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KONE MINISPACE™ (INCLUDING KONE ULTRAROPE®)

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1 ABOUT THIS INFORMATION

This information provides general guidance on the maintenance and usage of your elevator. By following this information you ensure safe, comfortable and reliable service for the elevator users in your building. You also increase the service life of your elevator, better retaining the value of your investment.

This information is compiled according to the guideline of the EEA for new elevator deliveries by providing the following information:

- Normal use of the elevator
- General maintenance
- Preventive maintenance
- Maintenance program
- Safety component maintenance
- Periodical inspection tests
- Rescuing trapped passengers

NOTE: Store this information so that it is accessible to authorized persons if needed.

NOTE: The pictures in these instructions are for illustrative purposes only, intended to provide general information. Some minor details in the illustrations can be different than the actual equipment.

We trust that you will be completely satisfied with your new equipment.

Safety and reliability are KONE's primary concerns and have been strongly emphasized in the design, manufacture, installation and maintenance processes of this elevator. The revolutionary elevator technology, together with KONE's quality, guarantees you a modern, ecologically-friendly elevator which will maintain its functionality in the years to come.

Planned preventive maintenance helps you take care of your elevator. You can ensure the future value of your investment by implementing a carefully-planned preventive maintenance program, carried out by a competent maintenance company. KONE has the experience and knowledge needed to plan and carry out a program that will meet all the maintenance needs of your elevator.

KONE offers you a wide range of top quality maintenance and training services with the help of our global organization and the latest elevator technology. For more information on these services, please contact your local KONE office.

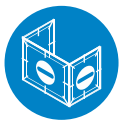
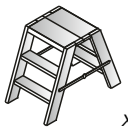
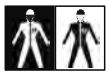
1.1 Audience

This information is intended for the elevator owner, competent maintenance company and authorities performing periodical inspections.

1.2 Signs

	Danger of falling
	General warning: caution, danger, risk
	Risk of electric shock
	Risk of tripping
	Risk of crushing
	Risk of crushing in pit
	Risk of crushing
	Risk of moving parts
	Risk of rotating parts
	Risk of falling objects
	Risk of sprain

	Nobody allowed in the elevator car
	Do not lubricate
	Do not step on
	General mandatory action
	Wear safety shoes
	Wear safety gloves
	Turn main power OFF
	Lock and tag equipment
	Activate stop button or switch
	Verify de-energization
	Use fall prevention measures

	Use safety fences
	Wear eye protection
	Wear harness
	Wear helmet
	Incorrect
	Correct
 *X0000086743*	Use work stool
 *X000010430*	Two or more competent persons required

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1.3 Related information

- Local safety and maintenance information
- EN 81-20 Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods. Passenger and goods passenger lifts
- EN 81-50 Safety rules for the construction and installation of lifts. Examinations and tests. Design rules, calculations, examinations and tests of lift components
- EN 12015: Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Emission
- EN 12016: Electromagnetic compatibility - Product family standard for lifts, escalators and moving walks - Immunity
- EN 13015 Maintenance for lifts and escalators. Rules for maintenance instructions

- EN 81-21: Safety rules for the construction and installation of lifts - Lifts for the transport of persons and goods - Part 21: New passenger and goods passenger lifts in existing building
- EN 81-58: Safety rules for the construction and installation of lifts - Examination and tests - Part 58: Landing doors fire resistance test
- EN 81-70: Safety rules for the construction and installations of lifts - Particular applications for passenger and good passenger lifts - Part 70: Accessibility to lifts for persons including persons with disability
- EN 81-71: Safety rules for the construction and installation of lifts - Particular applications to passenger lifts and goods passenger lifts - Part 71: Vandal resistant lifts
- EN 81-72: Safety rules for the construction and installation of lifts - Particular applications for passenger and goods passenger lifts - Part 72: Firefighters lifts
- EN 81-73: Safety rules for the construction and installation of lifts - Particular applications for passenger and goods passenger lifts - Part 73: Behaviour of lifts in the event of fire
- EN 81-77: Safety rules for the construction and installations of lifts - Particular applications for passenger and goods passenger lifts - Part 77: Lifts subject to seismic conditions
- Lifts Directive 2014/33/EU
- OM-01.01.006 KONE Cleaning Instructions - Elevator Decorative Materials and Accessories
- OM-01.01.007 Firefighting Elevator (EN 81-72)
- OM-01.01.008 Earthquake Devices (EN 81-77)
- OM-04.01.001 Hydraulic Lifting Tool, Owner's Manual
- OM-13.25.001 KRM Emergency Phone, Owner's manual

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1.4 National statutory requirements

In addition to Lifts Directive 2014/33/EU, you may need to follow national statutory requirements that are not discussed in this document. Typical requirements include the following:

- Fire regulations
- Working safety rules
- Elevator maintenance regulations
- Electromagnetic compatibility

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2 SAFETY

Safety is KONE's primary concern. Constant attention is given to safety aspects in the design, manufacture and maintenance of elevators. In addition, KONE maintains a constant research effort in the field of new safety elements in order to provide you with the safest products possible.

Safety features, for example, the overspeed governor, locks, brakes, pit safety devices and safety gear make your elevator safe. There are, however, some remaining safety risks that cannot be fully eliminated. The following sections describe how to further increase the safety of your elevator.

2.1 Prior to putting the elevator into service

Prior to putting your elevator into service, you must ensure the following:

– A planned maintenance service program, to be carried out by a maintenance company, is established. The maintenance company should be the same for all elevators on the same site
– A 24-hour call out service for the elevator is available for the entire time that the elevator is in operation
– The name and telephone number of the maintenance company is visible inside the elevator

2.2 Safety considerations

Elevators, like all transportation equipment, require maintenance to operate reliably. An operational elevator is an important safety element of your building. It avoids the risks involved in the use of stairs and is essential for the transport of elderly and disabled persons.

As the owner of the building you must make sure that your building is safe for persons that need to use it, by observing the following considerations:

– If the availability of rescue personnel is changed so that a trapped person cannot be freed without undue delay, the elevator must be taken out of service
– If maintenance work is to be carried out in the elevator shaft, a competent maintenance person must be available while service personnel are on site
– The access ways to the elevator and working places must be kept safe and clean. The maintenance company must be informed of any changes or hazards in these access ways
– The keys to the MAP (machine-room-less elevators), machine room and control cabinet (elevators with machine room) and landing doors must be kept in a secure place inaccessible to unauthorized persons. The keys may be given only to competent maintenance persons

Preventive maintenance is crucial to maintain the safety of the elevator. Regular checks of your elevator's safety equipment help to locate defective components before they cause hazards.

Proper maintenance provides the following benefits:

– Better safety for elevator users
– Retention of value of your investment
– Increased service life of your elevator

- More comfortable ride for elevator users
- Reduced number of elevator stoppages due to breakdown

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3 RESPONSIBILITIES AND QUALIFICATIONS

Elevator work is intended for elevator professionals only. Elevator maintenance work involves many risks that unskilled people are unaware of.

The following sections describe the roles involved in the maintenance of your elevator, and the responsibilities and qualifications of each role.

Table 1: Role definitions

Role	Definition
Owner	The owner is responsible for ensuring that a competent elevator maintenance company or organisation maintains the elevator in accordance with a predefined maintenance program.
Maintenance company	The maintenance company is a company or part of a company where competent maintenance persons carry out maintenance operations on behalf of the owner of the elevator.[1)]
Competent maintenance person	The competent maintenance person is a designated person, suitably trained, qualified by knowledge and practical experience, provided with necessary instructions and supported within their maintenance company to enable the required maintenance operations to be safely carried out. For more information on training, see the ISO 9000 series.

3.1 Owner's responsibilities

The following table describes the specific responsibilities of the owner as defined by EN 13015.

Table 2: Owner's responsibilities

	In particular the owner must be aware of the following:
1	Keep the elevator in safe operating condition. To fulfil this, the owner must use a maintenance company complying with the requirements of standard EN 13015 4.3.2.1.
2	Remove the elevator from service when the two-way means of communication is out of order (EN 13015 4.3.2.6).
3	Remove the elevator from service in case of dangerous situations (EN 13015 4.3.2.7).

The maintenance company must be informed of the following details:

– The access way to be used
– The location of any keys required for full access to all parts of the elevator
– The identities of persons accompanying the maintenance persons to the elevator, if necessary

1) EN 13015 Maintenance instructions for lifts and escalators - Rules for maintenance instructions

– The specifics of personal protective equipment needed in the access ways, and where the equipment is located, if necessary
– The necessity of any modification work of equipment, or modification to the conditions related to the elevator

3.2 Maintenance company's responsibilities

The following table describes the specific responsibilities of the maintenance company.

Table 3: Maintenance company's responsibilities

	In particular the owner must be aware of the following:
1	The maintenance company must promptly inform you about progressive upgrading, in accordance with any relevant "essential health and safety requirements" as defined in new European directives and standards.
2	The maintenance company is responsible for keeping a record of the results of each intervention due to a failure of the appliance (in particular, the type of failure) and making this record available for you on request. This requirement is in addition to any national legal requirements obligating you to retain records.
3	The maintenance company is responsible for putting the elevator out of service in case of dangerous situations, and informing you of the situation.
4	The maintenance company is responsible for providing a competent person to operate the elevator for inspection by an authorized body, and for special works.
5	The maintenance company is responsible for providing the necessary spare parts for any repair.
6	The maintenance company is responsible for carrying out a risk assessment for any maintenance location and for any maintenance operation to be undertaken.
7	The maintenance company is responsible for carrying out a maintenance program such that preventive maintenance is suited to the specific installation and that corrective maintenance time, including logistics and technical delays, is as short as reasonably practicable.
8	The maintenance company is responsible for deciding the frequency of preventive maintenance operations so that several operations can be performed at the same time to facilitate maximum utilization of the appliance.
9	The maintenance company is responsible for recording all maintenance operations in the maintenance logbook.

NOTE: The maintenance company must carry out a risk assessment of any maintenance area and of any maintenance operation to be undertaken.

3.3 Qualified maintenance company

The following table describes the required qualifications of the company responsible for your elevator's maintenance.

Table 4: Maintenance company's qualifications

	A qualified maintenance company is defined in this information as a company able to ensure that:
1	A risk assessment is carried out for every maintenance operation of an elevator, including cleaning, and taking into account the installer's maintenance instructions for every task to be undertaken.
2	The maintenance work is carried out in conformity with the relevant regulations and instructions and in line with the safety policy of the maintenance company.
3	Any call out is taken care of as soon as possible; most maintenance companies provide a 24-hour call out service. The call out response time, from the call to the arrival on site, must be in accordance with the nature of the call, giving priority to the rescue of persons. A remote monitoring system can provide information for response to the rescue.
4	To ensure transport of the infirm, elderly or disabled persons, any call out to the elevator must be performed as soon as possible; the maintenance company must provide a 24-hour call out service.
5	The competence of the maintenance personnel is continuously updated.
6	The maintenance company should carry adequate and proper insurance cover provided by a recognized insurance company.

3.4 Competent maintenance person

The following table describes the required qualifications of the person responsible for your elevator's maintenance.

Table 5: Maintenance person's qualifications

	A competent maintenance person is defined in this information as a person who:
1	Is a competent maintenance engineer as defined in EN 13015.
2	Has been trained in the maintenance procedures of this elevator to enable a true assessment of its condition for continued safe operation.
3	Is supported within his or her company.

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4 ENVIRONMENT

Elevators have an impact on the environment during their lifetime in the course of material and energy use, as well as wastes and emissions in manufacturing, installation and service. At KONE, our policy is to develop and supply environmentally-sound products.

4.1 KONE's environmental policy

We at KONE are conscious of the problems facing our environment and as a global organization feel that it is our duty to take care of and protect it. We do this through our operating practices and by developing environmentally-sound products and services. We feel that it is everyone's responsibility to ensure, and continually improve, efficient and economical use of all available natural resources.

4.2 Building efficiency

Your KONE elevator is an example of our environmental policy in practice and it shows how product innovations can minimize environmental degradation in building construction. Eliminating the need for a machine room, this elevator can be fitted into the building with minimum space requirements, saving costs compared with traditional elevator solutions. This is our contribution to the customer wish to make buildings more efficient and more environmentally friendly.

4.3 Energy savings

In accordance with regulations concerning the emissions of "greenhouse gases" and requirements for energy savings, the machine combined with the new control unit uses significantly less energy than a traditional traction machine with the same lifting power. Energy savings have characterized the design of the entire life cycle of this product. The light and compact hoisting machine saves much of the considerable energy consumed in the production of materials for a traditional traction elevator. The elevator also has an optional feature that switches off the elevator car lights when it has been idle for a few minutes.

The energy consumed by an elevator depends on the load, speed, travel height, average travel, traffic density, elevator technology and moving masses, for example, elevator car. This document consequently does not include energy consumption figures.

For more information on the power supply requirements, for example, voltage, frequency, maximum current and power, see the order bound document Basic Characteristics of the Lift in the owner's documentation binder.

4.4 Long lasting product

The construction of the machine is simple, assuring a long and reliable life span, a quality required of environmentally friendly products. KONE elevators are predominantly manufactured from recyclable materials.

4.5 Packaging materials

Elevator components are packed in wooden boxes. Cardboard, plastic films and polystyrene are used to protect small parts from damage during transportation and handling. KONE has

taken care of the disposal of packages at the installation of on elevator. Packaging materials are sorted and recycled when local circumstances permit.

4.6 Final disposal

Entrust the dismantling and disposal of an elevator to a company specialized to disposal. Note the following instructions:

- Remove lead battery and fluorescent tubes, if present. Dispose of these materials according to local hazardous waste management procedures.
- Separate metals and other recyclable materials from non-recyclable materials
- Arrange recycling and disposal of materials with a professional waste management company
- If the elevator needs to be replaced with a new elevator, contact KONE sales for the installation of a new elevator and recycling and disposal of old elevator components

4.7 Materials used in your elevator

Elevators are composed mainly of different metals, for example, steel and cast iron. Some aluminium, bronze and copper are used in specific components. Decorative materials are the same as can be found in building interiors, for example, coated steel sheets, laminated panels, glass and rubber. There are a number of different electronic components as well as plastics.

The following table lists common hazardous materials and their frequency of use in elevators.

Table 6: Hazardous materials

Material	**Used**
Oil	Occasionally
Lead battery	Yes
Fluorescent tubes containing mercury	Occasionally
Asbestos	No

NOTE: Make sure that the elevator maintenance company has proper waste management procedures. Elevator ropes and other metal components are recyclable. Lead batteries and fluorescent tubes are hazardous waste.

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5 KONE MINISPACE™

KONE MiniSpace™ offers excellent traffic handling capabilities, high flexibility and excellent ride comfort. It is a semi-customized product, allowing more flexibility than standard elevator systems. It features a machine room with MX hoisting machine and optional KONE UltraRope® technology.

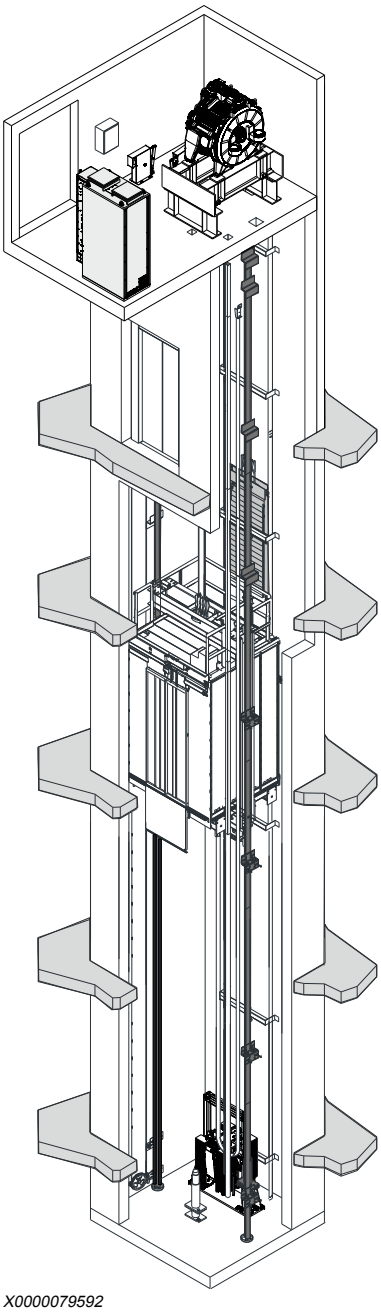

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Figure 1: KONE MiniSpace™

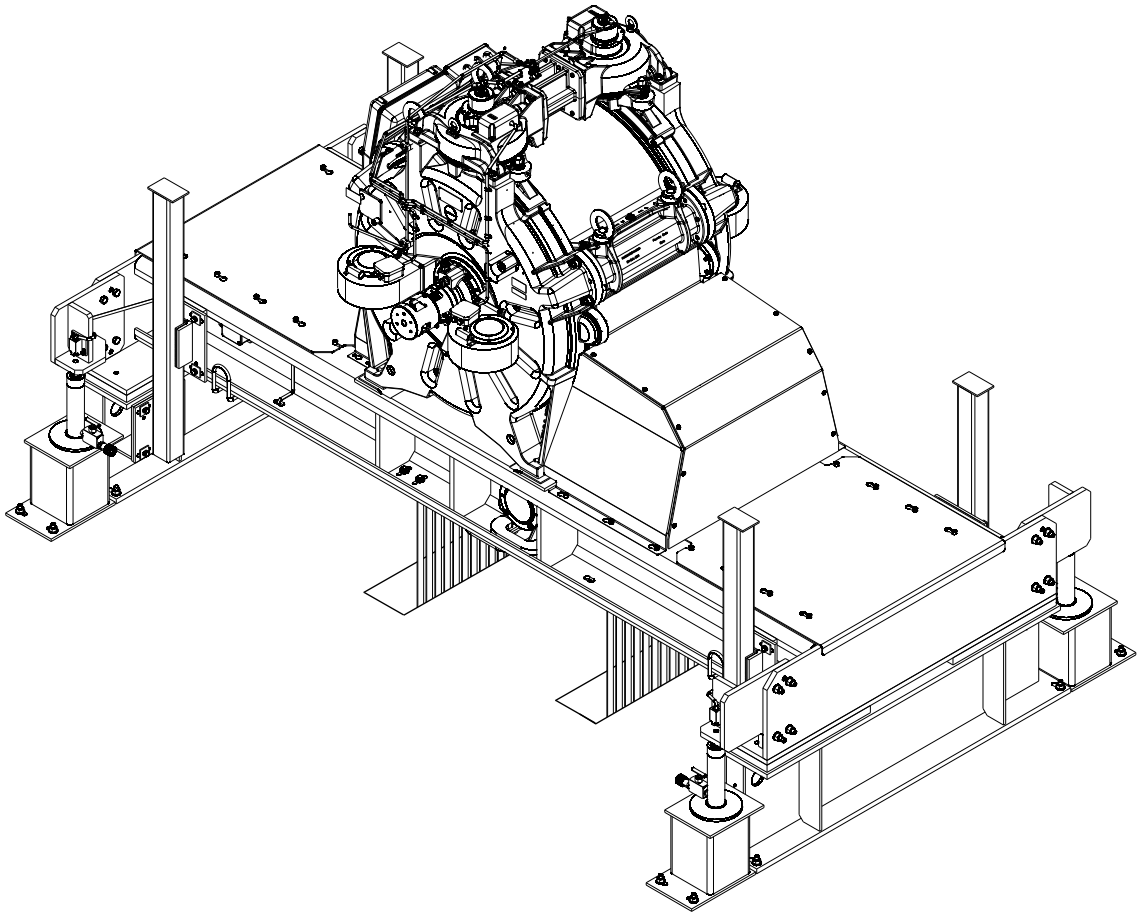

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Figure 2: Optional KONE UltraRope® hoisting machine and bedplate

5.1 Operating principle

Passengers control the movement of the elevator car with the push buttons located in the elevator car and at the landings. The push buttons are connected to the elevator control system which is the "intelligence" of the elevator.

When the control system registers a call given by a passenger, the car moves to the required direction.

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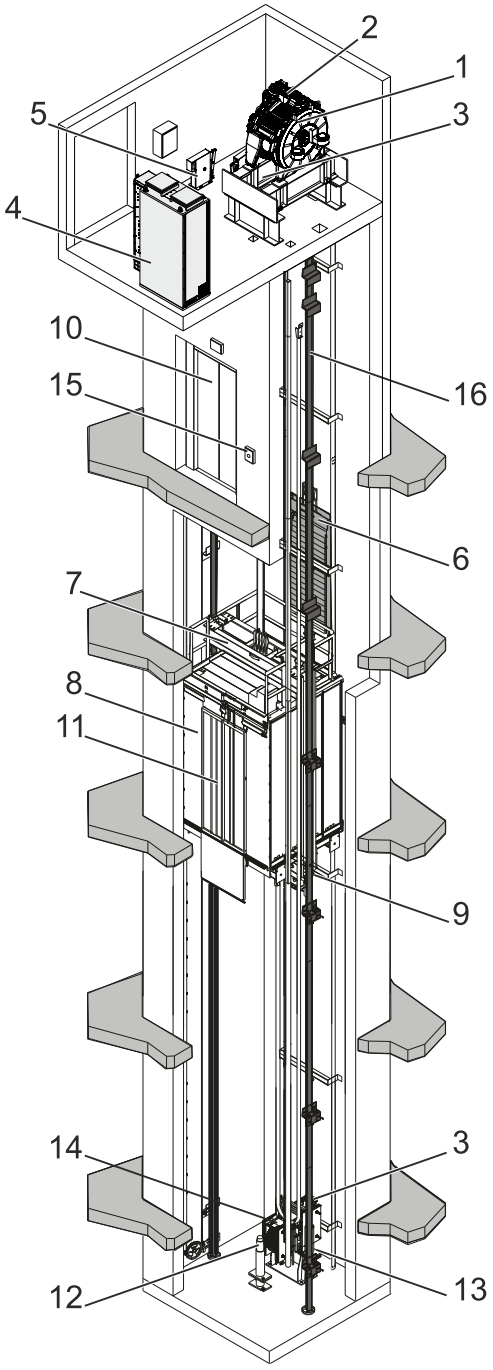
5.2 Components



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1	Machine
2	Brakes
3	Rope alignment detector (RAD) (KONE UltraRope® only)
4	Control cabinet
5	Overspeed governor
6	Counterweight

7	Rope condition monitoring (LCECMD) (KONE UltraRope® only)
8	Elevator car
9	Safety gear
10	Landing doors
11	Car door
12	Car buffer
13	Counterweight buffer
14	Compensator
15	Signalization
16	Guide rails

Figure 3: KONE MiniSpace™ (including KONE UltraRope®), suspension ropes not shown

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5.2.1 Hoisting machine

The machine is a gearless synchronous machine driven by a variable frequency drive.

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5.2.2 Brakes

The brakes are electromechanical devices that prevent the elevator car from moving when the car is at rest or power is cut OFF to the machine.

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5.2.3 Control cabinet

The control cabinet is located in the machine room. It contains the elevator emergency drive buttons and the car light supply switch.

NOTE: Do not block the entrance to the machine room. The control cabinet is needed in rescue and maintenance operations.

WARNING: Never leave the machine room door unlocked or open while it is unattended. This provides unauthorized persons access to the elevator controls and may cause danger.

WARNING: Never remove the shields from the electrical system while the system is energized. The elevator's electrical systems are behind the shield and there is a risk of an electric shock if the shield is removed.

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5.2.4 Suspension ropes

The ropes provide the suspension connecting the elevator car to the machine traction sheave, pulleys and counterweight. The ropes are capable of supporting the elevator with a safety factor according to the elevator standards (typically > 10).

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5.2.5 Overspeed governor

The overspeed governor's function is to stop the elevator using the safety gear, and assisted by the machine brakes. The overspeed governor switch activates if the elevator car exceeds its rated speed and cuts the safety circuit thus closing the machine brakes. If the car continues to move downwards, the overspeed governor brakes the governor rope, which is attached to the safety gear. The safety gear engages and the elevator car stops. The overspeed governor is a mechanical device that is fully functional even during power failures.

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5.2.6 Safety gear

The safety gear is a mechanical safety device attached to the frame of the elevator car. When the elevator car exceeds its rated speed downward and the overspeed governor pulls the governor rope, the safety gear firmly grips the guide rails and stops the elevator car.

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5.2.7 Elevator car

The elevator car is an enclosure for passengers so that they can be transported safely from floor to floor.

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5.2.8 Landing and car doors

Doors are fixed to each landing and on the elevator car to protect users from injury during operation of the elevator. Electrical contacts in the door prevent the elevator from moving if the doors are not fully closed. Landing doors are fitted with a special lock that keeps the doors closed and locked if the elevator car is not level at that landing floor.

Preventing the landing door opening by accident is necessary to prevent people from falling into the elevator shaft.

All automatic doors have a closing force limiter, which prevents people being crushed.

If the construction of the door panels is to be changed, check with KONE that the changes are allowed and do not harm the functioning of doors.

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5.2.9 Signalization

The KONE Signalization System is the elevator's user interface. With operating panels and displays it informs the passengers of the elevator's position, allows them to call the elevator and set the destination floor. The KONE Signalization System transfers these messages through the elevator network to the control unit, which drives the elevator according to user commands. If KONE Remote Monitoring Services™ is used, the signalization system also operates as a voice connection between the elevator and the service company, allowing trapped passengers to talk to the service company.

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5.2.10 Guide rails

The guide rails are steel rails that guide the elevator car through the elevator shaft. Guide rails are attached vertically to the shaft structure.

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5.2.11 Buffers

The buffers stop the elevator car if it descends beyond its normal limit of travel. Because of the buffers, the car does not hit the pit floor or shaft ceiling under any circumstances.

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6 USING YOUR ELEVATOR

6.1 Dos and don'ts

The following table describes the best practices in the care and use of your elevator.

Table 7: Dos and don'ts

Dos	Don'ts
Comply with the stated number of persons/ weight for the elevator.	Do not press any of the elevator car buttons other than the level you require.
Give priority to disabled and elderly passengers.	Do not hold the elevator doors open, as doing so delays elevator service.
Remember the elevator etiquette "last in, first out."	Do not try to enter the elevator if the elevator doors are closing.
Instruct children thoroughly on the use of elevators. Children playing with elevators can cause dangerous situations.	Do not sweep rubbish or water into the elevator shaft.
Beware of closing doors. The force of closing doors is controlled but may in some cases be hazardous, especially for children and elderly people.	
Make sure that domestic animals are kept on a sufficiently short leash. Dangerous situations may occur should animals run out of the elevator as the elevator doors are closing.	

WARNING: Do not stand too close to the elevator doors. Clothing or fingers may get caught between moving door panels or between landing door panel and frame.

6.2 Transporting heavy loads

NOTE: Vehicles with small wheels may get stuck between the car and landing sills. Heavy loads on small wheels can exert enough pressure to damage the sills. Do not transport heavy loads over the elevator doorstep with wheeled vehicles. Use vehicles with large wheels.

WARNING: If you are temporarily transporting freight in the elevator, observe the following considerations:

– The weight is evenly distributed over the elevator floor

– The freight is fixed and will not move freely

– The elevator is not overloaded, as this may cause damage to the elevator equipment and danger to the passengers and persons near the elevator

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6.3 Events requiring the intervention of a competent person

The intervention of a competent person is required in the following situations:

– If the elevator does not move
– If the car lighting has failed
– If abnormal noise is heard from the elevator shaft
– If the doors do not close
– If the elevator has stopped and the doors do not open
– If an alarm has been notified and there is somebody in the elevator

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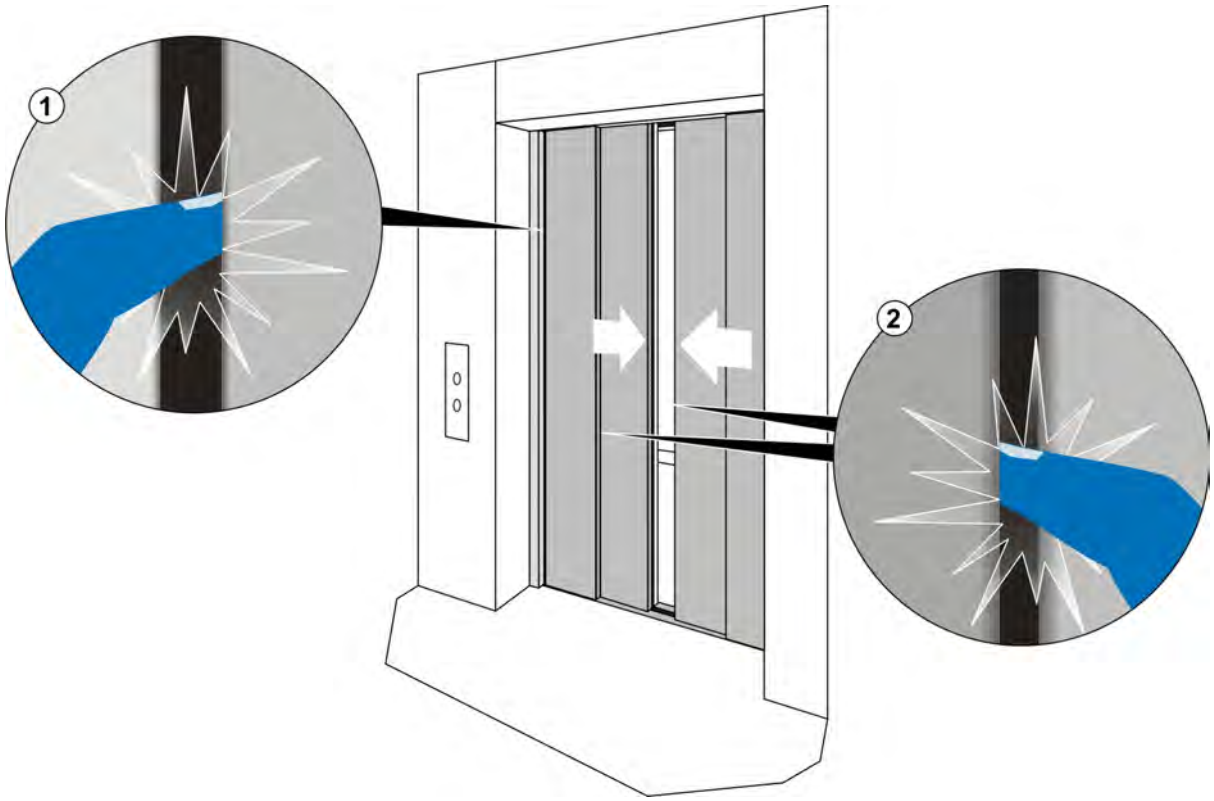
WARNING: Danger of severe accident. You must not start any rescue operation yourself unless you are trained for this task.

Related information

– Maintenance by competent maintenance person (36)
– Maintenance (32)

6.4 Door panel clearance

In a new elevator, clearance between the door panel and the wall must be 6 mm. With use, the clearance is allowed to expand to 8 mm. If the clearance is greater than 8 mm, door panels must be readjusted.



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1	Fingers or clothing may get caught between the door and the wall
2	Fingers or clothing may get caught between the doors

Figure 4: Door panel risk areas

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6.5 Optional features and components

Your elevator can be equipped with optional features or components.

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6.5.1 Elevators for persons with disabilities (EN 81-70)

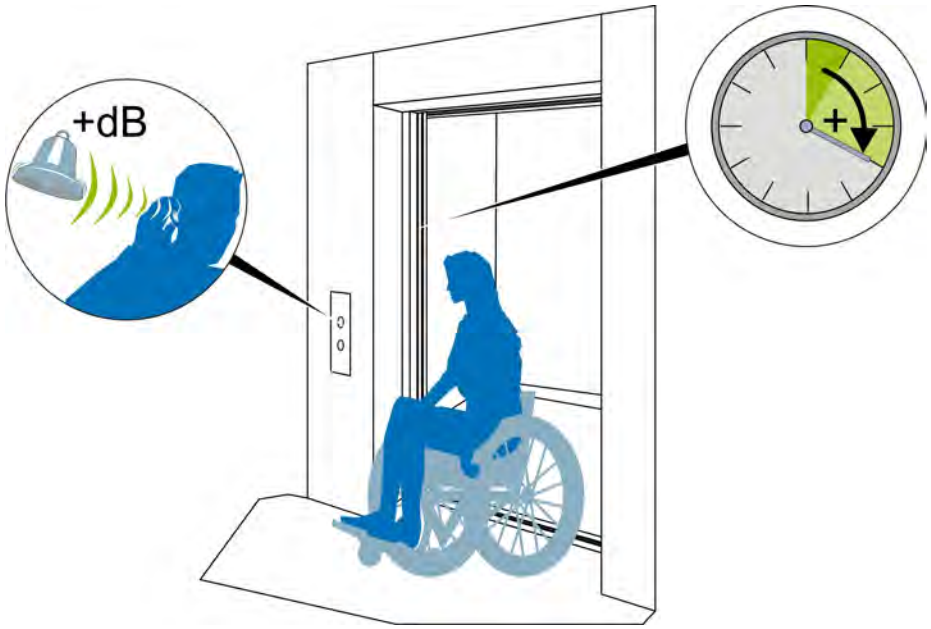

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Figure 5: Elevator features for the disabled

Accessibility features are an investment in building value. KONE provides elevators to comply with EN 81-70 when specified in the order. The owner must ensure that:

- There is safe and unobstructed access to the elevator and its control devices on landing. This is especially important for people using, for example, wheelchairs or roller frames.
- The door dwell time is sufficient for persons with disabilities. The initial setting with KONE elevator doors is 5 seconds, but this is adjustable to between 2 and 20 seconds. If the dwell time setting is not suitable or the passengers' needs change, for example, due to people getting older, the elevator owner must ask the elevator maintenance company to readjust the setting.
- The noise level of audible signals for call buttons in the car and at the landing is sufficient for people with impaired hearing. If the audible signal level is not sufficient, the elevator maintenance company can readjust them on request. Audible signals are adjustable between 35 and 65 dB(A). The background noise in the building may require an increase in the noise level of audible signals.
- Instructions for passengers on how to use specific control devices of the elevator, for example, accessibility button or destination control are available.
- Authorized persons to rescue trapped passengers are instructed to react immediately on signals from the emergency alarm device even when no response is given by the person in the car, as the person may have impaired hearing or speech. Rescue operations are otherwise performed as instructed in this document.

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6.5.2 Elevator behavior in the event of fire according to EN 81-73

The EN 81-73 option, behaviour of an elevator in the event of fire, is targeted at elevators which are not intended for fire fighting or evacuation. If this option is provided, a "No entry" indication light is installed above the landing call buttons.

A specific pictogram, “Do not use elevator in event of fire”, is installed near the landing call station.

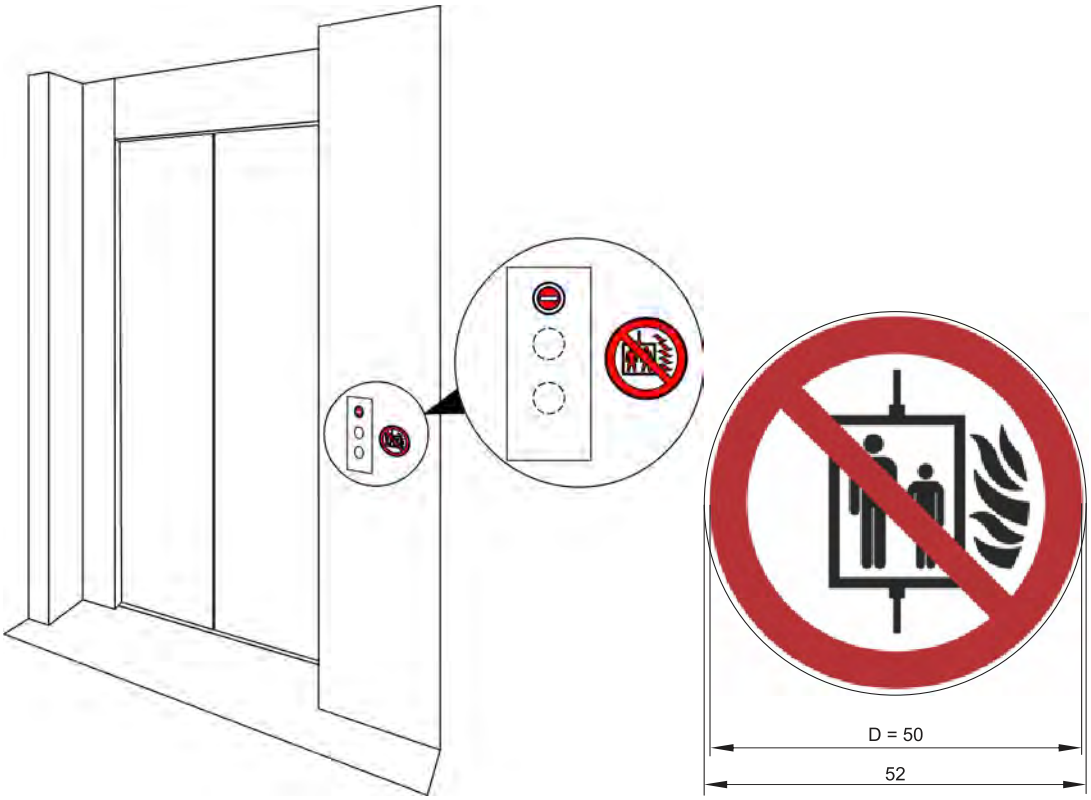


Figure 6: Elevator "No entry" indicators

The “No entry" indication light[2)] works in combination with the fire detection device. When the sensor detects a fire, the elevator returns to the evacuation floor to let passengers out. The elevator cannot be used after this. At the landing, there is a lighting message that the elevator is out of service due to fire.

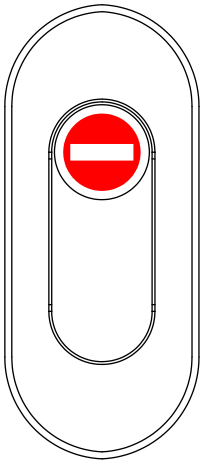


Figure 7: “No entry" indication light (EN 81-73:2005)

If there is no fire detection sensor, a manual switch at the evacuation floor will allow the fire fighters to ensure that no persons are trapped in the elevator.

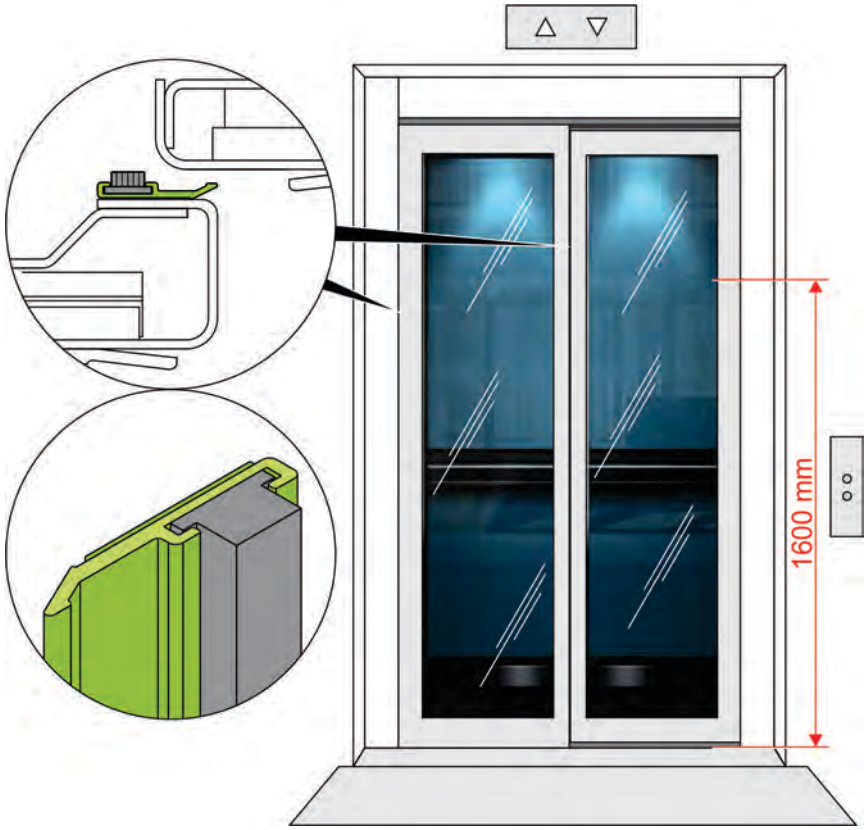
2) The “No entry" indication light is only valid with EN 81-73:2005. With EN 81-73:2016, the indication light is not mandatory.

It is the responsibility of the owner to test this function periodically.

X0000090524 D.3

6.5.3 Glass door panels

If the lower edge of the glass section on the door panel is situated lower than 1600 mm from finished floor level, a protection trim must be placed between the panel and the wall. Protection trim must not be removed, and must be replaced if broken.



X000030144

Figure 8: Critical protection area

X0000090473 B.2

X0000087672 C.2

7 MAINTENANCE

The elevator must be maintained by a competent maintenance company. The safety components must be maintained with special care, so all safety equipment is operational always.

NOTE: If you detect any abnormal behavior in any of the components of your elevator, contact your maintenance company immediately. Place out-of-order signs to landings to prevent using the elevator.

Related information

– Responsibilities and qualifications (15)
– Using your elevator (26)
– Safety component maintenance (53)
– Maintenance program checklist (36)

7.1 Before you contact KONE - maintenance by owner

Although most of the maintenance performed on elevator equipment must be left to your maintenance company, there are a few tasks you can carry out yourself. By carrying out these tasks, you retain the value of your elevator, and ensure a more comfortable and safe ride for elevator users.

Consult your local KONE representative concerning what is and what is not covered under the maintenance agreement. It is important that you understand what maintenance you must perform between service calls.

To prevent unnecessary service calls, check the following items before contacting KONE:

– Check that your building has power from the external power grid.
– Check for broken light bulbs or LEDs inside the elevator car, and replace accordingly if possible.
– Check that all key operated switches are in normal operating or RUN position.
– Check for blown fuses or tripped circuit breakers of the building power supply.
– Check that elevator car is cleaned regularly.
– Check that there is no debris in landing door sills and elevator car door sills, both are recommended to be cleaned regularly, as debris can prevent the doors from operating properly.

When you contact KONE for maintenance, provide the following information:

– Building address
– Elevator number
– Description of the problem

  Be as accurate and detailed as possible.

7.1.1 Changing tenant directory information sheet

Your elevator can be equipped with a tenant directory that contains the house tenant information. You can change the ordinary paper used as the information sheet yourself.

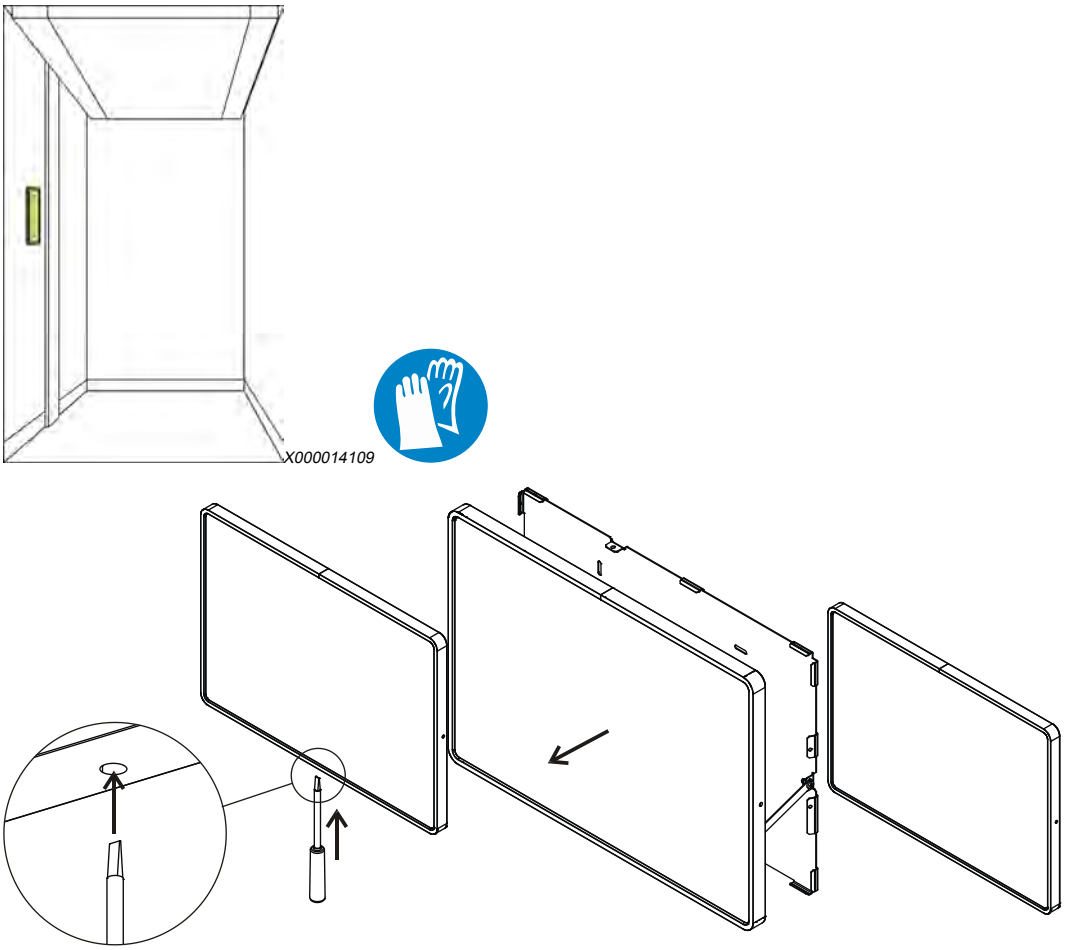


Figure 9: Tenant directory (TD1 and TD2)

1. Release the frame fixing with a screwdriver.
2. Pull the frame to access the information sheet.
3. Replace the information sheet.
4. Push the frame to lock it back in place.

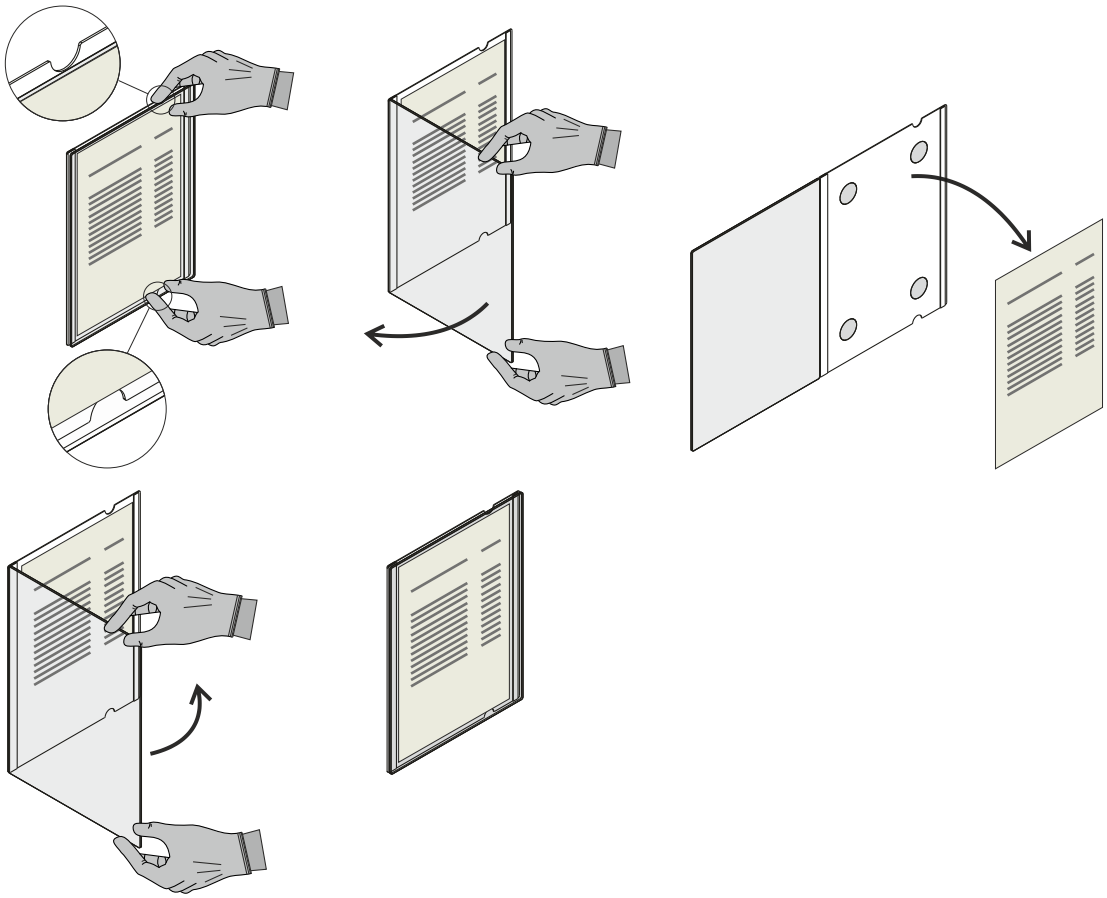


Figure 10: Tenant directory information sheet (TD3 and TD4)

7.1.2 Changing elevator lighting elements

You can change the elevator lighting elements with the help of your building maintenance personnel. For more information, contact your KONE service office.

7.1.3 Interfaces

Certain interfaces between the elevator and the building are crucial to the safe and correct functioning of the elevator. Interfaces include ventilation, electricity supplies and telephone lines. If any interfaces appear to be functioning incorrectly or not at all, they must be repaired immediately. If they cannot be repaired without undue delay, the elevator must be taken out of service or the safety of passengers cannot be guaranteed.

7.1.4 Ventilation

The purpose of the ventilation system is to keep the temperature and humidity within the originally specified values both in the elevator shaft and the elevator car. If the ventilation does not operate, temperature and humidity can exceed the allowed maximum values, harming the elevator and making the elevator ride an unpleasant experience. Humidity and temperature must be kept at the levels specified in original delivery documents.

7.1.5 Telephone lines

Telephone lines may have been connected to your elevator to enable a 24-hour connection between the elevator and the service office or, for example, building caretaker. To ensure the safety of your elevator users, the building owner must make sure that this line is always functional, including for at least one hour during a power failure in the building.

7.1.6 Electricity

The elevator requires electricity to function. The voltage must be kept within tolerances specified in the original delivery documents. To keep the elevator functional, it is imperative that you ensure a constant supply of electricity and that the supplied voltage complies with the original delivery documents.

X0000087702 C.4

7.2 Preventive maintenance

Preventive maintenance is crucial to maintain the safety of the elevator. Regular checks of your elevator's safety equipment help to locate defective components before they cause hazards. As the owner of the building you should make sure that your building is safe for persons that need to use it.

A preventive maintenance plan ensures the following:

– Equipment performance and availability
– Consistent high levels of safety for elevator users
– Minimal costs associated with breakdowns
– Value retention of your investment

X0000087737 A.2

X0000087652 E.2

8 MAINTENANCE BY COMPETENT MAINTENANCE PERSON

WARNING: All tasks described in this information are allowed for competent maintenance persons only, unless marked with the words "Maintenance by owner".

Related information

– Responsibilities and qualifications (15)
– Using your elevator (26)

8.1 Maintenance program

The manufacturer provides a maintenance program that must be followed. Do not exceed the recommended intervals given in the maintenance program. Local conditions and application rates may require more frequent maintenance intervals.

NOTE: The frequency of the maintenance program inspections is decided by the manufacturer. The checks are not at fixed intervals.

X0000087736 C.2

8.2 Maintenance program checklist

Table 8: Maintenance items and intervals (in months)

ITEM	INSPEC-TION	ACTIONS TO BE MADE IF NECESSARY		
		LUBRICA-TION	ADJUST-ING	CLEANING
HOISTING MACHINE AND MACHINE ROOM				
Rope guards	24			
Operation of machine stop button	24			
Wear of traction sheave and suspension ropes Wear of diverting pulley crownings[3)]	24		36 (ropes)	x
Machine: Tightness of the fastenings	24		x	
Machine: Function of brake and manual release device	12			
Machine and diverting pulley: Bearings	24			
Machine: Fan	24			
Elevator documents	24			
Rescue tools	24			
Control system: Condition and operation of devices	24		x	x
Control system: Cables and mountings	24			

3) Only with KONE UltraRope®

Table 8 Maintenance items and intervals (in months) (continued)

ITEM	INSPEC-TION	ACTIONS TO BE MADE IF NECESSARY		
		LUBRICA-TION	ADJUST-ING	CLEANING
Control system: Stopping accuracy and relevelling	24		x	
Emergency battery drive EBD (optional)	24			
Rope alignment detector (RAD)[4)]	24			
PIT AND SHAFT EQUIPMENT				
Guide rails and fixings	24			x
Counterweight: terminal check	12		x	
Overspeed governor and rope	12		x	x
Electrical installations and travelling cables	24			
Floor positioning devices	24		x	x
Limit switches	24		x	
Lighting, ventilation and drainage	24			x
Buffers	12		x	
Shaft pit: check that the pit bottom is dry	24			x
OSG tension weights: fixings, operation	12			x
Rescue tools[4)]	24			
Rope alignment detector (RAD)[4)]	24			
Elongation of compensation and suspension ropes, terminal check	12		x	
Terminal thermal insulation[4)]	24			
Wear of compensator diverting pulleys	24			x
Rope compensator: Bearings, lock-downs	24			
SLING, COUNTERWEIGHT AND CAR EQUIPMENT				
Car sling: bolts/joints/	24			
Fixing of car sling, insulators	24			
Guide shoes fixings and conditions, car and CWT	24			x
Anti-jitter blocks[4)]	24			
Function of safety gear, CWT safety gear if provided	12		x	x
Service drive operations	24			
Car roof (outside)	24			x
Electrical installations	24			
Surface of car walls	24			
Car floor, coatings	24			

4) Only with KONE UltraRope®

Table 8 Maintenance items and intervals (in months) (continued)

ITEM	INSPEC-TION	ACTIONS TO BE MADE IF NECESSARY		
		LUBRICA-TION	ADJUST-ING	CLEANING
Car lighting and ventilation and fans	24			x
Safety circuit: mechanical devices	24			x
Safety circuit: electrical devices	24			x
Push buttons and displays	24			
Handrails, mirrors and other car equipment	24			
Car doors: locking and operator	24		x[5)]	x
Door way safety devices: safety edges, curtain of light	24			
FLOOR LEVEL EQUIPMENT				
Push buttons, displays	24			x
Door locks, guide shoes, sills, panels and fixings	24		x[5)]	x
Door operation and equipment	24		x	x
TEST DRIVE				
Operation, noise, ride comfort	24	x	x	x

X0000093737 A.8

8.3 Safety

Table 9: Elevator safety precautions for competent maintenance persons

Safety precautions	Note
Develop and follow procedures that have assimilated the requirements of national elevator safety codes and other safety-related regulations.	If there is conflict between the code and these instructions, carry out a full risk assessment and define an appropriate course of action with the local regulator and company management.
Local safety codes and rules must be followed if they exceed KONE standards. Otherwise use the safe working methods defined in this information.	Refer to your local procedures to take the elevator out of use.
Follow the safe working methods defined in this information. If you are uncertain of the method's safety, seek expert advice.	

5) The lock is not adjustable

Table 9 Elevator safety precautions for competent maintenance persons (continued)

Safety precautions	Note
Follow this instruction. Any deviation creates potentially dangerous situations which you have not considered.	Warning signs highlight possible hazards.  Be sure that you only use maintenance instructions that apply to your elevator configuration. If you are unsure, contact KONE.
ENSURE THAT ELECTRICAL EQUIPMENT AND CONDUCTORS ARE SAFELY DE-ENERGISED BEFORE WORKING ON THEM. A locking off system for the main electric supply isolator or, for example, fuse removal or locking and tagging system when applicable, must be agreed with the person responsible for the building's electrics.	Do not connect or disconnect any connectors when the power is on. 
Personal protection equipment must be available and used as required.	
If there is a risk of injury from a fall, adequate fall prevention system must be in place.	
Handle and dispose of waste materials in accordance with company procedures that have assimilated the local regulations.	
Use safety fences to segregate your work area so that your work does not cause a hazard to others. Keep access ways and fire exits clear.	
To prevent anyone from falling into the elevator pit, always open any landing door as slightly as possible. This prevents anyone accidentally trying to enter the elevator car or open elevator shaft. Use safety fences.	
The keys to the machine room / maintenance access panel and landing doors must be kept in a secure place inaccessible to unauthorized persons. The keys can be given only to competent maintenance persons.	
To avoid unexpected movement of the elevator car, always activate the emergency stop on the elevator car roof, on the machine, and in the elevator pit as applicable. Always secure the elevator car with a car blocking device when working with the brakes. Check and adjust only one brake at a time.	

X0000087701 C.4

Related information

– Prepare equipment and safety (55)

8.3.1 Refuge space

Refuge space is a space above or below the car when the car or counterweight rests on its fully compressed buffer(s). It ensures a safe working area for installation and maintenance.

There is a refuge space label in the shaft pit and in the car top (balustrade). The label shows the person laying on his/her side (height 500 mm), crouching (height 700 or 1000 mm) or standing (height 2000 mm). The label also indicates the maximum number of people refuge space accommodates.

WARNING: There are no other refuge spaces available in the shaft pit or on the car top than what the site-specific refuge labels indicate. The layout of the elevator dictates the available refuge spaces. The refuge spaces are not optional or interchangeable.

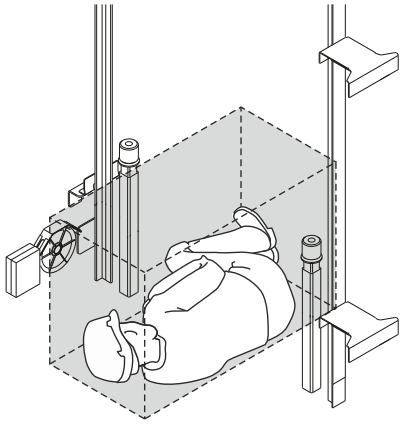


Figure 11: Refuge space in the pit (height 500 mm)

Figure 12: 0.5 m refuge space label in the pit

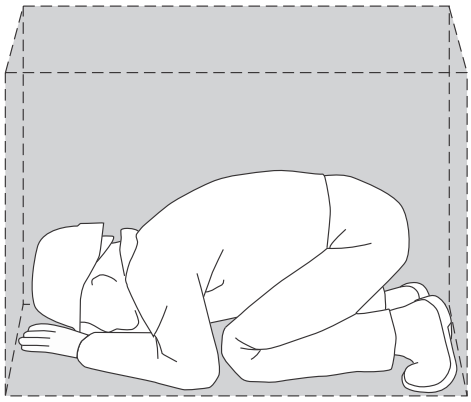
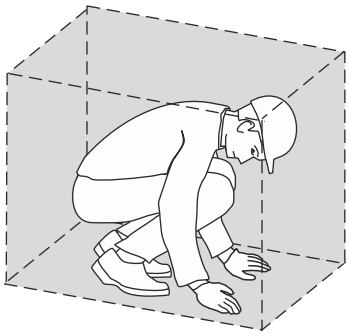


Figure 13: Refuge space in the pit (height 700 mm)

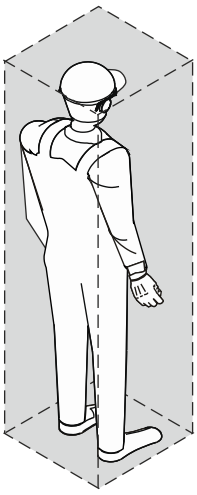
Figure 14: 0.7 m refuge space label in the pit



X0000090918

Figure 15: Refuge space in the pit or headroom (height 1000 mm)

Figure 16: 1 m refuge space label in the pit or headroom



X0000090914

Figure 17: Refuge space in the headroom (height 2000 mm)

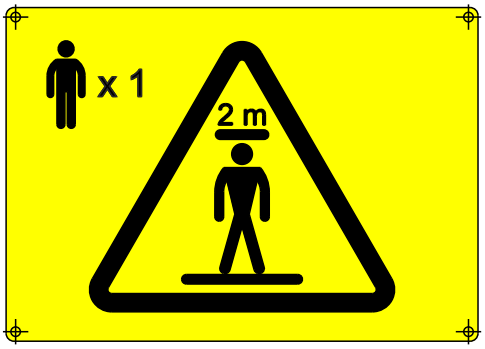


Figure 18: 2 m refuge space label in the headroom

If more persons than what is mentioned in the label are necessary on the car roof or in the pit for carrying out inspection and maintenance work, an additional refuge space shall be provided for each additional person by mechanically preventing the unexpected movement of the elevator car (for example, by parking chains attached to car sling and guide rail brackets).

X0000054133 E.3

8.3.2 Reset inspection control station

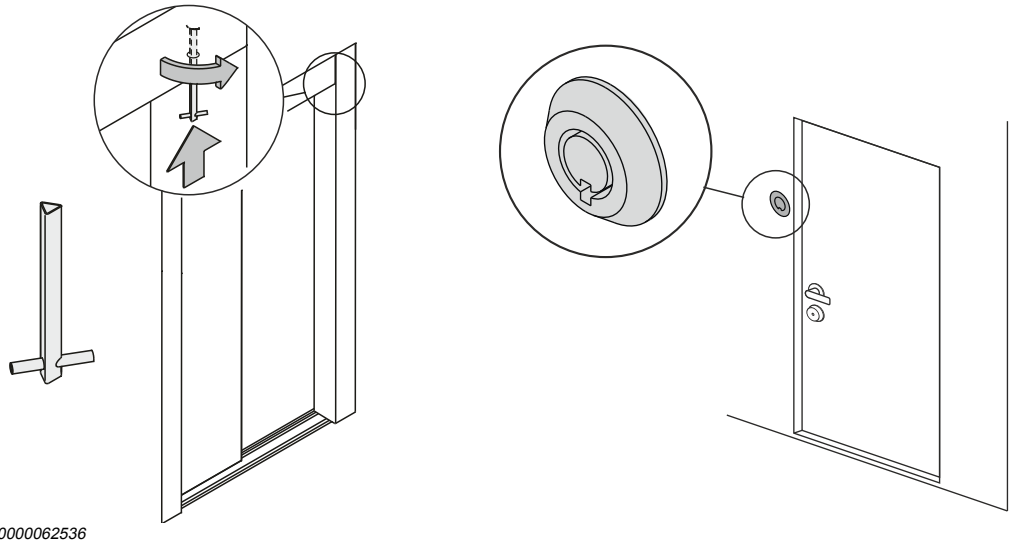
Before this procedure, check that:

- The inspection control station is in the holder.
- Normal drive is on.
- The stop switch is released.
- The pit stop switch is released, if applicable.

– The pit access door is closed, if applicable.

1. Open the bottom landing door lock using emergency door opening key.

   Do not open the door. Release and remove the key.



X0000062536

Figure 19: Emergency opening device in landing door (left), and resetting switch in pit access door (right)

NOTE: If the elevator has a pit access door, close the pit access door. Use the reset switch outside the elevator shaft with a maintenance access panel lock key.

2. Make sure that the landing doors (or pit access door) are mechanically locked.

X0000078783 F.2

8.3.3 Sway detector operation modes

8.3.3.1 High wind operation (Mode 1)

RES E option reduces the elevator speed into half of rated speed when activated by an external voltage free contact. This kind of option is needed on the high rise buildings when the elevator having travel more than 250 meters. The sway detector device has an adjustable timer of 1–99 minutes. So that from the last input came from the device, elevator would be riding 1–99 minutes on low speed to prevent back and forth type of change of elevator speed if the external conditions change rapidly. During this half speed mode when the car is NOT serving, the elevator is parked immediately to the designated RES E floor.

Purpose of RES E parking is to keep car on such position in the elevator shaft when the elevator not serving so that both car and counterweight are positioned on the non-resonant floors.

When RES E is not active (no signal and timer 1–99 minutes gone from last signal), other "normal" parkings are possible and RES E type parking is not valid.

8.3.3.2 Storm operation (Mode 2)

Car drives reduced speed also in second-level operation. Speed is dropped to half of rated speed when first-level signal goes to on state. The first-level signal is always on when the second-level signal comes.

When activated, the second-level signal generated by an external device through an external voltage free contact, the elevator serves existing car calls and cancel given landing calls and do not accept new car/landing calls. After car calls are served, the elevator is parked immediately to the designated RES E floor. The sway detector device having adjustable timer 1–99 minutes keeps the car parked at the designated RES E floor. When timer setup time has elapsed and no second-level signal exists, then other "normal" parkings are possible and RES E type parking is not valid, then the elevator starts to serve the new landing and car calls. If first-level signal exists, then the elevator operates as described high wind operation.

Timers, RES E floor, first and second-level limits must be site adjustable. Every new pulse resets the sway detector device timer counter. Separate timer counters are available for both modes. Elevator controller registers failure to log. Separate failure identification of high wind mode and storm operation.

X0000097341 B.2

Related information

– Test sway detector (119)

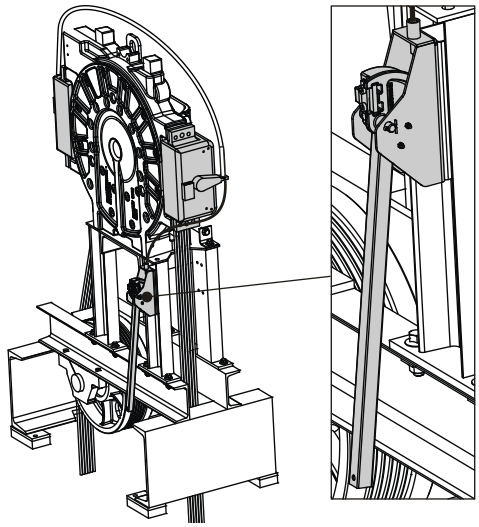
8.3.3 Open NMX11 machine brake manually

Before this procedure, check that you have performed all safety measures related to the task that you are performing. Make sure that car is empty and there is nobody in the elevator shaft.

