GMK 5130-2 Risk Assessment

This risk assessment is based upon the information contained within the standard Operator's Manuals for a Grove GMK 5130-2 all-terrain crane.

Although this risk assessment is comprehensive, and all efforts have been made to be as thorough as possible, Manitowoc CraneCARE makes no claim in any way, shape or form that all possible hazards have been identified, or that all associated risks have been assessed, or that all possible control measures that could be implemented have been provided.

The information contained within this risk assessment is also based upon the assumption that all personnel involved with the use of the crane, including operators, service personnel, or associated crane crew personnel have received prior instruction and/or appropriate training in all aspects of operating, or servicing and maintaining, or working with this particular model of crane, and that while conducting the previously mention tasks, are doing so with the full permission of the crane owner, and are doing so while holding all appropriate qualifications and/or certifications required by applicable legislation in the country, region, state or territory in which the crane is to be operated.

GENERIC HAZARDS AND INFORMATION

A. General Information

Warnings and Symbols


Hazard may cause personal injury


Hazard may cause damage to crane or other objects within the working range


Hazard may cause electrocution


Hazard may cause environmental damage

B. Generic Hazards

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections	Slips, trips and falls		**Risk of slips, trips and falls due to slippery surfaces!** Inspect all walkways, access ladders, steps and grab-rails for damage or presence of oils, greases, mud or slippery substances that could cause a slip. Wipe away or properly clean any substance that will cause a risk. Ensure that walking surfaces are coated with a non-slip coating.
	Cuts and abrasions		**Risk of cuts and abrasions due to sharp edges or damaged surfaces!** Wear protective gloves when inspecting or cleaning access devices as protection against any sharp edges or chemical contamination. Inspect for any evidence of damage, corrosion, broken welds, loose bolts, metal fatigue or any other factor that may cause a loss of strength to walkways, access ladders, steps and grab-rails.

B. Generic Hazards (cont.)

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections (cont.)	Use of OEM ladders		**Risk of fall from ladders if used incorrectly or unsafely!** Ensure that any OEM removable ladders are positioned correctly and locked into their respective holders before using them for access. Refer to ***Page 4-60 of the Operators Manual*** for more information.
	Use of portable ladders		**Risk of fall from ladders if used incorrectly or unsafely!** Ensure that any portable ladders are positioned on a firm level base. Ensure step ladders are fully opened and locked. Do not stand any higher than the third step from the top. Ensure standard ladders are elevated to approximately 75° (1:4), and are secured at the base and the top. If this is not possible, have a second person foot and steady the ladder. Only perform tasks that would normally be done using one hand. Maintain three points of contact on the ladder at all times. Do not over-reach. Do not attempt to carry tools up or down the ladder while holding them in your hands. Ensure that all OEM ladders are stowed and secured on the vehicle when not is use. Do not jump off the crane structure. Use provided access ladders. Face the ladder when climbing. Use proper hand-holds. Do not use control levers, seats or other non-secured items as hand-holds.
	Slips, trips and falls		**Risk of slips trips and falls due to loose covers and debris!** Inspect all covers and guards are secured in place. Remove any debris from ground around the machine, the cabin areas, carrier deck areas and access ways that may create any trip hazards. Dispose of debris correctly and safely.
	Falls from Height		**Risk of injury due to falls from heights!** Where access ways and edge protection is not provided in certain sections of the superstructure, utilise scaffolding or elevating work platforms to conduct the inspections. Where these control measures are not possible, the use fall prevention, fall restraint, or fall arrest devices and appropriate anchors and systems will be required. Do not attempt to gain access to the crane when it is in motion.

B. Generic Hazards (cont.)

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections (cont)	Pressurised or high temperature fluids		**Risk of serious injury due to hot/pressurised fluids!** Follow manufacturer's instructions regarding checking of fluid levels. Ensure that wherever possible that pressure is relieved in all reservoirs prior to opening. For engine coolant tank instruction ***Refer to Page 5-6 of the Operators Manual***. Ensure that all fluids have had sufficient time to cool down prior to opening the reservoir. Wear protective gloves, protective eyewear and appropriate protective clothing. Wear long sleeved protective clothing when checking the vehicle engine oil. It is necessary to reach between the back of the drivers cab and the exhaust system to access the engine dipstick. Ensure that you do not touch the hot exhaust system. ***Refer to Page 5-8 of the Operators Manual*** for procedure. Do not conduct fluid level inspections when the engine is running or if systems are energised. Do not attempt to remove inspection caps or covers when the engine is running or system is energised. If a hydraulic leak is suspected in a hose or pipe, do not use bare hands to locate the leak when the system is energised and pressurised. Be sure to read applicable Material Safety Data Sheets prior to working with fluids and abide by the advice given for appropriate PPE.
	Protruding objects		**Risk of head injuries!** Where necessary, use protective headwear such as a safety helmet to protect against head bumps on protruding objects such as hook blocks, boom sections and counterweights.
	Refuelling, servicing, repair work		**Risk of environmental contamination when handling fuels, lubricants and other fluids!** Ensure that any oil or fuel spills or leaks are either cleaned up or rectified. Ensure that oil-spill kits are available on-site. Wipe up any fuel spillage and secure fuel caps when refuelling is complete.

B. Generic Hazards (cont.)

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections (cont)	Batteries		**Danger of explosions due to batteries emitting vapours!** Be aware of hydrogen gases emitted from batteries. Do not allow metal objects to arc across battery terminals. Ensure terminal covers are in place. Do not smoke or use naked flames in the vicinity of batteries. Ensure that any maintenance or checks carried out on batteries are conducted in a well ventilated area.
	Flammable materials		**Risk of fire!** Do not leave any rags or clean-up materials on the machine that could catch fire due to heat build-up. Switch off the engine, heater and all additional heating devices prior to refuelling. Ensure that the appropriate types and numbers of fire extinguishers are fitted to the crane, or a fire suppression system is fitted. Ensure that all fire extinguishers comply with appropriate standards, and have been tagged and inspected. Ensure that operators and crane crew members have had training in the use of fire extinguishers. Do not smoke or use naked flames in the vicinity of oil or fuel. Extinguish all sources of ignition when handling these types of materials.
	Areas of low light/darkened areas		**Risk of accidents due to a lack of available light!** Ensure that inspections are carried out in a well lit area where clear vision available to all parts of the crane. In areas where seeing is difficult, utilise lighting plants, spotlights or torches to enable a clear view of the task being performed. Ensure that the light source does not itself create a hazard from generated heat.
	Crush zones		**Risk of crushing in limited access areas!** Ensure that crane is switched off when inspecting items located in crush zones. Place warning tags on operating controls and remove keys and battery isolator switch while performing inspections. Where applicable place “Danger – Crush Zone” warning stickers in appropriate areas.

B. Generic Hazards (cont.)

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections (cont)	Safety labels and signage		**Risk of accidents due to lack of visual warning!** Ensure that all warning labels and stickers are in appropriate places and legible. Clean warning labels and stickers when obscured with water and mild detergent. Do not use organic solvents to clean labels and stickers. Replace labels or stickers that have become illegible or damaged.
	Statutory signage		**Risk of accidents due to lack of appropriate signage!** Ensure that all appropriate signage is displayed upon the carrier of the truck crane prior to on-road driving. In this way you will minimise the risk of other road users being uninformed about the truck cranes characteristics. Ensure that *"Caution – Left Hand Drive"* warning labels are displayed in appropriate positions on the front and/or rear of the vehicle. Ensure that *"Oversize"* warning labels are displayed in appropriate positions on the front and/or rear of the vehicle. Ensure that *"Do not Overtake Turning Vehicle"* warning labels are displayed in appropriate positions on the front and/or rear of the vehicle. Ensure that the operator of the crane is the holder of the appropriate driver's licence for on-road operation. Ensure that the operator complies with applicable State or Territory traffic laws when operating the crane on public roads.
	Collision with objects		**Risk of accidents due to objects being out of the operator's field of vision!** If operating in close proximity to other vehicles or plant, ensure that another person is used to guide the operator while the machine is in motion. In this way you will prevent the truck crane from colliding with objects, other plant or on-site personnel.
	Access and Egress		**Danger of falls due to objects being mistaken for hand-holds!** Beware not to use the front window support strut or the front panel support bar as hand holds when entering the crane cab. These items look like hand-holds but are not designed as such and may collapse under a person's weight, causing a fall or damage to the component.

B. Generic Hazards (cont.)

Section / Heading	Hazard	Risk	Control Measures
0.0.0 Generic hazards that apply to multiple sections (cont)	Operator Physical Condition		**Danger of accidents due to physical condition of operator!** Prior to operating the machine, ensure that the operator is not suffering from fatigue or is under the influence of drugs or alcohol. Where required ensure that the operator has undergone a recent medical examination.
	System Unfamiliarity		**Risk of accidents due to operator not receiving full instruction!** Ensure that the operator has been fully instructed by a suitable competent person on the operational aspects of the crane functions, the ECOS crane control system and the EKS/RCI Rated Capacity Indicator. Failure to do so may result in damage to the crane and it's systems, or cause an accident that may result in personal injury to the operator or other members of the crane crew, or innocent bystanders.

CARRIER

1. Overview

Section / Heading	Hazard	Risk	Control Measures
1.4.2 How are the operating instructions structured?	Misinterpretation of Instructions		**Risk of accidents when only referring to the checklists during operation!** The checklists and the step-by-step instructions should always be considered as a single unit for the complete description of a rigging procedure. It is only safe to operate the truck crane by referring to the checklists when you are familiar with all of the dangers that may occur, and are confident in completing the necessary steps as described in the relevant operation instructions. If in doubt, always read the section first which is referred to in the checklist.

2. Basic Safety Instructions for Crane Operators

Section / Heading	Hazard	Risk	Control Measures

3. Operating Elements for Driving

Section / Heading	Hazard	Risk	Control Measures
3.2 Short description of the operating elements	System Unfamiliarity		**Risk of accidents due to operating error!** Section 3.2 is not a complete operating manual. It only provides a general overview of the operating element functions. Before using the operating elements for the first time, read through the following chapters and the safety instructions listed there.
3.2.18	Windows		**Risk of crushing when closing windows!** If the window winder encounters resistance, it does not stop but continues with reduced power. Monitor the window and let go of the rocker button as soon as someone reaches into or leans through the window.

4. Starting / Turning Off the Engine for Driving

Section / Heading	Hazard	Risk	Control Measures
4.1.3 Access ladders and ladders	Ladders		**Risk posed by ladder falling down!** Always secure the ladders before driving. This prevents the ladders from falling down while driving on the road and endangering other vehicles.
4.1.4 Refuelling	Refuelling		**Risk of fire due to flammable gases!** Switch off the diesel engine, the heater and all additional heating devices before refuelling. Do not smoke while refuelling. Extinguish all naked flames and sources of heat in the immediate area and ensure that an appropriate fire extinguisher is available.
	Refuelling		**Risk off splash-back while refuelling!** As the fuel tank approaches being full, there is a risk that escaping air from the fuel tank may cause a splash-back of fuel. Wear appropriate face/eye protection, and appropriate protective gloves during refuelling.
	Refuelling		**Risk of accidents if fuel tank is not closed!** Always screw the fuel cap back onto the filler neck after refuelling. In this way you prevent following vehicles from being endangered by the fuel cap falling off or fuel escaping.
4.1.5 Checks before starting the engine	Valves on hydraulic tank		**Risk of damage to the hydraulic pumps!** The diesel engine may only be started if all four shut-off valves in the suction lines of the hydraulic pumps are open. The shut-off valves are open when the handles are parallel to the suction lines.
4.1.6 Switch on the ignition	Transmission		**Risk posed by unexpected rolling!** When the ignition is switched on, the transmission switches to the neutral position N. Therefore always apply the parking brake or the service brake before you switch on the ignition. This prevents the truck crane from suddenly rolling away.

4. Starting / Turning Off the Engine for Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
4.1.7 Lamp test / equalisation of the switching states	Lamp test		**Risk of accidents due to faulty lamps!** The lamps that are used to provide warnings and information during operation go on for control purposes whenever the ignition is switched on. Always perform the lamp tests described in Section 4.1.7 and immediately replace faulty lamps or have them replaced. In this way, you will avoid accidents and damage that occur when malfunctions are not identified in time.
4.1.9 Starting the engine	Steering system		**Risk of crushing from turning wheels!** When you start the engine, no persons may be within the steering range of the 4th and 5th axle line. These axles lines are steered each time the engine is started, sometimes with a 5 second delay, in order to test the steering system.
	Without flame start system		**Danger of explosions when using starter fuel!** The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit may ignite.
	With flame start system		**Danger of explosions when using starter fuel!** The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit may ignite.
4.1.10 Checks after starting the engine	Checking in the main menu		**Risk of damage to the engine!** Switch off the engine if the *Diesel Engine Oil Pressure* warning symbol is still displayed about 10 seconds after starting the engine. The engine can be damaged by running it when the oil pressure is too low.
	Checking the instrument panels		**Risk of accidents due to the fact that the truck crane cannot be steered!** Under no circumstances should you drive the truck crane when the red *Steering System* warning lamp is lit. The truck crane can no longer be steered safely. The 4th and 5th axle can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.

4. Starting / Turning Off the Engine for Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
4.2 Turning off the engine **4.2.1 During normal operation, with the ignition lock / with the hand-held control**	Steering system		**Risk of accidents due to the fact that the truck crane cannot be steered!** Only turn off the engine once the truck crane is at a standstill. If you remove the ignition key, the steering will lock and you will lose control of the moving crane.

