GENERAL SAFETY INSTRUCTIONS

Every user of the equipment must read these general safety instructions, and the user manuals, before using the equipment.

CONTENTS

1. PREFACE

The purpose of these safety instructions is

- to promote safe, proper, and economical use of Sandvik equipment,
- to help the user to notice, avoid, and prevent dangerous situations,
- to minimize repair costs and downtime, and
- to increase the reliability and life of the equipment.

These safety instructions must be complemented with instructions given in local laws and regulations, and with orders given by local authorities.

The manufacturer provides a complete set of user and service manuals with the equipment. The user manuals must always be at hand where the equipment is used. The manufacturer or their representative can also issue additional check-up and service instructions.

Every user of the equipment must read these general safety instructions, and the user manuals, and apply the information therein when, for instance,

- **Using the equipment,** preparing for work, troubleshooting, cleaning, handling raw materials and other materials.
- **Servicing,** checking, and repairing the equipment.
- **Transporting the equipment.**

Proper use, and following of user and maintenance instructions, and check-up and maintenance regulations is very important for the safe use of the equipment. Using the equipment for other purposes than those it is designed for, or exceeding the specified performance of the equipment, is not considered proper use. The manufacturer or the supplier is not liable for damage caused by improper use.

Making any structural alterations on the equipment is strictly forbidden without a written permission from the manufacturer. The manufacturer or the supplier is not liable for damage caused by the use of equipment on which unauthorized structural alterations have been made.

2. MODIFICATIONS TO EQUIPMENT

SANDVIK Sandvik EQUIPMENT IS DESIGNED TO BE SAFE TO OPERATE AND TO COMPLY WITH INTERNATIONAL AND LOCAL STANDARDS AND LEGISLATION. DO NOT DO ANYTHING THAT MAY HAMPER SAFETY FEATURES ON EQUIPMENT.

It is strictly forbidden to make ANY modification to a Sandvik product without prior written approval of the factory. If ANY modifications are made without written approval, Sandvik cannot be held responsible for any accidents, incidents, or damage to persons or property that are related to use of the equipment after said modifications, especially if modifications are made on any safety feature including, but not limited to, safety-critical circuits or components.

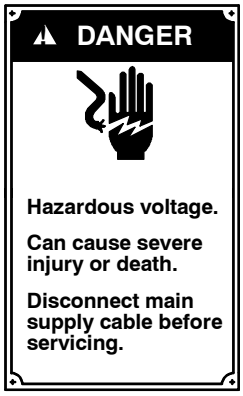
In many cases, the affect of a modification to a machine's total performance is unknown and there is a risk of injury. Therefore, if a machine is modified for any reason, even if safety is not affected, Sandvik's warranty shall be void.

3. WARNING LABELS AND WARNING INSTRUCTIONS

These instructions describe the manner in which Sandvik presents warnings in instructions. The designing of warning texts aim at unifying the contents of the texts in different groups of equipment.

3.1. Warning labels on the equipment

All the warning labels on the device will be presented in the instructions chapter dealing with the warning labels.



DANGER
Immediate danger related to a feature of the device, causing serious injury or death if the proper safety precautions are not taken.

WARNING
A dangerous or unsafe manner of operation that may cause serious injury or death if the proper safety precautions are not taken.

3.2. Warning of injury risks

A dangerous or unsafe manner of operation that may cause serious injury or death (injury or health risk) if the proper safety precautions are not taken.

Dangerous boom movement. The boom movement can cause serious injury or health risk. Do not enter the danger zone of the machine during drilling or tramming.

3.3. Warning of damage to equipment or property

These warnings are designed to instruct the operator how to use the equipment so that material damage can be avoided.

Risk of damage. Welding current can damage electric devices and circuit boards. Disconnect the battery terminals and circuit boards before welding the equipment.

3.4. Read the user or maintenance instructions

These instructions are used when it is forbidden to operate the equipment before receiving proper training or reading the information in the manuals.

Do not use the equipment unless you have been given proper training. Read the operating instructions before using the equipment. The operator must know the operating, maintenance, and safety instructions of the equipment, as well as the local safety instructions of the mine, before using the equipment.

4. EMPLOYER'S / PRINCIPAL'S RESPONSIBILITIES

4.1. Working environment

These instructions must be complemented as required by local laws and other regulations, and by requirements issued by authorities, in order to prevent personal safety hazards and damage to property.

- Special attention must be paid to keep the equipment, machineries lifting devices, auxiliary equipment, tools, safety devices, passages, and mining sites in proper condition.

4.2. Maintenance

- To keep the equipment in safe working condition, original spare parts must be used when parts are replaced in conjunction with service and repairs.
- Any alterations made on the equipment must be accepted by the manufacturer in writing.