The operating lever of the brake is located to either side of the machine bed plate.

1. Pull the lever carefully to brake open position.

   The car must move and stop immediately when the lever is released.



X000029787

WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.

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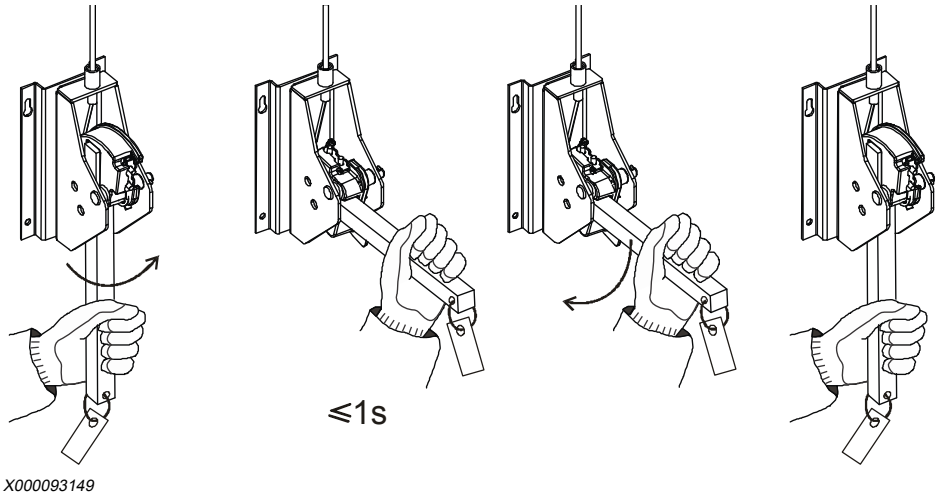
2. When the traction sheave starts to move, stop it by letting the brakes close every 0.5 – 1.0 second to prevent the elevator from accelerating to overspeed.



X000093149

X0000072561 E.2

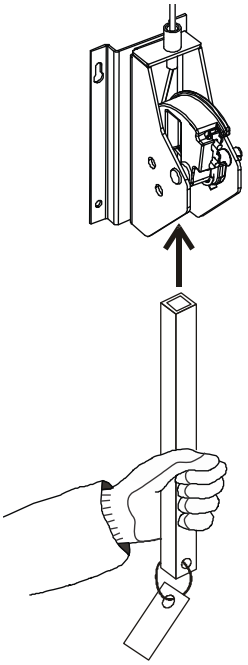
Related information

– *Safety (38)*
– *Prepare equipment and safety (55)*
– *Take elevator out of use (87)*

8.3.4 Open MX14 machine brake manually

Before this procedure, check that you have performed all safety measures related to the task that you are performing. Make sure that the car is empty and there is nobody in the elevator shaft.

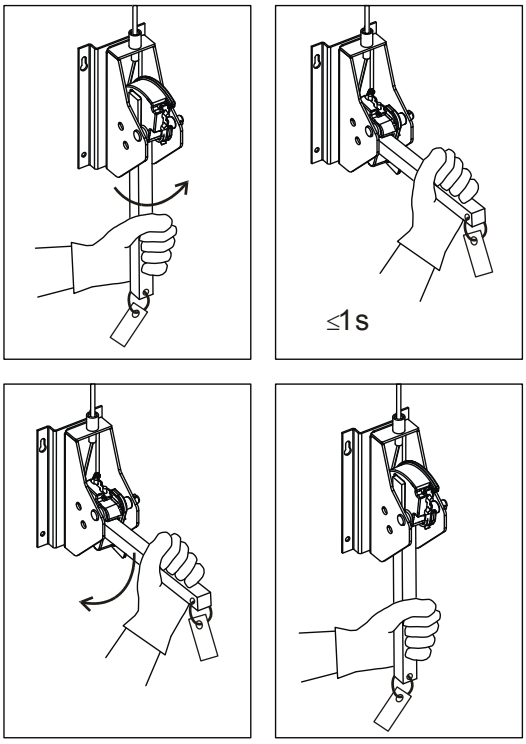
1. Install the lever to the manual brake releasing device.



X000093148

2. Pull the brake release lever to release the brakes.

   Keep the brakes open max. 1 second and then release the lever to close the brakes.

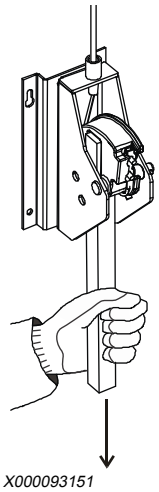


X000018515

WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.

---

3. Remove the brake release lever.



X000093151

4. Store the brake release lever inside the maintenance access panel or in the channel at the bed plate.

X0000088461 E.2

Related information

– Safety (38)
– Prepare equipment and safety (55)
– Take elevator out of use (87)

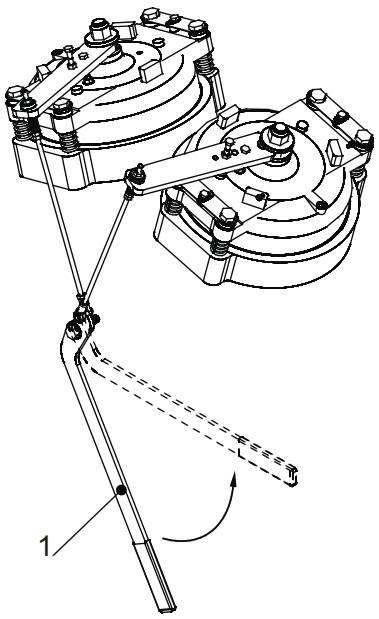
8.3.5 Open MX18 or NMX18 machine brake manually

Before this procedure, check that you have performed all safety measures related to the task that you are performing. Make sure that the car is empty and there is nobody in the elevator shaft

1. Open the machine brake carefully by pulling the brake opening lever (1).

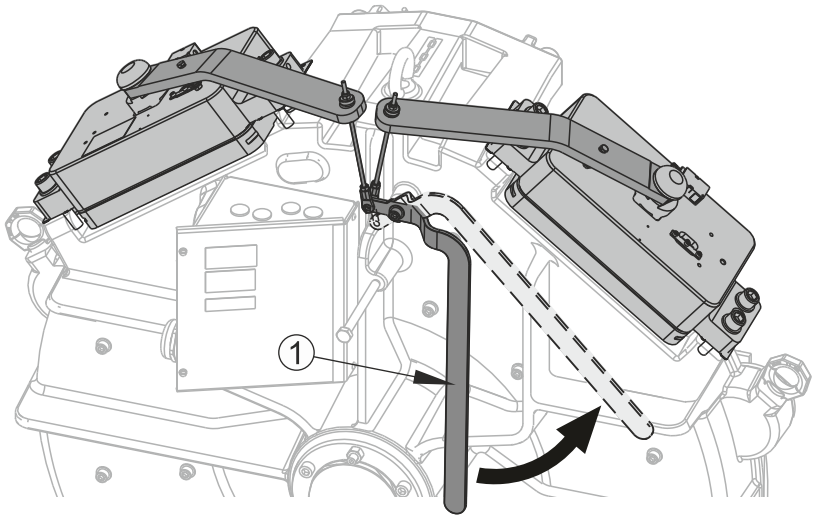
   The brake stays open as long as the lever is in up position.

WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.



X000029786

Figure 20: MX18



X0000091949

Figure 21: NMX18

2. Observe the traction sheave movement. Stop the movement by closing the brake after every 0.5 – 1.0 seconds.

   This is to prevent the car overspeeding.

X0000072511 E.2

Related information

– Safety (38)
– Prepare equipment and safety (55)
– Take elevator out of use (87)

8.3.6 Open MX32/MX40/MX100 machine brake manually

Before this procedure, check that you have performed all safety measures related to the task that you are performing. Make sure that elevator car is empty and there is nobody in the elevator shaft.

X0000316629 A.3

Related information

– Safety (38)
– Prepare equipment and safety (55)
– Take elevator out of use (87)

8.3.6.1 Hydraulic hand pump

The brakes can be opened manually by using the hydraulic hand pump.

The pump handle must be pumped several times (20-30 times) before full pressure is reached.

To get and hold the pressure in the system, the flow control button must be pressed.

The pressure valve is pre-adjusted and **must not** be adjusted at site.

X0000274068 A.2

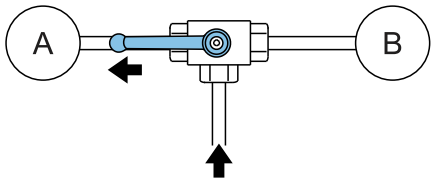
8.3.6.2 Use hand pump without flow control valve

WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.

Opening the brake.

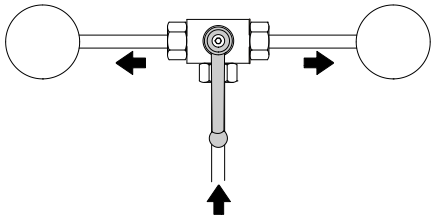
1. Turn the 3-way valve handle towards the brake to be opened.

   When the 3-way valve is in the middle position, both brakes open.



X0000274271

Figure 22: Opening brake A

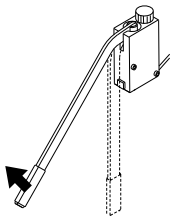


X000029898

Figure 23: Opening both brakes

2. Pump up pressure in the system.
3. Open the brake by holding the hand pump lever in upper position.

   The brake stays open as long as the hand pump lever is in upper position.



X0000282581

Closing the brake.

4. Release the hand pump lever to down position.
5. Turn the 3-way valve handle to middle position.

X0000282504 B.2

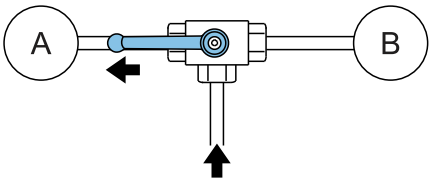
8.3.6.3 Use hand pump with one flow control valve

WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.

Opening the brake.

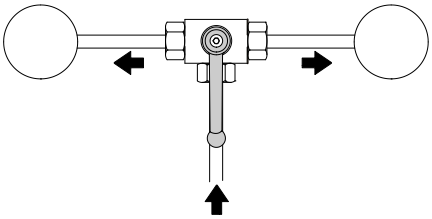
1. Turn the 3-way valve handle towards the brake to be opened.

   When the 3-way valve is in the middle position, both brakes open.



X0000274271

Figure 24: Opening brake A

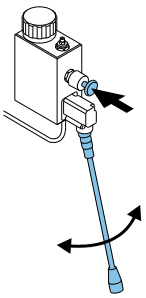


X000029898

Figure 25: Opening both brakes

2. Press the flow control valve and open the brake using the pump handle.

   The brake stays open as long as the control valve is pressed.



X0000282200

Closing the brake.

3. Release the flow control valve.
4. Turn the 3-way valve handle to middle position.

X0000282183 B.2

8.3.6.4 Use hand pump with two flow control valves

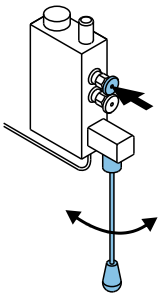
WARNING: Observe the traction sheave movement. The speed can increase fast, when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed.

Opening the brake.

1. Press the flow control valve of the brake to be opened and open the brake using the pump handle.

   If you press both flow control valves, both brakes open.

   The brake stays open as long as the control valve is pressed.



X0000282212

Closing the brake.

2. Release the flow control valve.

X0000282184 B.2

X0000228854 B.2

9 SAFETY COMPONENT MAINTENANCE

WARNING: If any of the safety components fails, the elevator must not be put into normal use before it has been repaired and it has passed all the tests.

If you replace a safety component, perform the commissioning tests according to EN 81-1, Annex E or EN 81-20, Annex C (examinations and tests after important modification or accident), depending on the elevator's compliance.

The EC-type examination certificate is valid only if the correct type of components and procedures are used in safety component manufacturing and repair. In order to ensure safety and conformity, it is essential to use original KONE spare parts only.

NOTE: KONE disclaims any liability resulting from possible safety risks or injuries caused by the use of other than KONE original spare parts.

Do not exceed the recommended maintenance intervals, unless otherwise instructed by the manufacturer. Local conditions and application rates may require more frequent maintenance intervals.

CAUTION: After each overspeed governor tripping, check that both safety gear and overspeed governor are operational before putting the elevator in normal service.

9.1 Safety components

The elevator is provided with safety equipment that must be maintained by a qualified maintenance company.

The following components are safety components:

– Machine brakes
– Overspeed governor
– Safety gear
– Doors
– Elevator car and landing door lock
– Buffers
– UCM protection
– Ascending car overspeed protection
– Slowdown monitoring

X0000093718 A.9

9.2 Traceability of safety components

KONE as an economic operator (installer, manufacturer, distributor and importer) keeps a record of suppliers and customers for each installed and replaced safety component. If

needed, this enables finding and organizing an immediate replacement of a faulty safety component in any elevator.

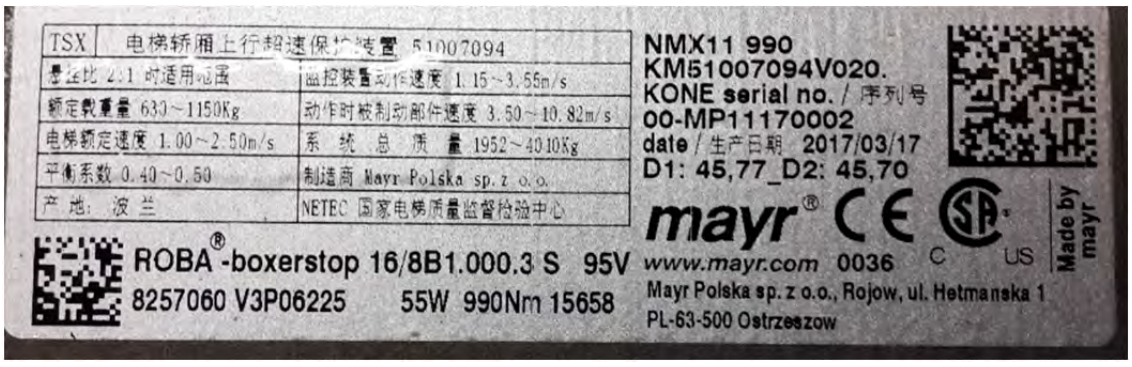
X0000062627 E.1

9.3 Identification of safety components

KONE safety components can be identified as follows:

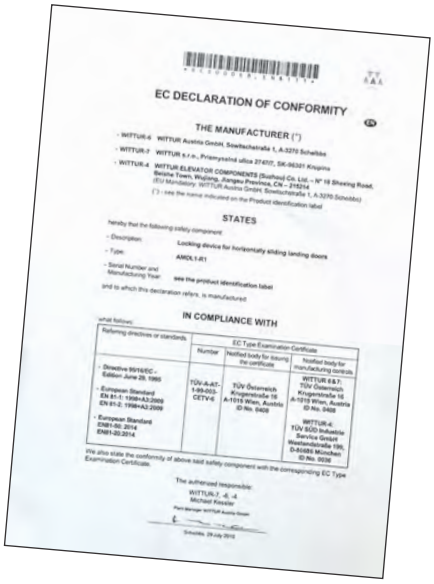
– KONE safety components are marked with a CE marking label and orange labels (or similar).

X0000063505



X0000183831

– Safety components have a declaration of conformity document (available in electronic format and sometimes delivered with the safety component).



EC DECLARATION OF CONFORMITY

THE MANUFACTURER (*)

STATES

IN COMPLIANCE WITH

X0000063517
X0000062626 F.1

9.4 Replacement of safety components

If you replace a safety component, ensure that you follow the local legislation. For example, regulations for the declaration of conformity and CE marking.

X0000062538 A.8

9.5 Prepare equipment and safety

1. Implement all safety measures for elevator maintenance and assimilate local safety regulations into local instructions with due regard to risk.
2. Switch OFF the elevator main switch (unless the check requires to have the main power on).
3. Activate the emergency stop switch in control panel or on machine (if provided) to prevent unexpected movement of the car (unless the check requires to move the car).
4. Lower the counterweight onto the buffer when checking or adjusting the brakes (unless instructed otherwise).

WARNING: Check and adjust only one brake at a time.

WARNING: Use the manual releasing device carefully because the elevator accelerates quickly to a high speed.

NOTE:

– Do not lubricate the overspeed governor, as lubrication reduces the braking force.
– Do not adjust or replace any parts of the overspeed governor.
– After every operation of overspeed governor and safety gear, check that the overspeed governor and safety gear are operational.

X0000093785 B.4

Related information

– Safety (38)

9.6 UCM protection with doors open

The elevator control system detects any unintended car movement (UCM), and stops the car with the machine brakes. The UCM detection is saved in the fault log and resetting can only be performed by a competent person.

To maintain UCM protection, perform the UCM periodical inspection.

X0000090514 B.2

Related information

– Perform unintended car movement test (with 0% load) (102)

9.7 Ascending car overspeed protection

Ascending car overspeed protection stops the elevator car in the event of an overspeed in the up direction. In cooperation with an overspeed governor and automatic one-sided brake test, the ascending car overspeed protection is kept in safe operating condition.

X0000106095 A.2

Related information

– Perform one-sided brake test (KDM drives) (99)
– Perform one-sided brake test (KDH drives with DCBH) (100)
– Test overspeed governor (164)

9.8 Slowdown monitoring

Slowdown monitoring is a safety system that is required by the elevator safety codes when the rated speed of the car or counterweight buffer is lower than the rated speed of the elevator. Slowdown monitoring allows using reduced stroke buffers that enable smaller pit and overhead dimensions compared to full stroke buffers.

Slowdown monitoring is implemented with electric safety device LCEETS or LCEETSL3. LCEETS or LCEETSL3 monitors the elevator's speed at the top and bottom terminal slowdown areas. If the elevator is running inside the terminal slowdown area, and it reaches a pre-defined monitoring point with too high speed, LCETS or LCEETSL3 performs an emergency stop by opening the safety chain of the elevator. This ensures that the elevator car or counterweight does not hit the buffer with higher speed than the rated speed of the buffer.

The higher the rated speed of the elevator is, the bigger the number of required monitoring steps and LCEETS / LCEETSL3 boards is. When more than one board is needed, the boards are connected in series to the safety chain.

The boards are equipped with two channel supervision system and self-diagnostic functionality, which allows maintenance-free operation.

NOTE: Do not adjust LCEETS or LCEETSL3 board settings. The boards have been adjusted during the installation and the slowdown monitoring system has been tested in the safety inspection before the elevator has been taken into use.

X0000106094 A.5

9.9 Hoisting machine brakes

All hoisting machines are equipped with two direct acting drum brakes. The brakes operate independently and must therefore be adjusted separately. The brakes operate only after the machine has stopped, except in an emergency braking situation.

X0000093763 A.3

9.9.1 Checking intervals

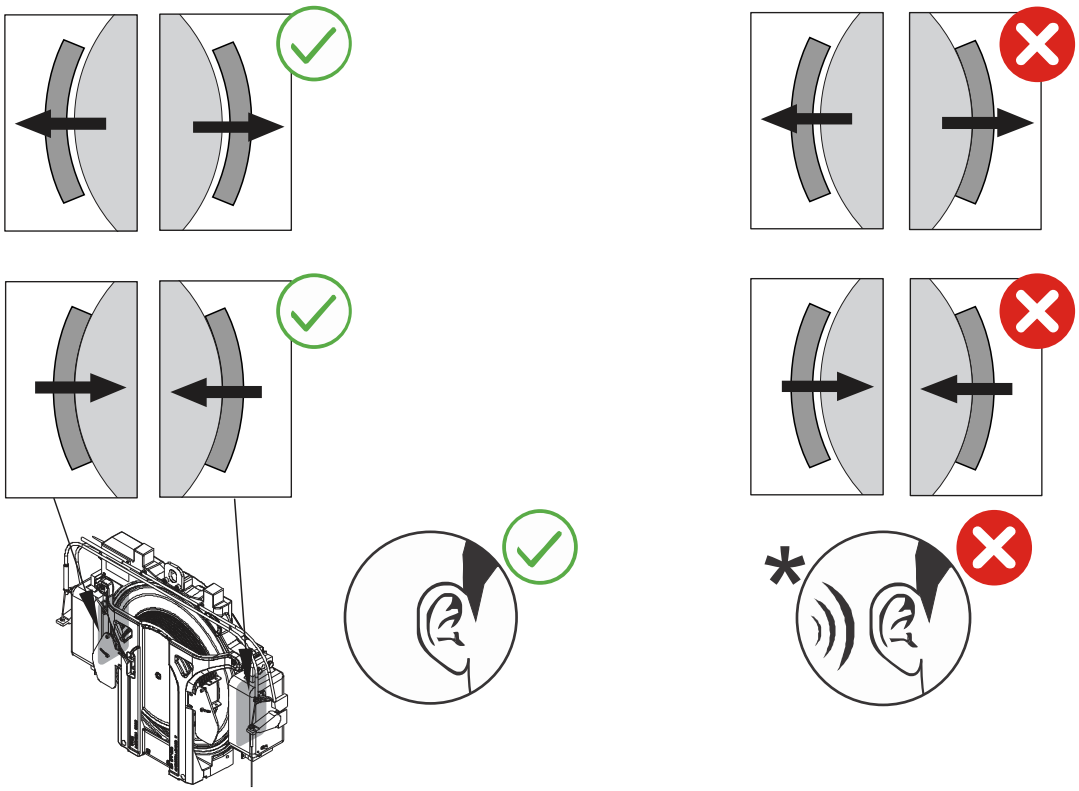
Table 10: Maintenance checking intervals

Check	Interval
Check the air gap between the brake lining and the drum. An excessive "clonking" sound when the brake engages indicates that the air gap is too large.	Once a year
Check the overall cleanness of the machine. Check that the machine is clean of dust.	Once a year
Check the operation of the brake opening device.	Once a year

X0000087824 C.2

9.9.2 Brake operation (condition check)

* = no abnormal noises are allowed

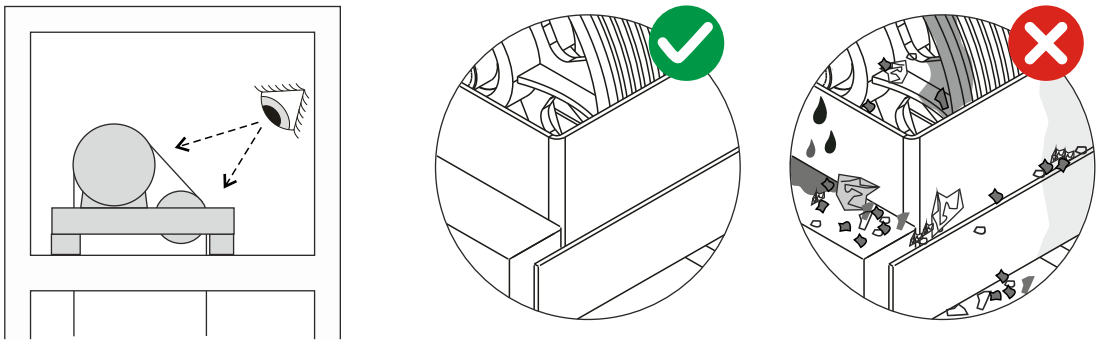


X0000063455
X0000062368 B.2

Related information

– *Prepare equipment and safety (55)*

9.9.3 Machine cleanliness

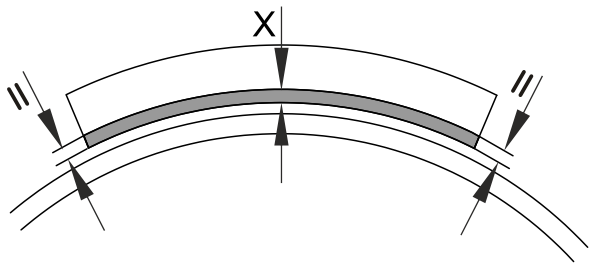


X0000086522
X0000079006 A.3

Related information

– *Prepare equipment and safety (55)*

9.9.4 Brake lining (condition check)



X0000062407

MX18	If X < 4 mm, the brake shoe must be replaced.
MX32	If X ≤ 4 mm, the shim plates must be removed between the brake and the machine. If X ≤ 2 mm, the brake shoe must be replaced.
MX40	If X ≤ 5 mm, the shim plates must be removed between the brake and the machine. If X ≤ 3 mm, the brake shoe must be replaced.
MX100	If X ≤ 5 mm, the brake shoes must be replaced.

X0000056392 C.3

Related information

– *Machine brake adjustment for KONE UltraRope® (64)*
– *Prepare equipment and safety (55)*

9.9.5 Check brake air gap

WARNING: Do not open the brakes with the center nut or by any other means.

---

1. Listen to the sound of the closing brakes in the machine room.

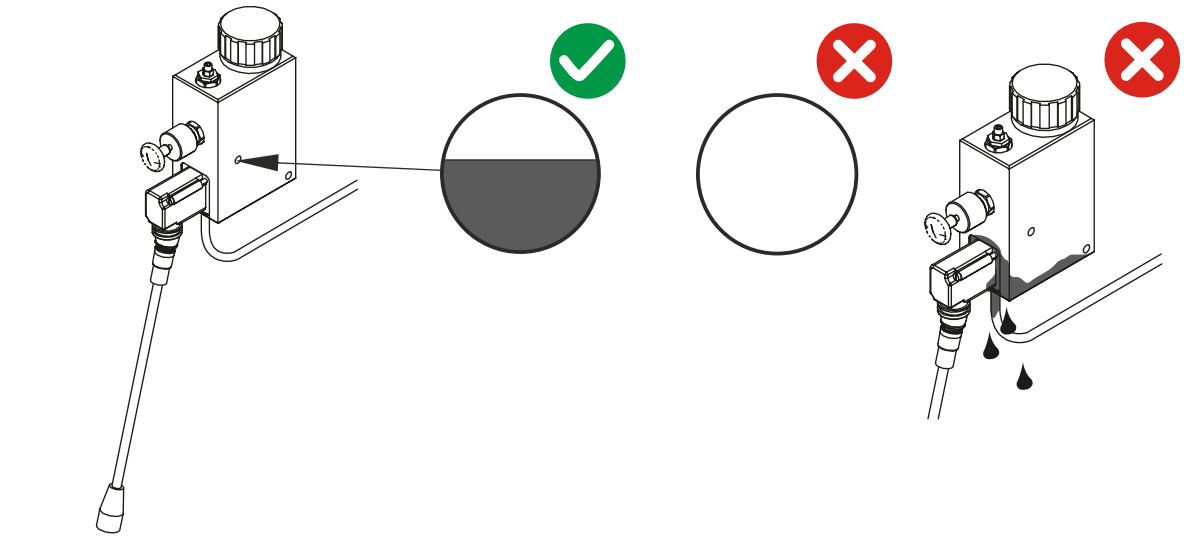
   Excessive noise indicates that the air gap is too large and you must adjust or replace the brakes. Depending on the machine type, adjustment of the air gap is not always possible.

X0000101601 B.2

Related information

– *Prepare equipment and safety (55)*

9.9.6 Oil level of manual brake opening pump (condition check)



X0000062733
X0000056409 A.4

Related information

– *Prepare equipment and safety (55)*

9.9.7 Check manual brake release system and relevelling

Do not keep the brake open for more than 1 second at a time. Be ready to close the brake immediately, when the car starts to move.

1. Release the stop button.
2. Open the brakes manually.

   NOTE: For detailed instructions on how to open the brakes, see the related information.
3. Check the movement of traction pulley and/or suspension ropes.
4. Close the brake.
5. Check that the elevator relevels automatically.

   If the car does not move, check and readjust or repair the manual brake opening system.

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.

X0000062317 D.2

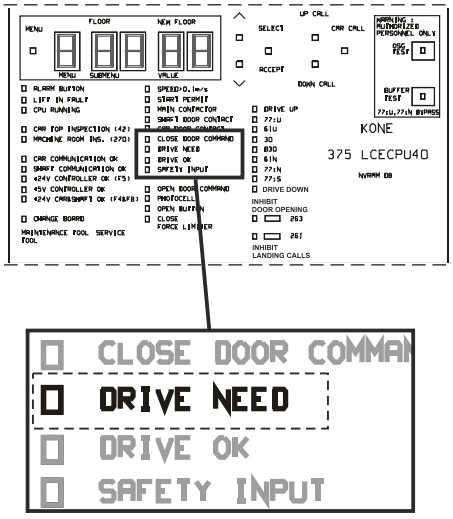
Related information

– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)
– Prepare equipment and safety (55)

9.9.8 Check operation of brake contacts

1. Switch on the Recall Drive Feature (RDF).
2. Drive the elevator downwards on RDF and check that the brake contacts operate properly.

   "Drive need" —LED stays off if the brake contacts are not working properly.



X0000062700

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.

X0000056408 B.2

Related information

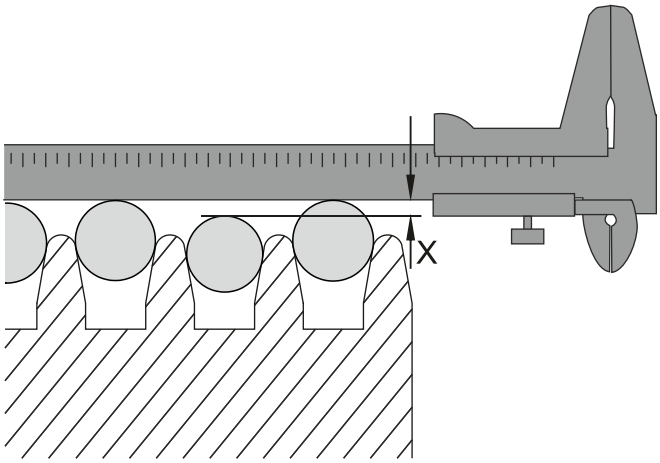
– Prepare equipment and safety (55)

9.9.9 Check steel rope traction sheave

1. Check the cleanliness of the traction sheave.

2. Align a slide gauge horizontally over the ropes. Measure the gap between the slide gauge and each rope with feeler gauge.

   All ropes should sit at the same depth in the rope grooves. Deviation (X) should be 0.2 mm or less.



X000025289

3. If the deviation (X) is more than 0.2 mm, measure the rope diameter.

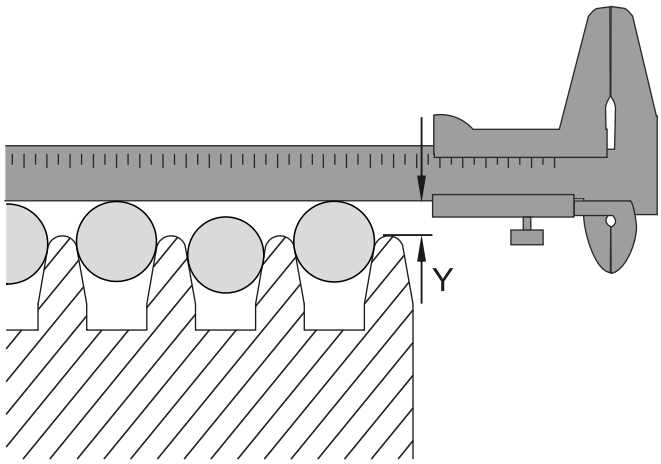
   The rope diameter must not be below the following rejection limits:

Rope nominal diameter [mm]	Rejection limit [mm]
d4	3.85
d6	5.6
d8	7.5
d10	9.4
d13	12.2
d16	15.0
d19	17.8
d22	20.6

   If the deviation is more than 0.2 mm, and the ropes are within specification, the machine must be replaced.

   If the traction sheave is intact, but any of the ropes is below the given limits, all of the ropes must be replaced.

4. Check the gap (Y) between the slide gauge and traction sheave.



X0000062194

Visible rope marks should not exist on the bottom of the grooves.

Rope	Y min [mm]
d8	0.5
d10	0
d13	1.5
d16	2.5
d19	3.5
d22	4

If the rope is so deep in the groove, that the slide gauge touches the traction sheave (Y = 0), and the rope is within specification, the groove is too worn. The machine must be replaced.

5. Check the rope guard fixings by shaking the rope guards manually.

   The rope guards must be in position to stop the ropes from jumping off of the traction sheave.

X0000056386 F.2

Related information

– *Prepare equipment and safety (55)*

9.9.10 Check KONE UltraRope traction sheave

1. Check the cleanliness of the traction sheave.

   Dirt, especially oil or grease (or other substances), are not allowed on sheave.

   NOTE: Rust is not allowed on pulley at rope crowning area.

X0000068830 D.2

Related information

– Prepare equipment and safety (55)

9.9.11 Machine brake adjustment for KONE UltraRope®

Due to the high friction of KONE UltraRope®, measure the elevator deceleration after every brake installation or adjustment. You have the following alternative methods:

– Measure speed with PMT EVA-625 and calculate deceleration.
– Use KDM drive test to measure deceleration.

The target values for deceleration are:

– Minimum deceleration, empty car up at midshaft
  - KDM drive
    - Nominal load 1000 kg ≤ Q ≤ 2000 kg = **1.8 m/s^2**
  - KDH drive
    - Nominal load 1000 kg ≤ Q ≤ 1350 kg = **2.7 m/s^2**
    - Nominal load 1350 kg ≤ Q ≤ 2000 kg = **2.4 m/s^2**
– Maximum deceleration, empty car down at midshaft = **5.5 m/s^2**
– Maximum brakes LM-dimension = **5.3 mm**

If the measured deceleration value is too high, the brake torques must be decreased:

– The LM measurement must be adjusted longer.
– Adjust the torque in steps of 1/2 rounds. Turning KM-nut 1/2 rounds is 1 mm in LM measurement.

If the measured deceleration value is too low, the brake torques must be increased:

– The LM measurement must be adjusted shorter.
– Adjust the torque in steps of 1/2 rounds. Turning KM-nut 1/2 rounds is 1 mm in LM measurement.

Two persons are required to perform this work.

X0000104591 C.2

Related information

– Measure deceleration using EVA (65)
– Adjust brake torque (65)

9.9.12 Measure deceleration using EVA

X0000104598

1. Drive the lift into the middle of the shaft.
   Put EVA measuring device on the car floor.

   Start the device and exit the car.
2. Inhibit landing calls and door opening.
   LCEUI switches 261 and 263.
3. Give a call up and when the car reaches full speed, switch RDF ON.
   Car stops with brakes.
4. Turn RDF OFF and drive the car back to the starting floor.
5. Repeat the test three times.
6. Repeat the same test procedure driving downwards.
7. Calculate the average value for both directions.

X0000104592 B.2

Related information

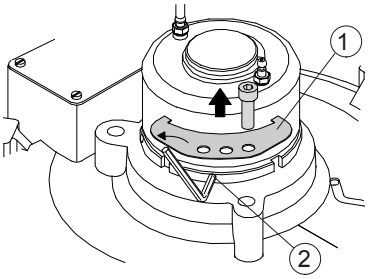
– *Prepare equipment and safety (55)*

9.9.13 Adjust brake torque

This procedure is to be done with the counterweight parked on the buffer (safety reasons).

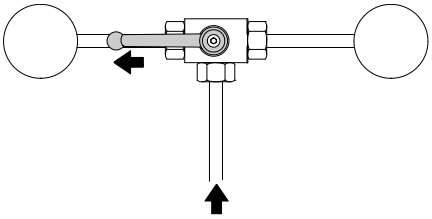
1. Remove the KM-nut lock plate (1).

2. Loosen the three lock screws (2).



X000029895

3. Turn the shut off valve handle in direction to the brake to be adjusted.



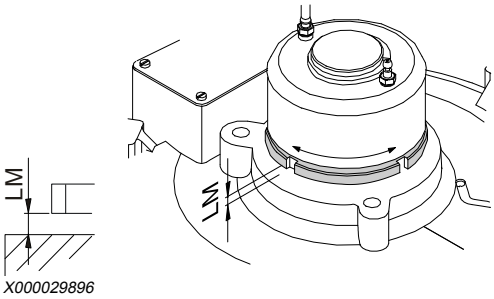
X000018938

4. Open the brake using the hand pump.

   NOTE: When the KM-nut lock screws are loosened, the brake lining may not be lifted up from the drum wheel.

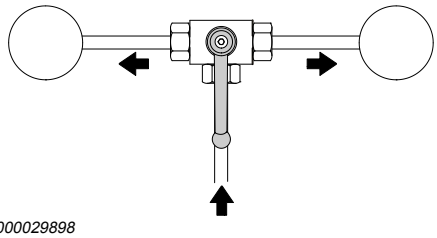
5. Adjust the KM-nut for correct distance LM.

   NOTE: Both brake adjustments must be the same.



X000029896

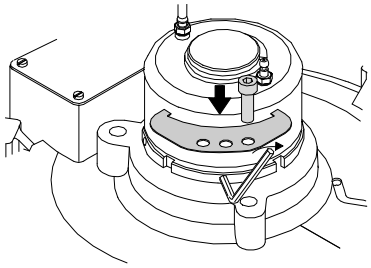
6. Release the hand pump and set the shut off valve handle in open position after finished adjustment.



X000029898

7. Tighten the lock screws.

8. Re-install the lock plate. Note the alternative fixing holes on the lock plate.



X000029899

9. Perform one-sided brake test.

   Do this always after adjustment of the brake torque.

10. Repeat testing and adjusting until the deceleration average values are within the target values.

X0000096744 B.3

Related information

– *Perform one-sided brake test (KDM drives) (99)*
– *Perform one-sided brake test (KDH drives with DCBH) (100)*
– *Prepare equipment and safety (55)*

9.10 Overspeed governor

9.10.1 Checking intervals

Table 11: Maintenance checking intervals

Check	Interval
Cleaning	Once a year or when needed
Condition of the flyweights and the springs	Once a year
Operation of the overspeed contact	Once a year
Operation of the tension weight contact	Once a year
Wear of the rope groove	Once a year

NOTE: If the recommended intervals or checks differ from the ones defined by local codes or regulations, follow the local codes or regulations.

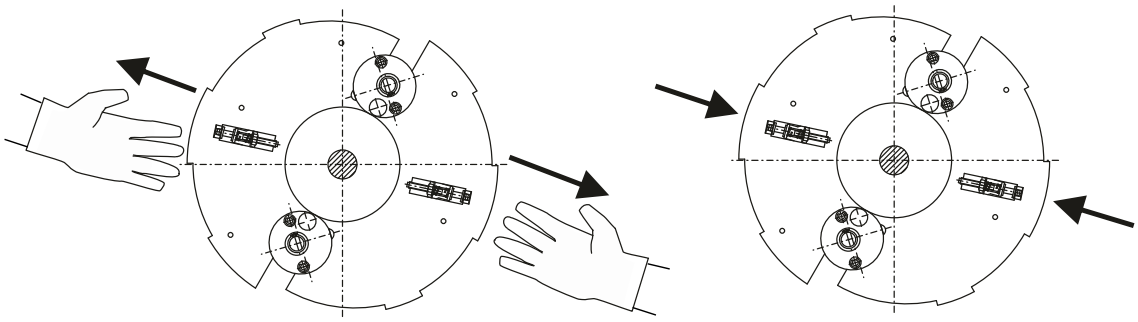
X0000090630 B.2

9.10.2 Check overspeed governor

1. Check the overspeed governor (OSG) mechanism.

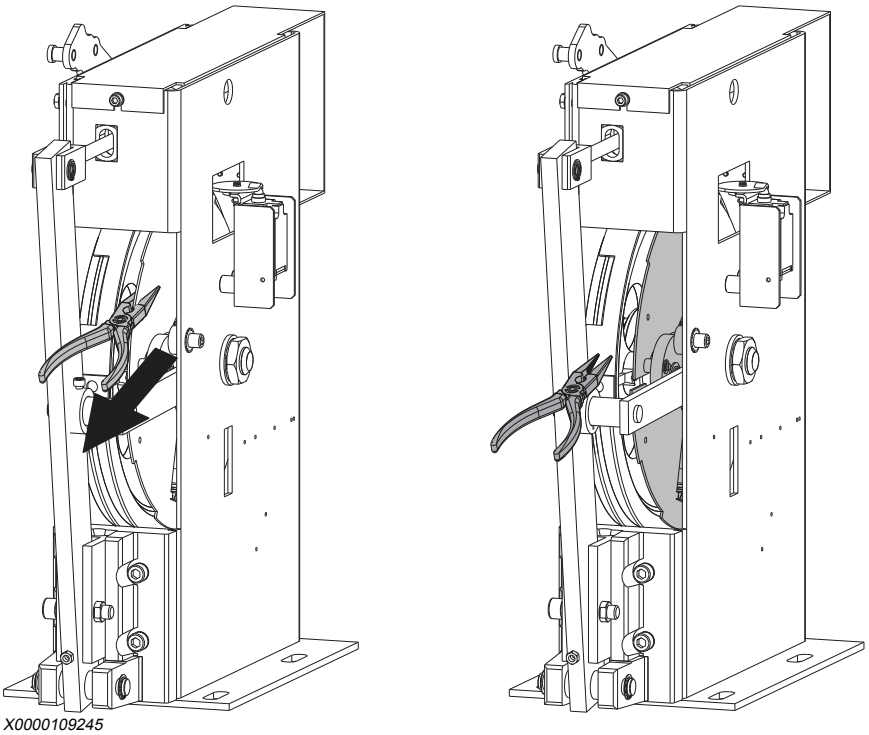
2. Check manually the operation and vertical movement of the flyweights.

   The flyweights must close by themselves, and they MUST return easily without extra friction when you stop pulling them.



X0000054893

Figure 26: OL35



X0000109245

Figure 27: OL100 and OL150

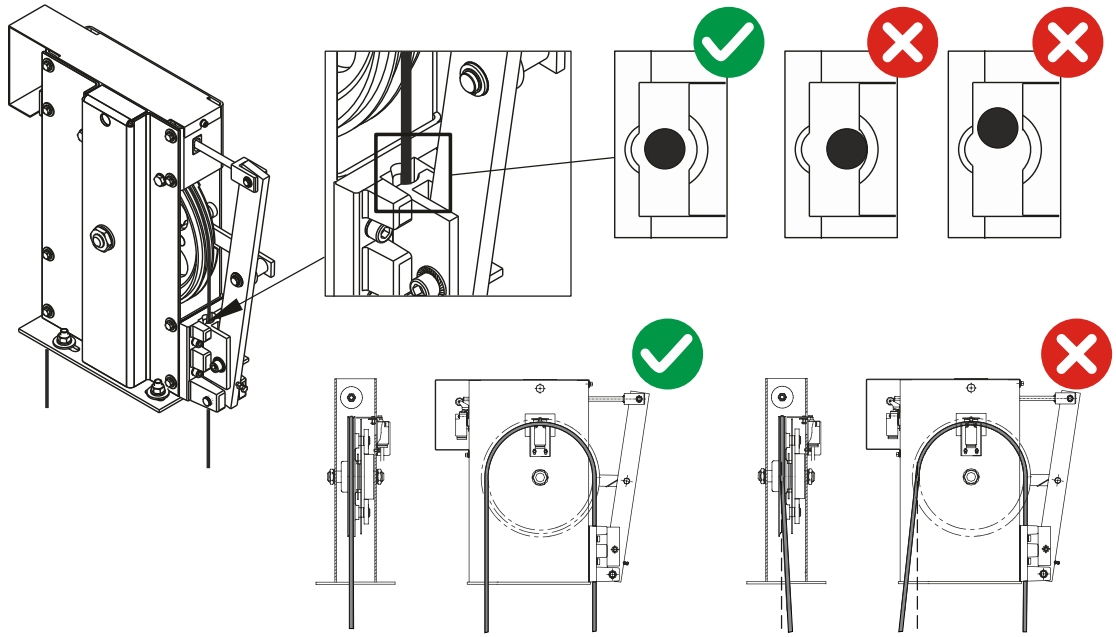
WARNING: With OL100 or OL150 OSG, watch out for your hands. The tripping lever moves quickly when the spring is released.

---

3. Check visually the condition of the OSG pulley groove.
   – The OSG rope should not lay too deep inside the OSG pulley groove.
   – There should not be any metal dust.
4. Check that the protective covers of the overspeed governor are intact and fixed into place.
5. Check that the rope runs vertically and in line with the rope pulley groove on both sides of the governor.

   Also check that the rope has free space through the brake blocks.

   NOTE: As it is difficult to check the free space, listen for sounds indicating the rope is scratching against the brake blocks later when the elevator is running.



X0000094498

NOTE: If you find anything abnormal (for example, rope not vertical or metal dust), investigate the root cause and repair it. If the rope groove of the OSG has worn too deep, replace the OSG.

X0000078832 B.4

Related information

– Prepare equipment and safety (55)

9.11 Safety gears

X0000093978 A.2

9.11.1 Checking intervals

Table 12: Maintenance checking intervals

Check	Interval
Operating condition of the safety gear	Once a year
Operation of safety gear contact	Once a year
System functioning (overspeed governor - safety gear) with empty car at reduced speed	Every other year unless for example dirty or humid circumstances require more frequent testing

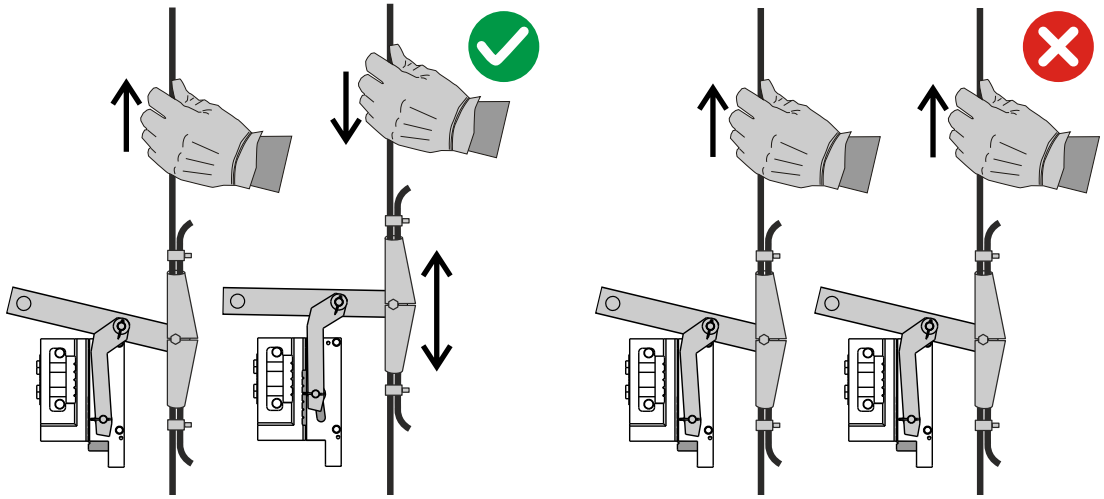
X0000087807 A.6

Related information

– Periodical inspections according to EN 81-20 Annex C (85)

9.11.2 Check linkage between overspeed governor rope and safety gear

1. Pull the overspeed governor rope by hand.



X0000055013

Figure 28: Example of linkage. Details may vary.

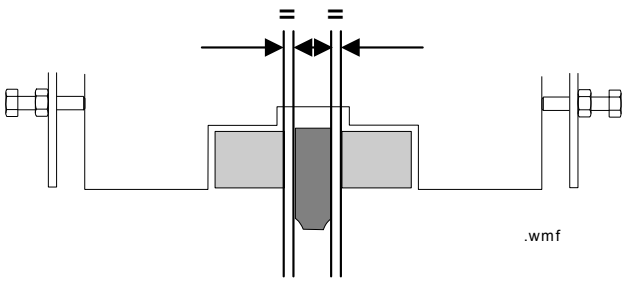
2. Check the movement of safety gear linkage.

X0000056588 C.3

Related information

– Prepare equipment and safety (55)

9.11.3 Safety gear tolerance (condition check)



X000026793

The gap between brake surface and guide rail in each side should be equal.

Rail [mm]	Maximum allowed gap [mm]
32	6.0
16/19/29	7.5

X0000056589 B.2

Related information

– Prepare equipment and safety (55)

9.12 Oil buffers

9.12.1 Checking intervals

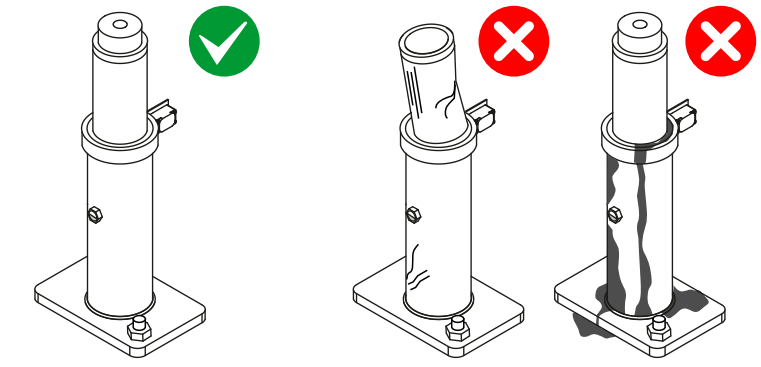
Table 13: Maintenance checking intervals

Check	Interval
Check condition	Once a year
Check oil level	Once a year

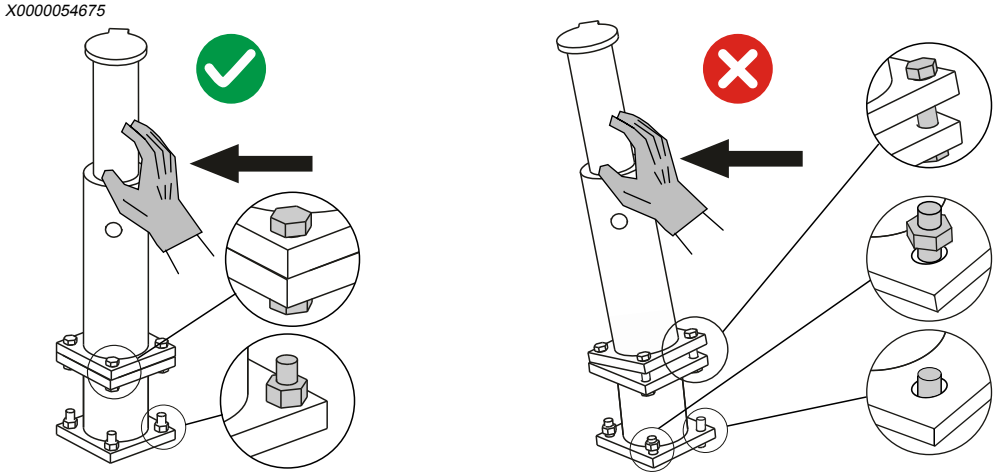
X0000094471 A.3

9.12.2 Oil buffers (condition check)

WARNING: If the buffer is not in full working order (it does not last until the next scheduled maintenance visit), arrange the replacement of the buffer immediately. If the buffer has failed already, take the elevator out of use until the buffer has been replaced.



X0000054675



X0000054694
X0000003001

Related information

– *Prepare equipment and safety (55)*

9.13 Landing door lock

9.13.1 Checking intervals

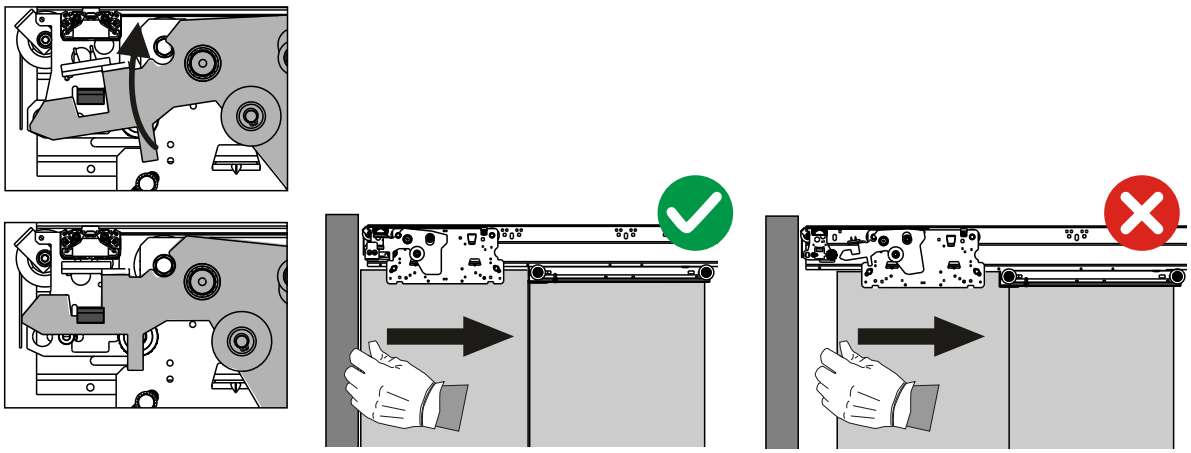
Table 14: Maintenance checking intervals

Check	Interval
Check the lock function	Once a year

X0000090808 A.2

9.13.2 Landing door lock (condition check)

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.

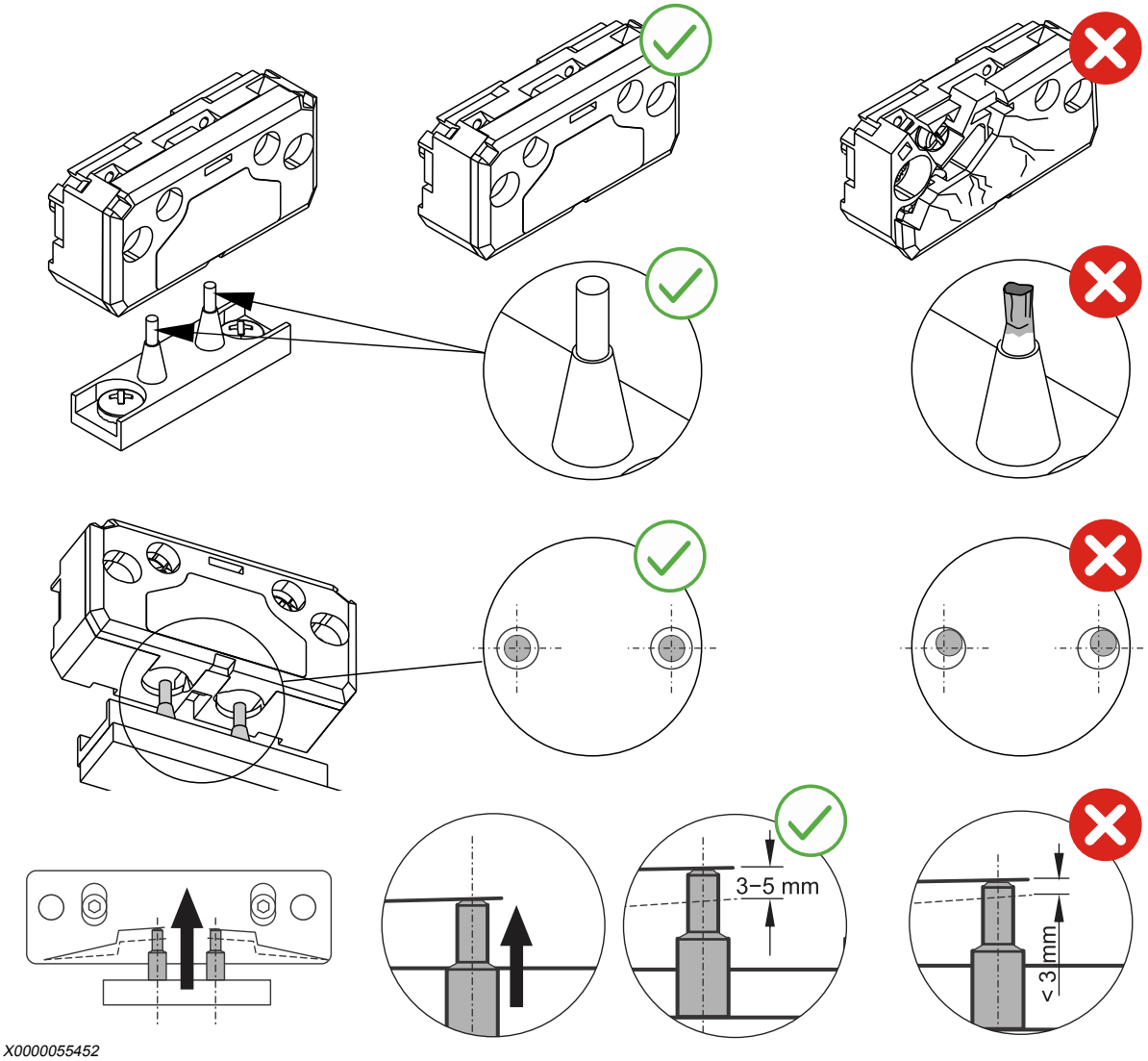


X0000055450
X0000054780 A.7

Related information

– *Prepare equipment and safety (55)*

9.13.3 Landing door lock contact (condition check)

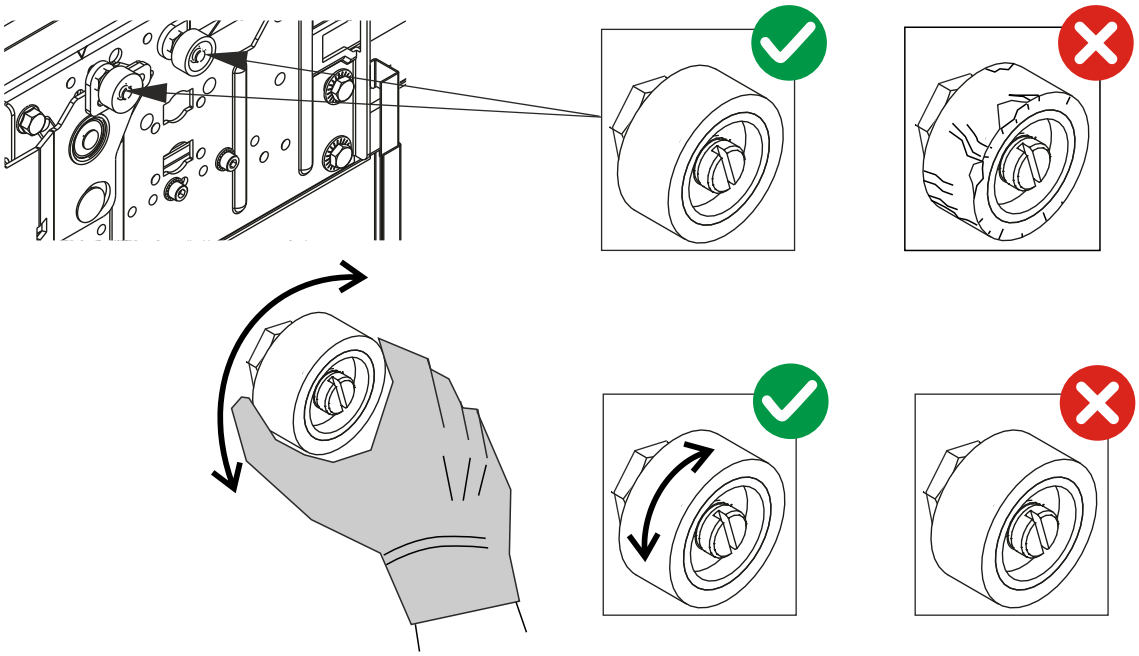


X0000055452
X0000078920 A.3

Related information

– Prepare equipment and safety (55)

9.13.4 Landing door lock rollers (condition check)



X0000055474
X0000054784 A.4

Related information

– Prepare equipment and safety (55)

9.14 Car door lock

9.14.1 Checking intervals

Table 15: Maintenance checking intervals

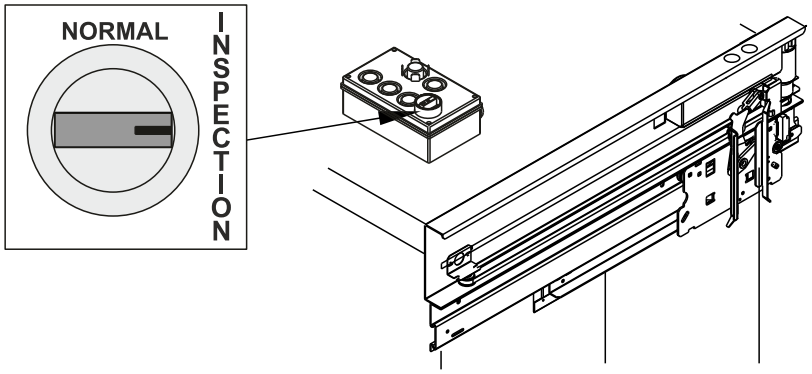
Check	Interval
Check the lock function	Once a year

X0000090808 A.2

9.14.2 Check car door lock

WARNING: Move safely between landing and elevator car roof. Follow the method approved by your local unit.

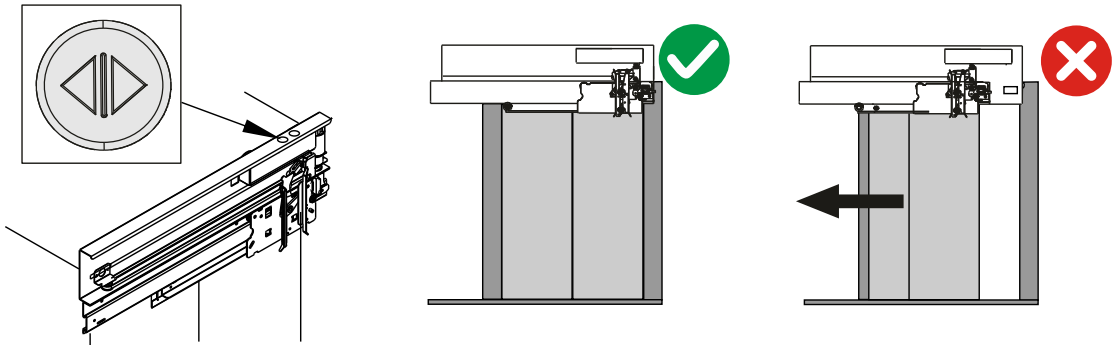
1. Switch ON the inspection drive.



X0000111545

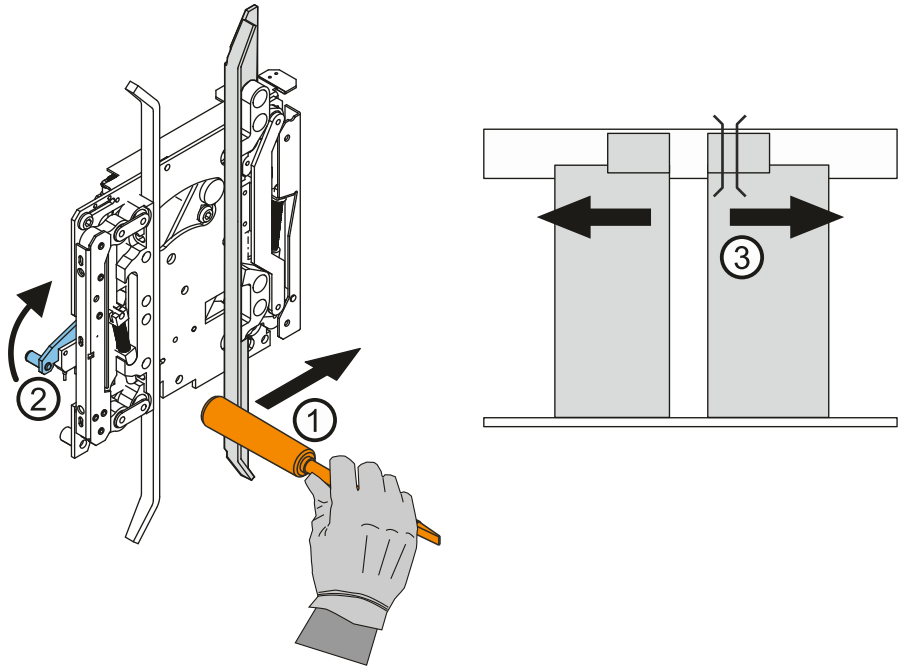
2. Try to open the car door with test button.

   The door must not open.



