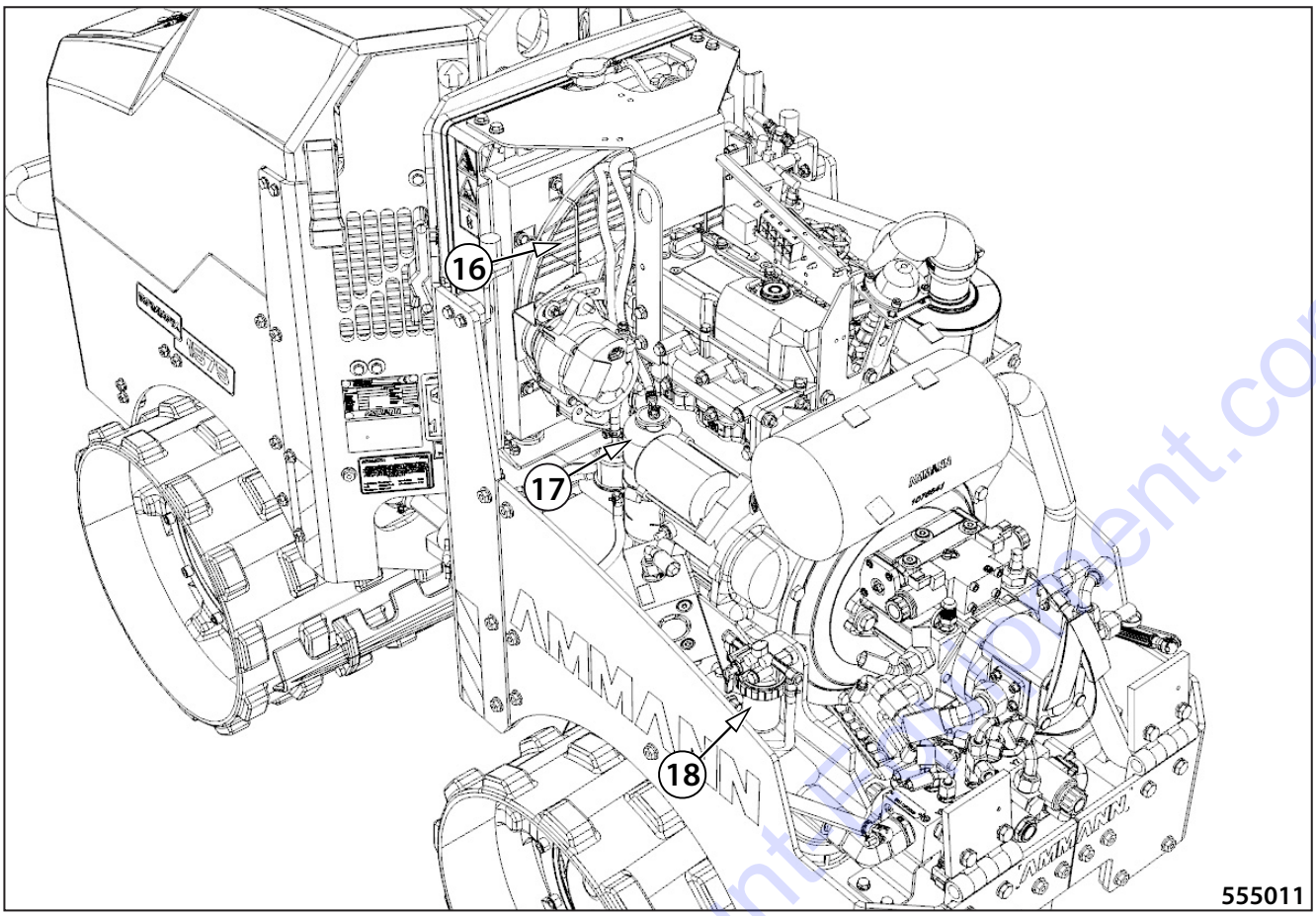
1 - 1-point lifting eye
2 - Identification plate
3 - Roller drum scraper
4 - Rear bonnet closure
5 - Front bonnet closure
6 - Front infrared sensor

View from left

7 - Articulated joint protection
8 - Shutdown bar (optional)
9 - Cockpit cover
10 - Rear infrared sensor



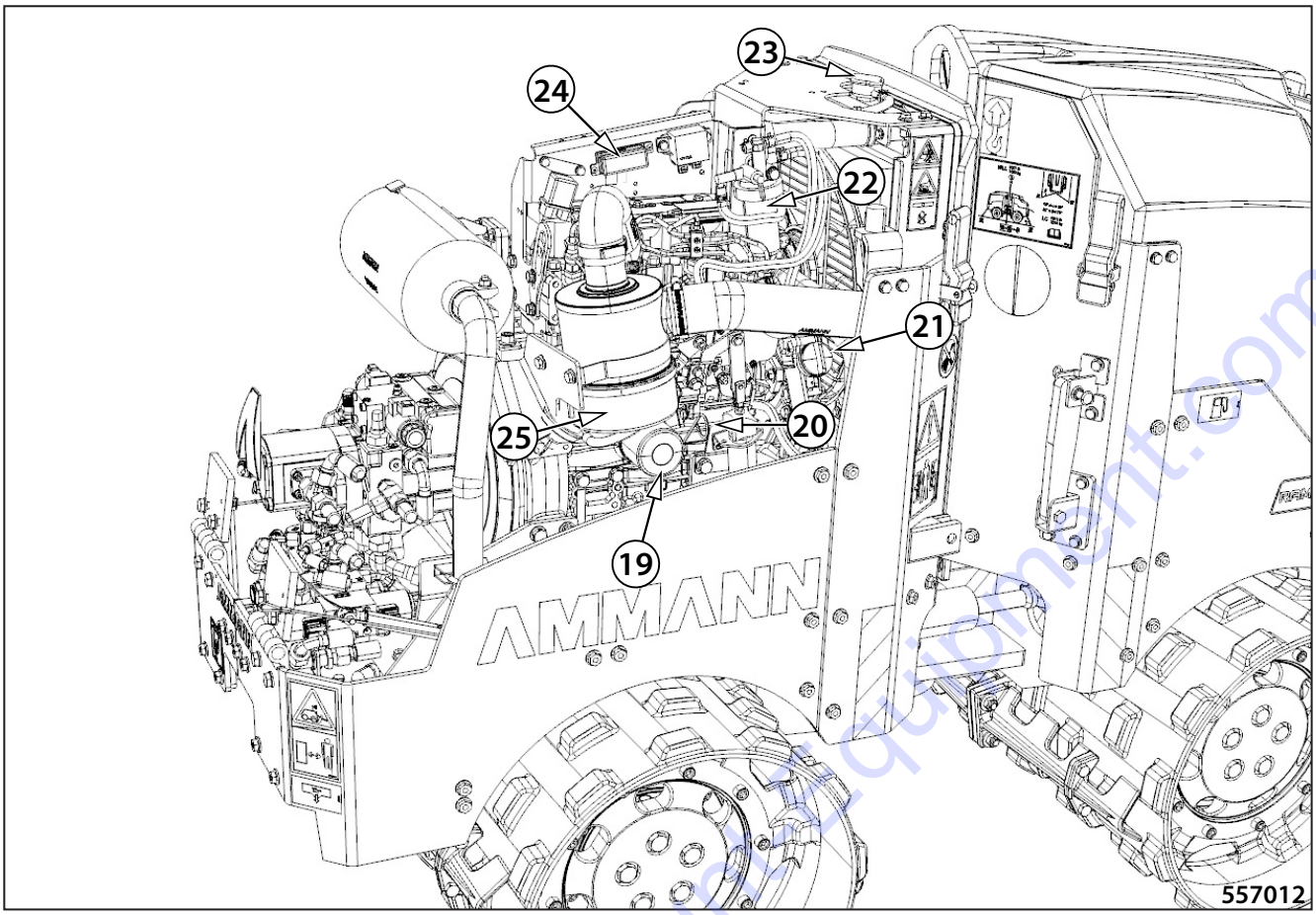
11 - Oil cooler
12 - Fuel tank
13 - Hydraulic tank
14 - Battery
15 - Controller (machine controller)



16 - Engine cooler

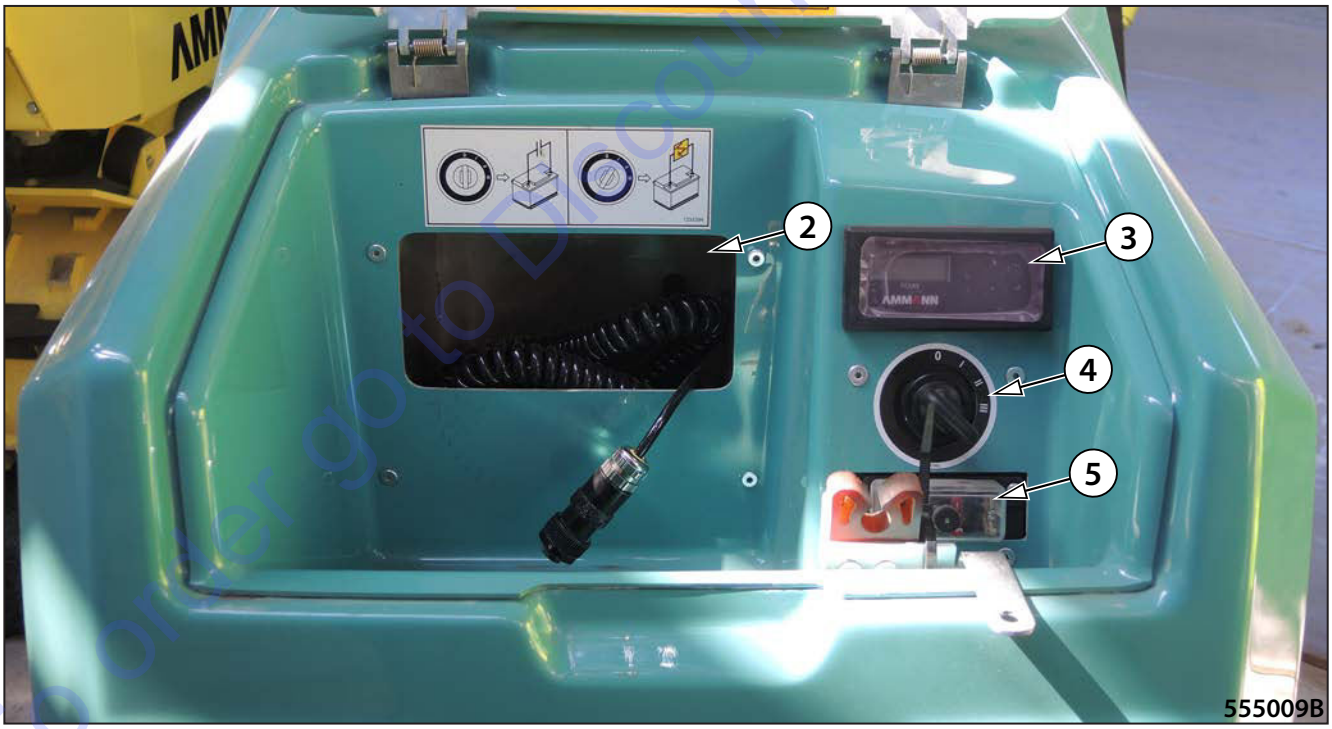
17 - Coolant expansion tank

18 - Water separator



19 - Oil filter
20 - Oil gauge
21 - Oil filling port
22 - Fuel filter
23 - Coolant filling port
24 - Engine fuses
25 - Air filter

2.6. Actuators and dashboard instruments



1 - Infrared transmitter

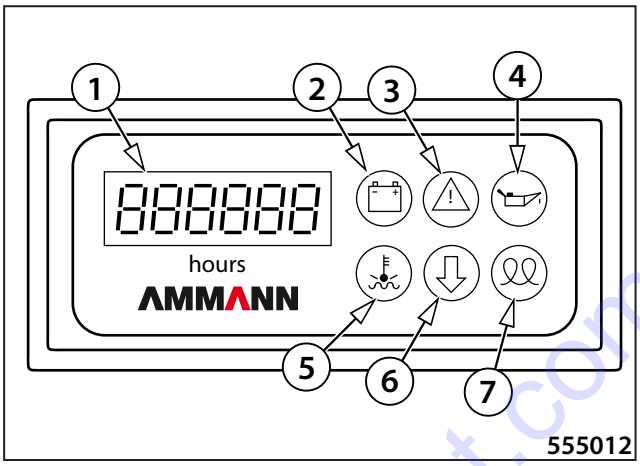
2 - Storage area for spiral cable

3 - Display unit

4 - Ignition box

5 - Fuses

2.6.1. Display unit



Operating hours counter (1)


RAM02

Control lamp for battery charge level (charge control) (2)

The pilot lamp lights up after the key in the switch box is switched in position „I" and goes out after the engine starts. If the pilot lamp lights up during operation or does not go off after starting, carry out the following check immediately.

- Stop the engine.
- Check the engine for defective or loose V-belt.

If the battery charging lamp is still on after you have carried out this check, contact Discount-equipment.


RAM01

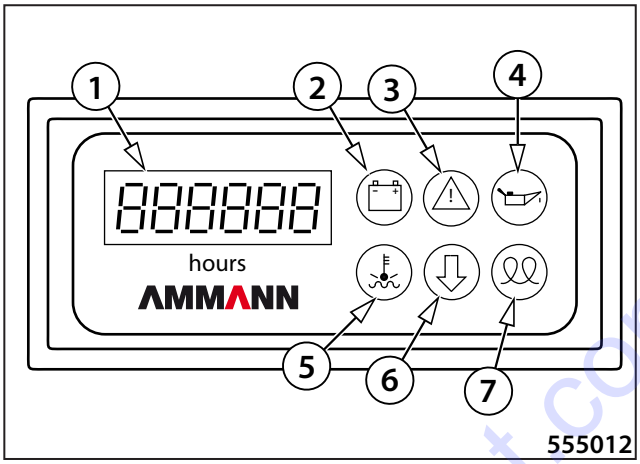
Control lamp functions (3)

The Error control lamp lights as soon as the controller recognizes an error.

The tilt sensor is activated. The compactor is in position with the angle exceeding 45°. Put the machine into vertical position.

Electric installation fault. Check the electric installation for short circuit or broken cable.

If the fault lamp is still on after you have carried out this check, contact Discount-equipment.



Control lamp for engine oil pressure (4)

The pilot lamp lights up after the key in the switch box is switched in position „I“ and goes out after the engine starts.

If the engine oil pressure control lamp lights up during operation or does not go off after starting, stop the roller and turn off the engine immediately!

- Check the engine for oil loss and correct oil level.
- If the level of oil is correct, contact Discount-equipment.

Note:

The machine is equipped with an automatic shutdown system. If the oil pressure falls below the limit value, the oil pressure warning lamp lights up. After the warning lamp has been lit for 4 seconds, the machine is shut down.

Control lamp for cooling water temperature (5)

Danger of engine overheating. Stop immediately!

If the coolant temperature control lamp lights up during operation of the machine, switch off the engine immediately and top up coolant!

- Check the cooling system for leaks and the radiator/expansion vessel for correct coolant level.
- You have not found a fault: Contact Discount-equipment.

Note:

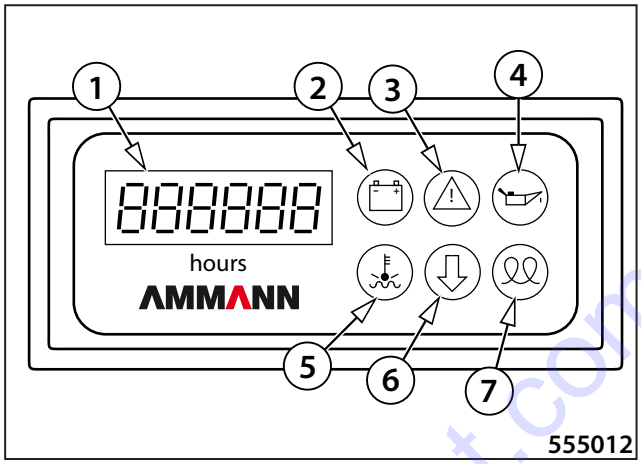
The machine is equipped with an automatic shutdown system. If the cooling water temperature exceeds the limit value, the temperature warning lamp lights up. After the warning lamp has been lit for 4 seconds, the machine is shut down.

Control lamp for shutdown bar (6)

The shutdown bar indicator lamp remains lit as long as the shutdown bar is actuated (OPTION).

Control lamp for pre-heating (7)

The pre-heating time lasts about 6 s. The pre-heating indicator lamp extinguishes when the engine is started.