5. Driving

Section / Heading	Hazard	Risk	Control Measures
5.1 Before Driving **5.1.2 Checking the condition of the truck crane**	Checking the vehicle height		**Risk of accidents from exceeding the permissible height!** Check that the symbol  is shown. Otherwise the overall height will also be exceeded at on-road level.
	Supply Pressure		**Risk of accidents due to the truck crane moving unintentionally!** Make sure that the parking brake lever is pulled backwards, pointing to the rear and locked into position before building up the supply pressure. In this way you prevent the parking brake from releasing as soon as sufficient pressure is available and the truck crane starting to move unintentionally.
	Parking Brake		**Risk of accidents due to the truck crane moving unintentionally!** Also press the brake pedal before releasing the parking brake. In this way you prevent the truck crane from starting to roll in an uncontrolled manner when the parking brake is released.
5.1.3 Adjusting the seat and the steering column	Adjusting the steering column		**Risk of accidents if the steering column is unlocked!** Always stop the truck crane before you unlock the steering column. You can no longer steer safely after unlocking the steering column.
5.1.4 Switching the suspension on / off	Switching off the suspension		**Risk of damage to the axle lines!** Always switch on the suspension for on-road driving. The axle lines may become damaged and the steering behaviour may change if the suspension is switched off.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.1.5 Setting the Tachograph	Tachograph drawer		**Risk of damage to the Tachograph drawer!** Open the Tachograph drawer only to insert or remove diagram sheets and do not use the opened drawer as a shelf or surface (e.g. to mark the diagram sheets). By doing this, you can prevent contamination and damage.
	Inserting diagram sheets		**Risk of malfunctions in the electronics!** If a diagram sheet has been damaged by being marked several times, this might cause malfunctions in the electronics. Therefore, always insert the plastic sheet diagram supplied should you need not to use the Tachograph.
5.2 Operating the transmission **5.2.1 Switching on**	Starting		**Risk posed by unexpected rolling!** When the ignition is switched on, the transmission switches to the neutral position **N**. Therefore always apply the parking brake or the service brake before you switch on the ignition. This prevents the truck crane from suddenly rolling away.
5.2.2 Shifting the transmission to the neutral position	Lack of drive		**Risk of accidents when driving in neutral position!** Never into neutral position while driving. In the neutral position, you cannot accelerate the truck crane and the engine retarder does not work.
5.2.4 Selecting the driving direction	Gear engagement		**Risk of accidents from unexpected movement!** If the engine speed is too high when selecting the driving direction, then no gear will be engaged. However, if the engine speed briefly drops low enough, then the gear will be engaged and the truck crane will begin to move, e.g. when you release the accelerator.
	Brakes		**Risk of accidents if brakes are not applied!** If the brakes are not applied, the truck crane moves immediately once the driving direction has been selected. Therefore, always apply the parking brake or holding brake to secure the truck crane before selecting the driving direction.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.2.6 Starting	High transmission loads		**Risk of damage to the transmission!** Release the accelerator after 30 seconds at the latest when the load is too high. This prevents the transmission from being damaged due to overheating. The starting gear is not automatically disengaged.
5.3 Driving and turning off the truck crane	Steering		**Risk of accidents due to the fact that the truck crane cannot be steered!** Never switch off the ignition or remove the ignition key while the truck crane is moving. In this way you prevent the steering from locking and do not lose control of the moving truck crane.
5.3 Driving and turning off the truck crane (cont.)	Steering		**Risk of accidents when the ignition is switched off!** Never switch off the ignition when driving. After the ignition is switched off, the 4th and 5th axle lines are brought into the straight-ahead position, and can no longer be steered. This changes the turning radius of the truck crane.
5.3.1 Checks while driving	Immediately after you start to move		**Risk of accidents if the steering circuits fail!** If one or more of the *Steering Circuit* warning lamps light up, stop the truck crane immediately and switch off the engine. Check whether oil has been lost. Depending on the size of the leak, the oil supply in a steering circuit may be lost within 2 minutes.
	While driving		**Risk of damage if warning messages are not observed!** Observe all information in the section *Warning Submenu* and take the appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions from causing malfunctions on the truck crane.
	Steering		**Risk of accidents due to the fact that the truck crane cannot be steered!** Stop as quickly as possible if the red warning lamp  lights up. The 4th and 5th axle lines can steer in an uncontrolled manner, which may lead to serious accidents, even when driving at reduced speed.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.3.4 Driving downhill	Transmission		**Risk of accidents when driving in neutral position!** Never switch into the neutral position when driving. In neutral position, the truck crane may accelerate and the engine retarder is ineffective,
	Checks when driving downhill		**Risk of damage due to excessive engine speed!** When the maximum engine speed is reached, brake the truck crane using the service brake. This prevents the engine or transmission from being damaged or the air intake inhibitor from being triggered.
	Checks when driving downhill		**Risk of damage from oscillating movements!** Always maintain a speed below 85 km/h. Stop the truck crane in good time.
	Additional brakes		**Risk of accidents due to unexpected acceleration!** Maintain sufficient distance when the engine retarder is switched on. The effectiveness of the engine retarder is interrupted during gear shifting. This may cause the truck crane to accelerate briefly.
5.3.6 Warning submenu	Meaning of the symbols		**Risk of damage if warning messages are not observed!** Observe all information in the section *Warning Submenu* and take the appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions from causing malfunctions on the truck crane.
	Supply pressure in the brake circuit too low		**Risk of accidents if one or both brake circuits fail!** If the brake pressure warning lamp  lights up on the instrument panel, stop the truck crane immediately and identify the cause.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.3.6 Warning submenu (cont.)	Oil pressure too low		**Risk of damage to the engine if the oil pressure drops!** If the oil pressure warning lamp  lights up and the warning buzzer sounds, turn the engine off as soon as possible and look for the cause. Never restart the engine until you have found the cause and eliminated the problem. Refer to ***Malfunctions on the Engine for Driving – Page 7-23 of the Operators Manual*** for more information.
	Hydraulic oil too hot		**Danger of Overheating!** If the hydraulic oil temperature warning lamp  lights up, there is a malfunction and the hydraulic oil temperature exceeds 80°C. Stop the truck crane at the next opportunity and try to find the cause. Stop the truck crane immediately if the temperature of the hydraulic oil rises to over 100°C.
5.3.8 Turning off the truck crane	Secure against rolling away		**Risk of accidents due to the truck crane moving unintentionally!** Secure the truck crane on uphill and downhill roads by using wheel chocks together with the parking brake.
	When stationary for more than 8 hours		**Danger due to unauthorised use!** Always stow away the hand-held control in the crane cab before leaving the truck crane, and lock the door to the crane cab or the driver's cab. In this way you can prevent unauthorised persons from starting the engine with the hand-held control.
5.3.9 Folding berth	Folding berth		**Risk of accidents due to the berth folding down!** Check that the locking bar is engaged and put up the back rest of the seats before driving. This prevents the berth from folding down when braking, resulting in uncontrolled manoeuvres due to fright.
5.4 Off-road driving **5.4.2 Longitudinal and transverse differential locks**	Firm surfaces		**Risk of damage to the differential locks!** Leave the transverse differential locks switched on for only as long as necessary. Always switch off the transverse differential locks before driving on a firm surface.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.4.3 Operating the level adjustment system	Changing the vehicle level		**Risk of accidents from exceeding the permissible overall height!** Always bring the truck crane to on-road level before driving on roads after changing the level. If the truck crane is on a higher level, then the specified overall height will be exceeded.
5.4.4 Freeing the truck crane stuck in terrain	Rocking the truck crane free		**Risk of damage to the transmission!** Release the accelerator after 30 seconds at the latest when the load is too high. This prevents the transmission from being damaged due to overheating. The starting gear is not automatically disengaged.
	Towing free forwards		**Risk of damage to the chassis!** Only tow the truck crane free while observing the procedure given for the pulling direction. Jerking the truck crane or pulling it at an angle can cause damage to the chassis.
	Towing free in reverse gear		**Risk of damage to the chassis!** Only tow the truck crane free while observing the procedure given for the pulling direction. Otherwise the chassis may be damaged or the towing eyes may be torn off or bend.
5.6 Heating and ventilating the driver's cab **5.6.2 Auxiliary water heater**	Switching on the auxiliary water heater		**Danger of explosions when operating the auxiliary heater!** The auxiliary heater is not allowed to be operated: • At service stations and tank farms • At locations where flammable gases and vapours are found or can be formed (e.g. at fuel stations and chemical factories) • At locations where explosive dust is found or can be formed (e.g. coal dust, wood dust, grain dust)
	Switching on the auxiliary heater		**Danger of suffocation when operating the auxiliary heater!** Do not use the auxiliary heater in closed spaces (e.g. in a garage)

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.6.3 Auxiliary water heater with timer	Switching on the auxiliary heater		**Danger of explosions when operating the auxiliary heater!** The auxiliary heater is not allowed to be operated: • At service stations and tank farms • At locations where flammable gases and vapours are found or can be formed (e.g. at fuel stations and chemical factories) • At locations where explosive dust is found or can be formed (e.g. coal dust, wood dust, grain dust)
	Switching on the auxiliary heater		**Danger of suffocation when operating the auxiliary heater!** Do not use the auxiliary heater in closed spaces (e.g. in a garage)
5.7 Towing a trailer	Security of trailer		**Risk of accidents from the trailer moving unintentionally!** Before coupling or uncoupling the trailer, it must be secured with the trailer parking brake as well as with wheel chocks to prevent it from rolling away. Ensure that it is still possible to swivel the front axle of the trailer.
	Coupling the trailer		**Risk of accidents when coupling the trailer!** No one may stand between the truck crane and the trailer when coupling the two vehicles.
	Coupling the trailer		**Risk of injury when the automatic closing device is triggered!** Do not put your hand into the coupling jaw when the towbar coupling is open. This can activate the automatic closing device, making the coupling pin move down with great force and seriously injuring your hand.
	Coupling the trailer		**Risk of accidents if trailer is incorrectly coupled!** If the control pin is protruding from the guide bushing, the trailer is not correctly coupled and could be disengaged from the towbar coupling when you are driving.
	Connecting the supply lines		**Risk of accidents if the hoses are too short or installed improperly!** The hose lines must not come off even when driving around corners. When connecting the hoses, make sure they are long enough and have enough clearance.

5. Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
5.7 Towing a trailer (cont.)	Removing supply lines		**Risk of accidents by the trailer rolling!** Always first remove the hose from the supply line so that the trailer is braked. This prevents the trailer from moving when you remove the brake hose. • First, disconnect the hose of the supply line from the red coupling head. Now the trailer is braked. • Second, disconnect the hose of the brake line from the yellow coupling head. • Third, pull the plugs of the trailer's electrical system out of the sockets. Pull the ABS connection cable (if one is attached) out of the respective socket.
	Uncoupling the trailer		**Risk of injury when the automatic closing device is triggered!** Do not put your hand into the coupling jaw when the towbar coupling is open. This can activate the automatic closing device, making the coupling pin move down with great force and seriously injuring your hand.
	Uncoupling the trailer		**Risk of injury when closing the towbar coupling by hand!** When closing, the hand lever moves down with great force in the direction of the coupling jaw. Therefore start the closing process only by moving the lever briefly in the direction of the coupling jaw with the palm of your hand only. Do not grasp the hand lever. If you hold the hand lever and move it down, it may carry your hand with it and crush it.
	Uncoupling the trailer		**Risk of injury when the automatic closing device is triggered!** Always close the coupling when no trailer is connected. This prevents people being injured by the automatic closing device being activated unintentionally.
	Checking the braking force		**Risk of accidents posed by the truck crane moving unintentionally!** When parking on downhill or uphill roads, always secure the truck crane and trailer against rolling away with wheel chocks in addition to the parking brake. Even when checking the parking brake has delivered a positive result. Observe the corresponding regulations in your state or territory when doing this.

6. Driving Modes and Rigging for On-Road Driving

Section / Heading	Hazard	Risk	Control Measures
6.1 Driving modes	Information on the axle loads		**Risk of accidents due to increased braking distance!** The braking deceleration required by the EU partial-type approval cannot be met when driving with axle loads of over 12 tonne,. Please bear in mind that the braking distance of the truck crane will increase as a result.
	Information on the axle loads		**Risk of damage due to premature wear!** Premature wear of parts under particular stress (brake system, steering, tyres, wheels, suspension, drive shafts) cannot be ruled out even when the axle loads only briefly exceed 12 tonne.
6.2 Rigging work for driving with a trailer **6.2.1 Switching on the slewing gear freewheel**	Houselock		**Risk of accidents with the houselock switched on!** Always switch the houselock off before setting down the main boom on the trailer. Otherwise the superstructure will be unable to slew when driving around corners.
	Prerequisites		**Risk of accidents if the bolts are not secured!** Always secure the bolts with the lock. This prevents the slewing gear freewheel from being switched off unintentionally while driving.
6.2.2 Switching on boom floating position	Switching on		**Risk of accidents when driving with boom floating position switched off!** Always switch on the boom floating position when the main boom is on a trailer. This prevents the trailer hanging briefly with its full weight on the main boom on uneven ground, the axle loads from rising suddenly, or the truck crane tipping over when driving around corners.
	Setting the main boom down on the trailer		**Risk of accidents due to the main boom falling down!** You may only switch on the boom floating position when the boom is already set down on the trailer. In this way you prevent the raised boom from falling down.

6. Driving Modes and Rigging for On-Road Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
6.3 Rigging the main boom	Correct equipment		**Risk of accidents when removing / installing the main boom without pulling devices!** Only remove or install the main boom if the truck crane is equipped with the factory-installed pulling devices and with the necessary accessories. Without these factory-installed pulling devices, the main boom may be removed by ***CraneCARE*** only.
6.3.3 Slinging the main boom	Use of correct equipment		**Risk of accidents due to incorrect procedure!** Only use the slinging gear included in the delivery. These must be attached only at the 4 slinging points on both sides of the main boom. Align the auxiliary crane in such a way that the main boom can be raised vertically without swinging.
6.3.4 Removing / attaching the clamp	Movement of main boom		**Danger of hands and arms being crushed!** Make sure that the boom pivot pin is bolted before making or removing or attaching the clamp. This means that you will avoid a swinging main boom crushing your arms or hands on the turntable.
6.3.5 Switching the pressure relief on / off	Falling main boom		**Risk of accidents from falling main boom!** Check to see that the main boom is in the boom rest before switching off the pressure relief. In this way, you prevent the raised main boom from falling down.
6.3.6 Retracting / fitting the derricking cylinder head pin	Operation of the lifting device		**Risk posed by lifting equipment not working!** Have the lifting device serviced in time before the maintenance interval specified on the label expires.
	Retracting the derricking cylinder head axle		**Risk of accidents from falling derricking cylinder!** Always take the load off the derricking cylinder using the lifting device before retracting the head pin. By doing this, you prevent the derricking cylinder from falling down, injuring people or being damaged while retracting the pin.

6. Driving Modes and Rigging for On-Road Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
6.3.6 Retracting / fitting the derricking cylinder head pin (cont.)	Fitting the derricking cylinder head axle		**Risk of damage to the bearings in the derricking cylinder head!** Make sure that the bearings in the derricking cylinder are aligned with the head pin before fitting the head pin. This prevents the head pin from damaging the bearing.
6.3.7 Retracting / extending the boom pivot pin	Retracting / extending the pivot pin		**Risk of damage to the main boom!** Before **retracting**, the main boom must be slung and all other sling gear must be tightened. Before **extending**, the bearing points on the turntable must be aligned with the boom pivot pin.
6.3.8 Disconnecting the hydraulic / electrical connection	Lifting in front of the turntable		**Risk of damage to connection lines and the driver's cab!** Lift the main boom far enough to ensure that the pivot point of the derricking cylinder does not damage the driver's cab. Only lift the main boom so far in front of the turntable that the cables and hoses do not tear off.
6.3.8 Disconnecting the hydraulic / electrical connection (cont.)	Lifting in front of the turntable		**Danger of hands and arms being crushed!** Lift the main boom only far enough in front of the turntable to ensure that you are not crushed between the turntable and the main boom.
	Disconnecting		**Risk of malfunctions in the superstructure electronics!** Always turn off the ignition in the crane cab before you establish or separate the electrical connection. In this way you prevent malfunctions in the electronics and corresponding error messages in the subsequent crane operation.
6.3.9 Establishing the hydraulic / electrical connection	Lifting onto the turntable		**Risk of damage to the driver's cab!** Lift the main boom far enough to ensure that the pivot point of the derricking cylinder does not damage the driver's cab.
	Lifting onto the turntable		**Danger of hands and arms being crushed!** Lift the main boom only far enough onto the turntable to ensure that you are not crushed between the turntable and the main boom.

6. Driving Modes and Rigging for On-Road Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
6.3.9 Establishing the hydraulic / electrical connection (cont.)	Establishing		**Risk of malfunctions in the superstructure electronics!** Always turn off the ignition in the crane cab before you establish or separate the electrical connection. In this way you prevent malfunctions in the electronics and corresponding error messages in the subsequent crane operation.
6.3.10 Aligning the connecting points	Connection lines		**Risk of damage to the turntable and the connection lines!** Make sure the connection lines are located within the turntable and that the main boom does not swing when you raise it onto the turntable.
6.3.12 Transporting the main boom	Suitable packing		**Risk of damage to the main boom!** Always place the main boom onto a suitable packing. If you lay the main boom on its side, add-on parts will be damaged.
6.4 Installing / removing supports	Stability of crane		**Risk of truck crane overturning if not properly supported!** The lifting of loads is only permitted when the truck crane is supported by all the outriggers. For this reason, always use an auxiliary crane to lift the outrigger beams.
6.4.6 Establishing / disconnecting the electrical connection	Establishing and disconnecting		**Risk of malfunctions in the electronic systems!** Always turn off the ignition before you disconnect or establish the electrical connection. In this way you prevent malfunctions in the electronics and corresponding error messages in the subsequent crane operation.
6.4.9 Extending / retracting the outrigger beam	Extending the outrigger beam		**Risk of damage to the hydraulic lines!** Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.
	Extending the outrigger beam		**Risk of being crushed by the swinging outrigger beam!** Secure the outrigger beam with the guide ropes as it is lifted out of the outrigger box. Keep a suitable distance to avoid injuring yourself or others on the swinging outrigger beam.