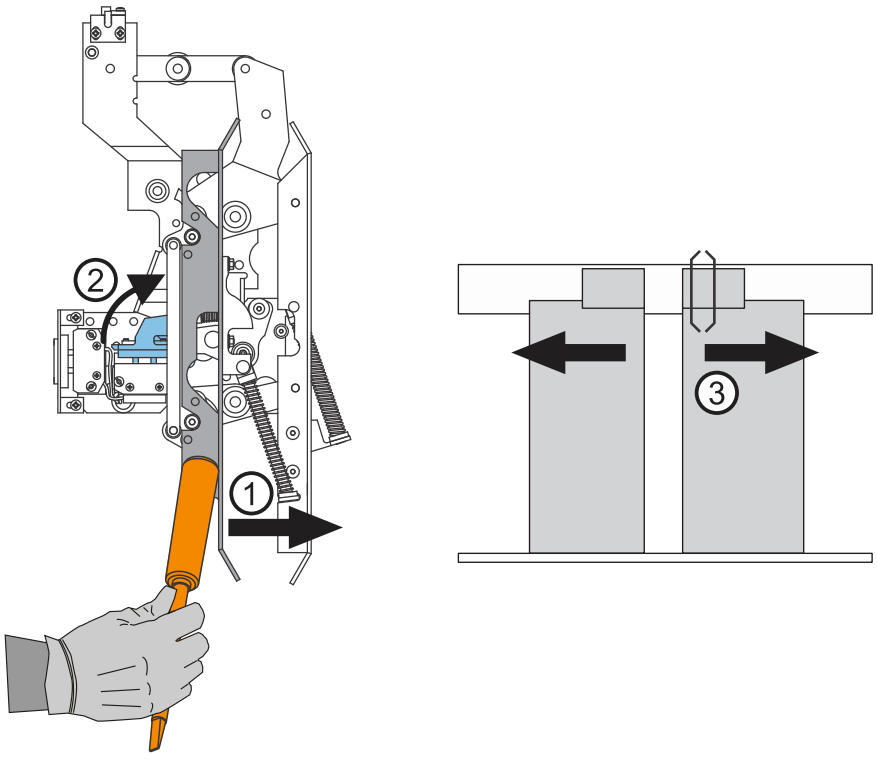
X0000111547

3. Open the car door lock manually.



X0000232756

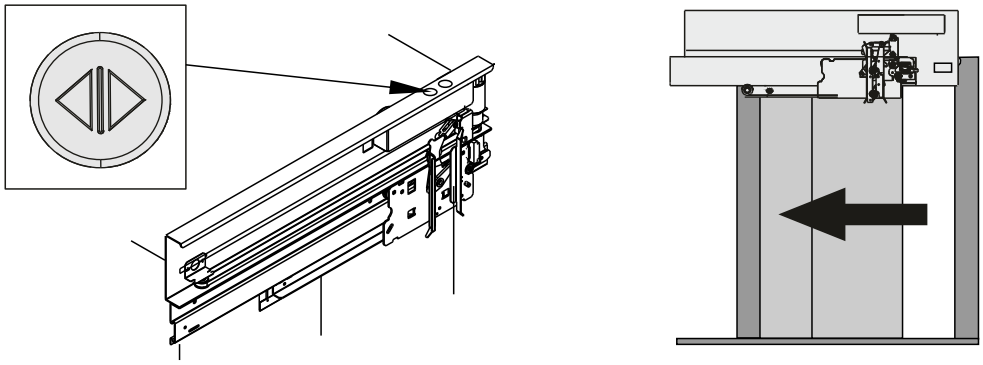
Figure 29: Option 1



X0000232875

Figure 30: Option 2

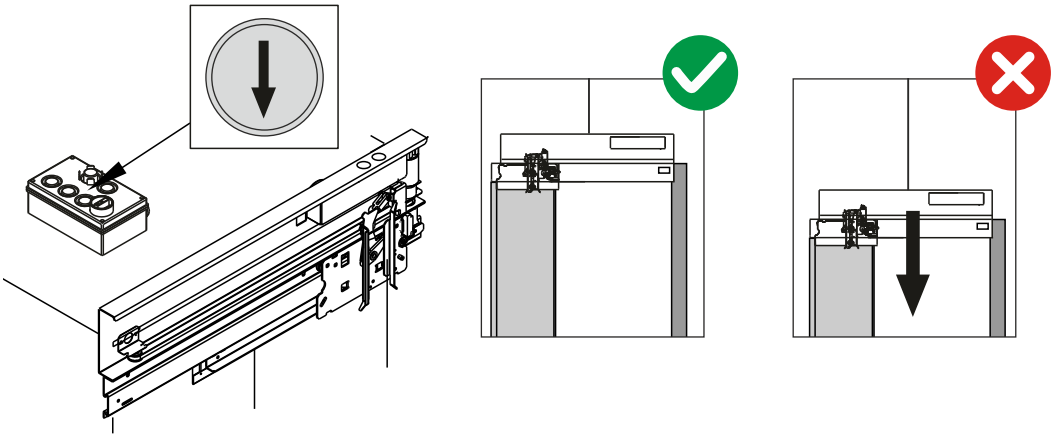
4. Press the test button to open the door.



X0000111555

5. Go to the elevator car roof.
6. Close the landing door and ensure that it is mechanically locked.
7. Try to drive downwards on inspection.

   The elevator car must not move before the car doors are entirely closed.



X0000111558

8. Adjust the door, if needed.

   NOTE: The car door lock is a safety component.

WARNING: If any of the safety components does not operate correctly and cannot be repaired during the same maintenance visit, take the elevator out of use. Inform the customer and arrange the repair immediately.

X0000062242 E.2

Related information

– Prepare equipment and safety (55)

9.15 Suspension ropes

The elevator can be equipped with steel ropes or with KONE UltraRope®. Depending on the rope type, the inspection criteria is different.

X0000101468 A.5

Related information

– Steel suspension ropes (condition check) (78)
– KONE UltraRope® (82)

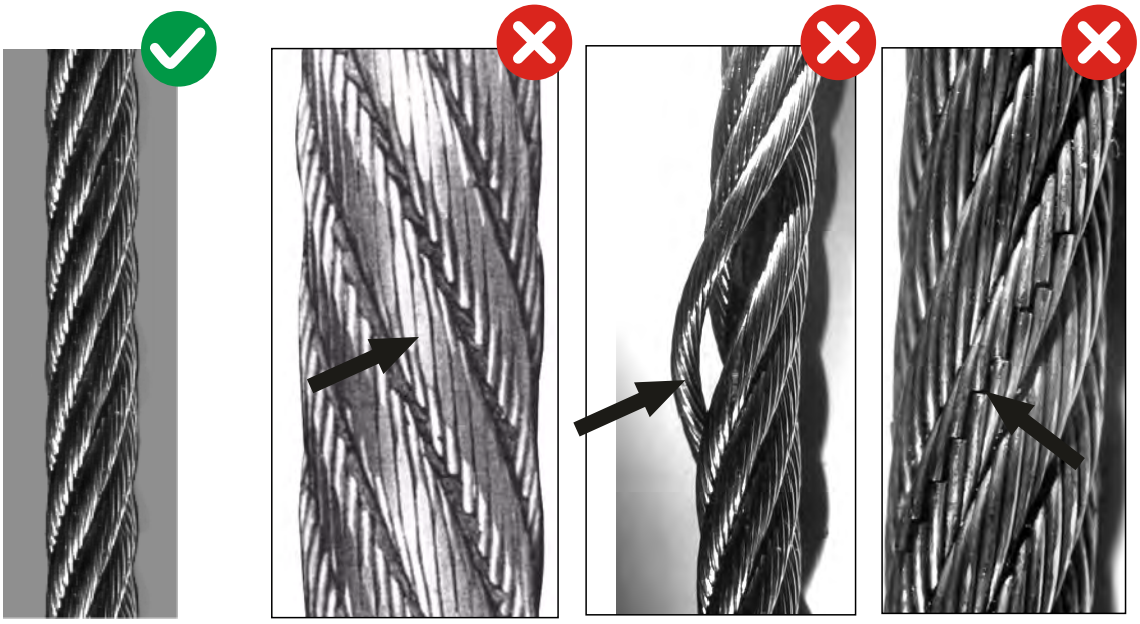
9.15.1 Checking intervals

Table 16: Maintenance checking intervals

Check	Interval
Wear and adjustment Check the whole shaft length (check at least 4 locations divided equally throughout the shaft length)	Once a year

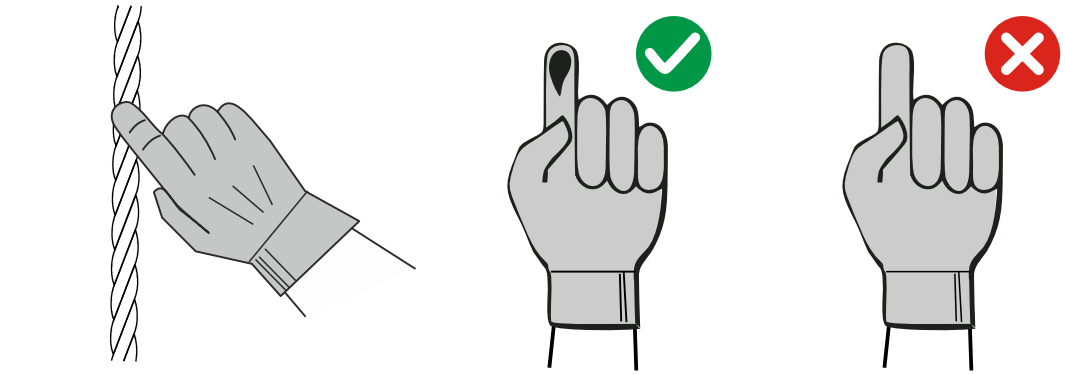
X0000088160 B.2

9.15.2 Steel suspension ropes (condition check)



X0000055039

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.



X0000055214
X0000003017

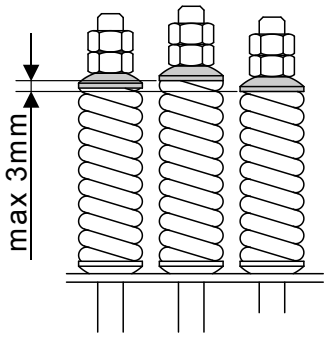
Related information

– *Prepare equipment and safety (55)*

9.15.3 Check suspension rope tension (2:1 or 4:1 roping)

1. Check the spring lengths of the suspension rope anchors with slide gauge.

   Washers at the rope ends should be at the same level. The maximum deviation is 3 mm.



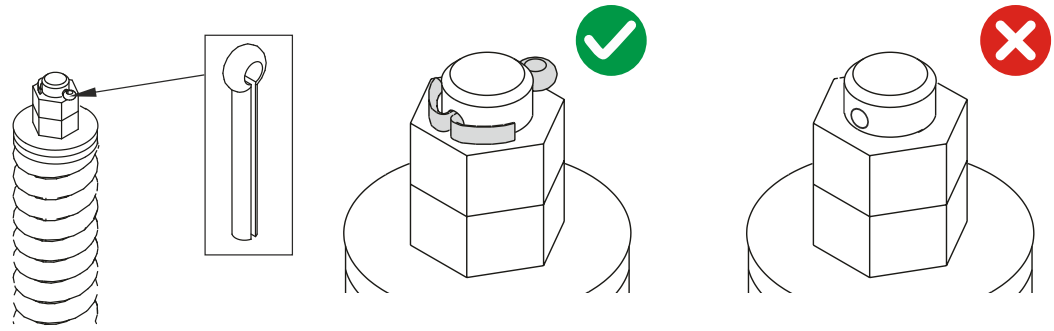
X0000055383

If suspension rope tension deviation exceeds 3 mm, equalize the rope tension.

1. Adjust the nuts by loosening or tightening, if needed.
2. Drive the elevator twice between terminal floors.
3. Check the tensions again.
4. Readjust, if needed.

2. Check the lock nuts and split pins.

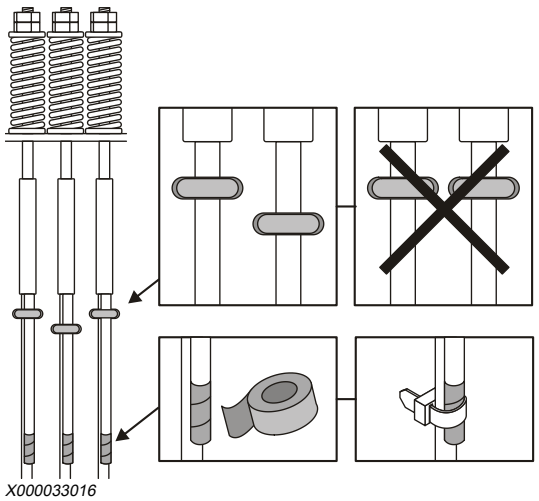
   Lock nuts and split pins must be in place and tight. Insert new split pins, if missing.



X0000062090

3. Check the rope clips.

   Rope clips must be in place and tight. Tighten, if needed.



X000033016

X0000056381 C.2

Related information

– Prepare equipment and safety (55)

9.16 Overspeed governor rope

9.16.1 Checking intervals

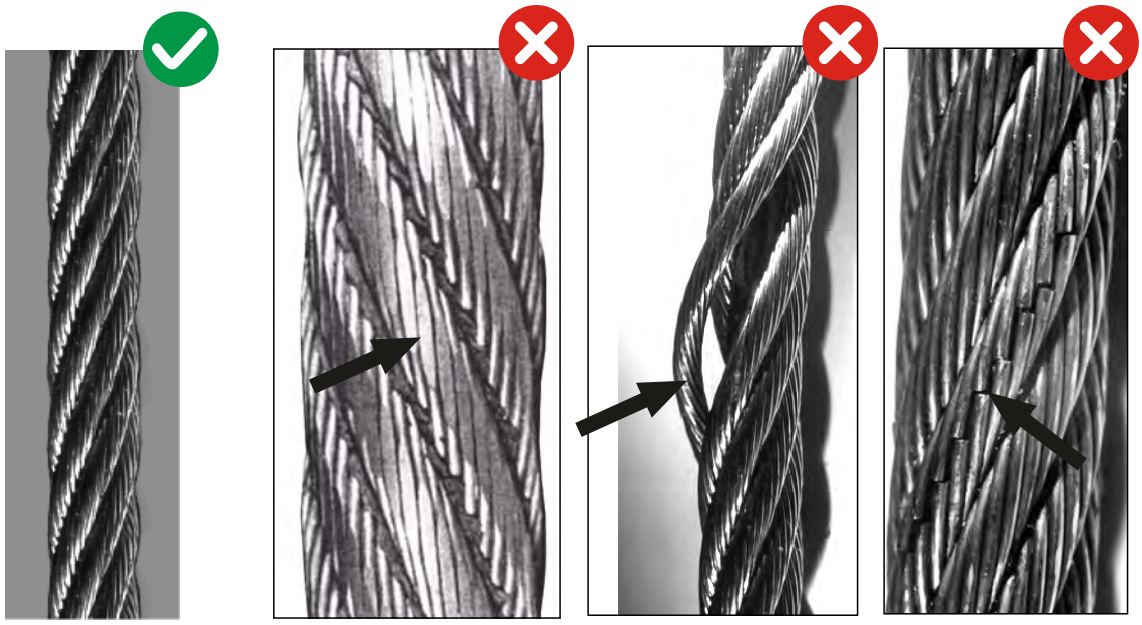
Table 17: Maintenance checking intervals

Check	Interval
Wear and adjustment Check the whole shaft length (check at least 4 locations divided equally throughout the shaft length)	Once a year

X0000088160 B.2

9.16.2 Overspeed governor rope (condition check)

WARNING: Do not lubricate the overspeed governor rope.



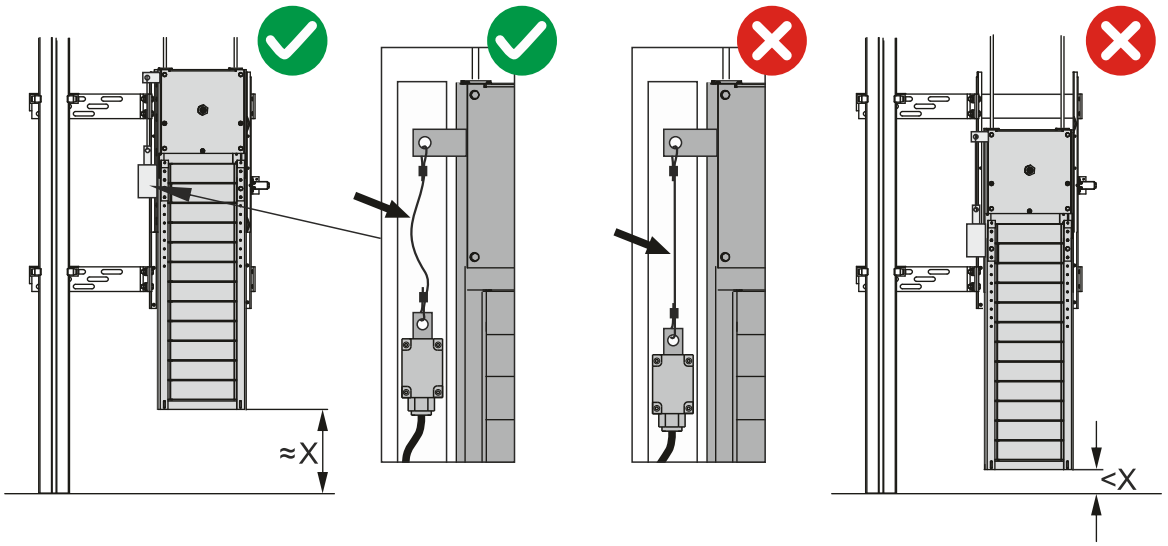
X0000055039
X0000003021

Related information

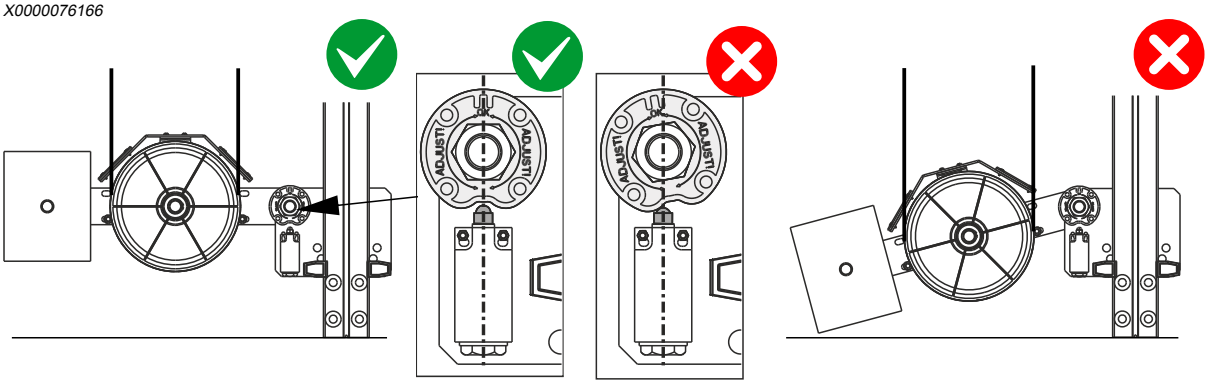
– *Prepare equipment and safety (55)*

9.16.3 Tension weight's distance from pit bottom (condition check)

X = 120 - 340 mm



X0000076166



X0000079524
X0000076056 A.10

Related information

– Prepare equipment and safety (55)

9.17 KONE UltraRope®

– Check that KONE UltraRope® replacement criteria is not met.
– Check rope terminals.
– Perform the LCECMD periodical test.
– Perform the rope alignment detector (RAD) periodical test.

X0000101473 A.5

Related information

– Prepare equipment and safety (55)

X0000087738 D.2

10 EXAMINATIONS AND TESTS AFTER IMPORTANT MODIFICATION OR ACCIDENT ACCORDING TO EN 81-20 ANNEX C

You must ascertain that your elevator continues to conform to standard after important modifications or after an accident. To determine the conformity to standard, a competent maintenance person must carry out examinations and tests in accordance with EN 81-20 Annex C.

NOTE: Record the important modifications and accidents in the elevator logbook and in technical documentation as applicable. For tests after an important modification or after an accident, documents and necessary information are submitted to the responsible person or organization. For more information, see EN 81-20 Annex C.

X0000087830 B.2

11 PERIODICAL INSPECTIONS ACCORDING TO EN 81-20 ANNEX C

According to EN 81-20 Annex C, the elevator owner ensures that the elevator gets periodically inspected to verify that it is in good condition. The inspection interval and contents should be according to local regulations. KONE recommends to test once every two years. In addition to the local authorized inspector, it is recommended that a representative of the qualified maintenance company is available during inspection.

If any of the tests in this information are part of the local periodical inspection procedure, follow the instructions described in this information. If local regulations require more tests, perform those tests according to local regulations. All periodical examinations and tests must be carried out in accordance with EN 81-20 Annex C.

Periodical examinations and tests are not more stringent than those required before the elevator was put into service for the first time.

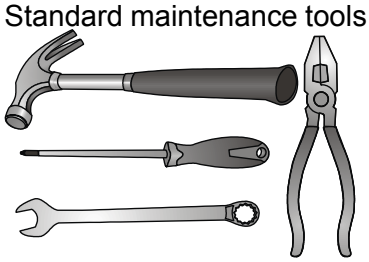
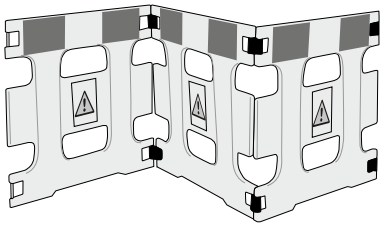
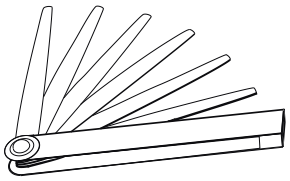
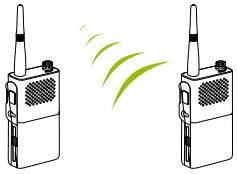
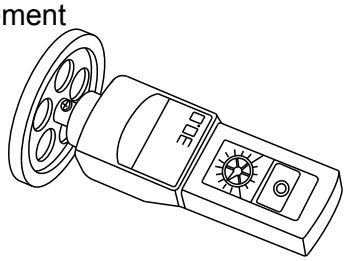
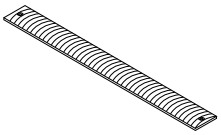
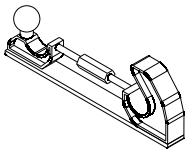
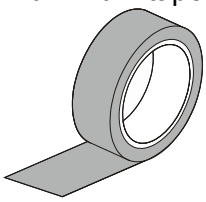
Make all tests in the defined order and mark the test date and results to the elevator's log book.

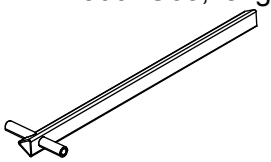
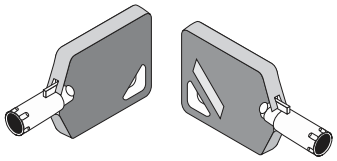
A separate test report sheet must be filled during the periodical inspection. A copy of it must be placed to the elevator's log book.

WARNING: Take the elevator out of use if it fails any of the tests. Keep the elevator out of use until you have identified and repaired the root cause of the failure.

NOTE: The periodical tests should not, through their repetition, cause excessive wear or impose stresses likely to reduce the safety of the elevator. Make all tests with an empty elevator car, unless stated otherwise. This is the case in particular of the test on components such as the safety gear and the buffers. If tests on these components are made, they must be carried out with empty car and at a reduced speed. The person appointed to make the periodical test must assure that these components, which do not operate in normal service, are still in an operating condition.

11.1 Tools

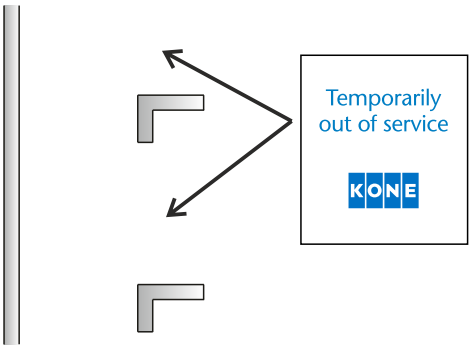
Standard maintenance tools  *X000010935*	Safety fences  *X0000228703*
Feeler gauge  *X0000071258*	Radio communication devices  1091442.pdf *X000020984*
Door blocking tool	Hand tachometer for OSG tripping speed measurement  *X000015355*
Milled file  *X0000228754*	Frame for milled file  *X0000228809*
Aluminium tape (only with UltraRope)  *X0000224093*	Marker pen or tape for marking the ropes and bed plate

Emergency opening key KM748001G01, length 200 mm KM748001G03, length 700 mm  *X0000210601*	MAP lock keys KM278355  *X0000209966*
Water	Würth R1 Universal Cleaner 0893 125 005
Würth Pineline Power Wash 0893 012 090	

X0000101555 C.3

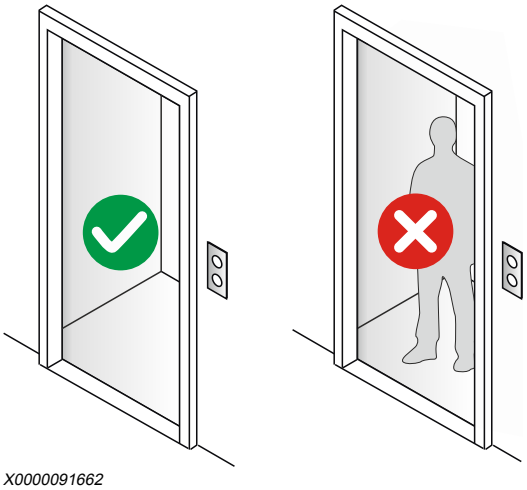
11.2 Take elevator out of use

1. Place 'Out of service' signs to all landings.



X0000091647

2. Drive the elevator car to the floor closest to the controller.
3. Make sure that the elevator car is empty (or both car when applicable).



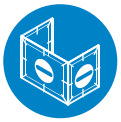
X0000091662

4. Switch on recall drive feature (RDF), if necessary.

   It depends on your upcoming task, whether it is necessary or not.
5. Disable the landing calls and door openings, if necessary.

   It depends on your upcoming task, whether it is necessary or not.

6. Place safety fences to working floors to prevent unauthorized access.



X0000070698 J.2

11.3 Periodical tests in machine room

NOTE: Check that there is no one inside the elevator car or in the elevator shaft during the safety inspection.

1. Go to the machine room.

   Verify that the machine room door lock operates correctly.
2. Inhibit door opening and landing calls by using LCEUI switches 263 and 261.
3. Switch on the Recall Drive Feature (RDF).
4. Switch off the car light (290:1).
5. Switch off the main switch.
6. Go to the topmost landing and open the landing doors manually.
7. Check:

   NOTE: For detailed instructions, refer to the related information.

   1. Emergency lighting in car
   2. Remote / local alarm system and telephone / intercom connection with back-up power
8. Close the landing doors.
9. In case of double deck elevator, go to lower car and perform the same lightning and alarm system checks.
10. Switch on the main switch.
11. Drive on RDF downwards.
12. After approximately 1 meter, operate machine room stop button.

    Verify that the car stops.
13. Switch off the main switch.
14. Go to the topmost landing and open the landing doors manually.
15. Verify that the emergency lighting on car roof works.

    NOTE: For detailed instructions, refer to the related information.
16. Close the landing doors and make sure that they are mechanically locked.
17. Go to the machine room.
18. Switch on the main switch.

19. Switch on the car light (290:1).
20. Go to topmost landing.
21. Check that the car roof stop switch operates.

    1. Send the car one floor down by using car calls.
    2. Open the landing door with the emergency opening key to stop the car roof on the floor level.
    3. Standing on the landing, push down the stop switch.
    4. Close the landing doors.
    5. Check that the landing doors are mechanically locked.
    6. Make a landing call.

       The elevator car must not move.
22. Check that the inspection switch operates.

    1. Open the landing door with the emergency opening key.
    2. Standing on the landing, switch on the inspection drive.
    3. Standing on the landing, release the stop switch.
    4. Close the landing doors.

       Check that the landing doors are mechanically locked.
    5. Make a landing call.

       The elevator car must not move.
    6. Open the landing door.
23. Test the inspection drive buttons (down and up).

24. Perform the following checks and tests:

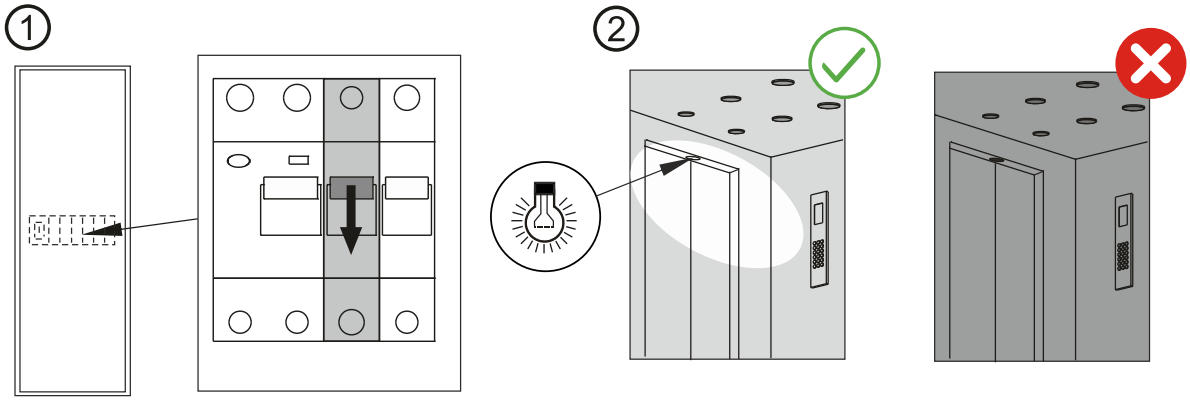
    NOTE: For detailed instructions, refer to the related information.

    1. Residual current devices
    2. Car and counterweight safety gears
    3. One-sided brake tests
    4. Final limit switches
    5. Traction tests
    6. Suspension rope tension (in case of 2:1 roping)
    7. Rope alignment detector (RAD) test, if applicable
    8. Counterweight derailment system test, if applicable
    9. Seismic switch test, if applicable
    10. Sway detector, if applicable
    11. Rescue tools
    12. Check start counter (only when KONE UltraRope)

X0000088318 C.5

11.3.1 Emergency light in car (condition check)

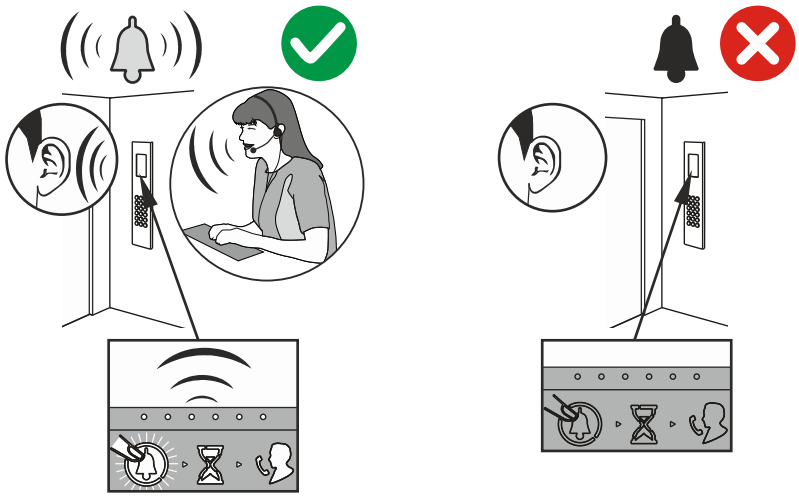
Switch off the car light to check the emergency light.



X0000071866
X0000068808 B.2

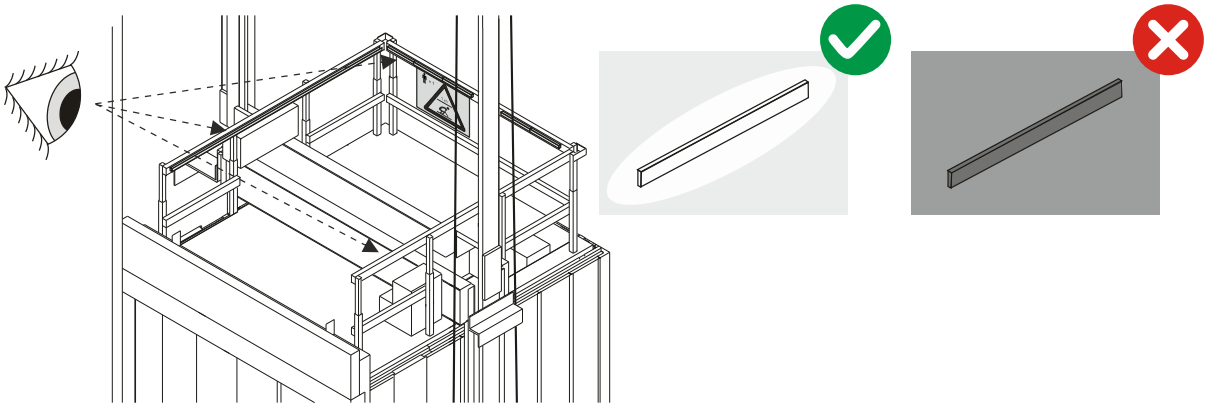
11.3.2 Remote / local alarm system and telephone / intercom connection with back-up power (condition check)

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.



X000048193
X0000070405 B.2

11.3.3 Emergency light on car roof (condition check)



X0000079688

If lights are fixed on balustrades, it is not required to have lights on the car door operator.

X0000074925 B.2

11.3.4 Test residual current device

There are three residual current devices (RCDs):

– For safety chain at pos. 296
– For car door operator at pos. 297
– For light supply at pos. 236

1. Briefly press the button marked "T" or "Test" on the residual current device to test.

WARNING: The device must be replaced if it does not break the circuit.

The device should operate and break the circuit it is connected to.

2. Reset the device.

X0000002029

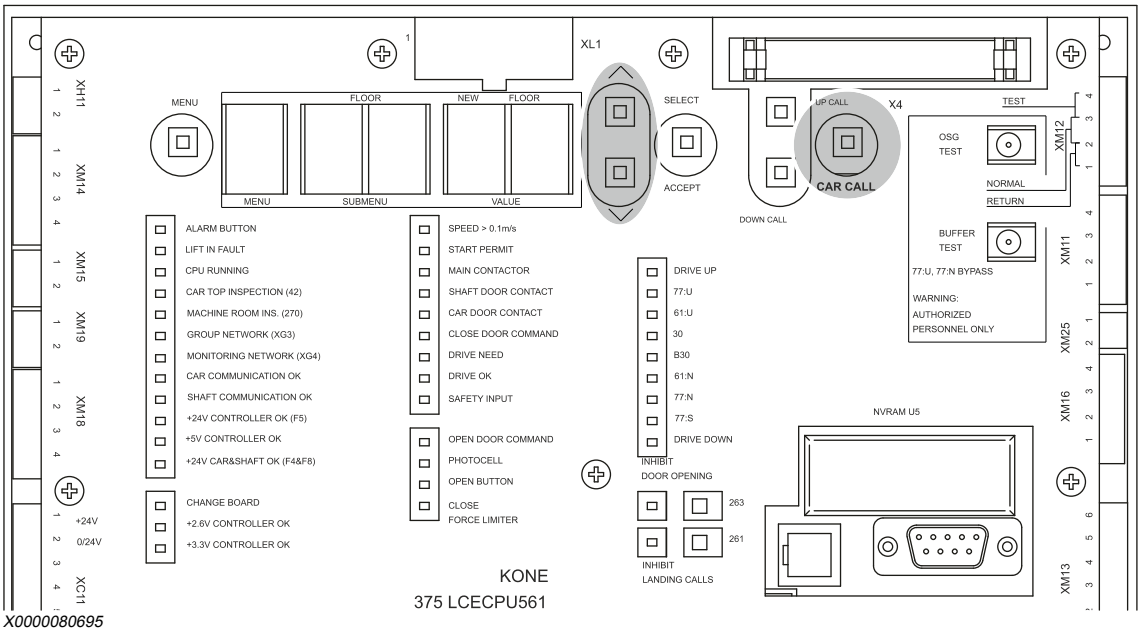
11.3.5 Test car safety gear

WARNING: Move safely between car roof and landing.

CAUTION: The safety gear must be tested with empty car at inspection drive speed.

---

1. Switch off the Recall Drive Feature (RDF).
2. Give a car call to the second floor from the top with LCEUI.
   1. Select the floor with arrow buttons.
   2. Press CAR CALL



X0000080695

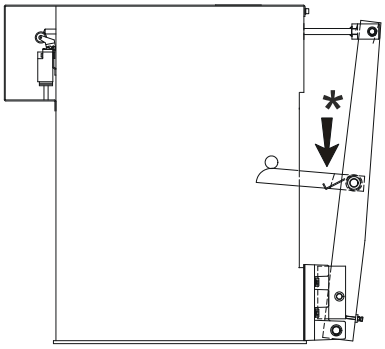
3. Switch on the RDF (270).

4. Activate the overspeed governor.

   Exact method depends on the overspeed governor type.

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.

– With OL100 or OL150, hit to trigger the lever (*) with hammer.



X0000080779

– With OL35, remove the safety cover, if applicable. Trip OL35 manually or remotely, depending on the overspeed governor type.

5. Perform the safety gear test by driving downwards on RDF.
   1. Press 270:RB + 270:N simultaneously.

      The safety gear must engage.
   2. Continue the RDF drive down direction.

      The elevator car must not move when the safety gear is engaged.

      NOTE: If the steel ropes are slipping, do not run more than three sec.

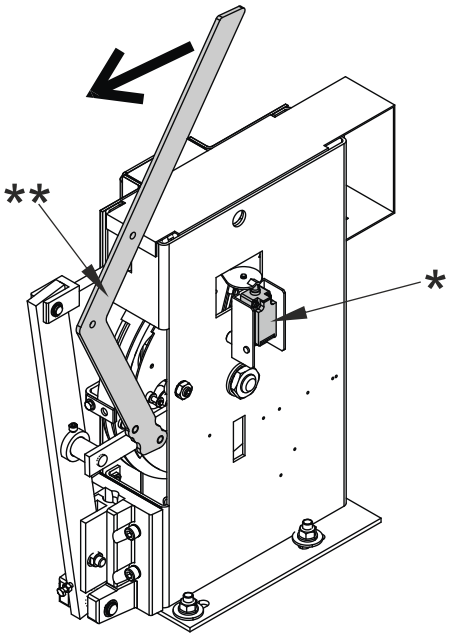
      NOTE: In case of KONE UltraRope®, torque limit should prevent machinery rotation. Slipping is not allowed.

6. Reset the overspeed governor switch (*), if activated.

   Exact method depends on the overspeed governor type.

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.

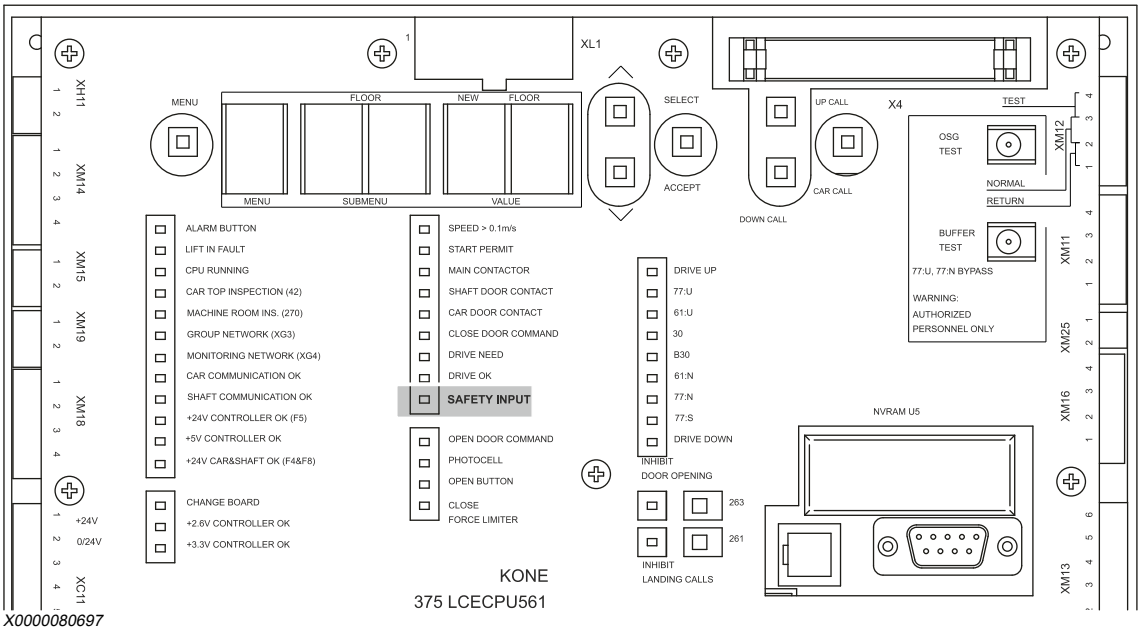
In case of OL100 or OL150, reset overspeed governor with the special releasing lever (**) in machine room.



X0000090910

7. With OL100 or OL150, check the condition of the OSG rope from gripping area before leaving the equipment in use. The rope must be in good condition. No visual damages are allowed.
8. Switch off the RDF (270).

9. Check that the safety gear contact is open by monitoring that the SAFETY INPUT LED is off.



X0000080697

10. Install OSG safety cover, if removed.
11. Switch on the RDF (270).
12. Drive upwards on RDF to get the elevator car off the safety gear.

    Press 270:RB + 270:U simultaneously.
13. Switch off the RDF (270).

    The SAFETY INPUT LED should go on.
14. Switch on the elevator shaft lights, if applicable.
15. Enable landing calls and door operation by using LCEUI switches 263 and 261.
16. Close the control cabinet door. Exit the machine room.

    Make sure that machine room door is locked.
17. Go to the floor where the elevator car is located.
18. Send the car one floor downwards by using a car call from COP.
19. Stop the elevator car by opening the landing doors with emergency opening key.
20. Go to the car roof.

NOTE: For detailed instructions, refer to the related information.

21. Drive the car down with inspection drive until you see the safety gear grip marks on the guide rails.

    NOTE: There are perhaps no marks, but to be safe, check the guide rails.

    Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving. If driving upwards, remember to look up to ensure that you do not hit any equipment or shaft ceiling.

22. If the marks are found, remove them by using a file.

    Removing the marks avoids excessive wear of the guide shoes or roller guides.

23. Drive the car downwards with inspection drive so that you can exit the car roof.

    Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving.

24. Exit the car roof.

    NOTE: For detailed instructions, refer to the related information.

25. Go to machine room.

X0000072644 C.6

11.3.6 Test counterweight safety gear

WARNING: Move safely between car roof and landing.

CAUTION: The safety gear must be tested with empty car at inspection drive speed.

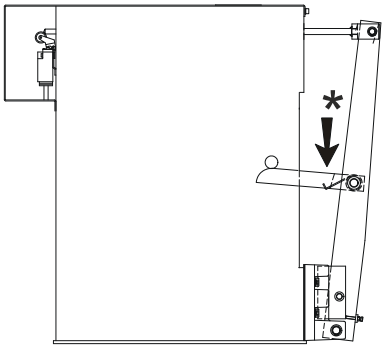
1. Inhibit door opening and landing calls by using LCEUI switches 263 and 261.
2. Send the car to the second lowest floor.
3. Switch on RDF.

4. Activate the overspeed governor.

   Exact method depends on the overspeed governor type.

WARNING: Watch out for your hands. The tripping lever will move quickly when the spring is released.

– With OL100 or OL150, hit to trigger the lever (*) with hammer.



X0000080779

– With OL35, remove the safety cover, if applicable. Trip OL35 manually or remotely, depending on the overspeed governor type.

5. Perform the safety gear test by driving up with RDF.
   1. Press 270:RB + 270:U simultaneously.

      The safety gear must engage.
   2. Continue the RDF drive up direction.

      The counterweight must not move when the safety gear is engaged.

      NOTE: If the steel ropes are slipping, do not run more than 3 sec.

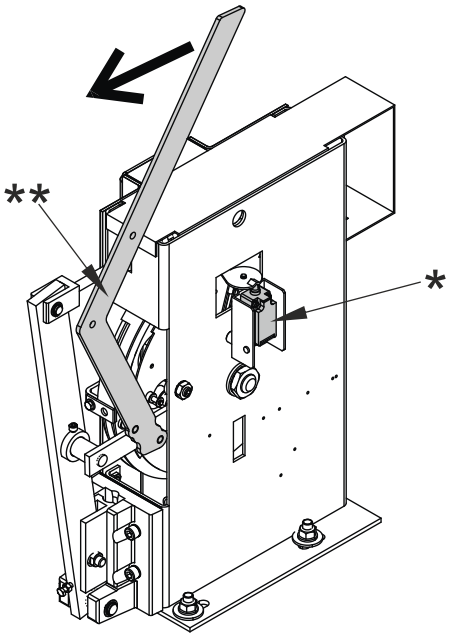
      NOTE: In case of KONE UltraRope®, torque limit should prevent machinery rotation. Slipping is not allowed.

6. Reset the overspeed governor switch (*), if activated.

   Exact method depends on the overspeed governor type.

WARNING: Watch out for your hands. The tripping lever will move quickly when the spring is released.

In case of OL100 or OL150, reset overspeed governor with the special releasing lever (**) in machine room.



X0000090910

7. With OL100 or OL150, check the condition of the OSG rope from gripping area before leaving the equipment in use. The rope must be in good condition. No visual damages are allowed.
8. Install OSG safety cover, if removed.
9. Drive down on RDF to get the counterweight off the safety gear.

   Press 270:RB + 270:N simultaneously.
10. Switch off the RDF (270).
11. Enable landing calls and door operation.

    LCEUI switches 263 and 261.
12. Close the control cabinet door. Exit the machine room.

    Make sure that the machine room door is locked.

13. Go to the topmost floor and call the car there by making a landing call.
14. Send the car one floor downwards by using a car call from COP.
15. Stop the elevator car by opening the landing doors with emergency opening key.
16. Go to the car roof.

NOTE: For detailed instructions, refer to the related information.

17. Drive the car downwards with inspection drive until you see the safety gear grip marks on the guide rails.

    NOTE: There are perhaps no marks, but to be safe, check the guide rails.

    Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving. If driving upwards, remember to look up to ensure that you do not hit any equipment or shaft ceiling.
18. If the marks are found, remove them by using a file.

    Removing the marks avoids excessive wear of the guide shoes or roller guides.
19. Drive the car downwards with inspection drive so that you can exit the car roof.

    Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving.
20. Exit the car roof.

NOTE: For detailed instructions, refer to the related information.

21. Go to machine room.

X0000072693 D.2

11.3.7 Perform one-sided brake test (KDM drives)

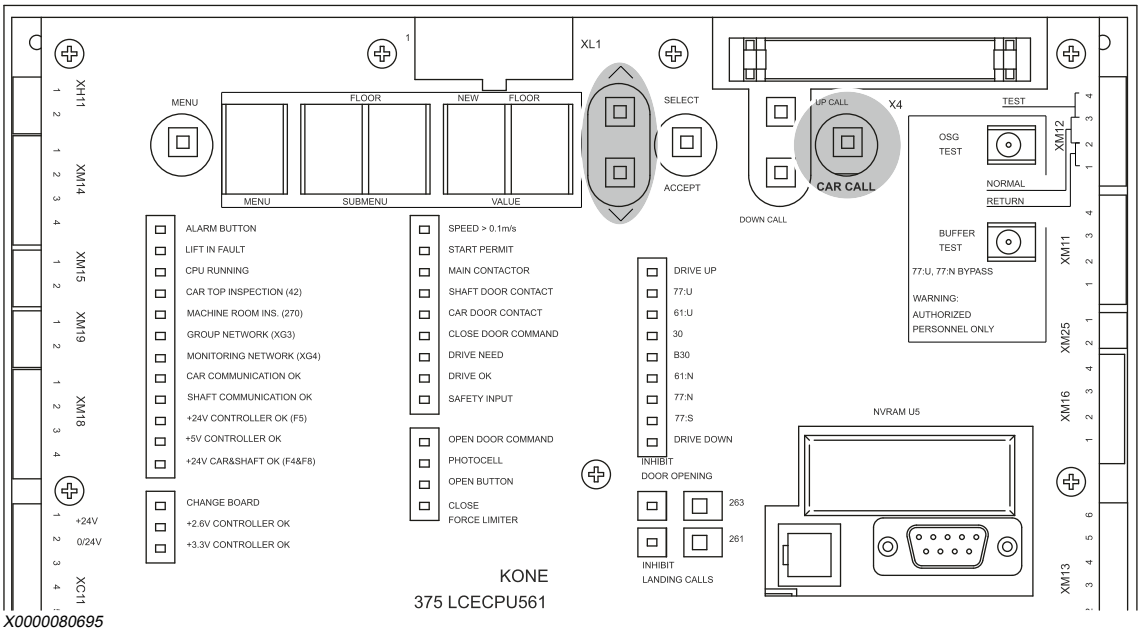
Drive identification label can be found from the controller door.

In a one-sided brake test, the performance of each brake unit of the hoisting machine is tested independently. Each brake alone must be able to hold the empty elevator car in position.

1. Travel in the car to the topmost floor.
2. Check that the car is empty.
3. Go to the machine room.
4. Open the control cabinet door.
5. Inhibit landing calls and door opening by using LCEUI switches 263 and 261.

   Ensure that no one can access the car.

6. Verify that the car is in topmost floor. If needed, give a car call to the topmost floor by selecting the topmost floor with the arrow buttons and pressing the CAR CALL button in LCEUI.



X0000080695

7. Turn the main switch off and back on.

   The controller automatically makes the one-sided braking test in 5 - 10 minutes after powering up. If the test fails, the controller tries to make the test 3 times (fault code 3 x 2072). If all tests fail, fault code 1046 displays.

8. Record the test date and result in the elevator's log book.

X0000109879 A.2

Related information

– Adjust brake torque (65)

11.3.8 Perform one-sided brake test (KDH drives with DCBH)

Make sure that no one can enter the elevator shaft or car during the test.

This test is applicable to the following drives:

– KDH100S
– KDH160D
– KDH180D
– KDH200D
– KDH300S
– KDH450S

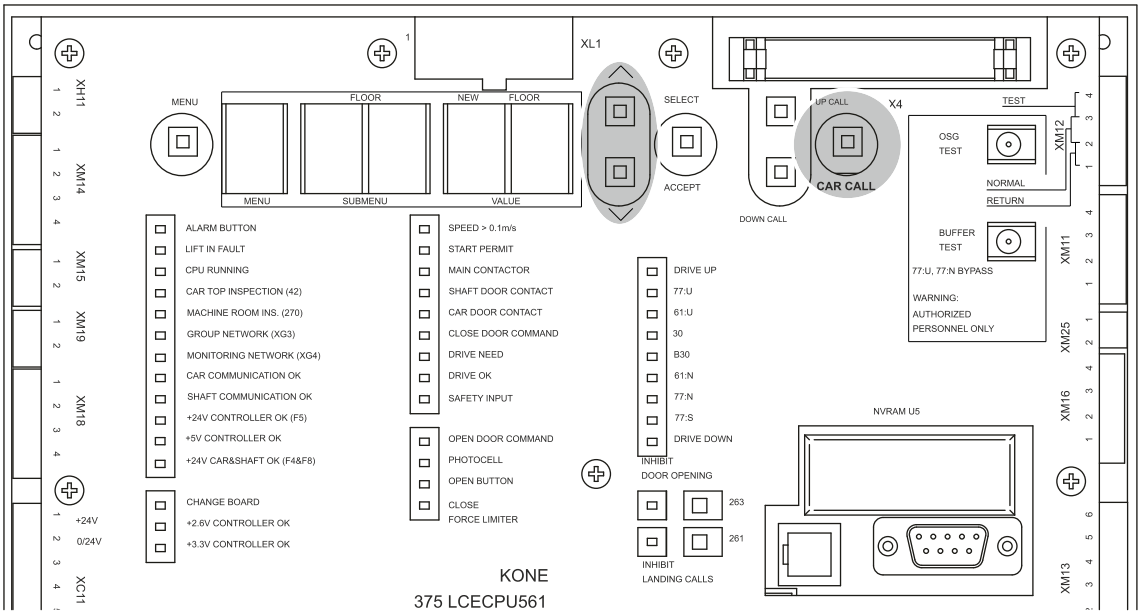
Drive identification label can be found from the controller door.

In a one-sided brake test, the performance of each brake unit of the hoisting machine is tested independently. Each brake alone must be able to hold the empty elevator car in position.

1. Travel in the car to the topmost floor.
2. Make sure that the car is empty (or both cars when applicable).

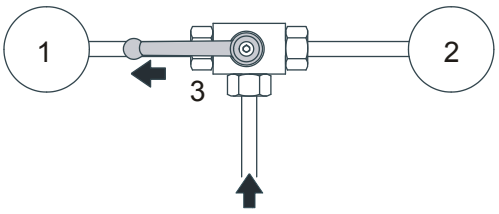
3. Go to the machine room.
4. Open the control cabinet door.
5. Inhibit landing calls and door opening by using LCEUI switches 263 and 261.

   Make sure that no one can access the car.
6. Verify that the car is in topmost floor. If needed, give a car call to the topmost floor by selecting the topmost floor with the arrow buttons and pressing the car call button in LCEUI.



X0000080695

7. Switch RDF (270) ON.
8. Turn the 3-way valve handle (3) towards brake 1, if applicable.



X000014748

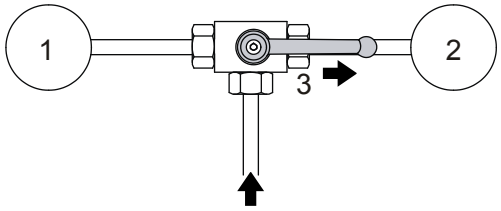
   1. Brake 1
   2. Brake 2
   3. Valve handle and flow direction
9. Open brake 1 manually.

   The car must not move. Therefore, visually monitor the traction sheave movements during the test.

   Be ready to close the brake immediately if the car starts moving.

   If the car moves, increase the brake torque and perform a new brake test.
10. Close the brake.

11. Turn the 3-way valve handle towards brake 2, if applicable.



X000026754

1. Brake 1
2. Brake 2
3. Valve handle and flow direction

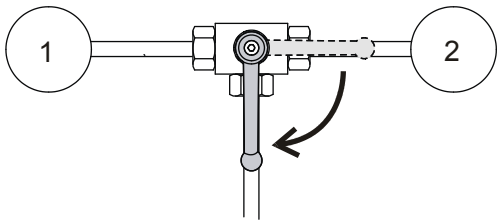
12. Open brake 2 manually.

    The car must not move. Therefore, visually monitor the traction sheave movements during the test.

    Be ready to close the brake immediately if the car starts moving.

    If the car moves, increase the brake torque and perform a new brake test.

13. Close the brake and turn the 3-way valve handle to middle position, if applicable.



X000026755

1. Brake 1
2. Brake 2
3. Valve handle and flow direction

X0000072494 D.5

Related information

– *Open NMX11 machine brake manually (43)*
– *Open MX14 machine brake manually (45)*
– *Open MX18 or NMX18 machine brake manually (47)*
– *Open MX32/MX40/MX100 machine brake manually (49)*
– *Adjust brake torque (65)*

11.3.9 Perform unintended car movement test (with 0% load)

Unintended car movement (UCM) monitoring is enabled in the following Lift Controller Electrification (LCE) software versions:

– CPU40/N applications - version 6.11.X or later
– CPU561 applications - version 8.2.X or later

The UCM test verifies that the UCM detection:

– Operates on the Accurate relevelling drive (ACL) and Advance Door Opening (ADO) board.
– Triggers the machine brake stopping devices.

The following conditions apply:

– Uncontrolled movement of the elevator car with doors open is registered and saved in the memory, in the fault log.
– The elevator remains in fault mode after switching the power off and on.
– The elevator recovers only if Recall Drive Feature (RDF) is switched on and off. (270)

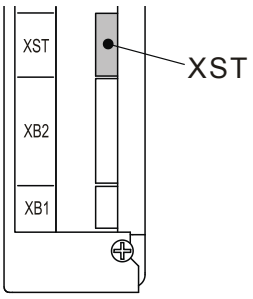
WARNING: Before this procedure, the elevator car must be empty and the landing calls must be disabled. Make sure that no-one can enter the elevator shaft or car during this test. Safety fences must be in place to prevent access through the second floor from the top landing doors.

---

1. Place a safety fence around the entrance of the second floor from the top.

   In case of double deck, place fences also on third topmost floor.
2. Inhibit landing calls by using LCEUI switch 261.
3. Switch elevator to RDF mode (270 on).
4. Switch off the main switch and check the de-energization of the drive.

5. Where applicable, overconnect brake contacts by connecting the XST overconnection plug at the brake control modules (388:1, 388:2)



X0000197336

6. Switch on the power using main switch.
7. Switch the elevator to normal drive (270 off).
8. Give a car call to the second floor from the top using LCEUI.

9. Wait until the car stops and the doors open. When the doors are fully open, release the machine brakes carefully. Use manual brake release lever.

   NOTE: If the doors close, reopen them. Give a call to the floor where the elevator car is. Use LCEUI car call button.

WARNING: The speed can increase fast when you open the brake. When the traction sheave starts to move, stop it by letting the brakes close every 0.5 – 1.0 second to avoid the elevator accelerate to over speed.

---

10. Raise the car above the door zone. LED 30 and LED 61 must be off.

    Verify that the unintended car movement is detected. Fault code 0005 is displayed.
11. Switch off the main power. Wait until the elevator control system shuts down (min. 5 minutes).
12. Switch on the main power. Check that the unintended car movement is detected. Fault code 0005 is displayed.

    The elevator must not recover to the normal drive.
13. Switch on the RDF.
14. Switch off the RDF.

    The elevator car starts to drive and recover to normal drive. Fault code 0005 is not displayed.
15. Where applicable reconnect the brake contacts.
    1. Switch off the main switch and check the de-energization of the drive.

    2. Remove XST overconnection plug from the brake control modules (388:1, 388:2).
    3. Switch on the power using main switch.
16. Enable landing calls with LCEUI switch 261.

X0000079342 D.8

11.3.10 Final limit switch tests

11.3.10.1 Test lower limit switch and car buffer

1. Give a car call to the bottom floor.
   1. Select the bottom floor with the arrow buttons.
   2. Press the car call button in Lift Controller Electrification User Interface (LCEUI).
2. Switch ON the Recall Drive Feature (RDF).

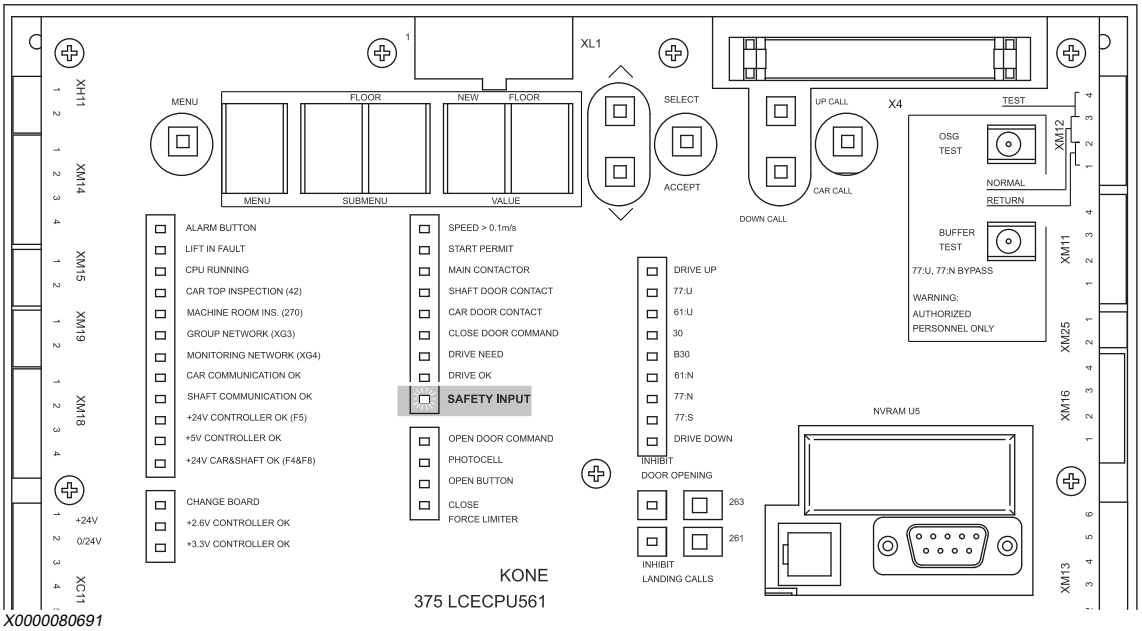
3. Indicate a reference point to the bottom of the bed plate. Mark a line using a paint marker.

4. Mark the ropes at the same level as the bed plate reference point.
5. Drive the car down on the buffer by using RDF.

   Press 270:RB + 270:N simultaneously.
6. When the car is on the buffer, switch off the RDF.
7. Raise the elevator car from the buffer past the limit switch. Carefully open the machine brakes with the manual brake opening lever.

   NOTE: For detailed instructions on how to open the brakes, see the related information.

   When the car moves past the limit switch, the SAFETY INPUT LED turns on at LCEUI.



X0000080691

8. Close the brake immediately when the LED turns on. Switch RDF on.
9. Verify the limit switch location. Measure the distance of the markers between ropes and bed plate.

10. Drive the elevator car 150 mm upwards with RDF.
11. Switch off the RDF.

    The car relevels to landing.

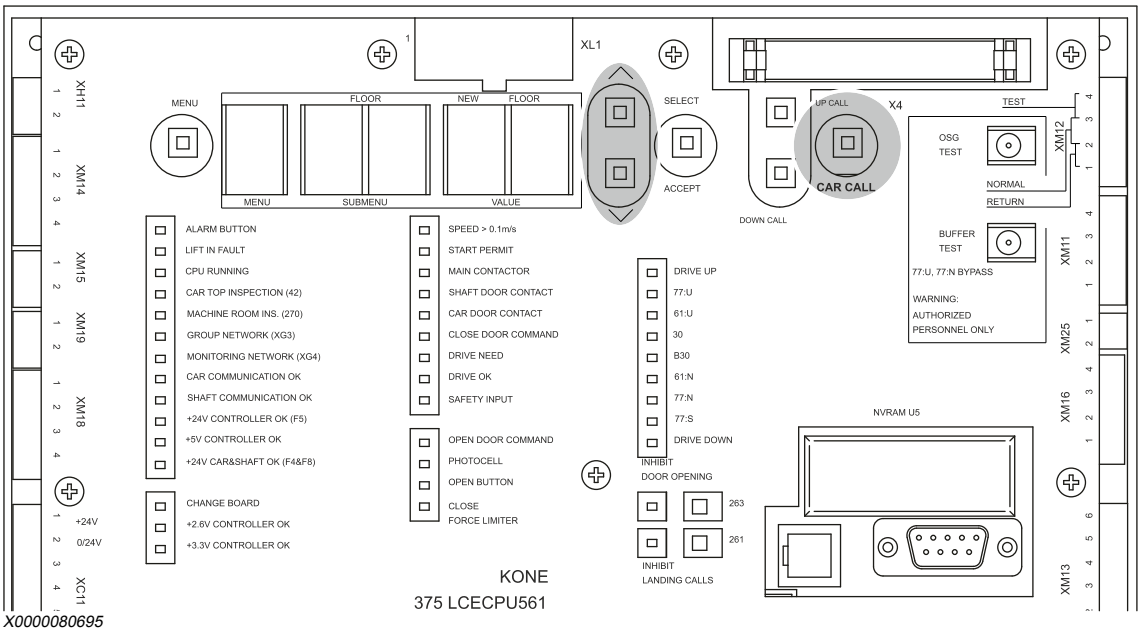
X0000072554 B.2

Related information

– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)

11.3.10.2 Test upper limit switch

1. Give a car call to the topmost floor.
   1. Select the topmost floor with the arrow buttons.
   2. Press the car call button in Lift Controller Electrification User Interface (LCEUI).



X0000080695

2. Indicate a reference point to the bottom of the bed plate. Mark a line using a paint marker.

3. Mark the ropes at same level as the bed plate reference point.

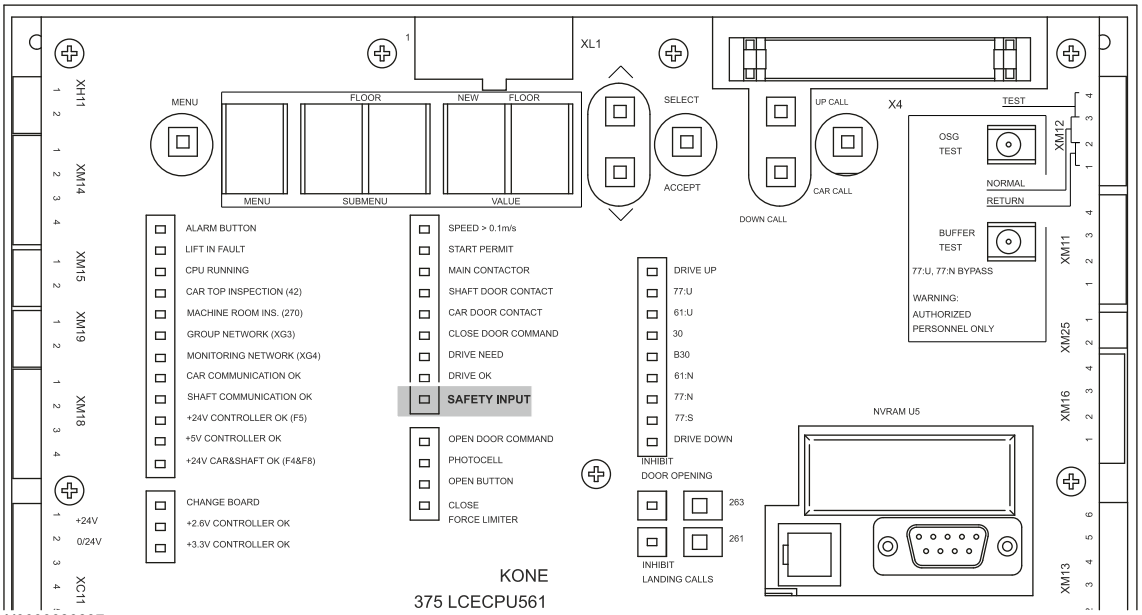
WARNING: Ensure that landing calls are disabled.

---

4. Carefully open the machine brakes with the manual brake opening lever.

   NOTE: For detailed instructions on how to open the brakes, see the related information.

   The car moves up to the limit switch. The SAFETY INPUT LED turns off in LCEUI.



X0000080697

5. When the SAFETY INPUT LED turns off, close the brakes. Switch on Recall Drive Feature (RDF) (270).
6. Verify the limit switch location. Measure the distance of the markers between ropes and bed plate.

7. Record the measure.

   Check that the measure corresponds to the layout drawings.
8. Drive the car off the limit switch by driving down with RDF about 150 mm.
9. Switch off the RDF.

   The car relevels to landing.
10. Close the control cabinet door.