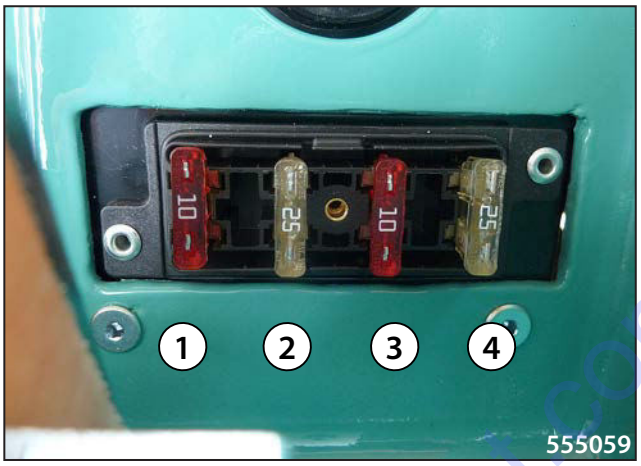


2.6. Actuators and dashboard instruments

Cockpit fuses

The fuses are located under the cowling in the cockpit

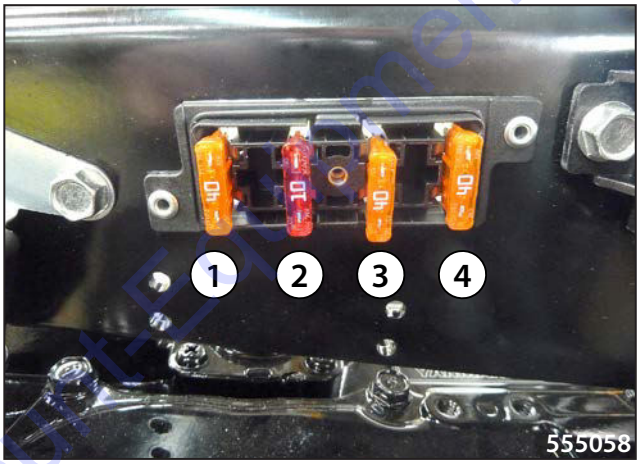
1	F11	10 A	Controller, power supply
2	F12	25 A	Controller, outputs
3	F13	10 A	Display unit, shutdown bar
4	F14	25 A	Hydraulic oil cooler



Engine compartment fuses

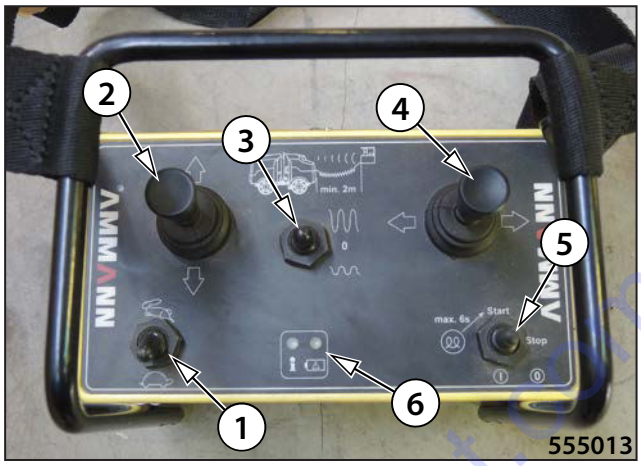
The fuses are located above the diesel engine.

1	F21	40 A	Pull-in solenoid
2	F22	10 A	Diesel pump, alternator
3	F23	40 A	Operating speed
4	F24	40 A	Pre-heating coil



Replace fuses only with fuses of identical value!!!

2.6.2. Infrared transmitter



1 - Operating speed (turtle) / travelling speed (rabbit).

2 - Forward drive / reverse drive

3 - High / low amplitude of vibrations

Do not use the vibration feature on steep slopes or under high angle of inclination.

Do not vibrate in buildings and on unstable ground.

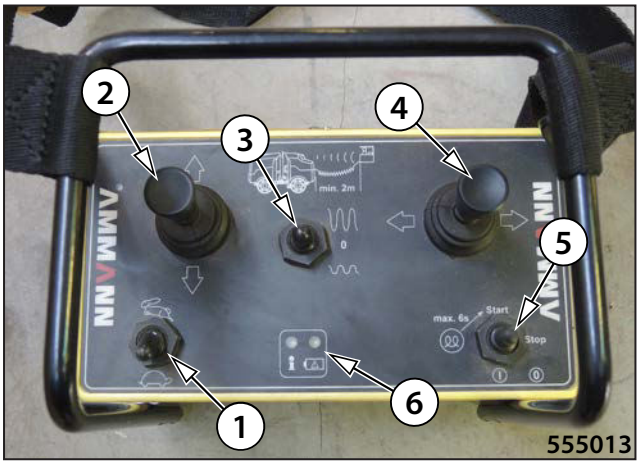
Risk of lethal injury due to slipping or falling of the compactor.

4 - Left/right lock angle

5 - Start/Stop

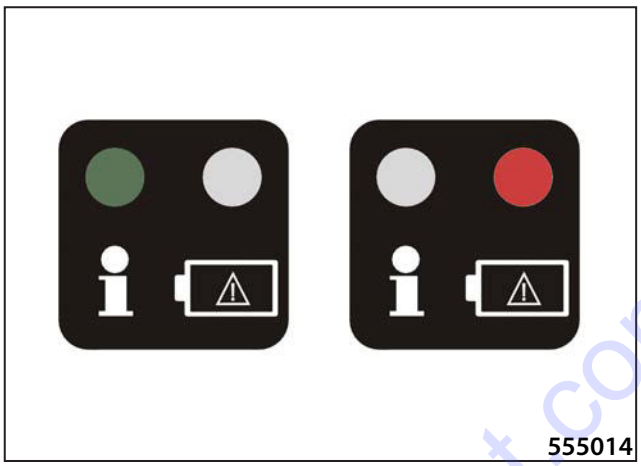
Serves to start the engine. More in chapter 2.7.3. Engine start

6 - LED signals



2.6.2.1. LED signals

- There are two LED signals on the transmitter: green and red.



There are two LEDs on the cover: a green one and a red one.

Standard display (green)

Display	Cause
The green LED is blinking slowly.	The roller is being controlled via the cable.
The green LED is flashing.	The roller is being controlled via infrared.

Battery charge monitoring display while performing a function(red)

Remote control

Display	Cause	Remedy
Red LED signal flashing.	Battery almost flat.	Connect the charging cable for at least 1 h.
Red LED signal lit.	Battery flat, remote control out of operation.	Connect the charging cable for at least 1 h.

Wire control

Display	Cause	Remedy
The red LED flashes.	The battery is being charged.	
The red LED is lit.	The battery is fully charged.	

Note:

It is still possible to control via the cable once the battery is empty.

Battery warnings and errors are only displayed during active control (i.e., when a control element is actuated).

After the cable is disconnected from the remote control, the red LED signal lights up for 1 second.

2.6.2.2. Cable connection

Spiral cable connector

1 - Spiral cable connector / protective cover fastener

2 - Solar cells / Transmission elements

Automatic pairing function

- If you wish to control the machine by the remote control, you must first perform mutual assignment of addresses. This is necessary only in case you need to register the new infrared transmitter in the machine.
- Connect the cable to the transmitter.
- Turn the ignition key to the „I“ position.
- You can disconnect the cable after ca 3 seconds.
- The cable is not needed for operation with infrared transmitter.

Display	Cause
The green and red LEDs are blinking in unison quickly.	The infrared transmitter is coupled with the machine controller.

Note:

This procedure normally only takes a maximum of about 3 seconds. If this blinking lasts longer or should even become permanent, there is a problem with pairing:

- A cable break in one of the signal lines
- A short circuit in one of the signal lines

2.6.2.3. Handling

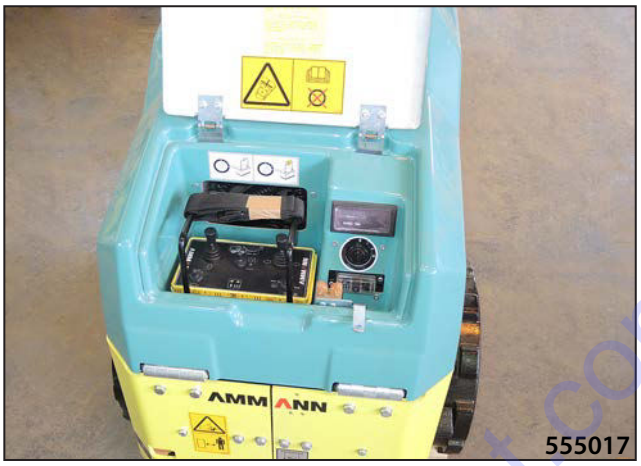
The infrared transmitter is located under the dashboard cover.

It includes the following transmission features:

- The solar cells
- The infrared diodes for data transmission and measuring the safety distance.

Before startup, clean the transmission elements.

Keep the solar cells clean during operation.



555017

Accident hazard due to covered over lower part of the housing!

Before and during operation with the infrared transmitter, make sure that the entire lower part of the housing remains completely uncovered for the entire time of operation.

In particular, the operator's hand must not cover the lower part of the housing even partially.


555016A

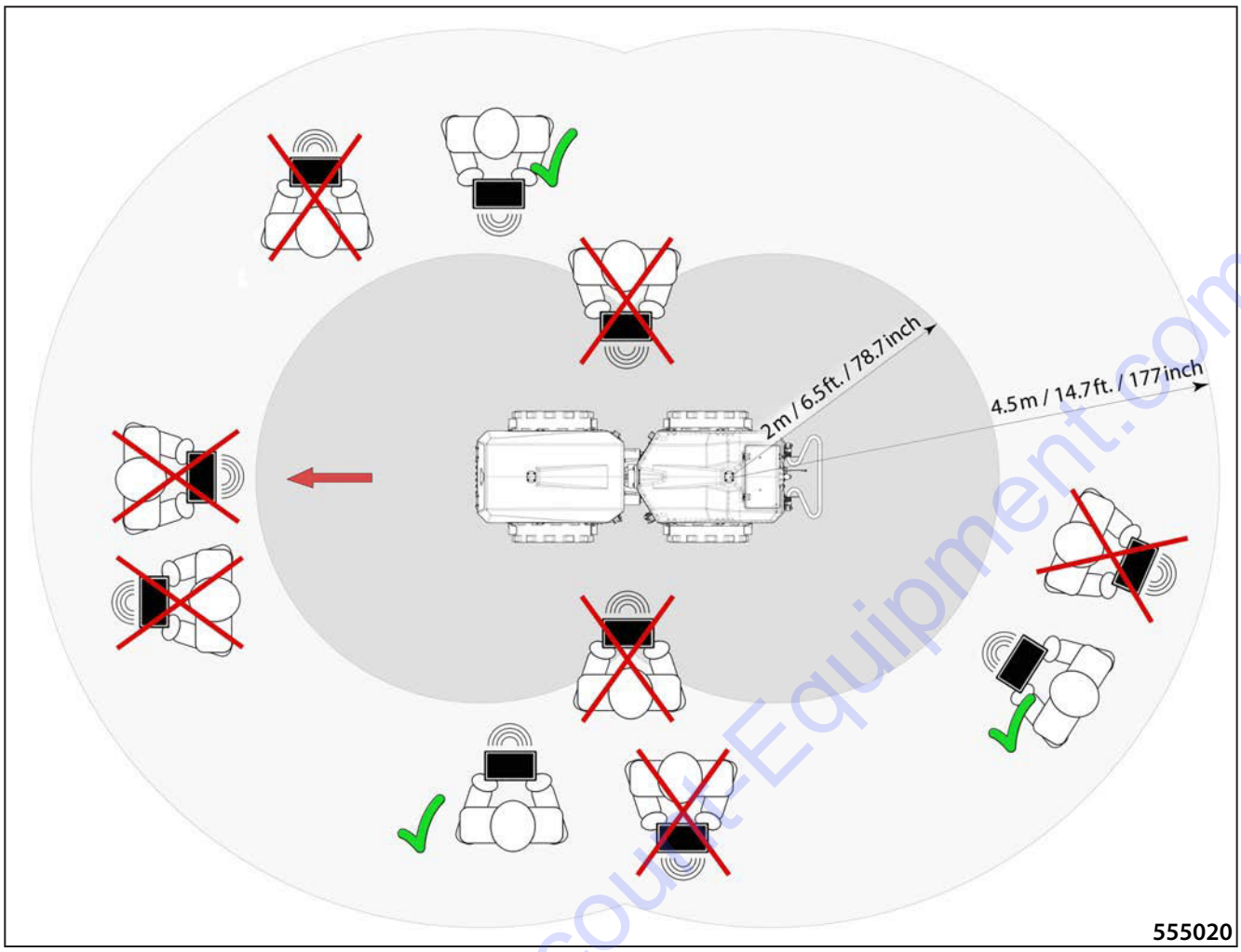
Wear the infrared transmitter correctly

Pay attention to correct positioning.

- The cable connector must face forwards or be oriented according to the sticker on the transmitter. The infrared transmitter may rest on the stomach of the operator.
- Adjust the strap for the correct length to ensure optimal wearing comfort.
- During operation, aim the IR transmitter in the direction of the roller only. When doing so, you can use the cable socket that faces forward as an aid to help you aim. You will obtain the best contact if you do not deviate more than 45° from the direct line of sight to the roller.
- Do not activate any functions when you are standing with your back to the roller.
- Do not aim the transmitter at reflective objects (large surfaces, light-coloured objects, other construction machinery, etc.).
- Pay attention to correct operation.
- Only hold the housing by the upper part; see the warning information.


555016B


555016C



2.6.2.4. Close proximity and distant shutdown

The close proximity and distant shutdown function is an electronic safety feature designed to prevent the operator from loosing visual contact with the machine and to keep it from coming to close.

All of the distance values indicated are measured between the front or back infrared sensor and the infrared transmitter.

The table below shows the approximate distance values for this feature.

If the maximum range is exceeded in infrared operation / cable operation, the diesel engine continues to idle, but the functions are interrupted. Reduce the distance to the machine in order to resume control of it.

Distance values for close proximity and distant shutdown

	Cable operation	IR operation
Close proximity shutdown	approx. 2,5 meters	approx. 2,5 meters
Distant shutdown	approx. 4 meters	approx. 20 meters

2.7. Machine control and use

2.7.1. Commissioning

Note:

Familiarize yourself with the manual before commissioning.

Inspection before commissioning

In order to begin operating the roller (driving), the following must be checked:

- The function of all safety devices
- Whether the transport restraint has been removed
- Whether the shutdown bar has been released
- All screw connections for tightness
- Fuel tank and pipes for leaks
- Machine and engine for damage
- Function of the controls
- Function of the steering
- Hydraulic system for leaks
- IR transmitter battery status (LED must be lit).
- Pair infrared transmitter with the machine controller.
- Electronic ballast interference (an external influence from fluorescent tubes)

Note:

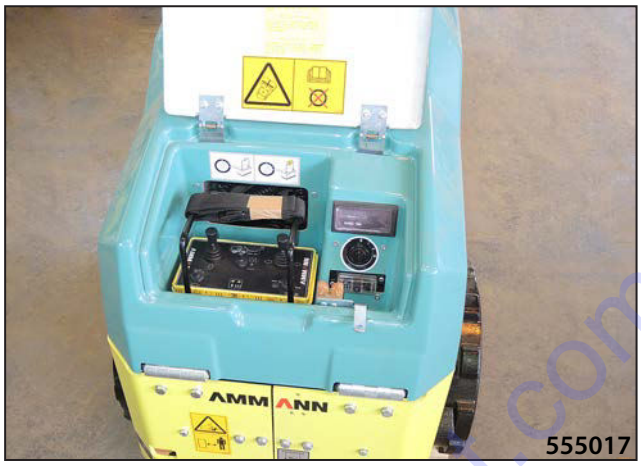
If the infrared transmitter is not functioning and no LED signals are lit, connect the transmitter to the machine using the spiral cable. The battery will charge.

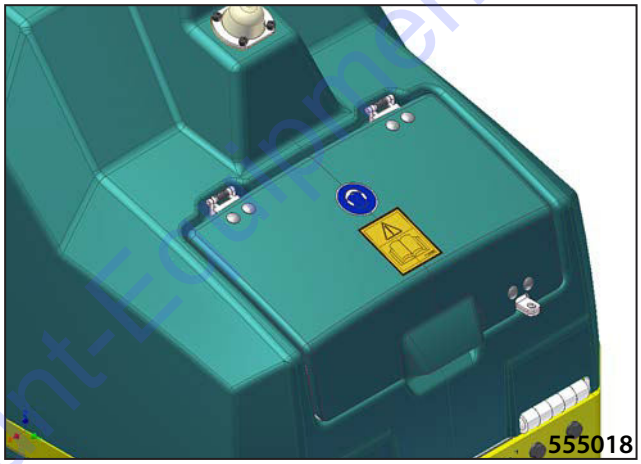
2.7.2. Protective cover

The vandalism protection cover protects the display unit and the infrared sensor from:

- the effects of weathering
- vandalism
- alterations by third parties

If you wish to secure the displaying unit and the infrared transmitter against unauthorized access by third persons, you can use a padlock (not supplied with the machine).





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2.7.3. Start-up of the engine

Starting the engine using the ignition switch

0 Off

All electrical loads are off.

I Ignition on

All electrical consumers can be switched on.

II Pre-heating

III Start

Pre-heating

If the outside temperature is below 0°C:

Turn the ignition key to position II.

Hold it in this position for max. 6 sec.

Turn the ignition key further to position III.

Note:

The control lamps for engine oil pressure and charging light up when the ignition is switched on. They extinguish once the engine is running.

If the ignition key remains in the "I" position for more than four hours, the control unit switches off automatically. In order to start the engine again, it is necessary to return the key into the "0" position and then start the engine again.