4.3. Personnel

- The operators must pass a medical examination when being employed, and we recommend that regular medicals be conducted to all operators.
- The employer's safety requirements include that one person in each working site is appointed responsible for matters of safety. The employees must know who this person is, and they must know the safety regulations of the working site.
- The employees must cooperate with the appointed safety person and follow the instructions he gives.
- Use and repair of the equipment is only allowed to persons trained for these tasks.
- Only authorized persons are allowed to operate the equipment.
- The employer / principal should clearly define the operator's responsibilities and authorize him to not obey instructions that contradict the safety regulations.
- New employees or persons in training are allowed to operate, service, or repair the equipment only under the direct supervision of an experienced employee.
- The operators must be acquainted with the instruction manuals issued by the manufacturer, and with the properties of the equipment.
- In addition, the operators must have a legal permits, if such are required.
- The principal must unambiguously define the qualifications required for operating, adjusting, servicing, and repair work.
- Work on the electric equipment is only allowed to qualified electricians, or persons trained for the tasks and working under the supervision and controlled by a qualified electrician as stated in electric safety regulations.
- Work on the hydraulic equipment is only allowed to trained and experienced hydraulic equipment mechanics.

4.4. Distribution of responsibilities

The distribution of responsibilities must be agreed upon in writing.

- Organization
- Subcontractors
- Temporary employees
- others

Any agreements, in which the manufacturer and the dealer restrict the right of a third party to compensation in case of personal injury or material damage, are not valid. With all the concerned parties involved, agreements can, however, be made on the distribution of and restrictions to responsibilities.

5. OPERATOR'S PERSONAL QUALITIES

5.1. Suitability for the work

- **Physical suitability** means that the person is able to act correctly and quickly to avoid accidents.
- **Mental suitability** means that the person is able to understand and apply the instructions and regulations, to work safely and concentrate on the work, and to withstand mental stress and thus avoid errors.

5.2. Training and experience

- The operator must be given user and service training. He must acquaint himself with the instruction manuals issued by the manufacturer, and know the specified performance and properties of the equipment he is using.

6. OPERATOR'S RESPONSIBILITIES

Accidents at work often happen in unpredictable situations. Therefore, it is important to try to consider all possible, even unlikely, situations that may occur in each phase of work.

- The operator must always bear safety in mind, and he must know the safety regulations of the work site.
- The operator must be trustworthy and reliable.
- In addition, the operator is required willingness to observe instructions.

Safety devices


Earmuffs


Eye protection


Helmet


Respirator


Protective overalls


Safety boots

- The operator must always wear the safety devices, such as helmet, earmuffs, eye protection, respirator, protective overalls, safety boots, and other safety devices required in the work or as stated in the regulations.
- All safety regulations must be observed.
- Always follow user and service instructions.
- Do not use any equipment, unless you are fully acquainted with its operation.

- The user must always know the operation of the equipment and all its controls.
- Safety systems are not to be bypassed or removed to make work easier. The equipment must never be started or operated, if any safety devices or protective guards are removed.
- Before starting or operating the equipment, the operator must make sure that it causes no risk of personal or material damage.
- The equipment is not to be used for any other purpose than what it is designed for.
- The specified performance of the equipment must not be exceeded.
- It is forbidden to use the equipment when ill, or under the influence of alcohol or drugs.

7. SAFETY AT WORK

7.1. Before starting to work

Acquaint yourself with the manuals issued by the manufacturer, and follow the instructions in them. Plan your work in advance to avoid accidents, mistakes, and injuries.

If an accident takes place, or a fire breaks out, act quickly and use the available equipment. Learn how to use first aid supply and fire extinguishers. Make always sure that you know where you can get help. Do not take things for granted. Do not suppose that the equipment is in good condition just because it worked properly when it was last used.

Work clothing should not be too loose. Loose jacket and sleeves, long hair, rings, bracelets, etc. can get caught in rotating machine parts. Wipe off mud and grease from your shoes before getting on the rig and starting to work. Always wear personal protective devices, such as helmet, eye protection, earmuffs, protective overalls, and safety boots. Observe the safety instructions.

Before starting to work, check the equipment carefully for signs of wear, and check all functions. When taking over from the previous shift, ask about the working conditions and the function of the equipment.

Before moving the rig, make sure that you know the height, width, length, and weight limits of the site, and that the rig does not exceed these limits. You should know the site well before starting to work. The positions of possible gas, water, and sewer lines, and overhead and underground electric lines, and other obstacles and hazards on the site must be known. Any such points must be clearly marked by the responsible person in order to avoid accidents.

Make sure that there is enough space for all movements.

Cave-ins are dangerous when drilling. Observe the condition of the rock, and use necessary supporting to prevent cave-ins.

Keep the equipment clean, especially all controls, windows, glasses, lights, etc. Remove possible oil and grease stains, and ice. Wash the equipment regularly.

Keep the tools and other accessories in the tool box.

Many accidents can be avoided by keeping the work site tidy.

Simultaneous charging and drilling is strictly forbidden.

7.2. Oils, greases, and fuels

- Always use only the type of lubricants recommended by the manufacturer. Neglecting these recommendations can lead to breakage or malfunction of the equipment, which can cause serious personal or material damage.
- Check regularly that fuel, lubricant, coolant, and hydraulic fluid levels are correct.
- Do not mix different types of fluids and oils.
- Remember that all bearings are not alike. Each bearing has its specific properties and lubricant requirements. Follow the manufacturer's instructions.
- Starter fluid and other flammable materials must not be stored in the cabin.
- Flammable materials must be protected against heat, sparks, and open flames.
- Storage containers of flammable materials must not be punctured or destroyed by burning, they may cause risk of explosion.
- Smoking is strictly forbidden when filling up the fuel tank.