X0000072568 B.2

Related information

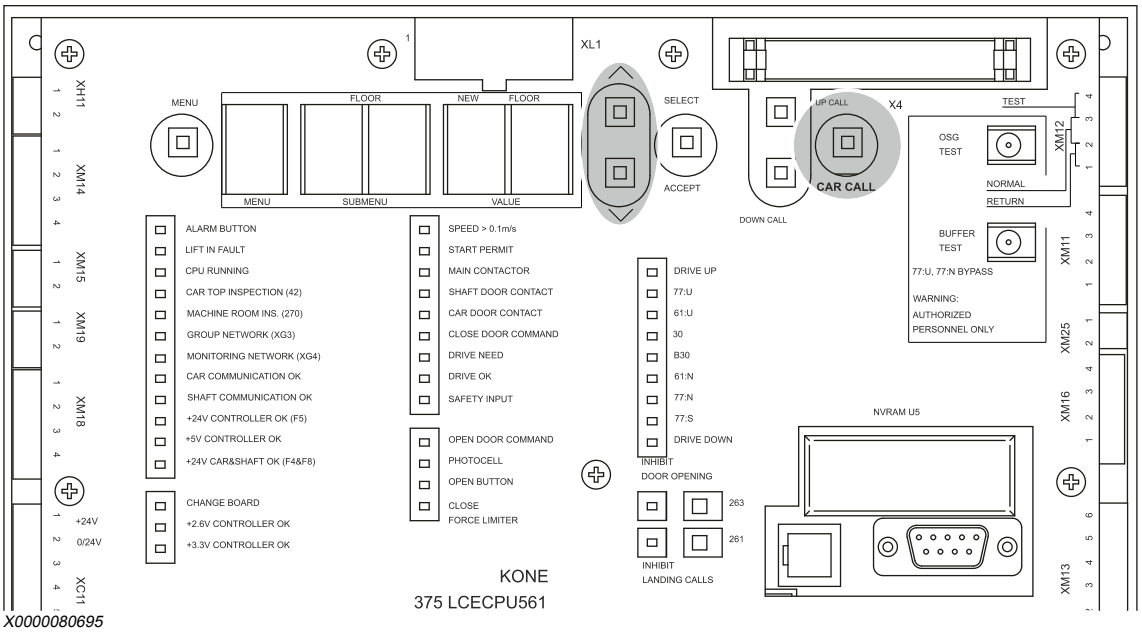
– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)

11.3.11 Traction tests

11.3.11.1 Test traction (stopping test)

NOTE: Perform the test with empty car (with 0% load).

1. Give a car call to the bottom landing. Use Lift Controller Electrification User Interface (LCEUI).
   1. Select the floor with arrow buttons.
   2. Press CAR CALL.



X0000080695

2. Give a car call to the topmost landing using LCEUI.
   1. Select the floor with arrow buttons.
   2. Press CAR CALL.
3. Wait a moment until the elevator has reached the rated speed. Then switch on Recall Drive Feature (RDF).

   The elevator must stop.

   NOTE: The machine brakes must stop the car completely.
4. Repeat the test twice.

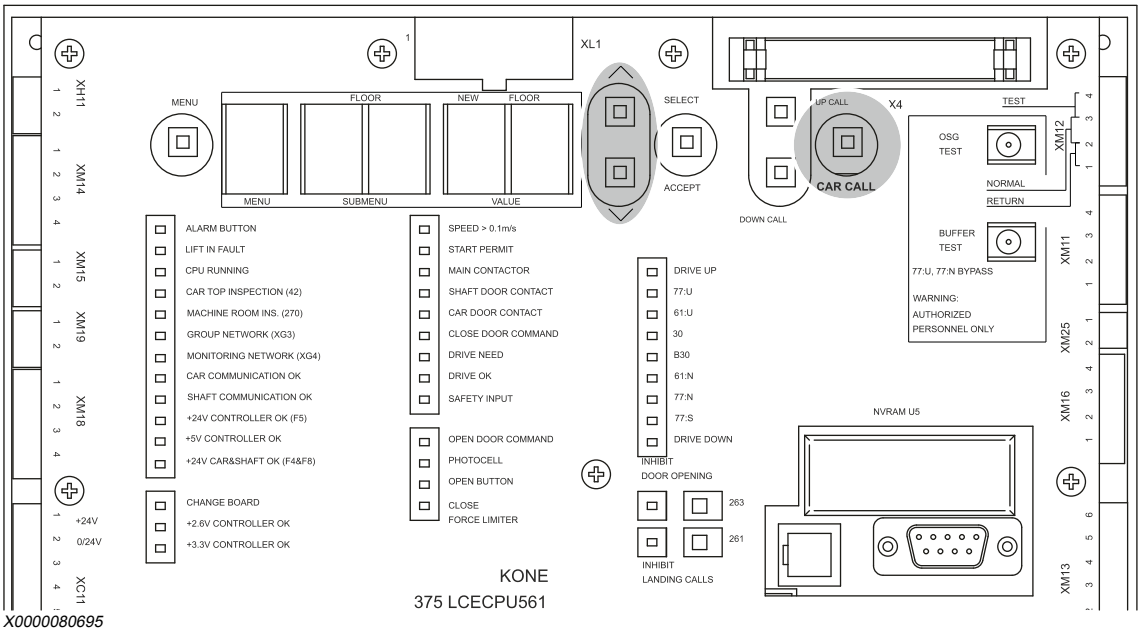
X0000072519 C.2

11.3.11.2 Test traction (stalling test) and counterweight buffer

NOTE: Perform the test with empty car (with 0% load).

1. Switch RDF (270) OFF.

2. Give a car call to the topmost landing with LCEUI.
    1. Select the floor with arrow buttons.
    2. Press CAR CALL.



X0000080695

3. Switch RDF (270) ON.
4. Drive the counterweight on the buffer with RDF.

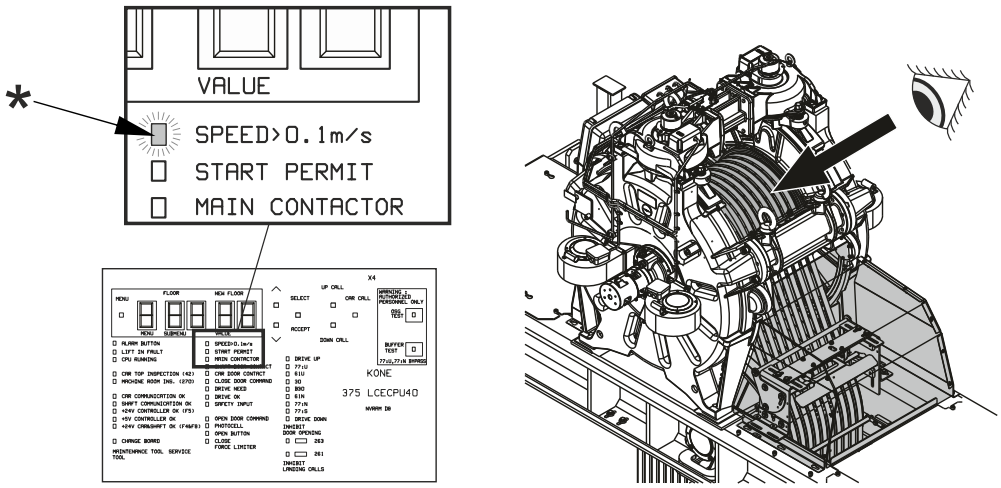
5. When the counterweight has reached the buffer, continue driving the car up. Drive the car up with RDF approximately three seconds.
   1. In case of steel ropes, observe the machinery.
      – Ropes are slipping on traction sheave, while traction sheave is rotating.

      OR

      – Machinery is stopped by the controller.

      The car must not move.
   2. In case of KONE UltraRope®, observe the "SPEED > 0.1m/s" LED in the LCEUI to ensure that the motor tries to rotate.

      Observe also the ropes on traction sheave, slipping should NOT occur.



X0000097442

      The car must not move.
6. Drive the car back to floor level by driving down with RDF.

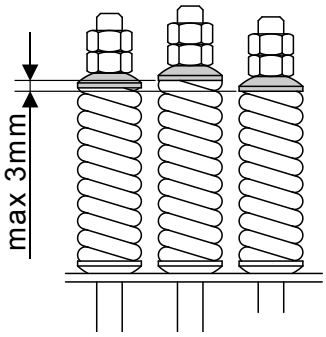
   Press 270:RB + 270:N simultaneously.
7. Return the elevator to normal use.
   1. Switch RDF OFF.
   2. Enable landing calls and door opening by using LCEUI switches 263 and 261.
   3. Close the control cabinet door.

X0000072575 A.8

11.3.12 Check suspension rope tension (2:1 or 4:1 roping)

1. Check the spring lengths of the suspension rope anchors with slide gauge.

   Washers at the rope ends should be at the same level. The maximum deviation is 3 mm.



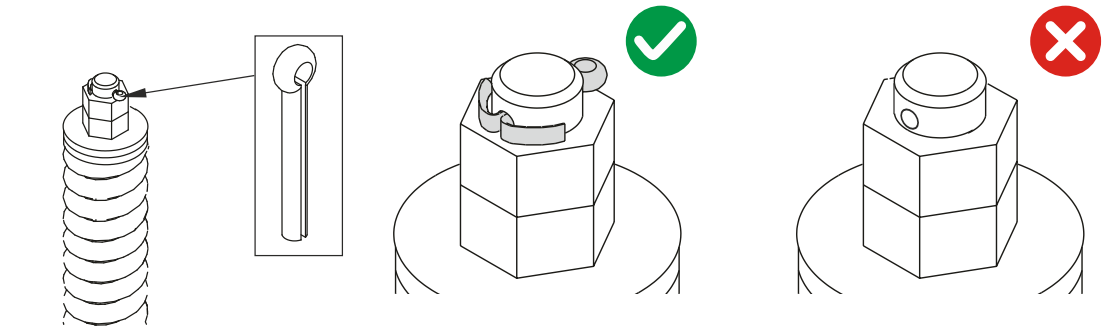
X0000055383

If suspension rope tension deviation exceeds 3 mm, equalize the rope tension.

   1. Adjust the nuts by loosening or tightening, if needed.
   2. Drive the elevator twice between terminal floors.
   3. Check the tensions again.
   4. Readjust, if needed.

2. Check the lock nuts and split pins.

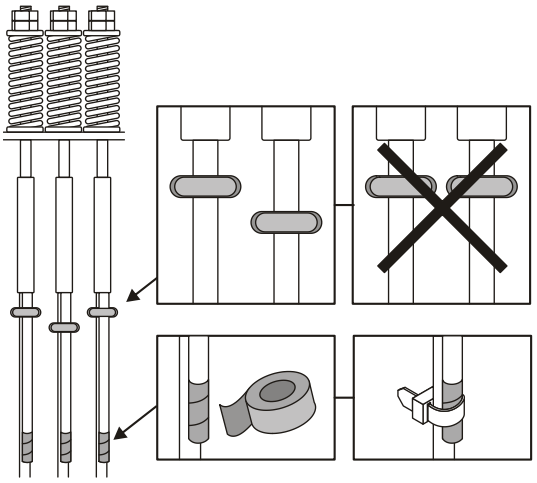
   Lock nuts and split pins must be in place and tight. Insert new split pins, if missing.



X0000062090

3. Check the rope clips.

   Rope clips must be in place and tight. Tighten, if needed.



X0000033016

X0000056381 C.2

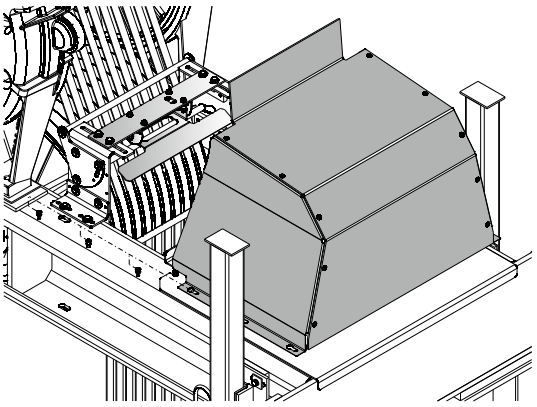
Related information

– *Prepare equipment and safety (55)*

11.3.13 Rope alignment detector (RAD) test

11.3.13.1 Prepare rope alignment detector (RAD) test

1. Switch on the recall drive feature (RDF) (270).
2. Switch off the main power.
3. Remove all needed machine covers to access the rope alignment detector (RAD).

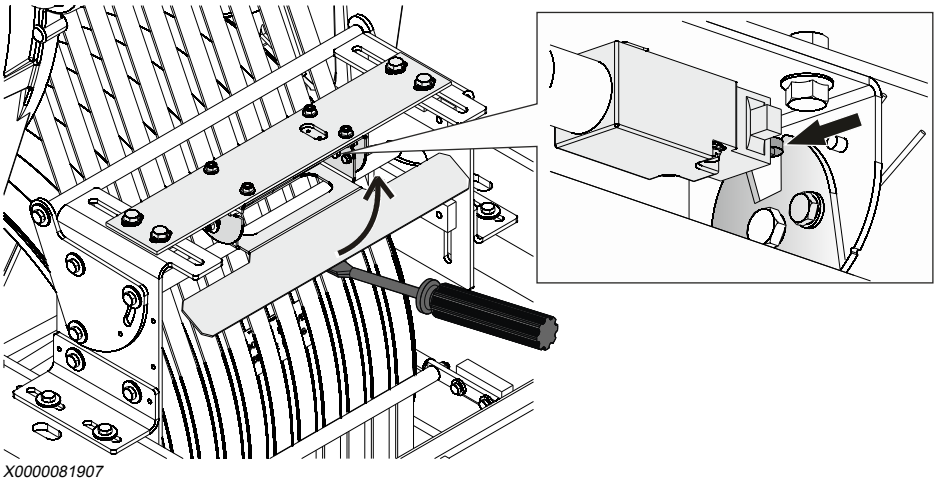


X0000081198

X0000095377 B.3

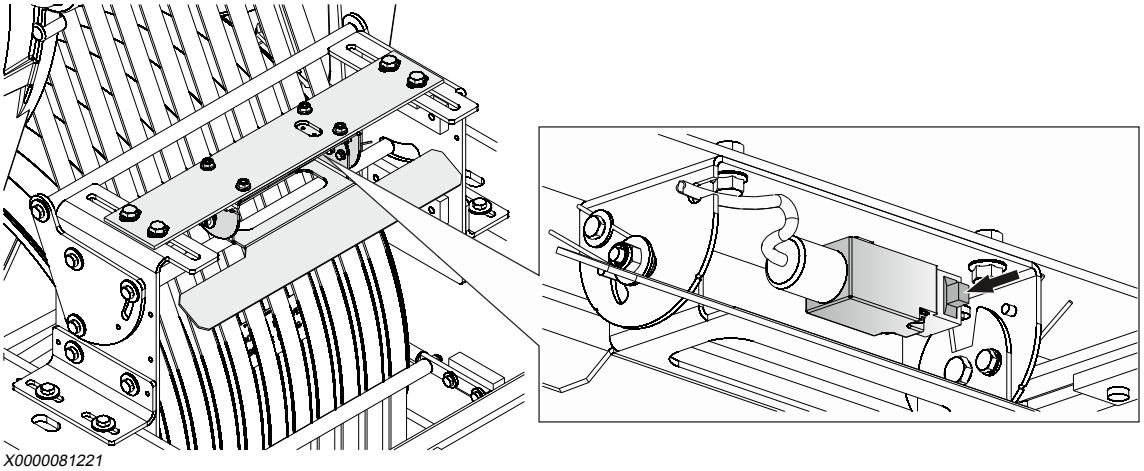
11.3.13.2 Test machine RAD

1. Move the RAD manually until the limit switch activates.



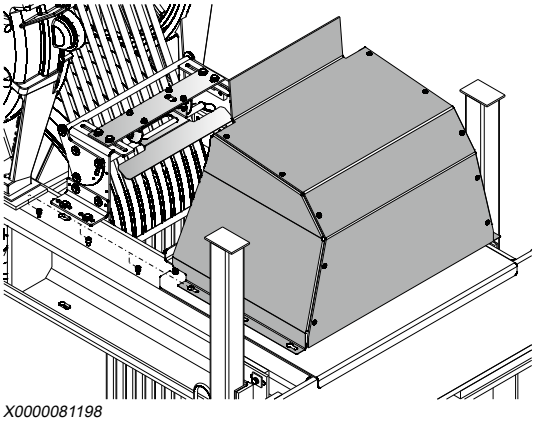
X0000081907

2. Ensure that RDF is on.
3. Switch on the main power.
4. Check that the fault code F0255 is active.
5. Switch off the main power.
6. Reset the RAD switch.



X0000081221

7. Install all removed machine covers.

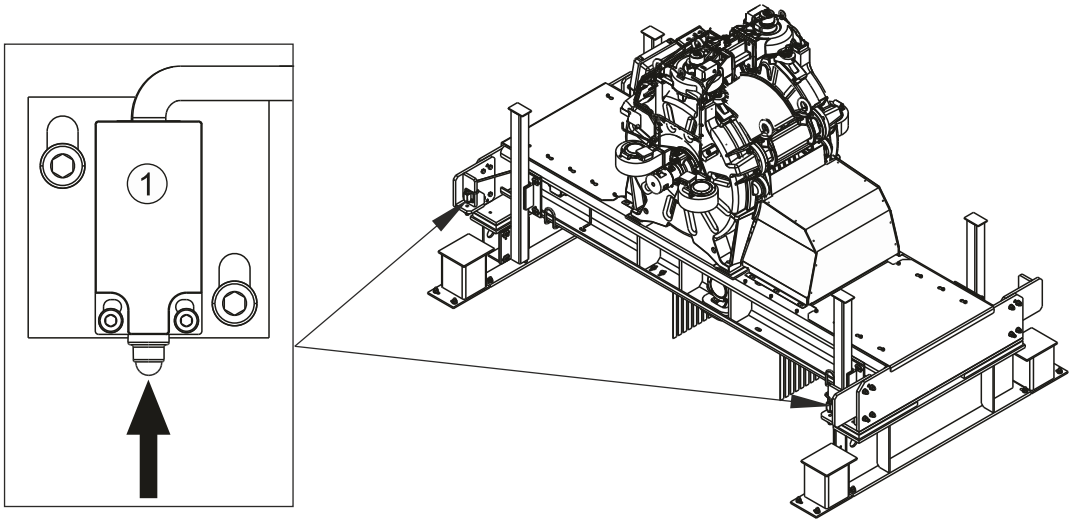


X0000081198

8. Switch on the main power.
9. Switch off the RDF.

X0000081910 A.3

11.3.13.3 Test bed plate safety switches



X0000100194

1. Switch on the RDF.
2. Activate safety switch (1).
3. Try to drive with RDF.
   The elevator must not move and the safety input LED must not lit.
4. Reset safety switch (1).
5. Repeat steps 2 — 4 to the other safety switch.
6. Switch off the RDF.

X0000100178 B.2

11.3.14 Test counterweight derailment system

11.3.14.1 Counterweight derailment simulation test

1. Place a barrier inside the car.
2. Gain access to car roof and run the elevator to the middle of the elevator shaft.

3. Place ring and string shorting springs on the 12VDC and GND strings at each side of the counterweight (CWT) frame.

   Make sure the shorting springs are 15 cm above the top ring on the CWT frame.

X000028057

Figure 31: Shorting spring attached to string above top ring on CWT frame.

4. Secure the shorting spring to the string by inserting a piece of steel wire into the spring.

   The steel wire must be placed so that it prevents the spring from coming off of the string during impact.

X000028058

Figure 32: Steel wire inserted into shorting spring.

5. Bend the ends of steel wire in such a way that it will ensure that the shorting springs will "ride" on their respective strings when pushed by the CWT rings.

X000028059

Figure 33: Steel wire is bent to ensure shorting spring cannot disengage from string during impact with CWT ring.

6. Drive the elevator car with inspection drive to the topmost floor.

   Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving. If driving upwards, remember to look up to ensure that you do not hit any equipment or shaft ceiling.
7. Exit the car roof.
8. Switch off the inspection drive.
9. Go to the machine room.
10. Ensure that car is empty and Inhibit Landing Calls by moving slider switch 261 on LCEUI.
11. Send the car to the bottom landing from the LCEUI.
12. Observe that when elevator is passing the mid-point of the shaft and CWT rings hit the shorting springs, the elevator makes an emergency stop.
13. Verify that after the emergency stop, the car will correct in the direction away from the CWT and will come to the nearest floor and open the door.
14. Place a car call from the LCEUI and observe that the car does not respond to it.
15. Verify elevator mode shows 4-1-16.

X0000091359 B.3

11.3.14.2 Recovery of car after counterweight derailment simulation test

1. Change parameter 1-86 to "0".
2. Turn the main power OFF and wait 20 seconds.
3. Switch the main power back ON.
4. Turn the Recall Drive Feature (RDF) switch 270 to ON position, and move the car to a floor where car top access can be gained.
5. Go to car roof.
6. Drive the car with inspection drive to position where removal of the shorting springs is possible.
7. Remove shorting springs from the strings.
8. Exit the car roof and go to the machine room.
9. Return elevator to Normal operation.
10. Change parameter 1-86 to "1".
11. Turn the main power OFF and wait 20 seconds.
12. Switch the main power back ON.
13. Verify that the elevator mode is 4-1-0.
14. Enable landing calls and door operation by using LCEUI switches 263 and 261.
15. Make a few car and landing calls to verify that the elevator is in Normal service.

X0000091344 A.3

11.3.15 Test seismic switch

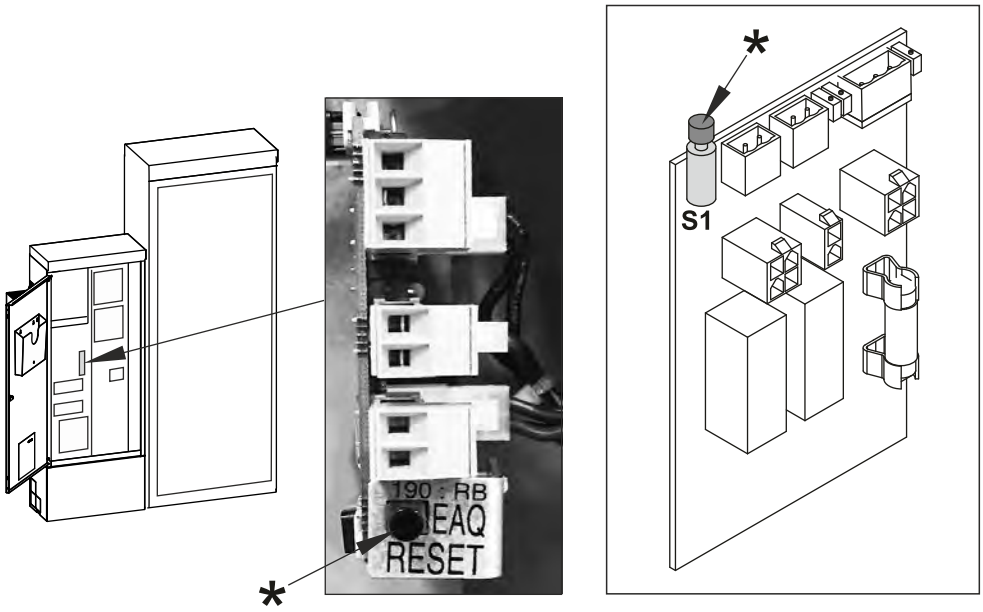
Refer to manufacturer's manual on how to run a test routine to trigger the seismic switch output.

NOTE: This test puts all elevators in the group into seismic mode.

1. Run the car to the topmost floor.
2. Place a car call from the Lift Controller Electrification User Interface (LCEUI) to the bottom floor.
3. While car is running at rated speed, conduct test routine of the seismic switch.
4. Observe that all cars make a controlled stop at the next available landing. Open their doors.
5. Verify that all elevators in the group show elevator mode 4-1-16.
6. Place a car call from the LCEUI on each car. Observe that neither of the cars responds to it.
7. Follow manufacturer's instruction. Reset the seismic switch.
8. Observe that the elevators do not respond to the car or landing calls.
9. Verify that the elevator mode shows 4-1-16.
10. Press earthquake (EAQ) reset push button on each car. Observe that the elevator mode has changed to 4-1-0 on each car.

    Seismic device reset is done from 373 LCEEAQ board. Press the reset button.

    Board location possibly varies in different controllers.



X0000092816

11. Verify that the elevators are in normal drive. Make a few car and landing calls.
12. Enable landing calls and door operation. Use LCEUI switches 263 and 261.

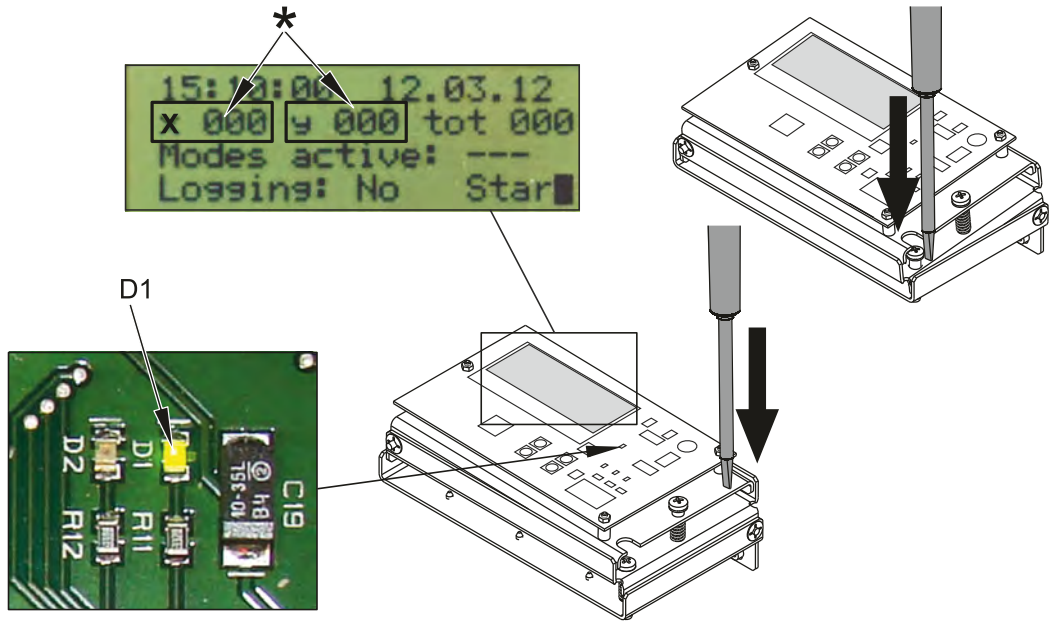
X0000091338 D.2

11.3.16 Test sway detector

1. Change the horizontal adjustment temporarily for checking.
    1. Push the device plates one at the time with screwdriver.
    2. Verify that X and Y values are changing.

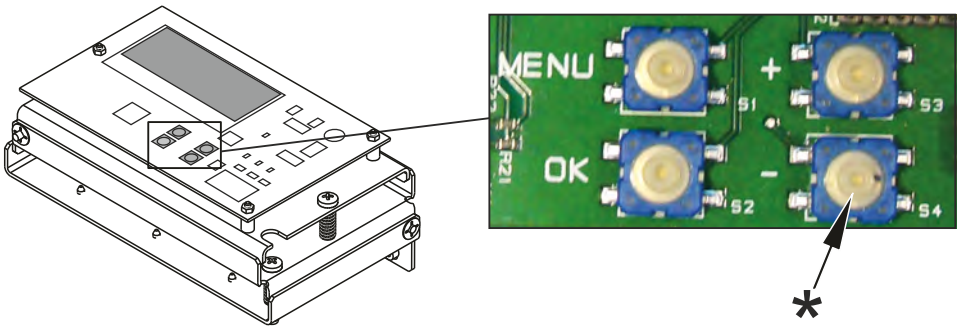
       LED D1 is blinking when the power is ON and the device is in stand by mode.

       The acceleration reading (*) on display indicates the direction the board is leaning to.



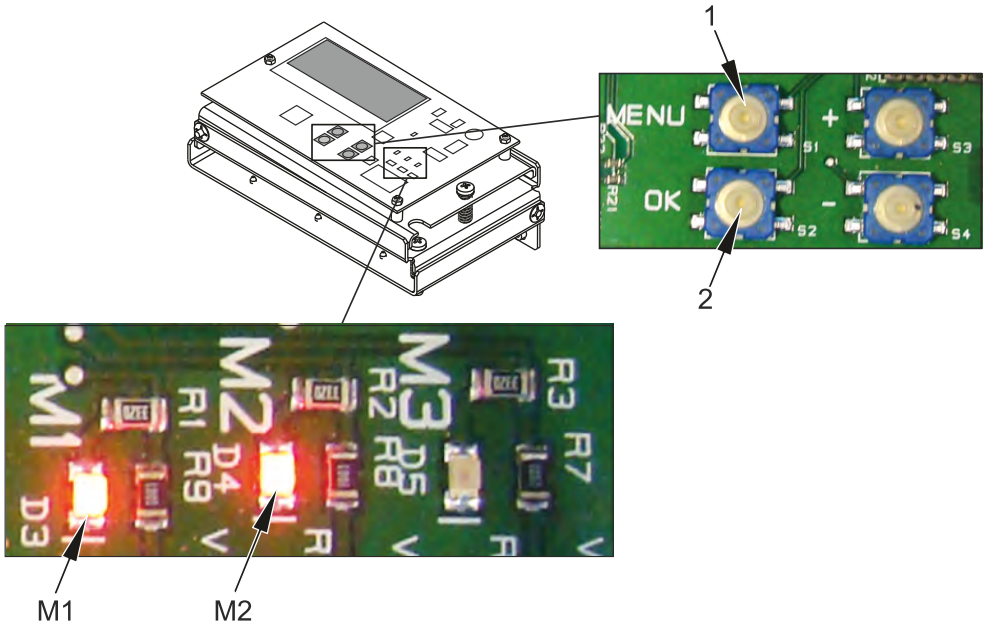
X0000097400

3. Check both two directions.
4. Reset High wind and Storm operation modes by pressing minus (-) -button (*).



X0000097466

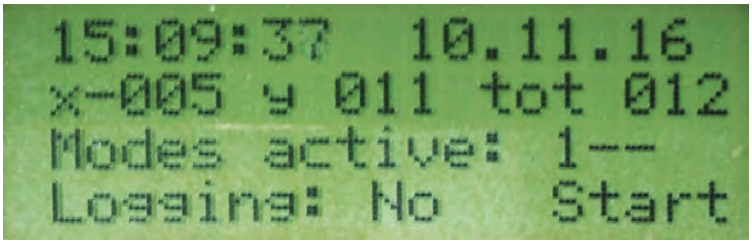
2. Test High wind operation mode (mode 1).
    1. Activate the test mode by pressing "MENU"-button (1) 1 – 3 times ("TEST MODE" is shown on the screen).



X0000097414

    2. Press "OK"-button (2) once to activate Mode 1 (high wind mode).

       LED M1 lights up.

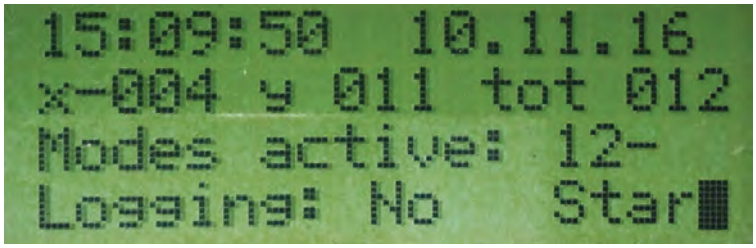


X0000097398

    3. Check that the elevator operates according to High wind operation mode description (elevator drives at reduced speed).

3. Test Storm operation mode (mode 2).
    1. Press "OK"-button once more.

       LED M2 lights up.



X0000097411

    2. Check that the elevator operates according to Storm operation mode description (elevator serves remaining calls and then stops to specified parking floor).
4. Return to main screen by pressing "MENU"-button.

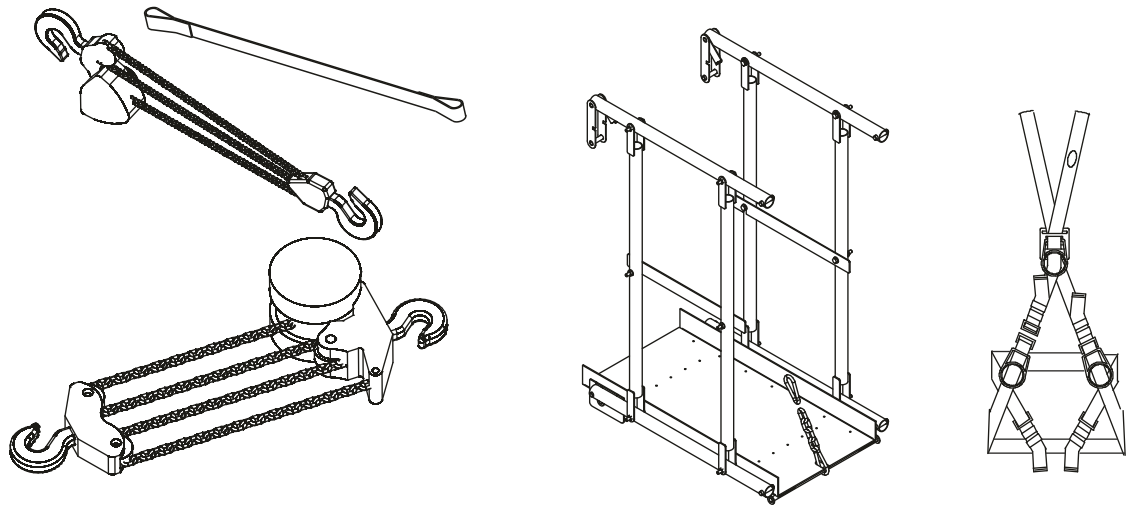
X0000095647 A.8

Related information

– Sway detector operation modes (42)

11.3.17 Rescue tools

11.3.17.1 Rescue tools (condition check)

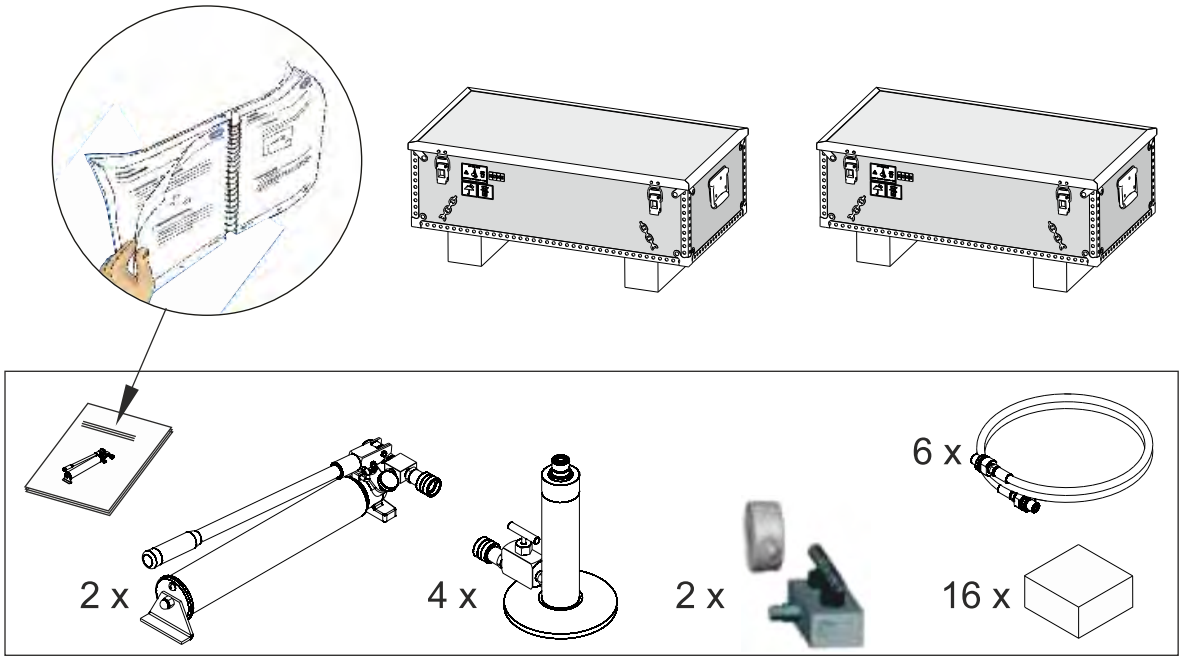


X0000062735

NOTE: Tools may vary in different installations.

X0000056423 A.5

11.3.17.2 KONE UltraRope hydraulic lifting tool (condition check)



X0000096407

NOTE: Follow the instructions stored beside the tool.

X0000068728 A.8

11.3.18 Check start counter and fault codes

1. Check the start counter.
   - In case of traditional steel ropes, use LCE User Interface LCEUI (4_2).
   - In case of KONE UltraRope™, check main floor start counter 4_7.

   NOTE: In case of KONE UltraRope™, the ropes must be replaced before the main floor start counter exceeds the allowed counter limit.

   Table 18: Main floor start counter limits as function of the amount of diverting pulleys.

Amount of diverting pulleys	Main floor start counter limit
2	4 000 000
1	6 000 000
0	12 000 000

2. Record fault codes.

   Use LCE User Interface LCEUI (E_1, max. 99 faults).
3. Enable landing calls and door opening.

   Use switches 261 and 263 on LCECPU printed circuit board.

4. Close the control cabinet.
5. Record start counter result.

X0000096028 B.4

11.4 Periodical tests in elevator shaft

WARNING: Move safely between landing and elevator car roof, and between landing and pit. Follow the method approved by your local unit.

---

1. Check rope condition monitoring (LCECMD), if applicable.
2. Go to the car roof.
3. Close the landing doors.

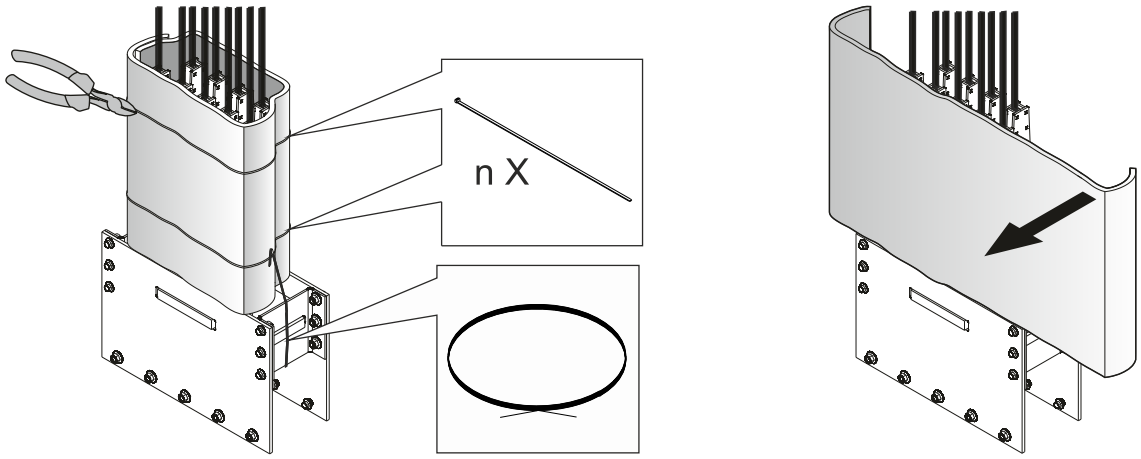
   Check that the landing doors are mechanically locked.
4. Check that the car roof safety switches operate.
5. Drive downwards on inspection drive.
6. During the drive, perform the following checks and tests:
   1. Shaft lights throughout the elevator shaft
   2. Snag point protection devices, if applicable
7. On each landing, check the electrical and mechanical function of landing doors.
8. In the middle of the shaft, check:
   1. Suspension ropes
   2. Overspeed governor rope
   3. Compensation rope
   4. Upper car retainers, if applicable
   5. Upper and lower counterweight retainers, if applicable
   6. Compensation chain fixings from counterweight side, if applicable.
   7. Pulleys on car roof and on top of counterweight
9. Switch off the Recall Drive Feature (RDF) (elevator to normal).
10. Release the stop buttons.
11. Go to the landing.

X0000088319 C.2

11.4.1 Rope condition monitoring LCECMD

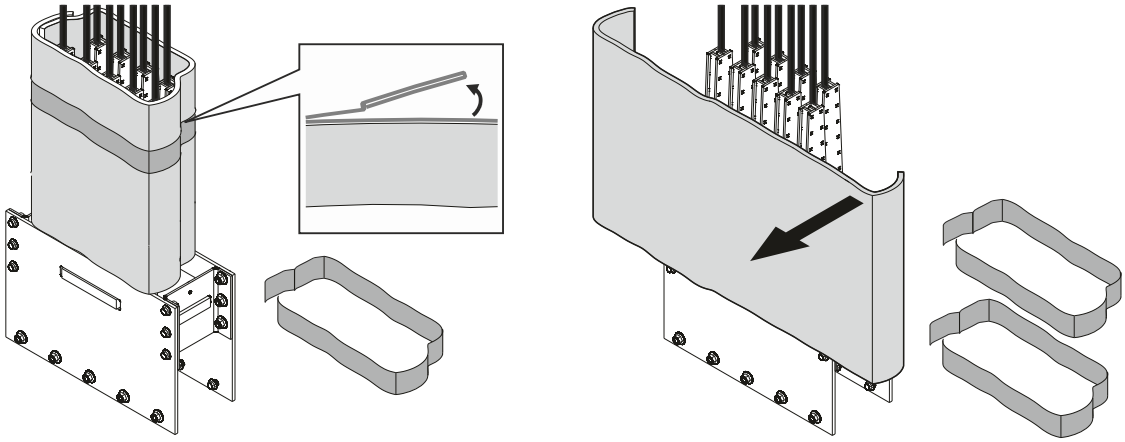
11.4.1.1 Test LCECMD

1. Remove the thermal insulation if not removed already.



X0000054766

Sometimes the thermal insulation has been fixed using aluminium tape. Remove the tape to remove the thermal insulation.



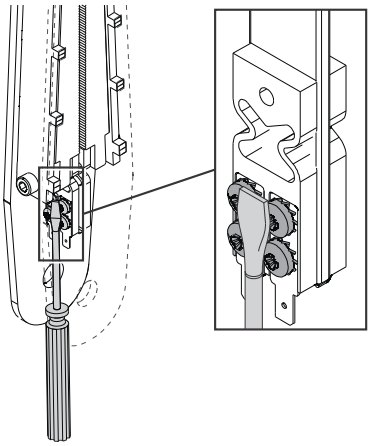
X0000225887

NOTE: If old thermal insulation material is used, new type of insulation and aluminium tape is needed for replacement.

NOTE: The aluminium tape can be reused a few times. Use new tape if the old tape cannot be used anymore.

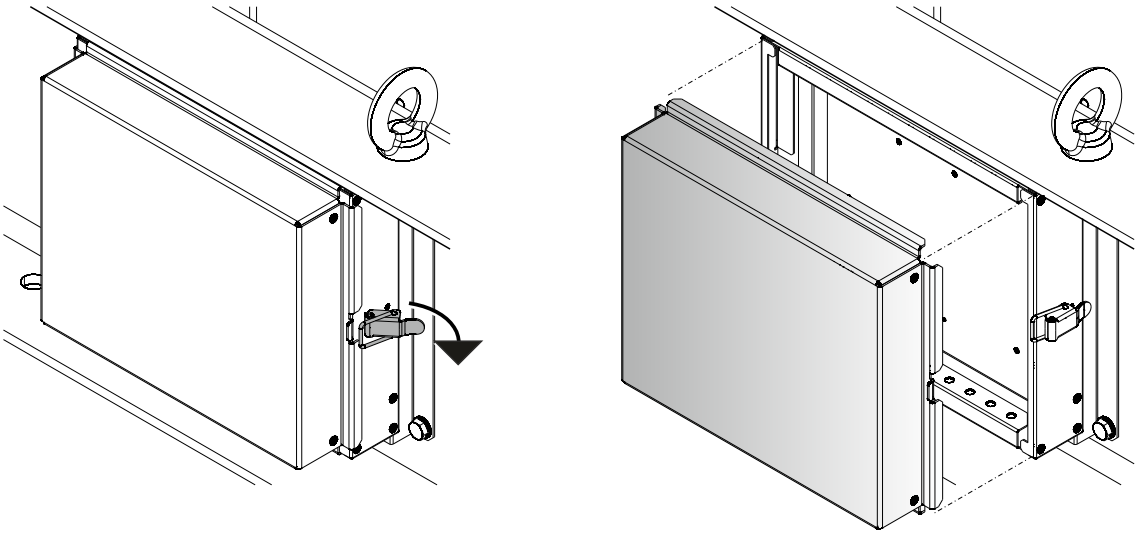
2. With a screwdriver, make an overconnection on the screw bases between the rope terminals of one rope, for example, rope 1.

   Keep the overconnection for 5 seconds and remove it.



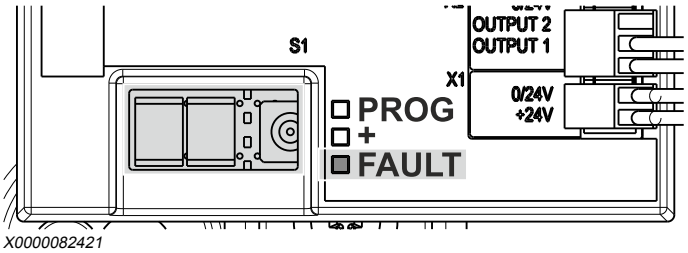
X0000082419

3. Open the LCECMD box.



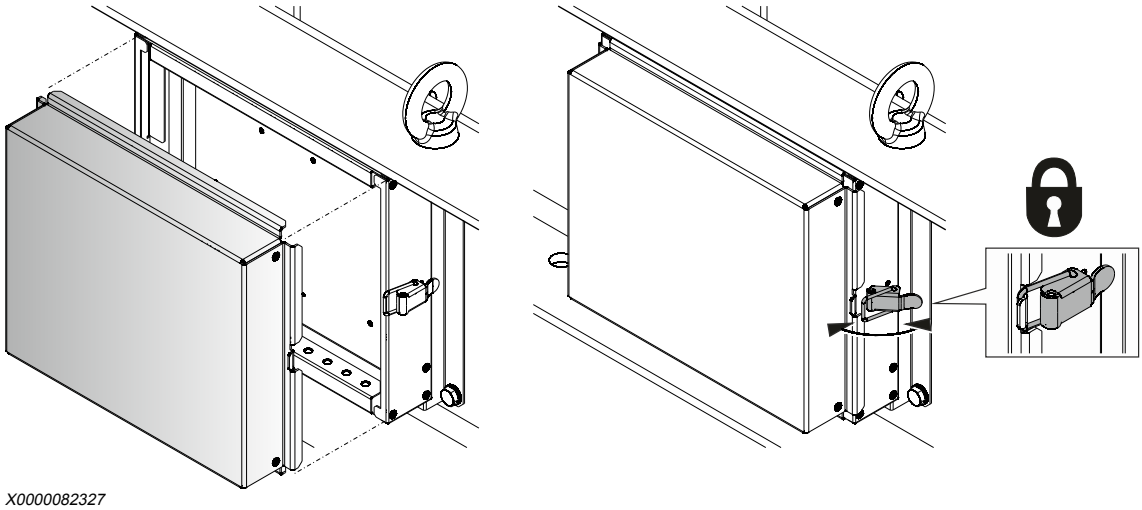
X0000082181

4. Check that on LCECMD, the FAULT LED is ON and the fault code "PU" of the overconnected rope is blinking, for example, 1.



X0000082421

5. Close the LCECMD box.



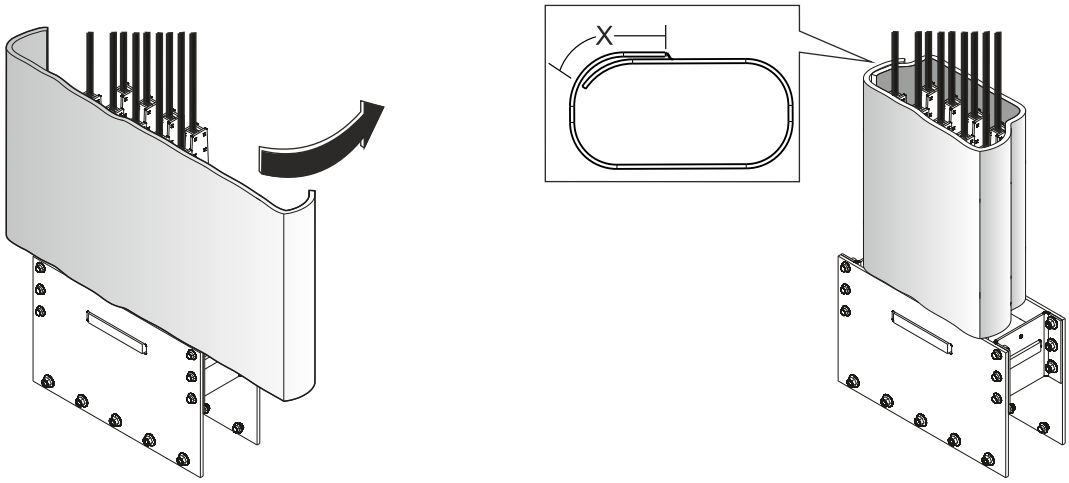
X0000082327

6. Install thermal insulations around the rope terminals.

   NOTE: If you need to access the rope terminals later during the same visit, do not install the thermal insulation yet. Make sure that you install the thermal insulation before you leave the site.

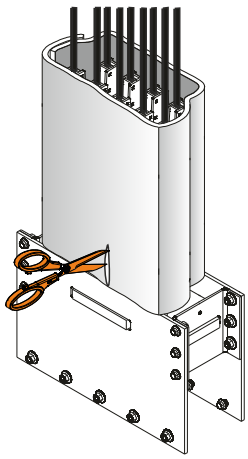
   1. Wrap the insulation around the terminals reflective side outwards.

      Overlapping (X) must be 200—500 mm, shorten the overlap if necessary.

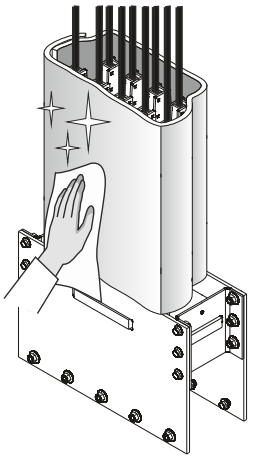


X0000104962

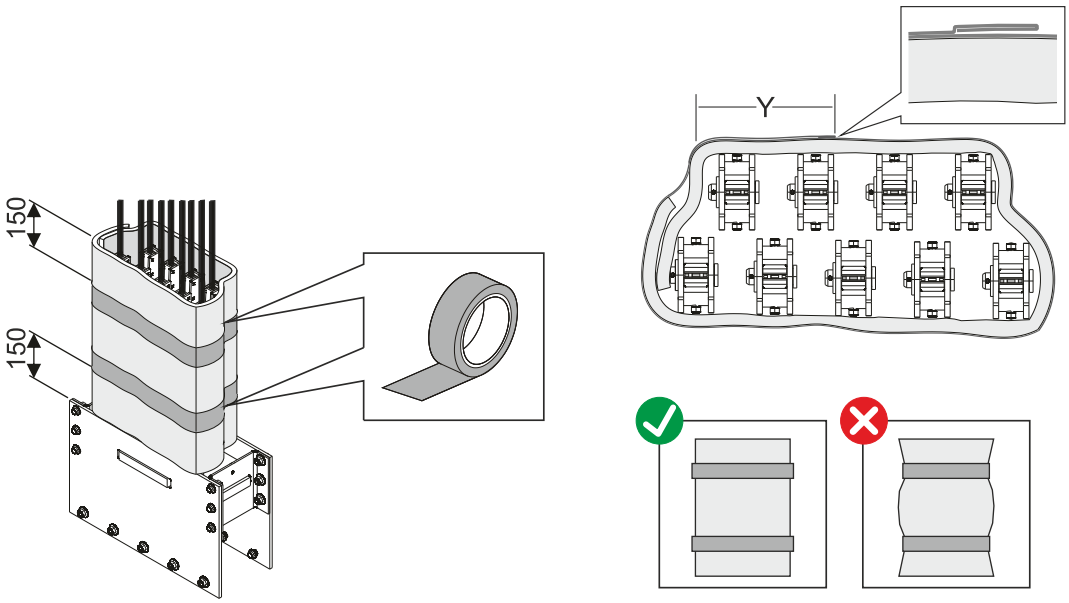
   2. Cut an opening for the CMD cables using scissors, if needed.



   3. Clean the insulation surface before fastening.



4. Fasten the insulation loosely against terminals using aluminium tape.
   Tape overlapping (Y) must be 250 mm and the tape end must be folded.



X0000104964

5. Check that the thermal insulation stays in place and that the aluminium tape holds.

X0000082364 E.2

11.4.1.2 Check LCEUI for LCECMD fault codes

1. Go to the machine room and open the control cabinet.
2. Check the fault codes with the menu E_1 on LCEUI.
   The fault codes F0243 and F0245 must be available on LCE.
3. Reset the elevator by switching the main power (220) OFF and back ON.
   Ensure that the fault codes F0243 and F0245 do not return.
4. Reset the fault codes on LCE with the menu E_2.
   Ensure that the fault codes F0243 and F0245 disappear from LCE.

X0000082427 B.2

11.4.2 Car roof safety switch tests

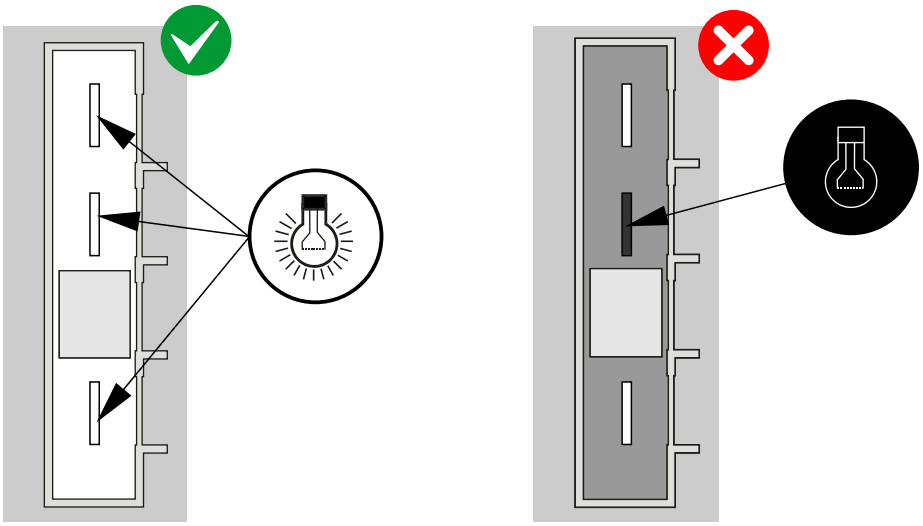
NOTE: The same procedure can be used to test all safety chain switches on the elevator car roof, for example trap door and blocking device.

1. Open the trap door, if applicable.
2. Try to drive with inspection drive.

   The elevator car should not move.
3. Test the other trap or exit doors in the same way.

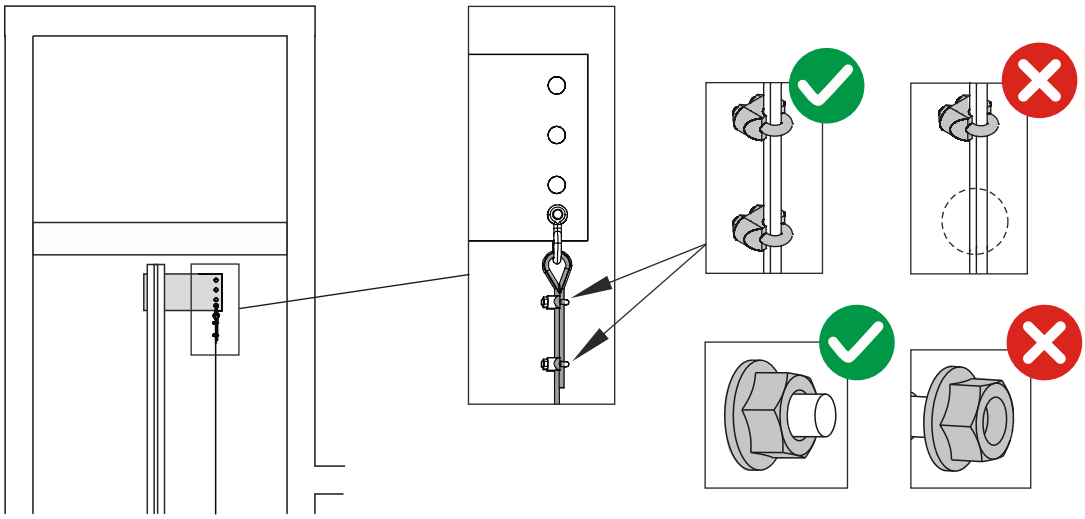
X0000074955 B.2

11.4.3 Shaft lighting (condition check)



X0000054741
X0000003019

11.4.4 Snag point protection devices (condition check)



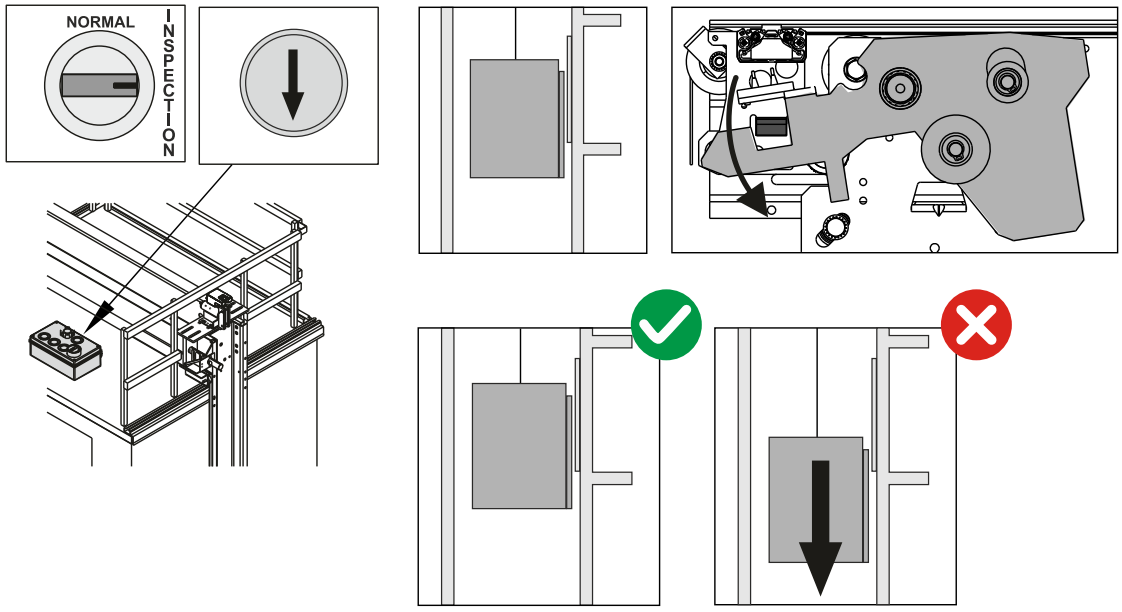
X0000149846
X0000086004 C.2

11.4.5 Test landing door electrical and mechanical functions

WARNING: Move safely between car roof and landing. Use work positioning equipment or restraint systems when required.

1. Drive down on inspection from car top.
2. Open the landing door lock from the lock roller, when the elevator car is moving.

   The car must stop.

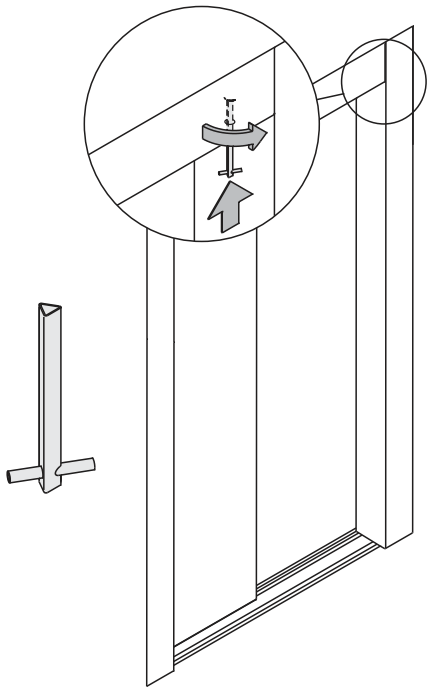


X0000104481

3. Push or pull the landing door to open direction.

   Landing door lock must keep the door locked mechanically.
4. Go to the landing, when the car roof is on landing level.

5. Manually open the landing door with the emergency opening device (EOD).
   Verify that EOD operates.



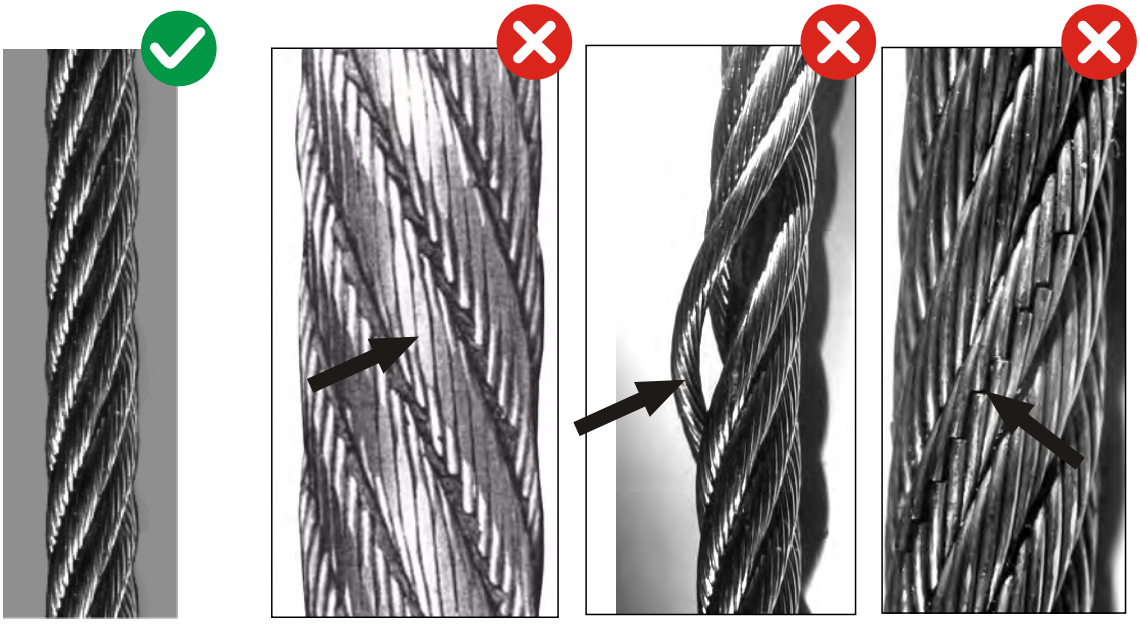
X0000056767

6. Repeat EOD test on each landing.

X0000074969 E.2

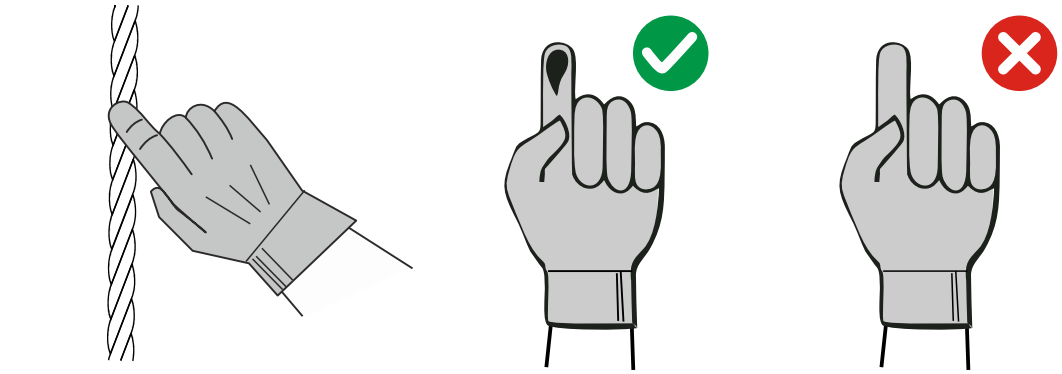
11.4.6 Suspension ropes

11.4.6.1 Steel suspension ropes (condition check)



X0000055039

WARNING: If the elevator does not pass the test, take the elevator out of use. Do not return the elevator into normal use until the problem is solved.