6. Driving Modes and Rigging for On-Road Driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
6.4.9 Extending / retracting the outrigger beam (cont.)	Inserting the outrigger beam		**Risk of being crushed by the swinging outrigger beam!** Do not guide the outrigger beam with your hands when inserting it. Always use the guide ropes and keep a suitable distance. This will prevent limbs from being crushed between the outrigger box and the outrigger beam.
	Inserting the outrigger beam		**Risk of damage to the hydraulic lines!** Ensure that the hydraulic lines on the outrigger beam do not remain hanging on the outrigger box and become damaged.
	Inserting the outrigger beam		**Risk of damage to the spacers!** Check that all spacers have been screwed in completely. This prevents the spacers from remaining hanging in the outrigger box and becoming damaged.
6.4.10 Transporting the outrigger beams	When the outrigger pads are mounted		**Risk of damage to the outrigger beams and outrigger pads!** When the outrigger pads are mounted, always use a device to set them down. If you lay the outrigger beams onto the side, connections may tilt and become damaged.

7. Malfunctions in Driving Mode

Section / Heading	Hazard	Risk	Control Measures

7.2 What to do when a malfunction occurs in road traffic	Poor Visibility		**Risk of accidents due to poor visibility!**
			
			If possible, do not stop in a tunnel or directly after a curve.
			• Secure the vehicle
			• Turn on the hazard warning lights
			• Secure the breakdown area
			  ○ Set up a warning triangle
			  ○ Set up a signal lamp or torch
			
			Warning triangles, signal lamps and torches must be set up in front of the breakdown area in such a way as to prevent rear end collisions, particularly in curves.

7. Malfunctions in Driving Mode (cont.)

Section / Heading	Hazard	Risk	Control Measures
7.2 What to do when a malfunction occurs in road traffic (cont.)	Working in danger Areas		**Risk of accidents during repair work in danger areas!** Even simple repairs can be dangerous in danger areas (e.g. tunnels, crossroads, motorway bridges). In a danger areas, only carry out repair work required to leave the danger area.
7.3.1 Towing in the event of engine or transmission damage	Towing long distances		**Risk of accidents and damage when towing the truck crane long distances!** Tow the truck crane at a maximum of 10 km/h and over a distance a maximum of 1 km. Additional measures must be taken for longer distances. In these cases, contact ***CraneCARE.***
	Parking brake		**Risk of accidents in the event of faulty brakes!** If damage has occurred to the service brake system, you may only tow the truck crane away from the immediate danger area after receiving permission to do so from ***Crane Care***.
	Towing the truck crane out of the danger area		**Risk of damage to the chassis!** Ensure the towing vehicle only drives off slowly. Starting to tow too quickly or in jolts can damage the chassis.
	Towing the truck crane out of the danger area		**Risk of accidents due to sluggish steering!** Remember that the steering will be sluggish. If the engine fails, only the emergency steering pump will be available, which only supports the steering from a speed of at least 2 km/h. At speeds less than 2 km/h, the truck crane can hardly be steered.
	Towing the truck crane out of the danger area		**Risk of accidents and damage when towing the truck crane long distances!** Tow the truck crane at a maximum of 10 km/h and over a distance a maximum of 1 km. Additional measures must be taken for longer distances. In these cases, contact ***CraneCARE.***

7. Malfunctions in Driving Mode (cont.)

Section / Heading	Hazard	Risk	Control Measures
7.4 Wheels and tyres **7.4.1 Wheel change**	Wheels leaning against truck crane		**Risk of accidents from overturning wheel!** If you lean a wheel against the truck crane briefly when changing a wheel, secure it against falling over with a rope. Only move the outriggers if there is no wheel leaning against the truck crane.
	Steering		**Risk of crushing when starting the engine!** Each time the engine is started, the 4th and 5th axle lines are steered to test the steering system, sometimes with a 5 second delay. Ensure that the engine is not started while you are changing a wheel. This will prevent you being crushed between the steering wheels.
	Removing a damaged wheel		**Risk of accidents from overturning wheel!** When unscrewing the last wheel nuts, the wheel can slip of the hub and tip in your direction. Secure the wheel and step back quickly if the wheel threatens to tip.
	On the spare wheel holder		**Risk of overturning while slewing!** Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius). Correct the rigging mode if necessary. Refer to ***Slewing with the Rigged Counterweight - Page 13-71*** of the Operator's Manual for more information.
	Mounting a wheel		**Danger of accidents!** Check the wheel rim, the tyres, the wheel nuts and the wheel studs for damage before mounting the spare wheel. Never mount damaged parts. Mount only the manufacturers original spare wheel or a permitted wheel of the same size and load bearing capacity.
7.4.2 Filling the tyres yourself	Inflation Pressure		**Risk of accidents due to impermissible tyre pressure!** If the maximum pressure is above the specified tyre pressure, fill the tyres up to the maximum specified pressure. In this way you prevent the tyres from becoming damaged during driving, and bursting. Refer to ***Tyres – Page 8-6*** of the Operator's Manual for correct inflation pressure.

7. Malfunctions in Driving Mode (cont.)

Section / Heading	Hazard	Risk	Control Measures
7.4.2 Filling the tyres yourself (cont.)	Remove the filling hose		**Risk of damage to the compressed air system!** Always close the filler connection with the cap. This prevents damage and contamination in the compressed air system.
7.5 Fuses on the carrier	Information on replacing fuses		**Risk of damage when the ignition is switched on!** Switch off the ignition whenever a fuse has to be replaced. In this way you can prevent the new fuse from being damaged by the increased starting current immediately after inserting it.
	Information on replacing fuses		**Risk of damage due to overloading!** Replace blown fuses only with new fuses of the same amperage. In this way you can prevent parts from being overloaded and damaged or the fuse from being immediately damaged again. Notify ***Crane Care*** if a fuse of the same amperage blows again after turning on the ignition.
	Information on replacing fuses		**Danger of fire!** Never replace a defective fuse with other electrically conductive materials.
7.5.2 Fuses in the battery box	Lead and lead compounds		**Danger due to lead and lead compounds of batteries!** Battery poles, clamps, and parts of the battery itself contain lead and lead compounds. Wash your hands thoroughly following work on these parts or in these areas.
7.7 Procedure in the event of malfunction **7.7.1 Switching on emergency operation in the coolant circuit**	Running diesel engine		**Risk of accidents due to turning fan wheel!** Always switch off the engine and secure against unauthorised use before switching on emergency operation. In this way, you prevent the fan wheel from being suddenly moved and injuring your fingers or hands.
	Hot engine parts		**Risk of burning yourself when the engine is hot!** During operation the engine and add-on parts heat up to a great extent. Wear appropriate protective gloves and be careful not to touch hot parts when you switch on the emergency operation.

7. Malfunctions in Driving Mode (cont.)

Section / Heading	Hazard	Risk	Control Measures
7.7.2 Malfunctions on the engine	Severe engine malfunction		**Risk of damage to engine!** Turn off the engine immediately after stopping the truck crane. Do not by any means restart the engine. Serious damage to the engine can be avoided this way.
7.7.3 Malfunctions to the transmission	Transmission oil too hot		**Risk of overheating damage to the transmission!** If the transmission oil temperature is still too high after 2 to 3 minutes, shut down the engine. Under no circumstances should you continue driving. This prevents the transmission from being damaged due to overheating.

8. Technical Information on the Carrier

Section / Heading	Hazard	Risk	Control Measures

9. Index for Part 1 – Operating Instructions – Carrier Driving

Section / Heading	Hazard	Risk	Control Measures

SUPERSTRUCTURE

10. Operating Elements for Crane Operation

Section / Heading	Hazard	Risk	Control Measures
10.2 Short description of the operating elements	System familiarity		**Risk of accidents due to operating error!** Section 10.2 of the Operator's Manual is not a complete operating manual. It only provides a general overview of the operating element functions. Before using the operating elements for the first time, read through the following chapters and the safety instructions listed there.

11. Starting / turning off the engine – for crane operation

Section / Heading	Hazard	Risk	Control Measures
11.1 Starting the engine from the crane cab **11.1.3 Refuelling**	Inflammable gases		**Danger of fire due to inflammable gases!** Turn off the engine, crane cab heater and all auxiliary heaters before refuelling.
	Filler cap		**Risk of accidents if the fuel tank is not closed!** Screw the cap back onto the filler neck each time after refuelling. In this way you can prevent other vehicles from being endangered by the cap falling off or fuel escaping.
11.1.4 Inspections before starting the engine	Valve on hydraulic tank		**Risk of damage to the hydraulic pumps!** You may only start the engine when the valves on the hydraulic tank are open.
11.1.6 Lamp test	Lamp test		**Risk of accidents due to faulty lamps!** The lamps that are used to provide warnings and information during operation light up for control purposes whenever the ignition is switched on. Always perform the lamp tests described in Section 11.1.6 and immediately replace faulty lamps or have them replaced. In this way you can avoid accidents and damage caused by detecting malfunctions too late.

11. Starting / turning off the engine – for crane operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
11.1.8 Starting the engine	Without flame start system		**Danger of explosions when using starter fuel!** The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit may ignite.
	With flame start system		**Danger of explosions when using starter fuel!** The engine may never be started with the aid of starter fuel. The starter fuel sprayed into the suction unit may ignite.
11.1.9 Inspections after starting the engine	Low oil pressure		**Risk of damage to the engine!** If the oil pressure warning lamp  does not go out after about 10 seconds, perform the inspections described in Section 11.1.9 and turn the engine off immediately if necessary. The engine can be damaged by running it when the oil pressure is too low.
11.3 Turning off the engine **11.3.1 During normal operation, with the ignition lock / with the hand-held control**	Suspended loads		**Risk of accidents due to suspended loads!** Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time. Always set down the load before you leave the crane cab.
11.3.2 In emergencies, with the emergency stop switches	Sudden stops		**Risk of overloading id used improperly!** Use the emergency stop switches only in an emergency, i.e. if the crane functions no longer respond to the control levers. Stopping crane movements suddenly may cause the truck crane to become overloaded under unfavourable conditions.

12. Crane Operation

Section / Heading	Hazard	Risk	Control Measures
12.1 Before crane operation **12.1.2 Checking the condition of the truck crane**	Auxiliary heater		**Danger of fire due to inflammable gases!** Turn off the engine and heating systems before refuelling.

12. Crane Operation

Section / Heading	Hazard	Risk	Control Measures
12.1.3 Adjusting the crane cab seat and front panel	Visual inspection		**Danger if crane cannot be unrigged!** In the event of loss of oil, you may no longer be able to perform crane movements, even in emergency mode.
	Visual inspection		**Risk of environmental damage due to leaking fluids!** Immediately repair or have repaired oil, fuel or coolant leakages. In this way you prevent oil, fuel or coolant seeping into the ground or polluting waters.
	Checking the position of the hoist ropes		**Danger of crushing due to turning rope drum!** Keep away from the turning rope drum. This will prevent your limbs from being drawn in and getting crushed.
12.1.4 Checking the safety devices	Faulty safety devices		**Danger of accidents when working with faulty safety equipment!** It is strictly prohibited to operate the crane safety devices that are faulty, overridden or out of service. Have faulty devices repaired immediately by ***Crane Care***.
	Seat contact switch		**Danger of accidents if the seat contact switch is faulty!** Always stand inside the crane cab when you perform this inspection. If you stand next to the crane cab, you can be pushed off the carrier if the superstructure slews as a result of a faulty dead man's switch.