7.3. Electric equipment

- To prevent personal injuries and material damage in conjunction with the use of electric equipment, there are many regulations concerning the structure, installation, and use of electric equipment. The regulations are always based on local laws and electric safety requirements - these must be strictly observed.
- Work on electric equipment is only allowed to qualified electrician.
- Do not use other than original spare parts.
- Electric conductors should always be considered live, and thus dangerous. Damaged electric wires and cables can start a fire or cause serious personal accidents.
- Current must always be cut off from the components to be checked, serviced, or repaired.
- If a component must be live when worked on, a fellow worker must stand by to immediately cut off electricity at the emergency or main switch in case of emergency.
- If a fault is detected in the electric equipment, such as open main switchgear door, cable damage, broken component, etc., current to the equipment must be cut off. The equipment must not be used before the fault has been repaired, and the necessary measurements, tests, and trial runs have been completed.
- Power must not be switched on until you have made sure that it will not cause any danger.

8. DRILLING SITE SURROUNDINGS

NO UNAUTHORIZED PERSONNEL SHOULD BE ALLOWED NEAR THE DRILLING SITE DURING DRILLING.

- Nobody should be allowed within the booms' operating range.
- Explain the meaning of the rig's warning signs and lights to everybody working on the site.
- The working area must be kept clear of drilling debris, hand tools, and other objects. All equipment, such as straps, chains, hoses, etc. must be checked regularly for signs of wear, looseness, breakage, or chafing, and any damaged equipment must be replaced immediately.
- The surroundings of the drilling rig must be kept clear of obstacles so that there is always free access to the emergency stop buttons. Everybody working at the site must know the locations of the emergency stop buttons.
- Under certain circumstances, work at the desired site can be dangerous. For instance, if the ground is sloping, it may be necessary to level the site to avoid danger.
- If work is to be done near underground gas, telephone, oil, electric power, sewer, or water lines, the owner of the network must be consulted before starting the work. In cooperation with the representatives of the owner you can determine what safety precautions are necessary to avoid danger. The operator and the representatives are responsible for carrying out the required safety precautions.
- The working environment should be arranged to promote safety, with regard to the methods, work, and equipment involved, as well as the blasting techniques, opening of mine and preparatory work, loading and transportation, crushing and lifting methods, supporting and reinforcing, possible construction work, electric, water, and air systems, ventilation, occupational and fire safety, and other possible measures promoting safety.
- The local environmental regulations must be observed.

9. ELECTRIC POWER LINES

To prevent the danger of injuries and material damage, the structure, installation, and use of electric equipment involves a number of regulations. You should always make sure that you follow the current safety regulations when working near electric power lines.

Electric current always flows to the ground when a suitable conductor is provided.

- Contact the local electricity board if you are going to drill near overhead power lines. Ask the electricity board to have their experts on the site, if necessary.
- **REMEMBER!** ELECTRIC CURRENT DOES NOT ALWAYS NEED DIRECT CONTACT, WITH HIGH VOLTAGES IT CAN “JUMP” OVER LONG GAPS, with high voltages up to 5 meters.
- ALWAYS KEEP A SAFE DISTANCE TO THE POWER LINES! Not even by accident should any part of the equipment get closer to the power lines than what is considered a safe distance. Refer to the local electric safety regulations for safe working distances.
- If it is impossible to follow the safety regulations, the owner of the power lines should always be contacted beforehand.
- The safety devices can become electrically charged if you are working near a high-frequency transmitter.
- Safety can be improved by earthing the drilling rig. Earthing is done with a thick copper cable connected from the mast top to an earthing rod in the ground. THIS DOES NOT, HOWEVER, OFFER COMPLETE PROTECTION!

9.1. Contact with electric power line

If the rig touches an electric power line, the following instructions may prevent injuries or death:

- f you are standing outside the rig, do not touch any part of the rig or try to get onto the rig. Keep everybody away from the rig.
- If you are on the rig, do not try to get off it. If the rig is touching a power line, the rig can catch on fire. If the rig has rubber tyres, leave the rig as soon as the tyres start smoking. JUMP OUT! Do not make yourself a conductor for the electric current to flow from the rig to the ground. Move away from the rig by jumping, or by leaping so that only one foot at a time touches the ground. The electric field in the ground can cause a dangerously high voltage between your legs. You will not be in safety until you are about 20 meters away from the rig.
- If the boom, or some other component of the rig touches an electric power line, the whole rig becomes live. Although the insulating rubber tyres may make the situation seem safe (not concerning track models), a person standing on the ground and touching the rig can get a fatal electric shock.
- Call for help without delay.