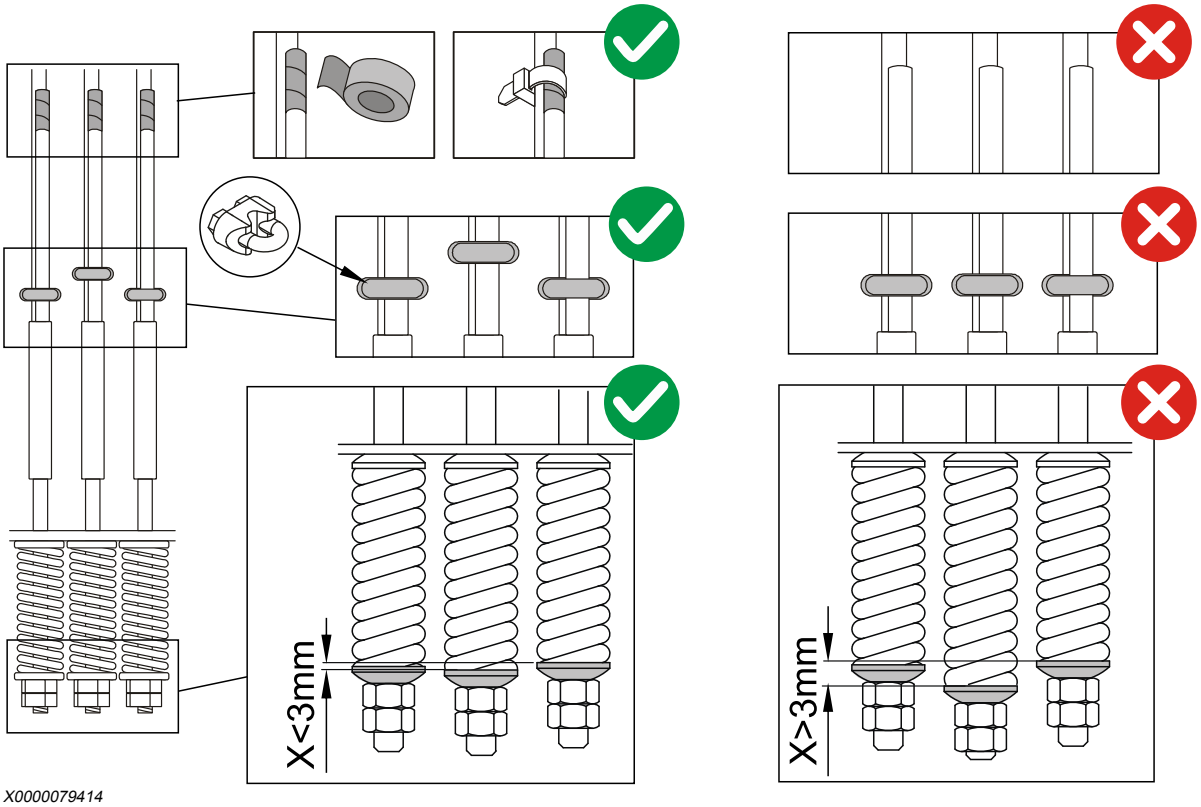


X0000055214
X0000003017

Related information

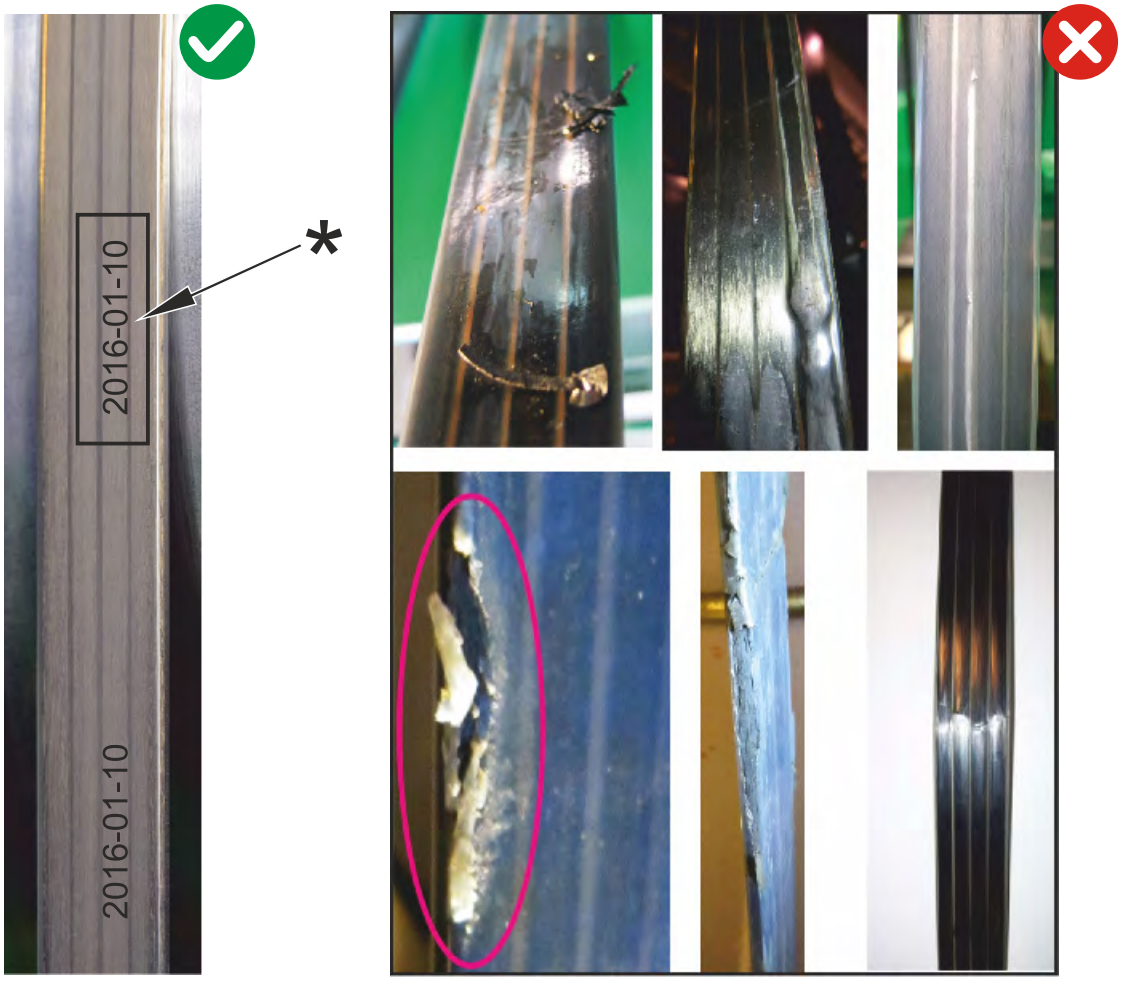
– *Prepare equipment and safety (55)*

11.4.6.2 Steel suspension rope anchors (condition check)



X0000079414
X0000078831 A.4

11.4.6.3 KONE UltraRope® suspension ropes on counterweight side (condition check)



X0000070927

NOTE: Check the manufacturing date (*). Ropes must be replaced before they are 15 years old (counting from the manufacturing date).

X0000068046 B.2

11.4.6.3.1 Clean KONE UltraRope®

1. If needed, clean the ropes.

   Use one of these substances:

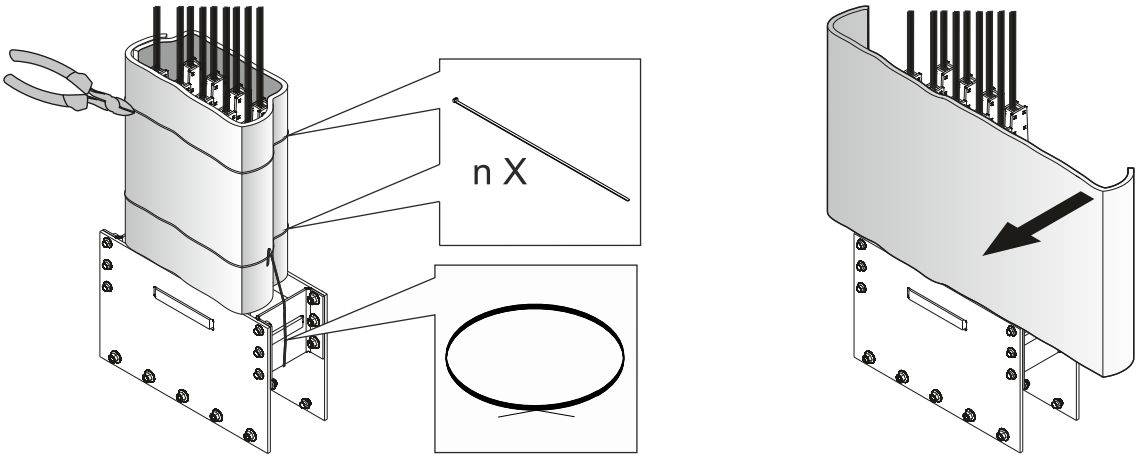
   – Würth R1 Universal Cleaner 0893 125 005
   – Würth Pineline Power Wash 0893 012 090
   – Water

2. Finish by wiping the rope dry.

X0000113189 A.2

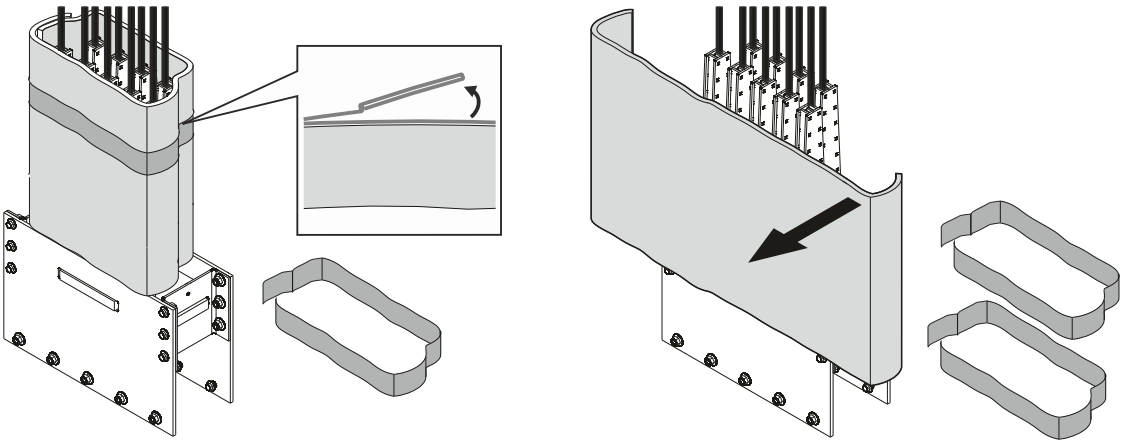
11.4.6.4 KONE UltraRope® suspension rope terminals (condition check)

1. Remove the thermal insulation from the rope anchorage if not removed already.



X0000054766

Sometimes the thermal insulation has been fixed using aluminum tape. Remove the tape to remove the thermal insulation.



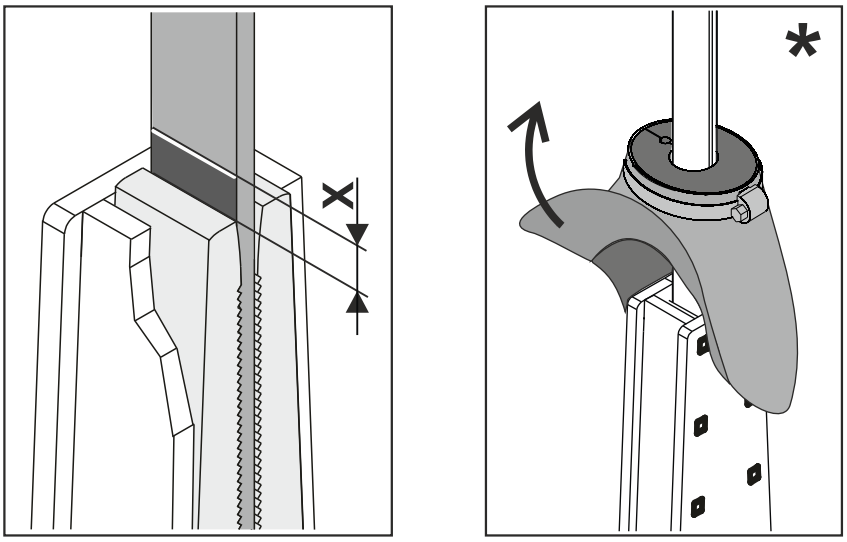
X0000225887

NOTE: If old thermal insulation material is used, new type of insulation and aluminum tape is needed for replacement.

NOTE: The aluminum tape can be reused a few times. Use new tape if the old tape cannot be used anymore.

2. Check the rope movement between the reference line and the wedges.

   The reference line is drawn during installation.



X000029788

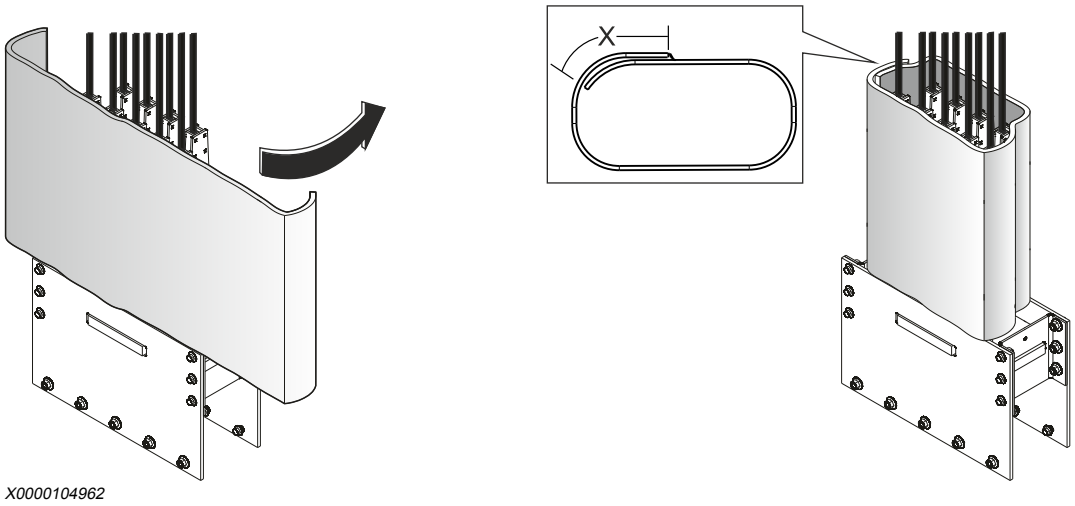
The maximum allowed movement (X) is 10 mm. If the rope has moved more, replace the terminal and the rope.

3. Install thermal insulations around the rope terminals.

   NOTE: If you need to access the rope terminals later during the same visit, do not install the thermal insulation yet. Make sure that you install the thermal insulation before you leave the site.

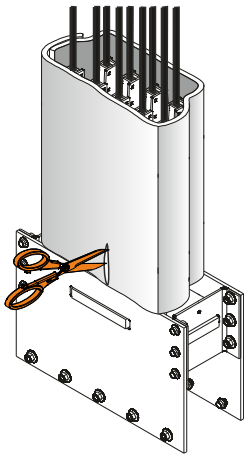
   1. Wrap the insulation around the terminals reflective side outwards.

      Overlapping (X) must be 200—500 mm, shorten the overlap if necessary.

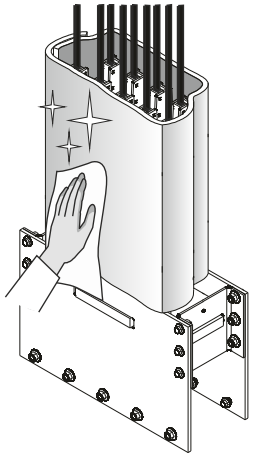


X0000104962

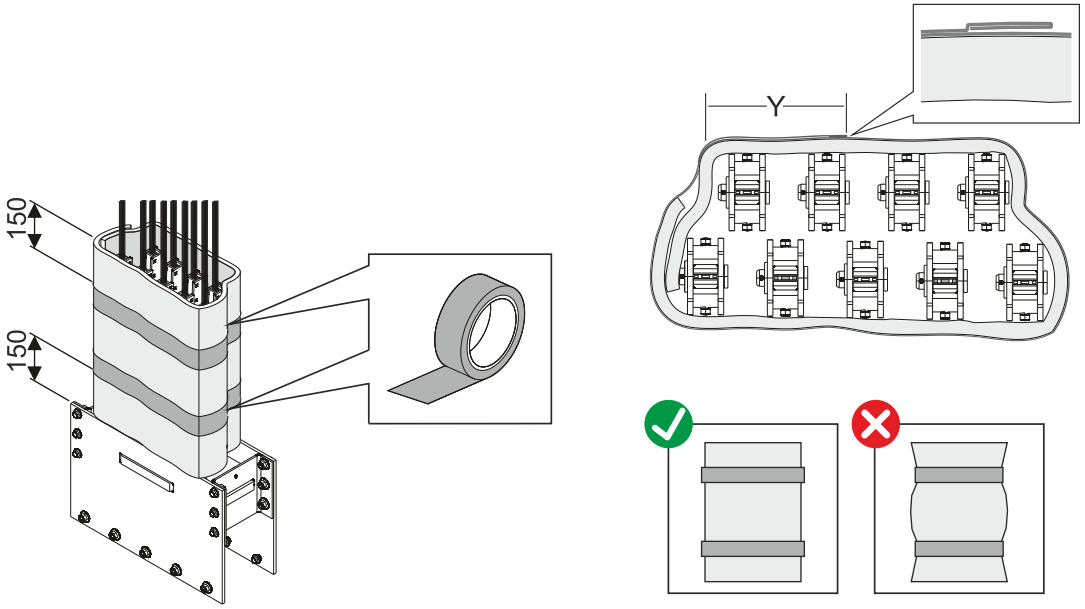
   2. Cut an opening for the CMD cables using scissors, if needed.



   3. Clean the insulation surface before fastening.

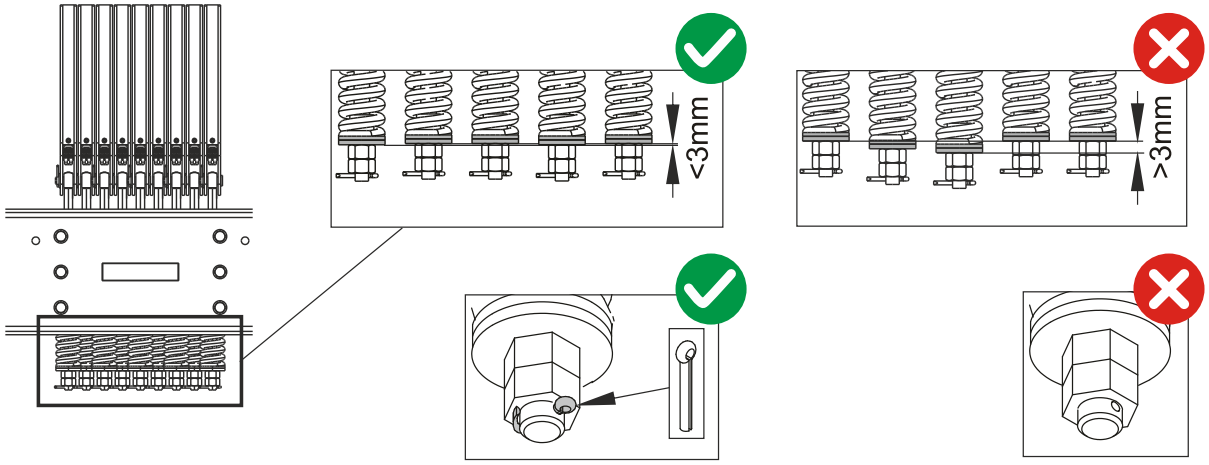


4. Fasten the insulation loosely against terminals using aluminum tape.
   Tape overlapping (Y) must be 250 mm and the tape end must be folded.



X0000104964
X0000068126 C.2

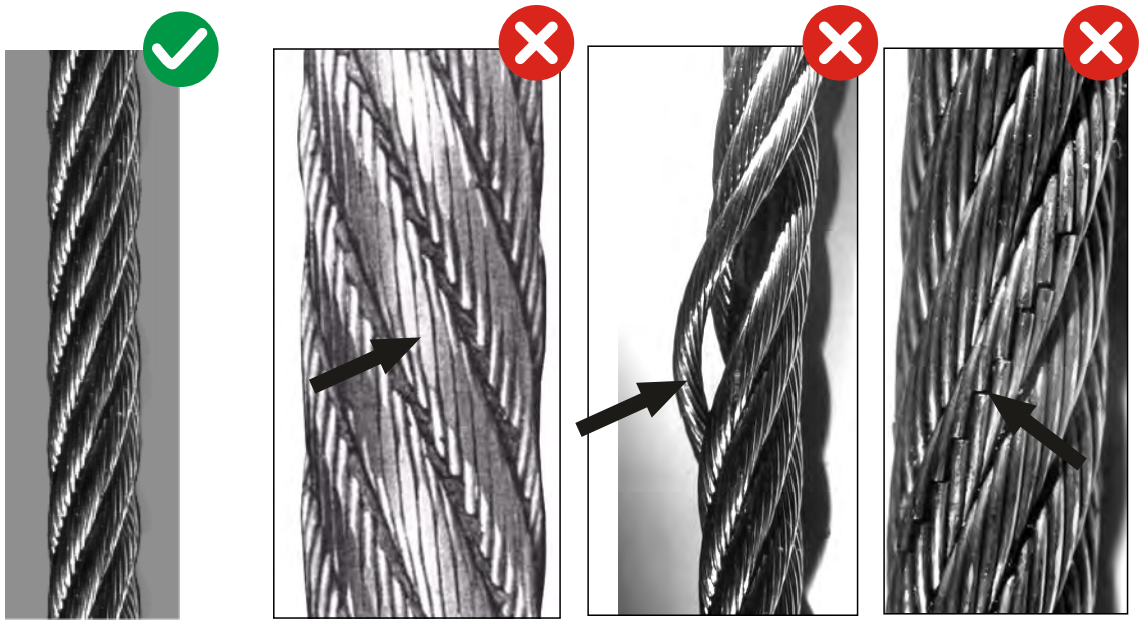
11.4.6.5 KONE UltraRope® suspension rope tension (condition check)



X0000070607
X0000108499 A.2

11.4.7 Overspeed governor rope (condition check)

WARNING: Do not lubricate the overspeed governor rope.



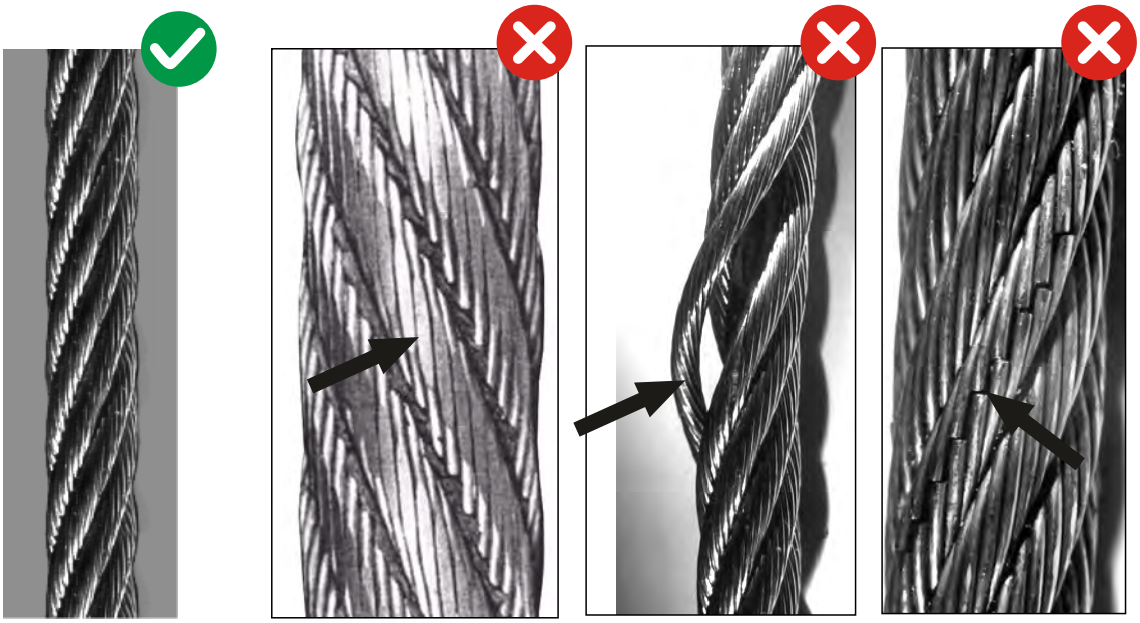
X0000055039
X0000003021

Related information

– *Prepare equipment and safety (55)*

11.4.8 Compensation rope

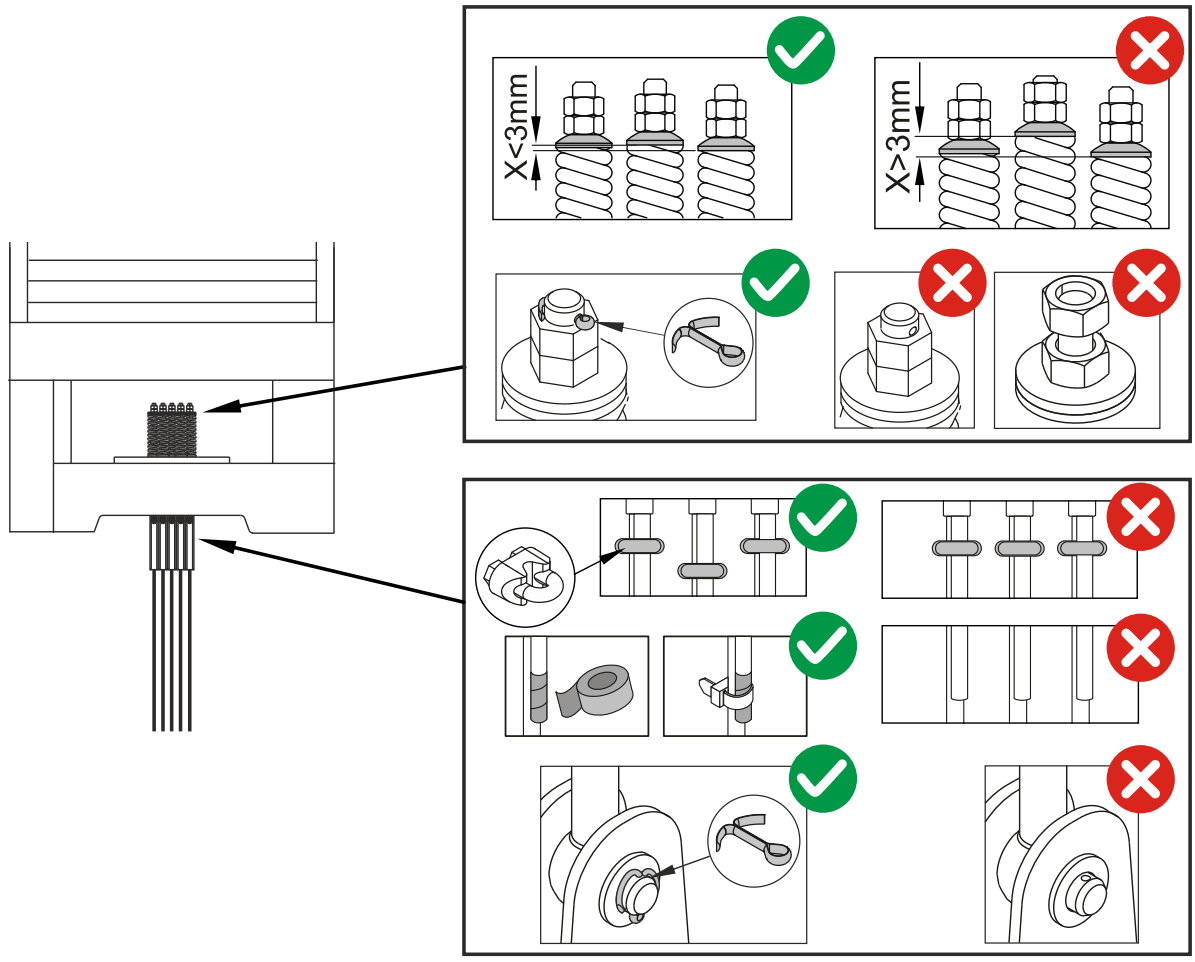
11.4.8.1 Steel compensation rope (condition check)



X0000055039
X0000056729 A.4

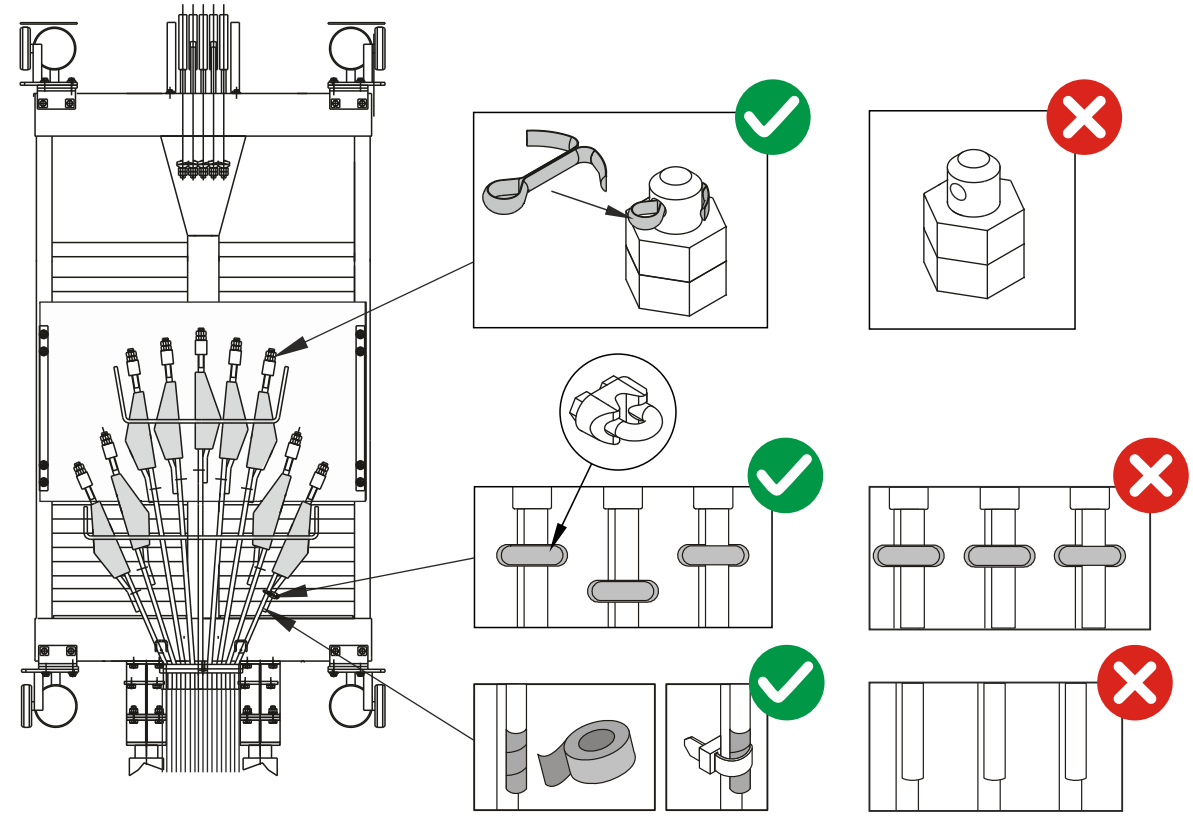
11.4.8.2 Steel compensation rope's fixing (condition check)

Option 1:



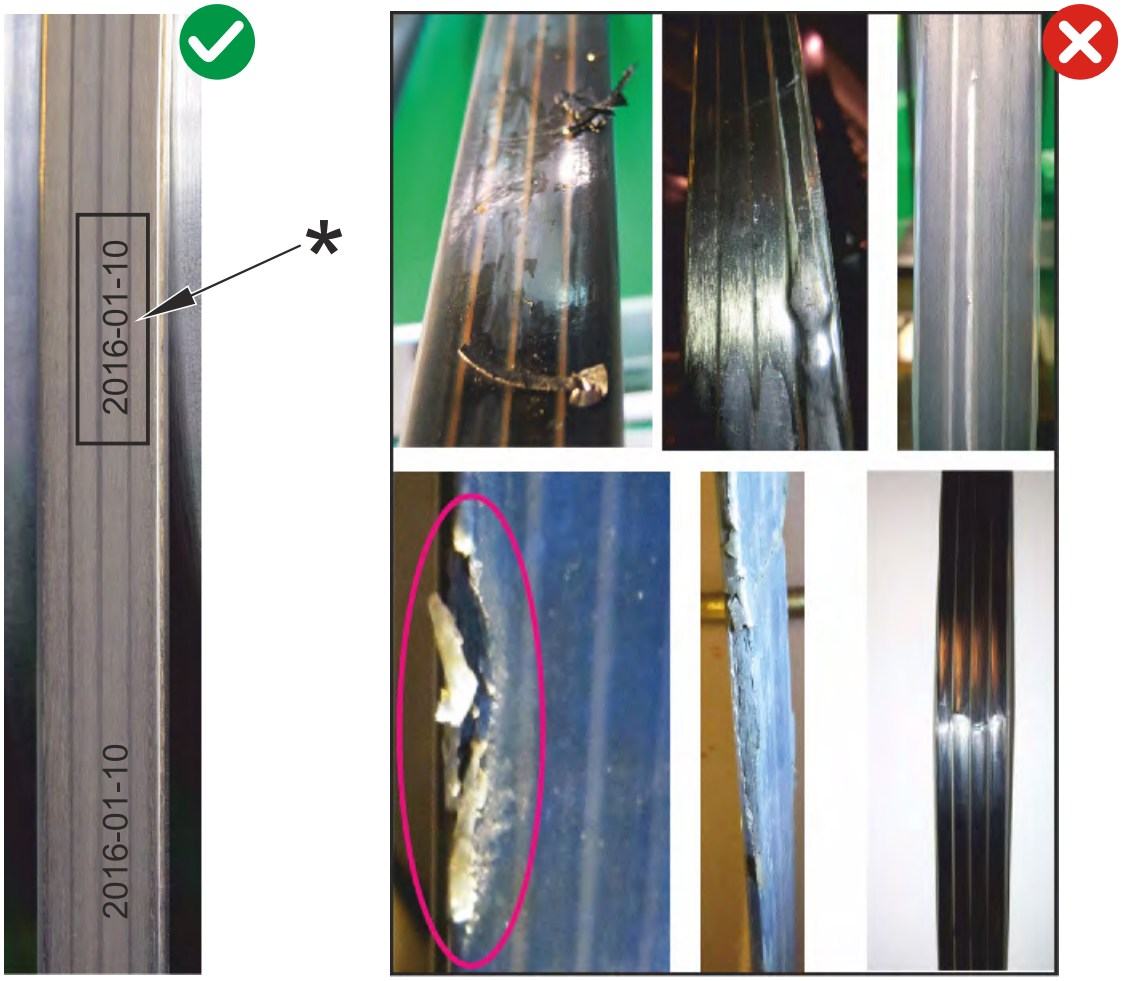
X0000061908

Option 2:



X0000079516
X0000056591 A.9

11.4.8.3 KONE UltraRope® compensation rope (condition check)



X0000070927

NOTE: Check the manufacturing date (*). Ropes must be replaced before they are 15 years old (counting from the manufacturing date).

X0000068567 B.2

11.4.8.3.1 Clean KONE UltraRope®

1. If needed, clean the ropes.

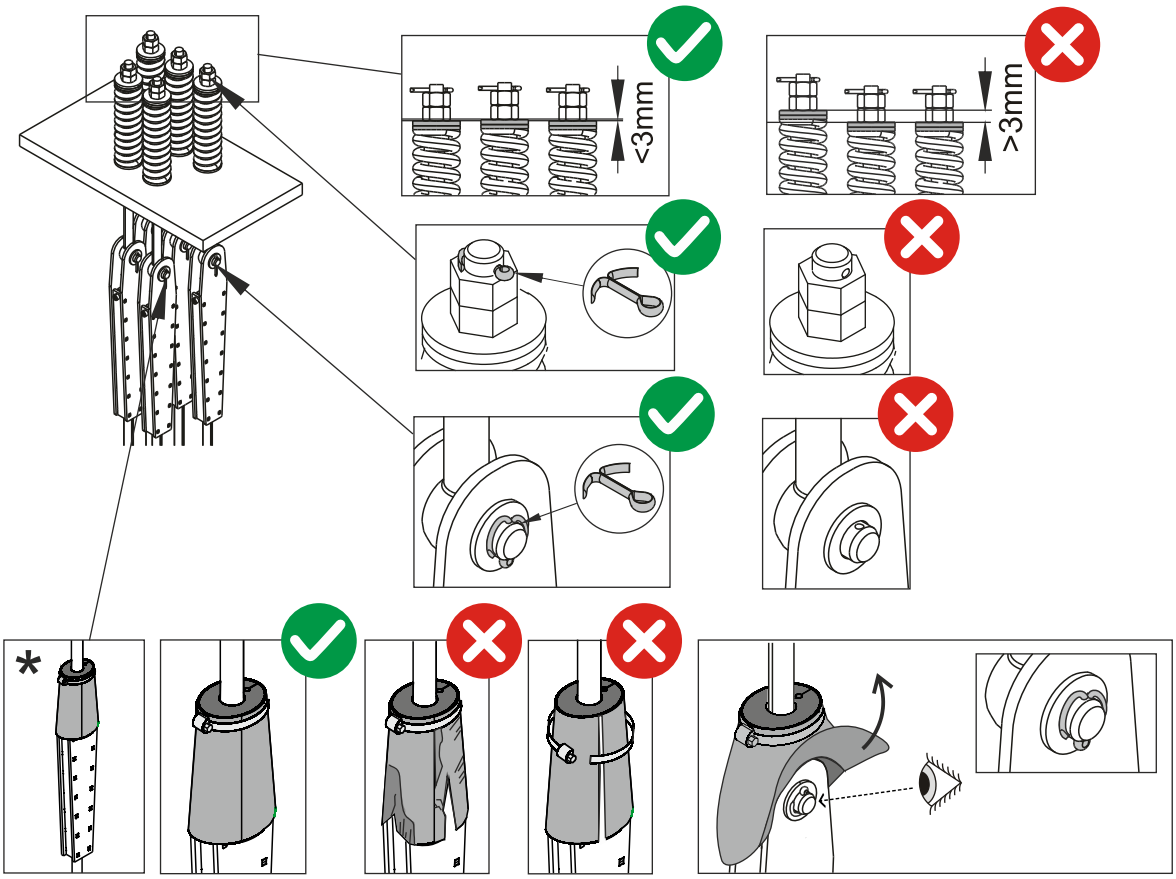
   Use one of these substances:

   – Würth R1 Universal Cleaner 0893 125 005
   – Würth Pineline Power Wash 0893 012 090
   – Water

2. Finish by wiping the rope dry.

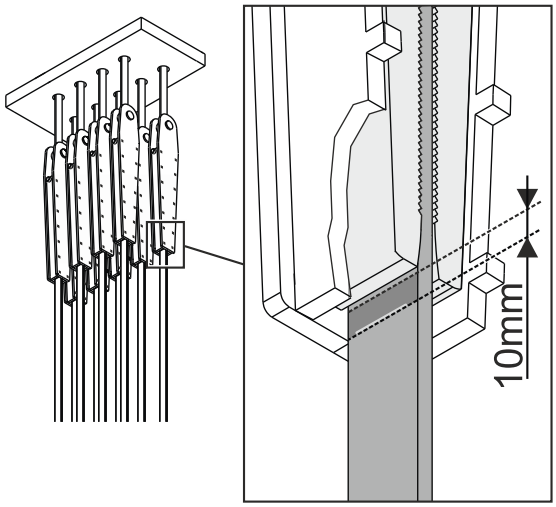
X0000113189 A.2

11.4.8.4 KONE UltraRope® compensation rope's fixing (condition check)



X0000097104

* With IPX3 rope terminal protection



X0000097129

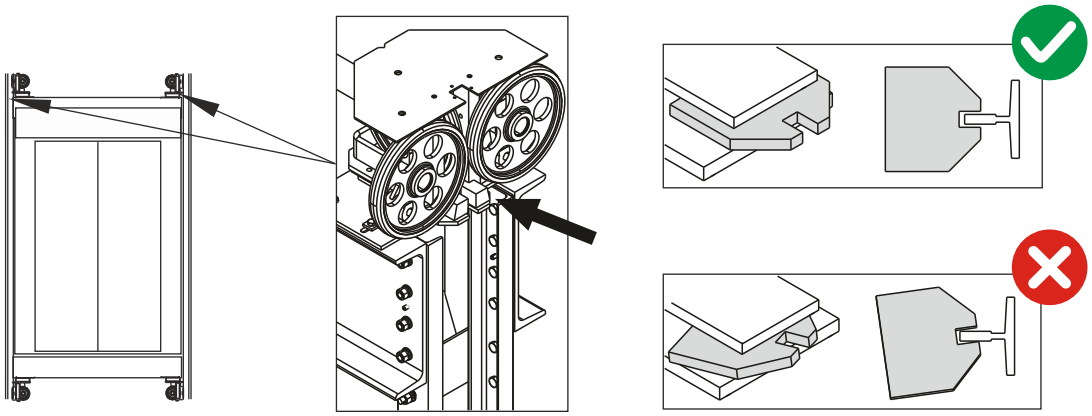
Check the rope movement between the reference line and the wedges.

The reference line is drawn during installation.

The maximum allowed movement is 10 mm. If the rope has moved more, replace the terminal and the rope.

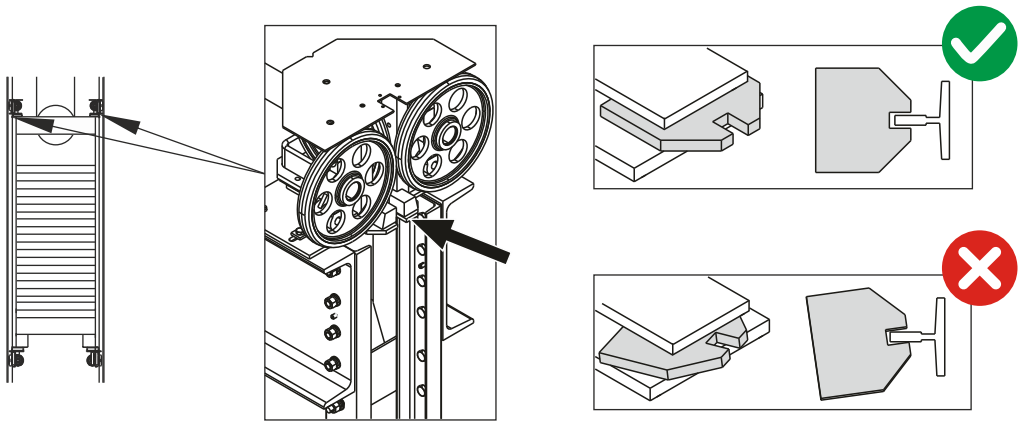
X0000097070 C.6

11.4.9 Upper car retainers (condition check)



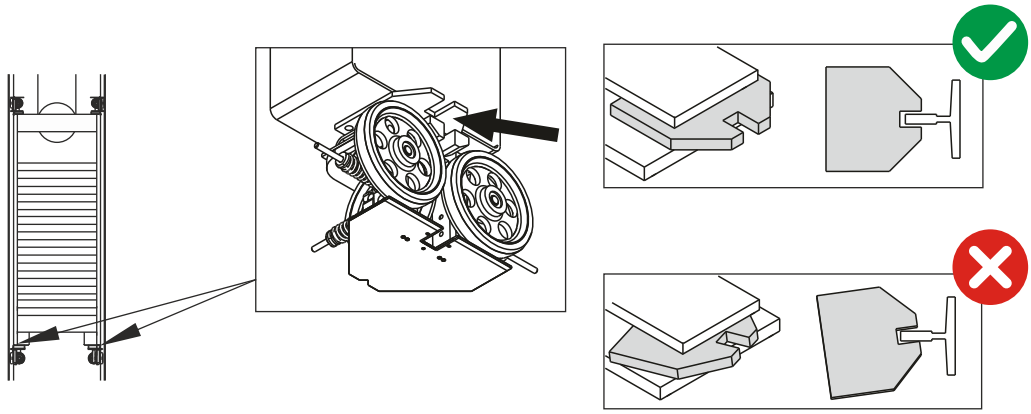
X0000107425
X0000097150 B.3

11.4.10 Upper counterweight retainers (condition check)



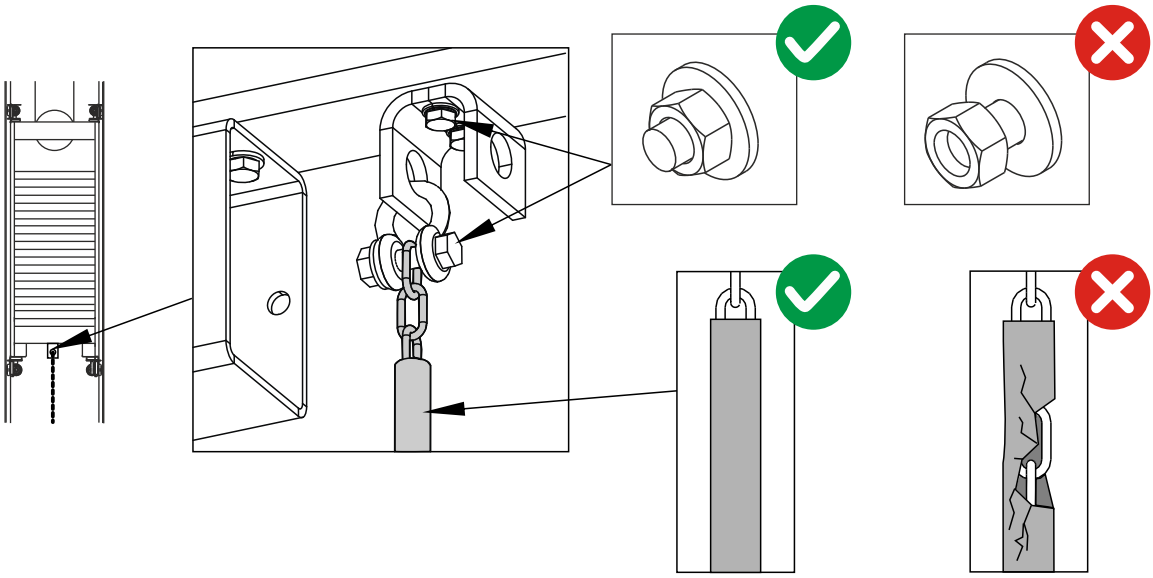
X0000107664
X0000106983 A.3

11.4.11 Lower counterweight retainers (condition check)



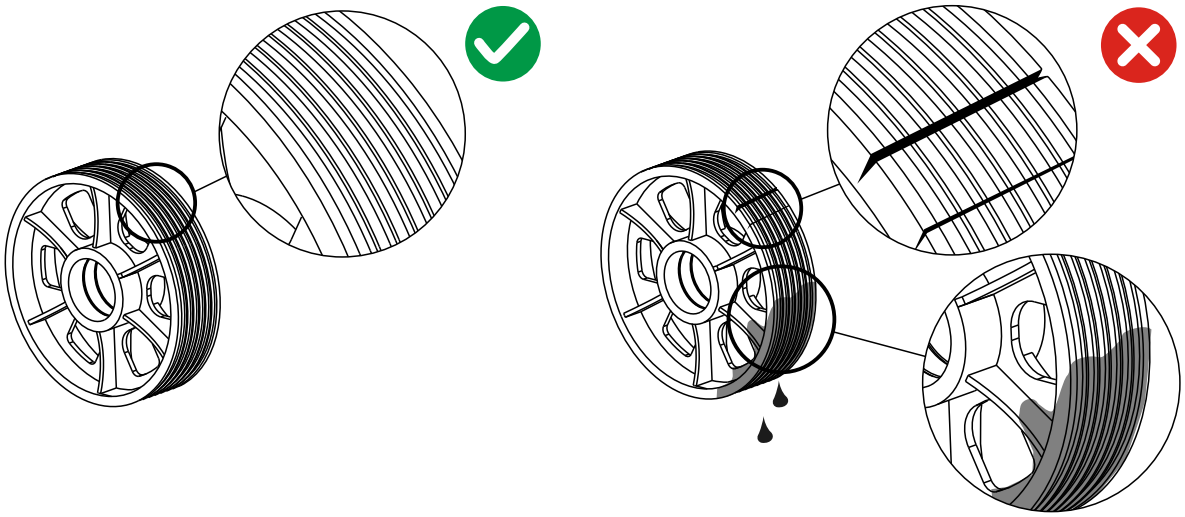
X0000107660
X0000086545 B.3

11.4.12 Compensation chain (condition check)



X0000055037
X0000003026

11.4.13 Diverting pulleys (condition check)



X0000055223

NOTE: Install all covers to diverting pulley if removed.

X0000056389 B.2

11.5 Periodical tests in elevator shaft pit

WARNING: Move safely between shaft pit and landing.

1. Go to the pit.

NOTE: For detailed instructions, refer to the related information.

2. Return the ladder to the storage position if applicable.
3. Close the landing doors or the pit access door.

4. Perform the following checks and tests:

   NOTE: For detailed instructions, refer to the related information.

   1. Inspection control station
   2. Refuge space labels in shaft pit
   3. Car and counterweight buffers
   4. Follower carriage, if applicable
   5. Snag point protection devices, if applicable
   6. Lower car retainers, if applicable
   7. Compensation rope
   8. Compensator
   9. Safety switches
   10. Overspeed governor
   11. Pit rescue tool, if applicable
   12. Jack bolts, if applicable
   13. Pit exit device (PED), if applicable
5. Go to the landing.

NOTE: For detailed instructions, refer to the related information.

X0000088320 B.3

Related information

11.5.1 Test inspection control station in pit

1. Activate the inspection control station stop switch.
2. Pick up the inspection control station from the holder, activate inspection drive and try to move the elevator car upwards.

   The elevator car should not move.
3. Release the stop switch and move the elevator car with the inspection control station.

WARNING: Risk of crushing. While moving the car, stay in the refuge space.

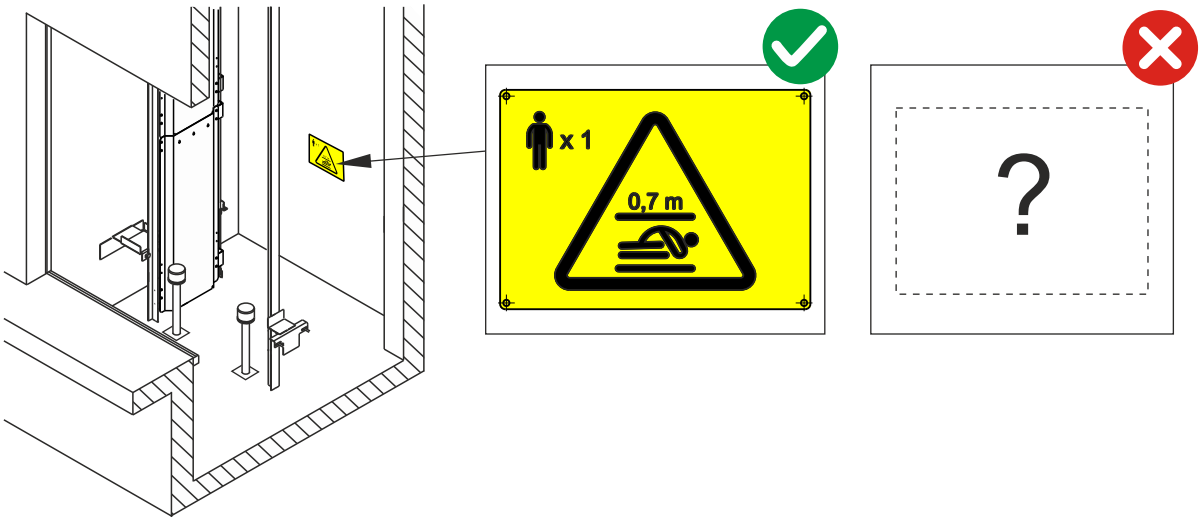
---

4. In case of a pit access door:
    1. Open the pit access door.
    2. Drive with inspection drive unit up direction.

       The car should not move.
    3. Close the pit access door.

X0000088150 B.2

11.5.2 Refuge space labels in shaft pit (condition check)



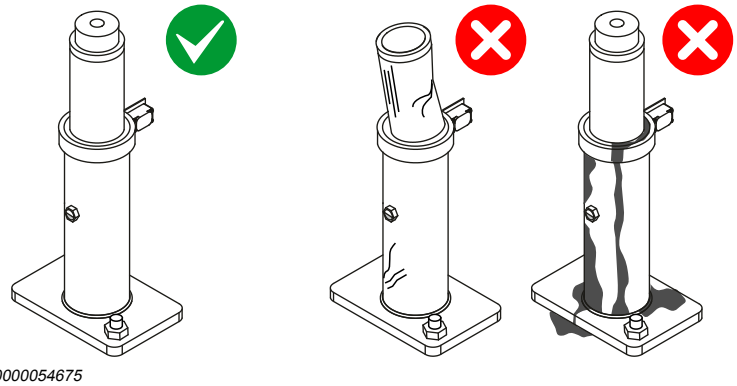
X0000059093
X0000056570 A.5

Related information

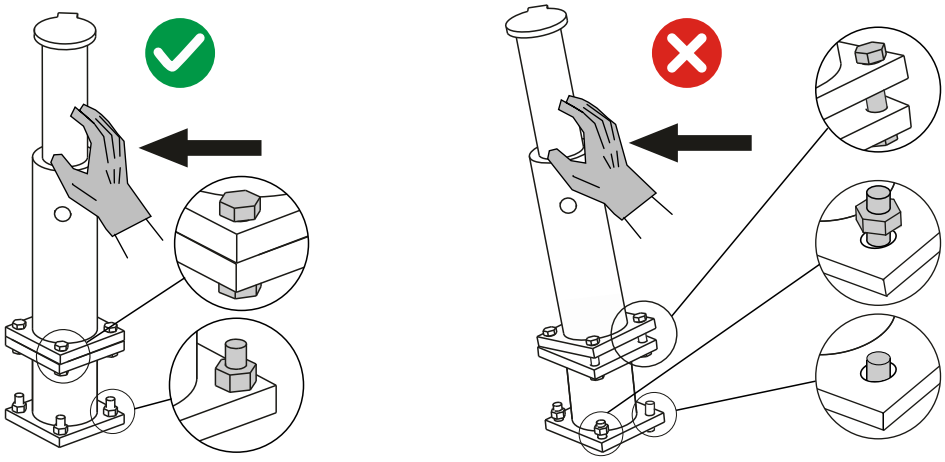
– Refuge space (40)

11.5.3 Oil buffers (condition check)

WARNING: If the buffer is not in full working order (it does not last until the next scheduled maintenance visit), arrange the replacement of the buffer immediately. If the buffer has failed already, take the elevator out of use until the buffer has been replaced.



X0000054675

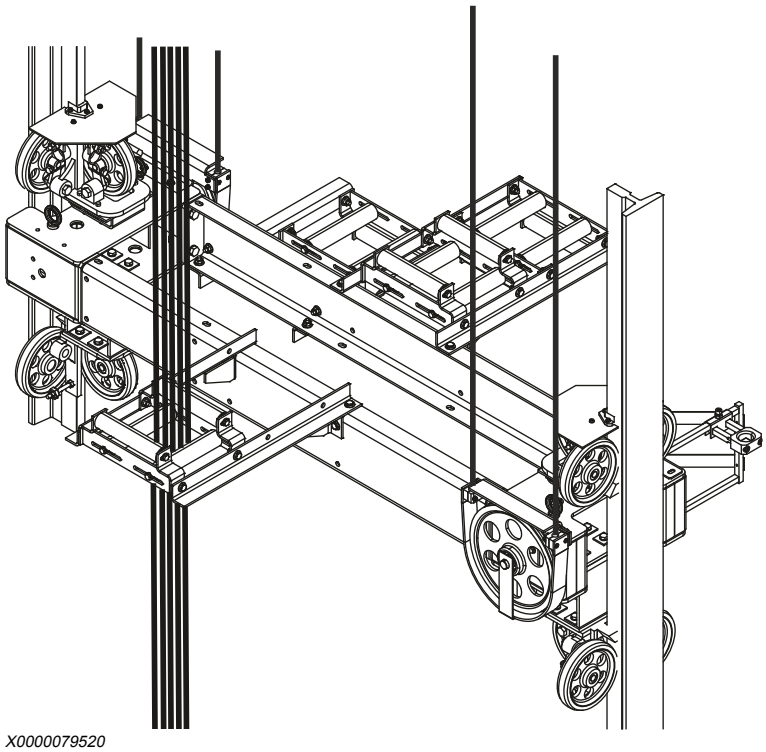


X0000054694
X0000003001

Related information

– *Prepare equipment and safety (55)*

11.5.4 Check follower carriage

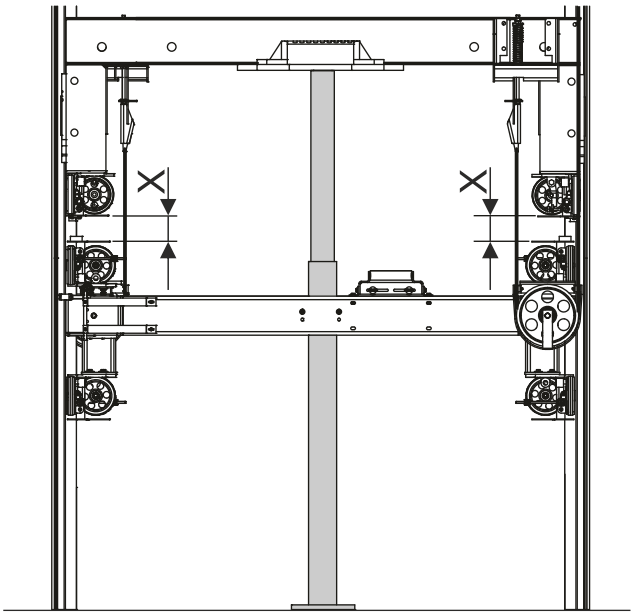


X0000079520

1. Check that the carriage is horizontally aligned

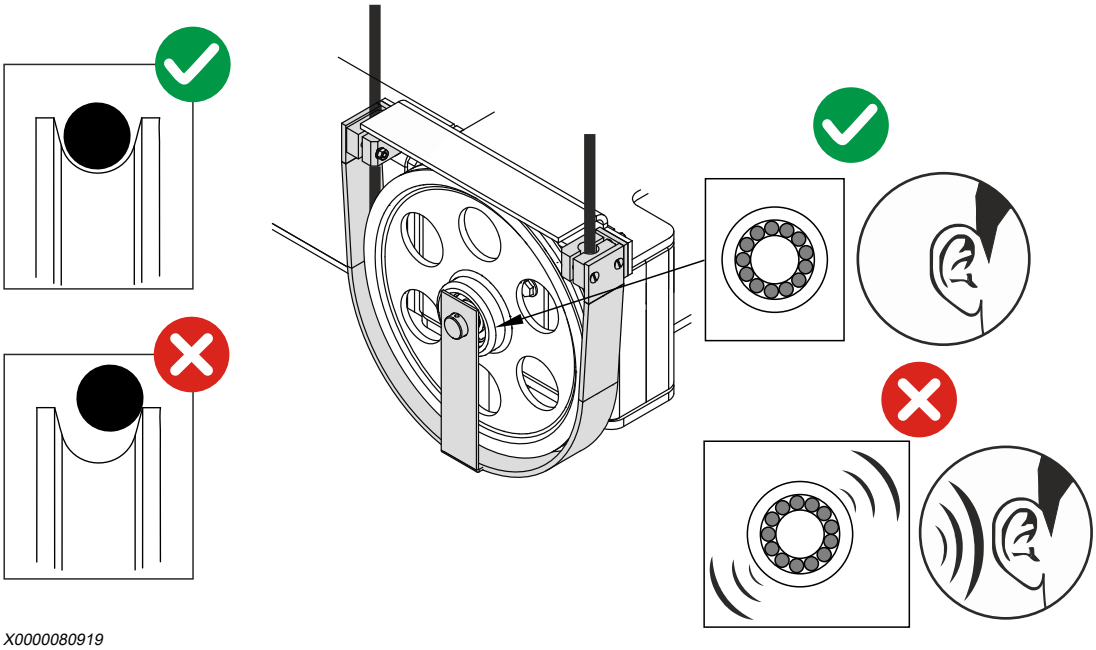
   Measure the gaps between car sling bottom beam and the follower carriage on both sides.

   – If the car is on the fully compressed buffer, x must be 50...150 mm.
   – If the car is not on the fully compressed buffer, x must be 50...150 mm + half of the uncompressed buffer stroke.



