

SERVICE MANUAL

5500 / 6500 / 7500
Tractor

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SERVICE MANUAL

5500 Turbo Super, TIER 3 engine, 2WD tractor , 5500 Turbo Super, TIER 3, 4WD tractor , 6500 TIER 3 engine, 2WD tractor , 6500 TIER 3 engine, 4WD tractor , 7500 TIER 3 engine, 2WD tractor , 7500 TIER 3 engine, 4WD tractor

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INTRODUCTION

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Foreword

Important notice

All maintenance and repair operations described in this manual should be carried out exclusively by NEW HOLLAND authorised workshops. All instructions should be carefully observed and special equipment where indicated should be used.

Anyone who carries out service operations described without carefully observing these prescriptions will be directly responsible for any damage caused.

Notes for equipment

Equipment which NEW HOLLAND proposes and shows in this manual is:

- Studied and designed expressly for use on NEW HOLLAND tractors.
- Necessary to make reliable repair.
- Accurately built and strictly tested to offer efficient and long-lasting working life.

Notice

The words "front", "rear", "right-hand side" and "left-hand side" refer to the different parts as seen from the operator's seat oriented to the normal direction of movement of the tractor.

Safety rules



This warning symbol points out important messages involving personal safety. Carefully read the safety rules contained herein and follow advised precautions to avoid potential hazards and safeguarded your safety.

In this manual you will find this symbol together with the following keywords.

WARNING: It gives warning about improper repair operations and potential consequences affecting the service technician's personal safety.

DANGER: It gives specific warning about potential dangers for personal safety of the operator or other persons directly or indirectly involved in the operation.

To prevent accidents

Most accidents and personal injuries taking place in workshops are due from non-observance of some essential rules and safety precautions.

The possibility that an accident might occur with any type of machines should not be disregarded, no matter how well the machine in question was designed and built.

A wise and careful service technician is the best precautions against accidents.

Careful observance of this only basic precaution would be enough to avoid many severe accidents.



DANGER

Never carry out any cleaning, lubrication or maintenance operations when the engine is running.

Safety rules

Generalities

Carefully follow specified repair and maintenance procedures.

- Do not wear rings, wrist watches, jewels, unbuttoned or flapping clothing such as ties, torn clothes, scarves, open jackets or shirts with open zips which could get caught in moving parts. Use approved safety clothing such as anti-slipping footwear, gloves, safety goggles, helmets, etc.
- Wear safety glasses with side guards when cleaning parts using compressed air.
- Damaged or frayed wires and chains are unreliable. Do not use them for lifting or towing.
- Wear suitable protection such as approved eye protection, helmets, special clothing, gloves and footwear whenever welding. All persons standing in vicinity of the welding process should wear approved eye protection. Never look at the welding arc if your eyes are not suitably protected.
- Never carry out any repair on the machine if someone is sitting on the operator's seat, except they are qualified operators assisting in the operation to be carried out.
- Never operate the machine or use attachments from a place other than sitting at the operator's seat or at the side of the machine when operating the fender switches.
- Never carry out any operation on the machine when the engine is running, except when specifically indicated. Stop the engine and ensure that all pressure is relieved from hydraulic circuits before removing caps, covers, valves, etc.
- All repair and maintenance operations should be carried out with greatest care and attention.
- Disconnect the batteries and label all controls to warn that the tractor is being serviced. Block the machine and all equipment which should be raised.
- Never check or fill fuel tanks or batteries, nor use starting liquid if you are smoking or near open flames as such fluids are flammable.
- The fuel filling gun should always remain in contact with filler neck. Maintain this contact until the fuel stops flowing into the tank to avoid possible sparks due to static electricity build-up.
- To transfer a failed tractor, use a trailer or a low loading platform trolley if available.
- To load and unload the machine from the transportation means, select a flat area providing a firm support to the trailer or truck wheels. Firmly tie the machine to the truck or the trailer platform and block wheels as required by the transporter.
- Always use lifting equipment of appropriate capacity to lift or move heavy components.
- Chains should always be safely fastened. Ensure that fastening device is strong enough to hold the load foreseen. No persons should stand near the fastening point.
- The working area should be always kept clean and dry. Immediately clean any spillage of water or oil.
- Never use gasoline, diesel oil or other flammable liquids as cleaning agents. Use non-flammable non-toxic proprietary solvents.
- Do not pile up grease or oil soaked rags, as they constitute a great fire hazard. Always place them into a metal container.

Start up

- Never run the engine in confined spaces which are not equipped with adequate ventilation for exhaust gas extraction.
- Never bring your body, arms, legs, feet, hands, fingers near fans or rotating belts.

Engine

- Always loosen the radiator cap very slowly before removing it to allow pressure in the system to dissipate. Coolant should be topped up only when the engine is stopped.
- Do not fill up fuel tank when the engine is running.
- Never adjust the fuel injection pump when the tractor is moving. Never lubricate the tractor when the engine is running.