9.2. If personal injuries occur

- If you come to a place where an electric accident has taken place, do not risk your own life by acting incautiously!
- Try to find out whether a high or a low voltage is involved.
- Where high voltage is involved, do not start any rescuing attempts until the power company has cut off the voltage. It can be dangerous even to approach a person in contact with the electric conductor, or with the rig that touches the conductor. Remember that high voltage power lines have no fuses that blow, the conductors are always dangerous, until a qualified electrician has made them dead.
- If a person is in contact with a low voltage line or with a rig that is touching a low voltage line, rescuing can be attempted by using a dry and clean rope, or a dry and unpainted piece of wood. Anyone who is attempting the rescue must keep as far away from the victim as possible. The victim must not be touched until he is completely disconnected from the live components.
- If the victim is unconscious, resuscitation and artificial respiration must be started immediately.

10. VENTILATION AND DUST PREVENTION

In mining and other quarrying work, ventilation and dust prevention are an important part of the technique. Mining regulations and safety requirements demand careful ventilation plans and air quality monitoring. Adequate ventilation must always be provided. Exhaust fumes can be lethal. If the engine has to be started in an enclosed space, make sure that ventilation is sufficient.

One of the purposes of ventilation is prevention of dust accumulation. Any or several of the following methods can be used:

- **Prevention**
  Correctly applied working methods
  Correct equipment
- **Extraction**
  Cleaning
  Filtrating
- **Binding**
  Water spray or vapour, foam
  Water flushing
  Chemical treatment of settled dust
- **Isolation**
  Enclosing
  Local extraction ducts
- **Attenuation**
  Local auxiliary ventilation
  General ventilation

10.1. Dust prevention

BREATHING OR INHALING DUST PARTICLES WILL CAUSE DEATH OR SEVERE INJURY.

ALWAYS WORK WITH A RESPIRATOR APPROVED BY THE RESPIRATOR MANUFACTURER FOR THE JOB YOU ARE DOING. IT IS ESSENTIAL THAT THE RESPIRATOR THAT YOU USE PROTECTS YOU FROM THE TINY DUST PARTICLES WHICH CAUSE SILICOSIS AND WHICH MAY CAUSE OTHER SERIOUS LUNG DISEASES. YOU SHOULD NOT USE THE EQUIPMENT UNTIL YOU ARE SURE YOUR RESPIRATOR IS WORKING PROPERLY. THIS MEANS THE RESPIRATOR MUST BE CHECKED TO MAKE SURE THAT IT IS CLEAN, THAT ITS FILTER HAS BEEN CHANGED, AND TO OTHERWISE MAKE SURE THE RESPIRATOR WILL PROTECT YOU IN THE WAY IT IS MEANT TO.

MAKE SURE THE DUST SUPPRESSION SYSTEM IN YOUR EQUIPMENT IS WORKING PROPERLY. IF THE DUST SUPPRESSION SYSTEM IS NOT WORKING PROPERLY, STOP WORKING IMMEDIATELY.

ALWAYS MAKE SURE DUST HAS BEEN CLEANED OFF YOUR BOOTS AND CLOTHES WHEN YOU LEAVE YOUR SHIFT.

THE SMALLEST PARTICLES OF DUST ARE THE MOST HARMFUL. THEY MAY BE SO FINE THAT YOU CAN NOT SEE THEM.

REMEMBER, YOU MUST PROTECT YOURSELF FROM THE DANGER OF BREATHING OR INHALING DUST.

11. BEFORE USE

- Make sure that the equipment is used only when it is in safe and proper working condition.
- The equipment should only be used when all the necessary protective and safety devices, such as detachable guards, emergency stop devices, sound insulations, dust separator, etc. are in place and in safe and proper working condition.
- When stepping in and out of the rig, move cautiously and use the rails and grips provided - beware of slippery surfaces.
- Before starting the engine and starting off, check the interior, surroundings, and underside of the vehicle.
- Make sure that all controls are in the correct position before starting the engine.
- **Warning signs.** If warning signs are placed on the engine starting switch or controls, these must not be touched until the person who placed the signs, or some other person who knows the situation, has removed them.
- The engine should never be started otherwise than with the proper starting controls.
- Always follow the starting and stopping instructions given by the control and indicator devices as described in the manuals.
- Drain condensate water out of the system as instructed by the manufacturer.

11.1. Hydraulic system

- Check the hydraulic system for possible leaks. Repair all leaks before use. Check all hydraulic hoses, especially those that bend in use, and replace hoses as necessary. Check that all cover plugs and caps, and filling caps are properly in place.
- Check that all safety devices, such as pressure relief valves, pressure gauges, etc. are in place and working properly. Make sure that you know their functions. Any of the safety systems must not be bypassed.

11.2. Water and air circuits

- Check the pipes, valves, drain valves, and other components of the pneumatic and water systems. Make sure that their pressures are correct, and that no leaks occur.
- Drain the air and water systems and valves completely if the ambient temperature drops below freezing point.

11.3. Electric system

- Check the operation of the safety devices. Test the instrument panel indicator lights by depressing the test button, see manual for location of the button. **NOTE!** This test does not reveal the condition of the indicator light sensors, and therefore they must be checked separately at regular intervals. Check the operation of the stopping solenoid as well.
- Check the electric cables visually, and make sure that the electric boxes and cabinets are properly closed. Before starting, make also sure that the power supply cable offers sufficient range of movement.
- A high deviation of supply voltage damages the equipment. Overvoltage damages components and starting with undervoltage damages the starting circuit components of the engine.

