10. Note pad for sketches, measurements and notes.
11. Putty knife for scraping debris to clean areas of interest.
12. Small wire brush for cleaning areas of interest.

Record of checks and inspections, reporting

A written record of service inspections must be kept. The record of a service inspection must include at least the following information:

- identity of the crane
- date of inspection
- result of the check, that is, whether or not the crane passed
- name and signature of person carrying out the check.

The record for a service inspection must include details of the condition of critical components that need to be monitored, for example a wire rope showing signs of wear. It must be related to the historical records of the crane and made available to the competent person responsible for the thorough examination.

Document the performed maintenance procedures carefully, writing down any defects detected and repairs made.

If you notice any defects, deteriorated components or unsafe conditions, inform the person responsible for the maintenance of the crane immediately. The defects must be repaired before continuing the use of the crane.

Store the records and reports carefully so that they are easily available when needed.

Maintenance tables

This chapter presents the scheduled maintenance of the crane.

Reading instructions for maintenance tables

Failure to read, understand and follow these instructions could result in harmful and damaging consequences.

WARNING

PERSONAL INJURY HAZARD!
Never operate a defective crane.
If any defects are found during inspections, report the defects immediately to your superior or those responsible for the maintenance of the crane.

The acronyms for different operating hours:

- C-OH = Crane operating hours
- G-OH = Gantry operating hours
- T-OH = Trolley operating hours
- H-OH = Hoist operating hours

Scheduled maintenance

Gantry motors

3. Driveline / Axle			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry motors			
Check and clean the cooling fins.	12	Month	
Check the mounting bolts for tightness.	12	Month	
Check visually the cabling condition and enclosures.	12	Month	
Check visually the connection box gasket.	12	Month	
Replace the bearings.	10	Year	
Check for running smoothness, and abnormal noise or behaviour.	12	Month	500 G-OH
If there is a reason to suspect dampness in system, measure insulation resistance of the windings and check the condition of the insulators.	12	Month	
Check the anti-condensation heaters for correct function.	12	Month	
Inspect the motor cable connections and tighten if necessary.	12	Month	500 G-OH
Inspect the shore supply socket outlet/inlet.	12	Month	
Check the location of the shaft seals.	12	Month	

Gantry gearboxes

3. Driveline / Axle			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry gearboxes			
Check for oil leaks.	3	Month	Once a month for the first two months
Check the oil level.	3	Month	Once a month for the first two months
Change the oil.	12	Month	500 G-OH
Renew the lubricating grease in all lubrication points.	3000 18	G-OH Month	See chapter *- Oils, lubricants and fluids*
Check the torque lever screw and bolt connections.	3	Month	
Check the breather visually and clean if necessary.	3	Month	
Check the flexible jaw coupling visually.	3	Month	
Check the oil visually through sight glass for signs of water, for example foam.	3	Month	Let the oil settle before inspection.
Check the gear unit for abnormal noise.	12	Month	

Gantry positioning

3. Driveline / Axle			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry positioning			
Check the mounting and the condition of the absolute encoders on the gantry non-driven wheels.	6	Month	

Gantry brakes

4. Brakes			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry brakes			
Check the brake shoes, brake linings and the brake disc.	1000	G-OH	
Check the reserve stroke (brake in closed position).	1000	G-OH	
Check the lever adjustment bolts by pulling the lever (brake in released position). The brake must not be instable.	1000	G-OH	
Check the braking torque (brake in closed position).	1000	G-OH	
Check the screw and bolt connections.	1000	G-OH	
Check the limit switches.	1000	G-OH	
Check the manual release device.	1000	G-OH	
Check the power supply cable connections.	1000	G-OH	1st time after commissioning, 2nd time after 500 G-OH.
Check the air gap.	1000	G-OH	

Gantry wheels

6. Suspension			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry wheels			
Check the wheels for cracks. If any cracks are found during visual check, verify using a dye penetrant inspection.	1000	G-OH	
Check the wheels for wear.	1000	G-OH	
Lubricate the bearings.	1000	G-OH	Once a month for the first two months See chapter *- Oils, lubricants and fluids*
Check the proper installation of the labyrinth-type seal. The flange must not rotate around the shaft.	1000	G-OH	
Gantry wheel alignment.	5000	G-OH	