Electrical systems

- If it is necessary to use auxiliary batteries, cables must be connected at both sides as follows. (+) to (+) and (-) to (-). Avoid short-circuiting the terminals. Gas released from batteries is highly flammable. During charging, leave the battery compartment uncovered to improve ventilation. Avoid sparks or flames near the battery area. Do not smoke.
- Do not charge batteries in confined spaces.
- Always disconnect the batteries before performing any type of service on the electrical system.

Hydraulic systems

- Some fluid coming out from a very small port can be almost invisible and be strong enough to penetrate skin. For this reason, Never use your hands to check for leaks, but use a piece of cardboard or a piece of wood for this purpose. If any fluid is injected into the skin, seek medical aid immediately. Lack of immediate medical attention may result in serious infections or dermatitis.
- Always take system pressure readings using the appropriate gauges.

Wheels and tires

- Check that the tires are correctly inflated at the pressure specified by the manufacturer. Periodically check for possible damage to the rims and tires.
- Stay a the tire side when inflating.
- Check the pressure only when the tractor is unloaded and tires are cold to avoid wrong reading due to over- pressure.
- Never cut, nor weld a rim with the inflated tire assembled.
- To remove the wheels, block both front and rear tractor wheels. Raise the tractor and install safe and stable supports under the tractor in accordance with the regulations in force.
- Deflate the tire before removing any object caught into the tire tread.
- Never inflate tires using flammable gases as they may originate explosions and cause injuries to bystanders.

Removal and installation

- Lift and handle all heavy components using lifting equipment of adequate capacity. Ensure that parts are supported by appropriate slings and hooks. Use lifting eyes provided to this purpose. Take care of the persons near the loads to be lifted.

Safety rules

Health and safety precautions

Many of the procedures associated with vehicle maintenance and repair involve physical hazards or other risks to health. This section lists, alphabetically, some of these hazardous operations and the materials and equipment associated with them. The precautions necessary to avoid these hazards are identified.

The list is not exhaustive and all operations and procedures and the handling of materials, should be carried out with health and safety in mind.

Acid and alkalis

See battery acids, e.g. caustic soda, sulfuric acid.
Used in batteries and cleaning materials.

Irritant and corrosive to the skin, eyes, nose and throat. Causes burns.

Avoid splashes to the skin, eyes and clothing. Wear suitable protective gloves and goggles. Can destroy ordinary protective clothing. Do not breathe mists.
Ensure access to water and soap is readily available for splashing accidents.

Adhesives and sealers

See fire highly flammable, flammable, combustible.

Generally should be stored in "No smoking" areas, cleanliness and tidiness in use should be observed. E.g. disposable paper covering benches should be dispensed from applicators where possible containers including secondary containers, should be labelled.

Solvent based adhesive / sealers

See solvents. Follow manufacturer's instructions.

Water base adhesive / sealers

Those based on polymer emulsions and rubber lattices may contain small amounts of volatile toxic and harmful chemicals. Skin and eye contact should be avoided and adequate ventilation provided during use.
Follow manufacturers instructions.

Resin based adhesives / sealers

E.g. Epoxide and formaldehyde resin based.
Mixing should only be carried out in well ventilated areas as harmful or toxic volatile chemicals may be released.
Skin contact with uncured resins and hardeners can result in irritation, dermatitis and absorption of toxic of harmful chemicals through the skin. Splashes can damage the eyes.
Provide adequate ventilation and avoid skin and eye contact. Follow manufacturers' instructions.

Anaerobic, cyanoacrylate and other acrylic adhesives

Many are irritant, sensitizing or harmful to the skin. Some are eye irritants.

Skin and eye contact should be avoided and the manufacturers' instructions followed.

Cyanoacrylate adhesives (super-glues) must not contact the skin or eyes. If skin or eye tissue is bonded cover with a clean moist pad and get medical attention. Do not attempt to pull tissue apart. Use in well ventilated areas as vapors can cause irritation of the nose and eyes.

For two-pack systems see resin based adhesives / sealers.

Isocyanate (polyurethane) adhesives / sealers

See resin based adhesives.

Individuals suffering from asthma or respiratory allergies should not work with or near these materials as sensitivity reactions can occur.

Any spraying should preferably be carried out in exhaust ventilated booths removing vapors and spray droplets from the breathing zone. Individuals working with spray applications should wear supplied air respirators.

Antifreeze

See fire, solvents e.g. isopropanol, ethylene glycol, menthol.

Highly flammable, flammable, combustible.

Used in vehicle cooling systems, brake air pressure systems, screen wash solutions.

vapors given off from coolant antifreeze (glycol) arise only when heated.

Antifreeze may be absorbed through skin in toxic or harmful quantities. Antifreeze if swallowed is fatal and medical attention must be found immediately.

Arc welding

See welding.

Battery acids

See acids and alkalis.

Gases released during charging are explosive. Never use naked flames or allow sparks near charging or recently charged batteries.

Brake and clutch fluids (polyalkylene glycols)

See fire combustible.

Splashes to the skin and eyes are slightly irritating. Avoid skin and eye contact as far as possible. Inhalation of vapor hazards do not arise at ambient temperatures because of the very low vapor pressure.

Brazing

See welding.

Chemical materials - general

See legal aspects.