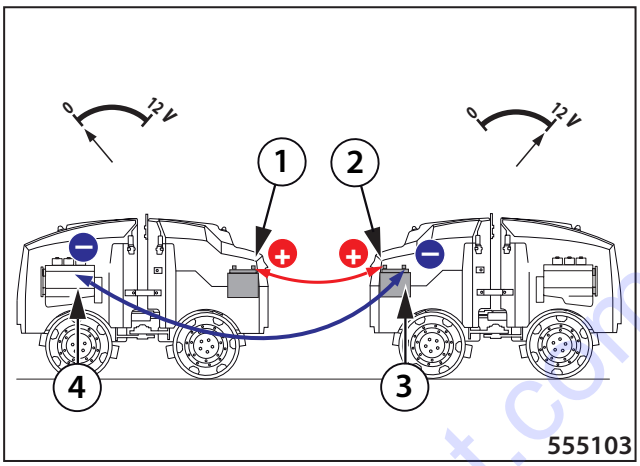
Starting the engine using the infrared transmitter

- Turn the ignition key clockwise to position I.
- Hold the switch on the infrared sensor in the start position.
- Engine will start automatically after glowing.
- Release the switch.

When using auxiliary starting source this power supply shall have starting voltage of 12 V.

How to start via starting cables from different machine

1. Connect one end (+) of cable pole to (+) pole of discharged battery.
2. Connect second end of (+) cable pole to (+) pole of the Machine battery from which starting will be made.
3. Connect one end of (-) pole to (-) pole of vehicle battery with the help of which starting will be made.
4. Connect second end of (-) cable pole to such part of the Machine being started which is wired in the engine (or eventually in the engine block itself).



Observe unconditionally the sequence of operations given below!

Once started, disconnect the starting cables in reverse sequence.

When having used starting unit with no batteries connected do not disconnect this unit before Machine's battery is connected.

Do NOT connect cable of (-) pole to (-) pole of discharged battery of started Machine! Strong sparking followed by explosion of gas generated by the battery may occur when starting.

Non-insulated parts of starting cable collets may not touch each other!

Starting cable connected to battery (+) pole may not come into contact with electrically conductive parts of the Machine - short-circuit possible.

Do NOT bend over the battery - hazard of acid burn!

Eliminate presence of flammable sources (open fire, burning cigarettes, etc.).

Do NOT check presence of voltage in wires with the use of sparking via Machine frame!

2.7.4. Driving and braking

Overview of functions	
Operation with the cable	**Operation with the infrared sensor**
Automatic pairing	
Steering functions	
Vibration functions	
max. range = 4,5 m	max. range = 20 m
Close proximity shutdown, 2 m	

After performing any function, the engine speed automatically increases to the working speed. If no function is activated within 15 seconds, the engine speed automatically drops to idle.

Driving forwards / backwards

Move the switch:

Toward the front: The roller moves forward.

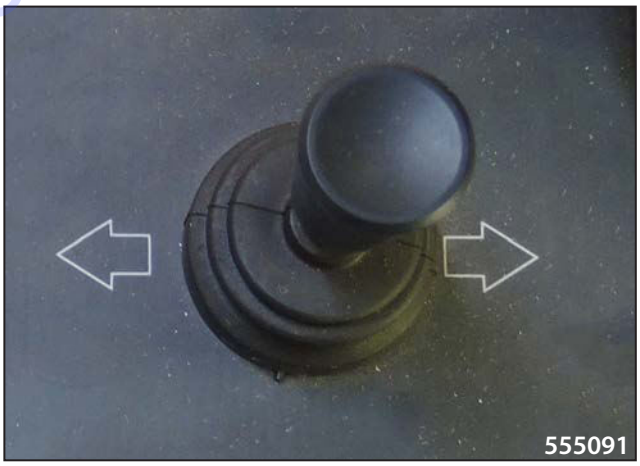
Toward the rear: The roller moves backward.

Steering left / right

Move the switch:

Toward the left: the compactor turns left

Toward the right: the compactor turns right



Work gear / Transport gear

The roller is equipped with two gears.

Move the switch:

Toward the top (rabbit): the hydraulic system switches to the "transport gear" drive level. The roller drives at a high speed.

Toward the bottom (0): the hydraulic system switches to the "working gear" drive level. The roller drives at a low speed.

Note:

When large / small vibration is switched on, it is only possible to drive in the working gear.

When the machine is cold, the difference between high speed and low speed is minimal.

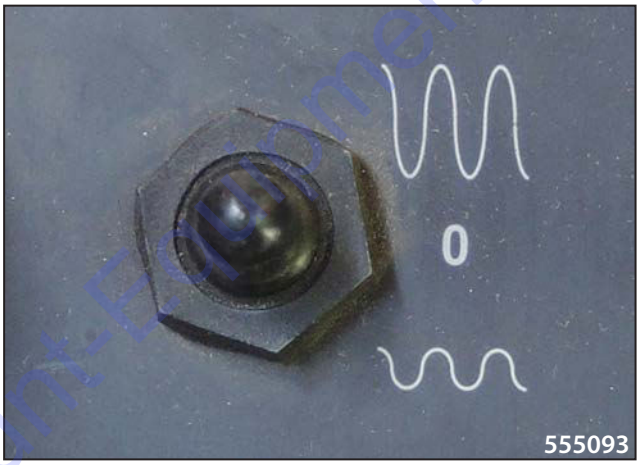
Large / small amplitude vibration

Move the switch:

Toward the top: The roller vibrates with a large amplitude.

To the center: The roller does not vibrate.

Toward the bottom: The roller vibrates with a small amplitude.



Do not use vibration on steep embankments or at steep angles!

Do not vibrate inside buildings and on unstable ground!

Danger to life through slipping or caving in of the roller!

Note:

Never use vibration while at a standstill! If the large / small vibration function is activated for more than 15 seconds while at a standstill, the machine controller shuts it off automatically.

When first started, it is only possible to use the small amplitude vibration function for the first 2 minutes.

Only travel directly up or down slopes.

Do not drive across slopes.

Keep your distance to embankments and edges!

Do not drive at an angle into or out of the trench.

Park the roller on slopes only in such a way that it cannot overturn.

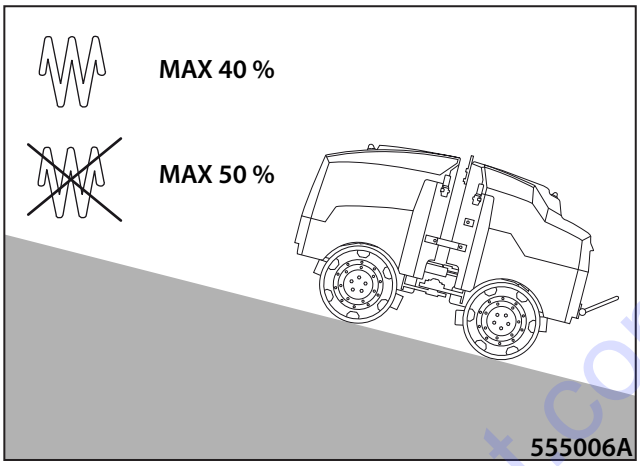
Use the roller on slopes only in such a way that it cannot overturn.

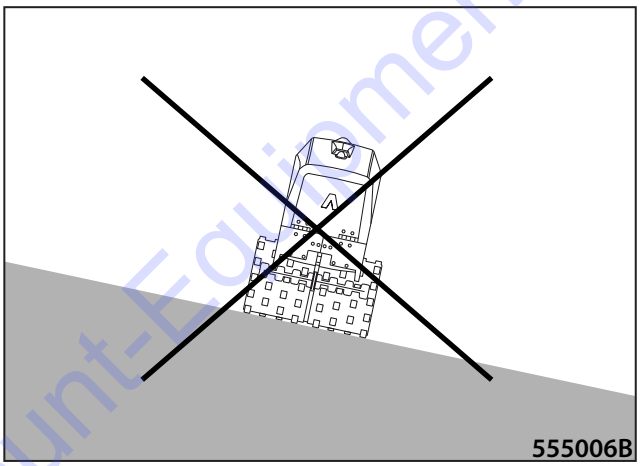
The roller drums have very poor adhesion on snow and ice. Driving or working on a slope in snow or ice is prohibited.

Damp and loose surfaces reduce the traction of the machine on upward and downward grades considerably. Adapt the speed of the machine to the terrain when driving on grades.

The nature of the ground and weather conditions can negatively affect the climbing ability of the machine.

Never drive on slopes that are steeper than the maximum climbing ability of the machine.





2.7.5. Turning off the engine

- Move the switch on the infrared transmitter to "STOP".

- Turn the ignition key to the "0" position.

As long as the "Start-Stop" rocker switch is placed in the "neutral" position, the transmitter remains operational.

Always switch off the transmitter during work breaks and after completing work by moving the rocker switch to the "Stop" position.

2.7.6. Machine parking

- Clean the Machine to get rid of any coarse dirt.
- Carry out overall inspection of the Machine and repair any defects that occurred during operation.
- Use scotch blocks to secure the drums.
- Close and lock the protective cover.

Shut down the Machine on flat and paved surface. Confirm there is no potential of natural hazard (landslide, potential flooding due to any deluges, etc.) at the location.

2.7.7. Opening the front and rear bonnets

Danger of severe injury through loose clothing being caught and drawn in!

Only open the bonnet when the engine is off.

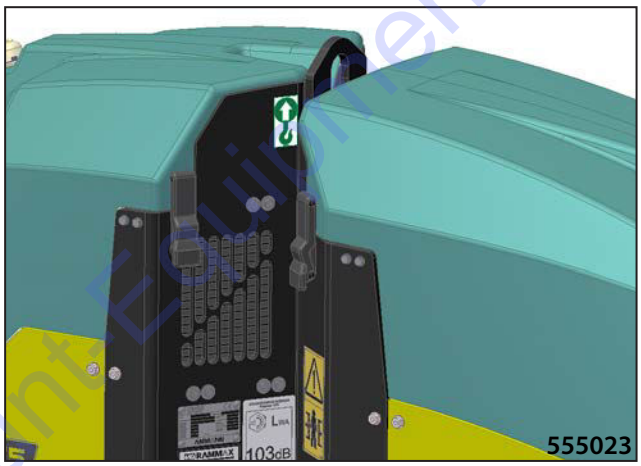
If trouble shooting makes working on moving parts (engine or roller) unavoidable, never wear: Necklaces, bracelets, rings, scarves, ties or other loose items of clothing.

If any of these get caught in moving parts there is a danger of serious injury!

Danger of scalding from hot water / steam!

Only work on a cool engine.

Keep enough distance to the exhaust.



There is one locking device each on the front and back as well as the left and right of the roller.

- Open both catches, on the right and the left.
- Push gently to lift the bonnet.

Note:

Two gas struts reduce the force required to open the hood and give it its final position. If you need to exert a greater force to lift the engine bonnet, replace the gas springs. Refer to chap. 3.6.22. Replacement of gas springs.

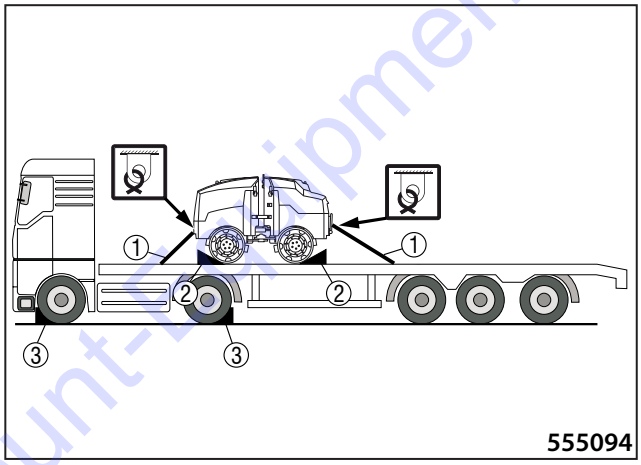
2.8. How to transport the Machine

- The machine can move on its own between working sites.

When moving on the working site, observe the safety measures applicable to the working site.

When driving for long distances, 1-hour cooling breaks after 3 hours of driving should be taken. Failing that, you are exposed to the risk of damage to the machine for which the manufacturer is not responsible.

- When on the road, the machine should be transported on a vehicle.



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When transporting the machine on a vehicle, observe the regulations in force in the given territory.

Make sure the transport carrier is braked and mechanically secured against undesired motion with scotch blocks (3) when loading or unloading.

When moving onto the transport carrier you must switch ON the function of Drum Slip Limitation. At the same time we recommend to put rubber bands or wooden planks, etc. underneath the drum.

The machine on the vehicle must be properly tied and mechanically secured against longitudinal and lateral displacement as well as against tipping (1). The drums must be secured using scotch blocks (2).The maximum force permitted for tying the machine to a transport vehicle is 2.5 t.

Center of gravity

The center of gravity relevant to transport is located 460 mm from the floor and approx. in the center of the roller, depending on the fill level of the diesel or water tanks.

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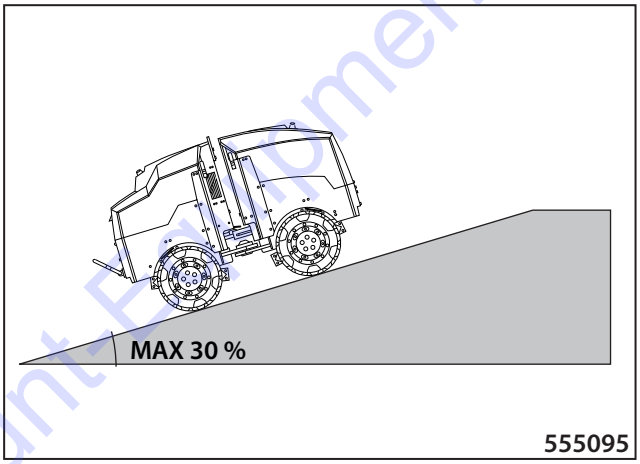
2.8.1. Machine loading

- Use a loading ramp or crane to load the machine onto the transport vehicle.

2.8.1.1. Loading the machine using a ramp

- When loading the machine using a ramp, all safety regulations related to loading of the machine valid in the place of loading must be adhered to. The ramp must have appropriate loading capacity, antislip surface and must be stored on a flat surface. We recommend that you adhere to regulation BGR 233.
- Maximum permissible incline of the ramp is 30 %.

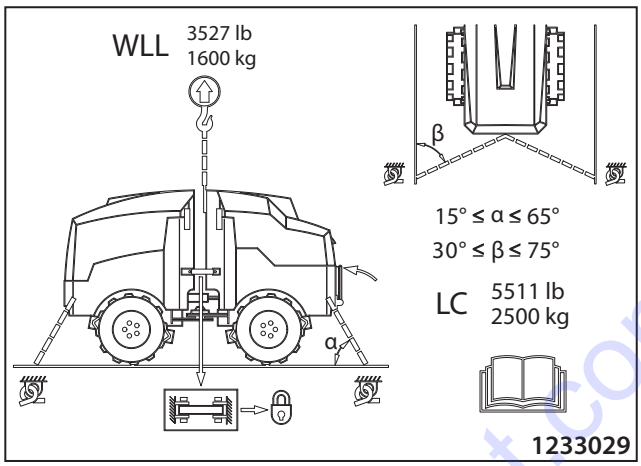


Non-adherence to the prescribed parameters of the ramp may result in damage to the machine.

Pay increased attention when loading the machine. Improper handling can cause serious injury or death.

2.8.1.2. Loading the machine using a crane

- When loading with crane the Roller is fitted with lifting lugs - refer to the Fig. showing the lifting method.
- The 1-point lifting eye is designed for a WLL of 1.6 tons (Working Load Limit).
- When lifting the Roller the Machine's joint shall be secured against turning.



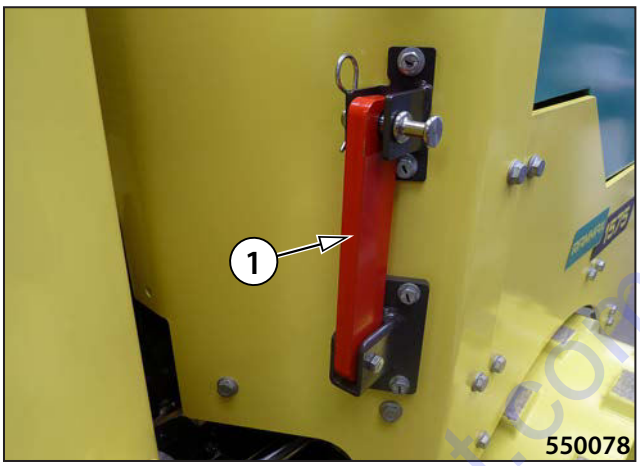
Before lifting , make sure all screws on the 1-point lifting eye are damage free and securely tightened.

When loading and unloading the machine, it is necessary to observe the provisions of ISO 12480-1 and to use slings under EN 1492-4+A1.

Pay increased attention when loading the machine. Improper handling can cause serious injury or death.

How to secure the joint:

- Release the lower part of the joint protection (1).
- First, remove the compression spring (2) and then the lock bolt (3).
- Carefully turn the roller steering until the joint protection comes in line with the opposite loop.
- Now steer to the left all the way to the stop.