Hoist motor

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist motor			
Check and clean the ventilation system.	12	Month	
Check the mounting bolts for tightness.	12	Month	
Check visually the cabling condition and enclosures.	12	Month	
Check the bearing condition.	12	Month	
Replace the bearings.	10	Year	
Check the anti-condensation heaters for correct function.	12	Month	
Check for running smoothness, and abnormal noise or behaviour.	12	Month	
If there is a reason to suspect dampness in system, measure the insulation resistance of the motor windings and the condition of the insulator(s).	2	Year	
Measure that no bearing insulation is short-circuited.	5	Year	
Check the seals of the junction box.	12	Month	
Check that there is no moisture in the junction box.	12	Month	
Check the cable connections.	12	Month	
Check the mounting of the hoist motor incremental encoder.	12	Month	

Cardan shaft

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Cardan shaft			
Grease the cardan shaft through greasing nipple	2000	H-OH	

Hoist gearbox

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist gearbox			
Check for oil leaks.	3	Month	Once a month for the first two months.
Check the oil level.	3	Month	Once a month for the first two months.
Change the oil.	3000	H-Oh	500 H-OH
Renew the seal lubricating grease.			
Check the breather visually and clean if necessary.	3	Month	
Check the gear unit for abnormal noise	12	Month	

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist gearbox			
Check the oil visually through sight glass for signs of water, for example foam.	6	Month	Let the oil settle before the inspection.
Check that the retaining screws are tightly secured	12	Month	

Hoist positioning

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist positioning			
Check the mounting of the absolute encoders at the end of the hoist drum	12	Month	

Auxiliary hoist gear

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Emergency hoist gear			
Check the gear oil level.	12	Month	Once a month for the first two months.
Change the gear oil.	3	Year	
Replace anti-friction bearing grease.	3	Year	
Inspection and functional testing.	12	Month	
Check the chain detection sensor for correct function.	12	Month	

Hoist drum

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist drum			
Lubricate the bearing.	1000	H-OH	
Check that the rope clamp locking plates are correctly installed.	1000	H-OH	

Hoist brake

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist brake			
Check the brake shoes, linings and brake disc.	1000	H-OH	
Check the reserve stroke (brake in closed position).	1000	H-OH	
Check the lever adjustment bolts by pulling the lever (brake in released position), the brake must not be instable.	1000 6	H-Oh Month	
Check the braking torque (brake in closed position).	1000	H-OH	
Check the screw and bolt connections.	1000	H-OH	
Check the limit switches.	1000	H-OH	
Check the manual release device.	1000	H-OH	
Check the hydraulic oil level in the thruster.	1000	H-OH	
Replace the hydraulic oil in the thruster.	5	Year	

Emergency hoist brake

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Emergency hoist brake			
Check the brake shoes, linings and brake disc.	1000	H-OH	
Check the reserve stroke (brake in closed position).	1000	H-OH	
Check the braking torque (brake in closed position).	1000	H-OH	
Check the screw and bolt connections.	1000	H-OH	
Check the limit switches.	1000	H-OH	
Check the manual release device.	1000	H-OH	
Check the hydraulic oil level in the thruster.	1000	H-OH	
Replace the hydraulic oil in the thruster.	1000	H-OH	

Rope sheaves

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Rope sheaves			
Lubricate the bearing.	1000	H-OH	Once a month for the first two months.
Check the rope sheaves for wear.	1000	H-OH	

Hoist ropes

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Hoist ropes			
Check the hoist ropes at full lenght for possible damage and change in shape.	1000	H-OH	
Lubricate the hoist ropes.	1000 6	H-OH Month	100 H-OH
Check the protective plastic or rubber plates and rollers guiding the hoist ropes for wear.	12	Month	

Aerial cable

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Aerial cable			
Lubricate the aerial cable.	3	Month	