Chemical materials such as solvents, sealers, adhesives, paints, resin foams, battery acids, antifreeze, brake fluids, oils and grease should always be used with caution and stored and handled with care. They may be toxic, harmful, corrosive irritant or highly inflammable and give rise to hazardous fumes and dusts.

The effects of excessive exposure to chemicals may be immediate or delayed, briefly experienced or permanent, cumulative, superficial, life threatening or may reduce life expectancy.

Do's

Do remove chemical materials from the skin and clothing as soon as practicable after soiling. Change heavily soiled clothing and have it cleaned.

Do carefully read and observe hazard and precaution warning given on material containers (labels) and in any accompanying leaflets, poster or other instructions. Material health and safety data sheets can be obtained from manufacturers'.

Do organise work practices and protective clothing to avoid soiling of the skin and eyes, breathing vapors / aerosols / dusts / fumes, inadequate container labelling; fire and explosion hazards.

Do wash before job breaks, before eating, smoking, drinking or using toilet facilities when handling chemical materials.

Do keep work areas clean, uncluttered and free of spills.

Do store according to national and local regulations.

Do keep chemical materials out of reach of children.

Do not's

Do not mix chemical materials except under the manufacturers' instructions. Some chemicals can form other toxic or harmful chemicals give off toxic or harmful fumes be explosive when mixed together.

Do not spray chemical materials, particular those based on solvents, in confined spaces. E.g. When people are inside a vehicle.

Do not apply heat or flame to chemical materials except under the manufacturers' instructions. Some are highly inflammable and some may release toxic or harmful fumes.

Do not leave containers open. Fumes given off can build up to toxic, harmful or explosive concentrations. Some fumes are heavier than air and will accumulate in confined areas, pits etc.

Do not transfer chemical materials to unlabeled containers.

Do not clean hands or clothing with chemical materials. Chemicals, particularly solvents and fuels will dry the skin and may cause irritation with dermatitis. Some can be absorbed through the skin in toxic or harmful quantities.

Do not use emptied containers for other materials, except when they have been cleaned under supervised conditions.

Do not sniff or smell chemical materials. Brief exposure to high concentrations of fumes can be toxic or harmful.

Clutch fluids

See brake and clutch fluids.

Clutch linings and pads

See brake and clutch linings and pads.

Corrosion protection materials

See solvents, fire.

Highly flammable, flammable.

These materials are varied and the manufactures' instructions should be followed. They may contain solvents, resins, petroleum products etc. skin and eye contact should be avoided. They should only be sprayed in conditions of adequate ventilation and not in confined spaces.

Cutting

See welding.

De-waxing

See solvents and fuels (kerosene).

Dusts

Powder, dusts or clouds may be irritant, harmful or toxic. Avoid breathing dusts from powdery chemical materials or those arising from dry abrasion operations. Wear respiratory protection if ventilation is inadequate.

Electric shocks

Electric shocks can result from the use of the faulty electrical equipment or from the misuse of equipment even in good condition.

Ensure that electrical equipment is maintained in good condition and frequently tested.

Ensure that flexes, cables, plugs and sockets are not frayed, kinked, cut, cracked or otherwise damaged.

Ensure that electric equipment is protected by the correct rated fuse.

Never misuse electrical equipment and never use equipment which is in anyway faulty. The results could be fatal.

Use reduced voltage equipment where possible in preference to electrical equipment.

In cases of electrocution:

- Switch off electricity before approaching victim.
- If this is not possible, push or drag victim from source of electricity using dry non-conductive material.
- Commence resuscitation if trained to do so.
- Summon medical assistance

Exhaust fumes

These contain asphyxiating, harmful and toxic chemicals and particles such as carbon oxides, nitrogen oxides, aldehydes, lead and aromatic hydrocarbons. Engines should only be run under conditions of adequate extraction or general ventilator and not in confined spaces.

Gasoline (petrol) engine

There may not be adequate warning properties of odour or irritation before immediate and delayed toxic or harmful effects arise.

Diesel engine

Soot, discomfort and irritation usually give adequate warning of hazardous fume concentrations.

Fiber insulation

See ducts.

Used in noise and sound insulation.

The fibrous nature of surfaces and cut edges can cause skin irritation. This is usually a physical and not a chemical effect.

Precautions should be taken to avoid excessive skin contact through careful organization of work practices and the use of gloves.

Fire

See welding, foams, legal aspects.

Many of the materials found on or associated with the repair of vehicles are highly inflammable. Some give off toxic or harmful fumes if burnt.

Observe strict fire safety when storing and handling flammable materials or solvents, particularly near electrical equipment or welding processes.

Ensure before using electrical or welding equipment but that there is no fire hazard present.

Have suitable fire extinguisher available when using welding or heating equipment.

First aid

Apart from meeting any legal requirements its i desirable for someone in the workshop to be trained in first aid procedures.

Splashes in the eye should be flushed with clean water for at least **10 min**.

Soiled skin should be washed with soap and water.

Inhalation affected individuals should be removed to fresh air immediately.

If swallowed or if effects persist consult a doctor with information (label) on material used.

Do not induce vomiting (unless indicated by manufacturer).

Foams

See fire.