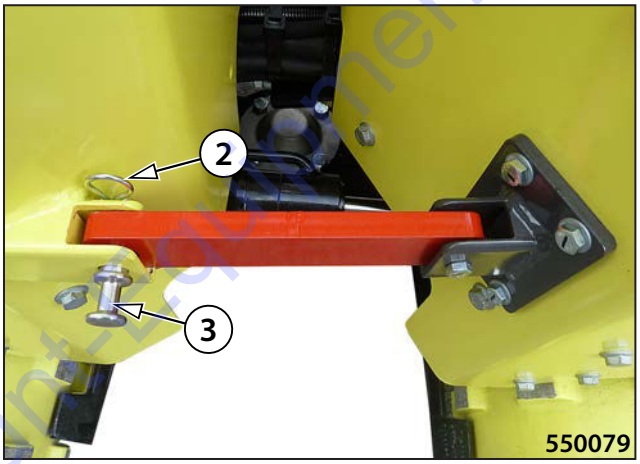


Note:

In order to operate the steering, you must start the roller and maintain a distance of at least 2 meters.

Risk of crushing through presence in the pivoting area (danger zone)!

As soon as the roller is aligned, shut if off again.



- Hook the joint protection into place.
- Secure the joint protection with the lock bolt (3).
- Secure the lock bolt with the compression spring (2).

Do NOT enter the area under the lifted load!

Upon loading completion, please return the safety arm and cotters to their initial position.

Use corresponding, undamaged riggings of sufficient loading capacity.

To sling, please use only the lifting lugs on the Machine designed for that purpose.

Only a trained slinger may carry out the slinging.

2.9. Special conditions of the Machine use

2.9.1. Machine operation during running-in

When putting a new machine into operation, the machine should not be run at full power for the first 50 hours (driving uphill with vibration).

2.9.2. Machine operation at low temperatures

Compacting in winter season depends on the content of fine particles and water in the soil being compacted. With the temperature declining below freezing point the soil becomes more solid and harder to compact.

It necessary to compact at the temperatures below 0 °C (32 °F) then it is possible to compact dry soil (and stony loose materials) or make swift compaction of non-frozen materials (before earth freezes through).

Preparation for work under low temperatures:

- Check concentration of the engine coolant.
- Exchange the engine oil with oil recommended for the range of outside temperatures.
- Use hydraulic oil of the corresponding cinematic viscosity.
- Use winter fuel.
- Check the batteries are recharged.

The good condition of the battery is a precondition for good starting under low temperatures. The machine can be used at full power only after the fillings have been heated up to their operating temperatures.

Min. temperature of engine coolant is 60 °C (140 °F). Max. temperature of 100 °C (212 °F).

At temperatures below -13 °C (9 °F), replace the oil in the hydraulic system with VG 32 class hydraulic oil.

Starting of the machine at temperatures below -23 °C (-9 °F) is not possible without preheating of the operating fluids.

2.9.3. Machine operation under high temperatures and humidity

- Engine power output decreases with increasing temperature and air humidity. Both power reducing factors are independent on each other:
  - a rise in temperature by every 10 °C (50 °F) results in a drop of power output by up to 4 % (at constant humidity)
  - a rise in relative humidity by every 10 % results in a drop of power output by up to 2 % (at constant temperature).

Note

The maximum permitted oil temperature for VG 46 class oil is 80 °C (144 °F); the maximum permitted oil temperature for VG 32 class oil is 70 °C (158 °F)

In the environment where hydraulic oil temperature remains constantly around 90 °C (194 °F), we recommend exchanging the hydraulic oil with oil which is one-class denser, with HV 68 cinematic viscosity.

2.9.4. Machine operation at higher altitudes

- In higher altitude, engine power output decreases as a result of lower atmospheric pressure and specific density of incoming air.
- The engine is equipped with an altitude sensor which adjusts fuel injection, eliminating the black smoke effect during operation of the machine at higher altitudes, in accordance with the EPA regulation.
- This function is activated automatically at the altitude of 800 m above sea level, and from this altitude up the engine output power is gradually reduced. For instance, at the altitude of 2000 m above sea level, the power output is reduced by 20 % of the maximum power output in regular conditions and the torque is reduced by 30 % (refer to the table).

Altitude (m above sea level)	0	1000	2000	3000
Power output reduction (%)	0	10	20	30
Max. torque reduction (%)	0	20	30	35

The engine power depends on the environment in which the machine is working.

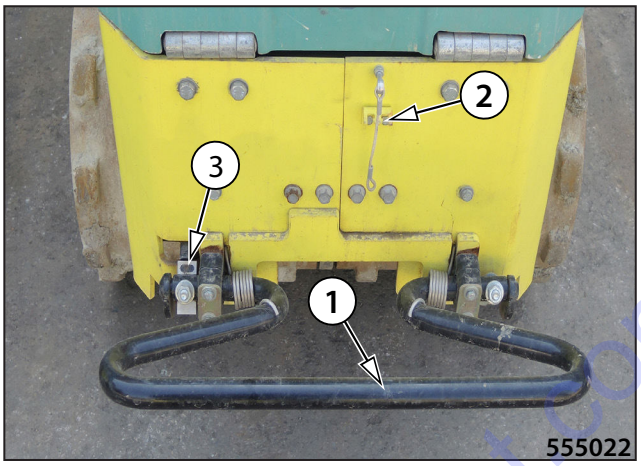
2.9.5. Machine operation in very dusty environment

- When working in very dusty environment, please shorten the intervals of cleaning and replacing of the air filter elements and shorten the intervals of cleaning of the coolers.
- The recommended interval of cleaning is once a week.

2.10. Optional equipment

2.10.1. Shutdown bar

- The shutdown bar is located on the rear of the machine under the operating unit. A proximity switch is located on the rear section of the machine above the attachment point of the shutdown bar. If the machine moves against an obstacle with the shutdown bar, the shutdown bar is actuated and triggers the proximity switch. This sends a signal to the machine controller and the machine can now only be moved forward away from the obstacle. If the vibration function is running, it will be shut down. The vibration function must be restarted manually after the shutdown bar has been deactivated.
- During transport, the shutdown bar must be secured with a strap in the transport position.



1 - Shutdown bar

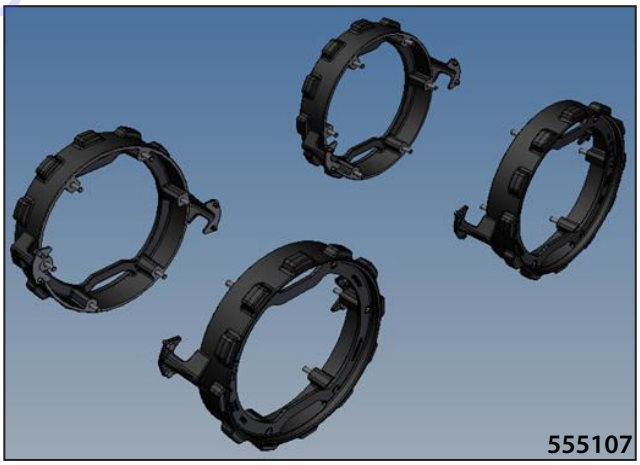
2 - Point for securing the safety bar by a belt

3 - Proximity switch

Shutdown bar
Order number: 1241609

2.10.2. Drum extension set

- The drum extension set can be ordered for drum width of 640 mm. The extension increases the width of drums to 850 mm.

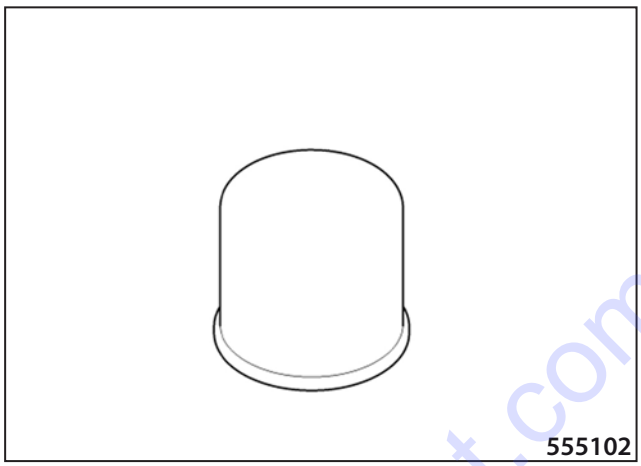


Drum extension set
Order number: 4-760100

2.10.3. Service set after first 50 engine hours and after 250 engine hours

- The service set contains an oil filter.

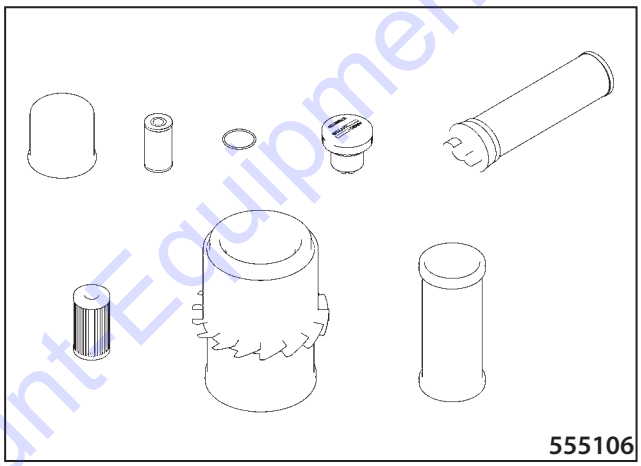
Oil filter
Order number: 1-954075



2.10.4. Service set after 500 engine hours

- The service set contains filters for regular maintenance after 500 engine hours.

Service set after 500 EH
Order number: 4-760099



2.10.5. Cover tarpaulin

- The covering tarpauline of rigid and waterproof material protects the machine against adverse climatic conditions, dust, dirt and vandalism. Four outside and inside use.

Cover tarpaulin
Order number: 3-51856

3. MAINTENANCE MANUAL

Rammax 1575
(Yanmar Tier 4f)

3.1. Safety and other measures for machine maintenance

3.1.1. Safety of machine maintenance

Lubrication, maintenance and adjustment must be carried out:

- by professionally trained personnel
- according to safety instructions given in the Operation manual
- in terms stated in the table of lubrication and maintenance
- on the machine marked with "Machine in repair" tag
- on the machine standing on a flat solid surface and secured against motion (by scotch blocks), always with the engine off, the key removed from the ignition box and the wiring disconnected
- on cold machine parts
- after the machine, lubrication points and maintenance places have been cleaned
- with the use of suitable, undamaged tools
- with the use of original spare parts from the catalogue of spare parts
- at sufficient lighting of the entire machine in a case of poor visibility and at night
- in such a way that all removed covers and safety elements are reinstalled after the work is completed
- by retightening of all bolted connections – with the torque specified, and checking the connections for tightness
- with the use of recommended operating fluids stated in the operation manual.

After the adjustment or maintenance is completed, check proper function of all safety devices!

3.1.2. Fire protection measures during exchanges of operating fluids

- From the point of fire hazard, the flammable liquids used on the machine are divided into the following hazard classes:

  class II - flammable substances with the point of ignition from 21 °C to 55 °C - diesel oil (according to specification from the supplier)

  class III - flammable substances with the point of ignition from 55 °C to 100 °C - diesel oil (according to specification from the supplier)

  class IV - flammable substances with the point of ignition from 100 °C to 250 °C - mineral oils, lubrication greases
- The place for carrying out an exchange of operating fluids must be situated in such a way that does not interfere with an explosion or fire hazard area.
- It must be identified with "No smoking" and "No open fire" signs and marks.
- The handling area must be dimensioned so that it can catch a volume of the flammable liquid equal to the capacity of the biggest vessel, transport container.
- The place for exchanging of operating fluids must be equipped with portable fire extinguishers.
- To handle operating fluids, use such vessels like metal barrels, canisters or sheet-metal cans.
- Transport containers must be properly closed during storage.
- The vessels must be only with one hole, be always stored with the opening up and secured so that their content cannot flow or drip out.
- The vessels must be identified with indelible inscription indicating the content and flammability class.

3.1.3. Ecological and hygienic principles

When operating or maintaining the Machines the user shall be liable to follow the general principles of health and environment protection according to the laws, ordinances and regulations in individual territories of the Machine use.

Hygienic principles

- Crude oil products, cooling system media, battery media and coating compositions incl. thinners are materials harmful to health. Workers coming into contact with these products during machine operation or maintenance shall be liable to follow the general principles of their own health protection and conform to the safety and hygienic manuals of these products' manufacturers.

  We call your attention to the following in particular:

  - Eye protection and skin protection during work with the batteries
  - Skin protection during work with crude oil products, coating compositions or cooling liquids
  - Proper hand washing upon work completion and before any meal; use adequate reparation cream to treat your hands
  - Adherence to the instructions given in this Manual

- Always store the crude oil products, cooling system media and battery media, and coating compositions incl. organic thinners, and also the cleaners and preserving agents, in the genuine, original and properly labelled packages. Do not admit any storage of these materials in unlabelled bottles or in any other vessels with regard to the hazard of mistaken identification (faulty change).
- When skin, mucosa, eyes are accidentally stained, or vapours inhaled, immediately apply the first aid principles. In the event of accidental use of these products get prompt medical attention.
- When working with the Machine in cases where the Machine has platform fitted, cabin windows are left opened, always use ear protectors of adequate type and version.

Ecological principles

The media of Machine's individual systems, and some of its parts after having been discarded (dismantled, media exchanged) become waste with hazardous properties against the environment.

This category of waste products includes the following in particular

- Organic and synthetic lubricating materials, oils and fuels
- Cooling liquids
- Battery media and the batteries themselves
- Cleaners & preserving agents
- All dismantled filters and filter elements
- All used and discarded hydraulic or fuel hoses, rubber-metal and Machine's other elements, made dirty due to the abovementioned products.

The given materials and parts, when scrapped, shall be handled compliant to the respective national regulations on environmental protection, and in line with the health protection regulations, as well.

3.2.1. Engine oil

Engine oil is specified by its performance and viscosity classifications.

Performance classification according to

API (AMERICAN PETROLEUM INSTITUTE)

ACEA (ASSOTIATION DES CONSTRUCTEURS EUROPÉENS DE AUTOMOBILE)

Viscosity classification

To determine SAE (Society of Automotive Engineers) viscosity class, the ambient temperature and type of operation in place of usage of the machine are decisive.

Permitted oil according to API: CF

Permitted oil according to ACEA: E-3, E-4 a E-5

All season - SAE 15W-40 (e.g. Valvoline, Premium Blue,).

NOTE

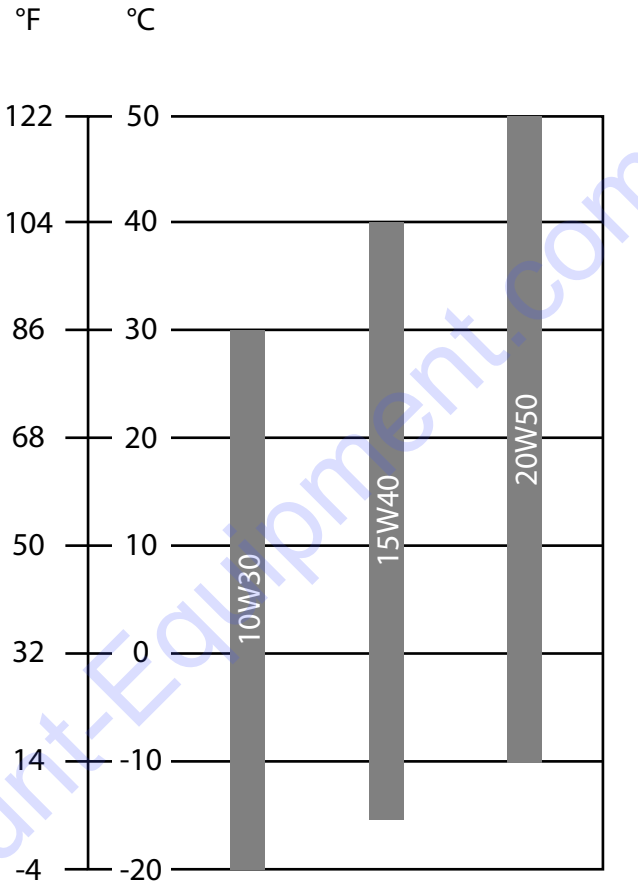
Exceeding of the lower temperature limit does not damage the engine, it may only cause starting problems.

It is suitable to use general-purpose multi-grade oil in order that oil need not be exchanged because of ambient temperature changes.

Use of synthetic engine oils is permited subjekt to the same performance and viskosity limitations of minarel (petroleum) based engine oils. The same oil change intervals must be applied to the synthetic oils that are applied to mineral (petroleum)based engine oils.

For easier start at temperatures below 0 °C (32 °F), SAE 10W-30 oil is recommended by the engine manufacturer.

Exceeding the upper temperature limit must not last for long, taking into consideration reduced lubricating properties of oil.



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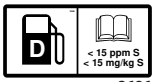
3.2.2. Fuel



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Diesel is used as fuel:

- CEN EN 590:96
- ASTM D 975-94: 1-D, 2-D
- ISO 8217 DMX

NOTE

Engine producer recommends to use fuel with sulphur content less than 0.05 weight percent.

Therefore use winter Diesel fuel at outdoor temperatures below 0 °C (32 °F).

Mixing diesel with special additives is prohibited.