11.4. Frame structures

- Check all sheet metal plates and welds visually for possible damage, such as cracks, bending, and deformations. Cracks in the surface paint or paint peeling may indicate a point of dangerous breakage in the structure. The equipment must not be used until the necessary repairs are made.

12. STARTING / STOPPING

- Before starting, make sure that it will not cause any danger.
- Starting an automatic drilling rig is forbidden if there are people within the operating range. Do not start the powerpacks when the automatic mode is on.
- Many Sandvik equipment are provided with an alarm and monitoring system that prevents serious damages caused by incorrect function. The automatic monitoring devices do not only prevent damages, but also indicate which component has caused the disturbance.
- The safety systems must never be bypassed or removed in order to make some work easier.
- Check all safety devices.
- Test the function of the controls.
- Check all gauge readings and indicator lights, and replace all faulty devices.
- At least once during every shift, the equipment should be visually checked for faults or defects. Report all possible faults (also functional disturbances) immediately to the person or department responsible for the equipment. If necessary, the equipment must be stopped at once, and possible safety precautions must be taken.
- Stop the equipment at once, and take necessary safety precautions if functional disturbances occur. Repair the fault or have it repaired without delay.
- Never leave the immediate vicinity of the equipment if the engine is running.
- Everybody who is working near the rig when it is in operation must wear earmuffs, a safety helmet, and eye protection.

12.1. Be alert

- Do not read anything.
- Do not drink.
- Do not eat.
- Concentrate on your work. If you must divert your attention elsewhere, stop the equipment.

12.2. Use in cold weather

- See user manuals for cold starting instructions.
- Operate the controls softly until the hydraulic oil has warmed up to normal working temperature. Hydraulic oil can be warmed up by following the manufacturer's instructions.
- Sudden, abrupt loading should especially be avoided.
- Oils for cold weather should be chosen according to the lubricant recommendations.
- The air and water circuits must always be drained if the temperature drops below freezing point.
- Use anti-freeze mixture in the engine cooling system (only water cooling engine models). Check the freezing point of the coolant.

12.3. Monitoring and safety devices

Many Sandvik equipment are provided with an alarm and monitoring system that prevents serious damage caused by improper function. The automatic monitoring devices do not only prevent damage, but also indicate the component that has caused the disturbance. This feature shortens the time required for repairs, and promotes safer working.

- *The phase sequence control relay* monitors phase sequence and drop out of a phase.
- *The return oil filter monitoring* employs a pressure switch. If the pressure difference between the intake and discharge pressures is too great, a warning indicator light goes on.

Automatic safety devices cut off current in the event of a serious disturbance. Simultaneously they usually indicate the component that has caused the disturbance.

- *The emergency stop button* stops all electric motors, and an indicator light goes on. Before restarting, the button must be turned in the direction indicated by the arrow in order to return the button up. The powerpack cannot be restarted until the *pressure control reset button* has been pushed.
- *Electric motor overheating* is prevented with an automatic switch that cuts off current to the motor if the load rises above the set limit.
- *Hydraulic oil level* control switch stops all drilling functions if the oil level is too low. Simultaneously, a warning light goes on.
- *Oil temperature* control switch stops drilling functions if the oil temperature rises above the set value (e.g. +65°C; different values are used). Simultaneously, the oil temperature warning light goes on.

13. PROPER USE

The use of the equipment for other purposes than what it is designed for, or exceeding the specified performance ratings is not considered proper use. The manufacturer / supplier is not liable for damage caused by such use. Proper use also includes observing the information in the user and service instructions and following the control and service regulations.

Acquaint yourself with the user and service manuals issued by the manufacturer, and keep them always with the equipment.

14. TRAMMING, TOWING, AND TRANSPORTING INSTRUCTIONS

14.1. Brakes

Do not operate the vehicle with faulty brakes. The operation and holding capacity of the brakes must always be ensured before driving is started. Damage to vehicle or serious personal injury or death may result.

14.2. Tramming

Tramming requires some special procedures depending on the equipment of your Tamrock drilling rig. Read the manuals of your rig carefully.

Do not release the parking brake until you have checked that

- steering works
- booms are in transport position
- correct speed range is selected
- tramming direction is selected
- all equipment and functions are in working order
- moving the rig will not cause personal or material damage

- In passages with limited space, it may be necessary to use the boom control levers in addition to the actual controls of the carrier. If the rig is equipped with a cable or hose reel, remember their use when tramming.
- You should never move or operate the rig unless you have made sure that it does not cause any danger.
- Do not try to steer the rig from anywhere else than the actual steering position.
- The rig must not be operated by anybody but trained persons.
- Stepping aboard or hopping out of a moving rig is forbidden.
- Transporting people with the rig is forbidden.
- Avoid narrow and low passages.
- Move the boom into the transport position. In this position, the centre of gravity is as low as possible and stability increases. Stresses on the boom will also be greatly decreased.
- In rough terrain, it may be necessary to move the boom during tramming. However, the boom should be kept as short as possible (extension cylinder fully retracted) and the feed in vertical position. The boom should always be moved very cautiously to maintain stability in slopes and difficult terrain.
- If you have to move the rig in dangerous places, for instance along the brink of a steep slope, use the control platform rather than the cabin (Track models). Try to drive the rig so that the platform is not on the brink side.
- If the rig is equipped with track oscillation, acquaint yourself with the instructions. Incorrect use of oscillation may cause the rig to turn over, resulting in serious damage.