Used in sound and noise insulation. Cured foams used in seat and trim cushioning.

Follow manufacturers' instructions.

Un reacted components are irritating and may be harmful to the skin and eyes. Wear gloves and goggles.

Individuals with chronic respiratory diseases, asthma, bronchial medical problems or histories of allergic diseases should not work with or near uncured materials.

The components, vapors, spray mists can cause direct irritation, sensitivity reactions and may be toxic or harmful.

vapors and spray mists must not be breathed. These materials must be applied with adequate ventilation and respiratory protection. Do not remove respirator immediately after spraying, wait until vapor / mists have cleared.

Burning of the uncured components and the cured foams can generate toxic and harmful fumes.

Smoking, open flames or the use of electrical equipment during foaming operations and until vapors/mists have cleared should not be allowed. Any heat cutting of cured foams or partially cured foams should be conducted with extraction ventilation.

Fuels

See fire, legal aspects, chemicals - general, solvents.

Used as fuels and cleaning agents.

Gasoline (petrol)

Highly flammable.

Swallowing can result in mouth and throat irritation and absorption from the stomach can result in drowsiness and unconsciousness. Small amounts can be fatal to children. Aspiration of liquid into the lungs, e.g. through vomiting, is a very serious hazard.

Gasoline dries the skin and can cause irritation and dermatitis on prolonged or repeated contact. Liquid in the eye causes severe smarting.

Motor gasoline may contain appreciable quantities of benzene, which is toxic upon inhalation and the concentrations of gasoline vapors must be kept very low. High concentrations will cause eye, nose and throat irritation, nausea, headache, depression and symptoms of drunkenness. Very high concentrations will result in rapid loss of consciousness.

Ensure there is adequate ventilation when handling and using gasoline. Great care must be taken to avoid the serious consequences of inhalation in the event of vapor build up arising from spillages in confined spaces.

Special precautions apply to cleaning and maintenance operations on gasoline storage tanks. Gasoline should not be used as a cleaning agent. It must not be siphoned by mouth.

Kerosene (paraffin)

Used also as heating fuel, solvent and cleaning agent.

Flammable.

Irritation of the mouth and throat may result from swallowing. The main hazard from swallowing arises if liquid aspiration into the lungs occurs. Liquid contact dries the skin and can cause irritation or dermatitis. Splashes in the eye may be slightly irritating.

In normal circumstances the low volatility does not give rise to harmful vapors. Exposure to mists and vapors from kerosene at elevated temperatures should be avoided (mists may arise in de-waxing). Avoid skin and eye contact and ensure there is adequate ventilation.

Gas-oil (diesel fuel)

See fuels (kerosene). Combustible.

Gross or prolonged skin contact with high boiling gas oils may also cause serious skin disorders including skin cancer.

Gas cylinders

See fire.

Gases such as oxygen, acetylene, carbon dioxide, argon and propane are normally stored in cylinders at pressures of up to 2000 lb/sq. in. (13,790 kn/m²) and great care should be taken in handling these cylinders to avoid mechanical damage to them or to the valve gear attached. The contents of each cylinder should be clearly identified by appropriate markings.

Cylinders should be stored in well ventilated enclosures, and protected from ice and snow, or direct sunlight. Fuel gases (e.g. acetylene and propane) should not be stored in close proximity to oxygen cylinders.

Care should be exercised to prevent leaks from gas cylinders and lines, and to avoid sources of ignition. Only trained personnel should undertake work involving gas cylinders.

Gases

See gas cylinders.

Gas shielded welding

See welding.

Gas welding

See welding.

General workshop tools and equipment

It is essential that all tools and equipment are maintained in good condition and the correct safety equipment used where required.

Never use tools or equipment for any purpose other than that for which they were designed.

Never overload equipment such as hoists, jacks, axle and chassis stands or lifting slings. Damage caused by overloading is not always immediately apparent and may result in a fatal failure the next time that the equipment is used.

Do not use damaged or defective tools or equipment, particularly high speed equipment such as grinding wheels. A damaged grinding wheel can disintegrate without warning and cause serious injury.

Wear suitable eye protection when using grinding, chiselling or sand blasting equipment.

Wear a suitable breathing mask when using sand blasting equipment, working with asbestos based materials or using spraying equipment.

Glues

See adhesives and sealers.

High pressure air, lubrication and oil test equipment

See lubricants and greases.

Always keep high pressure equipment in good condition and regularly maintained, particularly at joints and unions.

Never direct a high pressure nozzle at the skin as the fluid may penetrate to the underlying tissue etc. and cause serious injury.

Legal aspects

Many laws and regulations make requirements relating to health and safety in the use of materials and equipment in workshops.

Workshops should be familiar, in detail, with associated laws and regulations. Consult local factory inspectorate if in any doubt.

Lubricants and greases

Avoid all prolonged and repeated contact with mineral oils, especially used oils. Used oils contaminated during service (e.g. routine service change sump oils) are more irritating and more likely to cause serious effects including skin cancer in the event of gross and prolonged skin contact.

Wash skin thoroughly after work involving oil. Proprietary hand cleaners may be of value provided they can be removed from the skin with water. Do not use petrol, paraffin or other solvents to remove oil from the skin.