12. Crane Operation

Section / Heading	Hazard	Risk	Control Measures
12.1.5 Earthing load	Static electricity		**Danger of accidents due to electric shocks!** Always earth the load before operating the crane: • Near strong transmitters (radio transmitters, radio stations etc.) • Near high frequency switching gears • If a thunder storm is forecast Use electrically conductive material for earthing: • Hammer a metal rod(approx. 2.0 m) at least 1.5 m into the ground • Moisten the soil around the metal rod for better conductivity • Clamp an insulated cable to the metal rod (cross-section at least 16mm²) • Clamp the other end of the cable to a metal rod with an insulated grip. • Hold the metal rod firmly by the insulated grip • To earth, touch the load with the metal rod.
	Static electricity		**Risk of accidents due to electric shock!** Ensure that the connections between the cable and the metal rod are electrically conductive. When earthing, hold the metal rod only by the insulated handle and keep a sufficient distance to the metal rod in the ground.
12.1.7 Switching the houselock on / off	Switching on the houselock		**Risk of damage during slewing!** Always switch off the slewing gear before you operate the houselock. The system will be damaged when slewing the superstructure during the locking procedure.
	Switching on the houselock		**Risk of damage due to slewing with blocked lock!** Before slewing make sure the symbol  is displayed in red (houselock off). Otherwise the system will be damaged during slewing.
	Switching off the houselock		**Risk of damage from slewing during the locking procedure!** Always switch of the slewing gear before you operate the houselock. The system will be damaged when slewing the superstructure during the locking procedure.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.2 Operation of the safe load indicator (SLI)	Rigging mode		**Danger of accidents due to incorrectly set SLI!** Before operating the crane, ensure that the current rigging mode is correctly entered. An incorrect input will give you a false sense of security. This results in the truck crane overloading and causing an accident..
	Overridden or faulty SLI		**Risk of accidents due to overridden or faulty SLI!** The SLI should never be overridden. It is prohibited to work with the SLI if it is switched off, overridden, out of service or faulty.
	Two-hook operation		**Danger of overturning in two-hook operation!** The SLI only secures one-hook operations. Two-hook operations are not permitted.
12.2.1 Switching on the SLI	Switching on		**Risk of accidents if the safety devices are faulty!** If the lamps or the buzzer fails, notify ***Crane Care*** and have the error rectified. In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer ton or vice versa.
12.2.2 Entering the rigging mode	Entering individual components		**Danger of overturning due to incorrectly set rigging mode!** Values which have already been set may change when entering individual components. For this reason, you should always compare the displayed rigging mode with the current rigging mode of the truck crane after making the entry. In this way you prevent the SLI calculating with incorrectly set components and the truck crane becoming overloaded or from overturning.
	Accepting the rigging mode		**Danger of accidents due to incorrectly set SLI!** If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the SLI does not correspond to the actually permissible lifting capacity according to the *Lifting Capacity Table*. Overloading and accidents will be the result.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.2.3 Inspections prior to crane operation	Checking		**Risk of accidents due to incorrectly set SLI!** If the current rigging mode varies from the displayed rigging mode, the maximum load displayed by the SLI does not correspond to the actually permissible lifting capacity according to the *Lifting Capacity Table*. Overloading and accidents will be the result.
	Hoists display		**Danger of accidents due to incorrectly set SLI!** After switching over the hoists, always check whether the displayed reeving value corresponds to the current reeving value of the displayed hoist and, if necessary, enter the current reeving value. In this way, you can prevent the SLI from making calculations based on an incorrect reeving value, and the truck crane becoming overloaded or from overturning.
12.2.8 SLI override	SLI override		**Danger of accidents due to overridden or faulty SLI!** It is not permitted to work with an overridden or faulty SLI. Set down the load immediately and stop operating the crane if the SLI is faulty. You may only override the SLI if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane back into a safe condition in the event of a malfunction. In this case, do not perform any movements which increase the load moment.
	Overriding the SLI		**Risk of accidents due to accidental override!** The key must not remain in the key operated switch during the crane operation. In this way, you avoid overriding the SLI unintentionally.
12.3 Crane work with the main boom **12.3.1 Checks before crane operation**	Horizontal alignment		**Risk of accidents if the truck crane is not level!** The SLI calculates the radius from the length and angle of the main boom. The actual working radius changes and there is a danger of the crane overturning if the truck crane is not level.
	Current wind speed		**Danger of accidents due to excessively high wind speeds!** If the current wind speed is higher than the maximum permissible wind speed, stop crane operation immediately and restore the current rigging mode. This prevents the truck crane from overturning due to overloading.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.3 Main hoist	General precautions		**Danger of accidents due to accidental operation of a hoist!** Always switch off the hoist that is not in use. Never operate the hoist if the hook block is unreeved and the hoist rope is completely wound onto the drum. • Slack rope forms in the course of the *Lower* movement. Rope loops form, which can cause the load to slip and destroy the hoist rope. • The switch-off point of the lowering limit switch shifts in the course of the *Raise* movement. The lowering limit switch loses its function as a safety device.
	General precautions		**Danger of accidents due to loads being lifted at a slant!** Loads can bend the main boom, resulting in the hoist rope no longer being aligned vertically. Compensate the deflection by raising the boom in order to lift the load vertically. In this way you prevent the load dragging and injuring helpers. Inform all helpers about this issue.
	General precautions		**Danger due to slack rope!** Use only hook blocks and lifting gear of the minimum weight prescribed in the *Lifting Capacity Tables,* depending on the reeving and boom length. This way you will prevent slack rope developing at large heights when lifting without a load. This can result in the load slipping during subsequent lifting operations.
	Lifting and lowering		**Danger of accidents due to incomplete monitoring!** Operation of the main hoist is monitored fully only if: • The lifting limit switch is correctly rigged – refer to ***Installing / Removing the Lifting Limit Switch - Page 13-89*** of the Operator's Manual for more information. • The lifting limit switch is not overridden – refer to ***Lifting Limit Switch and Lowering Limit Switch – Page 12-51*** of the Operator's Manual for more information. • The lowering limit switch is correctly set – refer to ***Lifting Limit Switch and Lowering Limit Switch – Page 12-51*** of the Operator's Manual for more information.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.3 Main hoist (cont.)	Lifting and lowering		**Danger of accidents due to suspended loads!** Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time. Always set the load down before you leave the crane cab.
12.3.4 Auxiliary hoist	General precautions		**Danger of accidents when working with auxiliary hoist!** Read and observe all of the safety instructions in the section titled ***Main Hoist – Page 12-45*** of the Operator's Manual before operating the auxiliary hoist. All safety instructions for the operation of the main hoist also apply to the auxiliary hoist, along with the information in section 12.3.4
	Hoist rope		**Danger of accidents from damaged hoist ropes!** If you reeve the auxiliary hoist rope in addition to the main hoist rope, ensure that the hoist ropes do not rub against each other and that the auxiliary hoist rope does not touch the rotating flanged wheel of the main hoist during subsequent operation. Raise the main boom to at least 20° before lifting loads. This prevents damage to the hoist ropes, resulting in the ropes tearing.
	Lifting and lowering		**Danger of accidents due to incomplete monitoring!** Operation of the main hoist is monitored fully only if: • The lifting limit switch is correctly rigged – refer to ***Installing / Removing the Lifting Limit Switch - Page 13-89*** of the Operator's Manual for more information. • The lifting limit switch is not overridden – refer to ***Lifting Limit Switch and Lowering Limit Switch – Page 12-51*** of the Operator's Manual for more information. • The lowering limit switch is correctly set – refer to ***Lifting Limit Switch and Lowering Limit Switch – Page 12-51*** of the Operator's Manual for more information.
	Lifting and lowering		**Danger of accidents due to suspended loads!** Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time. Always set the load down before you leave the crane cab.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.5 Lifting limit switch and lowering limit switch	Lifting limit switch		**Danger of accidents due to intentional triggering of the lifting limit switch!** Always complete the hoisting operation (and extending) before raising the lifting limit switch weight. If the lifting limit switch is lifted at too great a speed, the hook block may swing into the main boom and damage the head sheaves and the hoist rope.
	Lifting limit switch override		**Risk of accidents if the lifting limit switch is overridden!** You may only override the lifting limit switch if this is specified in the operating instructions when carrying out maintenance or rigging work. With the lifting limit switch overridden, you may drive only at the minimum speed and without a load.
	Lifting limit switch override		**Risk of accidents due to incomplete monitoring!** If the lifting limit switch is overridden, crane operation is no longer completely monitored. When hoisting the limit switch weight, the crane movement is stopped once. After moving the control lever again, the crane movement is released again and therefore not switched off again.
	Lowering limit switch		**Risk of accidents due to incorrect setting or intended triggering!** Prior to crane operation, ensure that the lowering limit switch is set correctly and always complete the lowering operation before the lowering limit switch is triggered. This prevents the hoist rope from becoming damaged due to complete unreeling or switching off at high speeds, and the load being dropped as a result.
	Lowering limit switch		**Risk of accidents due to adjustments made to the lowering limit switch!** Always readjust the lowering limit switch if you unreel hoist rope from the stationary hoist drum. The lowering limit switch does not record the number of these winds. In this way, you prevent the lowering limit switch from switching off too late or not switching off at all, the hoist rope from being damaged and the load from being dropped.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.6 Derricking gear	Raising loads		**Danger of overturning while lifting loads!** It is prohibited to lift loads by raising the boom, since the SLI does not monitor this procedure. Raising the boom is a movement that decreases the load moment and is not deactivated by the SLI. However, raising the boom can cause the truck crane to overturn if excessively heavy loads are lifted.
	Raising and lowering		**Risk of accidents due to unexpected crane movements!** In the case of multiple configurations, check whether the control lever function *Derricking* is switched on before you move the control lever for derricking. This avoids accidents caused by unexpected telescoping.
	Lowering the main boom to a horizontal position		**Danger of overturning with overridden SLI!** Do not under any circumstances override the SLI. If the SLI shuts down the lowering procedure, the truck crane is in a condition in which the main boom may not be lowered beyond the working range (e.g. the load or working radius is too large). The truck crane will overturn if you continue to lower the boom with the SLI overridden.
12.3.7 Telescoping mechanism	Inspections prior to starting operation		**Risk of damage to the telescoping mechanism!** Before the first telescoping, always check whether the ECOS display indicates the current telescoping. This prevents the telescoping mechanism from being damaged when telescoping.
	Function of the control lever		**Danger of accidents due to unexpected crane movements!** In the case of multiple configurations, check whether the control lever function *Telescoping* is switched on before you move the control lever for telescoping. This avoids accidents caused by unexpected derricking.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.7 Telescoping mechanism (cont.)	Function of the control lever		**Risk of accidents due to incomplete monitoring!** Boom extension is monitored completely only if: • The lifting limit switch is correctly rigged– refer to ***Installing / Removing the Lifting Limit Switch - Page 13-89*** of the Operator's Manual for more information. • The lifting limit switch is not overridden– refer to ***Lifting Limit Switch and Lowering Limit Switch – Page 12-51*** of the Operator's Manual for more information. •
	Function of the control lever		**Risk of damage to the hoist rope!** The rope can become slack if the hook block touches the ground during retracting operations. Rope loops form, which can cause the load to slip and destroy the hoist rope.
	Unlocking the telescoping cylinder		**Risk of damage to the boom system!** If extending and retracting several times does not cause unlocking, you must not telescope any further against the stop.
	Unlocking the telescopic section		**Risk of damage to the boom system!** If extending and retracting several times does not cause unlocking, you must not telescope any further against the stop.
	Locking the telescopic section		**Risk of damage to the telescoping cylinder!** Move the control lever until the telescopic section is locked **and set down** – the symbol  must be yellow. In this way, you can prevent the load from exerting pressure on the telescoping cylinder and allow the load to be released for fixed lengths.
12.3.8 High speed mode	Using high speed mode		**Danger of accidents due to sudden acceleration of operations!** Reduce the engine speed before starting high-speed mode. This prevents the movements from becoming excessively accelerated, which may result in the truck crane starting to sway and overturn.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.8 High speed mode (cont.)	Hoisting gears		**Danger of accidents due to overloading!** Make sure that the lifted load is no more than 50% of the maximum load according to the *Lifting Capacity Table* (maximum degree of utilisation of 50%), before operating the hoists in high-speed mode.
	Hoisting gears		**Danger of slack rope formation with a light hook block!** If you switch on high-speed mode at high speeds, a light hook block will not be able to keep the hoist rope taut if it is hoisted up high with a small number of reevings and a large boom length.
	Hoisting gears		**Danger of slack rope formation with large number of reevings!** If you switch on high-speed mode with a large number of reevings and without a load, slack rope may form because the hook block is lowered too slowly due to the high degree of friction.
12.3.9 Slewing gear	Stability of truck crane		**Danger of overturning when slewing with a rigged counterweight!** Always check before slewing whether slewing is permitted in the current rigging mode of the truck crane (counterweight, outrigger span, working radius). Correct the rigging mode if necessary. Refer to ***Slewing with the Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information.
	Slewing gear brake		**Risk of accidents due to switched off operating elements!** Always check that the slewing gear brake function is switched on and switch to the function that you prefer as required. This prevents the slewing movement from continuing when you use the switched off operating element for braking.
	Slewing		**Danger of overturning when slewing with an incorrectly set SLI!** Always check before slewing whether the SLI code valid for the current rigging mode is displayed. This prevents slewing operations from being released within impermissible ranges and the truck crane from overturning.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.3.9 Slewing gear (cont.)	Slewing		**Danger of crushing during slewing!** Before slewing, actuate the horn and ensure there are no persons in the slewing range of the superstructure. In this way, you prevent persons from getting crushed between the superstructure and the carrier or between the superstructure and other parts.
	Slewing		**Risk of main boom buckling!** Do not accelerate the slewing speed to such a degree that the load starts swinging.
	Braking the slewing movement		**Risk of main boom buckling!** Do not under any circumstances switch off the slewing gear to brake it. Only switch off the slewing gear after the superstructure has stopped turning.
	Switching off the slewing gear		**Risk of damage to the main boom!** Brake the slewing movement down to a standstill before you switch off the slewing gear. The slewing gear brake is automatically engaged when the slewing gear is switched off. In this way, you can prevent lateral forces from affecting the main boom due to long delays or swinging loads.
12.4 Settings and displays for crane operation **12.4.1 Inclining the crane cab**	Loose objects		**Danger of accidents due to objects overturning in the crane cab!** Close the crane cab door before inclining and remove all loose objects (e.g. bags, bottles etc.) from the crane cab. In this way, you prevent objects from tipping over, the crane cab door opening by itself or unintended operational accidents caused by fright.
12.4.7 Slewable spotlights	Adjusting the direction		**Danger of accidents due to being blinded during on-road driving!** When driving on the road, always direct the spotlights in such a way that the reflector points downwards. In this way, you can prevent yourself or other road users from being blinded and causing accidents.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.4.9 Warning submenu	Meaning of the symbols		**Risk of damage if warning messages are not observed!** Observe the information contained in section 12.4.9 in good time and take appropriate remedial measures if a warning message appears. In this way, you can prevent these malfunctions from causing malfunctions on the truck crane.
			**Risk of damage to the engine if the oil pressure drops!** Turn off the engine as soon as possible and look for the cause if the oil pressure warning lamp  lights up or if the warning buzzer sounds. Never restart the engine before you have found the cause and eliminated the problem. Refer to ***Malfunctions on the Engine – Page 15-15*** of the Operator's Manual for more information regarding malfunctions on the superstructure engine. Refer to ***Malfunctions on the Engine – Page 7-23*** of the Operator's Manual for more information regarding malfunctions on the carrier engine.
			**Danger of overheating!** If the hydraulic oil temperature exceeds 80°C, there is a fault. Set down the load as soon as possible and try to find the cause. Set down the load as soon as possible and turn off the engine if the temperature of the hydraulic oil exceeds 100°C.
12.5 Working range limiter	Obstacles		**Danger of accidents arising from situations which cannot be monitored!** The working range limiter only serves as an additional safety device. Brake the crane movement in time to avoid the obstacle. Do not knowingly drive into the shutdown area. You, the crane operator, are responsible for supervising the working range at all times, so that you can react accordingly in a situation that cannot be monitored electronically.
	Clearances		**Danger of accidents due to limit values set too low!** When entering the limit values, be aware that, even after switching off the engine, movements can occur that would bring the load into the shutdown area (e.g. due to load swing or boom deflection). For this reason, always enter the limit value to the object with sufficient safety distance.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.5 Working range limiter (cont.)	Clearances		**Risk of accidents if the statutory safe distance is not complied with!** Even when the working range limiter is switched on, always observe all safety distances according to the country's legal regulations (e.g. concerning electrical overhead cables) *NOTE: For operation in Australia, refer to the Occupational Health and Safety Regulations or Codes or Practice that apply in your respective state or territory.* *Observe all clearances relating to **NO GO** zones and comply with any legislation regarding the use of observers or spotters.*
12.5.3 Entering limit values	Prerequisite		**Danger of accidents due to limit values set too low!** When entering the limit values, be aware that, even after switching off the engine, movements can occur that would bring the load into the shutdown area (e.g. due to load swing or boom deflection). For this reason, always enter the limit value to the object with sufficient safety distance.
	Entering the permissible slewing range		**Danger of accidents due to incorrectly set slewing angles!** Always slew the main boom to the shutdown point from the right with slewing angle **A** and from the left with slewing angle **B.** This prevents slewing into the impermissible range from being released.
12.5.5 Switching monitoring functions on / off	Switching monitoring on		**Danger of accidents due to incorrectly set limit values!** After switching on the monitoring function, slowly approach all limit values and check that they are switched off in time. If necessary, enter new values with larger safety distances.
12.5.6 Shutdown by working range limiter	Overriding SLI		**Danger of accidents from overriding shutdown procedures!** Only override the SLI if absolutely necessary and if you can clearly see the danger zone. Remember that, because of the boom deflection, the overall height of the truck crane will increase when putting down the load.

12. Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
12.6 Work break **12.6.1 In case of short work breaks**	Suspended loads		**Danger of accidents due to suspended loads!** Never turn off the engine with a load suspended. You must have the control levers at hand in order to intervene at any time. Always set the load down before you leave the crane cab.
12.6.2 In case of work breaks of more than 8 hours	Securing the truck crane against unauthorised use		**Danger due to unauthorised use!** Always stow away the hand-held control in the crane cab before leaving the truck crane, and lock the door to the crane cab. In this way, you can prevent unauthorised persons from starting the engine with the hand-held control.
12.7 Heating and air-conditioning system **12.7.3 Auxiliary water heating system**	Switching on		**Danger of explosions when operating the auxiliary heater!** The auxiliary heater is not allowed to be operated: • At service stations and tank farms • At locations where flammable gases and vapours are found or can be formed (e.g. at fuel stations and chemical factories) • At locations where explosive dust is found or can be formed (e.g. coal dust, wood dust, grain dust)
	Switching on		**Danger of suffocation when operating the auxiliary heater!** Do not use the auxiliary heater in closed spaces (e.g. a garage)
12.7.4 Auxiliary air heater	Switching on		**Danger of explosions when operating the auxiliary heater!** The auxiliary heater is not allowed to be operated: • At service stations and tank farms • At locations where flammable gases and vapours are found or can be formed (e.g. at fuel stations and chemical factories) • At locations where explosive dust is found or can be formed (e.g. coal dust, wood dust, grain dust)
	Switching on		**Danger of suffocation when operating the auxiliary heater!** Do not use the heating system or the heating system with timer in enclosed rooms (e.g. a garage).