Use of biofuel (Diesel fuel)

Using the fuel mixture under the trade name of Bionafta is in principle approved by the engine manufacturer for the engine on the machine if it conforms to the specifications under EN 14214 or ASTM D6751. Up to 5 % portion of biodiesel is accepted.

Before using Bionafta on the machine, make sure that it is supplied by a reputable supplier who supplies fuels corresponding to the above-mentioned standards.

Always ask the supplier of Bionafta for information concerning the condition under which it can be used.

Guarantee for the engine will be rejected when using Bionafta not conforming to the above-mentioned standards and if the fuel system or engine is damaged as a result of using improper Bionafta!

When using Bionafta, power can be reduced by up to 12% depending on the used mixture of Bionafta. Therefore, do not adjust the engine or the setting of the injection pump for increasing the power in any case. Never mix the fuel mixture at the place of use.

Bionafta has a higher cloud point at a low ambient temperature, which leads to the creation of wax crystals in the fuel resulting in the fuel filter clogging.

When using Bionafta, it is necessary to shorten the intervals of the engine oil exchange and replacement of an oil filter and fuel filter.

When changing over to Bionafta, the action of Bionafta releases corrosion and impurities created on the fuel tank internal walls. Impurities are brought by the fuel to the filter catching them and the filter must be replaced afterwards.

Bionafta has a higher ability to absorb atmospheric moisture, which results in the condensation of atmospheric moisture on the internal walls of the tank and a higher content of water in the fuel and the need for more frequent discharging of water from the fuel filter separators. The possibility of the occurrence of the problem increases in cold weather.

If Bionafta (Biodiesel) is used all the year round, it is necessary to clean the fuel system under the engine operation with a clean diesel fuel for at least 30 minutes before parking the machine for longer than 3 months. Further, it is necessary to drain off the fuel tank, clean it, and either fill it with diesel fuel or minimise the occurrence of moisture and limit the microbiological growth inside the tank. Consult the measures with Discount-equipment.

3.2.3. Coolant

Use coolant consisting of 50% of frost-resistant ethyl glycol agent and water. Use the coolant with antifreeze even in zones where temperatures do not fall below -36 °C (-34 °F). Propylene antifreeze may also be used as coolants.

Coolant specification:

- ASTM D6210, D4985
- SAE J814C, J1941, J1034 or J2036

Do not use more than 50 % of antifreeze in the coolant, unless absolutely necessary.

Never use a ratio higher than 68 %.

Their mutual mixing is not recommended. Anti-corrosive properties may be lost when mixing different types of coolants.

Nitric amines dangerous to health are formed when mixing the nitride-base antifreeze and the amine-base agent.

Check the ratio of antifreeze in the coolant before wintertime using a refractometer (hydrometer).

3.2.4. Hydraulic oil

For use in the hydraulic system of the machine, only high-quality hydraulic oils of output class according to ISO VG 46 HVLP (equal to DIN 51524 part 3 HVLP).

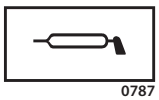
Standardly refill the machines with hydraulic oil of kinematic viscosity 46 mm^2/s at the temperature of 40 °C (104 °F) ISO VG 46. This oil is the most suitable one to use in the broadest range of ambient temperatures.

Synthetic hydraulic oil

Hydraulic system can be filled with synthetic oil, that is completely degradable by microorganisms found in water and soil in case of leak. Hydraulic oil on the basis of HE ester, HEES category according to ISO 15380, can only be used.

When changing over from mineral oil to synthetic or when mixing oils of different brands, always consult the procedure with Discount-equipment!

3.2.5. Lubricating grease



For lubrication of the machine, lubricants must be used according to:

ISO 2137

DIN 51 502

3.3. Fills

Fills of...	Type of fill	Quantity l (gal US)	Brand
Engine	Engine oil according to chapter 3.2.1.	3,4 (0,9)	 2412
Fuel tank	Diesel according to chapter 3.2.2.	28 (7,4)	 2151
Hydrostatic system	Hydraulic oil according to chapter 3.2.4.	16 (4,23)	 2158
Engine cooling system - coolant	All year round - anti-freeze liquid according to chapter 3.2.3.	1,2 (0,3)	 2152
Joint bearings - joint and steering cylinder	Plastic grease according to chapter 3.2.5.	as required	 0787

3.4. Lubrication and Maintenance Chart

Every 10 operating hours	
3.6.1.	Checking fuel level
3.6.2.	Engine oil level check
3.6.3.	Engine cooling liquid level check
3.6.4.	Hydraulic tank oil level check
3.6.5.	Cleaning the hydraulic oil cooler
3.6.6.	Air filter check
3.6.7.	Cleaning of the water separator
3.6.8.	Scrapers
Every 50 operating hours	
3.6.9.	Inspection of brakes
3.6.10.	Battery check
Every 100 operating hours	
3.6.11.	Lubricating steering cylinder, bearing
Every 250 operating hours	
3.6.12.	Check of the fan and engine belt condition *
3.6.13.	Replacement of engine oil and filter *
Every 500 operating hours	
3.6.14.	Replacement of fuel filters
3.6.15.	Air filter cartridge replacement
Every 1000 operating hours	
3.6.16.	Exchanging hydraulic oil and filter **
3.6.17.	Engine cooling liquid change
3.6.18.	Cleaning the fuel tank
3.6.19.	Valve clearance adjustment
3.6.20.	Check of swing support
3.6.21.	Check of articulation joint

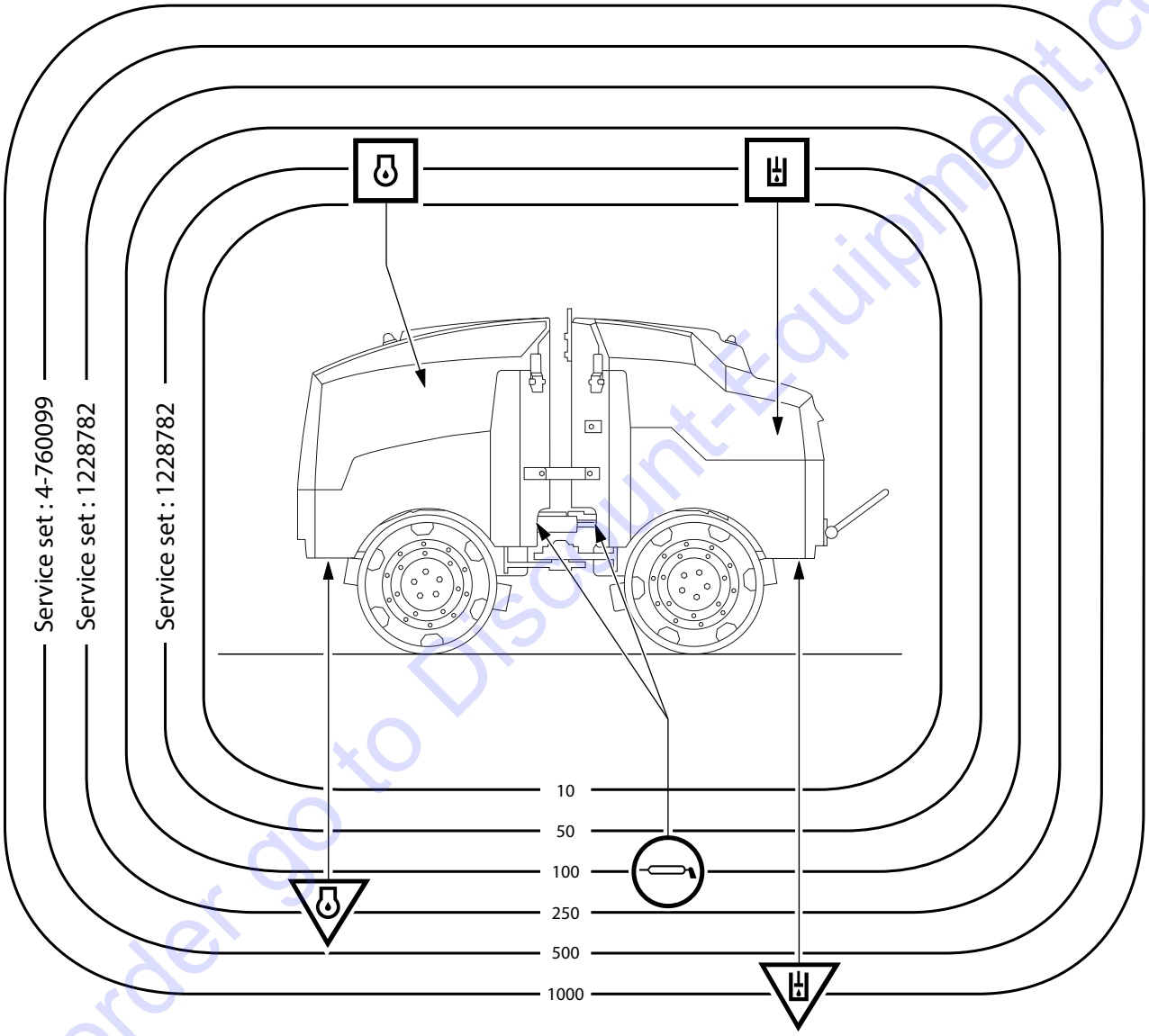
Maintenance - As Needed	
3.6.22.	Replacement of engine cover gas struts
3.6.23.	Cleaning the machine
3.6.24.	Check of the screw connection tightening

*** First after 50 hours**

**** First after 500 hours**

LUBRICATION AND SERVICE PLAN

□	CONTROL
○	LUBRICATE
▽	EXCHANGE

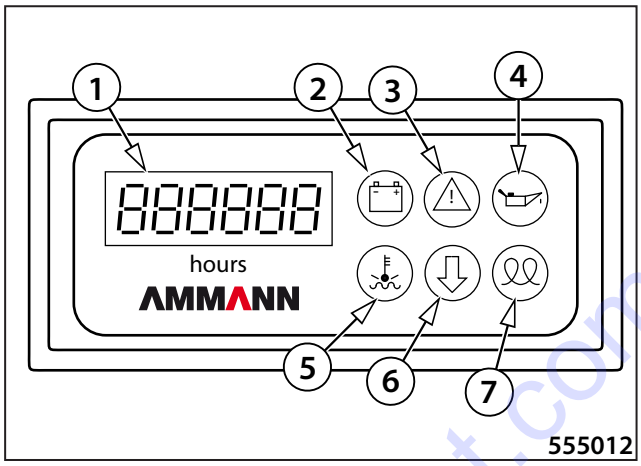


	Engine oil:	**SAE 15W/40**	**API CF, ACEA E3-E5**
	Hydraulic oil:	**ISO VG 46 HVLP**	
	Grease:	**ISO 2137**	**DIN 51 502**

555084en

3.6. Individual Operations of Maintenance

Carry out lubrication and maintenance on regular basis and repeatedly in the intervals as per daily reading on the counter of hours actually worked.



This Manual states only the basic information about the engine, other data are given in the Engine Operation and Maintenance Manual which is part of the Documentation supplied with the Machine.

Follow the instructions given in the Engine Operation and Maintenance Manual!

Tighten the removed or loosened bolts, plugs, threaded joints of the hydraulics, etc. with tightening torque according to the Chart in par. 3.6.24. unless another value is provided with the respective operation.

Carry out maintenance with the Machine placed on flat, paved surface, and secured against any self-motion, always with the engine off, and key removed from the ignition box and with the wiring cut off (unless otherwise required).

Only carry out lubrication, maintenance and adjustment on a machine marked with "Machine in repair" tag!

Following the first 50 hours of operation of the new Machine (following a major overhaul) carry out as per:

3.6.12. Check of the fan and engine belt condition

3.6.13. Replacement of engine oil and filter

Following the first 500 hours of operation of the new Machine (following a major overhaul) carry out as per:

3.6.16. Exchanging hydraulic oil and filter

Every 10 operating hours

3.6.1. Checking fuel level

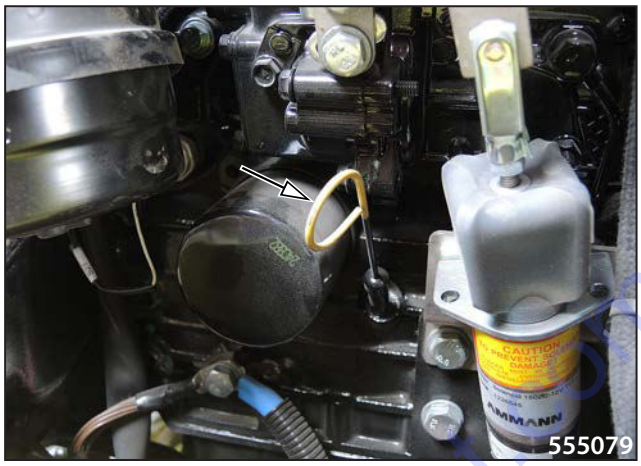
- Open the hood.
- Check the level in the plastic tank.
- If needed, fill the fuel tank with diesel fuel up to the lower edge of the filler neck.
- The tank holds 28 liters of diesel fuel.

No smoking at work!

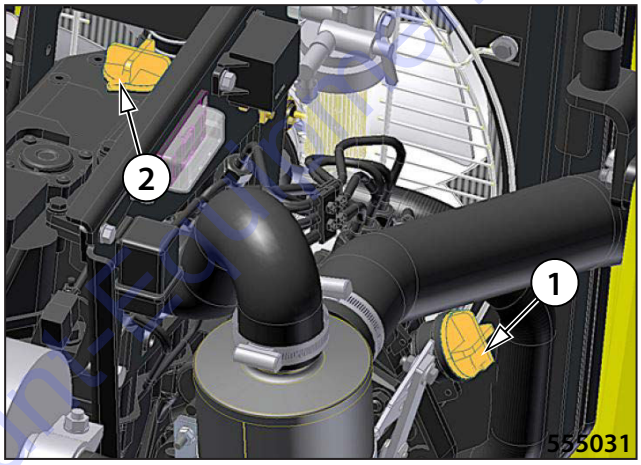
Check the tightness of the fuel tank and fuel system.

Retain any fuel flowing out.

3.6.2. Engine oil level check



- Wait approx. 5 min. until oil runs down to the engine sump.
- Take out the oil dipstick (1), wipe it, insert fully back and take it out again to read out the oil level.



- Keep the level within the range of gauge marks pressed in the dipstick. The lower mark L (Low) marks the lowest possible oil level, the upper mark H (High) the highest one.
- Top up the engine oil at one of the two oil filler necks.
  - Filler neck on the left-hand side of the engine (1).
  - Filler neck on the engine (2).
- Check the engine for leakage, repair possible causes.
- Check the engine for damaged and missing parts and for changes in appearance.

Note:

The total amount of oil in the engine is 3.4 l (0.9 US gal).

Do not use the engine unless the oil level in the engine is correct.

Check oil when it is cooled down.

Refill the identical type of oil to chapter 3.2.1.

Avoid leakage of oil to the soil.

3.6.3. Engine cooling liquid level check

- Let cooling liquid cool down to less than 50 °C (120 °F).
- You can read off the level of coolant on the expansion tank display. The water level must be between the top (FULL) and bottom (LOW) marks.
- Top up coolant as required.

Note:
The total amount of engine coolant is 1.2 l (0.3 US gal).

Dismantle the filling plug only when the temperature of engine cooling liquid falls to less than 50 °C (120 °F). If you open it at higher temperatures, you risk scalding by steam or by cooling liquid due to the inner overpressure.

The level must not fall below the level indicator eyesight.

Refill only cooling liquids containing the frost-resistant agents on the identical basis, according to chapter 3.2.3.

Do not add additives eliminating untightness of the cooling system to the engine cooling liquid!

Do not refill cold cooling liquid into hot engine. Engine castings might get damaged.

In case of larger losses, find the location of cooling system leaks and repair the cause.

3.6.4. Hydraulic tank oil level check

- Always check the hydraulic oil level at operating temperature with the engine running.
- Place the roller on level ground.
- Let the roller continue to idle.
- Check the oil level in the inspection window.
- If the oil level is at the middle of the inspection glass, add 1 liter of hydraulic oil via the filler neck.

Topping up hydraulic oil

- Remove the screw lid (1) on the filler neck.
- Refill hydraulic oil if necessary.
- Reinstall the screw lid (1).

Important: Always grease the O-ring before screwing it in place.

Check oil when it is cooled down.

Refill the identical type of oil to chapter 3.2.4.

Avoid leakage of oil to the soil.

3.6.5. Cleaning the hydraulic oil cooler

- Check the cooling ribs of the hydraulic oil cooler for dirt and clogging.
- Clean the ribs with water or blow them out with compressed air.
- In case of work in very dusty conditions clean the radiator daily. Clogged radiators will result in lower cooling capacity and increasing temperatures of engine cooling liquid and hydraulic oil.

Do not use cleaner with too high pressure so as not to damage radiator honeycombs.

In case of contamination of the radiator by oil products, use a cleaning agent and proceed according to the manufacturer's instructions! Find the cause of contamination!