Lubricants and greases may be slightly irritating to the eyes.

Repeated or prolonged skin contact should be avoided by wearing protective clothing if necessary. Particular care should be taken with used oils and greases containing lead. Do not allow work clothing to be contaminated with oil. Dry clean or launder such clothing at regular intervals. Discard oil soaked shoes.

Do not employ used engine oils as lubricants or for any application where appreciable skin contact is likely to occur. Used oils may only be disposed of in accordance with local regulations.

There are publications describing the problems and advising on precautionary measures.

Noise insulation materials

See foams, fibre insulation.

Paints

See solvents and chemical materials - general.
Highly flammable, flammable.

One pack

Can contain harmful or toxic pigments, driers and other components as well as solvents. Spraying should only be carried out with adequate ventilation.

Two pack

Can also contain harmful and toxic unreacted resins and resin hardening agents. The manufacturers instructions should be followed and the on resin based adhesives, isocyanate containing adhesives and foams should be consulted.

Spraying should preferably be carried out in exhausted ventilated booths removing vapor and spray mists from the breathing zone. Individuals working in booths should wear respiratory protection. Those doing small scale repair work in the open shop should wear supplied air respirators.

Paint thinners

See solvents.

Petrol

See fuels (gasoline).

Pressurised equipment

See high pressure air, lubrication and oil test equipment.

Resistance welding

See welding.

Sealers

See adhesives and sealers.

Solder

See welding.

Solders are mixtures of metals such that the melting point of the mixture is below that of the constituent metals (normally lead and tin). Solder application does not normally give rise to toxic lead fumes, provided a gas/air flame is used. Oxy-acetylene flames should not be used, as they are much hotter and will cause lead fumes to be evolved.

Some fumes may be produced by the application of any flame to surfaces coated with grease etc. and inhalation of these should be avoided.

Removal of excess solder should be undertaken with care, to ensure that fine lead dust is not produced, which can give toxic effects if inhaled. Respiratory protection may be necessary.

Solder spillage and filing should be collected and removed promptly to prevent general air contamination by lead.

High standards of personal hygiene are necessary in order to avoid indigestion of lead or inhalation of solder dust from clothing.

Solvents

See chemical materials- general fuels (kerosene), fire.

E.g. Acetone, white spirit, toluene, xylene, trichlorethane.

Used in cleaning materials, de-waxing, paints, plastics, resins, thinners etc.

Highly Inflammable, flammable.

Skin contact will decrease the skin and may result in irritation and dermatitis following repeated or prolonged contact. Some can be absorbed through the skin in toxic or harmful quantities.

Splashes in the eye may cause severe irritation and could lead to loss of vision.

Brief exposure to high concentrations of vapors or mists will cause eye and throat irritation, drowsiness, dizziness, headaches and in the worst circumstances, unconsciousness.

Repeated or prolonged exposures to excessive but lower concentrations of vapors or mists, for which there might not be adequate warning indications, can cause more serious toxic or harmful effects.

Aspiration into the lungs (e.g. through vomiting) is the most serious consequence of swallowing.

Avoid splashes to the skin, eyes and clothing. Wear protective gloves, goggles and clothing if necessary.

Ensure good ventilation when in use, avoid breathing fumes, vapors and spray mists and keep containers tightly sealed. Do not use in confined spaces.

When the spraying material contains solvents, e.g. paints, adhesives, coatings, use extraction ventilation or personal respiratory protection in the absence of adequate general ventilation.

Do not apply heat or flame except under specific and detailed manufacturers instructions.

Sound insulation

See fibre insulation, foams.

Spot welding

See welding.

Suspended loads

There is always a danger when loads are lifted or suspended. Never work under an unsupported suspended or raised load, e.g. jacked up vehicle, suspended engine, etc.

Always ensure that lifting equipment such as jacks, hoists, axle stands, slings, etc. are adequate and suitable for the job, in good condition and regularly maintained.

Never improvise lifting tackle.

Underseal

See corrosion protection.

Welding

See fire, electric shock, gas cylinders.

Welding processes include resistance welding (spot welding), arc welding and gas welding.

Resistance welding

This process may cause particles of molten metal to be emitted at high velocity and the eyes and skin must be protected.

Arc welding

This process emits a high level of ultraviolet radiation which may cause eye and skin burns to the welder and to other persons nearby. Gas-shielded welding processes are particularly hazardous in this respect. Personal protection must be worn, and screens used to shield other people.

Metal spatter will also occur and appropriate eye and skin protection is necessary.

The heat of the welding arc will produce fumes and gases from the metals being welded and from any applied coatings or contamination on the surfaces being worked on. These gases and fumes may be toxic and inhalation should always be avoided. The use of extraction ventilation to remove the fumes from the working area may be necessary,

particularly in cases where the general ventilation is poor, or where considerable welding work is anticipated. In extreme cases where adequate ventilation cannot be provided, supplied air respirators may be necessary.

Gas welding

Oxy-acetylene torches may be used for welding and cutting and special care must be taken to prevent leakage of these gases, with consequent risk of fire and explosion.