14.3. Towing

Great caution and the manufacturer's instructions should always be observed when towing. Neglecting the instructions will cause severe damage on the rig, and the damaged rig can cause serious accidents.

- Do not try to start the engine by towing.
- If the engine is running, the rig's normal tramming speed can be used for towing.
- If the engine cannot be started, towing requires special preparations depending on the rig type; see towing instructions in the rig's manuals.
- A rig without brakes must always be towed using a rigid towing bar. Remember also that power steering works only when the engine is running. If the engine is not running, steering works but it is heavy and slow.
- Make sure that the towing vehicle's brakes are in good condition, and powerful enough to stop both vehicles in all circumstances.

14.4. Transporting

Always plan transportation in advance to be able to ensure safety. Choose the safest method of transport, and make sure that the capacity of the transporting vehicle is sufficient.

- Use access ramps when moving the rig onto the platform and down from it. Driving on or off the platform must be done on level ground.
- Always use low tramming speed, and be very careful when coming from the ramps onto the platform.
- When coming onto the access ramps, the rig must be balanced with boom movements and oscillation (if provided).
- Before transportation, the parking brake must be engaged and the boom lowered down and properly supported against the platform. Secure the rig with straps or chains to prevent it from moving during transportation. In addition, observe all other special requirements for transport of your rig, as given in the user manual.
- When planning the transporting route, keep the rig's dimensions in mind (especially cabin models). Always measure the maximum height and width of the transport.
- The lifting points of the drilling rigs are marked with hook symbols. Note that some rigs have no lifting eye on the boom. The lifting point is, however, marked with a hook symbol. When you lift a drilling rig make sure that the lifting equipment is in good condition.
- Make sure that you know the actual weight of the rig before starting to lift it.

15. LOAD LIFTING

Most countries have regulations concerning lifting, lifting wires, and lifting devices. These local safety regulations must always be followed.

- Only the right type of lifting device with sufficient lifting capacity should be used. No other devices than specified lifting devices should be used for lifting the equipment or their components. Do not use, for instance, a loader for lifting.
- The weight of the load must be known, and the rated lifting capacity must not be exceeded.
- Lifting should be planned so that the load need not be moved over people or places where people may be present.
- Make sure that the lifting device is in good condition.
- Lifting wires and chains should be checked regularly. Discarded wires must be marked clearly and disposed of without delay.

- The lifting points of Sandvik drilling equipment are marked with hook symbols. Lift the equipment at the marked points only.

- Check proper fastening and balance of the load by at first lifting it up only a few centimeters. Continue lifting when you are sure that the load is properly fixed and in balance.
- Lifting wires with several ropes must not be twisted. Lifting ropes must be fixed according to the manufacturer's instructions.

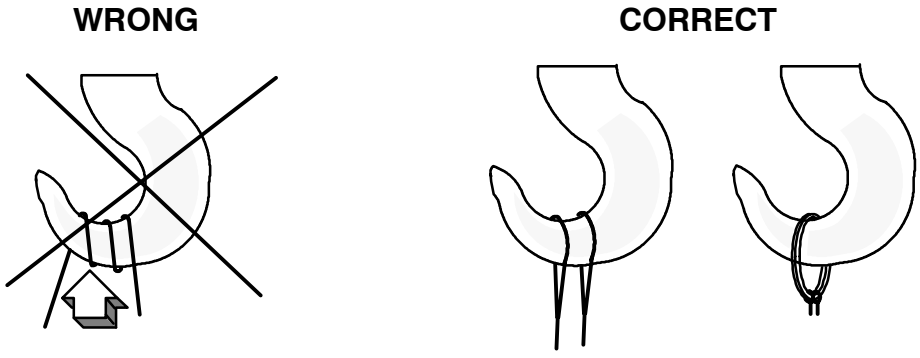


Fig 1. Use of lifting equipment

- The lifting wire must not make a loop round the load in place of a lifting strap or chain.