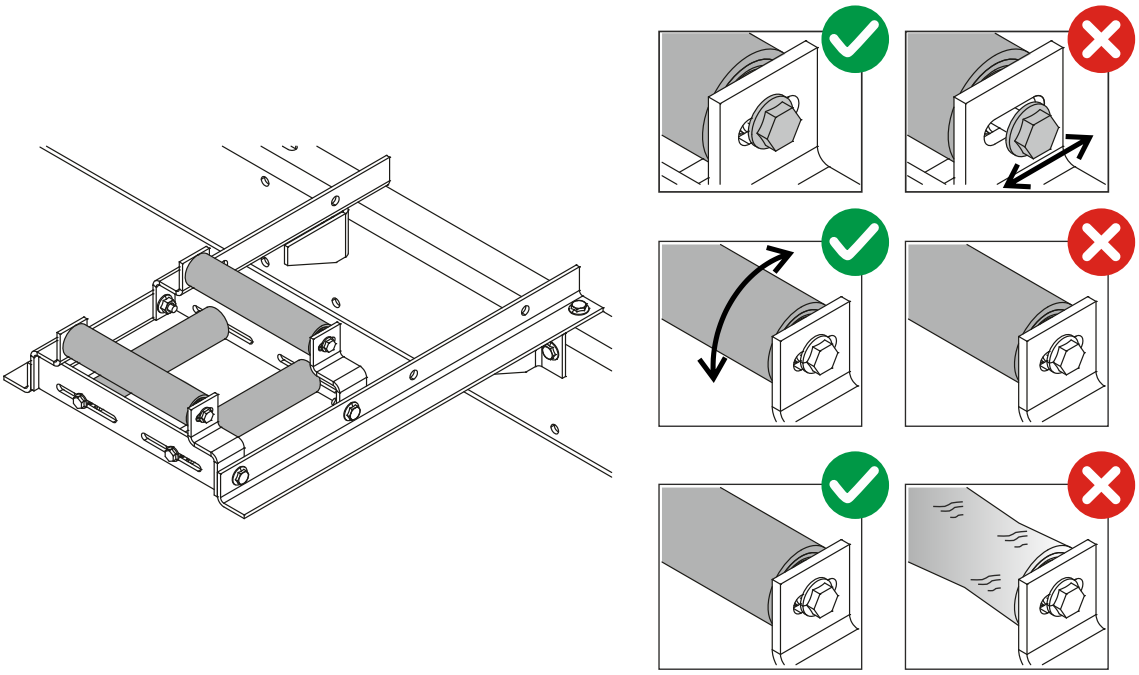
X0000079518

2. Check the proper running performance of the diverting pulleys.
3. Check the rope guards.



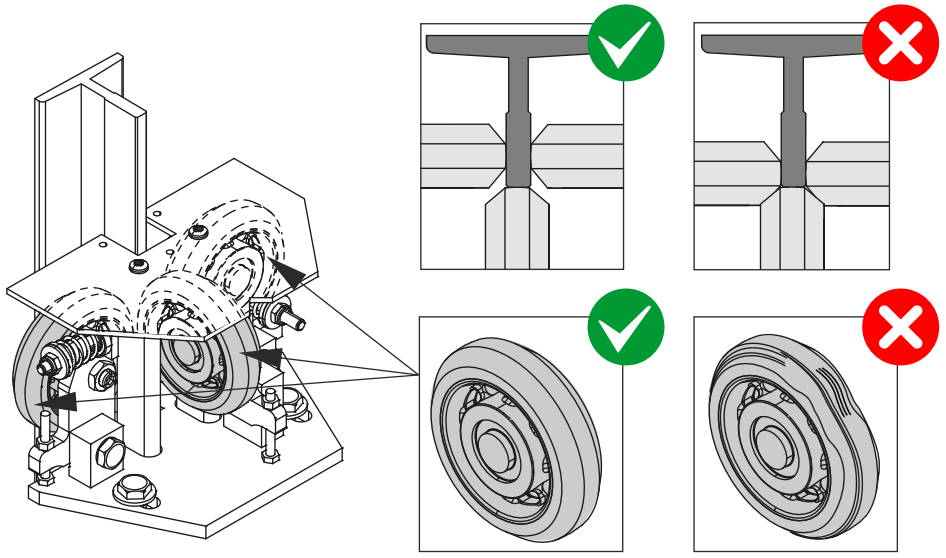
X0000080919

4. Check all the guides and retainers around the ropes and travelling cable for mechanical damages or loose fixings.

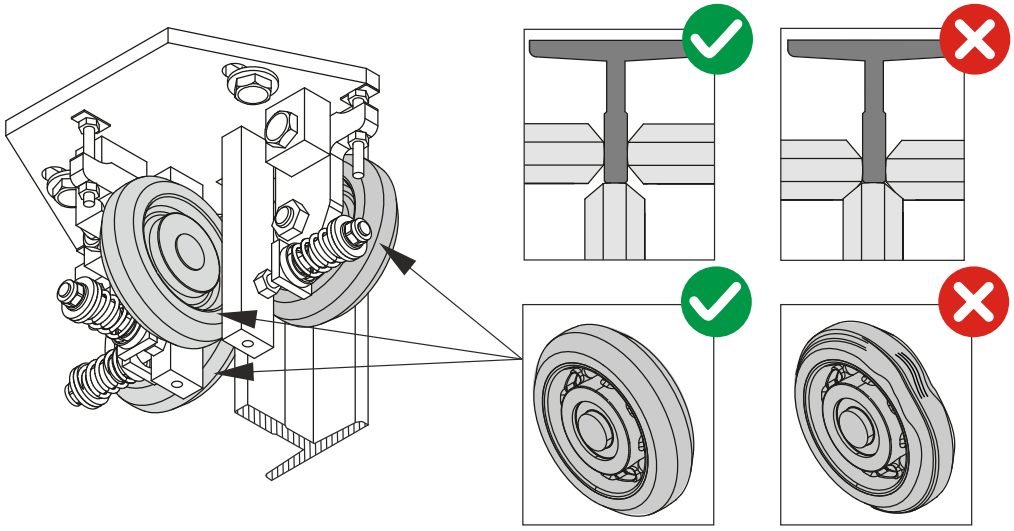


X0000080921

5. Check the roller guide shoes of the follower carriage.



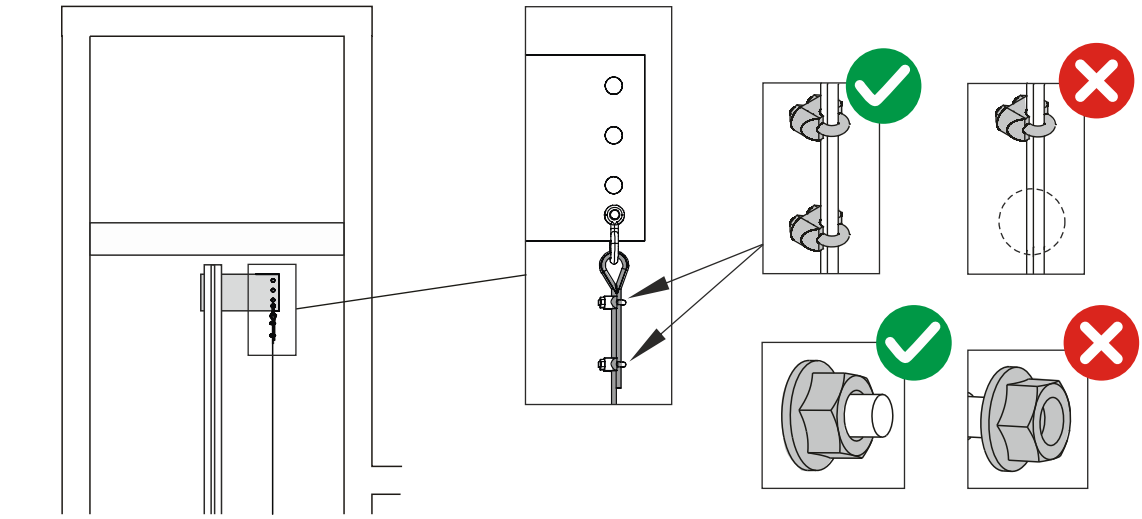
X0000054483



X0000061857

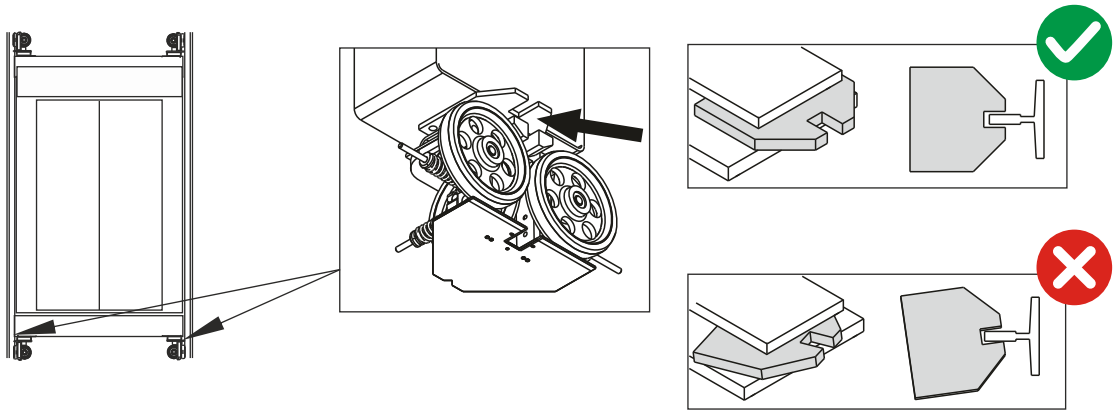
X0000079032 A.5

11.5.5 Snag point protection devices (condition check)



X0000149846
X0000086004 C.2

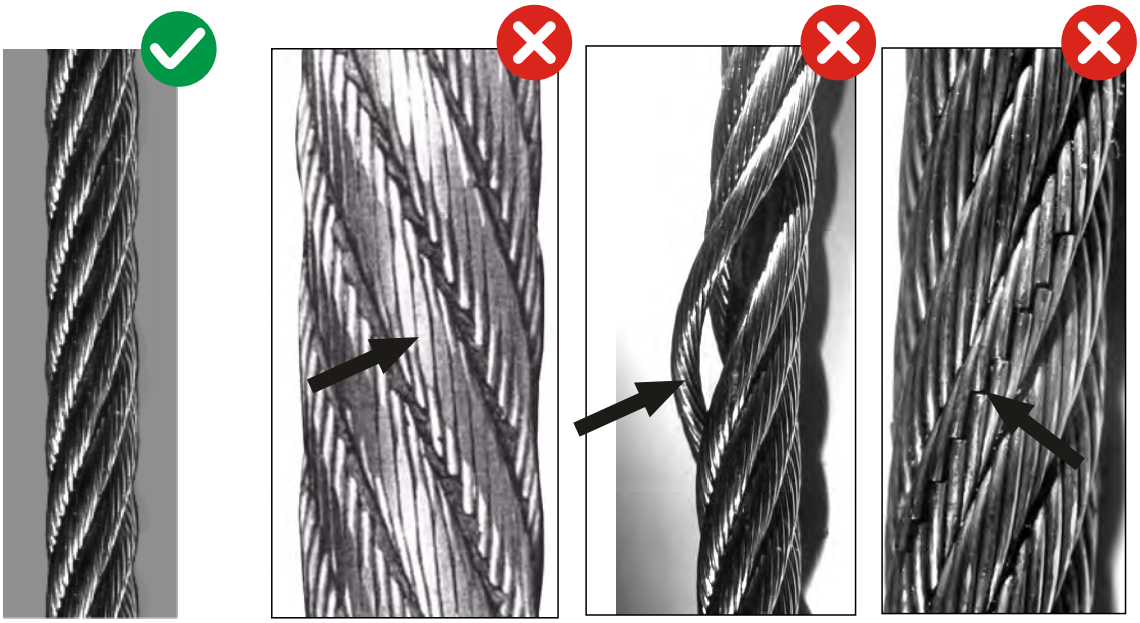
11.5.6 Lower car retainers (condition check)



X0000107406
X0000097125 B.3

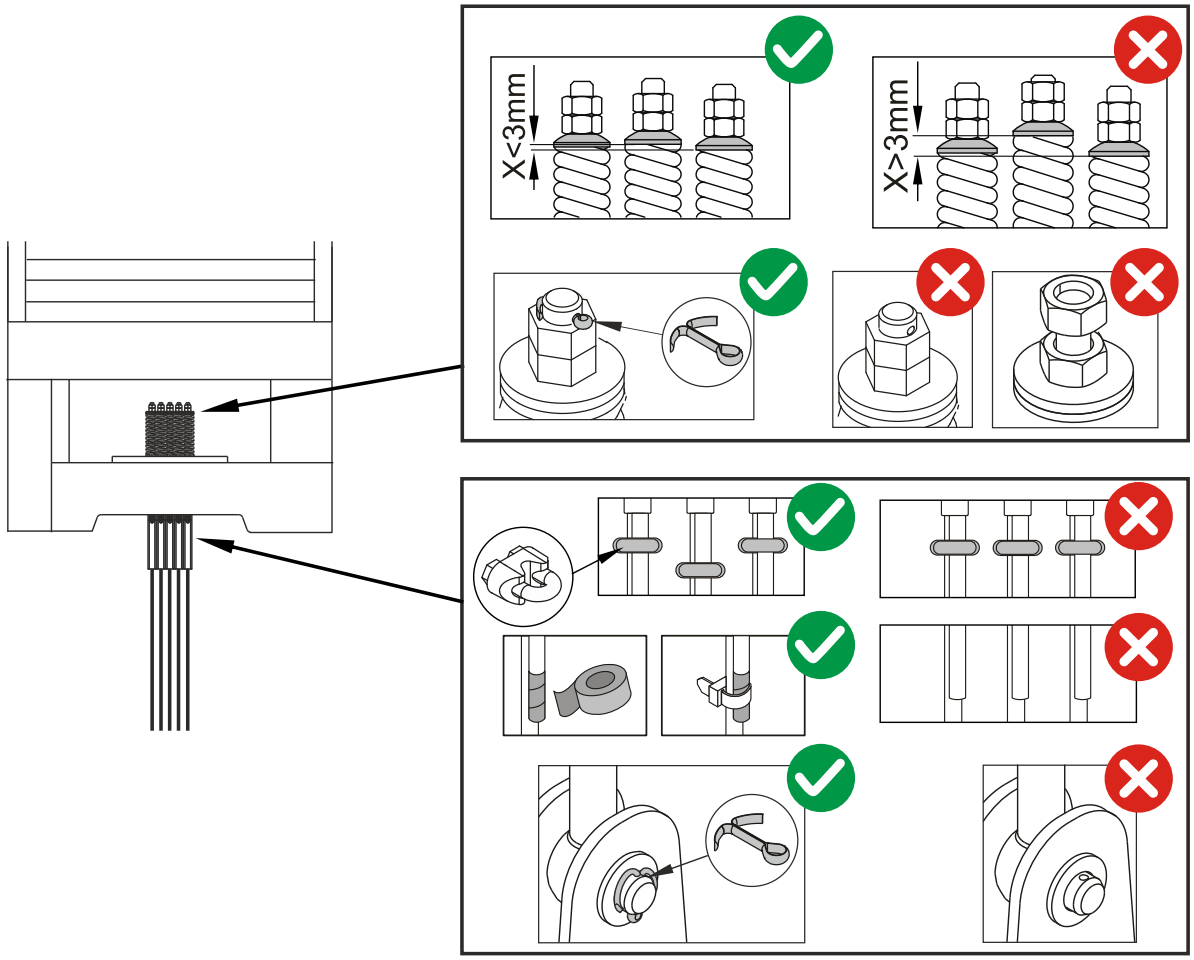
11.5.7 Compensation rope

11.5.7.1 Steel compensation rope (condition check)



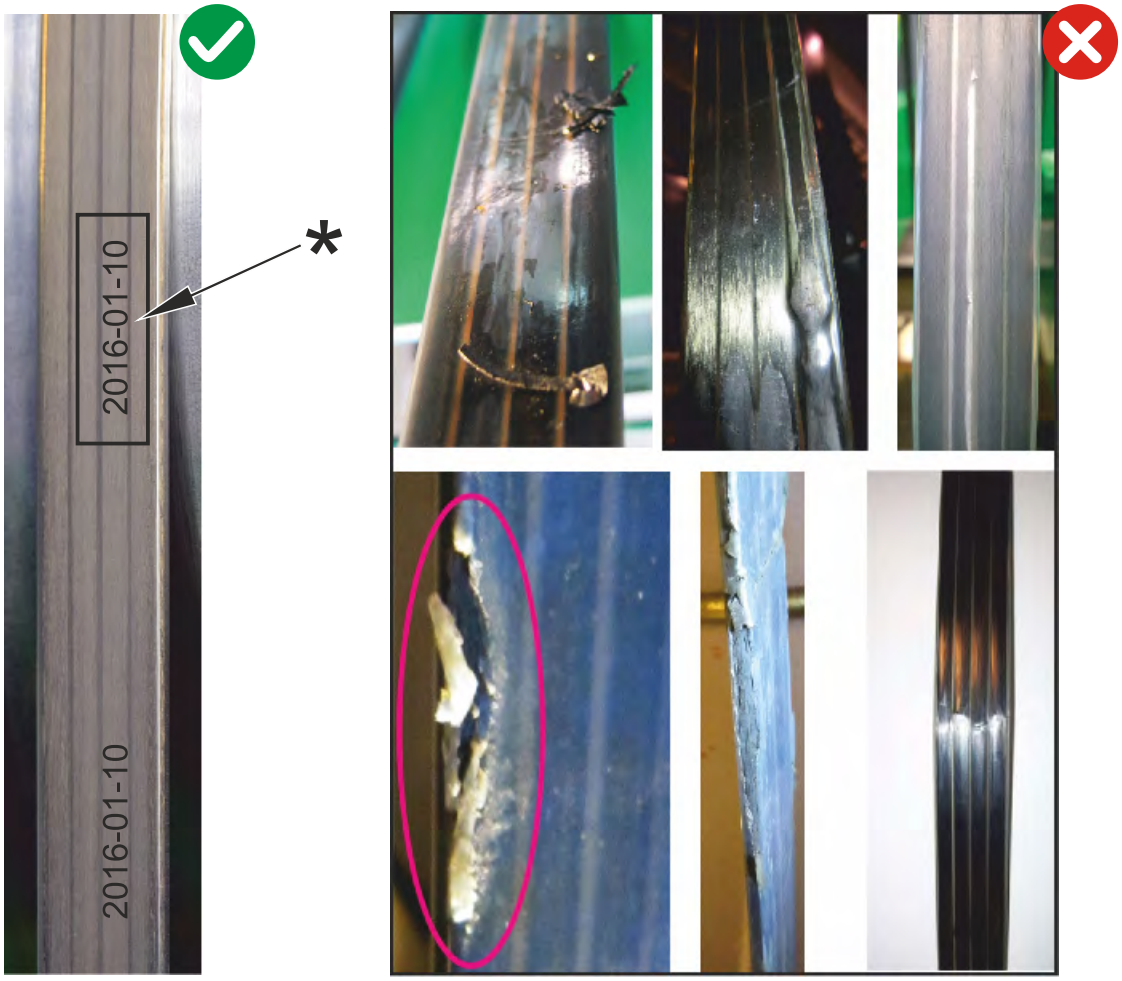
X0000055039
X0000056729 A.4

11.5.7.2 Steel compensation rope's fixing (condition check)



X0000061908
X0000087063 A.3

11.5.7.3 KONE UltraRope® compensation rope (condition check)



X0000070927

NOTE: Check the manufacturing date (*). Ropes must be replaced before they are 15 years old (counting from the manufacturing date).

X0000068567 B.2

11.5.7.3.1 Clean KONE UltraRope®

1. If needed, clean the ropes.

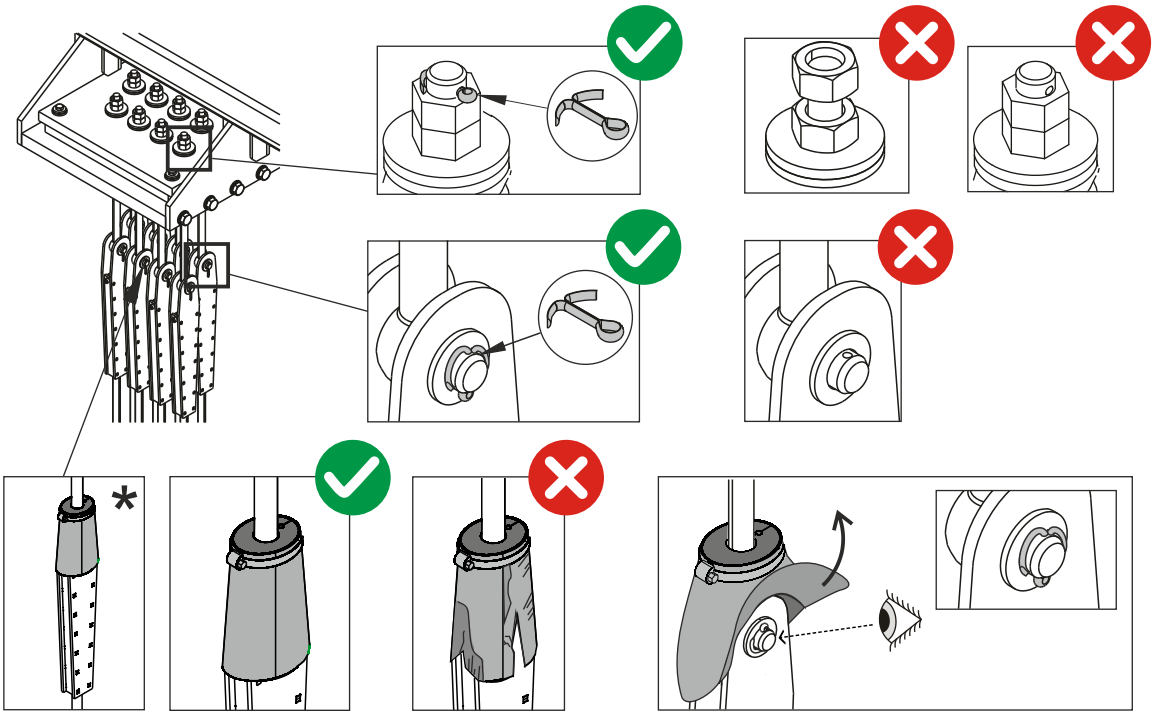
   Use one of these substances:

   – Würth R1 Universal Cleaner 0893 125 005
   – Würth Pineline Power Wash 0893 012 090
   – Water

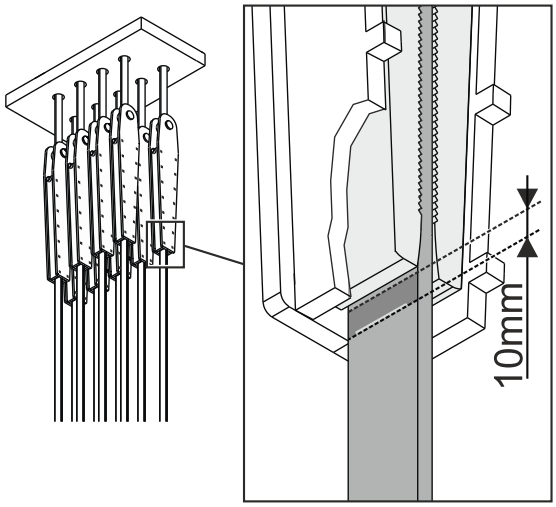
2. Finish by wiping the rope dry.

X0000113189 A.2

11.5.7.4 KONE UltraRope® compensation rope's fixing and rope terminals (condition check)



X0000096189



X0000097129

Check the rope movement between the reference line and the wegdes.

The reference line is drawn during installation.

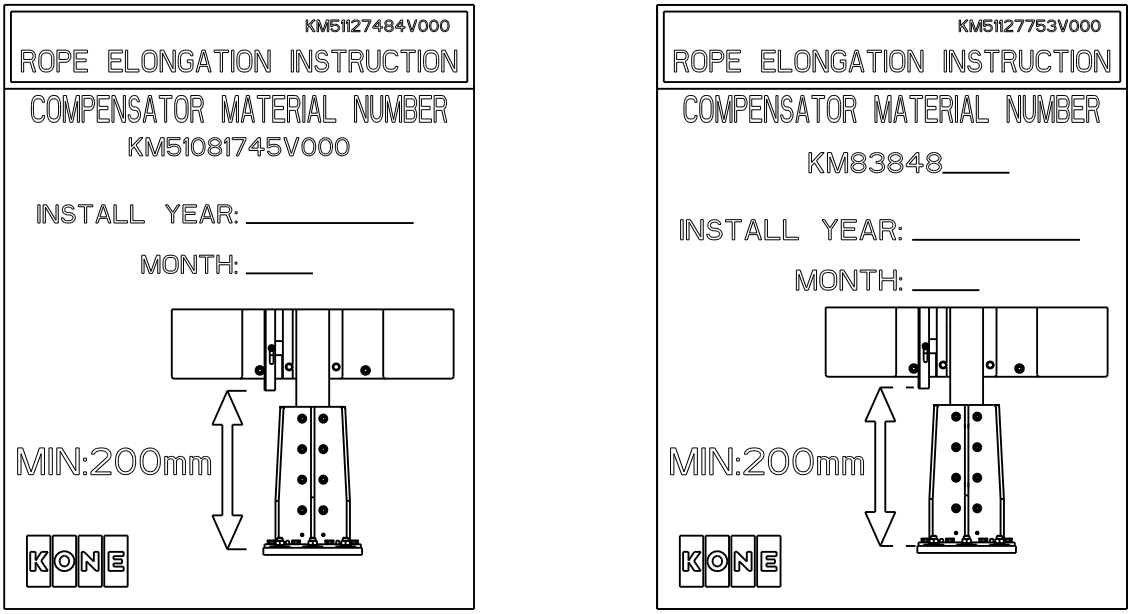
The maximum allowed movement is 10 mm. If the rope has moved more, replace the terminal and the rope.

X0000100200 A.6

11.5.8 Rope compensator

11.5.8.1 Check rope compensator with steel ropes

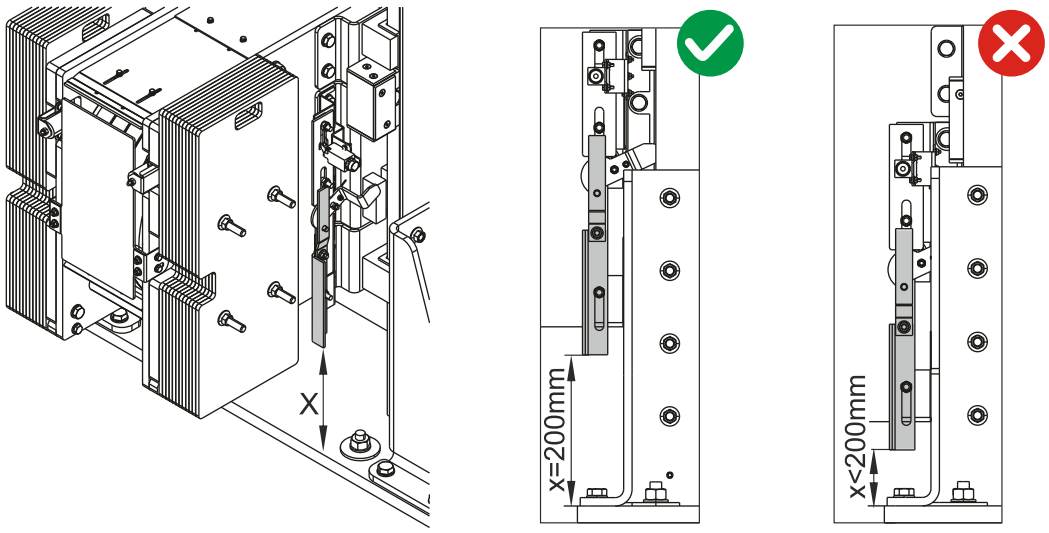
1. Check the condition of the rope compensator sticker.



X0000079390

Figure 34: Examples of stickers. Details may vary.

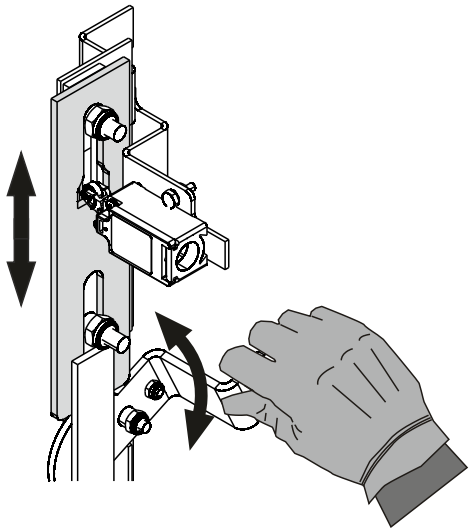
2. Measure the clearance below the pulley assembly. (X)



X0000070450

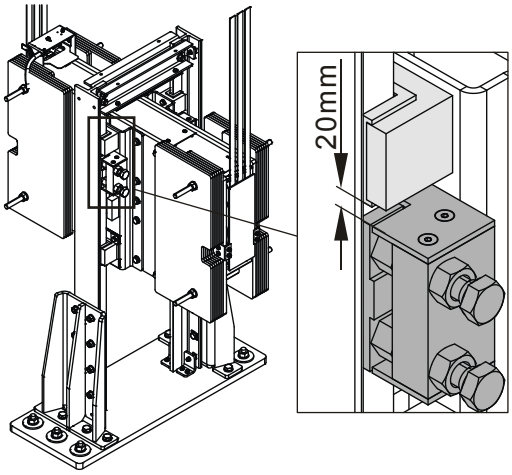
If the clearance is less than 200 mm, check overtravel and shorten the suspension ropes first, if needed. If it does not help, shorten the compensation ropes from counterweight side.

3. Check that compensator switch plate moves.



X0000107210

4. Check the gap between lock down device and upper sliding pieces.
   - Check that the lock down devices are aligned on same level and that they do not touch the safety switch.
   - The gap must be 20 mm.



X000026782

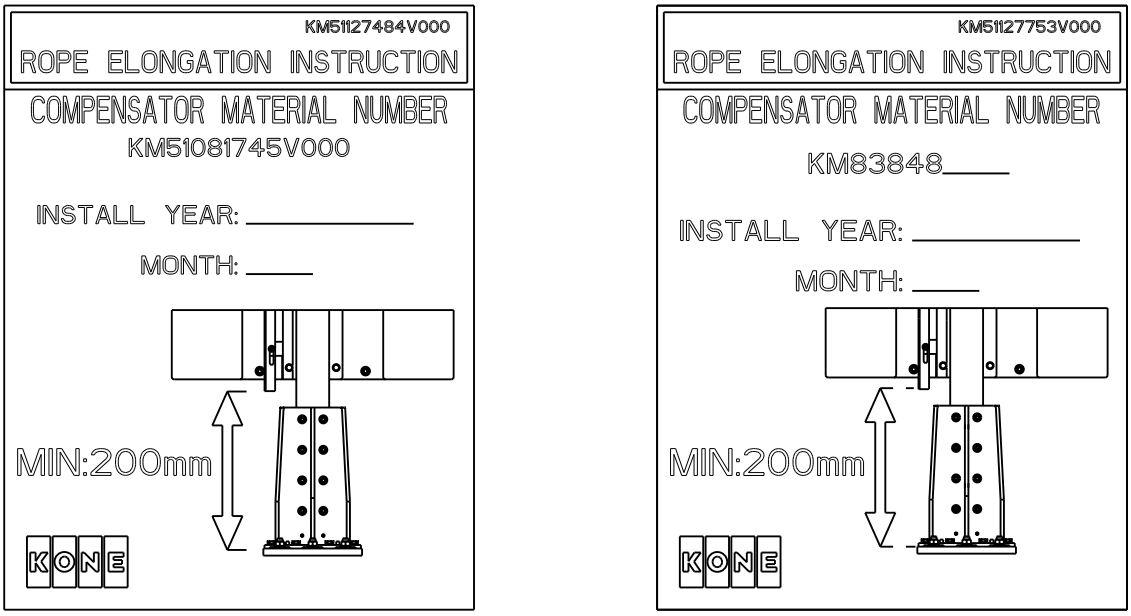
5. Check the positioning of the mechanical lock down device (vertical and matching the counter surface on the pulley frame and angle on the switch rod).
6. Check condition of the guides and sliding guide shoes.
7. Check if the compensator is vibrating or making noise when using inspection control station.
8. Check wear on the dust covers or rope guards.

   Wear would indicate unusual contact with the ropes, which might indicate rope damage.

X0000056566 D.4

11.5.8.2 Check rope compensator with KONE UltraRope®

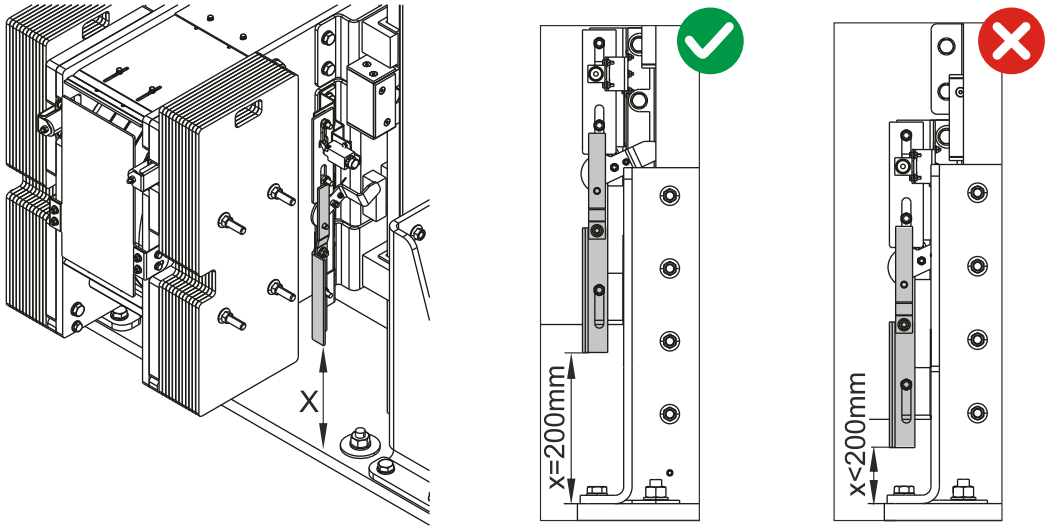
1. Check the condition of the rope compensator sticker.



X0000079390

Figure 35: Examples of stickers. Details may vary.

2. Measure the clearance below the pulley assembly. (X)



X0000070450

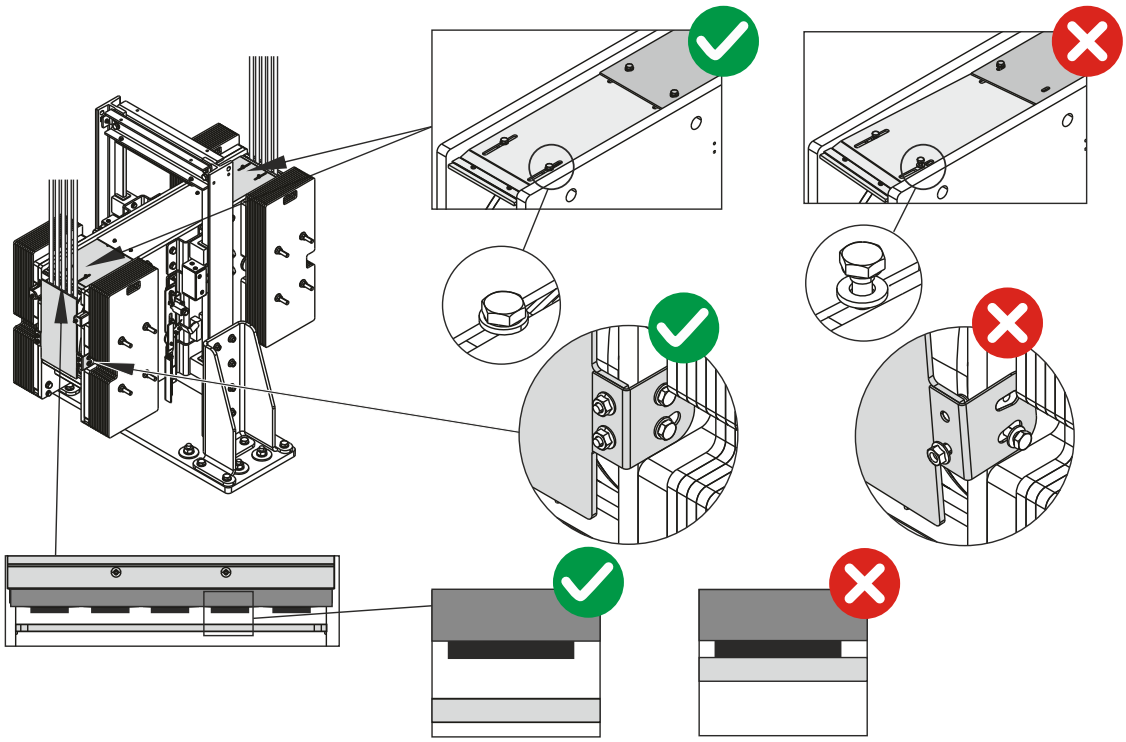
If the clearance is less than 200 mm, shorten the compensation ropes from counterweight side.

3. Make sure that the cover plate bolts are tightened and that the covers do not touch the ropes.

   Adjust the CWT side brushes when the car is at topmost floor, if needed.

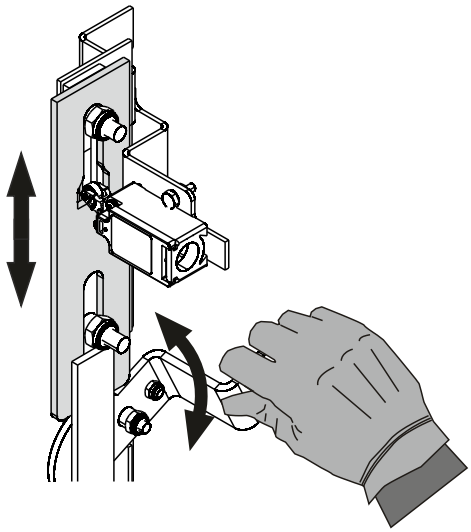
   Adjust the car side brushes when the car is at bottom floor, if needed.

   Adjust side cover plate when the car is at bottom floor, if needed.



X0000070527

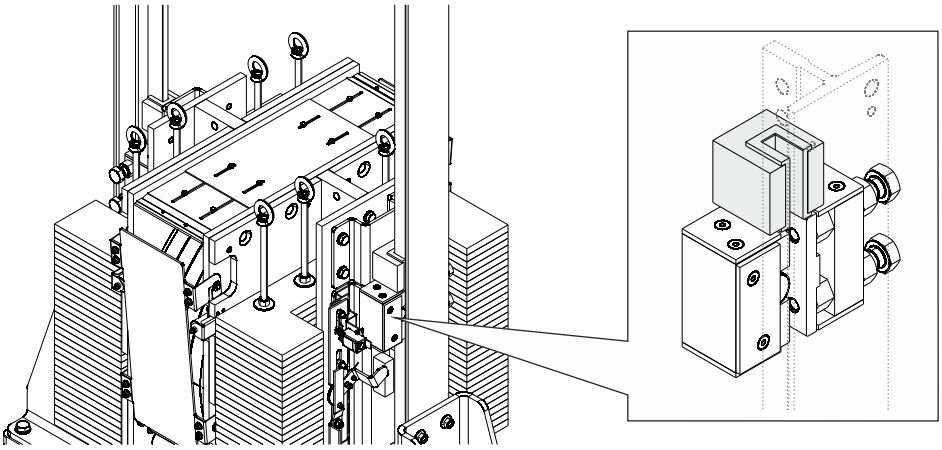
4. Check that compensator switch plate moves.



X0000107210

5. Check the gap between lock down device and upper sliding guides.
   – Check that the lock down devices are aligned on same level and that they do not touch the safety switch.
   – If adjustment is needed, both lock down devices must be lifted against the upper guides.

   NOTE: Car must be empty and at the lowest floor during adjustment.



X0000103167

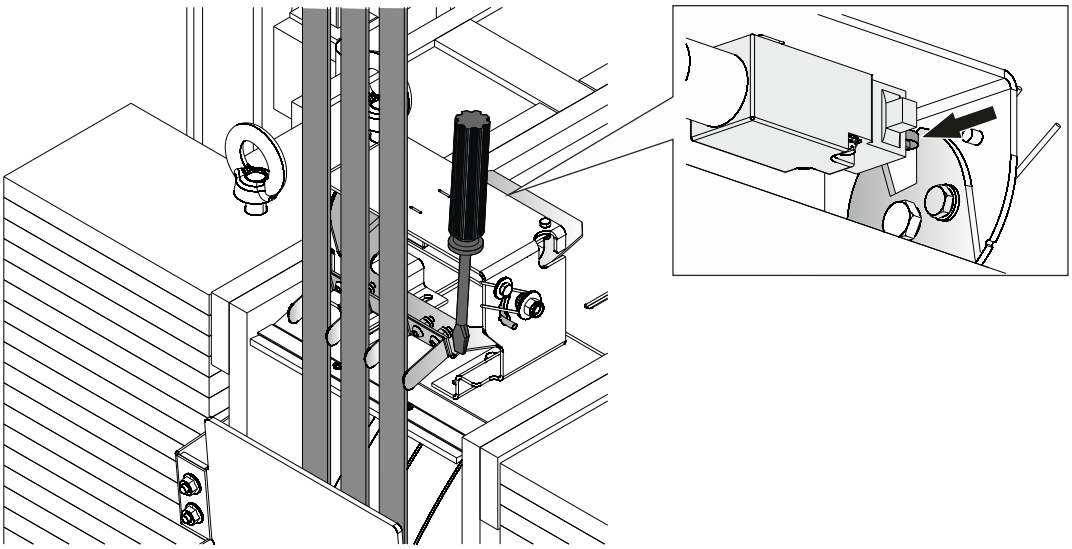
6. Check the positioning of the mechanical lock down device (vertical and matching the counter surface on the pulley frame and angle on the switch rod).
7. Check the leakage of the cylinders of the hydraulic compensator.
8. Check condition of the guides and sliding guide shoes.
9. Check if the compensator is vibrating or making noise when using inspection control station.
10. Check wear on the dust covers or rope guards.

    Wear would indicate unusual contact with the ropes, which might indicate rope damage.

X0000100204 B.4

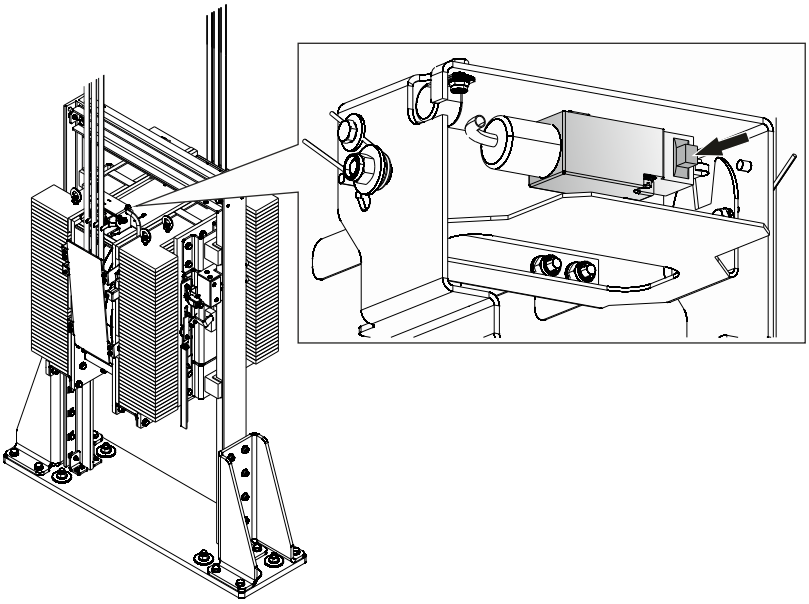
11.5.8.3 Test compensator RAD

1. Move the RAD manually until the limit switch activates.



X0000082159

2. Reset the RAD switch.



X0000081224

The fault log is checked in the machine room after the test.

1. Check fault log E_1.

   Fault F0256 should appear. If not, test the compensator RAD again.
2. Record the test date and result in the elevator's log book.

X0000081962 B.2

11.5.9 Check safety switches

1. Manually trigger the switch in question.
2. Try to move the elevator car with inspection control station.

   The elevator car must not move.

3. Repeat the test for all safety switches in the elevator shaft pit.

X0000089215 B.2

11.5.10 Test overspeed governor

WARNING: Wear protective, cut-resistant safety gloves.

NOTE: This test is done only for elevators with max speed 4.0 m/s.

NOTE: Two maintenance technicians are required for OL100 and OL150 testing: one in the pit and one in the machine room. Keep active radio communication.

1. If needed, move the elevator car lower by driving with inspection control station, until the car is at suitable level.

   WARNING: Risk of crushing. While moving the car, stay in the refuge space.

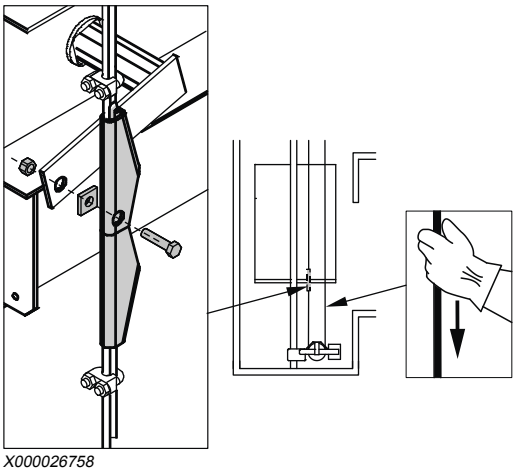
   

   ---

2. Use a maintenance platform or work stool and disconnect the OSG wedge from the safety gear levers.

   Lower the rope wedge to the tension weight pulley.

   Example picture. The components vary per elevator.

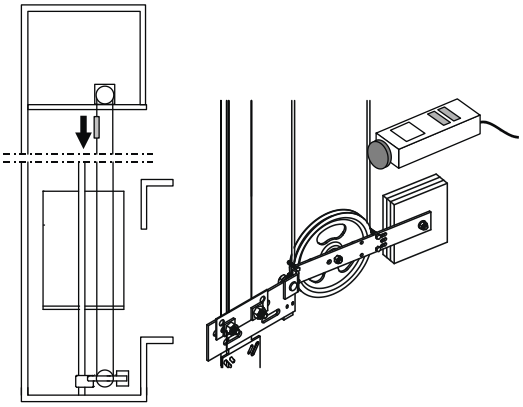
   X000026758

3. Go to the bottom of the pit.

4. From OSG rope free side, pull the rope down until the fixing part is high enough to accelerate the OSG to overspeed when dropped.
5. Let the rope wedge accelerate the OSG rope speed and, at the same time by using a hand tachometer, measure on the rope opposite side to the wedge assembly, near the tension weight.

WARNING: Watch out for the falling rope wedge.

Example picture. The components vary per elevator.



X000026759

Check the correct tripping range from OSG ID plate and log the results.

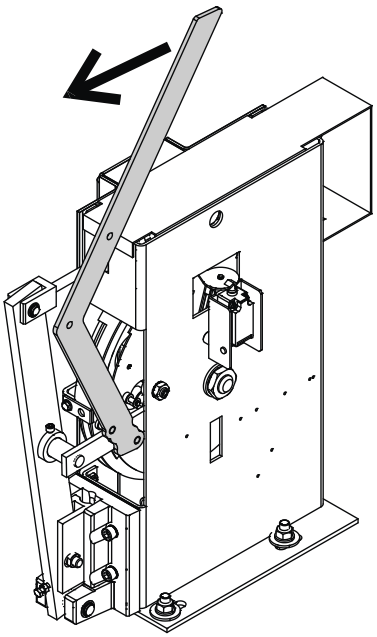
6. Lower the OSG rope wedge down.

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.

NOTE: With OL100 and OL150, perform the lowering as follows because the OSG must be reset before the rope moves:

X000010430

1. **Maintenance technician in the pit** - Hold the OSG rope and give permission to reset OSG.
2. **Maintenance technician in the machine room** - Reset OSG.



X000015307

3. **Maintenance technician in the pit** - Lower the OSG rope wedge down.

In case of OL100 or OL150: Before lowering the wedge back down, check the condition of the OSG rope after reset, to ensure that the gripping has not damaged the OSG rope.

7. Use a maintenance platform or work stool and connect the OSG wedge to the safety gear levers.
8. Reset the OSG electrical switch.

X000010430

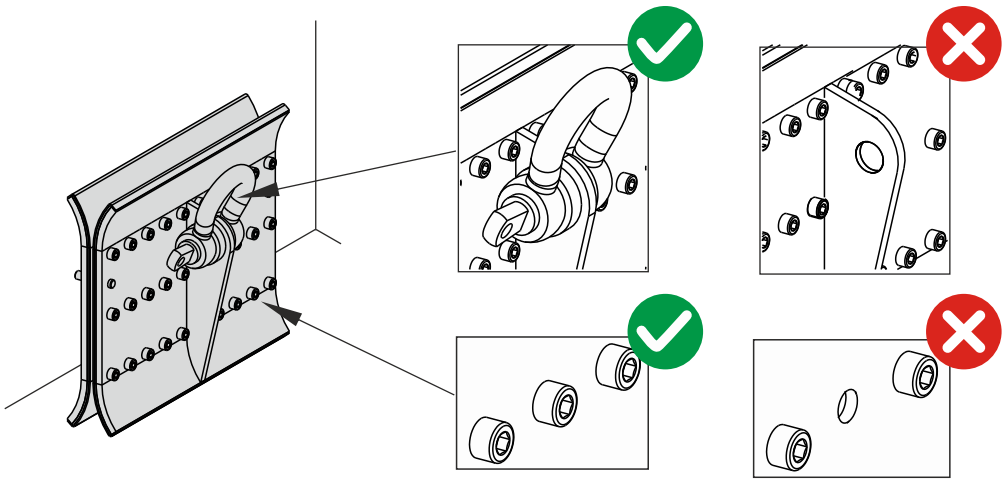
X0000072658 C.3

11.5.10.1 OSG tripping ranges

Nominal speed (Vn) m/s	Electrical tripping (min) Vn x 1.15 m/s	Mechanical tripping (max) Vn x 1.25 + (0.25 / Vn) m/s
0.63	0.7	1.0
1	1.2	1.3
1.25	1.4	1.7
1.4	1.6	1.8
1.6	1.8	2.0
1.78	2.0	2.3
2	2.3	2.5
2.5	2.9	3.2
3	3.5	3.8
3.5	4.0	4.2
4	4.6	4.8
5	5.8	6.0
6	6.9	7.2

X0000072659 A.7

11.5.11 Pit rescue tool (condition check)



X0000070377
X0000067809 A.5

11.5.12 Gap between guide rails and jack bolts (condition check)

NOTE: The criteria applies both to elevator car guide rails and counterweight guide rails.

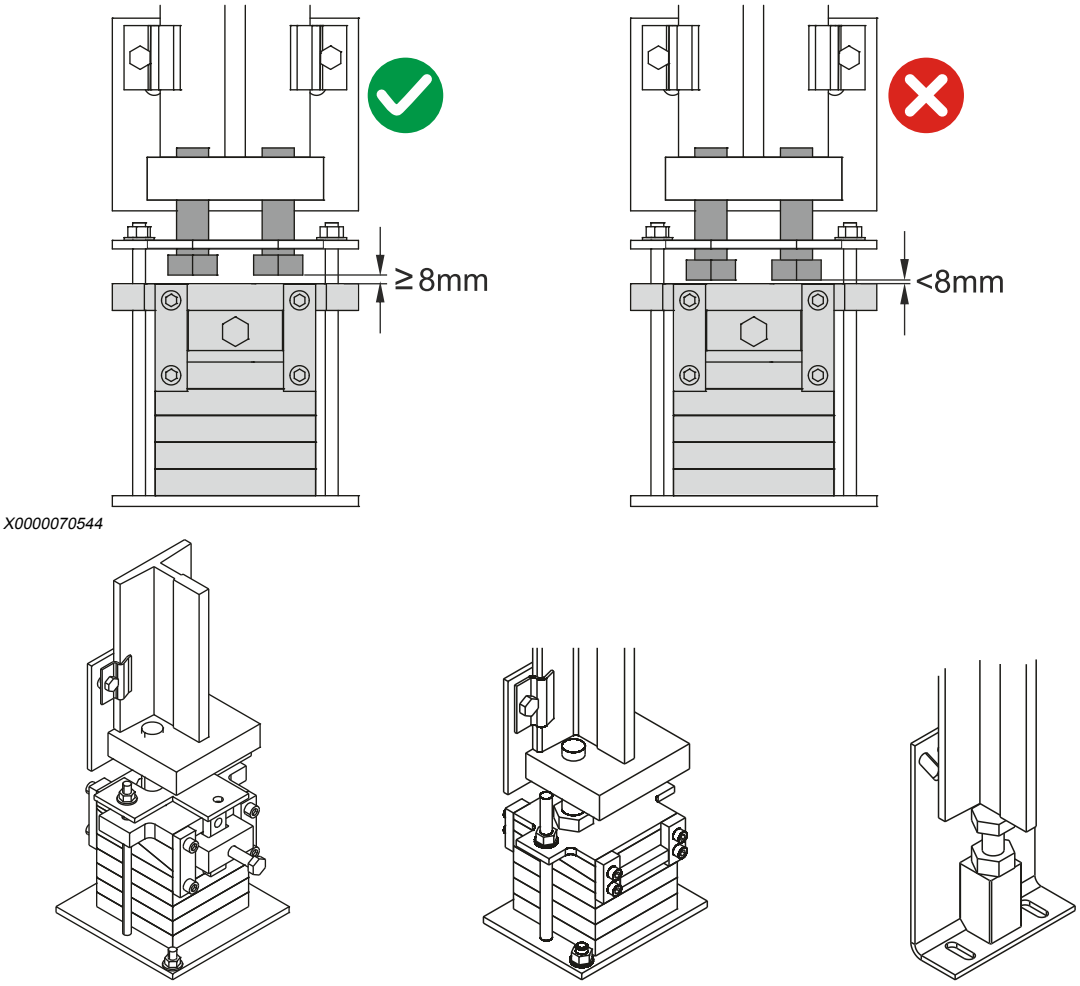
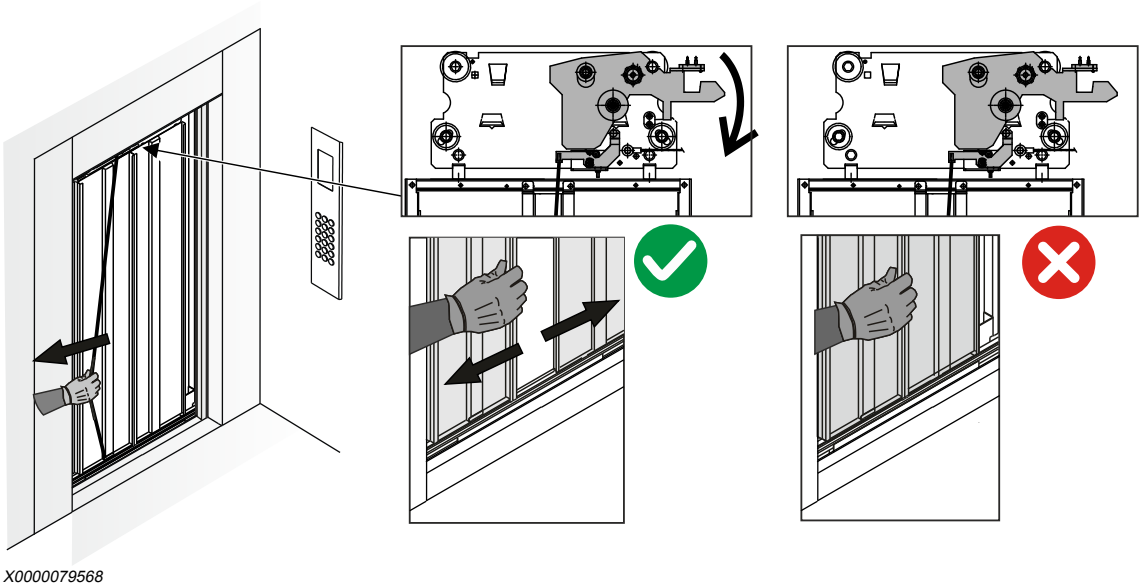


Figure 36: Examples of different jack bolts

X0000056587 A.5

11.5.13 Test pit exit device (PED)

1. Use the pit exit device to open the landing door lock.
   If it does not operate properly, replace immediately.



X0000079568

X0000088684 A.3

11.6 Finalize maintenance visit

1. Fill in the maintenance logbook.
2. Store the logbook back to its storage place.
3. Remove all the tools and waste material from the work site.
4. Clean the site.
5. Switch off the elevator shaft lights.
6. Check that Recall Drive Feature (RDF) is OFF.
7. Check that landing calls and door opening are enabled.
8. Close the controller door.
9. Check that all doors are closed and mechanically locked.
10. Remove maintenance signs from all landings.
11. Complete the reporting.

X0000056745 H.2

X0000072784 C.2

12 RESCUE OPERATIONS

12.1 Contact qualified personnel

Only trained and experienced elevator emergency personnel can rescue passengers from elevators. The following persons are allowed to rescue trapped passengers:

- Maintenance personnel of the building, if allowed by national legislation, provided that they have received proper training for rescue procedures, and taking into account local regulations
- Competent elevator maintenance persons with knowledge of general maintenance procedures and the KONE elevator
- Third party personnel, for example, firemen, provided that they have received proper training for rescue procedures, and taking into account local regulations

1. Contact a trained person or a competent maintenance person at the earliest opportunity.
2. Wait for the qualified person to arrive.

WARNING: Danger of severe accident. Passengers must not try to exit the elevator without the assistance of a competent person. Passengers must wait for a trained person to arrive on the scene and follow the trained person's instructions.

X0000088218 A.3

12.2 Rescue categories and authorization

Rescue operations are divided into three different categories:

1. **Normal rescue**, allowed for trained maintenance personnel of the building or trained elevator personnel.
2. **Technical rescue**, allowed only for trained elevator personnel.
3. **Emergency rescue**, specially trained emergency personnel, (rescue in emergency situation).

X0000065984 B.1

12.2.1 Definition of normal rescue

Normal rescue describes the release of passengers from a trapped elevator car without moving the car, entering the elevator shaft or using special rescue tools. In practice this means that specially trained and authorized personnel are able to open the landing doors to release the passengers when the car is in the door zone.

If rescue cannot be done using the normal rescue methods, professional and authorized elevator maintenance personnel must be contacted for technical rescue.

X0000088561 D.1

12.2.2 Definition of technical rescue

Technical rescue operation is required when an elevator car is trapped more than 200 mm above or below the landing or there is a gap below the apron.

This means that persons authorized to perform technical rescue must move the car using recall drive feature (RDF) or brake releasing device. Exact methods vary case-by-case, they depend for example on the position of the car and the load inside the car.

In some cases the car must be released with special equipment before the car can be moved to the door zone.

If technical rescue does not succeed, emergency rescue is needed.

X0000088562 E.1

12.2.3 Definition of emergency rescue by emergency services

Emergency rescue is required when the elevator car is trapped between landings and it cannot be moved to a door zone (technical rescue is not successful).

WARNING: This kind of rescue operation must always be performed by emergency services trained and authorized for these tasks. It is possible that passengers are too frail, injured, disabled (for example blind) and, for example, cannot climb ladders.

NOTE: The site-specific rescue plan must define the exact number of rescue persons needed!

Building configuration, elevator accessories and local level emergency rescue procedures create a wide range of possible variations for emergency rescue requirements and actual tasks. Emergency rescue plans must therefore be made locally.

Normally the building owner, professional elevator maintenance organization and local emergency services make such plans together. The procedures are then incorporated into the building rescue plans. In countries where it is required, a site specific rescue plan must be available in the elevator controller or machine room (if applicable). It must include relevant parts of this instruction and additional, site specific content. All parties who are to be involved in any possible emergency scenario are then trained according to the emergency plan. Practice drills are to be held according to the local safety policy.

KONE specified rescue devices are stored in the elevator controller or machine room (if applicable). Fall protection equipment is provided by emergency services.

NOTE: For emergency rescue by emergency services, KONE only describes the usage of KONE elevator components. The emergency rescue method selection is the responsibility of the emergency services.

X0000088563 H.1

12.3 Communication with passengers during rescue

Good communication between the passengers and responsible personnel is extremely important. The elevator is always equipped with 2-way communication between controller and car.

When you are about to start the rescue operation, inform passengers that:

– They are safe and should remain calm.

– Help is on the way to safely rescue them from the elevator car.

– Car ventilation is adequate even if car fan does not operate.
– They should stay away from the elevator door, so the doors can be opened safely.
– Ask reassuring questions from passengers and find out what happened:
  • How many passengers are inside the elevator car?
  • Are passengers ok?

    Does anyone need medical help?

    If medical help is needed, contact paramedics at once in order to start treatment without delay.
  • Are the lights still functioning inside the elevator car?
  • Are any of the call buttons lit?
  • Is there a floor number displayed on the floor position indicator, which position?
  • Which direction was the elevator going when it stopped?
  • Which floor did you last leave?
  • Which floor was to be your last stop?

X0000065985 D.3

12.4 Rescue safety

The following safety rules are mandatory:

– When starting the rescue operation, make sure that the rescue is not already in progress by somebody else.

  Coordinate with others if needed.
– Do not leave an open landing door unguarded.
– Follow the local safety regulation and safety rules (no exceptions because of an unusual situation).
– Do not release the brake when the elevator is in the door zone (the door zone indicator (DZI) LED is on).
– Keep in mind that the DZI LED and speed and direction LEDs do not operate if the emergency battery is empty and normal power supply is unavailable.
– Be careful if manually releasing the hoisting machine brakes. If the elevator does not have an electrical brake release device (RBO), do not keep the brakes open for more than 1 second at a time.

  Risk of the elevator car moving too fast.
– Do not move the car without direct supervision if passengers may be able to open the car doors.
– If there is a power break down and you cannot use the machine room or shaft lights, use headlights or flashlights.

WARNING: If there is risk of falling for example, to stairs, use additional fall prevention system and barriers as necessary.

WARNING: Always push a stop button down before entering the elevator shaft, car roof or pit.

WARNING: If the main brake does not hold or the gear mechanism is damaged, it is not allowed to open the auxiliary brake (if equipped). In this case, emergency rescue is needed.

X0000088918 D.2

12.5 Tools, controls and rescue equipment

12.5.1 Tools

Table 19: Common tools

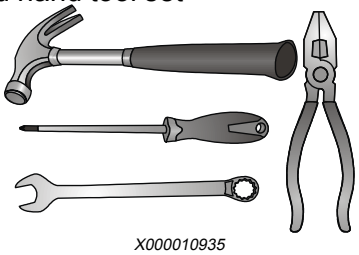
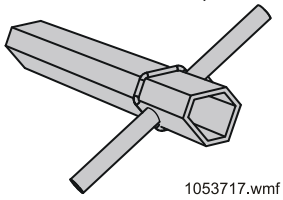
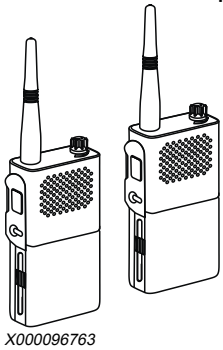
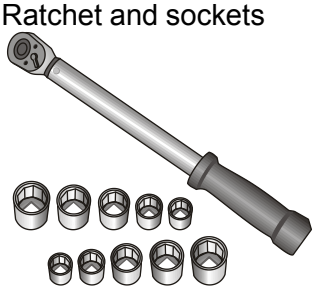
Standard hand tool set  *X000010935*	Emergency opening key KM748001G01, L = 200 mm KM760860G01, L = 700 mm  1053717.wmf *X000026815*
Two way radios for communication Or equivalent communication devices between rescue personnel  *X000096763*	Ratchet and sockets  *X000096769*

Table 19 Common tools (continued)

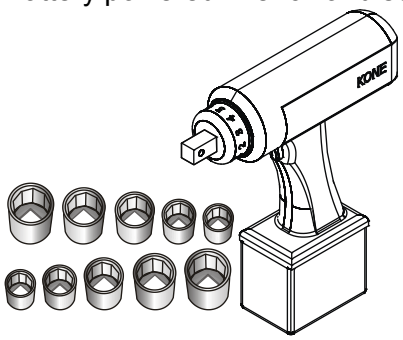
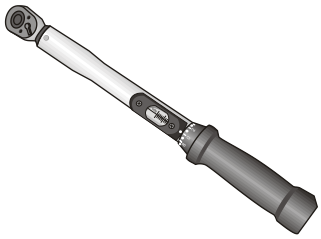
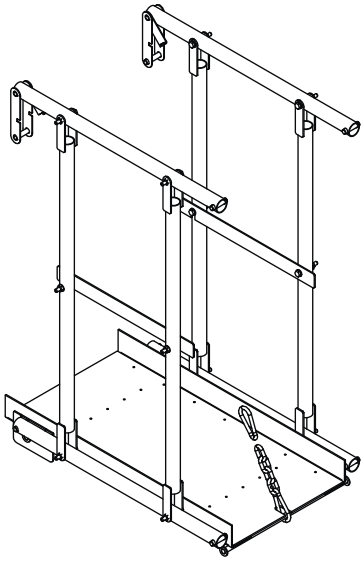
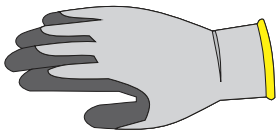
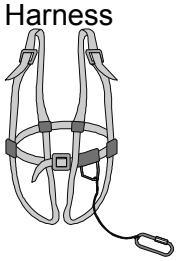
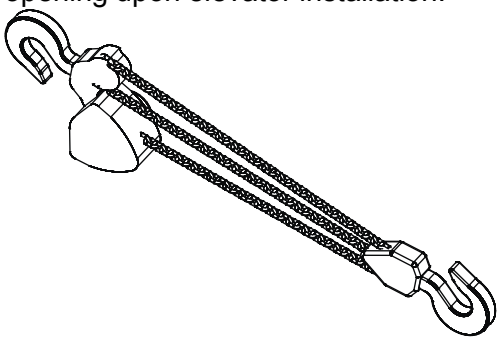
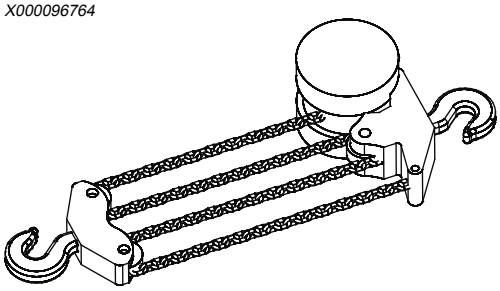
Battery powered wrench and sockets  X000096770	Torque wrench, 170 Nm  X000096771
Cutter (if wire mesh between shafts) **NOTE**: Supplied by the emergency services.	Fireman's axe (if wind deflectors on car roof) **NOTE**: Supplied by the emergency services.
Emergency bridge **NOTE**: The bridge design is elevator order specific. It may be stored in the machine room or integrated into the car.  X000096774	Tripods and hoists (1 – 2), for lifting passengers between car and car roof (if emergency trap door on the ceiling) **NOTE**: Supplied by the emergency services.
Safety gloves  X0000085580	Harness  X000029175

Table 20: KONE MiniSpace™ with steel rope and KONE ReGenerate™ 800 specific tools

Manual chain hoist according to the elevator's load (the entire load to be lifted). Stored in the machine room. The hoist may be hung in a lifting point above the car rope opening upon elevator installation.



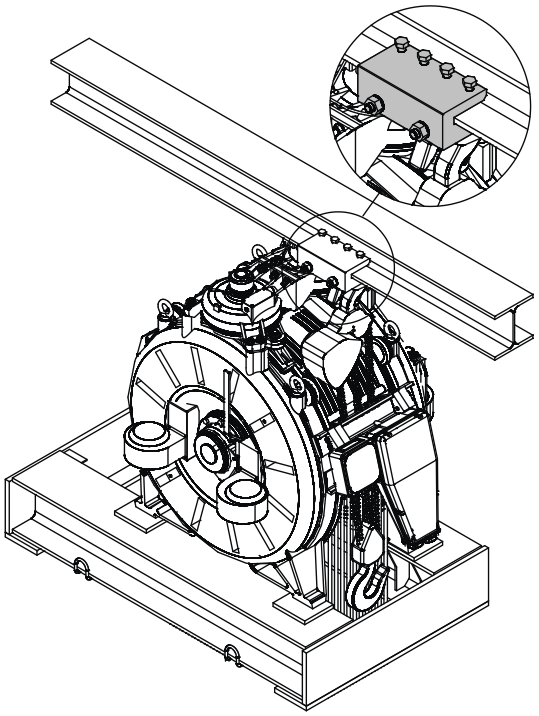
X000096764



X000096765

Suspension clamp
For example, Corso clamps LT-10B

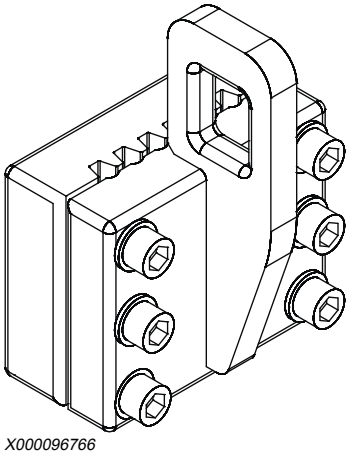
NOTE: Stored in the machine room.



X000096767

Rescue clamp:
- KM1334995 (for 8 × D16 ropes)
- KM1334996G01 (for 6 × D16 ropes)
- KM1334996G02 (for 8 × D13 ropes)
- KM1334997 (for 6 × D13 ropes)
- KM1335011 (for 6 × D19 ropes)

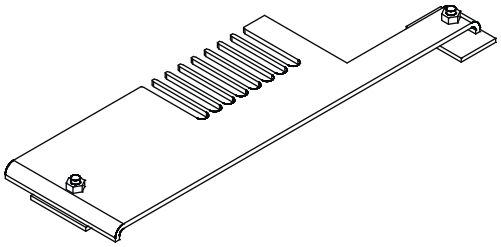
NOTE: Stored in the machine room with Allen key of correct size (M16).



X000096766

Rope clamp assembly support in the machine room (1:1 roping)

NOTE: Stored in the machine room.