The process will produce metal spatter and eye and skin protection is necessary.

The flame is bright and eye protection should be used, but the ultra-violet emission is much less than that from arc welding, and lighter filters may be used.

The process itself produces few toxic fumes, but such fumes and gases may be produced from coatings on the work, particularly during cutting away of damaged body parts and inhalation of the fumes should be avoided.

In brazing, toxic fumes may be evolved from the metals in the brazing rod, and a severe hazard may arise if brazing rods containing cadmium are used. In this event particular care must be taken to avoid inhalation of fumes and expert advice may be required.

Special precautions must be taken before any welding or cutting takes place on vessels which have contained combustible materials, e.g. boiling or steaming out of fuel tanks.

White spirit

See solvents.



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Engine - 10

Engine and crankcase - 001

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DIAGNOSTIC

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Engine - General specification

General specifications	5500	6500	7500
Make	IVECO		
Type	4 stroke, diesel, turbocharged, direct injection, water cooled		
Power	55 Hp	65 Hp	75 Hp
Number of cylinders	3	3	4
Bore	104 mm (4 in)	104 mm (4 in)	104 mm (4 in)
Stroke	115 mm (5 in)	115 mm (5 in)	115 mm (5 in)
Cubic capacity	2931 cm³ (179 in³)	2931 cm³ (179 in³)	3908 cm³ (238 in³)
Compression ratio	18:1	18:1	18:1
Firing order	1-2-3	1-2-3	1-3-4-2
Idle speed	650 RPM	650 RPM	650 RPM
Maximum no load speed	2525 RPM	2770 RPM	2525 RPM
Rated speed	2300 RPM	2500 RPM	2300 RPM

Engine block	
Type	Dry type pre fitted liner with collar
Cylinder liner seat diameter in engine block	106.850 - 106.900 mm (4.207 - 4.209 in)
Cylinder sleeve O.D	107.020 - 107.050 mm (4.213 - 4.215 in)
Interference between liners and seats in block	0.120 - 0.200 mm (0.005 - 0.008 in)
Liner O.D oversize	0.200 mm (0.008 in)
Cylinder liner inner diameter	104.00 - 104.024 mm (4.09 - 4.095 in)
Maximum ovality and taper due to wear	0.120 mm (0.005 in)
Liner inner diameter oversize	0.400 - 0.800 mm (0.016 - 0.031 in)

Camshaft bush seat diameters	
• Front	54.780 - 54.805 mm (2.157 - 2.158 in)
• Intermediate	54.280 - 54.305 mm (2.137 - 2.138 in)
• Rear	53.780 - 53.805 mm (2.117 - 2.118 in)
Tappet seat bore diameter	15.000 - 15.018 mm (0.591 - 0.591 in)
Tappet oversize	0.100 mm (0.004 in) 0.200 mm (0.008 in) 0.300 mm (0.012 in)
Main bearing seat bore diameter	84.200 - 84.230 mm (3.315 - 3.316 in)

Cylinder head	
Valve guide seat bore diameter in head	13.950 - 13.983 mm (0.549 - 0.551 in)
Valve guide oversize	0.200 mm (0.008 in)
Valve stand-in	0.700 - 1.000 mm (0.028 - 0.039 in)
• Maximum stand-in permitted	1.300 mm (0.051 in)
Injector standout	0.050 - 0.700 mm (0.002 - 0.028 in)
• Maximum stand-out permitted	1.000 mm (0.039 in)
Original cylinder head height	92 mm (4 in)
Maximum head dressing allowed	0.500 mm (0.020 in)

Exhaust valves	5500	6500	7500
Valve head diameter	41.000 - 41.250 mm (1.614 - 1.624 in)	37.500 - 37.750 mm (1.476 - 1.486 in)	41.000 - 41.250 mm (1.614 - 1.624 in)
Valve stem diameter	7.985 - 8.000 mm (0.314 - 0.315 in)	7.985 - 8.000 mm (0.314 - 0.315 in)	7.985 - 8.000 mm (0.314 - 0.315 in)
Face angle	45° 30'±7'	45° 30'±7'	45° 30'±7'
Tappet (cold)	0.300 mm (0.012 in)		0.300 mm (0.012 in)
Valve clearance (cold/hot)		0.450 mm (0.018 in)/ 0.300 mm (0.012 in)	
Cam lift	6.167 mm (0.243 in)	5.677 mm (0.224 in)	6.167 mm (0.243 in)
Valve lift	10.937 mm (0.431 in)	10.060 mm (0.396 in)	10.937 mm (0.431 in)

Intake valves	5500	6500	7500
Valve head diameter	43.300 - 45.500 mm (1.705 - 1.791 in)	43.300 - 45.500 mm (1.705 - 1.791 in)	43.300 - 45.500 mm (1.705 - 1.791 in)
Valve stem diameter	7.985 - 8.000 mm (0.314 - 0.315 in)	7.985 - 8.000 mm (0.314 - 0.315 in)	7.985 - 8.000 mm (0.314 - 0.315 in)
Face angle	60° 30'±7'	60° 30'±7'	60° 30'±7'
Tappet (cold)	0.300 mm (0.012 in)		0.300 mm (0.012 in)
Valve clearance (cold/hot)		0.450 mm (0.018 in)/ 0.300 mm (0.012 in)	
Cam lift	5.889 mm (0.232 in)	5.250 mm (0.207 in)	5.889 mm (0.232 in)
Valve lift	10.444 mm (0.411 in)	9.310 mm (0.367 in)	10.444 mm (0.411 in)