Spreader

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Spreader			
Lubricate the spreader lubrication points.	1000	C-OH	First time directly after commissioning.
Check the glide plates and replace if excess wear found.	2000	C-OH	
Check the telescopic chain tension.	4000	C-OH	First time directly after commissioning.
Check the telescopic chain elongation. Replace the chain and gears when maximum trimming allowance is reached.	4000	C-OH	
Check the gears.	6000	C-OH	
Check the function of the spreader twistlocks and tighten them.	1000	C-OH	First time directly after commissioning.
Dismantle, inspect and detect the twistlocks for cracks.	3000	C-OH	
Replace pins and spherical washers of the twistlocks.	6000	C-OH	
Check the spreader alignment.	1000	C-OH	
Clean position sensors.	1000	C-OH	First time directly after commissioning.
Test position sensors.	1000	C-OH	

Headblock

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Headblock			
Check the slack rope sensors for correct function.	3	Month	
Dismantle, inspect and detect the twistlocks for cracks.	3000	C-OH	
Check the twistlock position sensors for correct function.	3000	C-OH	
Check that the inductive sensors for slack aerial cable work.	3	Month	

Headblock drive unit

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Headblock drive unit			
Clean the cooling rims with pressurised air.	6	Month	3 months in dusty environment

Headblock micromotion carriages

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Headblock micromotion carriages			
Check the micromotions for smoothness, noise and abnormal behaviour.	3	Month	
Check the micromotion actuators for rust and wear	3	Month	
Lubricate the ball screw shafts and rods and the end fitting bearings of the micromotion actuators.	6	Month	The actuators must be extended before lubrication.
Check and adjust the brake gap of the micromotion actuator's electric motor	6	Month	
Lubricate the carriage wheel bearings.	3	Month	
Check the carriage wheels for cracks. If necessary, verify using a dye penetrant inspection. A cracked wheel must be replaced.	4000	C-OH	
Check the carriage wheels for wear.	6000	C-OH	
Check that the carriage wheel bearings roll freely without play.	4000	C-OH	

Headblock electric cabinet

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Headblock electric cabinet			
Check the mounting of the cabinet.	12	Month	
Check the vibration dampers.	12	Month	
Check the cabinet anti-condensation heater for correct function.	12	Month	
Check the cabinet doors for waterproof protection.	12	Month	
Perform a recidual current device test for the cabinet socket and socket outlets.	6	Month	
Clean the cabinet fan.	6	Month	
Change the cabinet fan filter.	6	Month	

Service crane

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Service crane			
Lubricate the chain.	12	Month	
Check the operation of lifting and lowering limit switches.	12	Month	
Check the cable and casing parts of the control pendant.	12	Month	
Check the electrical switchgear and wiring.	12	Month	
Check the slipping clutch for correct operation.	12	Month	
Check the brake for wear.	10	Year	
Check the suspension, suspension bracket and securing elements (clip etc.).	12	Month	
Check the securing screws on hook assembly.	12	Month	
Check the hooks and the safety catches of the hooks for cracks, deformation and wear.	12	Month	
Check the hook bearing for wear.	12	Month	
Check the chain sprocket and chain guide.	12	Month	
Check the chain and the chain collector box for fastening	12	Month	
Check the chain for deformation, damage, cracks, pitting, reduction in the thickness of the links or increase in pitch due to wear, elongation caused by deformation.	12	Month	
Check the securing elements (clips, screws etc.) for tight fit and corrosion.	12	Month	
Check and apply or supplement corrosion protection, as required.	12	Month	
Check the electrical enclosure and gearbox for leakages.	12	Month	
Check the condition of the trolley, load bar and buffers.	12	Month	
Check all functions of the service crane using its own controls.	12	Month	

Trolley motors

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley motors			
Check and clean the ventilation system.	12	Month	
Check the mounting bolts for tightness.	12	Month	
Check visually the cabling condition and enclosures.	2	Year	
Replace the bearings.	10	Year	
Check the seal of the connection box gasket.	12	Month	
Check running smoothness, noise and abnormal behaviour.	12	Month	500 T-OH
If there is a reason to suspect dampness in system, measure the insulation resistance of the motor windings and the condition of the insulator(s).	2000 12	T-OH Month	
Check the anti-condensation heaters for correct function.	12	Month	
Check that there is no moisture in the connection box and that the drainage holes are not obstructed.	12	Month	
Check the cable connections.	12	Month	