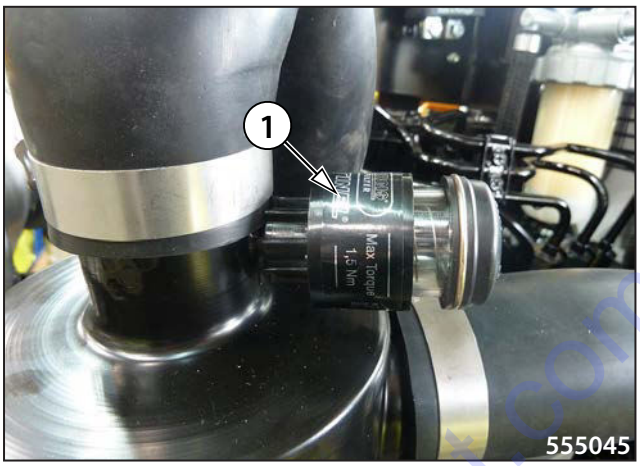
Follow environmental standards and regulations when cleaning the machine!

Clean the machine in a site equipped with an intercepting system for cleaning agents so that the soil and water sources are not contaminated!

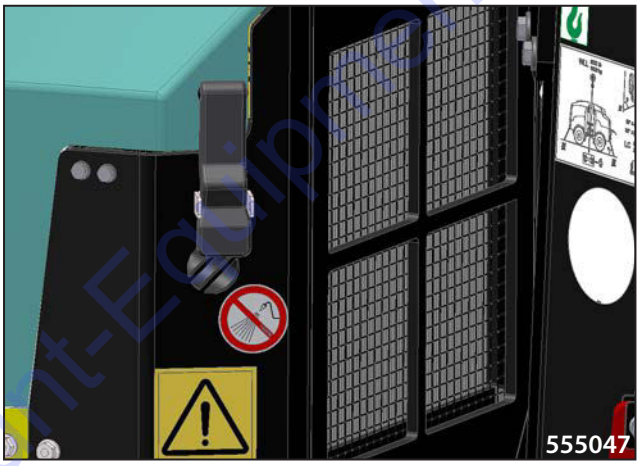
Do not use forbidden cleaning agents!

3.6.6. Air filter check

- If a red ring appears on the soiling display (1) during operation of the roller, you must:
  - replace the air filter insert according to chap. 3.6.15.



Check the air intake for: Soiling: clean the intake opening.



- Clean the exit slit, press to remove any dust trapped.

Note

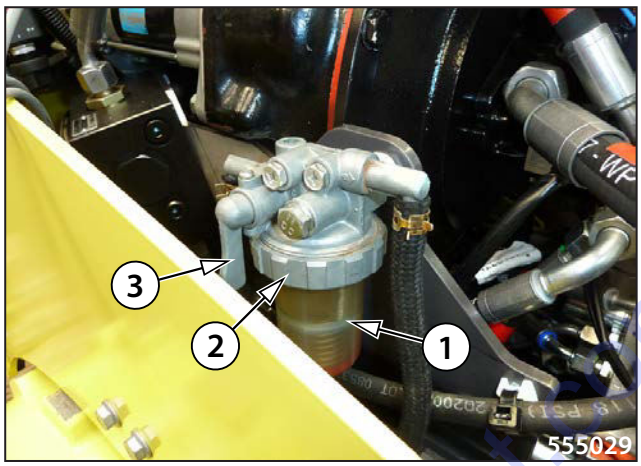
Possible dust trapped in the dust valve is automatically emptied during operation of the machine.

Replace the dust valve immediately if it is damaged!

Dust valve
Order number: 1227914

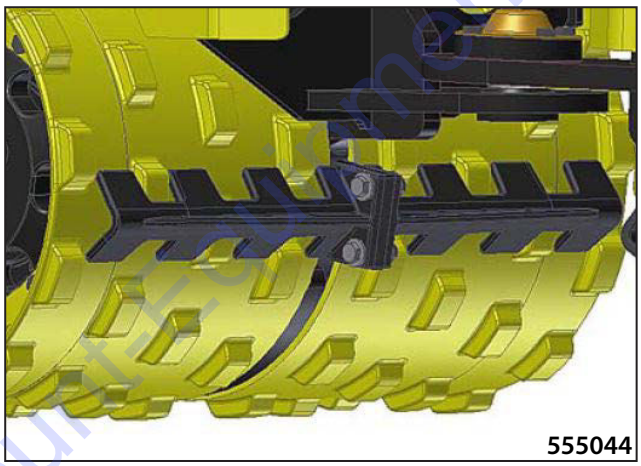
3.6.7. Cleaning of the water separator

- If the red ring leaves the bottom, pour out water from the separator.
- Close stop cock (3).
- Unscrew the filter housing (2).
- Clean filter element (1).
- Screw the filter housing (2) on.
- Open stop cock (3).
- Turn the ignition on. The fuel pump bleeds the system automatically.



3.6.8. Scrapers

- Before driving, adjust the roller drum scraper so that there is a clearance of about 5 mm between the roller drum and the scraper.

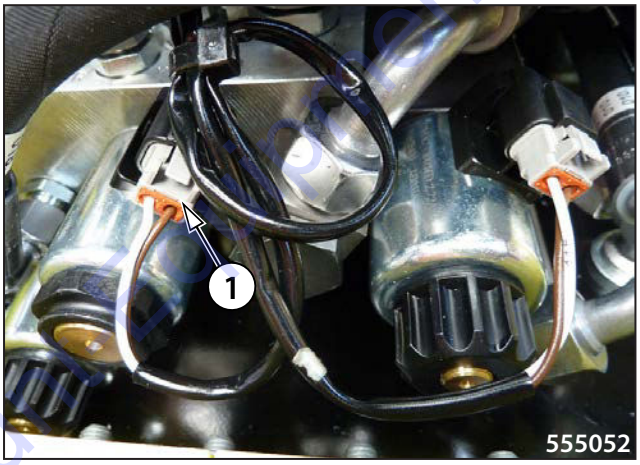


Every 50 operating hours

3.6.9. Inspection of brakes

- The function of the brakes must be checked periodically.
- The cable / connector Y9, which must be disconnected for the brake test, is located at the front under the hood.

- Put the machine into the work gear.
- Disconnect connector Y9 (1) from the connector housing at the magnet.
- Perform the forwards and backwards driving functions using the infrared sensor.
- If a brake is defective, the corresponding roller drum will rotate.

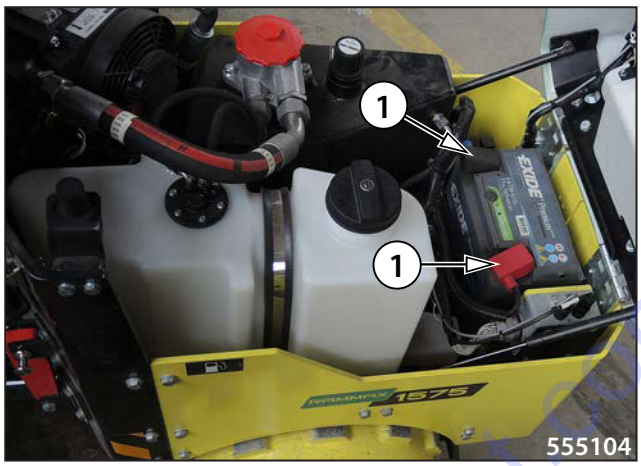


Note:

If a brake is defective, the roller is no longer safe for operation. Contact Discount-equipment and have the roller repaired pro-fessionally.

3.6.10. Battery check

- Stop the engine.
- Clean the surface of batteries.
- Check the condition of poles and terminals (1) and clean them. Slightly wipe terminals with grease.



MAINTENANCE-FREE BATTERY

- In case of a maintenance-free battery (the battery has no freely accessible plugs), only the no-load voltage on terminals is checked. The batteries cannot be replenished. If the no--load voltage is 12.6 V and more, the battery is fully charged. If the no-load voltage is below 12.4 V, the battery should be charged immediately. After the battery is charged, leave it to stand for 2–3 hours and then measure the voltage again. It is recommended to be mounted 24 hours after charging.

Note:

The no-load voltage is the voltage measured at the terminals of the battery which was at rest for at least 12 hours – was neither charged nor discharged.

Do NOT turn over the batteries, electrolyte may pour out from degassing batteries.

When there is electrolyte spillage, rinse the affected place with water, and neutralize with lime.

Hand over old batteries that do not work for their disposal.

Keep the batteries dry and clean.

Do NOT disconnect battery while the engine runs.

When handling with the battery, always follow battery Manufacturer's Manual!

Use rubber gloves and eye protection aids when handling the battery.

Use proper clothing to protect your skin against any electrolyte stain.

When there is eye contact with electrolyte immediately flush affected eye with large amounts of water for a few minutes. Get prompt medical attention.

When there is electrolyte ingestion, drink max amount of milk, water, or solution of calcined magnesia in water.

During skin contact with electrolyte, remove clothing, including shoes, flush affected points as soon as possible with soap water or solution of soda and water. Get prompt medical attention.

Do NOT eat, drink or smoke while at work!

After work is completed, wash your hands and face thoroughly with water and soap!

Do NOT check a wire is energized by touching Machine frame.

Disconnect the battery before its repair, or when about to handle the wires and electric devices within the wiring circuit so to avoid a short circuit.

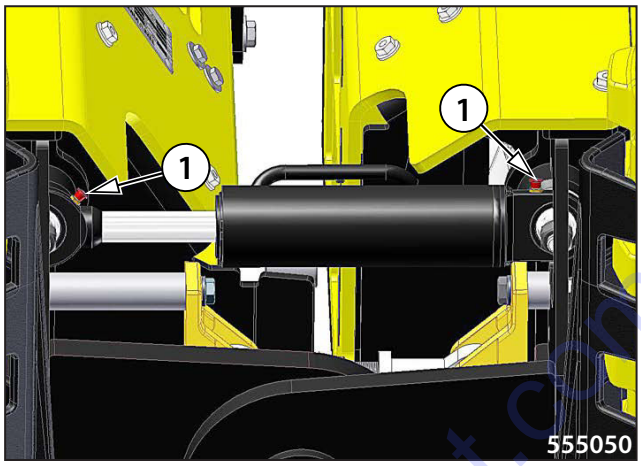
When disconnecting the battery, please disconnect cable with (-) pole first. When connecting, you must connect (+) pole first.

Making direct conductive connection between battery's both poles you will cause a short circuit with battery explosion hazard.

Every 100 operating hours

3.6.11. Lubricating steering cylinder, bearing

- Rotate the roller's steering fully to the stop in order to grease the cylinder.
- Steer the roller briefly to the right and the left. This causes the bearing to be unloaded.
- Clean the grease nipple (1) before greasing.
- Connect the grease gun to the grease nipple.
- Press grease into the bearing until it visibly begins to ooze out.
- Put the protective cover back on.



Note:

Regrease the bearing after every cleaning / steam cleaning of the roller.

Every 250 operating hours

The service set after 250 engine hours can be ordered under the order number 1228782. For the list of all spare parts, see the table in the end of this publication.

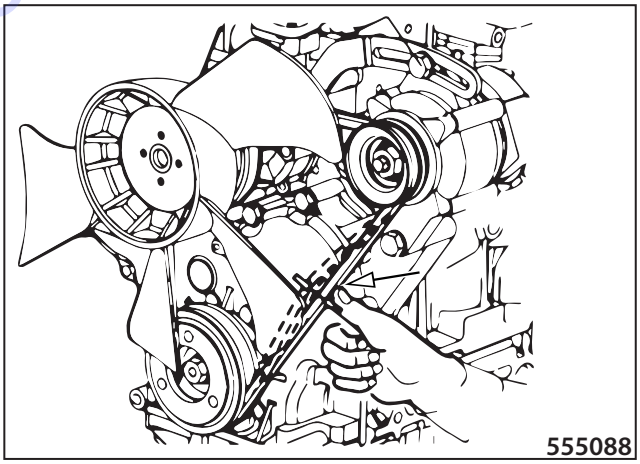
3.6.12. Check of the fan and engine belt condition

- Check the ventilator visually. In case of any damage (e.g. missing parts of the material, cracks, changes in shape etc.) replace the ventilator.

  Fan
  Order number: 1-952338

- Check visually the belt, for intersecting crakcks. Longitudinal (direction of belt length) cracks that intersect with traverse cracks are not acceptable. Replace the belt if it is frayed or has pieces of materiál missing.

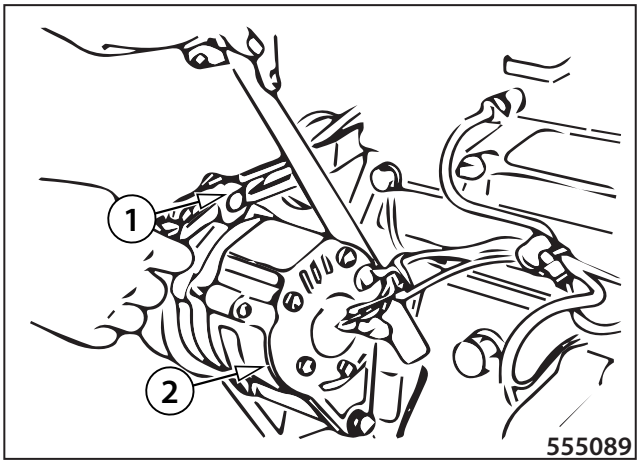
The engine must be stopped for check of tightness of the belt.



- Use your thumb to press the belt by the force of 100 Nm. Check the slack of the belt at the point illustrated in the picture. It should be between 10-14 mm.

  Belt
  Order number: 1183743

- If needed, tighten the belt by releasing the bolt and shifting the alternator.
- Let the engine run for five minutes and then check the belt for correct tightness.

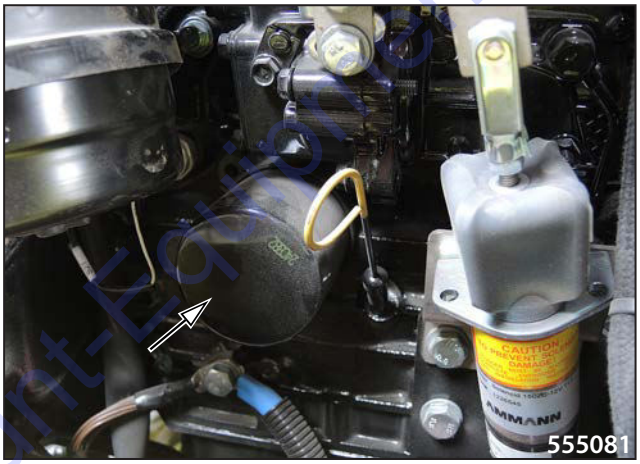


Check after the first 50 engine hours.

3.6.13. Replacement of engine oil and filter

Draining engine oil

- The engine oil drain (1) is located under the chassis at the front left.
- Place a container under the drain.
- Open the union by turning it anti-clockwise (size 27 wrench).
- The oil starts to flow out immediately.



Replacement of engine oil filter

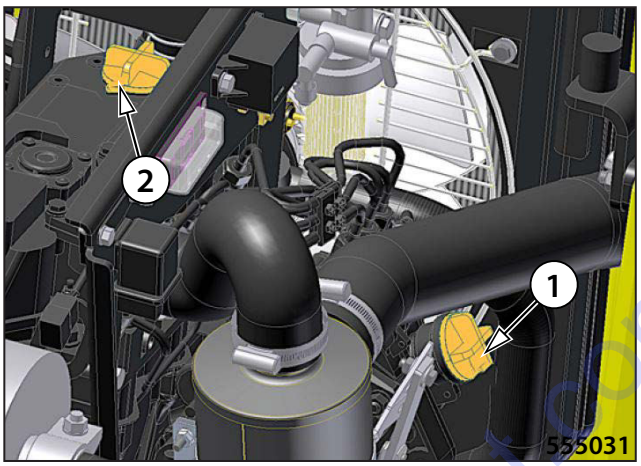
- Loosen the filter (1) by hand or using a filter wrench.
- The oil starts to flow out immediately. It's best to place a rag under it beforehand.
- Replace oil filter.
- Install in accordance with instructions (see filter packaging or filter housing).
- Screw the complete filter back in place.

Engine oil filter
Order number: 1-954075

Note:

- After refilling, start the engine for 2 - 3 min. Check tightness of drain plug and filter.
- Stop the engine, wait for approx. 5 min. until oil runs down to the engine sump. Then check the level with oil dipstick.

- Refill engine oil through one of two filling ports.
  - Oil filling port on the left engine side (1)
  - Oil filling port on the engine (2)
- Keep the level within the range of gauge marks pressed in the dipstick. The lower mark shows the lowest possible oil level, the upper mark the highest possible oil level.



Note:

The total amount of oil in the engine is 3.4 l (0.9 US gal).

Beware of scalding when draining hot oil. Let oil cool down to less than 50 °C (122 °F).

Follow the fire safety measures!

Change the oil after the first 50 engine hours.

Use recommended filters - see Spare parts catalogue. Use recommended oil - see chapter 3.2.1.