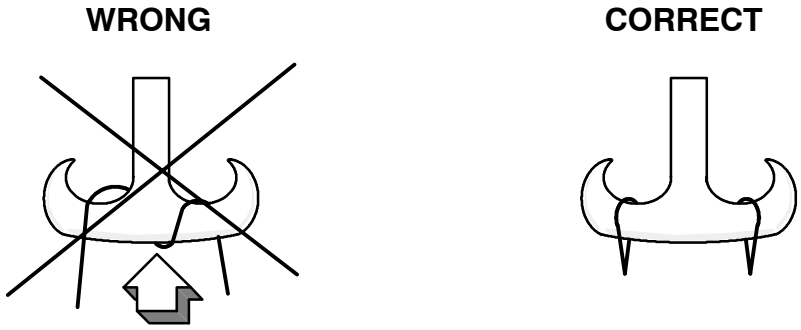
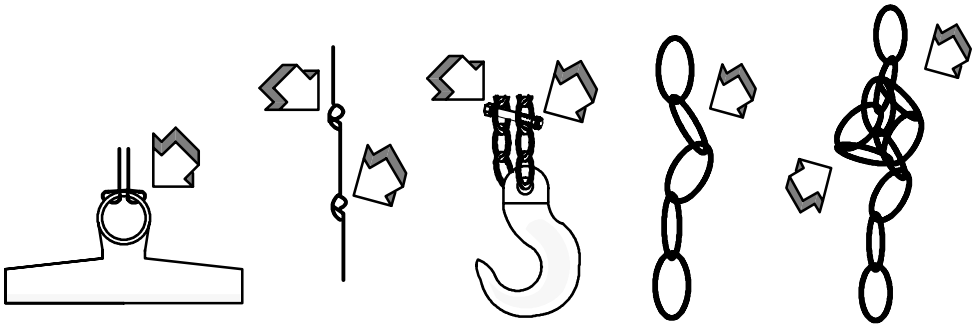


Fig 2. Use of lifting equipment

- The load should never be lowered so far down that less than two turns of wire is left on the wire reel. This way you can make sure that the weight of the load is evenly distributed between the wire and its fixing point on the reel.
- Check the capacity and length of the wire whenever the wire or mast length is altered.
- Never stand or work under a hanging load.
- Do not estimate lifting capacity on the basis of stability.
- Do not move a load over persons.
- Take care that the load does not bump into anything.
- Do not use any other lifting devices for lifting persons than those designed for that purpose. Drilling rig booms are not designed for lifting persons, and it is absolutely forbidden to climb on them!
- It is ABSOLUTELY FORBIDDEN to carry persons on the load.

DANGEROUS LIFTING EQUIPMENT !



16. END OF WORK SHIFT

Stop the equipment and finish work according to instructions.

- Move the equipment away from high walls or steep slopes before ending the day's work.
- Carefully choose the place where you park the equipment. Do not leave it in a place where rocks may fall down on it, or in a place where heavy rain may form a pool.
- Do not leave the equipment in a slope or ramp, unless you can make sure that it will not start moving.
- To ensure that the rig remains stationary, refer to the instructions given in the manuals.
- Make sure that the pressurized systems are in the state given in the manuals.
- Move all control levers to middle or parking position.
- Engage parking brake and lock it to prevent the equipment from moving.
- If a clutch is provided, disengage it before stopping the diesel engine.
- Lock the ignition switch or the starting circuit, and take the key away, if locking is possible. This is to prevent unauthorized starting.
- Lock up the cabin, and install protective devices, if provided.

17. CONSIDERATION FOR THE ENVIRONMENT WHEN SERVICING THE EQUIPMENT

When servicing the equipment, you handle many substances that are regarded as hazardous waste. When dealing with these, be very careful and follow the applicable local regulations. The following instructions should provide useful guidance – for more location-specific instructions, contact the local garbage disposal company or the appropriate authority.

Service area

The facilities used for servicing must be designed for this purpose. The floor material must be oil-resistant - preferably cast concrete. For washing the equipment and to prevent damage from oil, the sewage system must be equipped with an oil trap.

According to regulations, those in possession of hazardous waste must know the amount, quality, and origin of the waste; i.e., companies must keep a record of this information. Always follow the regulations for storage of hazardous waste. It is a good idea for the company to appoint a person who is responsible for the storage and further processing of hazardous waste.

Appropriate handling of oil waste

Any oil that is spilled onto the ground, including biodegradable oil, must be collected as carefully as possible. Oil waste must not be disposed of by burning, and under no circumstances must oil be poured down the drain or into water systems. One liter of oil is enough to pollute a million liters of ground water intended for household consumption.

Used lubrication oil is hazardous waste that must always be processed by an authorized waste treatment plant. During its use, metal particles and other impurities have entered the oil. These increase the risks to the user's health.

If the company produces a larger amount of oil waste, it is worth separating. For treatment, oil waste is divided into three categories:

- Clear oils, which include hydraulic and transmission oils.
- Black oils, which are motor oils. Synthetic and mineral oils are collected in the same container.
- Vegetable oils, which are collected in a separate container.

Greases, fuels, solvents, and other substances must not be mixed with oil waste.

Solid waste containing oil

Oil filters, oil rags, fuel filters, and oil absorbents must be collected in a separate container.

Radiator, brake, and clutch fluids

Used radiator, brake, and clutch fluids contain traces of heavy metals, zinc, and copper, for which reason they must not be poured down the drain or mixed with oil waste. They are to be collected in a separate, labeled container and delivered to the same plants as the oil waste.

Solvents and oil trap sludge

Solvents and sludge that has collected on the surface of the oil traps are collected in the same container. The surface layer in the oil traps must be removed regularly, and the entire trap must be drained at least once a year, including the sludge at the bottom. Do not mix the oil trap sludge with oil waste.

Fuel oil

Fuel oil is hazardous waste that must in all cases be processed by an authorized waste treatment plant.