Valve springs	
Number per valve	1
Free length	44.600 mm (1.756 in)
Length loaded at 26.1 - 28.9 kg (57.5 - 63.7 lb)	34.000 mm (1.339 in)
Length loaded at 51.2 - 56.5 kg (112.9 - 124.6 lb)	23.800 mm (0.937 in)

Valve timing	5500	6500	7500
Intake opening (before top dead centre)	15°	12°	15°
Intake closing (after bottom dead centre)	45°	31°	45°
Exhaust opening (before bottom dead centre)	56°	50°	52°
Exhaust closing (after top dead centre)	26°	16°	22°

Valve timing		
Intake opening (before top dead centre)	15°	15°
Intake closing (after bottom dead centre)	45°	45°
Exhaust opening (before bottom dead centre)	56°	52°
Exhaust closing (after top dead centre)	26°	22°

Valve inserts	
Valve guide O.D	13.933 - 14.016 mm (0.549 - 0.552 in)
Valve guide oversize	0.200 mm (0.008 in)
Valve guide interference fit in housing cylinder head	0.0050 - 0.0500 mm (0.0002 - 0.0020 in)
Valve guide fitted I.D after reaming	8.023 - 8.043 mm (0.316 - 0.317 in)
Valve stem clearance in guide	0.0230 - 0.0580 mm (0.0009 - 0.0023 in)
Maximum wear clearance	0.130 mm (0.005 in)
Maximum valve stem eccentricity over one revolution with stylus on sealing face	0.030 mm (0.001 in)

Engine - Torque

Description	Thread size	Torque	Angle
Bolt, cylinder head (C1)	M12 x 1.25	40 N·m (354 lb in)	(125 - 135 °) + (135 - 145 °)
Bolt, main bearing caps (C2)	M14 x 1.25	80 N·m (708 lb in)	90 °
Bolt, timing cover and case (C3)	M12 x 1.25	40 N·m (354 lb in)	—
Bolt, connecting rod caps (C4)	M11 x 1.25	40 N·m (354 lb in)	60 °
Bolt, flywheel (C5)	M12 x 1.25	40 N·m (354 lb in)	60 °
Bolt, rocker shaft bracket (C6)	M8 x 1.25	25 N·m (221 lb in)	—
Nut, crankshaft pulley hub (C7)	M30 x 1.5	300 N·m (2655 lb in)	—
Bolt, fan and alternator drive pulley (C8)	M12 x 1.25	49 N·m (434 lb in)	—
Nut, injection pump shaft gear (C9)	M12 x 1.25	64 N·m (566 lb in)	—
Nuts, injection pump to support (C10)	M12 x 1.25	23 N·m (204 lb in)	—
Retaining screws, additional weights (C11)	M12 x 1.25	110 N·m (974 lb in)	—
Injector clamp nut M8	M8	18 N·m (159 lb in)	—

Engine - Sealing

Operation description	Sealant specification
Adopter for oil filter (S1)	LOCTITE® 270
Adopter for tachometer cable (S2)	LOCTITE® 243™
Flywheel housing to engine block (S3)	LOCTITE® 510™
Timing gear case studs (S4)	LOCTITE® 270
Timing gear cover dowel pin (S5)	LOCTITE® 270
Starter motor to flywheel housing (S6)	LOCTITE® 510™
Allen plug in cylinder head thermostat housing (S7)	LOCTITE® 243™
Cylinder head exhaust manifold studs (S8)	LOCTITE® 270
Oil sump to engine block (S9)	Loctite® 5699
Silencer mounting studs on exhaust manifold (S10)	Loctite® 77164
Flywheel bolt (S11)	LOCTITE® 243™

Engine - Special tools



CAUTION

Operations described in this section of the manual must be performed using the following essential tools to work safely and achieve the best technical results with additional savings of time and effort.

Tool description	Tool number
Injector tester	290284
Sling hook, engine	290740
Cylinder head valve spring compressor	291050
Tractor splitting trolley	292320
Installer rear main oil seal	9970846
Installer front oil seal	9970845
Dummy injector	9970364
Swan neck pipe (fuel timing)	9970848
Engine mounting bracket (to be used with engine stand 293860)	9970844
Steering wheel puller	82834312
Bushes for steering wheel puller	9971375
Remover, hand accelerator pin	9971378
Cylinder pressure test Kit	9971410
Lube pressure check Kit	9971367
Piston ring compressor	Local
Piston ring expander	Local