13. Rigging Work

Section / Heading	Hazard	Risk	Control Measures
13.2 Choosing a suitable site **13.2.1 Determining the required ground bearing area**	Ground bearing area		**Danger of overturning if the ground bearing area is too small!** Ensure that the actual ground bearing area is at least as large as specified in the table. This prevents the ground from giving way and the truck crane from overturning.
	Ground/supporting surface conditions		**Damage to underground services due to subsidence!** Wherever possible, obtain information regarding the location of any underground services such as water, gas, electricity, telephone or sewer lines. Avoid setting the outriggers above these underground services.
	Ground/supporting surface conditions		**Danger of support surface collapse due to inadequate strength!** Do not set up the crane on any suspended concrete slab without an engineering report being conducted by a competent person. Do not move the crane onto the suspended slab until all of the requirements of the engineering report have been completed (such as propping and extra supports) and the crane operator has personally inspected the required improvements and received a written copy of the engineering report and written verification that the requirements of the report have been completed.
	Levelling the crane		**Danger of overturning when carrier of truck crane is at an angle!** Line up the carrier horizontally and align the truck crane horizontally with the outrigger cylinders. In this way you prevent the outrigger pads slipping from the angled carrier, or the truck crane from having an unfavourable centre of gravity owing to an incline and overturning when subject to a load.
	Enlarging the outrigger surface area		**Danger of accidents by crane overturning due to weak packing!** Thin boards or planks made of pine wood or bricks are not made to withstand the resulting pressure and divert it safely to the ground. Ensure that the surface area of the outrigger packing is enlarged as much as possible by using hardwood timber packing with a minimum strength rating of **F14** and with minimum dimensions of **200mm wide** by **75mm thick**, by using steel plates, by using “bog mats” or by using OEM synthetic outrigger mats. Under no circumstances should the crane be set up for lifting without increasing the surface bearing area of the outrigger pads.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.2.1 Load bearing capacity of the ground and the outriggers (cont.)	Heavy outrigger packing		**Risk of manual handling injuries while lifting outrigger packing!** Ensure that correct manual handling techniques are used when handling heavy outrigger packers. Wherever possible utilise two person lifting techniques.
	Placement of outrigger packing		**Risk of accidents and machine damage due to incorrectly placed outrigger packing!** Ensure that the initial layer of packing has been laid as horizontally as possible. Failure to do this will mean that the packing will not be vertically aligned and this will cause instability of the packing. There is also the risk that the outrigger pads will slide off the packing during levelling. If using hardwood timber packing to increase the surface bearing area of the outriggers, ensure that the bottom layer of packing is laid closely together with no gaps between the timbers. Each subsequent layer of timber packing should be laid at right angles (90°) to the previous layer and arranged so that the packing resembles a gently sloping pyramid. Ensure that the top layer of timber packing is placed at right angles (90°) to the outrigger beams.
13.2.2 Safe distances from banks and pits	Clearances		**Danger of ground subsidence due to crane weight too close to bank or pit!** Avoid setting up the crane in the vicinity of trenches, slopes or excavations that may collapse under the combined weight of the crane, lifted load and other imposed forces. For guidance on appropriate distances to maintain, Refer to ***Safe Distance from Banks and Pits – Page 13-12*** of the Operator's Manual.
13.2.3 Earthing of the truck crane	Earthing the truck crane		**Danger of accidents due to electric shocks!** Earth the crane before crane operation: • Near strong transmitters (radio transmitters, radio stations etc.) • Near high frequency switching stations • If a thunder storm is forecast
	Earthing the truck crane		**Risk of accidents due to electric shock!** Ensure that the connections between the cable and the clamp are electrically conductive. Do not attach the clamp to parts that are screwed on, such as valves, covers or similar parts.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.2.4 Safe distance from electrical lines	Overhead power lines		**Danger of accidents due to electric shocks!** This truck crane is not insulated. Contact between overhead powerlines and the boom, the hoist rope, the hook block, the lifting tackle, the load itself or the guide ropes can result in serious, possible fatal injuries. If possible, have the current in the powerlines switched off or keep the truck crane, its equipment, lifting tackle and the load at a **minimum safe distance** as specified by local regulations for that level of voltage. *NOTE: For operation in Australia, refer to the Occupational Health and Safety Regulations or Codes or Practice that apply in your respective state or territory.* *Observe all clearances relating to **NO GO** zones and comply with any legislation regarding the use of observers or spotters*
13.3 Rigging work after driving with a trailer **13.3.1 Switching off the boom floating position**	Boom security		**Risk of accidents due to the main boom falling down!** Always secure the hand lever with the padlock after switching off the boom floating position. This prevents the main boom from falling down when actuating the lever.
13.3.2 Switching off slewing gear freewheel	Movement of boom		**Risk of accidents with the slewing gear freewheel switched on!** Switch off the slewing gear freewheel before working with the crane. If it is not switched off, the slewing gear brake does not work and you cannot stop slewing movements in time.
13.3.3 Switching off boom pre-tensioning	Valve IV		**Danger of hydraulic oil overheating!** Always switch valve IV over (lever in horizontal position) before operating the crane. This prevents the pressure in the hydraulic circuit from rising and the hydraulic oil from exceeding the permissible temperature of 80°C.
13.4 Connecting / removing the hand-held control	To connect the hand-held control		**Danger of unauthorised use!** Always stow the hand-held control in the driver's cab or in the crane cab before you leave the crane, and lock the doors. In this way, you can prevent unauthorised persons from starting the engine.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.5 Starting the engine for driving for rigging work **13.5.1 Starting / turning off the engine with the hand-held control**	Steering system		**Risk of crushing due to turning wheels!** When you start the engine, no persons may be within the steering range of the 4th and 5th axle lines. These axle lines are steered to test the steering system each time the engine is started.
13.6 Outriggers	Movement of outriggers		**Danger of crushing due to extending supports!** You may activate the outriggers only if you yourself or a helper with whom you are in visual contact have an unobstructed view of the outrigger movements.
	Movement of outriggers		**Danger of contact with objects when extending or retracting outrigger beams!** Ensure that prior to extending the outrigger beams that there is sufficient clearance to allow full extension of the outrigger beams without collision with surrounding objects. Clear away any obstructions that may cause interference.
	Lowering suspension		**Danger of crushing when lowering suspension!** To allow use of the outrigger controls, the crane suspension must be fully lowered and locked. Ensure that no person is standing in a position where crushing can occur while the crane suspension is being lowered and locked.
13.6.1 CHECKLIST: Extending the outriggers	Crane stability		**Danger of truck crane overturning if improperly supported!** When working with the crane, always: • Extend the outrigger beams only to the permitted spans of 2.76 m, 4.36 m, 5.96 m, or 7.80 m. • Extend all four outrigger beams to the same span • Enlarge the surface area of the outrigger pad packing • Raise the truck crane until all wheels are off the ground • Align the truck crane horizontally

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.6.2 CHECKLIST: Retracting the outriggers	Clearances		**Danger of accidents during on-road driving!** For on-road driving, ensure: • All outrigger beams and cylinders have been retracted fully • All outrigger beams have been pinned and secured • All outrigger pads have been pushed in and secured • The outriggers do not protrude beyond the outer limits of the vehicle
13.6.3 Permissible outrigger spans	Rotating the superstructure		**Danger of overturning when slewing the superstructure!** With some outrigger spans, slewing is only permissible with certain counterweigh combinations and boom positions. Refer to ***Slewing with a Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information.
13.6.5 Setting the spans	Outrigger extension		**Danger of the truck crane overturning if it is not properly supported!** Always extend all four outrigger beams to the required outrigger span, even if you are only working to one side. Otherwise the rear stability of the rigging mode according to the SLI code is no longer guaranteed.
	For on-road driving		**Danger of accidents due to supports moving out!** Always fully retract all the supports and secure them with the pins. This prevents the supports from swaying out in curves and causing serious accidents.
13.6.5 Extending / retracting supports	Persons in the support area		**Danger of accidents if supports cannot be seen!** Cordon off the area where you intend to extend and retract the supports. Nobody is allowed to be in this area. Observe the moving supports or have them observed by a helper who is in visual contact with you.
	Crane stability		**Danger of overturning if improperly supported!** Always extend all the supports, and always extend them to the spans corresponding to the SLI code. This also applies if you are working on one side only, since it ensures that the truck crane is stable at the rear.
	Retainer pins		**Risk of damage to the outrigger beams!** Before driving, always check whether the required pins for the desired outrigger span are inserted / removed.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.6.5 Extending / retracting supports	With the hand-held control		**Risk of crushing due to turning wheels!** When you start the engine, no persons may be within the steering range of the 4th and 5th axle lines. These axle lines are steered each time the engine is started, sometimes with a 5 second delay, in order to test the steering system.
13.6.8 Enlarging the ground bearing area	Outrigger packing		**Danger of accidents if the packing is insufficient!** Only use materials of sufficient strength. This will prevent the packing from giving way and causing the truck crane to tilt and overturn.
	Outrigger packing		**Danger of overturning if the packing or the truck crane is at an angle!** Level the packing and the truck crane horizontally. This prevents the outrigger pads from slipping off the inclined packing and causing the truck crane to overturn.
13.6.9 Extending / retracting supporting cylinders	Ground conditions		**Danger of overturning due to insufficient load bearing capacity of the ground!** Enlarge the ground bearing area if the ground cannot withstand the resulting outrigger pressure. This prevents the ground under the outrigger pads from giving way and causing the truck crane to tilt and overturn.
	Persons in the support area		**Danger of accidents if supporting cylinders cannot be observed!** Nobody is allowed to be in the area of the supporting cylinders. Observe the moving supporting cylinders or have them observed by a helper who is in visual contact with you.
	Extending the outrigger cylinders		**Risk of damage to the outrigger cylinders!** Move the outriggers as uniformly as possible on all four support points. This prevents the outrigger cylinders from being damaged due to one-sided pressure.
	Retracting the outrigger cylinders		**Risk of damage to the tyres!** Before retracting the outrigger cylinders, remove any sharp-edged and pointed materials from under the tyres. This prevents the tyres from being punctured or being damaged when the tuck crane is lowered.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.6.9 Extending / retracting supporting cylinders (cont.)	With the hand-held control		**Risk of crushing due to turning wheels!** When you start the engine, no persons may be within the steering range of the 4th and 5th axle lines. These axle lines are steered each time the engine is started, sometimes with a 5 second delay, in order to test the steering system.
13.6.10 Levelling the truck crane on outriggers horizontally	Prerequisites		**Danger of overloading the main boom!** Always slew the superstructure to the 0° or 180° position and set down the load before levelling the truck crane. In other positions, the deformation of the carrier will create incorrect results for the inclination and the truck crane will be at an angle. This could cause the main boom to become overloaded during crane operation.
	Checks to be performed after levelling		**Risk of accidents due to incorrectly supported truck crane!** Perform the following checks each time you have levelled the truck crane and correct any misalignments. Otherwise the truck crane may overturn even when lifting a load released by the SLI. Check after you have levelled the truck crane: • Whether all the wheels are lifted off the ground • Whether the ground under any of the outrigger pads has given way • Whether the packing is correct for the enlarged ground bearing area.
	Automatic procedure		**Danger of overturning if truck crane is not level!** When ECOS ends automatic alignment, the truck crane may not necessarily be horizontally aligned (if for example one outrigger cylinder has been extended as far as possible)Always check the horizontal alignment on the electronic level display after automatic alignment.
13.7 Counterweight **13.7.2 Identification**	Identification		**Danger if counterweight parts are interchanged!** Use only the counterweight sections that belong to your truck crane. The truck crane and the counterweight parts are labelled with the same serial number. Other or additional parts may not be rigged.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.7.3 Slinging points	Appropriate slinging		**Danger of accidents if used incorrectly!** Attach the various counterweight sections only to the intended slinging points and use lifting gear with sufficient lifting capacity. Only lift the counterweight sections one by one, since the slinging points are not designed for lifting stacked counterweight sections.
13.7.4 CHECKLIST: Rigging the counterweight	Crane stability		**Danger of overturning when slewing with a rigged counterweight!** Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span. Refer ***to Slewing with Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information..
13.7.5 CHECKLIST: Unrigging the counterweight	Crane stability		**Danger of overturning when slewing with a rigged counterweight!** Before slewing with the rigged counterweight, check whether slewing is permissible with the rigged outrigger span. Refer ***to Slewing with Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information..
13.7.6 Assembling counterweight combinations	Current rigging mode		**Danger of overturning when slewing with a rigged counterweight!** When a counterweight combination is rigged, check whether slewing is permitted with the current rigging mode (outrigger span, working radius). Correct the rigging mode if necessary. Refer to ***Slewing with the Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information.
	Setting down counterweight sections		**Danger of crushing when setting down the counterweight sections!** Ensure that helpers maintain sufficient clearances from the counterweight sections with all parts of their bodies during placement. Remove all objects from the counterweight platform that could become jammed or crushed.
	Using access ladder		**Danger of crushing when slewing the superstructure!** The access ladders are located in the slewing range of the superstructure. Ensure that nobody uses the access ladders (e.g. helper) while you lift a plate onto the counterweight platform.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.7.6 Assembling counterweight combinations (cont.)	Slinging counterweight sections		**Danger of accidents caused by falling counterweight sections!** Only attach the counterweight sections to the appropriate slinging points and use lifting gear with sufficient lifting capacity. The counterweight sections should be lifted one at a time. The slinging points are not designed for hoisting stacked counterweight sections.
13.7.7 Counterweight hoist unit	Lifting and lowering counterweight		**Danger of crushing when lifting and lowering the counterweight!** Be sure nobody is on the counterweight platform while the counterweight is being lifted or lowered.
	Counterweight retainer pins		**Risk of damage when lifting and lowering!** Ensure the counterweight retainer pins have been moved into the upper keeper plate holes of the bracket prior to lifting or lowering the counterweight. In this way, you will prevent damage to the counterweight, pins, or the moveable upright.
	Cancel automatic mode		**Risk of damage to the counterweight!** With the key operated switch actuated, the functions are always released. Never move the lifting cylinder to the *Intermediate* position rigging range. Slew the superstructure only if the lifting cylinders are fully extended (or fully retracted).
13.7.8 Screwing the counterweight section to the turntable	Correct counterweight combinations		**Risk of damage to the counterweight!** Do not stack the 5 tonne plate without cut-outs onto the counterweight combination. This prevents the extending lifting cylinders from being pushed against the 5 tonne section and getting damaged, and it ensures that the counterweight sections are stacked flush on top of each other and stay in place.
13.7.9 Slewing with the rigged counterweight	Setting the SLI		**Danger of overturning when slewing with an incorrectly set SLI!** Always check before slewing whether the SLI code valid for the current rigging mode is displayed. This prevents slewing operations from being released within impermissible ranges, which could cause the truck crane to overturn.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.7.9 Slewing with the rigged counterweight (cont.)	Using the hand-held control		**Danger of overturning when operating with the hand-held control!** When the hand-held control is connected, there is no monitoring by the SLI. Before slewing, always check whether sufficient outrigger span for the rigged counterweight has been set. This prevents the truck crane from overturning during slewing because of too much counterweight mass.
13.8 Rigging work on the main boom **13.8.1 Hook block on the bumper**	Picking up the hook block from the bumper		**Danger of accidents if your view is obstructed!** Have someone guide you when raising the main boom, since the view of the hook block is obscured. In this way you will prevent the main boom from being raised too far, which could cause the retainer sling to tear.
	Attaching the hook block to the bumper		**Danger of accidents if your view is obstructed!** The reeved hook block rope lines obstruct your view of the roadway. The number of legally permissible rope lines can differ depending on the country in which you are working.
	Attaching the hook block to the bumper		**Danger of accidents due to the hook block swinging unexpectedly!** The hook block will suddenly swing forwards If the retaining sling for the hook block breaks during tightening of the hoist rope,. Therefore ensure that any helpers stand a sufficient distance **to the side** of the hook block. Nobody may be in front of the hook block during tightening of the hoist rope.
13.8.2 Hook block on a separate vehicle	Slewing		**Risk of overturning while slewing!** Always check before slewing whether slewing is permitted in the truck crane's current rigging mode (counterweight, outrigger span, working radius). Correct the rigging mode if necessary. Refer to ***Slewing with the Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information.
	Overridden SLI		**Danger of overturning when turning with an overridden SLI!** Do not override the SLI before slewing the superstructure. Enter an SLI code for the working range 360° if the slewing operation is not released. This prevents the superstructure from being slewed into impermissible areas and the truck crane tipping over as a result.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.8.2 Hook block on a separate vehicle (cont.)	Swinging loads		**Danger of damage to the accompanying vehicle!** Only lift the hook block from the separate vehicle when the boom head is located directly above the hook block. This prevents the hook block from swaying and damaging the vehicle.
	Slack rope		**Risk of damage to the hoist rope!** To prevent slack rope, do not ease down too much hoist rope when picking up and reeving the hook block. Slack rope causes rope loops to form on the hoist drum which can lead to load slipping and the hoist rope being destroyed.
13.8.3 Reeving and unreeving the hoist rope	Rope end clamp (wedge socket)		**Danger of accidents due to a falling load!** Only thread the hoist rope as described in section *Correct Rope Guide* and adhere to manufacturer's instructions depending on the supplier of the wedge socket termination fitting. If you thread the hoist rope differently, the load bearing section of the rope will be kinked under load, causing severe damage to the hoist rope which may cause the hoist rope to fail, leading to the load falling to the ground during crane operation.
	Rope end clamp (wedge socket)		**Danger of accidents due to a falling load!** If you use a rope wedge which does not belong to the rope end clamp, the hoist rope slips out of the rope end clamp during crane operation and the load crashes uncontrolled to the ground.
	Reeving the hoist rope		**Danger due to slack rope!** Use only hook blocks and lifting gear of the minimum weight prescribed in the *Lifting Capacity Tables* for the reeving and boom length. This will prevent the deployment of slack rope at large heights when lifting with no load, which can lead to load slipping during subsequent lifts.
	Reeving the hoist rope		**Risk of damage to the hoist rope!** Always guide the hoist rope over the right head sheave. You must extend a telescopic section at least to the middle fixed length before lifting a load if a second hoist rope is to be guided over the left head sheave. This prevents the maximum permissible rope angle from being exceeded, which could damage the hoist rope.