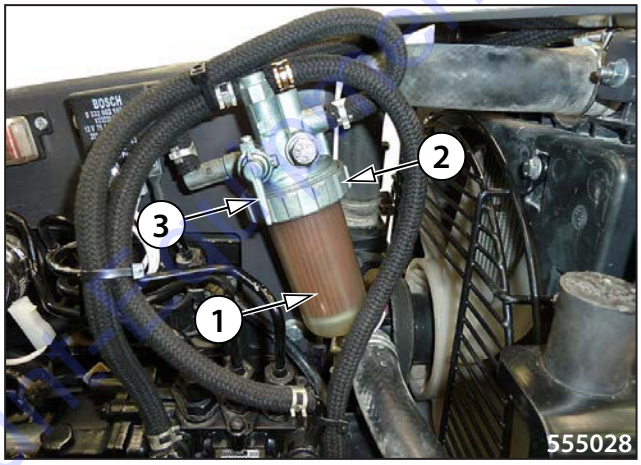
Collect drained oil; do not let it soak into the ground.

Used oil and filters are environmentally dangerous waste - have them liquidated.

Every 500 operating hours

The service set after 500 engine hours can be ordered under the order number 4-760099. For the list of all spare parts, see the table in the end of this publication.

3.6.14. Replacement of fuel filters



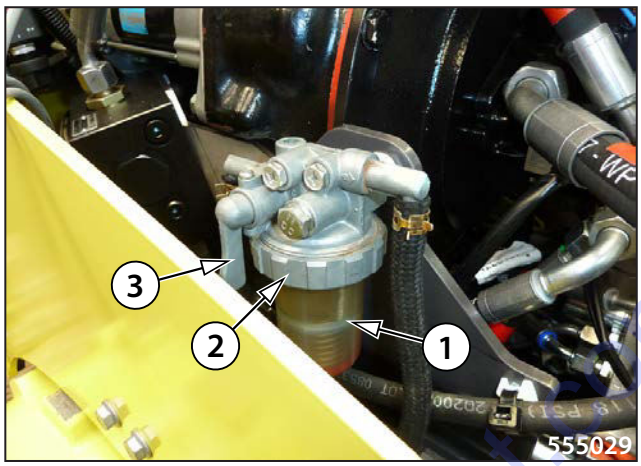
- Close stop cock (3). Move to OFF (C).
- Unscrew the filter housing (2).
- Remove the old filter element (1).
- Insert new filter element (1).

Filter cartridge
Order number: 1-954197

- Screw the filter housing (2) on.
- Open stop cock (3). Move to ON (O).

- Close the stop valve (3).
- Unscrew the filter housing (2).
- Replace the filter cartridge (1).

Filter cartridge
Order number: 1-954195



- Reinstall the filter housing (2).
- Open the stop valve (3).
- Turn the ignition on. The fuel pump vents the system automatically.

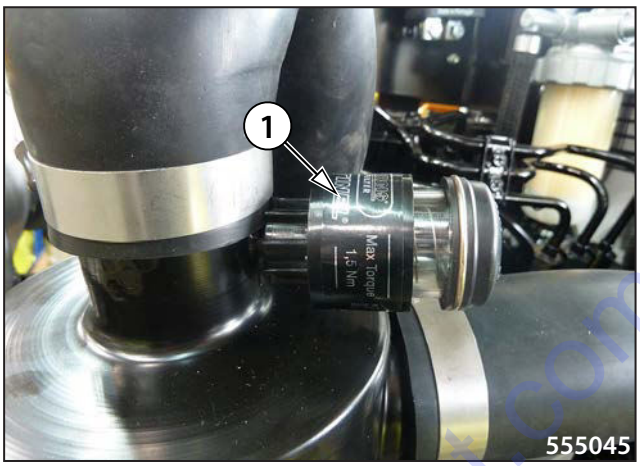
Use original filters required.
No smoking at work!
Do NOT tighten the filters with force.

Retain any fuel flowing out.
Store used filters inside separate container, and hand over for their disposal.

3.6.15. Air filter cartridge replacement

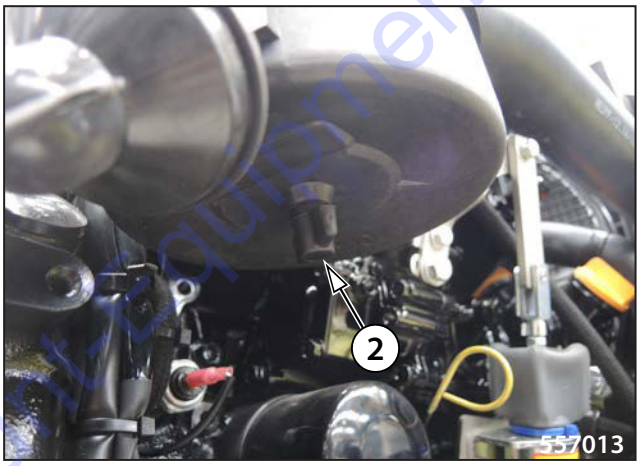
- If a red ring appears on the soiling display (1) during operation of the roller, you must replace the cartridge, however at the latest after 500 engine hours.

The manufacturer recommends that the elements should not be cleaned due to a decrease in the filtration capacity by up to 40 % and possible damaging of elements resulting from the cleaning.



The air filter is located on the left side of the engine.

- Remove the wing nut (2) with the cover.



- Unscrew another winged nut.

- Remove the main cartridge of the air filter (3).

- Unscrew the nut and replace the filter cartridge.

Safety cartridge
Order number: 1300309

- Install a new main cartridge. Tighten the winged nut.

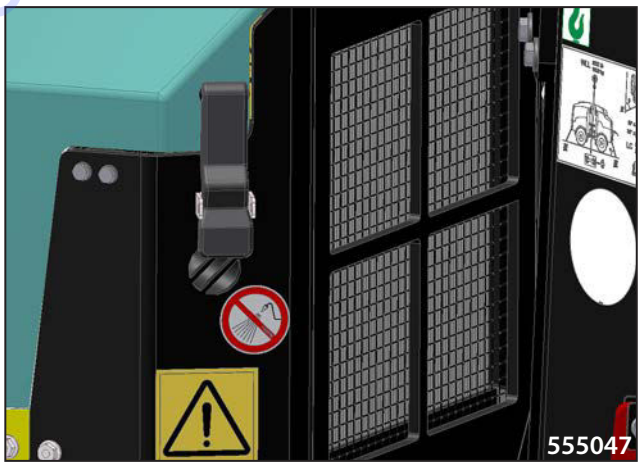
Main cartridge
Order number: 1300308

Note:

If the machine is used on very dusty surfaces, the air filter must be checked for clogging once per week.

When replacing the cartridges, take care that no dirt enters the suction hose.

- Check the air intake for: Soiling: clean the intake opening.



Do not clean the inside of the cleaner by pressure air; dust might get into the engine inlet piping.

Use original elements only.

When washing the machine, make sure water cannot pour into the air cleaner.

In case of absorbing water, exchange main element. Dry the cleaner body.

Replace defective vacuum valve immediately!

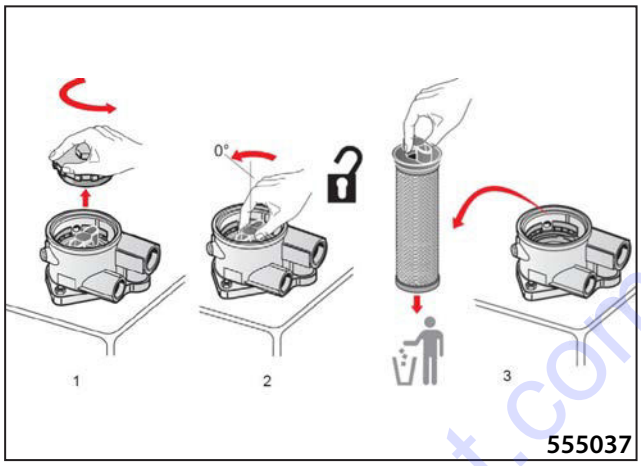
Do not operate the machine with damaged cleaner body or cover.

Every 1000 operating hours

3.6.16. Exchanging hydraulic oil and filter

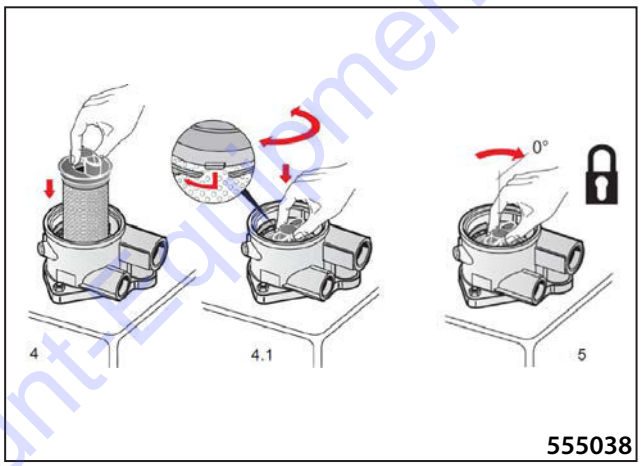
Replacing the hydraulic oil filter

- Remove the filter lid.
- Unlock the filter element.
- Lift the filter element out of the filter housing.
- Dispose of the filter element in an ecologically appropriate manner.

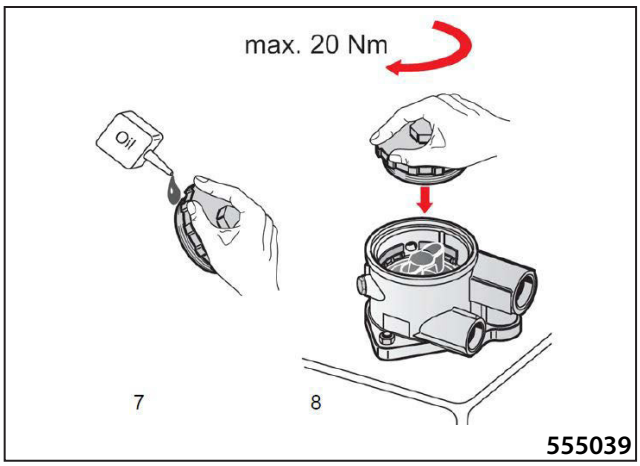


- Place the new filter element in the proper position. Observe the position of the locking cam.
- Turn the filter element fully clockwise to the stop.

Filter cartridge
Order number: 1179047



- Lightly oil the sealing ring on the filter lid.
- Put the filter lid in place.
- Tighten the lid with a torque wrench (max. torque, 20 Nm).

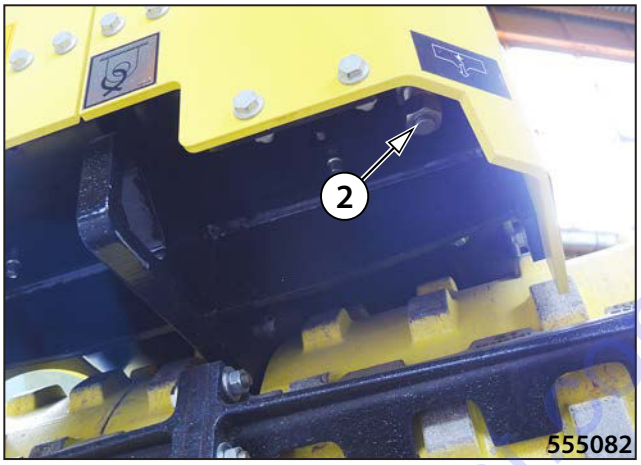


Draining the hydraulic oil

Note:
Only drain the hydraulic oil at operating temperature.
Residues in the tank will be flushed out with the oil.

- Place a container (with at least a 30 liter capacity) under the hydraulic oil drain.
- Remove the hydraulic oil tank lid (1).

- Unscrew the cover screw (2) under the roller (AF size 27 wrench).
- Allow the oil to drain into the container.
- Install the screw plug (2).
- Tighten the screw connection hand tight.
- Tighten the screw connections in the hydraulic tank hand tight.



Filling the hydraulic circuit:

- Fill hydraulic oil through the port into the tank.
- Replace the venting filter (1) for a new one.

Breather filter
Order number: 1242184

- Apply thin film of oil on the sealing ring in the lid.
- Install new filter in the tank.

Exchange oil when it is warm, preferably after the machine stops.

Let drained oil cool down to less than 50 °C (122 °F).

Perform the first oil exchange after reaching 500 operation hours.

Refill the identical type of oil.

Avoid leakage of oil to the soil.

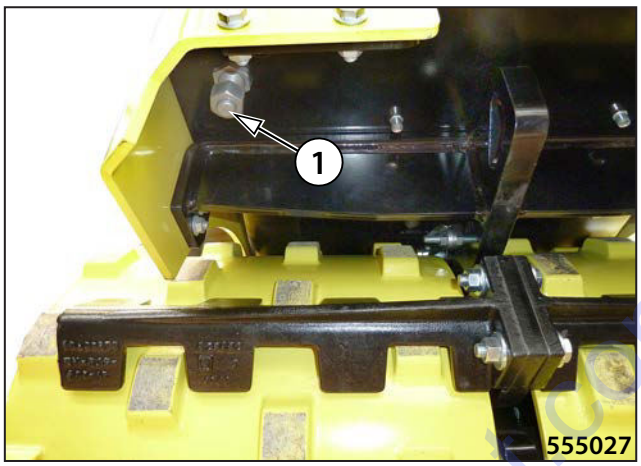
3.6.17. Engine cooling liquid change

- Open cooling system by removing pressure plug on the equaliser reservoir.
- Fill the cooling system through the port in the coolant expansion tank.

Note:
The total amount of engine coolant is 1.2 l (0.3 US gal).

- Unscrew the draining plug and drain the coolant.

3.6.18. Cleaning the fuel tank



- Over time, condensation water gathers in the fuel tank. It must be drained once a year.
- Unscrew the cover screw (1) under the roller (AF size 27 wrench).
- Place a container under the drain tap.
- Drain off the diesel.
- Inspect and clean the tank's inner area.
- Install the screw plug (1). Tighten the screw connection hand tight.

- Fill the fuel tank with diesel oil up to the lower edge of the filler neck.

No smoking at work!

Retain any fuel flowing out.

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3.6.19. Valve clearance adjustment

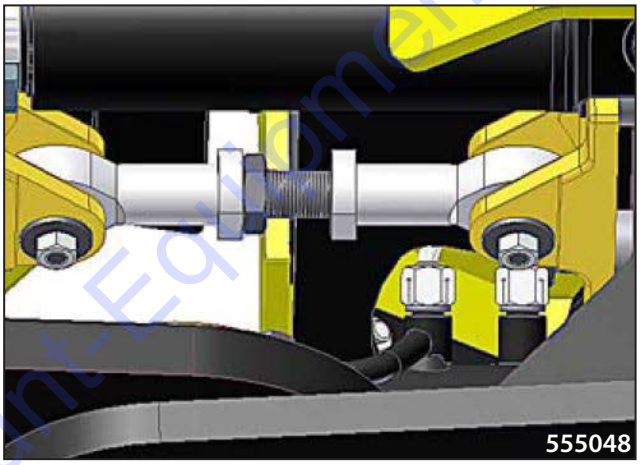
- Call Discount-equipment to adjust the engine valves. For contact points, please refer to Engine Operation and Maintenance Manual.

Note:

Further regular maintenance (check of injection and venting of the crankcase after 1500 engine hours, emission check after 3000 engine hours) should be consulted Discount-equipment.

3.6.20. Check of swing support

- Check the swing support once a year for excessive play.
- Attach the roller to a crane (central lifting point).
- The play can be checked by alternately applying and releasing upward pressure to the roller (visual inspection).



3.6.21. Check of articulation joint

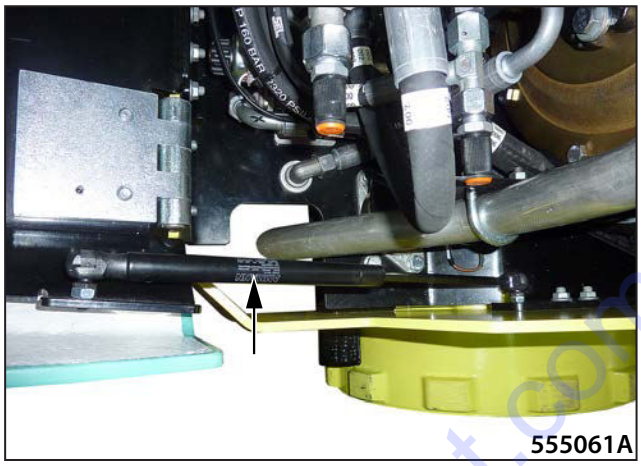
- Check the articulation joint once a year for excessive play.
- Attach the roller to a crane (central lifting point).
- The play can be checked by alternately applying and releasing upward pressure to the roller (visual inspection).

Maintenance - As Needed

3.6.22. Replacement of engine cover gas struts

- Gas struts are maintenance-free! They require no maintenance such as lubrication. They are designed for the respective requirements and work trouble-free for many years. When the gas springs fail to fulfil their function, replace them for new ones.

Gas springs (2 pcs)
Order number: 1205428



Secure the hood before you replace the gas struts.

Support the hood with a rod.

Attach the hood to a crane by the handle.

Removal

- Use a screwdriver to lift the clips.
- Pull the gas strut away from the ball joint.

Installing

- The new gas struts can easily be installed by pressing them onto the ball joint.
- The clamp must be seated securely afterward.

Gas struts should not be installed if they have been damaged through mechanical manipulation.

Welding on gas struts as well as dirt or paint on the piston rods can lead to failure of the units.

Avoid modifications, manipulation, impacts, tensile loading, heating, painting over or removal of imprints.