Trolley brakes

4. Brakes			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley brakes			
Check the brake shoes, brake linings and the brake disc.	1000	G-OH	Initial maintenance after 500 G-OH
Measure the thickness of the friction lining support group.	1000	G-OH	
Check the friction lining support group, replace it if necessary.	1000	G-OH	
Check brake flange and armature plate, replace it if necessary.	1000	G-OH	
Check the screw and bolt connections.	1000	G-OH	
Drain condensate.	1000	G-OH	
Check compression springs, replace it if necessary.	1000	G-OH	
Check the power supply cable connections.	1000	G-OH	Initial maintenance after 500 G-OH
Check the air gap, adjust if necessary.	1000	G-OH	Initial maintenance after 500 G-OH

Trolley gearboxes

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley gearboxes			
Check for oil leaks.	3	Month	Once a month for the first two months.
Check the oil level.	3	Month	Once a month for the first two months.
Change the oil.	12	Month	500 G-OH
Renew the lubricating grease in all lubrication points.	3000 18	T-OH Month	See chapter *- Oils, lubricants and fluids*
Check the torque lever screw and bolt connections.	3	Month	
Check the breather visually and clean if necessary.	3	Month	
Check the flexible jaw coupling visually.	3	Month	
Check the oil visually through sight glass for signs of water, for example foam.	3	Month	Let the oil settle before the inspection.
Check the gear unit for abnormal noise.	12	Month	

Trolley wheels

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley wheels			
Check wheels for cracks. If necessary, verify using a dye penetrant inspection.	1000	T-OH	
Check wheels for wear.	5000	T-OH	
Lubricate the bearings.	1000	T-OH	Once a month for the first two months.

Trolley guide roller

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley guide roller			
Check the rollers for wear. Measure the roller diameter.	2000	T-OH	The tolerance is 5 mm. If diameter is less than 365 mm, the roller needs to be replaced.
Check the guide rollers adjustment.	1000	T-OH	
Check that the bearings roll freely without play.	1000	T-OH	

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley guide roller			
Lubricate the bearings.	1000	T-OH	Once a month for the first two months.
Check the guide rollers for loose bolts.	1000	T-OH	

Trolley positioning

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley positioning			
Check mounting and condition of the incremental and absolute encoders.	6	Month	
For automation - check BTG instructions if the item is needed: Check mounting and condition of the positioning antenna.	6	Month	

Measurement systems

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Measurement systems			
Check the mounting and condition and clean the optica lens surfaces of the TPMS laser scanners. Check the filter and replace if necessary.	3	Month	Observe local conditions. Clean more often if necessary.
Check the mounting and condition and clean the optical lens surface of the LPMS camera.	3	Month	Observe local conditions. Clean more often if necessary.
Check the mounting and condition and clean the surface of LPMS light module on the headblock.	3	Month	
Recalibrate the TPMS system.	12	Month	
Recalibrate the LPMS system.	12	Month	
Recalibrate the headblock inclinometer.	12	Month	
Recalibrate the trolley inclinometer.	12	Month	

Cameras

7. Load handling			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Cameras			
Check the mounting and condition and clean the optical lens surface of the cameras. Observe local conditions.	3	Month	

General

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
General			
Inspect visually the paint condition for cracks, rust and other damages.	6	Month	Also after every accident.
Check all warning plates for readability and damage. Replace if necessary.	12	Month	

Emergency stop buttons

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Emergency stop buttons			
Check the emergency stop buttons for correct function.	3	Month	

Fire extinguishers

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Fire extinguishers			
Check the fire extinguishers for functionality and proper inspection. Check the inspection tag on the fire extinguisher.	6	Month	

Warning horns and warning lights

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Warning horns and warning lights			
Check the warning horns and warning lights for correct function.	6	Month	

Gantry obstacle detection

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry obstacle detection			
Clean the scanner cover.	1	Month	