Crankcase - General specification

Crank gear

Crankshaft - bearings

Main journal diameter	79.791 - 79.810 mm (3.141 - 3.142 in)
Main journal undersize	0.254 mm (0.010 in) – 0.508 mm (0.020 in) – 0.762 mm (0.030 in) – 1.016 mm (0.040 in)
Main bearing wall thickness	2.168 - 2.178 mm (0.085 - 0.086 in)
Main bearing undersize	0.254 mm (0.010 in) – 0.508 mm (0.020 in) – 0.762 mm (0.030 in) – 1.016 mm (0.040 in)
Main journal clearance in bearings	0.034 - 0.103 mm (0.001 - 0.004 in)
• Maximum wear clearance	0.180 mm (0.007 in)
Crankpin diameter	63.725 - 63.744 mm (2.509 - 2.510 in)
Crankpin undersize	0.254 mm (0.010 in) – 0.508 mm (0.020 in) – 0.762 mm (0.030 in) – 1.016 mm (0.040 in)
Big end bearing wall thickness	1.805 - 1.815 mm (0.071 - 0.071 in)
Big end bearing undersize	0.254 mm (0.010 in) – 0.508 mm (0.020 in) – 0.762 mm (0.030 in) – 1.016 mm (0.040 in)
Crankpin clearance in big end bearing	0.033 - 0.087 mm (0.001 - 0.003 in)
• Maximum wear clearance	0.180 mm (0.007 in)
Crankshaft thrust washer thickness	3.378 - 3.429 mm (0.133 - 0.135 in)
Thrust washer oversize	0.127 mm (0.005 in) – 0.254 mm (0.508 in) – 0.508 mm (0.020 in)
Width of main bearing housing over thrust washers	31.766 - 31.918 mm (1.251 - 1.257 in)
Length of corresponding main journal	32.000 - 32.100 mm (1.260 - 1.264 in)
Crankshaft end float	0.082 - 0.334 mm (0.003 - 0.013 in)
• Maximum wear clearance	0.400 mm (0.016 in)
Maximum main journal and crankpin ovality or taper after grinding	0.0100 mm (0.0004 in)
Maximum main journal and crankpin ovality or taper due to wear	0.0500 mm (0.0020 in)
Maximum main journal misalignment crankshaft resting on end journals	0.0100 mm (0.00039 in)
Maximum misalignment of crankpins relative to main journals (in either direction)	0.2500 mm (0.00984 in)
Tolerance from outer crankpin edge to crankshaft center line	± 0.1000 mm (0.0039 in)
Maximum crankshaft flange run-out with gauge styli, over 108.000 mm (4.252 in) diameter (total gauge reading)	0.0250 mm (0.0010 in)
Maximum flywheel seat eccentricity relative to main journals (total gauge reading)	0.0400 mm (0.0016 in)

Connecting rods

Small end bore diameter	41.846 - 41.884 mm (1.647 - 1.649 in)
Small end bushing outer diameter	41.979 - 42.017 mm (1.647 - 1.649 in)
Bushing interference fit in small end	0.0950 - 0.1710 mm (0.0037 - 0.0067 in)
Small end bushing fitted ID	38.004 - 38.014 mm (1.496 - 1.497 in)

Big end bore diameter	67.407 - 67.422 mm (2.654 - 2.654 in)
Maximum connecting rod axis misalignment at 125.000 mm (4.921 in)	± 0.0700 mm (0.0028 in)
Maximum connecting rod weight difference over a complete set from the same engine	25.00 g (0.88 oz)
NOTE: 6500 Big end bearing is without hole	

Pistons

Piston diameter (Measured at 12.000 mm (0.472 in) from base of skirt and right angles to pin)	103.852 - 103.870 mm (4.089 - 4.089 in)
Piston clearance in liner	0.130 - 0.172 mm (0.005 - 0.007 in)
• Maximum wear clearance	0.300 mm (0.012 in)
Piston oversize range	0.600 mm (0.024 in)
Piston stand-out with respect to head at TDC	0.430 - 0.840 mm (0.017 - 0.033 in)
Piston pin diameter	37.983 - 37.990 mm (1.495 - 1.496 in)
Piston pin seat bore in piston	38.000 - 38.006 mm (1.496 - 1.496 in)
Piston pin clearance in piston	0.0100 - 0.0230 mm (0.0004 - 0.0009 in)
Piston pin clearance in small end bushing	0.0140 - 0.0310 mm (0.0006 - 0.0012 in)
• Maximum wear clearance	0.060 mm (0.002 in)
Maximum weight difference between pistons on same engine	20.00 g (0.71 oz)
Piston ring clearance in groove	
• Top	0.0900 - 0.1220 mm (0.0035 - 0.0048 in)
• 2nd	0.0600 - 0.0850 mm (0.0024 - 0.0033 in)
• 3rd	0.0400 - 0.0750 mm (0.0016 - 0.0030 in)
Maximum wear clearance	
• Top	0.50 mm (0.02 in)
• 2nd and 3rd	0.20 mm (0.01 in)
Piston ring gap	
• Top	0.250 - 0.400 mm (0.010 - 0.016 in)
• 2nd	0.600 - 0.850 mm (0.024 - 0.033 in)
• 3rd	0.300 - 0.550 mm (0.012 - 0.022 in)
Maximum wear gap	1.20 mm (0.05 in)