Do not install defective or improperly handled products.

If gas struts are no longer needed, they must be disposed of in an environmentally appropriate manner. For this purpose, they will be drilled out to allow the compressed nitrogen to escape and to drain the oil they contain.

3.6.23. Cleaning the machine

- Clean the machine from major impurities after finishing your work.
- Perform overall cleaning regularly at least once in a week.

Blind all openings into which the cleaning agent might penetrate (e.g. engine inlet opening) prior to pressure water washing. Remove these blinders after washing the machine.

Do not expose electric parts or insulation material to direct water or steam flow. Always cover such materials (inside of the alternator etc.).

Work with stopped engine.

Do not use aggressive and highly inflammable cleaning agents (e.g. petrol or highly inflammable materials).

Follow environmental standards and regulations when cleaning the machine!

Clean the machine in a site equipped with an intercepting system for cleaning agents so that the soil and water sources are not contaminated!

Do not use forbidden cleaning agents!

3.6.24. Check of the screw connection tightening

- Check regularly that no bolted connections have been slackened. Use torque spanners to tighten.

	Torque			
	For 8,8 Bolts (8G)		For 10,9 Bolts (10K)	
Thread	Nm	lb ft	Nm	lb ft
M6	10	7,4	14	10,3
M8	24	25,0	34	25,0
M8x1	19	14,0	27	19,9
M10	48	35,4	67	49,4
M10x1,25	38	28,0	54	39,8
M12	83	61,2	117	86,2
M12x1,25	66	48,7	94	69,3
M14	132	97,3	185	136,4
M14x1,5	106	78,2	148	109,1
M16	200	147,5	285	210,2
M16x1,5	160	118,0	228	168,1
M18	275	202,8	390	287,6

	Torque			
	For 8,8 Bolts (8G)		For 10,9 Bolts (10K)	
Thread	Nm	lb ft	Nm	lb ft
M18x1,5	220	162,2	312	230,1
M20	390	287,6	550	405,6
M20x1,5	312	230,1	440	324,5
M22	530	390,9	745	549,4
M22x1,5	425	313,4	590	435,1
M24	675	497,8	950	700,6
M24x2	540	398,2	760	560,5
M27	995	733,8	1400	1032,5
M27x2	795	586,3	1120	826,0
M30	1350	995,7	1900	1401,3
M30x2	1080	796,5	1520	1121,0

Values given in the Table are the torques at dry tread (at coefficient of friction = 0,14). Such values do NOT apply to a greased thread.

Table of torques used for cap nuts with sealing "O" ring - hoses

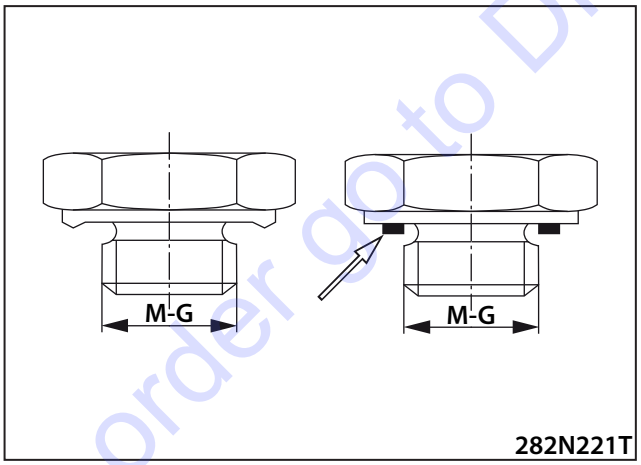
			Torques for cap nuts incl. "O" ring - hoses					
			Nm			lb ft		
Spanner Size	Thread	Pipe	Nominal	Min	Max	Nominal	Min	Max
14	12x1,5	6	20	15	25	15	11	18
17	14x1,5	8	38	30	45	28	22	33
19	16x1,5	8	45	38	52	33	28	38
		10						
22	18x1,5	10	51	43	58	38	32	43
		12						
24	20x1,5	12	58	50	65	43	37	48
27	22x1,5	14	74	60	88	55	44	65
		15						
30	24x1,5	16	74	60	88	55	44	65
32	26x1,5	18	105	85	125	77	63	92
36	30x2	20	135	115	155	100	85	114
		22						
41	36x2	25	166	140	192	122	103	142
46		28						
50	42x2	30	240	210	270	177	155	199
50	45x2	35	290	255	325	214	188	240
	52x2	38	330	280	380	243	207	280
		42						

Chart for torques of necks with sealing edge or with flat gasket

	Neck Torques	
G -M	**Nm**	**lb ft**
G 1/8	25	18
G 1/4	40	30
G 3/8	95	70
G 1/2	130	96
G 3/4	250	184
G 1	400	295
G 11/4	600	443
G 11/2	800	590
10 x 1	25	18
12 x 1,5	30	22
14 x 1,5	50	37
16 x 1,5	60	44
18 x 1,5	60	44
20 x 1,5	140	103
22 x 1,5	140	103
26 x1,5	220	162
27 x 1,5	250	184
33 x 1,5	400	295
42 x 1,5	600	443
48 x 1,5	800	590

Chart for torques of plugs with flat gasket

	Plug Torques	
G -M	**Nm**	**lb ft**
G 1/8	15	11
G 1/4	33	24
G 3/8	70	52
G 1/2	90	66
G 3/4	150	111
G 1	220	162
G 11/4	600	443
G 11/2	800	590
10 x 1	13	10
12 x 1,5	30	22
14 x 1,5	40	30
16 x 1,5	60	44
18 x 1,5	70	52
20 x 1,5	90	66
22 x 1,5	100	74
26 x1,5	120	89
27 x 1,5	150	111
33 x 1,5	250	184
42 x 1,5	400	295
48 x 1,5	500	369



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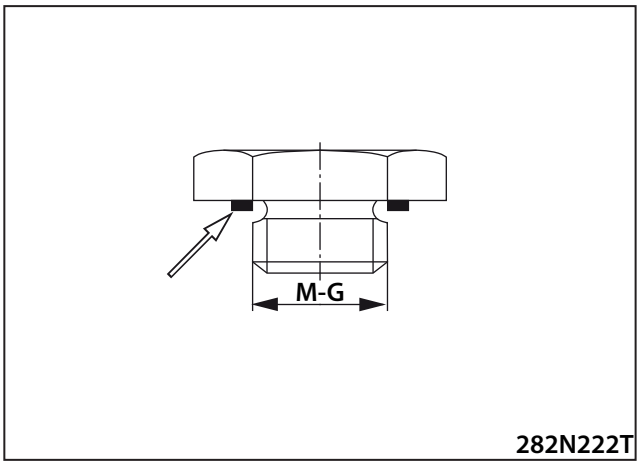

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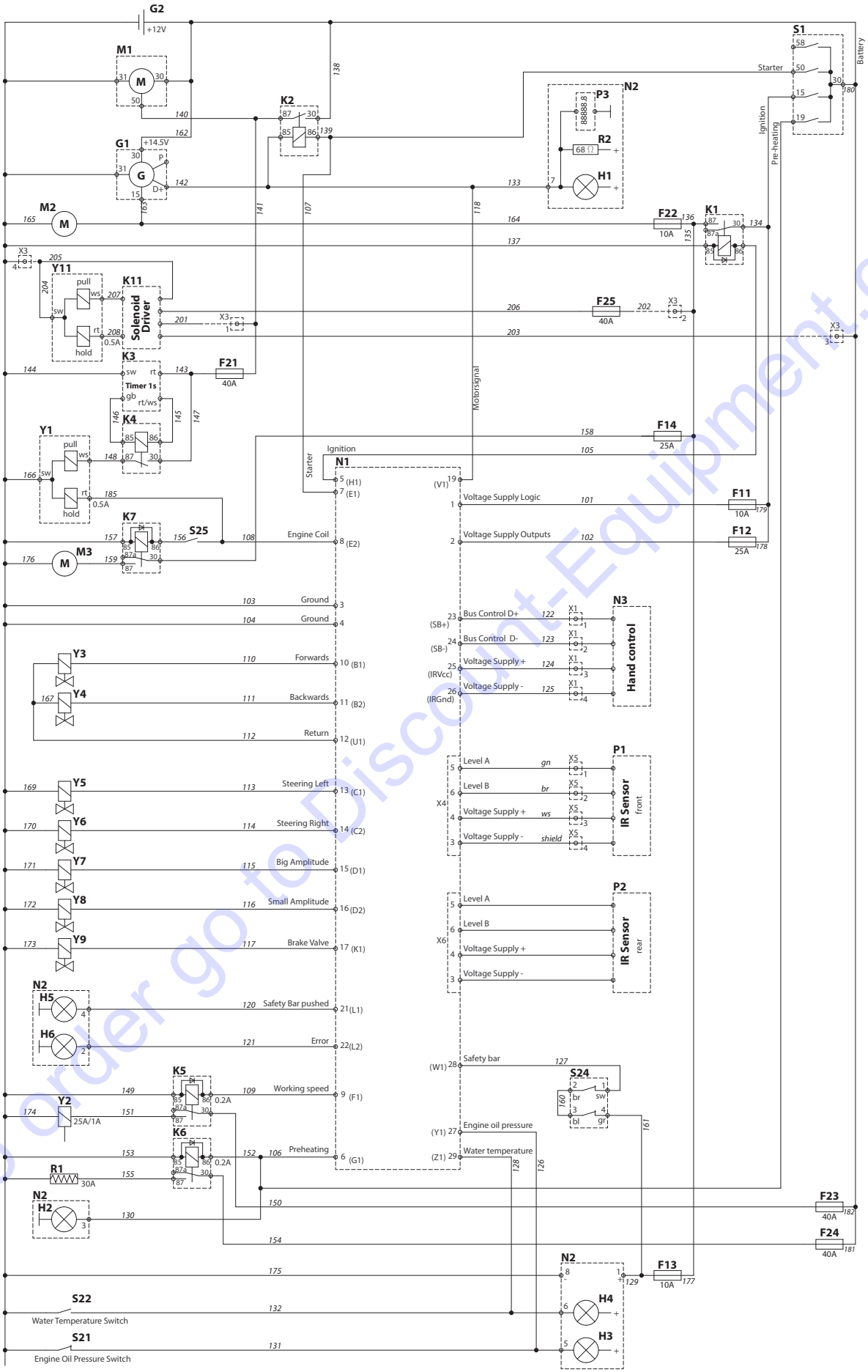
3.8. Annexes

3.8.1. Wiring diagram

Legend:

F11 Fuse, controller, supply
F12 Fuse, controller, outputs
F13 Fuse, display unit, shutdown bar
F14 Fuse, hydraulic oil cooler
F21 Fuse, pull-in solenoid
F22 Fuse, diesel pump, alternator
F23 Fuse, operating speed
F24 Fuse, pre-heating coil
F25 Fuse, "2nd solenoid"
G1 Alternator
G2 Battery
K1 Relay, ignition
K2 Relay, starting interlock
K3 Timer relay
K4 Relay, pull-in solenoid
K5 Relay, operating speed
K6 Relay, pre-heating coil
K7 Relay, hydraulic oil cooler
K11 Relay, "solenoid driver"
M1 Starter motor
M2 Diesel pump
M3 Hydraulic oil cooler
N1 Machine controller
N2 Display unit
N3 Infrared transmitter
P1 Front infrared transmitter
P2 Rear infrared transmitter
R1 Pre-heating coil
S1 Switch, ignition switch
S21 Sensor, engine oil pressure
S22 Sensor, coolant temperature
S24 Sensor, shutdown bar
S25 Sensor, hydraulic oil temperature
Y1 Magnet, pull-in / holding solenoid
Y2 Magnet, operating speed
Y3 Magnet, drive pump, forwards
Y4 Magnet, drive pump, backwards
Y5 Valve, steering, left
Y6 Valve, steering, right
Y7 Valve, large amplitude vibration
Y8 Valve, small amplitude vibration
Y9 Valve, locking brake
Y11 Magnet, "2nd solenoid"



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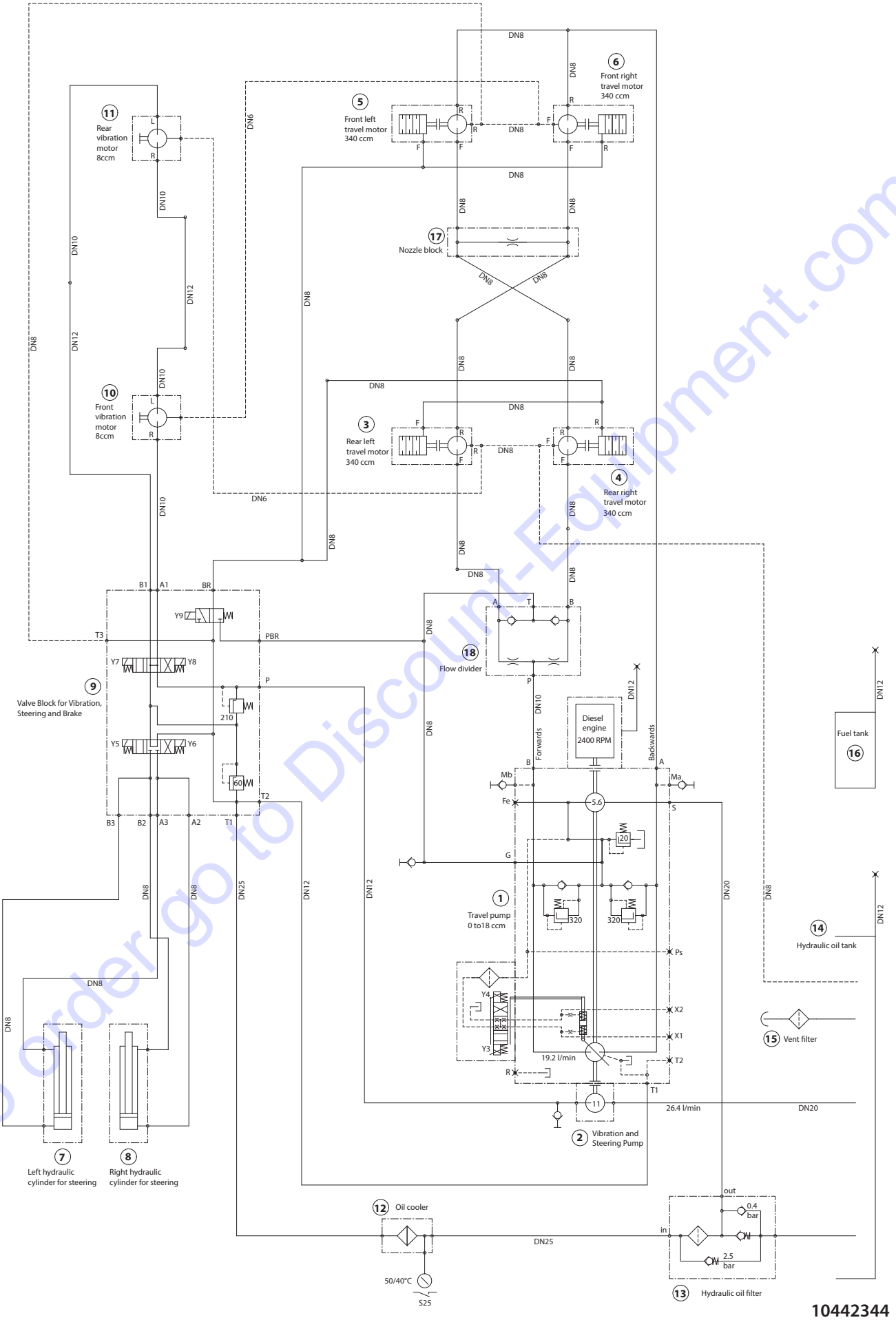
3.8.2. Hydraulic system diagram

Legend:

1 Drive pump
2 Vibro-steering pump
3 Drive motor, rear left
4 Drive motor, rear right
5 Front left drive motor
6 Front right drive motor
7 Left steering cylinder
8 Right steering cylinder
9 Vibro steering/brake valve
10 Vibro motor, front
11 Vibro motor, rear
12 Oil cooler
13 Return-line suction filter
14 Hydraulic oil tank
15 Filler, ventilation filter
16 Diesel tank
17 Nozzle block



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3.8.3. Regular maintenance spare parts chart

Chapter	Spare part	Order No.
Every 10 operating hours		
3.6.6.	Dust valve	1227914
Every 250 operating hours		
	Service set after 250 EH	1228782
3.6.12.	Fan	1-952338
3.6.12.	Belt	1183743
Every 500 operating hours		
	Service set after 500 EH	4-760099
Every 1000 operating hours		
3.6.16.	Filter cartridge	1179047
3.6.16.	Breather filter	1242184

Content of the service set after 50 EH and 250 EH (1228782)

Chapter	Spare part	Number of parts	Order No.
3.6.13.	Engine oil filter	1 ks	1-954075

Content of the service set after 500 EH (4-760099)

Chapter	Spare part	Number of parts	Order No.
3.6.13.	Engine oil filter	1 ks	1-954075
3.6.14.	Filter cartridge	1 ks	1-954197
3.6.14.	Filter cartridge	1 ks	1-954195
3.6.15.	Main cartridge	1 ks	1300308
3.6.15.	Safety cartridge	1 ks	1300309

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