Walkways and doorways

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Walkways and doorways			
Check that main girder walkways and doorways are clean and unobstructed.	1000	C-OH	
Check that portal walkways and doorways are clean and unobstructed.	1000	C-OH	
Check that trolley walkways and doorways are clean and unobstructed.	1000	C-OH	

Gantry storm lock

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Gantry storm lock			
Check storm locking system for correct function.	6	Month	
Lubricate the threads of the tie-rods and their nuts.	6	Month	

Trolley storm pins

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley storm pins			
Check for correct function.	6	Month	

Buffers

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Buffers			
Check visually the gantry buffers condition. Check the rubber seal.	6	Month	
Check visually the trolley buffers condition. Check the rubber seal.	6	Month	

Bogies

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Bogies			
Lubricate the shaft bearings.	2000	G-OH	Once a month for the first two months.

Balances

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Balances			
Lubricate the shaft bearings.	2000	G-OH	Once a month for the first two months.

E-house

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
E-house			
Check that the first-aid kit is complete and up to date.	12	Month	

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
E-house			
Check that the outer door of the E-house for proper closing. Replace the gasket if damaged.	12	Month	

E-house air conditioners

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
E-house air conditioners			
Clean the air filters.	1	Month	
Clean the unit casings.	1	Month	
Check and clean the drain trays.	12	Month	Prior to start-up
Change the air filters.	12	Month	

Control stands and operator panels

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Control stands and operator panels			
Check the condition of the control stands and operator panels.	6	Month	

Lighting system

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Lighting system			
Check and clean the access lights, replace defective units.	6	Month	
Check and clean the working lights, replace defective units.	6	Month	
Check and clean the maintenance lights of the headblock electric cabinet, replace defective units.	6	Month	
Check and clean the maintenance lights of the trolley electric cabinets, replace defective units.	6	Month	
Check and clean the maintenance lights of the E-house, replace defective units.	6	Month	

Trolley rails

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Trolley rails			
Check trolley rails for wear and cracks. If any cracks are found during visual check, verify using a dye penetrant inspection. Cracked rails must be replaced. Contact Kalmar service personnel for assistance.	1000	T-OH	
Check the condition of the rail clip fastening bolts.	4000	T-OH	

Structural inspection

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
General interval of bolted joints			
Main steel structure (connections between frames, columns, and main girders)	12	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, handrails, walkways, stairs and ladders.			
All welds, brackets, and bolted joints	12	Month	Refer to *Structural Inspection Manual*
Fastening of the grates	12	Month	Refer to *Structural Inspection Manual*
Internal ladders, inside main girders and fixed side columns	3	Year	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, main girders			
Buffers of the trolley, welded and bolted joints	12	Month	Refer to *Structural Inspection Manual*
Energy chain	12	Month	Refer to *Structural Inspection Manual*
Flanges of the columns	12	Month	Refer to *Structural Inspection Manual*
Rail connections, plate, and the position of the rubber pad	12	Month	Refer to *Structural Inspection Manual*
Girder, externally from the trolley	12	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, main girders			
Support	12	Month	Refer to *Structural Inspection Manual*
Girder, internally through the hatches	3	Year	Refer to *Structural Inspection Manual*
E-house platform	12	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, column, fixed side			
Girder and frame connections, flanges, welds and bolted joints	12	Month	Refer to *Structural Inspection Manual*
Full external and internal inspection	3	Year	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, column, flexible side			
Hinge joints,pins, eye plates with all welds	12	Month	Refer to *Structural Inspection Manual*
Cable reel connections	12	Month	Refer to *Structural Inspection Manual*
Full external and internal	3	Year	Refer to *Structural Inspection Manual*
Power cable reel and cable shelf, bolted joints	12	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, cross girders			
Girder connections, flanges, welds and bolted joints	12	Month	Refer to *Structural Inspection Manual*
Full external and internal inspection	3	Year	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, frames			
Flanges and welds to the columns, balance beams and storm locking mechanism	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of the storm locking mechanism and electric cabinet	12	Month	Refer to *Structural Inspection Manual*
Full external inspection	3	Year	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, gantry travels			
Balance and bogie structures	6	Month	Refer to *Structural Inspection Manual*
Welded pieces for the pivot pins	12	Month	Refer to *Structural Inspection Manual*
Bores and pivot pins	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of travel equipment	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of motors and gearboxes	12	Month	Refer to *Structural Inspection Manual*
Balance and bogie alignment bolts	6	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, trolley			
Fastening of the rope sheaves	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of the hoist brake and emergency brake	3	Month	Refer to *Structural Inspection Manual*
Bolted joints of drum bearing housing and plinths, fastening clamp of hoist rope	6	Month	Refer to *Structural Inspection Manual*
Bolted joints of the trolley travel motors, gearboxes, and brakes	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of drum coupling and service crane	12	Month	Refer to *Structural Inspection Manual*
Bolted joints of hoist motor, gearbox and brake	6	Month	Refer to *Structural Inspection Manual*
Bolted joints of trolley wheels and rollers	12	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, headblock			
Quick inspection: possible damage and defects	3	Month	Refer to *Structural Inspection Manual*
Springs and screws of cable reel basket	3	Month	Refer to *Structural Inspection Manual*
Screws of the rope sheave	6	Month	Refer to *Structural Inspection Manual*
Corners of the headblock structure	12	Month	Refer to *Structural Inspection Manual*
All welded parts	12	Month	Refer to *Structural Inspection Manual*
Fastening lugs, welds and bores	6	Month	Refer to *Structural Inspection Manual*
End frames around the four twistlocks	6	Month	Refer to *Structural Inspection Manual*
Micromotion carriages, structure and bolted joints	6	Month	Refer to *Structural Inspection Manual*