X000096768

Table 20 KONE MiniSpace™ with steel rope and KONE ReGenerate™ 800 specific tools (continued)

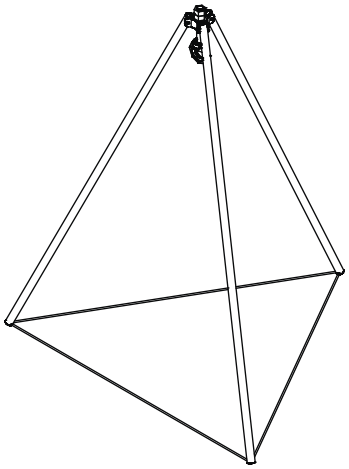
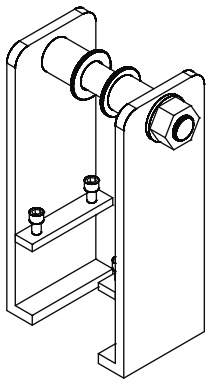
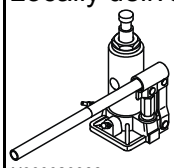
Tripod crane for manual chain hoist (2:1 roping), supplied locally and verified by local KONE Elevator Support Center Tripod crane must be selected according to counterweight capacity (from layout drawings). For example, Huchez aluminium telescopic tripod CT3 up to 3000 kg. **NOTE:** Stored in the machine room.  *X000096772*	Anchorage clamp for lifting the rope anchorage assembly (2:1 roping) **NOTE:** Stored in the machine room.  *X000096773*

Table 21: KONE UltraRope® specific tools

Hydraulic bottle jack Capacity of the jack is selected according to the weight of the rope compensator (varying from 2000 to 5000 kg). Locally delivered.  *X000020966*	White tape or white marker pen Locally delivered.
KONE UltraRope® pit rescue tool	KONE UltraRope® hydraulic lifting tool

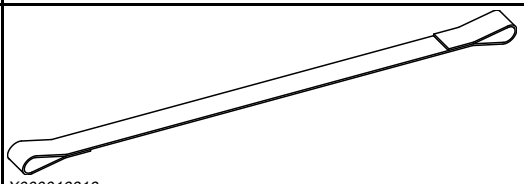
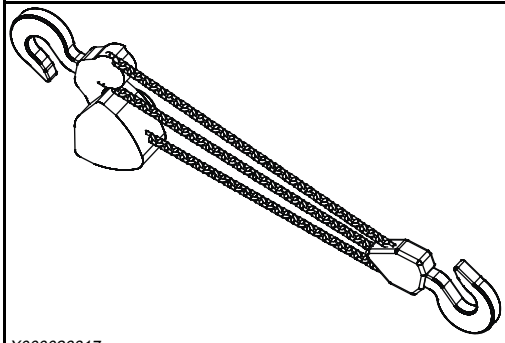
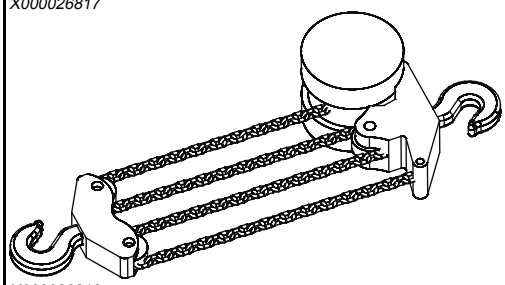
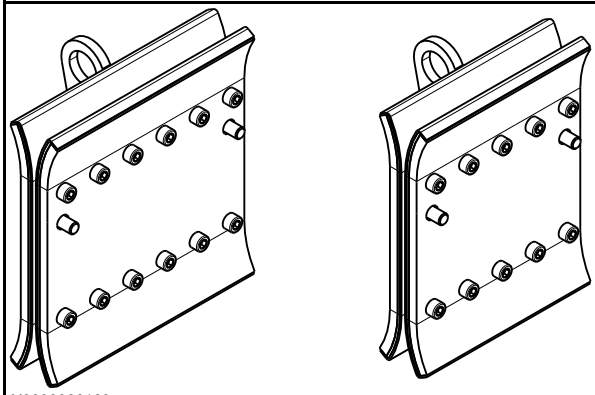
X000096775 D.2

Related information

– *KONE UltraRope® pit rescue tool (176)*
– *KONE UltraRope® hydraulic lifting tool (177)*

12.5.2 KONE UltraRope® pit rescue tool

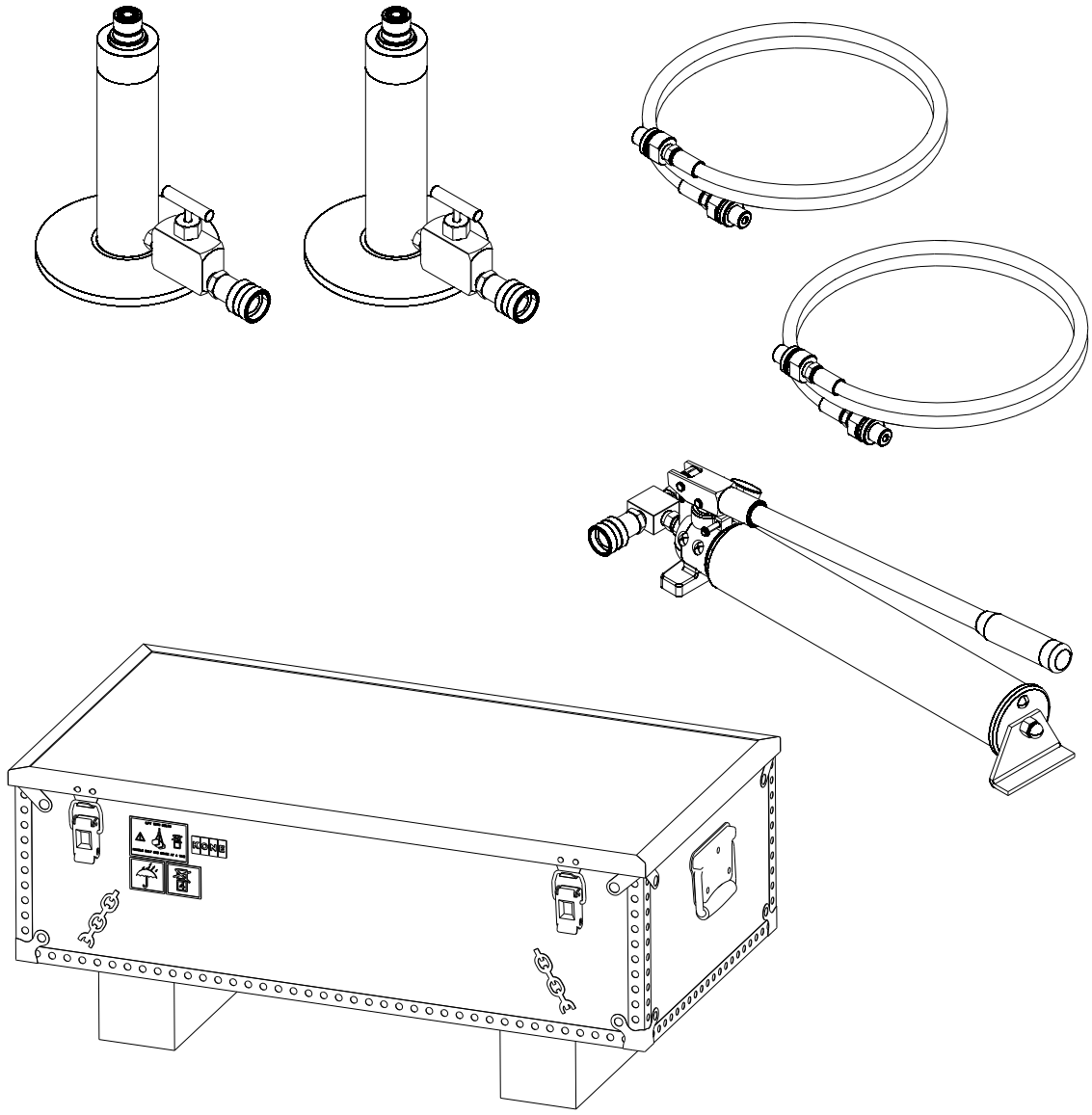
You can use the pit rescue tool to pull the elevator car up or down if it does not move with any other method.

Illustration	Description
Multiple hoisting straps according to the elevator Q. Locally delivered	 X000016818
 X000026817  X000026818	**Lifting device:** Manual chain hoist according to the elevator Q/2. Locally delivered
 X0000066163	**Pit rescue tool (rope clamp) for KONE UltraRope®:** Is used for fixing the lifting device to the compensation ropes. The rescue tool is stored in the pit. KM51163557V000 is for 3 or 5 URs (13 kg). KM51167334V000 is for 2 or 4 URs (11 kg). **NOTE:** The weight of the rescue tool is 11 / 13 kg. Two maintenance persons are required for fixing and removing the tool.

X0000066044 E.2

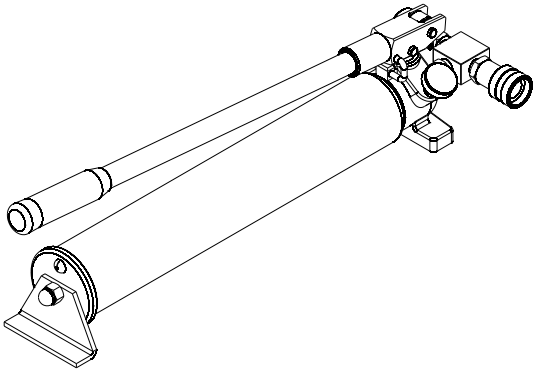
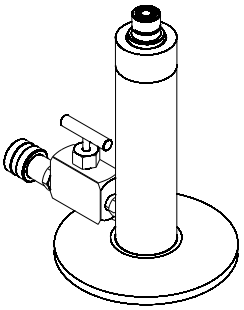
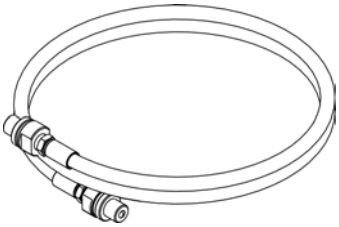
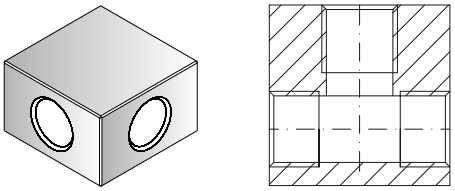
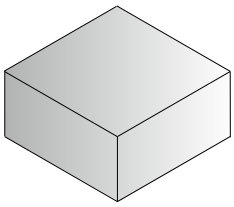
12.5.3 KONE UltraRope® hydraulic lifting tool

The hydraulic lifting tool raises the hoisting machine bed plate so that the car or counterweight raises off the safety gears (maximum 350 mm).



X0000313514

Hydraulic lifting tool, 2 pcs

Part	Figure	Pieces
Manual hand pump KM51186920	 X0000066436	2
Cylinder KM51186886 Flow regulating valve KM51186913 Cylinder stand KM51186890	 X0000066440	4
Hydraulic hose 2 m KM51186916	 X0000066444	4
T-adapter KM51186918	 X0000100192	2
Wooden spacer 200x200x100 (only with KM51186873V000)	 X0000066448	16

X0000067167 E.4

Related information

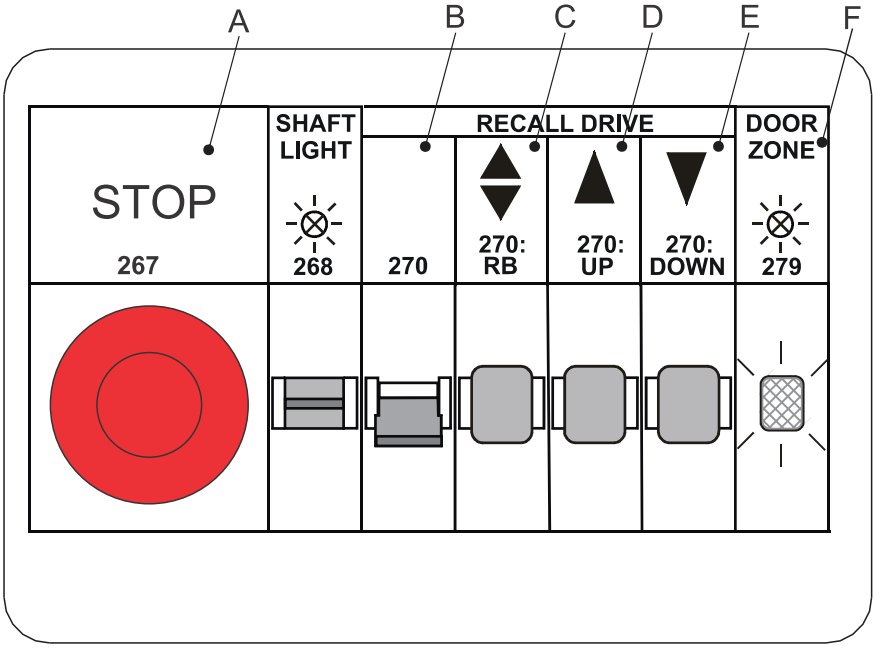
– OM-04.01.001 Hydraulic Lifting Tool, Owner's Manual

12.5.4 Recall drive feature

Recall drive feature (RDF) electrically moves the elevator car at a lowered speed. Trained elevator technicians operate RDF with the RDF unit.

The RDF unit is mounted inside the control panel (in top part). It is visible also when the control cabinet door is closed.

Depending on the elevator delivery, the RDF unit design may vary, but the naming convention of the buttons and the operating principle is the same.



X000022138

A STOP button (267)

B Recall drive switch (270)

C RUN button (270:RB)

D UP direction button (270:UP)

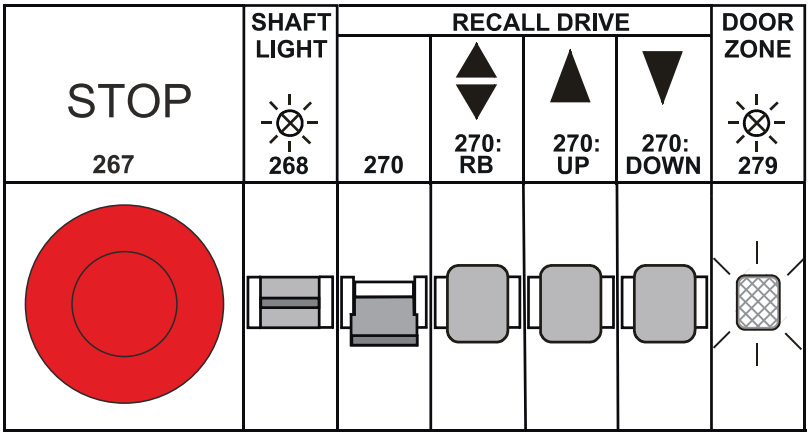
E DOWN direction button (270:DOWN)

F Door zone indicator (DZI) (279)

X0000066068 D.3

12.5.5 Door zone indicator

Door zone indicator (279) indicates when the elevator car is in door zone. When door zone indicator is lit, it is safe to open the elevator doors.



X0000066072
X0000066071 B.1

12.5.6 Main switch

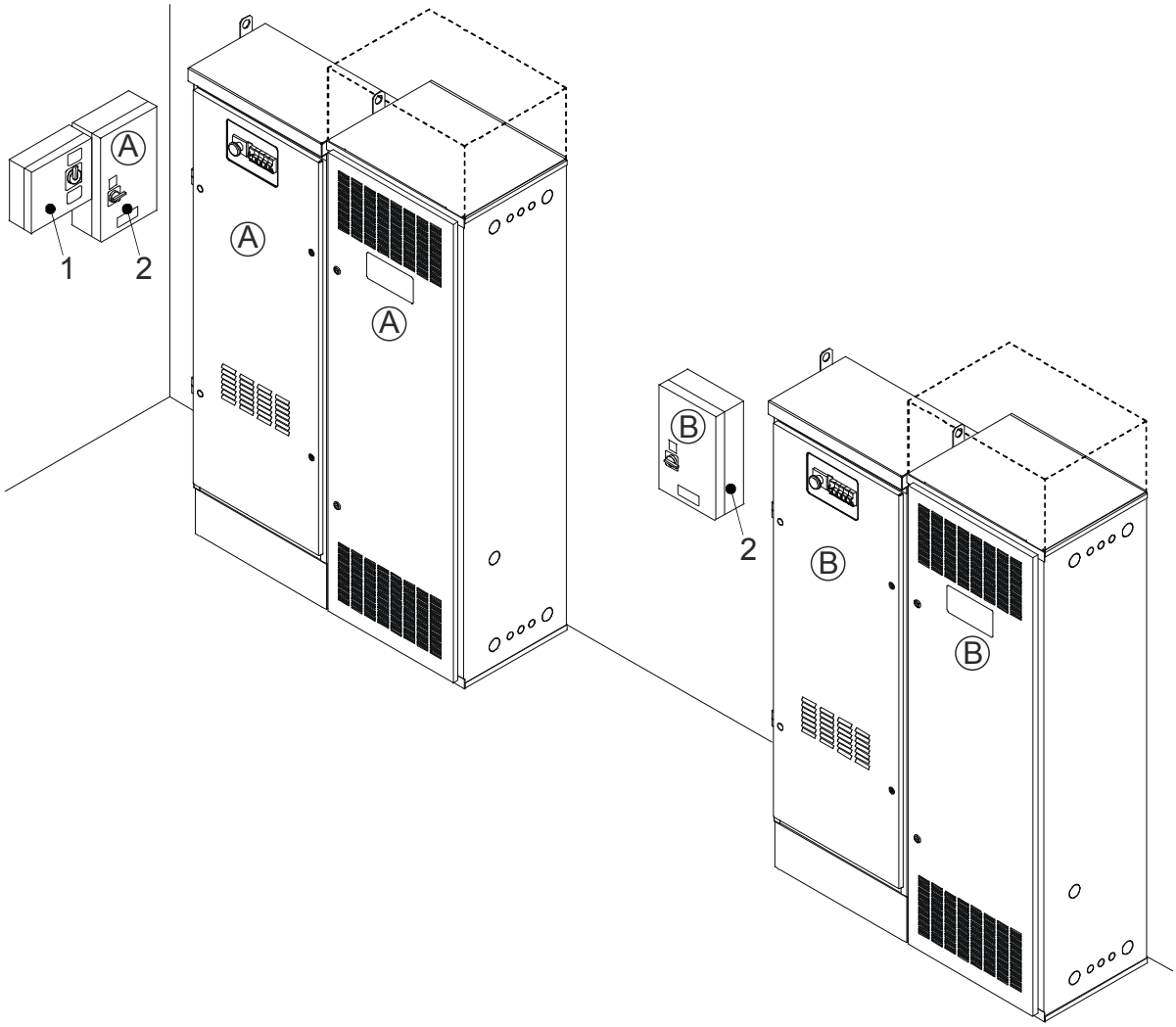
The main switch (Q1) is used for switching electrical power to elevator on or off.

The main switch(es) are located on the machine room wall.

Single elevators have one main switch (2) for the elevator controller.

Elevator groups can have a separate main switch for the segmented shaft network (1) if the building is equipped with such.

Cabinets belonging to the same elevator are marked similarly, for example, with A and B (marking can vary).



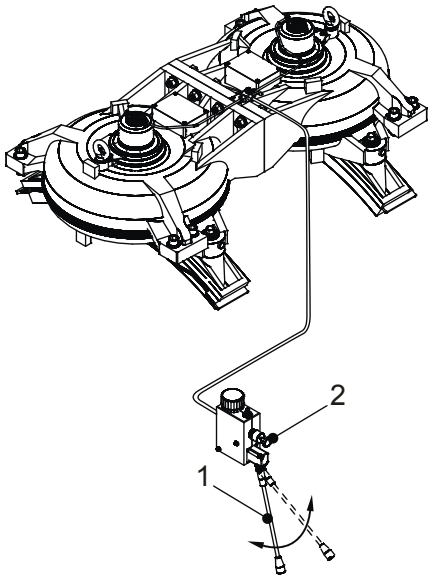
X000030173

Figure 37: Example elevator group

X0000066074 C.1

12.5.7 Hoisting machine brakes

Closed hoisting machine brakes keep the elevator stationary when the elevator car is not moving. The hoisting machine brakes and brake lever are located beside the machine or integrated to hoisting machine body.



X000026753

Figure 38: MX32, MX40, MX100 brake opening example

You can manually open the machine brakes with the pump handle (1) and the flow control button (2).

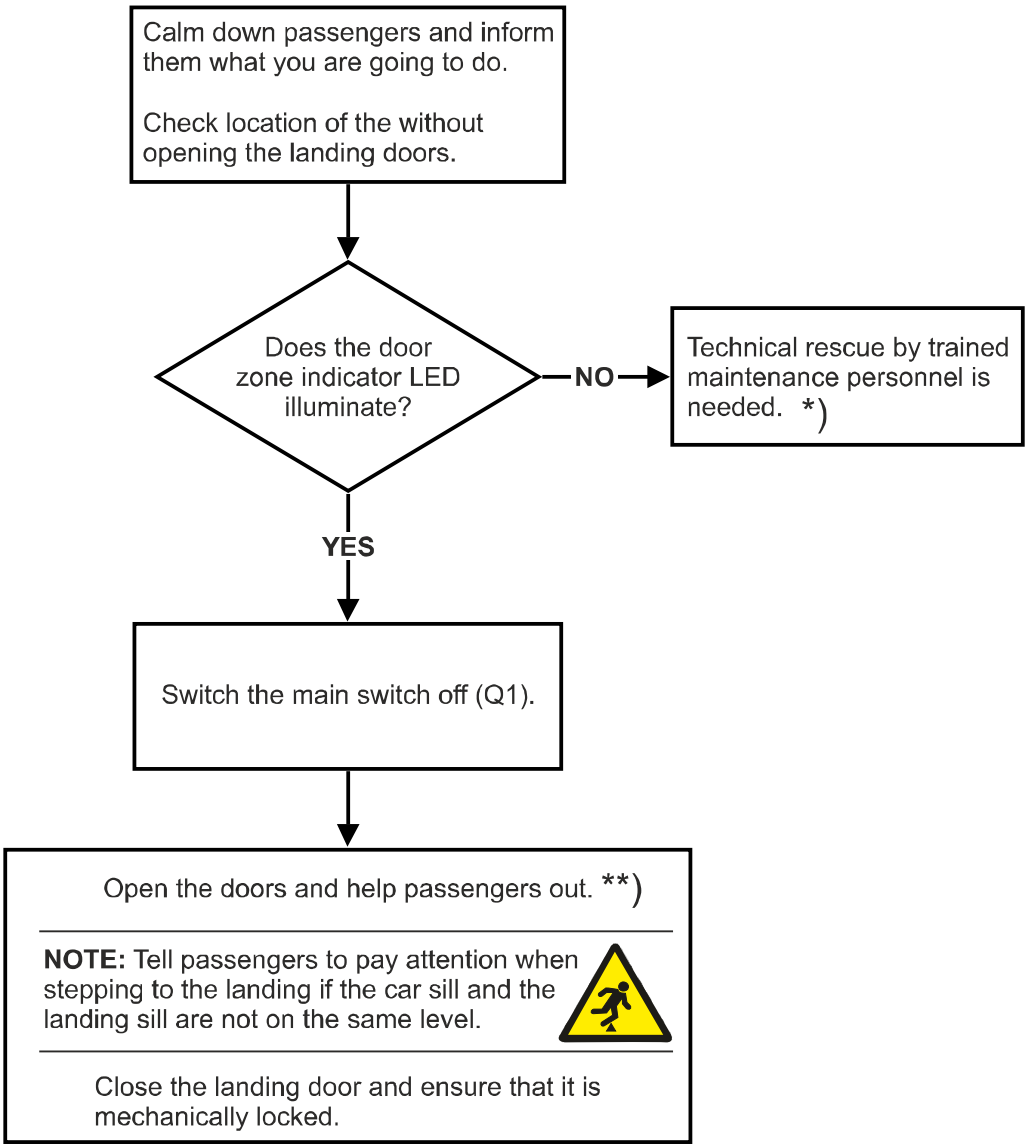
X0000066075 C.1

Related information

– *Open NMX11 machine brake manually (43)*
– *Open MX14 machine brake manually (45)*
– *Open MX18 or NMX18 machine brake manually (47)*
– *Open MX32/MX40/MX100 machine brake manually (49)*

12.6 Normal rescue

1 qualified person needed.



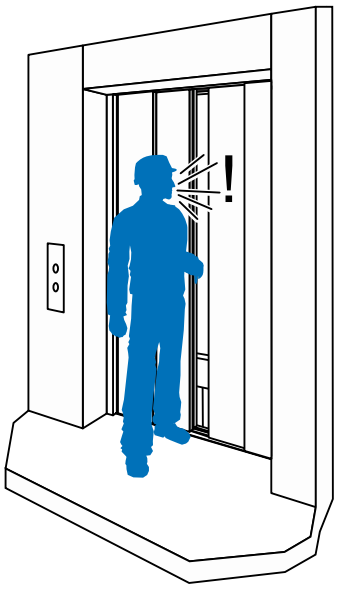
X0000066140
X0000066139 C.1

Related information

– *) Technical rescue (190)
– **) Release passengers (car in door zone) (187)

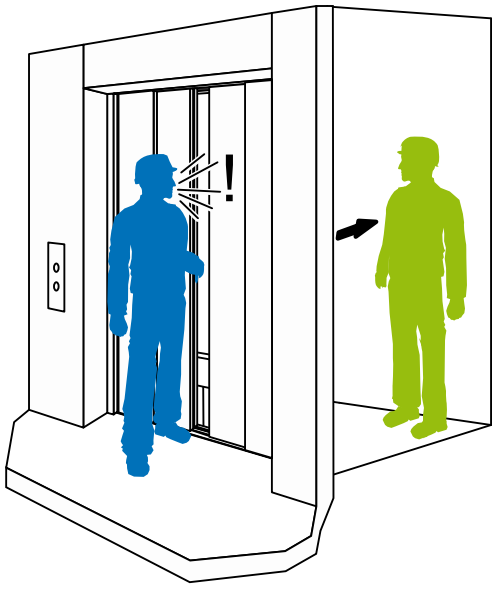
12.6.1 Check elevator car location

1. Inform the passengers that:
   – you are about to let them out
   – they must not try to do anything themselves.



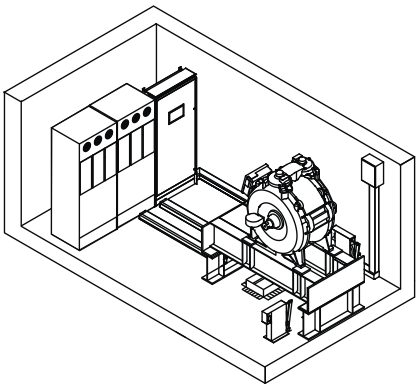
X0000212121

Tell the passengers to stay clear of the doors.



X0000212123

2. Go to the controller in the machine room.



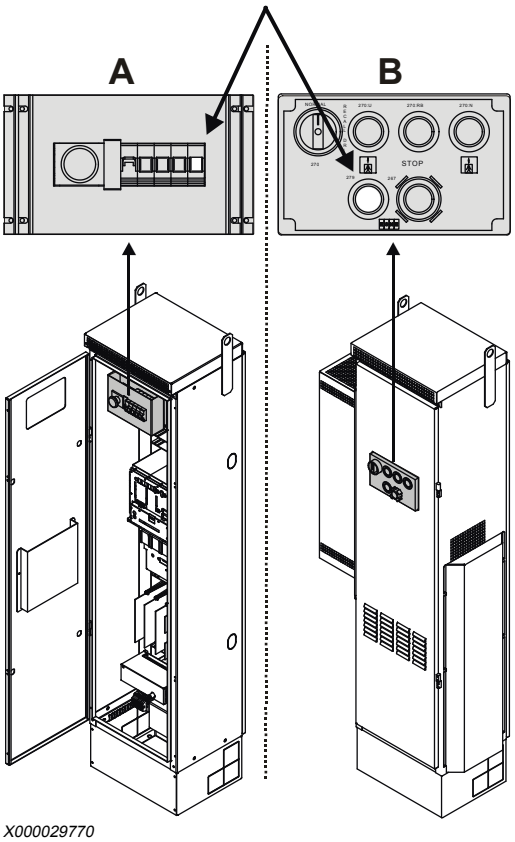
X000026826

3. Check the door zone indicator (DZI, green indicator light).

   Open the controller door if needed.

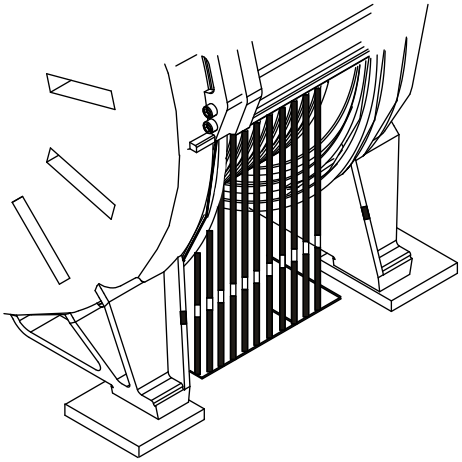
   The elevator car is near landing level when the DZI illuminates in the controller.

   NOTE: DZI has a battery back up.



X000029770

4. Check the elevator car position from the position indicator, or (if applicable) from the suspension rope markings (not used in all countries).

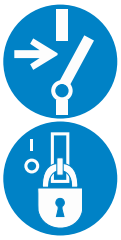


X000026837

5. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.



6. Close the machine room door.

   Make sure that the door is locked and outsiders cannot enter the machine room.

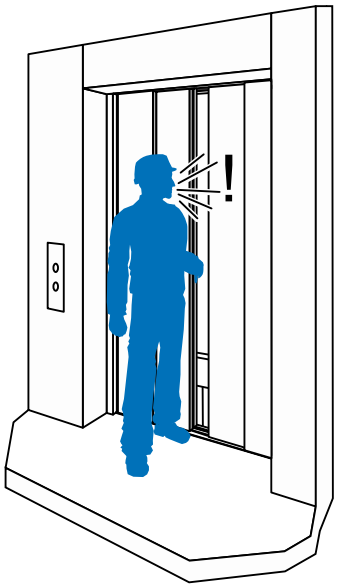
X0000066142 E.3

12.6.2 Release passengers (car in door zone)

WARNING: Wear protective cut-resistant safety gloves.

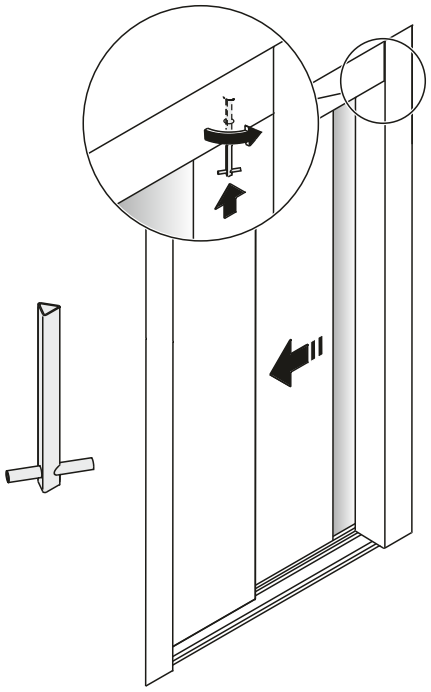
---

1. Inform the passengers about how to act when you open the doors:
   - They must stay calm.
   - They must obey the instructions you give.
   - They must to move away from the car door when the door will be opened.
   - They must to exit the car one by one.



X0000212121

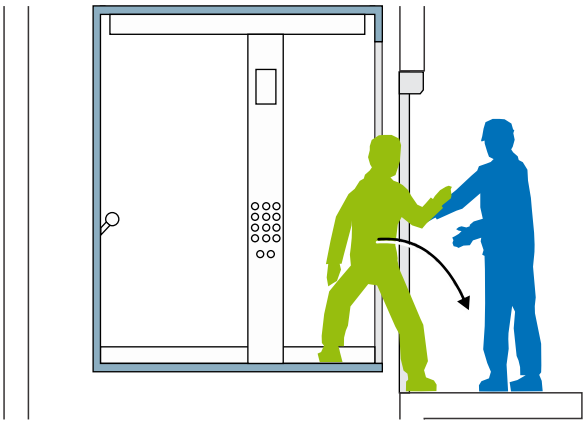
2. Open the landing doors with the emergency opening key.



X0000067418

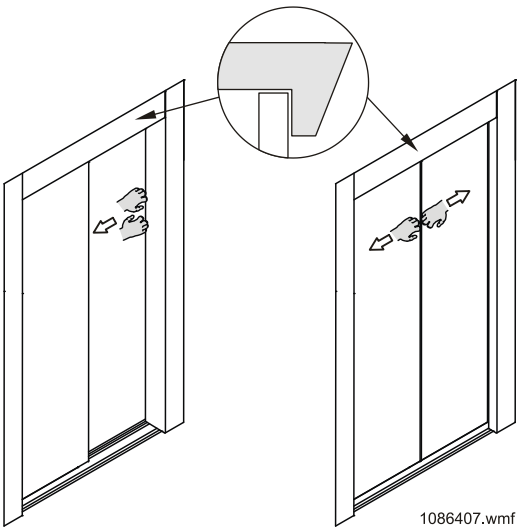
3. Assist the passengers out from the car.

Ensure that the passengers will not stumble if the elevator car is not exactly at the sill level.



X0000212484

4. Close the car and landing doors and ensure that they are mechanically locked.



1086407.wmf

X000026832
X0000066143 C.1

12.7 Technical rescue

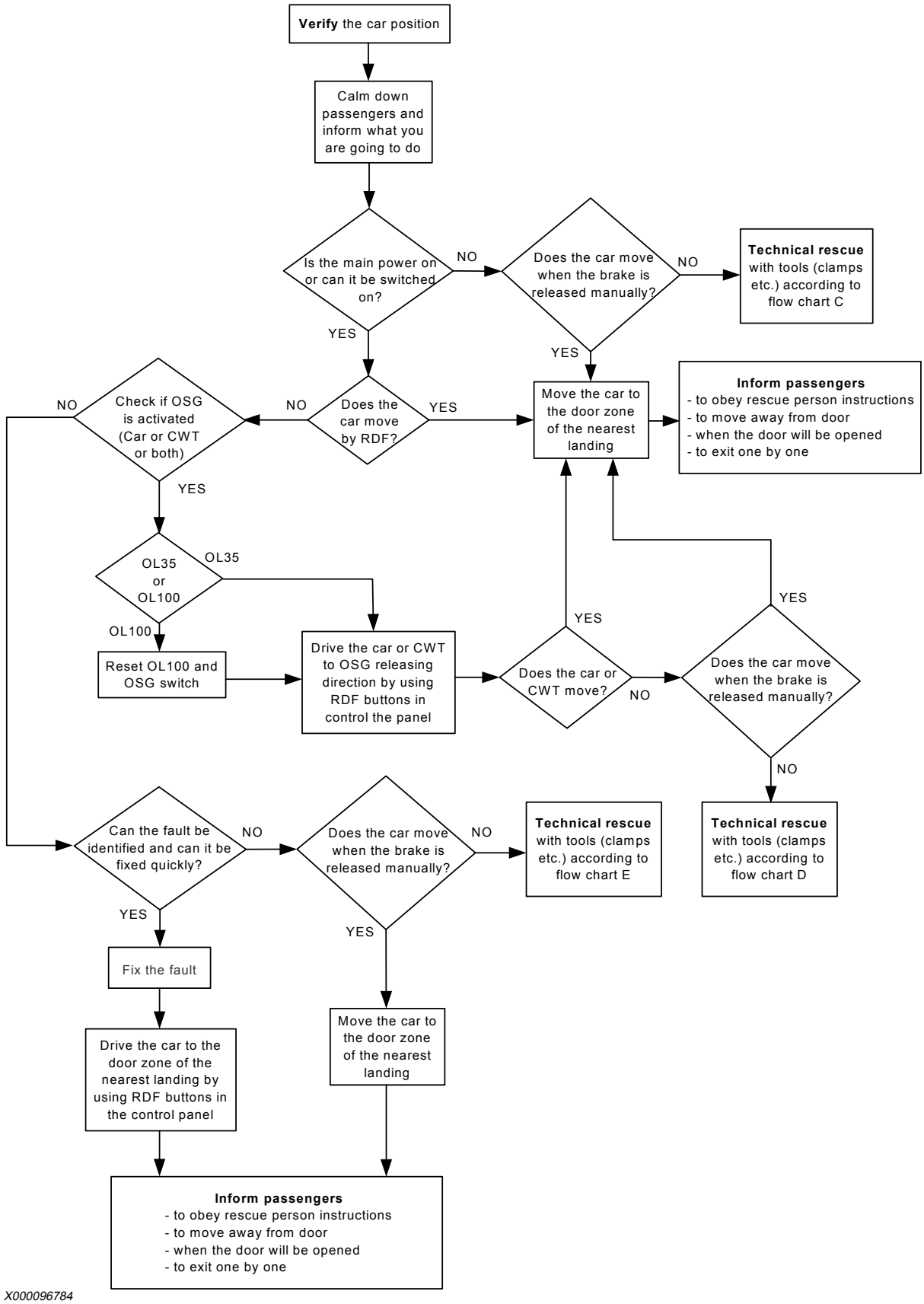


Figure 39: Flowchart B

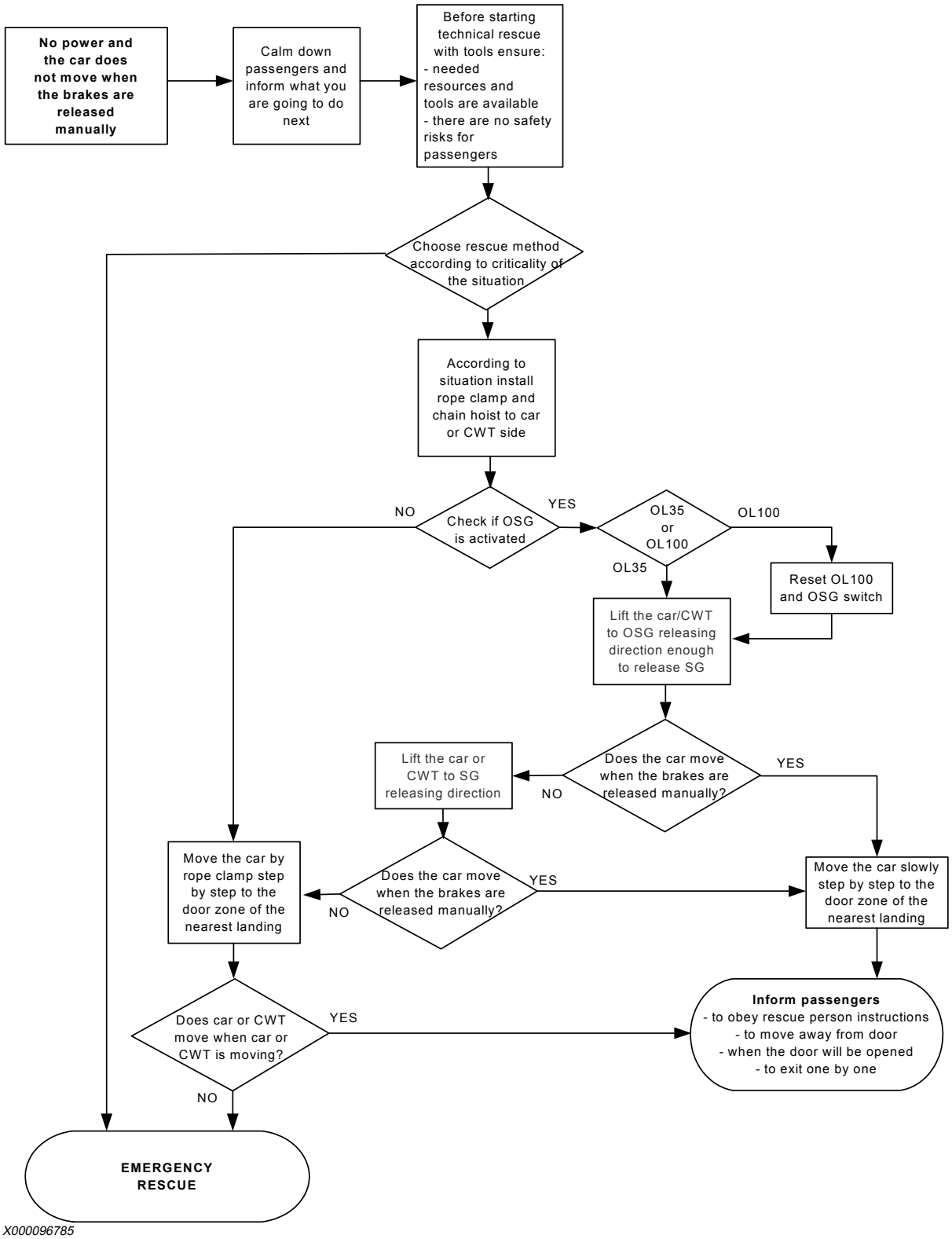
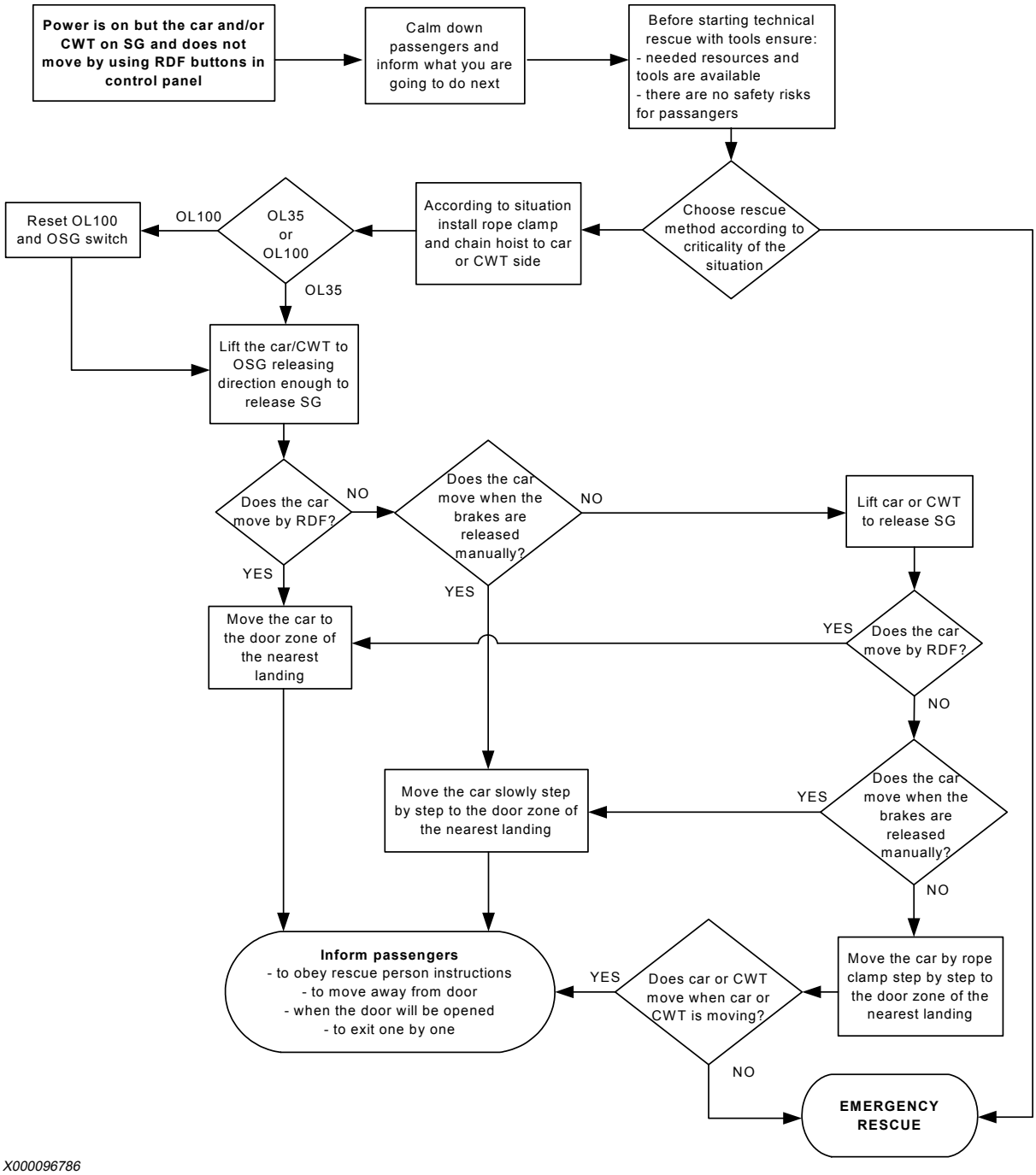
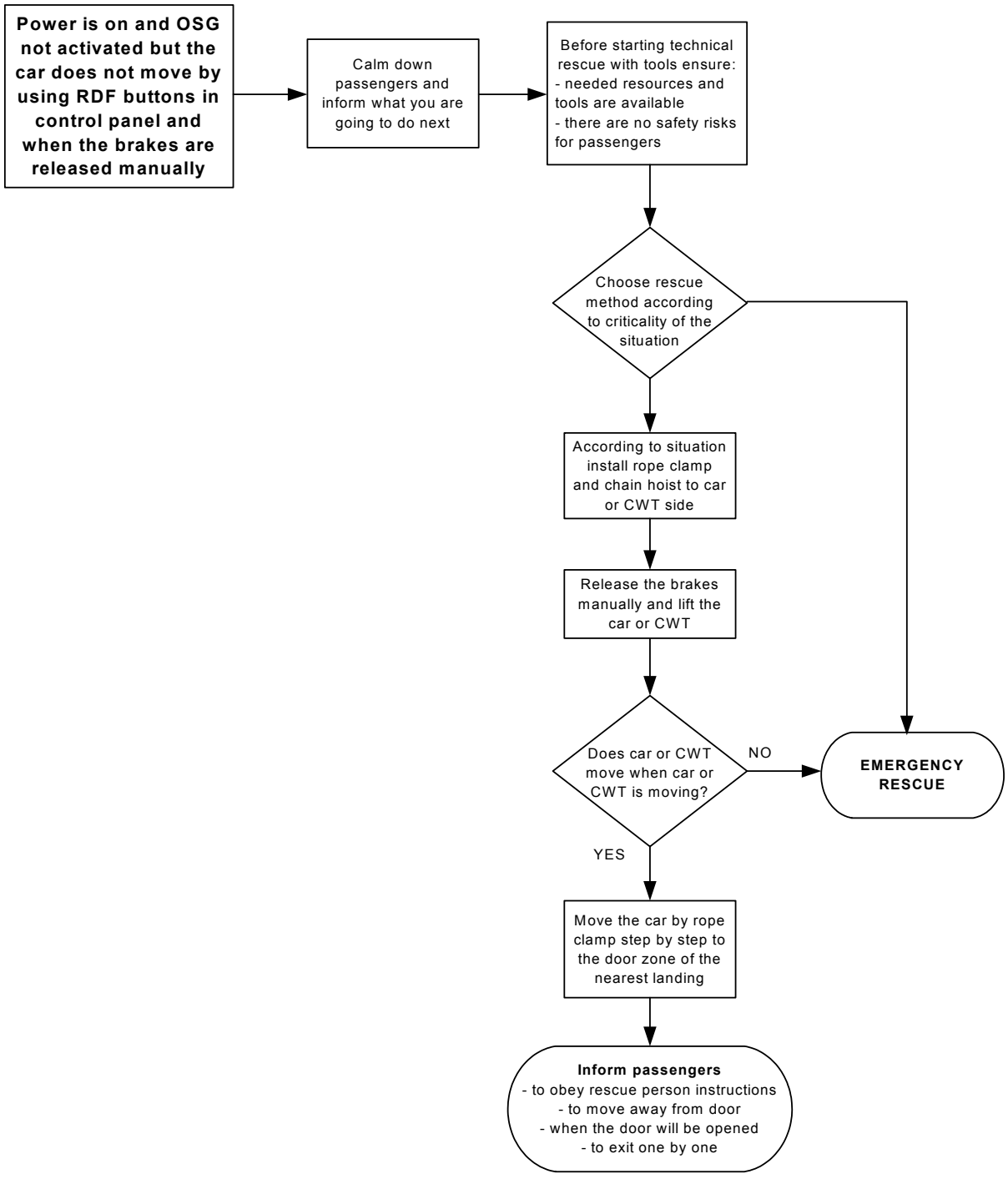


Figure 40: Flowchart C



X000096786

Figure 41: Flowchart D



X000096787

Figure 42: Flowchart E

X000096798 B.1

Related information

– Check car location (194)
– Reset overspeed governor (194)
– Use recall drive feature to move elevator car to door zone (195)
– Use manual brake releasing device to move car to door zone (door zone indicator operative) (196)
– Use manual brake releasing device to move car to door zone (door zone indicator inoperative) (199)
– Raise elevator car or counterweight off safety gear (1:1 roping) (204)
– Raise elevator car off safety gear (2:1 roping) (209)
– Release passengers (car in door zone) (187)
– Emergency rescue using emergency side doors (242)
– Emergency rescue by emergency services (254)

12.7.1 Check car location

Use the following methods in the presented order and stop when you locate the car.

1. Ask if building personnel know where the car is.
2. If equipped, use KONE E Link™ or similar monitoring systems to locate the car.
3. Check the hall display (HLI) at landing.

   In most cases it shows the latest passed floor.

   There must be power supply present for the elevator in order the HLI to function.
4. Open the bottom floor landing doors (maximum 90 mm), switch on the shaft lights and estimate roughly the car position.

5. Go to a landing at middle zone of the shaft and open the landing door (maximum 90 mm).

L0000000197

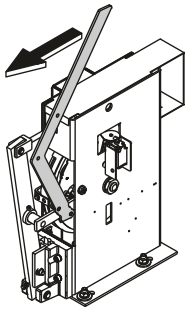
   – If you can see the loop of the travelling cable, the car is above you.
   – If you do not see the loop of the travelling cable, the car is below you. (only a straight travelling cable can be seen.)
6. Close the landing doors and repeat the check above or below of the first checking point until you have located the car.

L0000000197
X0000066322 D.1

12.7.2 Reset overspeed governor

If the overspeed governor (OSG) is activated, investigate the cause. Make sure that it is safe to try to move the elevator car.

1. If activated, reset the OSG with the tripping lever.



X0000063457

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.

---

2. If needed, try to move the elevator car or counterweight upwards on recall drive feature (RDF) to release the safety gear.

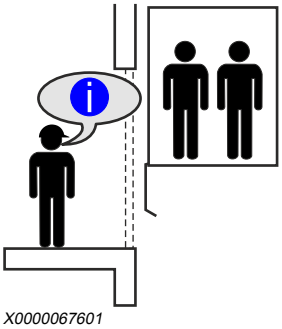
X0000066976 D.3

12.7.3 Use recall drive feature to move elevator car to door zone

Check that the overspeed governor (OSG) has been reset, if necessary.

1. Inform the passengers that you are about to move the elevator car in order to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.



X0000067601

2. Switch on the recall drive feature (RDF).
3. If safety gear must be released, push the direction button UP or DOWN and RUN button simultaneously.

   Move the elevator car up if car is on safety gear. Move the elevator car down if counterweight is on safety gear.

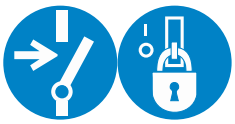
4. Push the direction button DOWN or UP and RUN button simultaneously to move the elevator car to the nearest landing level.

   The elevator car is near landing level when the door zone indicator (DZI) illuminates in the controller.

5. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.



6. Close the machine room door.

   Make sure that the door is locked and outsiders cannot enter the machine room.

7. Release the passengers from the elevator car.

X0000066303 E.3

Related information

– *Reset overspeed governor (194)*
– *Release passengers (car in door zone) (187)*

12.7.4 Use manual brake releasing device to move car to door zone (alternative methods below)

12.7.4.1 Use manual brake releasing device to move car to door zone (door zone indicator operative)

Check that the overspeed governor (OSG) has been reset, if needed.

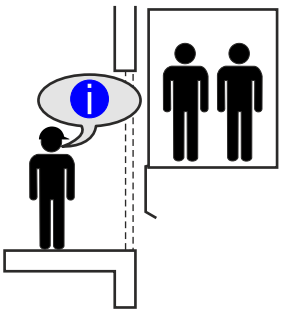
Two authorized persons are needed in the machine room if the door zone indicator (DZI) is not visible from the hoisting machine.

WARNING: Wear protective cut-resistant safety gloves.

---

1. Inform the passengers that you are about to move the elevator car in order to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.

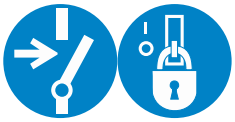


X0000067601

2. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.



3. Open the machine brake by pumping the hand pump handle (1) several (20 - 30) times and by simultaneously pushing the flow control button (2).

The brake stays open as long as the flow control button is pressed.

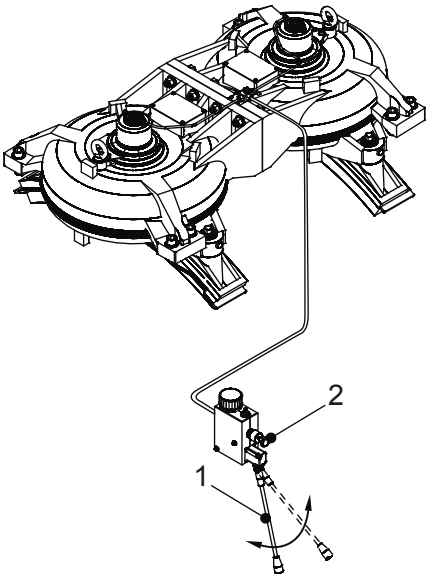


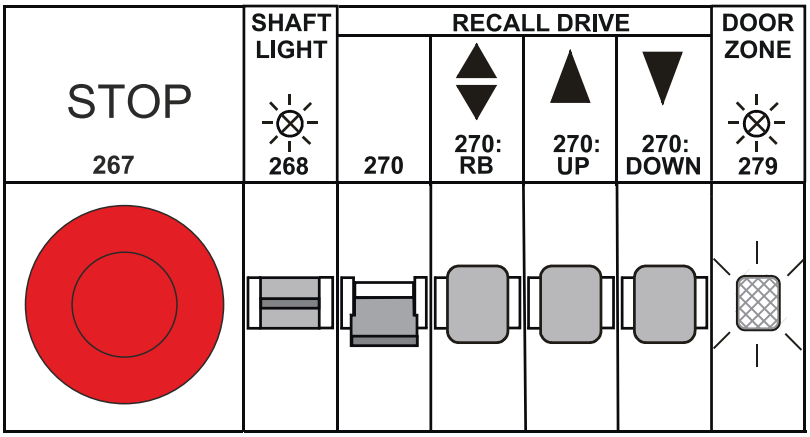
Figure 43: MX40 manual brake opening

WARNING: The elevator uses a gearless hoisting machine which means that the speed may increase very fast once the brakes are opened. Observe the traction sheave movement. Stop the movement by closing the brake after every 0.5 – 1.0 seconds.

CAUTION: When moving the elevator car, supervise the rope position. Make sure that the rope guards are on their place to prevent the suspension ropes from dropping from the diverting pulleys. If a suspension rope drops from a diverting pulley, stop moving the elevator car immediately and proceed to emergency rescue.

---

4. Stop the car when the DZI in the controller illuminates.



X0000066072

WARNING: Never open the brake if the elevator car already is in the door zone!

5. Close the machine room door.

   Make sure that the door is locked and outsiders cannot enter the machine room.

6. Release the passengers from the elevator car.

X0000066331 F.3

Related information

– Reset overspeed governor (194)
– Release passengers (car in door zone) (187)
– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)

12.7.4.2 Use manual brake releasing device to move car to door zone (door zone indicator inoperative)

Check that the overspeed governor (OSG) has been reset, if needed.

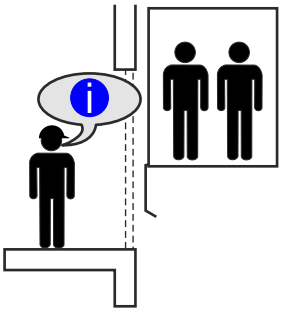
The door zone indicator (DZI) can be inoperative during a power cut if the backup battery is empty.

WARNING: Manual brake release must be used with extreme care and after each short brake opening sequence, the position of the elevator car must be checked with direct visual check. This method requires that one rescue person is located at the closest floor related to elevator position. Two-way communication is mandatory.

WARNING: Wear protective cut-resistant safety gloves.

1. Inform the passengers that you are about to move the elevator car to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.



X0000067601

2. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.

3. Communicate and verify with the person at the landing level that it is safe to move the elevator car.

WARNING: Do not move the elevator car, if you do not get the instructions from the person at landing.

4. Open the machine brake by pumping the hand pump handle (1) several (20 - 30) times and by simultaneously pushing the flow control button (2).

The brake stays open as long as the flow control button is pressed.

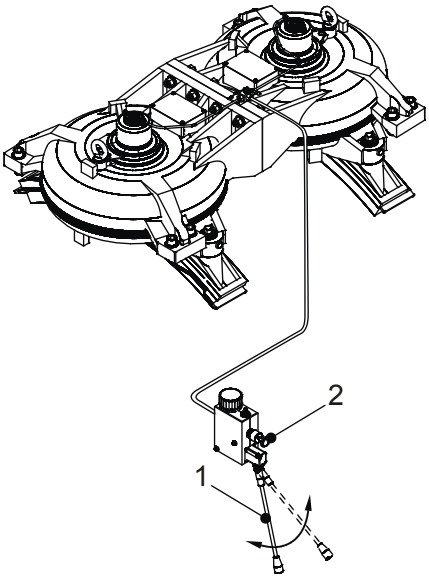


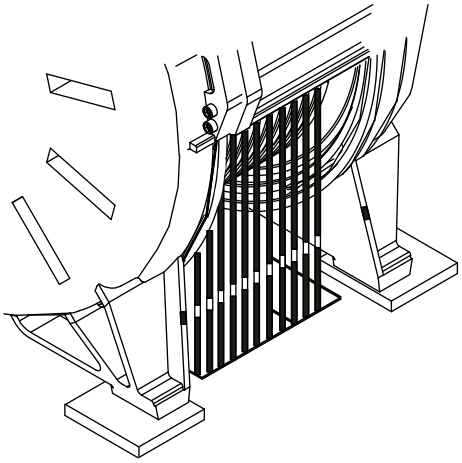
Figure 44: MX40 manual brake opening

WARNING: The elevator uses a gearless hoisting machine which means that the speed may increase very fast once the brakes are opened. Observe the traction sheave movement. Stop the movement by closing the brake after every 0.5 – 1.0 seconds.

CAUTION: When moving the elevator car, supervise the rope position. Make sure that the rope guards are on their place to prevent the suspension ropes from dropping from the diverting pulleys. If a suspension rope drops from a diverting pulley, stop moving the elevator car immediately and proceed to emergency rescue.

Stop the elevator car immediately if the elevator car is at the door zone.

Sometimes, there are suspension rope markings that align with the marking on the hoisting machine (not used in all countries). Depending on the site, the markings may be covered by machine protections.



X000026837

Figure 45: Example suspension rope markings

WARNING: Never open the brake if the elevator car is already in the door zone!

If the elevator car is in door zone, inform your colleague at landing that the releasing of passengers from the elevator car can begin.

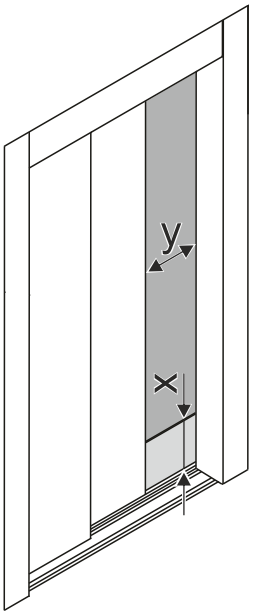
Keep active communication regarding the rescue progress.

5. Check the elevator car position (rescue person at landing).

WARNING: Keep active communication.

---

1. Open the landing door with emergency opening key, maximum opening width 90 mm (y).
2. Check the elevator car position:
   - If the dimension X is ± 200 mm at maximum and the apron covers the open space when the elevator car is above the landing, release the passengers from elevator car.
   - If the dimension X is more than 200 mm, proceed to next step.



X0000066355

3. Close the landing door.
4. Check that the landing door is mechanically locked.

6. Repeat the "brake open - car position check" -procedure with your colleague until the elevator car arrives to door zone.

   Keep active communication while performing the steps.

7. Release the passengers from the elevator car.

X0000066342 F.4

Related information

– Reset overspeed governor (194)
– Release passengers (car in door zone) (187)
– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)

12.7.5 Raise elevator car or counterweight off safety gear (1:1 roping)

If an elevator car or counterweight (CWT) is stuck on safety gear, a chain hoist fixed to a hoisting beam above the rope opening in the machine room must be used either if there is no power or there is insufficient motor torque to raise the elevator car and release the safety gear. Before setting up the hoists, check if CWT has its own overspeed governor (OSG). If it does, check which one of the OSGs is activated. If both elevator car and CWT OSGs are activated, check the load in the elevator car (more or less 50%) and set the chain hoist to the lighter side.

The elevator car can then be moved to a door zone on recall drive feature (RDF) or by using manual brake releasing device. At least two rescue persons are required to perform this task. One rescue person shall observe the elevator, and one or two rescue person(s) perform the rescue operations in the machine room.

NOTE: If both elevator car and CWT are stuck on safety gear, lift the rope compensator. Also, if compensation ropes are not left loose, lifting the elevator car or CWT results in spring loading the ropes and adding extra weight.

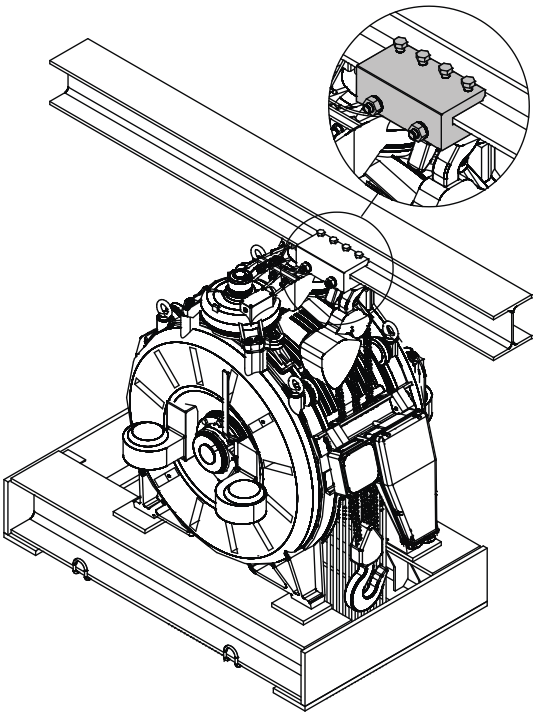
NOTE: If KONE JumpLift 1000 2.0: Use rope clamp to lift elevator car or CWT off the safety gear.

X000096807 E.2

12.7.5.1 Fix chain hoist and rope clamp

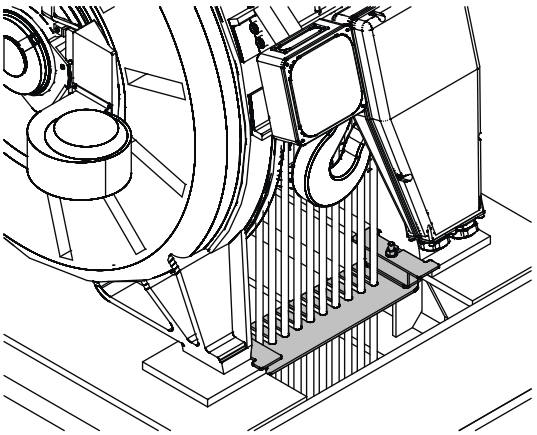
1. Switch the main power off.

2. Move chain hoist in the suspension clamp above the car or counterweight rope opening. Fix the chain hoist to the beam.



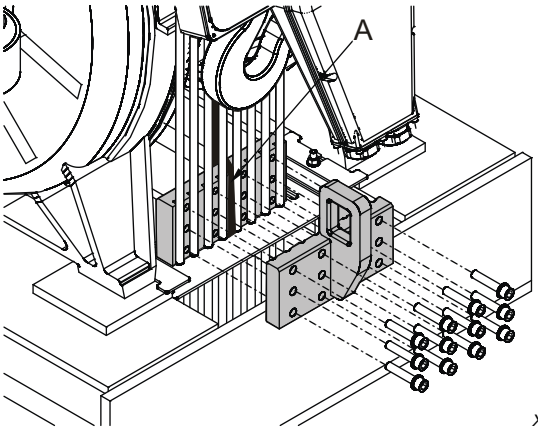
X000096808

3. Fix the rope clamp assembly support between the machinery beams or on the floor, if possible.

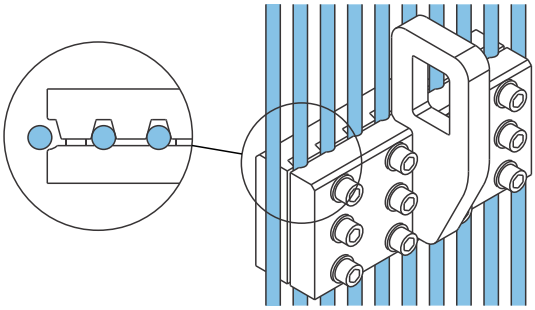


X000096809

4. Attach the rope clamp plate to the hook with a wire (A) to prevent if from falling into elevator shaft.



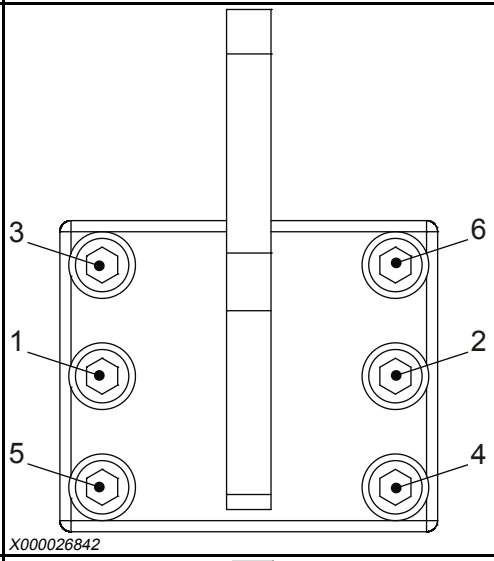
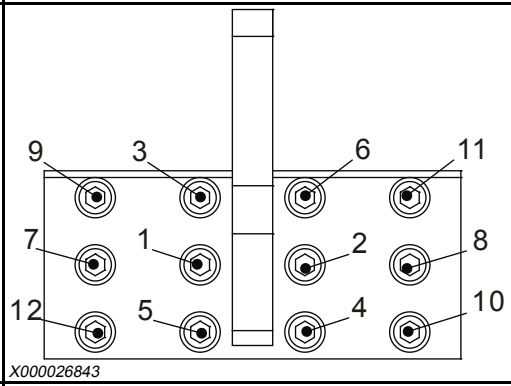
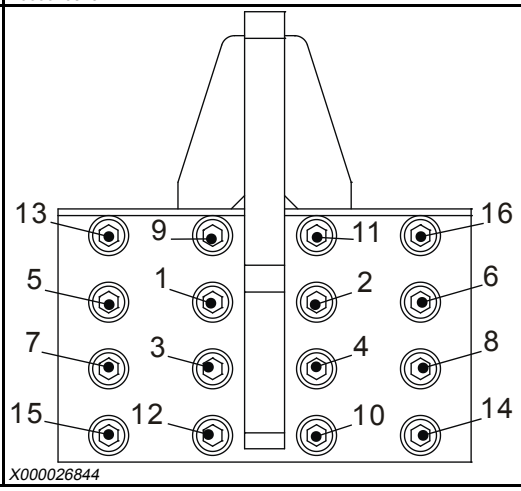
NOTE: Rope clamp can also be used, if number of suspension ropes exceeds the number of grooves.