13. Rigging Work (cont.)

Section / Heading	Hazard	Risk	Control Measures
13.8.5 Installing / removing the lifting limit switch	Installing the lifting limit switch		**Risk of damage if the lifting limit switch is locked!** The lifting limit switch must not be locked. Remove the lock if necessary. If the lifting limit switch is locked, the hook block could hit the bottom side of the main boom head when hoisting, and the hook block, main boom head and hoist rope can be damaged.
13.8.6 Locking / unlocking the lifting limit switch	Locking		**Risk of damage if the lifting limit switch is locked!** The lifting limit switch to which the lifting limit switch weight is attached may under no circumstances be locked when operating the crane. If the lifting limit switch is locked, release the lock. If the lifting limit switch is locked, the hook block could hit the bottom side of the main boom head when hoisting, and the hook block, main boom head and hoist rope can be damaged.
13.8.7 Anemometer and air traffic control light	On-road driving		**Risk of damage during on-road driving!** Always remove the anemometer and air traffic control light before on-road driving. This prevents the specified overall length from being exceeded at on-road level, and the anemometer from being damaged by air currents.
13.9 Other rigging works **13.9.1 Mirror for crane operation**	On-road driving		**Risk of accidents due to exceeding the permissible dimensions!** Fold all mirrors in for on-road driving. With the mirrors folded out, the specified overall height at on-road level and the specified overall width for driving on roads is exceeded.

14. Rigged truck crane, driving

Section / Heading	Hazard	Risk	Control Measures
14 Rigged truck crane, driving	General precautions		**Risk of overturning due to superstructure slewing!** When driving the rigged truck crane, the slewing gear must be switched off – slewing gear brake engaged.

14. Rigged truck crane, driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
14 Rigged truck crane, driving (cont.)	General precautions		**Risk of overturning due to swinging hook block / load!** Secure the hook block / load when driving so that it cannot swing. Start to drive slowly so that the hook block / load do not swing.
	General precautions		**Risk of accidents if your view of the truck crane is partially obscured!** While driving, always stay in visual or radio contact with a helper who can observe the parts which you cannot see.
	General precautions		**Risk of accidents when driving on public roads!** Driving on public roads is only permissible if all requirements listed in the ***CHECKLIST: Checks Before On-road Driving – Page 5-1*** of the Operator's Manual are met. Driving from the crane cab and driving with the truck crane rigged is not permissible on public roads.
	General precautions		**Risk of damage to the counterweight!** You must secure the counterweight before moving the rigged truck crane. This prevents damage to the counterweight, the turntable and the lifting cylinders.
14.2 Before driving the rigged truck crane **14.2.1 Checking the tyre pressure and the wind speed**	Tyre pressure		**Risk of damage to the tyres!** Only drive the rigged truck crane if the tyres are at the prescribed pressure level. Never reduce the tyre pressure in order to increase the bearing surface of the tyres.
	Wind speed		**Risk of accidents due to excessively high wind speeds!** You may not drive the rigged truck crane if the wind speed exceeds the maximum permissible values specified in the *Lifting Capacity Tables.* In this case, you must bring the truck crane into a safe condition.
14.3 Permissible rigging modes and axle loads	Axle loads		**Risk of damage to the axle lines!** Bring the superstructure and the main boom into the specified positions only. This prevents excessive strain on the axle lines.

14. Rigged truck crane, driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
14.3 Permissible rigging modes and axle loads (cont.)	SLI codes		**Risk of accidents if SLI is overridden!** Always enter the SLI code for the current rigging mode. The specified positions are within the monitored working ranges. If the SLI is overridden, the truck crane may overturn even if you approach the positions specified.
14.4 Before driving **14.4.1 Secure the counterweight to the turntable**	Rigged counterweight		**Risk of damage to the turntable!** Secure the counterweight on the turntable if you want to move the rigged truck crane. This prevents damage to the turntable and the counterweight.
14.4.2 Securing the superstructure against slewing	Rigged counterweight		**Danger of overturning by slewing the superstructure while driving the truck crane!** Always secure the superstructure before driving the rigged truck crane to prevent it from slewing. When slewing the superstructure while driving the truck crane, there is an increased risk of overturning.
14.4.3 Putting the truck crane on the wheels	Crane stability		**Danger of overturning if the outrigger cylinders are retracted unevenly!** Retract the outrigger cylinders evenly. This prevents the truck crane from overturning when retracting individual outrigger cylinders.
	Suspension		**Danger of overturning when switching on the suspension!** You may under no circumstances switch on the suspension as long as the rigged truck crane is on wheels. The suspension struts would be suddenly pressed together and damaged and the truck crane could overturn when switching on the suspension.
	Crane security		**Danger of overturning if outriggers are retracted!** Always leave the outriggers extended and the outrigger pads just above the ground to secure the truck crane against overturning.
14.5 Driving **14.5.2 While driving**	Steering system		**Risk of damage to the steering linkage!** The steering linkage can be damaged if the steering is operated while the vehicle is stationary.

14. Rigged truck crane, driving (cont.)

Section / Heading	Hazard	Risk	Control Measures
14.5.2 While driving (cont.)	Suspension		**Risk of overturning when switching on the suspension!** The suspension must be deactivated (locked) as long as the rigged truck crane is on wheels. When switching on the suspension, the suspension cylinders would be suddenly pressed together and damaged, and the truck crane could overturn.
14.6 Driving in combined operation (from the crane cab)	Crane movement		**Risk of accidents when driving in combined operation!** Crane movements may not be carried out when driving in combined operation. Therefore, always adhere to the specified rigging modes.
14.6.3 While driving	Vehicle control		**Risk of accidents when the carrier ignition is switched off!** Do not under any circumstances switch off the carrier ignition. In this way, you prevent the engine for driving from being switched off and the driver in the driver's cab from losing control of the truck crane.

15. Malfunctions during Crane Operation

Section / Heading	Hazard	Risk	Control Measures
15.1 Emergency stop switch	Intended use		**Risk of overloading if used improperly!** Only activate the emergency stop switch if it is no longer possible to stop the crane movements with the normal operating elements. The emergency stop switch stops the crane movements suddenly. This may overload the truck crane, e.g. in the event of high working speeds and large working radii.
15.2 What to do when malfunctions occur during crane operation	Suspended loads		**Risk of accidents when carrying out repairs with loads lifted!** Repairs must not be carried out as long as a load is lifted. Always try to lower the load before carrying out repairs. Only properly qualified personnel may perform crane movements with the solenoid valves.

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.2 What to do when malfunctions occur during crane operation (cont.)	Load can be lowered		**Risk of accidents due to overridden or faulty SLI!** You may only override the SLI if it becomes absolutely necessary in the event of an emergency. This is to put the truck crane into a safe condition in the event of a malfunction. In this case, do not perform any movements that would increase the load moment.
15.3 Fuses on the superstructure	Information on replacing the fuses		**Risk of Damage when the ignition is switched on!** Switch off the ignition whenever a fuse has to be replaced. In this way you can prevent the new fuse from being damaged by the increased starting current immediately after inserting it.
	Information on replacing the fuses		**Risk of damage due to overloading!** Replace blown fuses only with new fuses of the same amperage. In this way you can prevent parts from being overloaded and damaged or the fuse from being immediately damaged again. Notify ***CraneCARE*** if a fuse of the same amperage blows again after turning on the ignition.
	Information on replacing the fuses		**Danger of Fire!** Never replace a defective fuse with other electrically conductive materials.
15.3.3 Fuses in the battery box	Lead and lead compounds		**Danger due to lead and lead compounds of batteries!** Battery poles, battery terminals and parts of the battery itself contain lead and lead compounds. Wash your hands after working on these parts or in these areas.
15.4.11 Troubleshooting the SLI	Error messages		**Risk of accidents!** Immediately stop operating the crane if an error message is displayed. The SLI may only be repaired by trained and qualified personnel.

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.4.11 Troubleshooting the SLI (cont.)	Overridden or Faulty SLI		**Danger of accidents in the event of a faulty or overridden SLI!** In the event of a defective SLI, first try to eliminate the error using the information in ***section 15.4 of the Operator's Manual***. Only override the SLI if it becomes absolutely necessary in order to lower the load in the event of an emergency. Do not carry out any movements which increase the load moment in the event of a faulty or overridden SLI. If the SLI is overridden, the crane operations are not monitored and no shutdown procedures are initiated when leaving the working range.
	Error messages in the monitoring submenu		**Risk of accidents!** Immediately stop operating the crane if an error message is displayed. The SLI may only be repaired by trained and qualified personnel.
	Switching off sensor / tachogenerator		**Danger due to failure of SLI!** Have the error rectified before the next crane job. By doing this, the crane can then still be unrigged without SLI monitoring if the second sensor/tachogenerator fails.
	Switching off sensor / tachogenerator		**Risk of accidents due to defective functioning!** After switching off the faulty sensor/tachogenerator, only begin crane operations if the remaining sensors/tachogenerators are displayed correctly. In this way you prevent the SLI from not switching off when leaving the working range and the truck crane overturning as a result.
15.5 Emergency operations and programs **15.5.1 Mechanical emergency operation for retracting**	Mechanical emergency operation		**Risk of accidents due to sudden retraction of a telescopic section!** Before unlocking the telescopic section, secure it against automatic retraction. In this way, you can prevent the retracting telescopic section from shearing off any of your limbs or the truck crane from being damaged or being overturned by the telescopic section suddenly retracting.
	Unlocking telescopic sections		**Risk of accidents due to a mechanically released lock!** Under no circumstances may you operate the telescopic cylinder if the lock is mechanically released. Screw all set screws out of the bore holes immediately after finishing the repair work. This prevents damage to the telescoping cylinder and the locking system.

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.5.2 Telescoping emergency program	Determining the type of error		**Risk of damage to the telescoping mechanism!** Ensure you always have an overview of the current status of the telescoping mechanism before you initiate locking or unlocking. In emergency mode, there is no monitoring of prerequisites – the function is performed **immediately** after pressing the button.
	Determining the type of error		**Risk of damage to the main boom!** Never telescope the main boom if there is an error on the length indicator and on the proximity switch at the same time. It would then not be possible for you to monitor operations, and components in the main boom could be damaged, or a situation could arise in which the main boom can no longer be extended or retracted.
	Inspections prior to telescoping		**Risk of accidents from sudden retraction of a telescopic section!** Press the  button for unlocking the telescopic section **not more than twice**. If this does not start the unlocking procedure, contact ***Crane Care.***
	Retracting and locking a telescopic section		**Risk of damage to the main boom!** If you select *Lock* during telescoping, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.
	Unlocking the telescopic cylinder		**Risk of accidents from sudden retraction of a telescopic section!** Press the button  for unlocking the telescopic cylinder **not more than twice**. If this does not start the unlocking procedure, contact ***Crane Care.***

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.5.2 Telescoping emergency program (cont.)	Extending and locking the telescoping cylinder		**Risk of damage to the main boom!** If you select *Lock* while the telescoping cylinder is moving, the locking pins on the telescopic section are slid out immediately and they can damage or tear the electrical or hydraulic components in the main boom.
	Retracting		**Risk of damage if the length specifications are not observed!** Extend the telescoping cylinder (without telescopic section) only to the specified length. This prevents the piston rod from becoming damaged if the telescoping cylinder slides out of the telescopic section.
15.5.3 Entering the current telescoping	Entering set values		**Risk of damage due to incorrect input!** Before working with the crane, check whether ECOS now indicates the correct telescoping and correct an incorrect input, if necessary. Entering incorrect values causes malfunctions and may cause damage to the telescoping mechanism.
15.5.4 Emergency operation in the event of a failure of the operating elements in the crane cab.	SLI function		**Danger of overturning due to deactivated monitoring function!** The **SLI is switched off** and the crane operations are not monitored when operating with the hand-held control. If you move into a critical range, the truck crane will overturn.
	Operating a power unit		**Danger of overturning when driving into the shutdown ranges!** Avoid lowering. If you cannot avoid lowering, try to set the load down beforehand, and ensure that the maximum permissible working radius for the rigging mode as specified in the *Lifting Capacity Table* is not exceeded. Before slewing, always check whether this is permissible in the current rigging mode. Refer to ***Slewing with a Rigged Counterweight – Page 13-71*** of the Operator's Manual for more information.
	Operating a power unit		**Risk of accidents when operating the slewing gear!** Sit down in the crane cab to operate the slewing gear. This prevents you from being pushed off the carrier or being crushed by the carrier as a result of slewing. Lay the connecting cable of the hand-held control so that it will not catch on anything.