9. Frame, body and accessories			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Structural inspection, spreader			
Quick inspection: possible damage and defects	3	Month	Refer to *Structural Inspection Manual*
Spreader guides	12	Month	Refer to *Structural Inspection Manual*
Ties, bearing beams	12	Month	Refer to *Structural Inspection Manual*
Detailed inspection: damage and defects from all welds, bolted joints, and bottom rails	12	Month	Refer to *Structural Inspection Manual*

General

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
General			
Check all of the portal earthing cables for condition and proper connection.	12	Month	
Check all of the main girder earthing cables for condition and proper connection.	12	Month	
Check the mounting and condition of the trolley cable terminals, screw terminals and busbars.	12	Month	500 T-OH

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
General			
Check the mounting and condition of the headblock cable terminals, screw terminals and busbars.	12	Month	500 T-OH
Check the mounting and condition of the gantry cable terminals, screw terminals and busbars.	12	Month	500 T-OH
Check the mounting and condition of the portal cable terminals, screw terminals and busbars.	12	Month	500 T-OH
Check visually the shore supply socket inlet/outlet .	12	Month	500 T-OH

Power cable reel

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Power cable reel			
Check the safety cover for missing or defective parts.	3	Month	
Check the fasteners of the drum and the reel flange clamping screws for tightness.	12	Month	After 3 months
Check the adjusted reel width at multiple points around the circumference with empty reel.	12	Month	
Check the fixing of the first turn of cable on the drum.	12	Month	
Check the winding of the cable for lateral slip.	3	Month	
Check the power supply cable for wear and tear. Check carefully for big and small chips. If the outer insulation is damaged, contact the cable supplier service.	12	Month	
Check the rib supports of the slip ring assembly for damage and contamination.	12	Month	After 3 months
Check the surface of the slip rings.	12	Month	After 3 months
Check the wear of the slip brushes.	3	Month	After 3 months
Check the position of the current collector on the slip rings.	12	Month	After 3 months
Check the connection cable for damage to the insulation near the slip ring housing, and check that it is correctly fastened to the slip rings or current collectors.	12	Month	After 3 months
Check the slip ring housing anti-condensation heater for correct function.	12	Month	After 3 months
Vacuum the carbon dust from the insulators, cable terminations and floor of the collector housing. Alternatively, use a brush or a lint free cloth.	12	Month	Never use water or solvents for cleaning.
Check the seals on the housing door for damage and the cable entry for leaks.	12	Month	After 3 months
Check the secure fastening of the optical fibre cable within the plastic socket.	12	Month	After 3 months
Check the insulation of the optical fibre cable for wear.	12	Month	After 3 months
Check the anti-condensation heater of the rotary optical fiber transmitter for correct function.	12	Month	After 3 months