Oil waste storage

The best containers for collecting oil waste are the original containers for the oils. Naturally, new containers become available whenever new oil is purchased. They already have the necessary warning labels, are easy to close, and can be moved around fairly easily. Always strike out the product name on the label and clearly label the container “oil waste”. This ensures that everyone knows the container contains oil waste. Store the waste in an appropriate manner. A suitable storage room for hazardous waste has a roof, a leak-proof floor, and preferably a lockable door. When storing flammable fluids, always ensure that the room has a separate ventilation system or is otherwise well ventilated. The path to the storage room must be free of obstacles.

Empty oil containers

Empty oil containers must not be dumped in landfills without having been cleaned. Cleaned plastic containers can be disposed of as regular waste. Most countries have arranged a recycling system for metal barrels.

18. CONSIDERATION FOR THE ENVIRONMENT WHEN USING THE EQUIPMENT

SANDVIK Sandvik Corp. actively considers environmental concerns when designing and manufacturing its products. The equipment are designed to burden the environment as little as possible; i.e., the vibration, noise, exhaust, and lubrication/additive emissions of the machine have been minimized. The manufacturing process for the equipment has been designed so that recycled materials are used as much as possible, and the process quality and emissions are considered carefully in selection of the subcontractors. There is an ongoing aim of continually lowering the emissions from the machining of metal, and from painting and assembling the equipment, and these processes fulfill the very strict requirements of the Finnish environmental legislation.

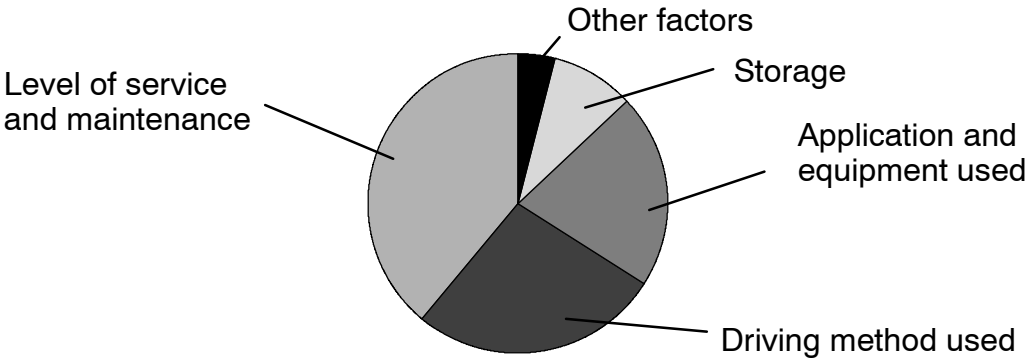
18.1. Economical operation of the equipment

The costs incurred by using the equipment go hand in hand with the amount and type of emissions it lets into the environment. Through systematic training of the operator and service personnel, one can reduce the operating costs of the equipment significantly, and at the same time reduce the environmental burden caused by the equipment. See the graph below.

An economical driving method and correct operation are another key factor in reducing operating costs and the effect on the environment:

- Avoid idling. Warm up the machine by performing light tasks, not by idling.
- When you are working, try to keep the engine speed close to the maximum torque or just above it, as this will ensure optimal engine fuel economy and keep the noise and exhaust emissions low. There are still some power reserves in the engine for momentary load peaks.
- Avoid unnecessary carrying and use of auxiliary devices (e.g., air–conditioning unit or extra electrical and other work equipment) that will not be needed for the work at hand.
- Avoid overloading

Factors affecting the service life of the equipment



18.2. Decommissioning

The end user of the equipment is responsible for its decommissioning. If the end user does not have the ability or the resources to disassemble the equipment, the work must be performed by someone who does possess the necessary knowledge and skills.

In disposing of the waste material from disassembly of the equipment, the following matters should be considered:

- The equipment body, all the steel constructions, and the copper and aluminum in the electrical wiring are recyclable. The metals can be melted and used as raw material for new products, except for parts that have been in contact with substances that are regarded as hazardous waste. The contaminated parts can usually be simply cleaned or rinsed, after which they can be recycled.
- Most plastic parts are recyclable, similarly to the metals. Each plastic part carries information on the material used and a manufacturing date, which can be used for determining whether the part can be recycled.
- Rubber parts are not regarded as hazardous, and they can be disposed of according to normal procedures. Tubes (hydraulics etc.) must be cleaned before they are disposed of. Worn-out tires can be returned to the dealer from whom they were originally bought.
- Windshields and other cabin windows are not accepted for conventional glass recycling, but they can be disposed of via normal waste disposal methods.
- Electrical components that are classified as hazardous waste (accumulators, batteries, circuit boards) and other hazardous waste must be delivered to a licensed waste treatment location or be disposed of according to local regulations.
- Air conditioning units, which contain CFC and HCFC compounds, must always be delivered for treatment to a licensed waste disposal facility.
- For disposal instructions for fluids and lubricants, refer to the service manual.

These instructions are not binding, but they offer suggestions for appropriate waste disposal procedures. Local authorities always have more detailed instructions and recommendations on the disposal of different materials.

When removing equipment from use, you must always follow the relevant authorities' regulations on waste disposal that are in force at the time and location of disassembly.

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