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.5.5 Switching on emergency operation in the coolant circuit	Fan wheel		**Risk of accidents due to turning fan wheel!** Always switch off the engine and secure it against unauthorised start before switching on emergency operation. This prevents the fan wheel from starting to turn suddenly, and injuring you.
	Hot engine parts		**Risk of burning yourself when the engine is hot!** During operation, the engine and the add-on parts heat up to a great extent. Wear appropriate protective gloves and be careful not to touch hot parts.
15.6 Hydraulic emergency operation	Improper use		**Risk of accidents due to improper use!** Operate in hydraulic emergency operation only to transport small loads in emergencies and have the malfunction rectified as soon as possible. Crane operation in hydraulic emergency operation is prohibited since it is not monitored by the SLI.
15.6.2 Connecting / disconnecting hoses	Establishing connections		**Risk of damage to the hoses!** Lay the hoses in such a manner that they can be moved freely, so as to prevent them from being crushed or torn or getting caught during subsequent carne movements.
15.6.4 Establishing the hydraulic circuits required	Switching over valves – for crane operation		**Danger due to mutual interference of the power units!** For crane operation, always switch **all** the valves **1 to 5** down diagonally. This prevents the power units from suddenly starting to move.
	Switching over valves – for emergency operation		**Danger due to interaction of the power units!** Always switch valves for one crane movement up diagonally at a time. This prevents wrong crane movements from being performed and several movements being performed unintentionally at the same time.
	Switching over valves – for lifting / lowering		**Danger due to falling loads!** Switch off continuous operation immediately after emergency operation. Check whether the pins can be seen on both caps. In this way, you can prevent the load from falling immediately after being lifted during subsequent crane operations.

15. Malfunctions during Crane Operation (cont.)

Section / Heading	Hazard	Risk	Control Measures
15.6.5 Carrying out emergency operation	Slewing in emergency mode		**Risk of accidents during slewing!** Do not stand on the carrier. This prevents you from being pushed off the carrier or being crushed by the carrier as a result of slewing.
	Slewing in emergency mode		**Risk of damage to the hoses and the transformer!** Make sure the hoses do not get caught and torn off while performing slewing operations.
	Raising / lowering in emergency mode – before lowering		**Danger due to unexpected changes in the direction of movement!** Only operate the small control lever to lower the boom. The direction of movement is changed and the main boom is raised if you additionally actuate the large control lever.
	Raising / lowering in emergency mode – before lowering		**Danger of overturning if the working radius is too large when lowering the boom!** In emergency operation, operations are not shut down by the SLI. This also applies if the SLI displays are still active after switching on the ignition. The truck crane will overturn if you exceed the maximum permissible working radius for the current rigging mode as specified in the *Lifting Capacity Table* when lowering the boom.

16. Technical Information about the Superstructure

Section / Heading	Hazard	Risk	Control Measures

17. Index for Part 2 – Operating Instructions – Superstructure

Section / Heading	Hazard	Risk	Control Measures

LATTICE EXTENSION

1. Information			
Section / Heading	**Hazard**	**Risk**	**Control Measures**
2. For operations planning			
Section / Heading	**Hazard**	**Risk**	**Control Measures**
2.1 Notes	Identification		**Risk of accidents if not adjusted properly!** The lattice extension is designed for the truck crane with which it is delivered. If a lattice extension is to be used on several truck cranes, it must be adjusted to the truck crane and marked with the serial number. Have the lattice extensions only adjusted by ***Crane Care***. In this way, you can prevent malfunctions and damage.
	Slinging points		**Risk of accidents due to falling parts of the lattice extension!** Observe the centre of gravity in the corresponding illustrations shown in Section 2.2.4 of the Operator's Manual when slinging. Use the existing slinging points. Always use lifting gear with sufficient lifting capacity. In this way, you can prevent attached sections from slipping out, falling down and causing injury during the installation or removal.
	Transport		**Risk of damaging the lattice extension!** Always secure the lattice extension by tying it down with suitable belts when transporting it on a separate vehicle. This prevents the lattice extension from tipping and becoming damaged during transport.

3. Swing-away lattice

Section / Heading	Hazard	Risk	Control Measures
3.3 Rigging work checklists **3.3.2 CHECKLIST: Installing the 11 / 18 metre swing-away lattice**	Security of swing-away lattice		**Risk of crushing due to swinging swing-away lattice!** Always secure the swing-away lattice against swinging with the guide ropes before you establish the hydraulic or electrical connections. In this way, you can prevent the swing-away lattice from swinging inadvertently to the side of the main boom and possibly crushing you.
3.4 Description of the rigging work **3.4.1 Securing the swing-away lattice with a rope**	Security of swing-away lattice		**Risk off accidents due to the swing-away lattice swinging of its own accord!** Secure the swing-away lattice on the main boom always with the guide ropes before undoing any connection. In this way, you can prevent the swing-away lattice from swinging around of its own accord and pushing you off the carrier or injuring other persons in the slewing range.
3.4.2 Checking the transport condition	Security of swing-away lattice		**Risk of damage to the lattice extension and the main boom!** Always put the swing-away lattice into transport condition before driving the truck crane with folded swing-away lattice or working with the main boom. Only then is the swing-away lattice secured against slipping. This will prevent the incompletely fastened swing-away lattice from hitting the main boom or components of the swing-away lattice from hitting each other and becoming damaged.
3.4.3 Checking the locking device on the hose drum	Hose drum		**Risk of damage to the hydraulic hoses!** Always check whether the locking device is undone before beginning operation with the lattice extension. This will prevent the hydraulic hoses from tearing during the telescoping procedure.
	Locking device		**Risk of accidents due to the hose drum turning in an uncontrolled manner!** The locking device must always be engaged before the hose drum is removed. Otherwise, the hose drum will turn in an uncontrolled manner against the holder and could injure you.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.4 Position of hydraulic connections	Strain relief		**Risk of accidents due to hydraulic hoses springing back!** If you detach the strain relief after the locking device has been released, you must under no circumstances let go of the strain relief until it has been re-attached. If you let go of the strain relief, the hydraulic hoses will spring back in an uncontrolled manner due to the spring force in the hose drum and may injure persons or damage parts of the truck crane.
3.4.5 Establishing / disconnecting the hydraulic connection	Establishing the hydraulic connection		**Risk of damage to the hydraulic hoses!** Lay the hydraulic hoses under the main boom in such a way that they hang freely. Take care that the hoses are not torn off when folding the lattice extension. This will prevent damage to the hydraulic hoses.
3.4.6 Folding out / in the run-up rail	On-road driving		**Risk of accidents by exceeding the overall width!** Always fold in the run-up rail before driving. With the run-up rail folded out, the overall width specified for on-road driving is exceeded.
3.4.7 Connections with folded swing-away lattice	Security of pins		**Risk of accidents due to falling parts!** Secure the pins both in the bearing points and the holders always with retaining pins to prevent unsecured pins from coming loose, falling down and causing injuries.
	Connections in the front area – Establishing the connection		**Risk of accidents due to falling lattice extension!** Always attach section 1 to the main boom with the pin. If section 1 is only attached at the slewing axis, the lattice extension could slip out of the slewing axle and fall down (e.g. when working with the main boom)
	Connections at the front area – with inclinable swing-away lattice		**Risk of accidents due to falling swing-away lattice!** Before undoing the connection, make sure that section 1 is pinned to the front right side of the main boom head. This will prevent the swing-away lattice from falling down and injuring you or other persons when undoing the connection.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.7 Connections with folded swing-away lattice (cont.)	Connections at the front area – with inclinable swing-away lattice		**Risk of accidents due to the swing-away lattice swinging of its own accord!** Always secure the lattice extension with a guide rope on the main boom before retracting the slewing axis. This will prevent the lattice extension from slipping off the run-up rail of its own accord, swinging around and knocking you off the carrier or injuring other persons in the slewing range.
	Bringing the *Front* connection into the *Unrigging* position		**Risk of crushing due to swinging lattice extension!** Start this process only if the lattice extension is pinned in front of the main boom head or secured against swinging around. This will prevent the lattice extension from swinging inadvertently to the side of the main boom and crushing you.
	Connections in the rear area – undoing the connection – with 18 metre swing-away lattice		**Risk of accidents due to falling parts!** Before undoing the connection, make sure all of the aforementioned connections have been established. In this way you will prevent either section 2 or section 1 or both of them from falling down when the connection is undone.
	Connections between section 1 and section 2 – Undoing the connection		**Risk of accidents due to falling parts!** Before undoing the connection, make sure all of the aforementioned connections have been established. In this way you will prevent either section 2 or section 1 or both of them from falling down when the connection is undone.
3.4.8 Connections on the left and right hand sides of the main boom	Right-hand connection		**Risk of accidents due to falling lattice extension!** Make sure the connections in the *Front* area have been established before you undo the connection on the right-hand side. This will prevent the lattice extension from falling down and injuring you or other persons when undoing the connection.
	Left-hand connection		**Risk of accidents due to the lattice extension swinging of its own accord!** Always secure the lattice extension with a guide rope before undoing any connections. This will prevent the lattice extension from swinging around of its own accord and causing injury to you or other persons.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.8 Connections on the left and right hand sides of the main boom (cont.)	Hydraulic rigging aid (additional equipment)		**Falling hazard if ladder is set up incorrectly!** Do not lean the ladder in the area of the swing-away lattice. You will fall when the swing-away lattice is swung. Lean the ladder only in the area of the main boom.
3.4.9 Swinging the swing-away lattice towards the main boom head	Prerequisites		**Risk of crushing due to falling swing-away lattice!** Make sure the connections in the *Front* area have been established before you swing the lattice extension towards the main boom head. This will prevent the swing-away lattice from falling down during swivelling and causing injury to you or other persons.
3.4.10 Swinging the swing-away lattice during rigging	When rigging section 1		**Risk of accidents due to the swing-away lattice swinging of its own accord!** Always secure the lattice extension with a guide rope before swinging it. Make sure that no persons or objects are within the slewing range of the swing-away lattice and always swing out the swing-away lattice from the base with a guide rope.
	When unrigging section 1		**Risk of accidents due to the swing-away lattice swinging of its own accord!** Always secure the lattice extension with a guide rope before swinging it. Make sure that no persons or objects are within the slewing range of the swing-away lattice and always swing out the swing-away lattice from the base with a guide rope.
	When rigging section 2		**Risk of accidents due to the section 2 swinging of its own accord!** Always secure section 2 with a guide rope before you undo the connection between section 1 and section 2 and only position the ladder on the left side of section 1. In this way, you will prevent section 2 from swinging round of its own accord and knocking you off the ladder when the connection is undone.
	When rigging section 2		**Risk of accidents due to section 2 swinging!** Make sure no persons or objects are within the slewing range of the swing-away lattice and always use a guide rope from the ground to swing out the swing-away lattice.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.10 Swinging the swing-away lattice during rigging (cont.)	When unrigging section 2		**Risk of accidents due to section 2 swinging!** Make sure no persons or objects are within the slewing range of the swing-away lattice and always use a guide rope from the ground to swing out the swing-away lattice.
	When unrigging section 2		**Risk of accidents due to the section 2 swinging of its own accord!** Always secure section 2 with a guide rope before you establish the connection between section 1 and section 2 and only position the ladder on the left side of section 1. In this way, you will prevent section 2 from swinging round of its own accord and knocking you off the ladder when the connection is undone.
3.4.11 Establishing / undoing connections at the swing-away lattice	Section 1 and 2 installed		**Risk of accidents due to the section 2 swinging of its own accord!** Always secure section 2 with a guide rope and only position the ladder on the left side of section 1. In this way, you will prevent section 2 from swinging round of its own accord and knocking you off the ladder.
	Only section 1 installed		**Risk of crushing due to the section 2 swinging!** Always secure section 2 with a guide rope from the ground before establishing or undoing the connection. In this way, you will prevent the swinging lattice extension from knocking you off the ladder, or yourself from being crushed between the sections of the swing-away lattice.
3.4.12 Electrical connections at the swing-away lattice	Security of swing-away lattice		**Risk of crushing due to the swing-away lattice swinging around!** Start the subsequent work only if the swing-away lattice has been pinned in front of the main boom head or is secured against swinging around. This will prevent the swing-away lattice from swinging inadvertently to the side of the main boom and crushing you.
	With the 18 metre swing-away lattice – establishing the electrical connection		**Risk of damage to the cable!** Always disconnect the electrical connection before you swivel section 2 to section 1. In this way, you will prevent the cable from tearing during swivelling.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.13 Folding deflection sheaves out / in	Folding out deflection sheaves		**Danger of crushing!** When pulling the pins, always hold the *Rear Deflection Sheave* tight by the handle and the *Front Deflection Sheave* by the strut. Your fingers might get crushed if you hold the sheave by the side plate.
	Folding in deflection sheaves		**Risk of accidents by exceeding the permissible overall height!** Always fold in the deflection sheaves when the swing-away lattice is folded onto the main boom for driving. The overall height specified for on-road driving is exceeded if the deflection sheaves are folded out.
	Folding in deflection sheaves		**Danger of crushing!** When pulling the pins, always hold the *Rear Deflection Sheave* tight by the handle and the *Front Deflection Sheave* by the strut. Your fingers might get crushed if you hold the sheave by the side plate.
3.4.14 Applying / removing the hoist rope	Security of elements		**Risk of accidents due to falling parts!** Always secure the sheaves and rods with retaining pins when securing the hoist rope. This will prevent elements from becoming loose, falling down and injuring persons.
3.4.16 Installing / removing the anemometer	Installing the anemometer		**Risk of damage to the anemometer!** Remove the anemometer for on-road driving. This will prevent the anemometer from being damaged by wind pressure.
3.4.18 Derricking the swing-away lattice	During operation – raising and lowering		**Risk of accidents due to unexpected movements!** If the control lever is assigned more than one function, check whether the control lever function *Derricking* is switched on before you move the control lever for derricking. In this way, you can avoid accidents due to unexpected crane movements.
3.4.19 Setting the angle – with an auxiliary crane	Security of swing-away lattice		**Risk of accidents due to the swing-away lattice folding down!** Always secure the swing-away lattice with an auxiliary crane or by setting it down on the ground before knocking out the pin for inclination. This will prevent the swing-away lattice from suddenly folding down and injuring persons.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.20 Setting the angle – without an auxiliary crane	Hoist rope		**Risk of damage to the hoist rope!** Unreeve the hook block and set down the hoist rope beside the swing-away lattice before you angle the swing-away lattice. This will prevent the hoist rope from being damaged when the swing-away lattice is set down on the ground in order for it to be angled.
	Entering the SLI code		**Risk of overturning in impermissible rigging mode!** Always enter the SLI rigging code for the current rigging mode of the truck crane, and only slew the superstructure into the working position permitted by the SLI rigging code set according to the Lifting Capacity Table. This will prevent the truck crane from overturning when the main boom is extended.
	Entering the SLI code		**Risk of overturning with the hook block (hook tackle) raised!** The telescoping range enabled with the set rigging code is only permissible for telescoping without a load and hook block / hook tackle. If the main boom is fully extended, load measurements are not possible and the SLI monitoring is based on the working radius. For this reason, you must always unreeve the hook block. This will prevent the truck crane from overturning when the main boom is extended.
	Setting an angle of 20° or 40°		**Risk of accidents in the event of other procedures!** For the procedure described in section 3.4.20, the swing-away lattice is set down on the ground. If the swing-away lattice is to be set down on packing for inclination, please bear in mind that the swing-away lattice will slide towards the truck crane when raised, until the angle of inclination is reached. The swing-away lattice could slip off inappropriate packing material, fold down and cause injuries.
	Setting an angle of 20° or 40°		**Risk of accidents when overriding the SLI!** Never override the SLI if the crane movements are switched off. This will prevent you from slewing beyond the permissible range and the truck crane overturning.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.4.20 Setting the angle – without an auxiliary crane (cont.)	Setting an angle of 20° or 40°		**Risk of overturning due to the truck crane standing at an angle!** After setting the angle of inclination, always check whether the truck crane is level. This will prevent the actual working range from deviating from the permissible working range, and the truck crane overturning.
	Inclining the truck crane		**Risk of accidents if the wheels touch the ground!** Make sure the wheels do not touch the ground after inclining the truck crane. This will prevent a reduction in stability of the truck crane and the truck crane from overturning when setting the angle.
3.5 Operation with swing-away lattice	Hoisting		**Risk of damage to the main boom!** During operation with the 11 metre swing-away lattice at an angle of 0° in the steepest boom position, the head sheaves on the main boom can be damaged if a hook block is raised or lowered. Reduce the hoist speed so that the hook block is raised slowly past the head sheaves.
3.5.2 Derricking the main boom	SLI override		**Risk of accidents with overridden SLI** Do not override the SLI when lowering the boom into a horizontal position. If the SLI is overridden, the crane operation will not be monitored and the truck crane will overturn if you leave the permissible working range.
3.5.3 Telescoping with rigged swing-away lattice	Telescoping and slewing at the same time		**Risk of overloading the main boom!** When telescoping the main boom with rigged swing-away lattice, you may not simultaneously slew the superstructure. This prevents the main boom from being subjected to additional side forces and increased vibration and becoming overloaded.
3.5.5 Procedure if the permissible wind speed is exceeded	High wind speeds		**Risk of accidents due to excessive wind speeds!** If the current wing speed is higher than the maximum permissible wind speed, stop operating the crane immediately and establish the corresponding rigging mode. This will prevent the truck crane from overturning.