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Power cable reel			
Check the limit switch of the power cable reel for wire connections and tightness of the terminal screws.	12	Month	After 3 months
Check the limit switch chain for sufficient tension.	12	Month	After 3 months
Check the limit switch chain for sufficient lubrication.	12	Month	After 3 months
Check the limit switch sprockets for tooth wear.	12	Month	After 3 months
Check the housing of the cam switch with gears for leaks.	12	Month	After 3 months
Check the shaft sealing rings on the hollow shaft and the housing of the gearbox for oil leaks.	12	Month	After 3 months
Check the oil level in the gearbox.	12	Month	After 3 months
Change the oil in the gearbox.	10 000	G-OH	After 3 months
Check the function of external fan of the motor and check the air pathways.	12	Month	After 3 months
Check the motor connection for correct fastening.	12	Month	After 3 months
Check the connection box for moisture and that the drainage holes are not obstructed.	12	Month	After 3 months
Check all glands of the motor for correct tightness and sealing.	12	Month	After 3 months
Check the motor anti-condensation heater for correct function.	6	Month	After 3 months
Check the brake microswitch for correct function.	6	Month	After 3 months
Check the brake for wear and the air gap between coil body and anchor plate with a feeler gauge.	12	Month	After 3 months
Check the brake anti-condensation heater for correct function.	12	Month	After 3 months
Check the running smoothness, noise and abnormal behaviour.	12	Month	After 3 months
Check the gear-rim of the coupling for wear through the sight glass on coupling.	12	Month	After 3 months

Cable guide

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Cable guide			
Check the sensors for correct function.	3	Month	
Check the rollers for free rotation.	3	Month	

Energy chain

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Energy chain			
Check the energy chain for wear	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the energy chain for obstructions	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the roller links	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the energy chain endpoints	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the strain reliefs	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the cables and hoses	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the troughs	1200 6	T-OH M	First 1 month Third-part documentation CD
Check the moving arm	1200 6	T-OH M	First 1 month Third-part documentation CD

E-house

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
E-house			
Remove dust deposits from the E-house electric devices, like drives, UPS devices, air conditioner and other devices including power electronics or fans inside.	6	Month	
Remove dust from behind the PC racks and covers.	6	Month	
Check UPS front panel for battery charge level.	3	Month	

E-house drive modules

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
E-house drive modules			
Replace the cooling fans of the drive modules.	6	Year	
Replace the capacitors of the drive modules.	10	Year	

Transformers

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Transformers			
Check the mounting and condition of the cable terminals, screw terminals and busbars.	3	Year	1000 G-OH
Check the doors of the trafo room for correct closing. Replace the gasket if damaged.	12	Month	
Replace the filters of the ventilation fans.	2000	C-OH	
Check the trafo room ventilation fans and thermostat for correct function.	4000	C-OH	
Vacuum the trafo room from dust. Clean the busbars and terminals with a brush or a lint free cloth.	12	Month	

Crane switch

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Crane switch			
Check the arcing chambers and contact systems.	3	Year	
Check the mechanical functionality.	12	Month	
First level maintenance for SACE Emax 2 circuit-breakers			One year or 20% of mechanical life or 20% of electrical life in standard environments 6 months or 10% of mechanical life or 10% of electrical life in dusty environments (dust level measured > 1mg/m3)

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
Crane switch			
Second level maintenance for SACE Emax 2 circuit-breakers			Three years or 50% of mechanical life or 50% of electrical life or after a trip due to short-circuit in standard environments 18 months or 25% of mechanical life or 25% of electrical life or after a trip due to short-circuit in dusty environments (dust level measured > 1mg/m3)

MV switchgear

11. Common electrics			
Description	**Interval**	**Type**	**Initial maintenance/ Reference & Other notes**
MV switchgear			
Check the arcing chambers and contact systems.	3	Year	
Check the mechanical functionality.	12	Month	