3. Swing-away lattice (cont.)

Section / Heading	Hazard	Risk	Control Measures
3.5.6 Notes on main boom operation with the folded / rigged swing-away lattice	Rigged swing-away lattice		**Risk of overturning in impermissible rigging mode!** Main boom operation with a rigged swing-away lattice is only permissible in rigging modes that are also permissible for the rigged swing-away lattice (outrigger span, counterweight, slewing range). If you establish rigging modes that only apply to main boom operation without a rigged swing-away lattice (e.g. *Free-on-wheels* working position), the truck crane could overturn during operation.
	Reduction of the lifting capacities		**Risk of accidents with overridden SLI!** Do not under any circumstances override the SLI. If the SLI is overridden, the crane operation will not be monitored and the truck crane will overturn if you leave the permissible working range.

4. Boom extension

Section / Heading	Hazard	Risk	Control Measures
4.2 Description of the rigging work **4.2.1 Installing / removing section 3 and section 4**	Hydraulic and electrical connections		**Risk of damage to connection cables and hydraulic hoses!** Before the removal, check whether the electrical and hydraulic connections have been disconnected. This will prevent damage to the connection cables and hydraulic hoses during the removal.
4.2.2 Installing / removing the swing-away lattice for the boom extension	Hydraulic and electrical connections		**Risk of damage to connection cables and hydraulic hoses!** Before the removal, check whether the electrical and hydraulic connections have been disconnected. This will prevent damage to the connection cables and hydraulic hoses during the removal.
4.2.6 Applying / removing the hoist rope	Security of elements		**Risk of accidents due to falling parts!** Always secure the rope protection rollers and rods with retaining pins when securing the hoist rope. This will prevent elements from becoming loose, falling down and injuring persons.

4. Boom extension

Section / Heading	Hazard	Risk	Control Measures
4.3 Operation with boom extension	Operation		**Risk of overturning when operating with the boom extension!** No hook block may be reeved on the main boom when operating with the boom extension. It is not permitted to operate with the main boom with the boom extension rigged.
	Two-hook operation		**Risk of accidents due to overloading!** Lifting a load with two hooks with the boom extension rigged is not permitted.
4.3.2 Derricking the main boom	Overridden SLI		**Risk of accidents with overridden SLI!** Do not override the SLI when lowering the boom into a horizontal position. If the SLI is overridden, the crane operation will not be monitored and the truck crane will overturn if you leave the permissible working range.
4.3.3 Telescoping with rigged boom extension	Telescoping and slewing at the same time		**Risk of overloading the main boom!** When telescoping the main boom with rigged boom extension, you may not simultaneously slew the superstructure. This prevents the main boom from being subjected to additional side forces and increased vibration and becoming overloaded.
4.3.5 Procedure if permissible wind speed is exceeded	High wind speeds		**Risk of accidents due to excessive wind speeds!** If the current wind speed is higher than the maximum permissible wind speed, stop operating the crane immediately and establish the corresponding rigging mode. This will prevent the truck crane from overloading and overturning.

5. Auxiliary single sheave boom top

Section / Heading	Hazard	Risk	Control Measures
5.2 Rigging the auxiliary single sheave boom top **5.2.1 Rigging in working position / transport position**	Swivel Pin		**Risk of accidents due to falling parts!** To swing into working position or transport position, the swivel pin must be inserted. This prevents the auxiliary single sheave boom top from falling down and injuring people.
5.2.2 Applying and removing the hoist rope	Security of elements		**Risk of accidents due to falling parts!** Always secure the sheaves and rods with retaining pins when securing the hoist rope. This will prevent elements from becoming loose, falling down and injuring persons.
5.2.3 Lifting limit switch and anemometer	Anemometer – Installation and removal		**Risk of damage to the anemometer!** Remove the anemometer for on-road driving. This will prevent the anemometer from being damaged by wind (e.g. by suction currents caused by oncoming traffic in tunnels).
5.3 Operation with auxiliary single sheave boom top **5.3.2 Derricking and telescoping the main boom**	Overridden SLI		**Risk of accidents with overridden SLI!** Do not override the SLI when lowering the boom into a horizontal position. If the SLI is overridden, the crane operation will not be monitored and the truck crane will overturn if you leave the permissible working range.
5.3.4 Procedure if permissible wind speed is exceeded	High wind speeds		**Risk of accidents due to excessive wind speeds!** If the current wind speed is higher than the maximum permissible wind speed, stop operating the crane immediately and establish the corresponding rigging mode. This will prevent the truck crane from overloading and overturning.

6. Integrated heavy load lattice extension (ISS)

Section / Heading	Hazard	Risk	Control Measures
6.1 Checklists for rigging work **6.1.2 CHECKLIST: Installing ISS-A and ISS-B**	Prerequisites		**Risk of crushing due to swinging ISS!** Always secure the ISS with a guide rope before you establish the hydraulic or electrical connection. This will prevent the ISS swinging inadvertently to the side of the main boom and possibly crushing you.
6.2 Description of rigging work **6.2.1 ISS with a guide rope**	Swinging ISS		**Risk of accidents due to the ISS swinging of its own accord!** Always secure the ISS with a guide rope on the main boom before removing any connection. This prevents the ISS swinging around of its own accord and causing injury to you or other persons.
6.2.5 (Only ISS-A) Electrical connection between Section A – main boom	Security of elements		**Risk of accidents from a falling lattice extension!** Always fasten section A with the pin to the main boom before all four pins between section A and the ISS are loosened. If the ISS is swivelled in front of the main boom head without section A being fastened, the swing-away lattice will fall down.
6.2.6 (Only ISS-A) Electrical connection between Section A – ISS	Security of elements		**Risk of accidents from a falling lattice extension!** Before the connection with all four pins is released, the connection between section A and the main boom must be established. Refer to Page 6-29 of the Operator's Manual for more information. If the connection is completely released without section A being fastened, the swing-away lattice will fall down.
6.2.7 (Only ISS-B) *Front* connection	Establishing a *Front* connection		**Risk of accidents from a falling lattice extension!** Always fasten the Heavy Load Lattice to the main boom with the pin. When the Heavy Load Lattice is only attached at the slewing axis (e.g. when working with the main boom) and could fall.
	Releasing the *Front* connection		**Risk of accidents from falling Heavy Load Lattice!** Before removing the connection, ensure that the Heavy Load Lattice is locked at the right of the main boom head. This will prevent the Heavy Load Lattice from falling and causing injury to you and other persons.

6. Integrated heavy load lattice extension (ISS)

Section / Heading	Hazard	Risk	Control Measures
6.2.7 (Only ISS-B) *Front* connection (cont.)	Releasing the *Front* connection		**Risk of accidents due to the Heavy Load Lattice swinging of its own accord!** Always secure the Heavy Load Lattice with a guide rope on the main boom before retracting the slewing axis. This will prevent the Heavy Load Lattice from slipping off the *Front* connection, swinging around and knocking you off the carrier or injuring other persons in the slewing range.
6.2.8 (Only ISS-B) Rear connection	Swivelling the ISS		**Risk of crushing!** Keep your hands away from the holder when you swivel the Heavy Load Lattice. There is a risk of your hands and fingers being crushed.
6.2.11 Installing / removing the anemometer	Mounting the anemometer		**Risk of damage to the anemometer!** Remove the anemometer for on-road driving. This prevents the anemometer from being damaged by wind (e.g. by suction currents caused by oncoming traffic in tunnels).
6.2.13 Setting angle	Security of ISS		**Risk of accidents from ISS folding down!** Always secure the ISS with an auxiliary crane before you knock out the pins for the angle. In this way, you prevent the ISS from suddenly folding downwards and causing personal injury.
6.2.14 Positioning / removing the hoist rope	Security of elements		**Risk of accidents due to falling parts!** Always secure the sheaves and rods for securing the hoist rope with the retaining pins. This prevents elements from coming loose, falling down and injuring people.
6.2.16 Mechanical rigging aid (additional equipment)	Security of rigging aid		**Risk of accidents due to falling parts!** Hook the ratchet into the clamp so that it does not fall down while you are working with the crane or driving on the road. This way you prevent other people from being injured.

6. Integrated heavy load lattice extension (ISS)

Section / Heading	Hazard	Risk	Control Measures
6.3 Operation with ISS **6.3.2 Derricking the main boom**	SLI override		**Risk of accidents if the SLI is overridden!** Do not override the SLI when lowering the boom into the horizontal position. If the SLI is overridden, the crane operations will not be monitored and the truck crane will overturn if you leave the permissible working range.
6.3.3 Telescoping with rigged ISS	Telescoping and slewing at the same time		**Risk of overloading the main boom!** When telescoping the main boom with rigged ISS, you may not simultaneously slew the superstructure. This prevents the main boom from being subjected to additional side forces and increased vibration and becoming overloaded.
6.3.5 Procedure if permissible wind speed is exceeded	High wind speeds		**Risk of accidents due to excessive wind speeds!** If the current wind speed is higher than the maximum permissible wind speed, stop operating the crane immediately and establish the corresponding rigging mode. This will prevent the truck crane from overloading and overturning.
6.3.6 Information about main boom operation when the ISS is folded / rigged	Folded ISS-A		**Risk of damage to ISS!** It is prohibited to fold the ISS to the side on the main boom without locking it on section A of the swing-away lattice. In this case, the ISS is not correctly fastened to the main boom and would cause damage during work with the crane.
	Rigged ISS-A or ISS-B		**Risk of overturning with impermissible rigging mode!** Main boom operation with a rigged ISS is only permissible in rigging modes that are also permissible for the rigged ISS (outrigger span, counterweight, slewing range). If you set up rigging modes that are only valid for main boom operation without a rigged ISS (e.g. *free-on-wheels* working position), then the truck crane could overturn during operation.
6.3.7 Notes on two-hook operation	Overridden SLI		**Risk of accidents if the SLI is overridden!** Do not under any circumstances override the SLI. If the SLI is overridden, the crane operations will not be monitored and the truck crane will overturn if you leave the permissible working range.

7. Turning loads

Section / Heading	Hazard	Risk	Control Measures
7 Turning loads	Following procedures		**Risk of accidents due to overloading!** Lifting a load with two hooks is permitted only according to the instructions and illustrations listed in ***section 7 of the Operating Instructions for Lattice Extension***. If these instructions are disregarded, there will be a risk of accidents due to individual parts of the truck crane being overloaded. In this case the SLI no longer provides protection.
7.3 Turning loads	Speed of operation		**Risk of accidents due to overloading!** Keep the acceleration forces to a minimum during two-hook operation. For this reason, move the load at minimum speeds.

8. Driving with rigged crane

Section / Heading	Hazard	Risk	Control Measures
8.1 Safety Instructions	General precautions		**Risk of accidents by not having a clear overview of the entire truck crane!** When driving the truck crane, stay in constant visual or radio contact with a helper who can observe the sections you are unable to see, e.g. the raised boom in 0° to the rear position.
	General precautions		**Risk of overturning due to slewing superstructure!** The slewing gear must be switched off when driving the truck crane.
	General precautions		**Risk of accidents when driving on public roads!** Driving on public streets is only permitted when all items on the ***CHECKLIST: Checks before on-road driving*** are fulfilled; Refer to ***Operating instructions GMK5130-2*** for more information. Driving on public roads with a rigged truck crane is not permitted.

8. Driving with rigged crane (cont.)

Section / Heading	Hazard	Risk	Control Measures
8.1 Safety Instructions (cont.)	General precautions		**Danger of tipping when driving the rigged truck crane!** Driving with a rigged truck crane is an operating mode which must be carried out with the utmost care. For this reason, make sure that you observe the listed safety instructions in the relevant sections of the ***Operating instructions GMK5130-2***
	General precautions		**Risk of accidents due to swinging hook block / load!** Secure the hook block / load for driving so that it cannot swing. Start to drive slowly so that the hook block / load does not swing.
8.3 Rigging modes and axle loads	Driving without a load		**Risk of damage to the axle lines!** Always move the main boom and the lattice extension into the specified position before driving the rigged truck crane. Boom positions which deviate from the specified position can result in impermissible loads on the axle lines.
8.5 Driving the rigged truck crane	While driving		**Risk of accidents when driving with a raised load!** The maximum permissible speed for driving with a raised load is 1.5 km/h.
	While driving		**Risk of damage to the steering linkage!** The steering linkage can become damaged if the steering is operated while the truck crane is stationary.
	While driving		**Danger of overturning when switching on the suspension!** The suspension must be switched off (disabled) as long as the rigged truck crane is on wheels. When switching on the suspension, the suspension cylinders would suddenly be pressed together and damaged, and the truck crane could overturn.

9. Maintenance			
Section / Heading	**Hazard**	**Risk**	**Control Measures**
10. Index			
Section / Heading	**Hazard**	**Risk**	**Control Measures**

REMOTE CONTROL

1. Additional equipment, remote control			
Section / Heading	**Hazard**	**Risk**	**Control Measures**
2. Description of the remote control			
Section / Heading	**Hazard**	**Risk**	**Control Measures**
2.1 Operating and display elements **2.1.1 In the crane cab**	Unauthorised use		**Unauthorised use prohibited!** After switching the *remote control* key-operated switch on / off, always pull the key out. This prevents the *remote control* key-operated switch from being used by unauthorised persons and allows you to retain control of the crane.
2,3 Operation with remote control **2.3.1 Switching on the remote control**	Unauthorised use		**Unauthorised use prohibited!** After switching the *remote control* key-operated switch on / off, always pull the key out. This prevents the *remote control* key-operated switch from being used by unauthorised persons and allows you to retain control of the crane.
	Safety devices		**Risk of accidents if the safety devices are faulty!** If the lamps or the buzzer fails, notify ***Crane Care*** and have the error rectified. In the meantime, pay particular attention to the lamps in the event of a failure of the buzzer or vice versa.
2.3.4 Exchange and charge battery pack	Charging the battery pack		**Risk of damage through excessive voltage!** Connect the 12 / 24 volt battery charger supplied to a cigarette lighter only. This is to prevent damage to the battery charger and battery packs due to incorrect supply voltage (e.g. 240 volts)
3. Malfunctions			
Section / Heading	**Hazard**	**Risk**	**Control Measures**