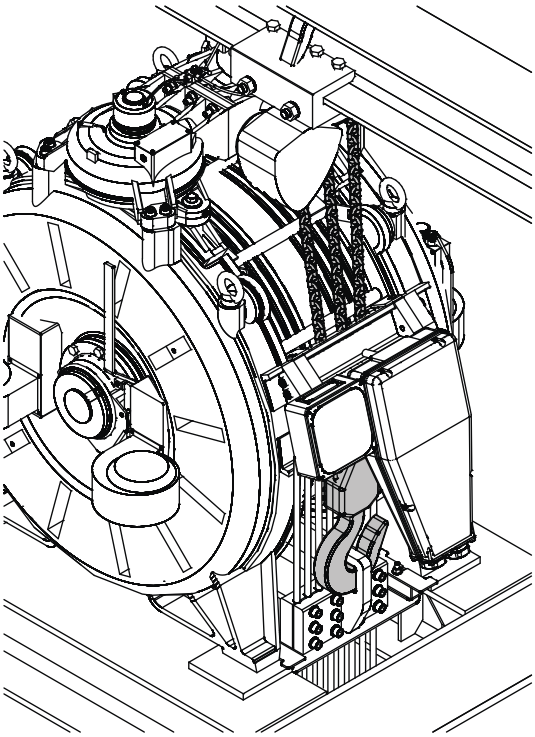
5. Raise the rope clamp plate on assembly support under hoisting machine, behind the suspension ropes.
6. Raise the rope clamp pressure plate on assembly support on the outside of the suspension ropes.
7. Place bolts to the rope clamp plate and pressure plate.

8. Tighten the bolts (M16) to 170 Nm torque by using a manual or cordless impact wrench. See the correct order of tightening from the following table.

   NOTE: Rope clamp can also be used, if number of suspension ropes exceeds the number of grooves.

Rope clamp type	Tightening order
KM1334997 for d13 ropes 19.0 mm pitch, MX32 and NMX18 for KONE JumpLift 1000 2.0	
KM1334996G01 for d16 ropes 39.0 mm pitch, MX32 KM1334996G02 for d13 ropes 33.0 mm pitch, MX32	
KM1334995 for d16 ropes 39.0 mm pitch, MX40 / MX100 KM1335011 for d19 ropes 44.0 mm pitch, MX40 / MX100	

9. Lower the hoist hook down to the rope clamp between the machine body support beam and traction sheave.



X000096814

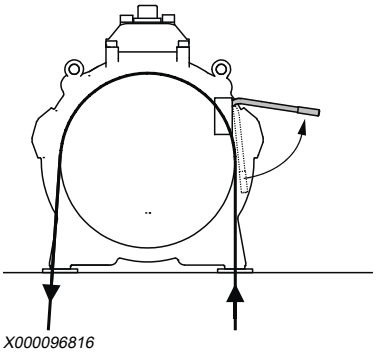
10. Fix the hoist hook to the rope clamp.

X000096815 F.2

12.7.5.2 Raise elevator car or counterweight off safety gear

Check that the overspeed governor (OSG) has been reset, if needed.

1. Inform the passengers that you are about to move the elevator car in order to let them out and that they must not attempt to leave it until they are advised that it is safe to do so.
2. Open the machine brake to ease raising.



X000096816

3. Start raising the suspension ropes up by using the manual hoist.

   The loose suspension ropes start moving up. After the loose part of the ropes have been raised up, the ropes tighten and the elevator car or counterweight (CWT) starts to move up.

4. Follow the OSG movements.

   When the elevator car or CWT has moved up a few centimetres, the OSG rope starts to move. After a few centimetres the OSG rope will fall down a little (safety gear wedges fall down).
5. Start lowering the elevator car or CWT down.
6. When the suspension ropes are tight, stop lowering.
7. Remove the rope clamp and assembly support.
8. Raise the hoist hook up from inside the hoisting machine.
9. Lower the rope compensator back to compensation ropes. Remove the bottle jack, if used.
10. Locate the lockdown devices back to position and tighten the fixing bolts.
11. Exit the pit. Release the pit stop button.
12. Release the passengers from elevator car.

After the suspension ropes are tensioned, the elevator car can be moved to the nearest door zone by using RDF or manual brake releasing device.

X000096817 E.5

Related information

– Reset overspeed governor (215)
– Use recall drive feature to move elevator car to door zone (195)
– Use manual brake releasing device to move car to door zone (door zone indicator operative) (196)
– Use manual brake releasing device to move car to door zone (door zone indicator inoperative) (199)

12.7.6 Raise elevator car off safety gear (2:1 roping)

WARNING: If KONE JumpLift 1000 2.0 (2:1 roping): Cathead rope fixing is impossible to lift as it is fixed to cathead floor. Instead 1:1 rescue method using rope clamp is used.

If an elevator car or counterweight (CWT) is stuck on safety gear: A chain hoist fixed to a tripod above the rope opening in the machine room must be used. This operation is done when there is no sufficient power or motor torque to raise the elevator car and release the safety gear.

Before setting up the hoists, check if CWT has its own overspeed governor (OSG). Check the OSG which is activated. If both elevator car and CWT OSGs are activated, check the load in the car (more or less 50%). Set the chain hoist to the lighter side.

The elevator car can then be moved to a door zone on recall drive feature (RDF) or by using manual brake releasing device. At least two rescue persons are required to perform this task. One rescue person observes the elevator, and one or two rescue persons perform the rescue operations in the machine room.

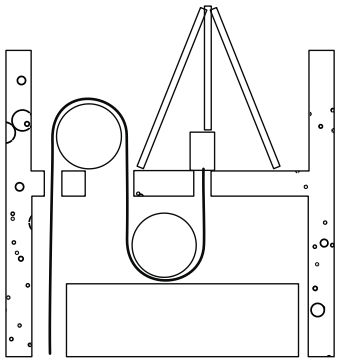
NOTE: If both elevator car and CWT are stuck on safety gear, lift the rope compensator. Lifting the elevator car or CWT when compensation ropes are tight, results in spring loading the compensation ropes and adding extra weight.

X000096818 D.3

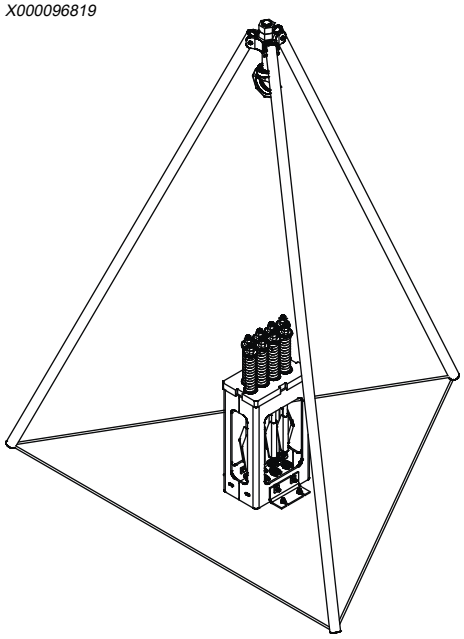
12.7.6.1 Assemble the lifting tools for rope terminal lifting

WARNING: Make sure that the main switch is off.

1. Assemble the tripod above the car or counterweight side rope opening in the machine room.

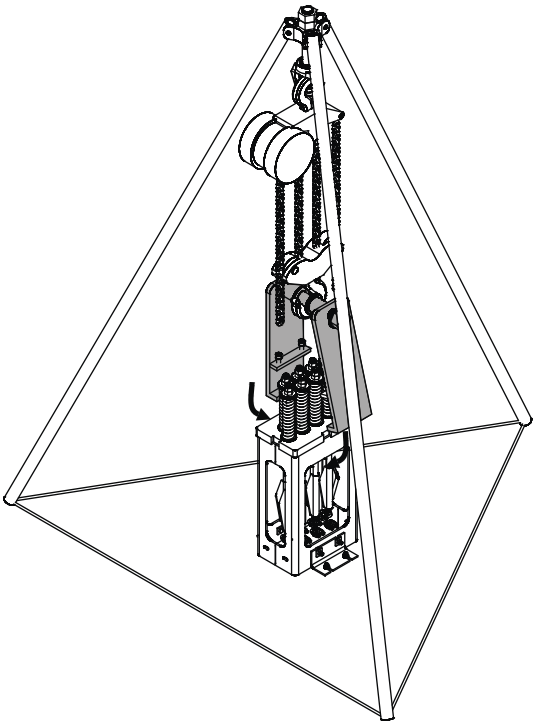


X000096819



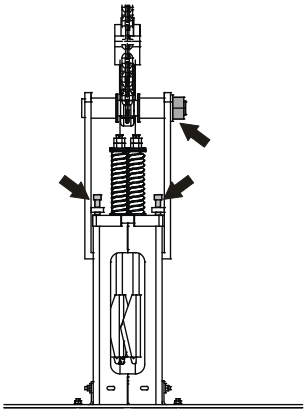
2. Fix the chain hoist to the tripod.

3. Fix the clamp to the chain hoist hook. Lower the clamp to a position where it can be fixed to the rope termination stand.



X000096821

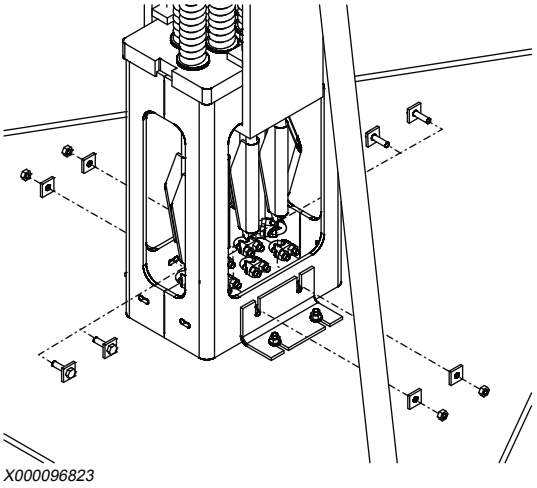
4. Fix the anchorage clamp to the rope termination stand.



X000096822

5. Tighten the clamp bolts to 170 Nm with torque wrench or electric torque wrench.

6. Remove the rope termination stand fixing.



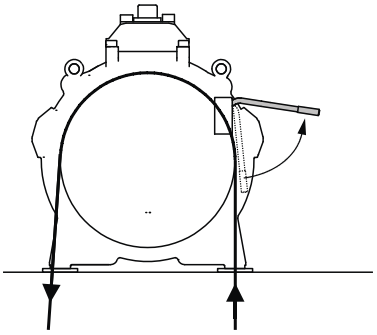
X000096823

X000096824 D.2

12.7.6.2 Raise elevator car or counterweight off safety gear

Check that the overspeed governor (OSG) has been reset, if needed.

1. Inform the passengers that you are about to move the elevator car in order to let them out and that they must not attempt to leave it until they are advised that it is safe to do so.
2. Open the machine brake to ease raising.



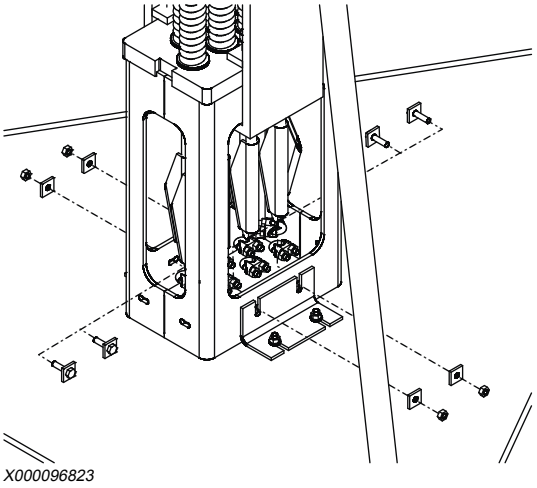
X000096816

3. Start raising the suspension ropes up by using the manual hoist.

   The loose suspension ropes start moving up. After the loose part of the ropes have been raised up, the ropes tighten and the elevator car or counterweight (CWT) starts to move up.
4. Follow the OSG movements.

   When the elevator car has moved up a few centimetres, the OSG rope starts to move. After a few centimetres the OSG rope will fall down a little (safety gear wedges fall down).
5. Start lowering the elevator car down.
6. When the suspension ropes are tight, stop lowering.

7. Reinstall the rope termination stand fixing.



X000096823

8. Remove the chain hoist and the tripod.
9. Lower the rope compensator back to ropes. Remove the bottle jack, if used.
10. Locate the lockdown devices back to position. Tighten the fixing bolts.
11. Exit the pit. Release the pit stop button.
12. Switch off the main switch.
13. Close the machine room door. Make sure that the door is locked.
14. Release the passengers from elevator car.

After the suspension ropes are tensioned, the elevator car can be moved to the nearest door zone by using recall drive feature (RDF) or manual brake releasing device.

X000096825 D.3

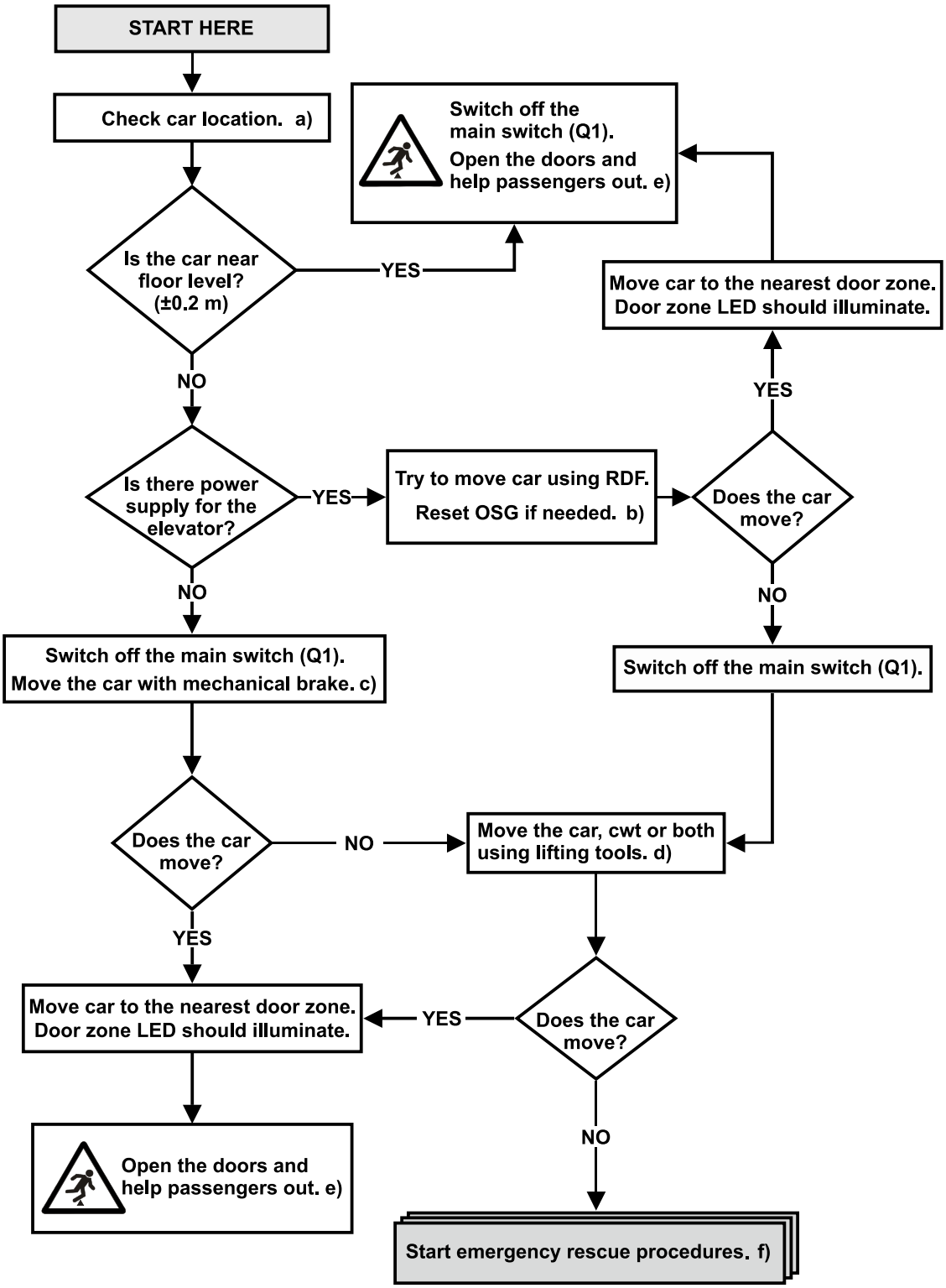
Related information

– Reset overspeed governor (215)
– Use recall drive feature to move elevator car to door zone (216)
– Use manual brake releasing device to move car to door zone (door zone indicator operative) (217)
– Use manual brake releasing device to move car to door zone (door zone indicator inoperative) (199)

12.8 Technical rescue (KONE UltraRope®)

NOTE: 3 qualified persons needed.

– 2 if the emergency battery is inoperative
– 2 when using pit rescue tool
– 3 when using hydraulic lifting tool



X0000066292
X0000066318 D.1

Related information

– a) Check car location (215)
– b) Use RDF to move car to zoor zone (216)
– c) Use manual brake releasing device to move car to door zone (217)
– c) Use manual brake releasing device to move car to door zone (DZI inoperative) (220)
– d) Move car to door zone with pit rescue tool (50% load) (225)
– d) Raise car and CWT from safety gear (with hydraulic lifting tool) (229)
– e) Release passengers (car in door zone) (187)
– f) Emergency rescue (with rescue car and emergency side doors) (242)
– f) Emergency rescue (by emergency services) (254)

12.8.1 Check car location

Use the following methods in the presented order and stop when you locate the car.

1. Ask if building personnel know where the car is.
2. If equipped, use KONE E Link™ or similar monitoring systems to locate the car.
3. Check the hall display (HLI) at landing.

   In most cases it shows the latest passed floor.

   There must be power supply present for the elevator in order the HLI to function.
4. Open the bottom floor landing doors (maximum 90 mm), switch on the shaft lights and estimate roughly the car position.

5. Go to a landing at middle zone of the shaft and open the landing door (maximum 90 mm).

L0000000197

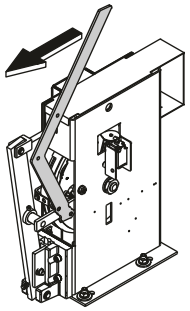
   – If you can see the loop of the travelling cable, the car is above you.
   – If you do not see the loop of the travelling cable, the car is below you. (only a straight travelling cable can be seen.)
6. Close the landing doors and repeat the check above or below of the first checking point until you have located the car.

L0000000197
X0000066322 D.1

12.8.2 Reset overspeed governor

If the overspeed governor (OSG) is activated, investigate the cause. Make sure that it is safe to try to move the elevator car.

1. If activated, reset the OSG with the tripping lever.



X0000063457

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.

---

2. If needed, try to move the elevator car or counterweight upwards on recall drive feature (RDF) to release the safety gear.

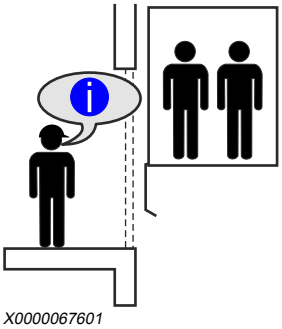
X0000066976 D.3

12.8.3 Use recall drive feature to move elevator car to door zone

Check that the overspeed governor (OSG) has been reset, if necessary.

1. Inform the passengers that you are about to move the elevator car in order to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.



X0000067601

2. Switch on the recall drive feature (RDF).
3. If safety gear must be released, push the direction button UP or DOWN and RUN button simultaneously.

   Move the elevator car up if car is on safety gear. Move the elevator car down if counterweight is on safety gear.

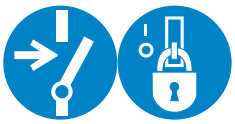
4. Push the direction button DOWN or UP and RUN button simultaneously to move the elevator car to the nearest landing level.

   The elevator car is near landing level when the door zone indicator (DZI) illuminates in the controller.

5. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.



6. Close the machine room door.

   Make sure that the door is locked and outsiders cannot enter the machine room.

7. Release the passengers from the elevator car.

X0000066303 E.3

Related information

– Reset overspeed governor (215)
– Release passengers (car in door zone) (187)

12.8.4 Use manual brake releasing device to move car to door zone (alternative methods below)

12.8.4.1 Use manual brake releasing device to move car to door zone (door zone indicator operative)

Check that the overspeed governor (OSG) has been reset, if needed.

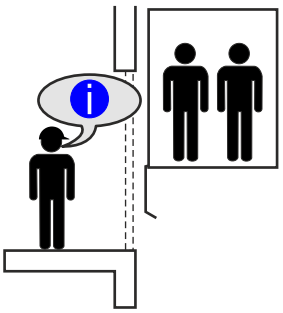
Two authorized persons are needed in the machine room if the door zone indicator (DZI) is not visible from the hoisting machine.

WARNING: Wear protective cut-resistant safety gloves.

---

1. Inform the passengers that you are about to move the elevator car in order to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.

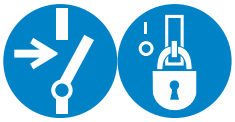


X0000067601

2. Switch off the main switch (Q1).

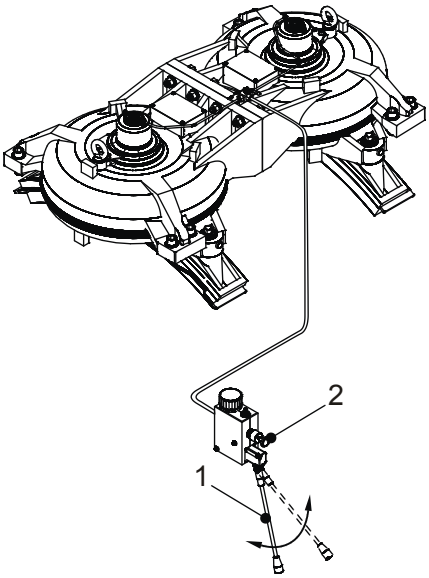
   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.



3. Open the machine brake by pumping the hand pump handle (1) several (20 - 30) times and by simultaneously pushing the flow control button (2).

The brake stays open as long as the flow control button is pressed.



X000026753

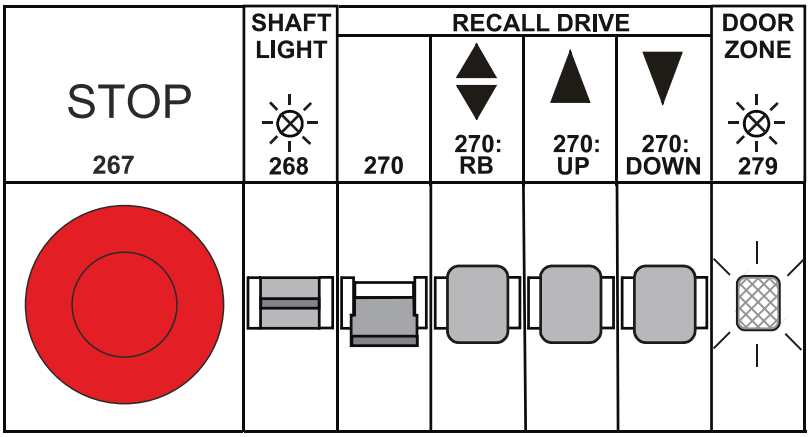
Figure 46: MX40 manual brake opening

WARNING: The elevator uses a gearless hoisting machine which means that the speed may increase very fast once the brakes are opened. Observe the traction sheave movement. Stop the movement by closing the brake after every 0.5 – 1.0 seconds.

CAUTION: When moving the elevator car, supervise the rope position. Make sure that the rope guards are on their place to prevent the suspension ropes from dropping from the diverting pulleys. If a suspension rope drops from a diverting pulley, stop moving the elevator car immediately and proceed to emergency rescue.

---

4. Stop the car when the DZI in the controller illuminates.



X0000066072

WARNING: Never open the brake if the elevator car already is in the door zone!

5. Close the machine room door.

   Make sure that the door is locked and outsiders cannot enter the machine room.

6. Release the passengers from the elevator car.

X0000066331 F.3

Related information

– Reset overspeed governor (215)
– Release passengers (car in door zone) (187)
– Open NMX11 machine brake manually (43)
– Open MX14 machine brake manually (45)
– Open MX18 or NMX18 machine brake manually (47)
– Open MX32/MX40/MX100 machine brake manually (49)

12.8.4.2 Use manual brake releasing device to move car to door zone (door zone indicator inoperative)

Check that the overspeed governor (OSG) has been reset, if needed.

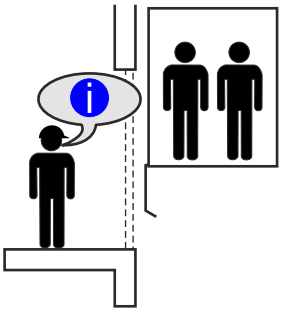
The door zone indicator (DZI) can be inoperative during a power cut if the backup battery is empty.

WARNING: Manual brake release must be used with extreme care and after each short brake opening sequence, the position of the elevator car must be checked with direct visual check. This method requires that one rescue person is located at the closest floor related to elevator position. Two-way communication is mandatory.

WARNING: Wear protective cut-resistant safety gloves.

1. Inform the passengers that you are about to move the elevator car to let them out.

   State also that they must not attempt to leave the elevator car until they are advised that it is safe to do so.



X0000067601

2. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.

3. Communicate and verify with the person at the landing level that it is safe to move the elevator car.

WARNING: Do not move the elevator car, if you do not get the instructions from the person at landing.

4. Open the machine brake by pumping the hand pump handle (1) several (20 - 30) times and by simultaneously pushing the flow control button (2).

The brake stays open as long as the flow control button is pressed.

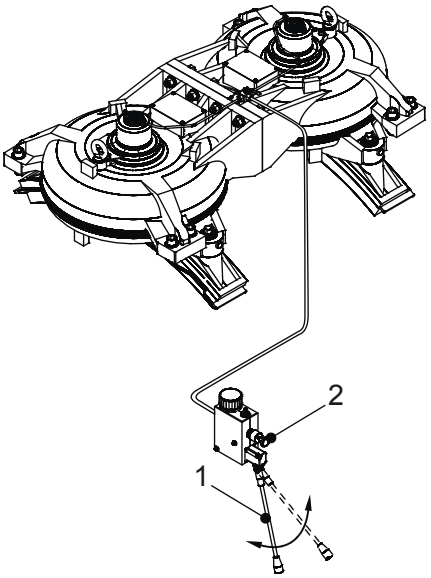


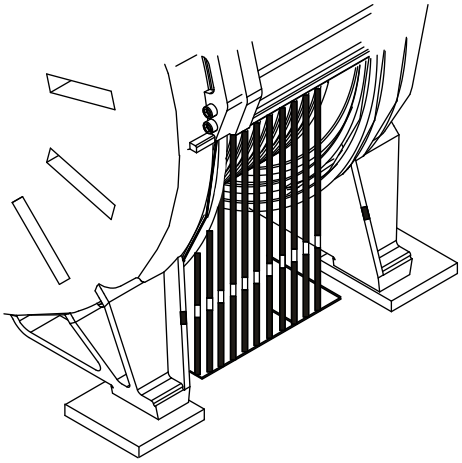
Figure 47: MX40 manual brake opening

WARNING: The elevator uses a gearless hoisting machine which means that the speed may increase very fast once the brakes are opened. Observe the traction sheave movement. Stop the movement by closing the brake after every 0.5 – 1.0 seconds.

CAUTION: When moving the elevator car, supervise the rope position. Make sure that the rope guards are on their place to prevent the suspension ropes from dropping from the diverting pulleys. If a suspension rope drops from a diverting pulley, stop moving the elevator car immediately and proceed to emergency rescue.

Stop the elevator car immediately if the elevator car is at the door zone.

Sometimes, there are suspension rope markings that align with the marking on the hoisting machine (not used in all countries). Depending on the site, the markings may be covered by machine protections.



X000026837

Figure 48: Example suspension rope markings

WARNING: Never open the brake if the elevator car is already in the door zone!

If the elevator car is in door zone, inform your colleague at landing that the releasing of passengers from the elevator car can begin.

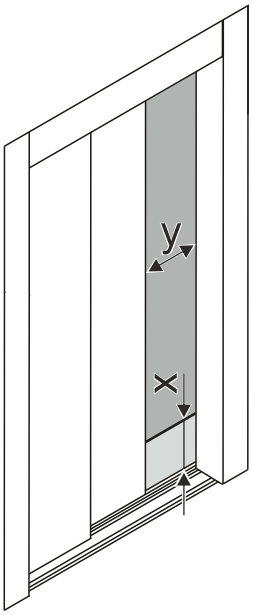
Keep active communication regarding the rescue progress.

5. Check the elevator car position (rescue person at landing).

WARNING: Keep active communication.

---

1. Open the landing door with emergency opening key, maximum opening width 90 mm (y).
2. Check the elevator car position:
   - If the dimension X is ± 200 mm at maximum and the apron covers the open space when the elevator car is above the landing, release the passengers from elevator car.
   - If the dimension X is more than 200 mm, proceed to next step.



X0000066355

3. Close the landing door.
4. Check that the landing door is mechanically locked.

6. Repeat the "brake open - car position check" -procedure with your colleague until the elevator car arrives to door zone.

   Keep active communication while performing the steps.

7. Release the passengers from the elevator car.

X0000066342 F.4

Related information

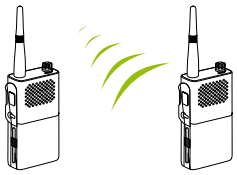
– *Reset overspeed governor (215)*
– *Release passengers (car in door zone) (187)*
– *Open NMX11 machine brake manually (43)*
– *Open MX14 machine brake manually (45)*
– *Open MX18 or NMX18 machine brake manually (47)*
– *Open MX32/MX40/MX100 machine brake manually (49)*

12.8.5 Move car to door zone with pit rescue tool (50% load)

Before this procedure, check that you have reset the overspeed governor (OSG) if needed.

WARNING: Wear protective cut-resistant safety gloves.

WARNING: Two-way communication is mandatory. Stop working if the connection cuts.



1091442.pdf

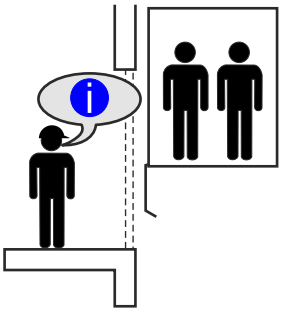
X000020984

At least three rescue persons are required to perform this task as follows:

– Two rescue persons are needed for fixing and removing the rescue tool to compensation ropes in the shaft pit. After fixing the rescue tool, one person is enough in the shaft pit.
– One rescue person operates the brakes in the machine room.
– One rescue person performs the rescue operations in the pit.
– One rescue person performs the rescue operations at landing.

1. Inform the passengers that you are about to move the car in order to let them out.

   State also that they should not attempt to leave the car until they are advised that it is safe to do so.

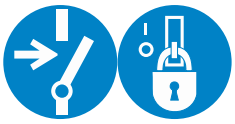


X0000067601

2. Switch on the shaft lights (268).
3. Switch on the RDF (270).
4. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of a group, ensure that you isolate the correct supply (switch that is marked with the same number as the elevator).

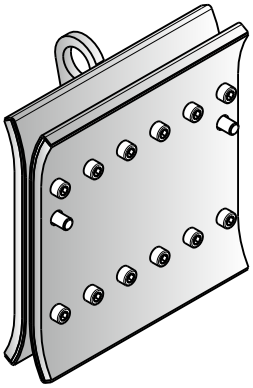
   Lock and tag the main switch.



5. Go to pit.

6. Attach the rescue tool in the pit.
   – If you want to move car up, attach the pit rescue tool to compensation ropes on CWT side.
   – If you want to move car down, attach the pit rescue tool to compensation ropes on car side.

   Attach the rescue tool as high as possible to maximize the lifting distance.



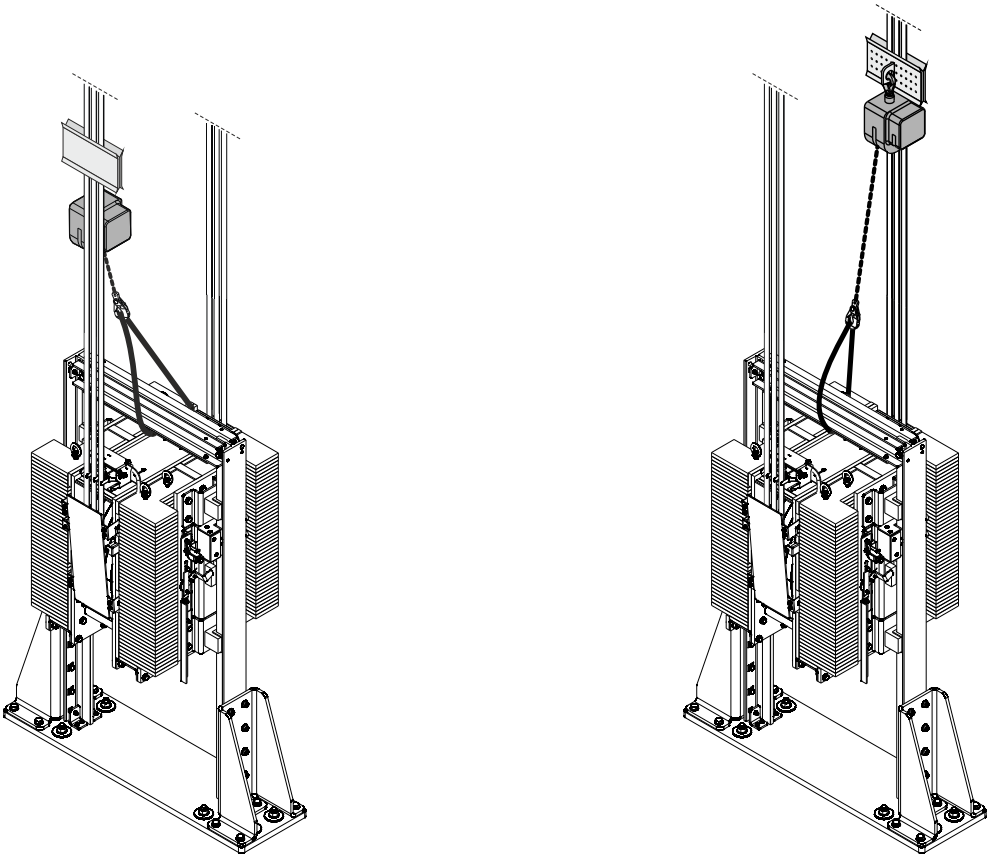
X0000066991

CAUTION: Ensure that the rescue tool and tightening bolts are not piercing nor damaging the ropes during the attachment.

---

7. Tighten the bolts (M10) to a minimum of 50 Nm torque by using a manual or cordless impact wrench.
8. Attach the chain hoist to the rescue tool lifting eye.
9. Attach the hoisting strap around the compensator horizontal bar.

10. Attach the chain hoist hook to the hoisting strap.

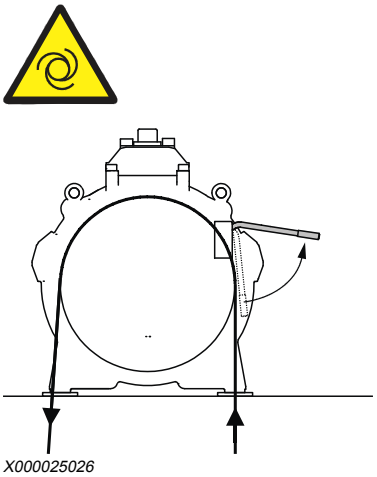


X0000066360

11. Inform the other rescue person in machine room when rescue tool is attached and ready to be used.

    Keep active communication.

12. Open the brake and inform the other rescue person in shaft pit to start hoisting.



X000025026

WARNING: Release the brake immediately if machine starts to accelerate.

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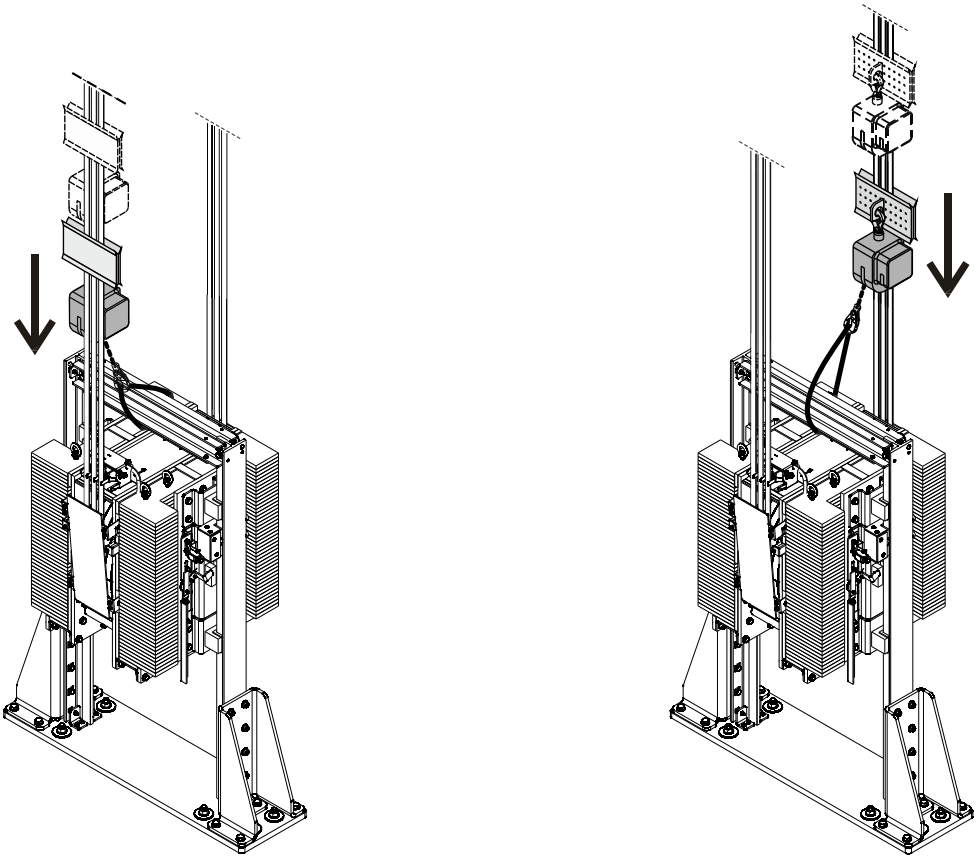
13. Start pulling the ropes downwards.



X0000066362

14. Pull the ropes downwards. Loosen the bolts (M10) and repeat from step 6 until the car is on the door zone.

    Inform your colleague in the pit to stop pulling and close the brake.

15. Remove rescue tool assembly, chain hoist and hoisting strap.

    Store rescue tools in the pit after operation.

16. Exit from the pit.
17. Release the passengers from the car.

X0000066357 C.1

Related information

– *Reset overspeed governor (215)*
– *Release passengers (car in door zone) (187)*

12.8.6 Use hydraulic lifting tool KM51186873V000

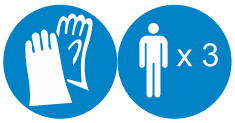
X0000066411 C.3

12.8.6.1 Prepare raising

NOTE: Before this procedure, check that you have reset the overspeed governor (OSG) if needed.

WARNING:

Move safely between landing and pit.



Operation needs at least three technicians:

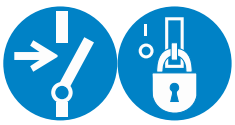
– Two in the machine room.
– One on the lowest floor or in the pit.

1. Switch ON the shaft lights (268).

   In cases that there is power break down – you cannot use machine room lights and / or shaft lights- use headlights and / or flashlights.
2. Switch ON the RDF (270).
3. Switch off the main switch (Q1).

   NOTE: Ensure that you isolate the correct supply (switch that is marked with the same number as the elevator).

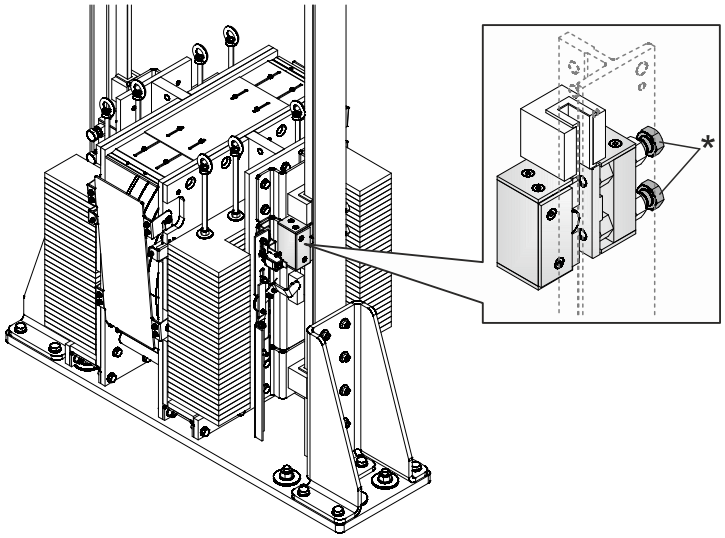
   Lock and tag the main switch.



4. One technician on the lowest floor:
    1. Wait that technicians in machine room will give permission to enter the pit.
    2. Enter the pit.

       NOTE: Ensure that the pit stop button is activated.

    3. Release lockdown devices by loosening bolts (*). Do not remove bolts.



X0000054756

NOTE: Keep active communication.

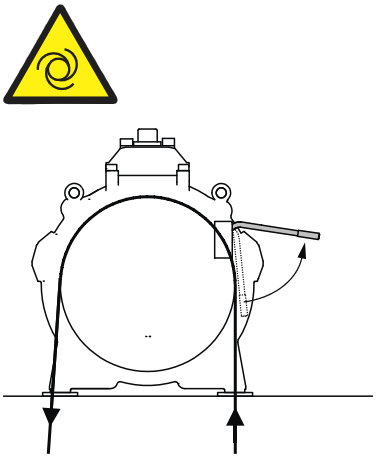
5. Mark OSG rope or OSG tension weight wheel with white tape or marker pen.

   Marks on the rope or wheel help you to follow safety gear release. When the rope starts to move or wheel starts to rotate it means that safety gear is released. When this happens inform technicians in the machine room.
6. Exit the pit and give a permission to the technicians in the machine room to open the brake.

7. Technicians in the machine room:

   Open the brake to even the rope tension.

   NOTE: If machine starts to accelerate safety gears are not engaged.



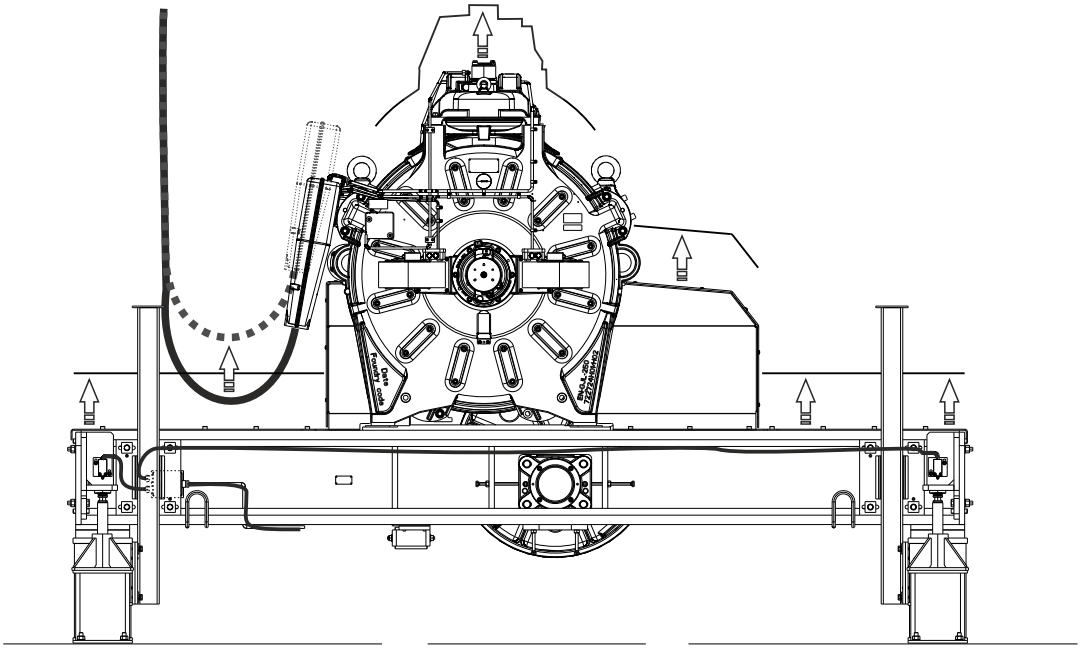
X000025026

WARNING: Release the brake immediately if machine starts to accelerate.

---

8. Ensure that there is enough loose cable so that the cable is not tensioned during lifting.

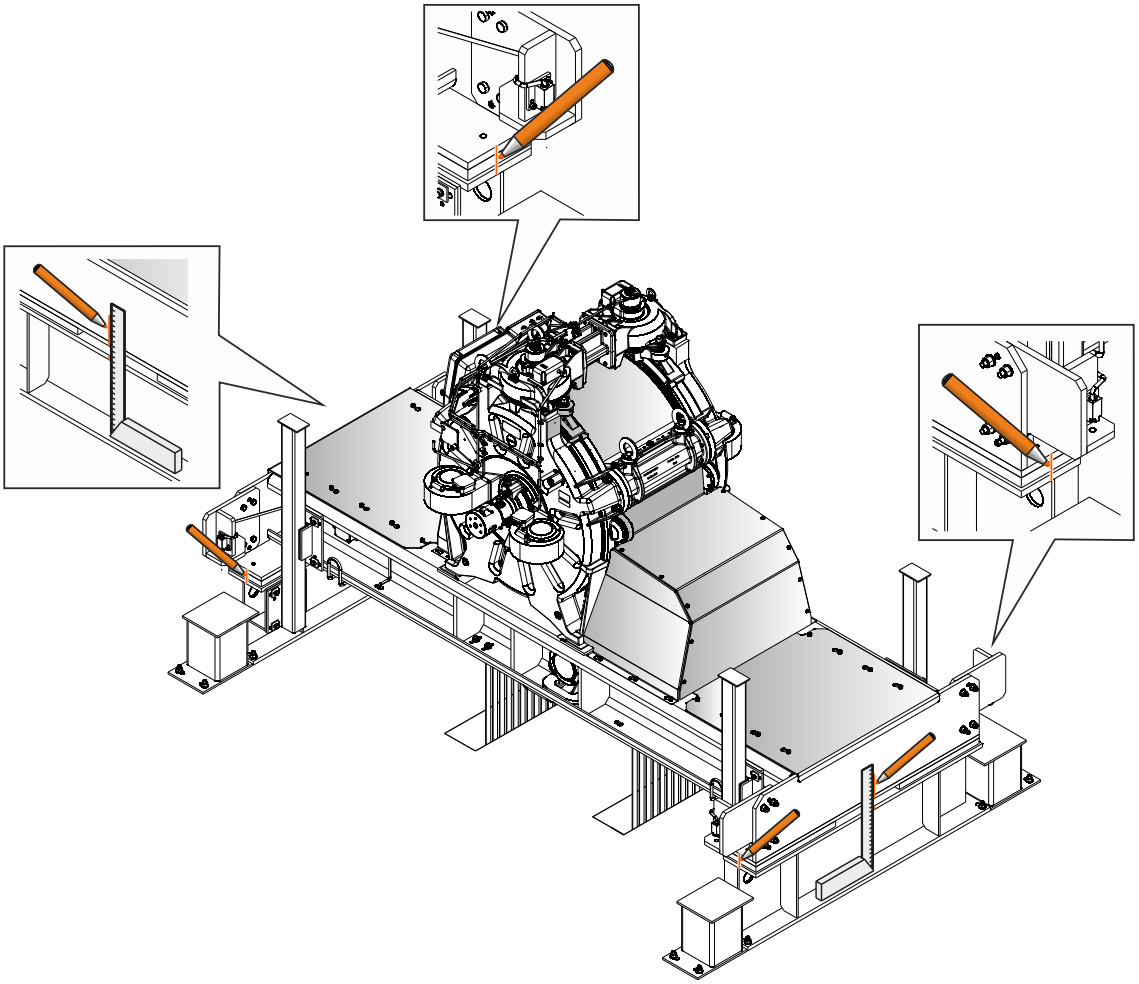
   If needed, remove cable fixings in the trunkings or routings. Do not disconnect the cables from the hoisting machine.



X0000102386

9. Ensure that there is enough room above the machine and bed plate for lifting.

10. Mark the bed plate position with respect to the plinths.



X0000115501

After the operation, ensure that the bed plate lands at the same position.

X0000067043 F.6

Related information

– *Reset overspeed governor (215)*

12.8.6.2 Assemble hydraulic lifting tool

NOTE: Before this procedure, check that you have reset the overspeed governor (OSG) if needed.

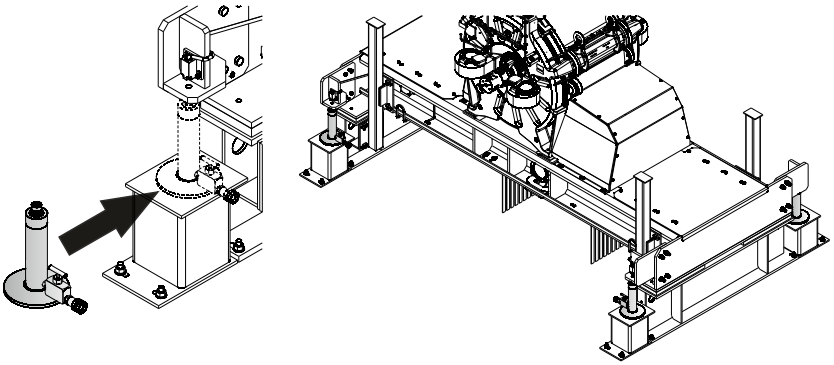
CAUTION: Risk of sprain. Two technicians are recommended to lift the packages. Take the tools out of the packages, so that they are lighter to handle.

1. Unpack the hydraulic lifting tool.

   NOTE: Visually check that the tool is in good condition.

   Make sure that you have all the tools and equipment needed for the work and they are in good condition and properly inspected or certified, where required.

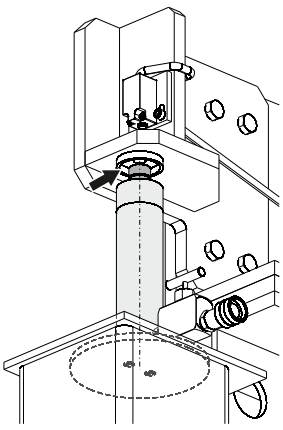
2. Place cylinders on each corner of the machine bed plate.



X0000066490

3. Make sure that the tip of the cylinders meets the opening in the lifting bracket.

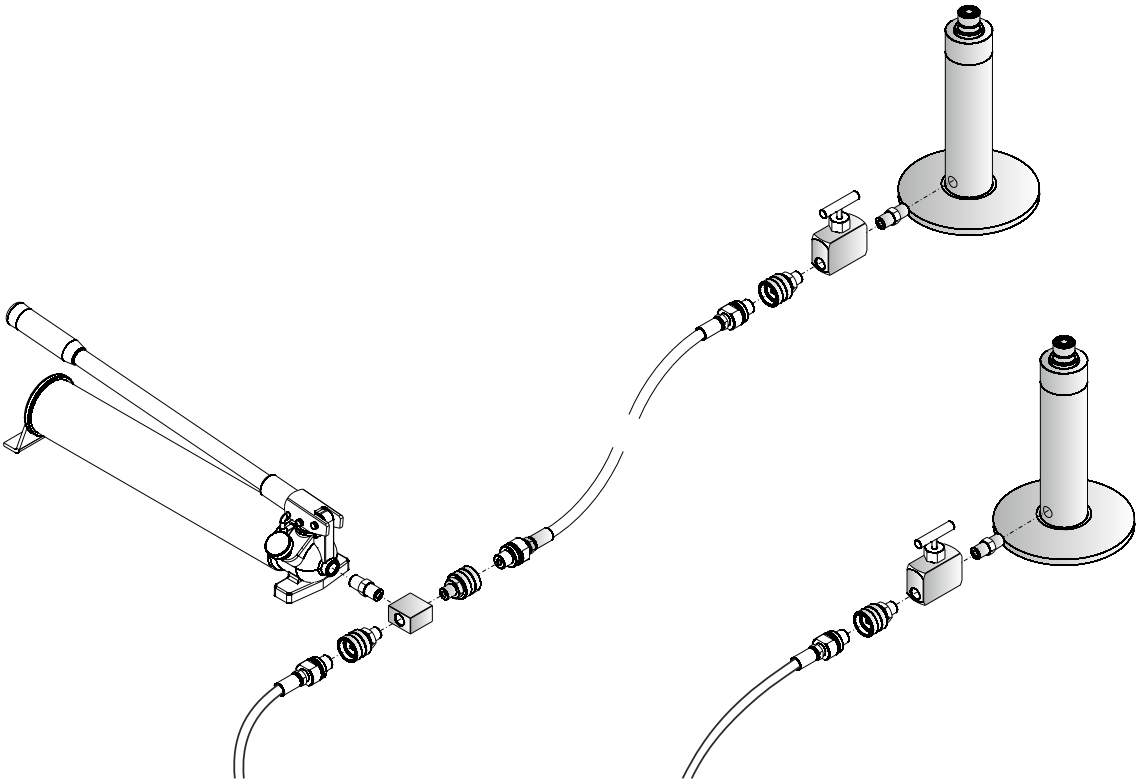
   Check that cylinders are in vertical position (90 degrees from lifting support and approximately 90 degrees to lifting support).



X0000066492

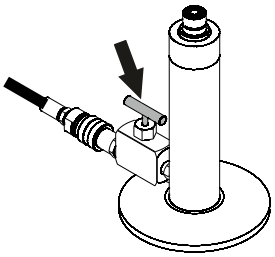
4. Install hydraulic hand pump and hose kit to car side end of the bed plate.

5. Repeat installation with another pump and hose kit for CWT side end of the bed plate.



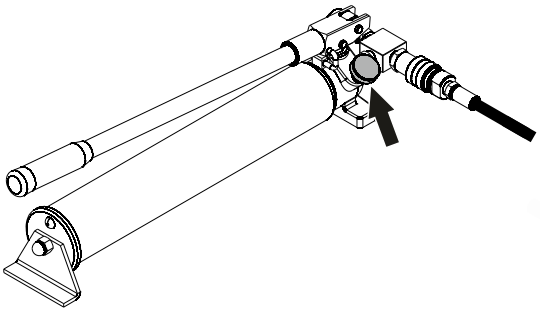
X0000100281

6. Close the flow regulating valves (cylinder valves) by turning lever of the valve clockwise.
   Hand tighten valves, do not overtight.



X0000115378

7. Close the hand pump valves by turning adjusting knob clockwise.
   Hand tighten valves, do not overtight.



X0000066425

X0000067168 F.3

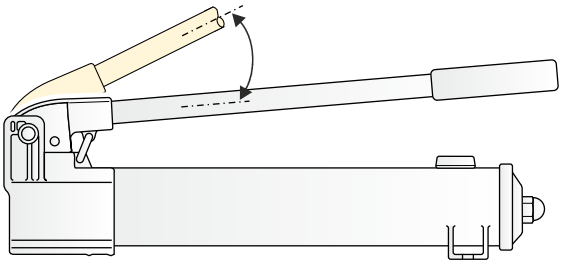
12.8.6.3 Raise car, CWT or both from safety gear

NOTE: Before this procedure, check that you have reset the overspeed governor (OSG) if needed.

CAUTION: Risk of uneven raising and lowering. Do not raise or lower both bed plate ends at the same time. Always raise or lower one end at a time. All the time, follow the movement of the bed plate with tape measure and spirit level or equivalent. Follow the movement of the cylinders. All cylinders have to raise or lower the bed plate evenly so that one cylinder does not carry all the load.

If the bed plate starts to move unevenly in longitudinal direction lift lower end more. If the bed plate starts to move unevenly in traverse direction you must lower the side which is more up. To lower only one cylinder, cylinder needs to be open ¼ round and release hydraulic pressure carefully from pump valve. Stop lowering when cylinders are even.

1. Pump the bed plate maximum 10 mm up per one end at a time (15 - 20 pumps).



X0000066509

2. Pump the other end of the bed plate until the bed plate has raised evenly.
3. Technician at the lowest floor:

WARNING: Risk of falling. Open the landing door 90 mm at maximum.

Follow the OSG rope or OSG tension weight wheel movement.

When the counterweight or car has moved up a few centimeters, the OSG rope starts to move.

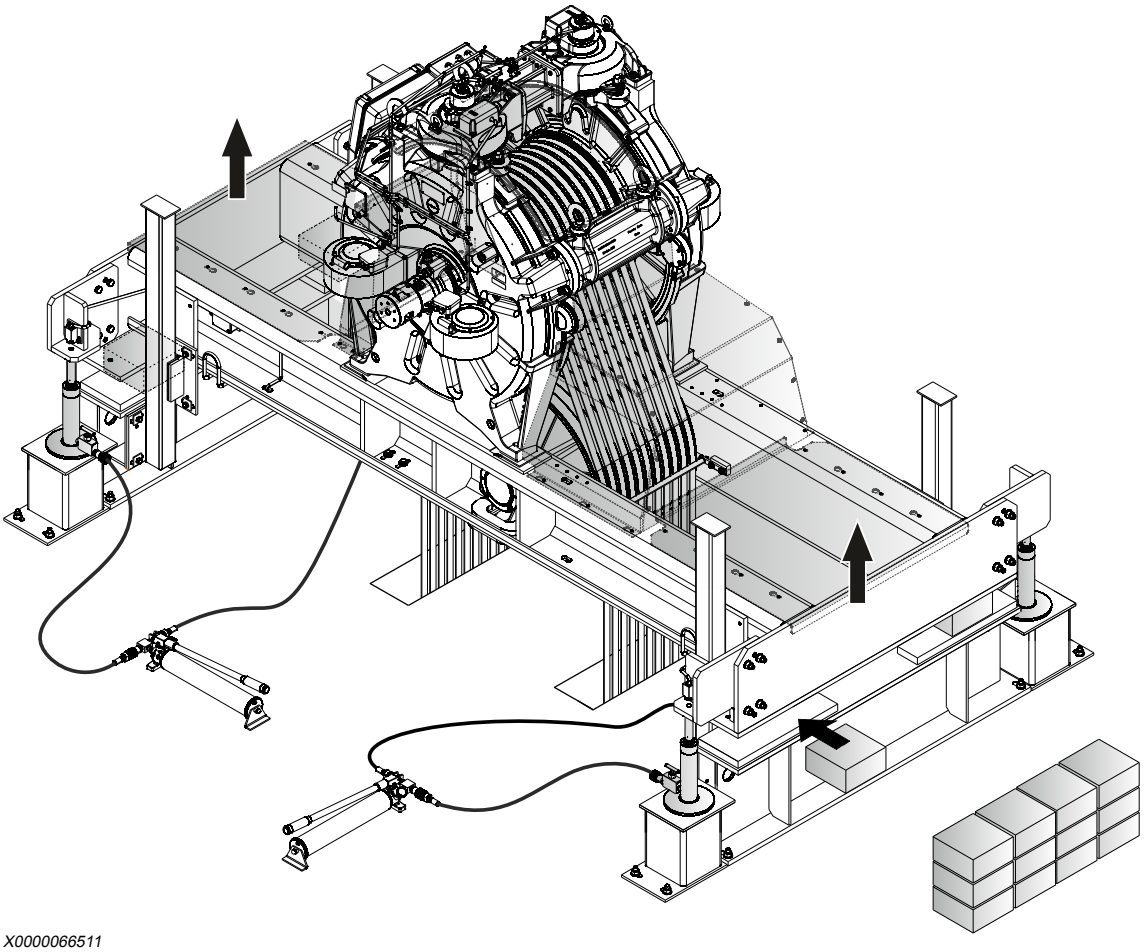
After a few centimeters the rope will fall down a little (safety gear wedges fall downwards due to their opening). Inform your colleague(s) to stop pumping.

NOTE: If safety gears are released lower the bed plate and remove hydraulic lifting tool.

4. If overspeed governor has not moved when distance between plinths and bed plate reaches over 100 mm, install 100 mm spacers between plinths and bed plate.

   Add one spacer in every corner.

NOTE: Check that surfaces are clean of crease and oil. Ensure that spacers are correctly in position.



X0000066511

5. Open cylinder valves ¼ round and lower bed plate by opening pump valve slowly and carefully.

   Lower the bed plate approximately 20 mm per one end at the time.

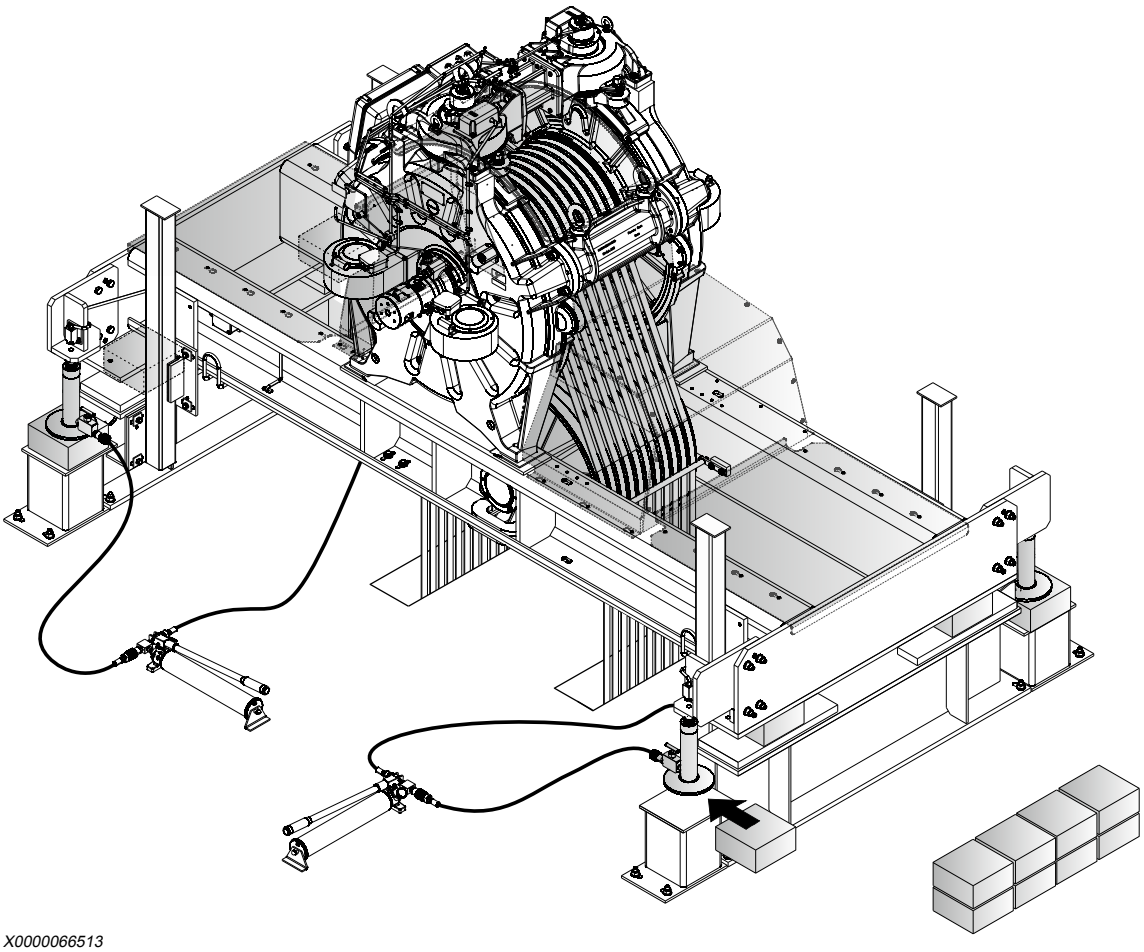
WARNING: During lowering DO NOT touch the spacers. Adjust the cylinder valves if needed to keep the bed plate in level horizontally.

Lower the bed plate to the spacers.

NOTE: Landing velocity of the bed plate depends on opening of the pump valve.

6. Wait that cylinders are fully compressed. After that place spacers under the cylinders.

   NOTE: Cylinders will compress automatically when all valves are in open position.



X0000066513

7. Repeat steps 1 - 5 until the OSG rope has moved.

   NOTE: Follow the OSG movements. When the CWT / car has moved up a few centimeters, the OSG starts to move.

   After a few centimeters the rope will fall down a little (safety gear wedges fall downwards due to their opening). Inform your colleague(s) to stop pumping.

   NOTE: With hydraulic lifting tool maximum lifting is 350 mm. If safety gear is not released within 350 mm remove hydraulic lifting tool and proceed to emergency rescue.

X0000067044 C.4

Related information

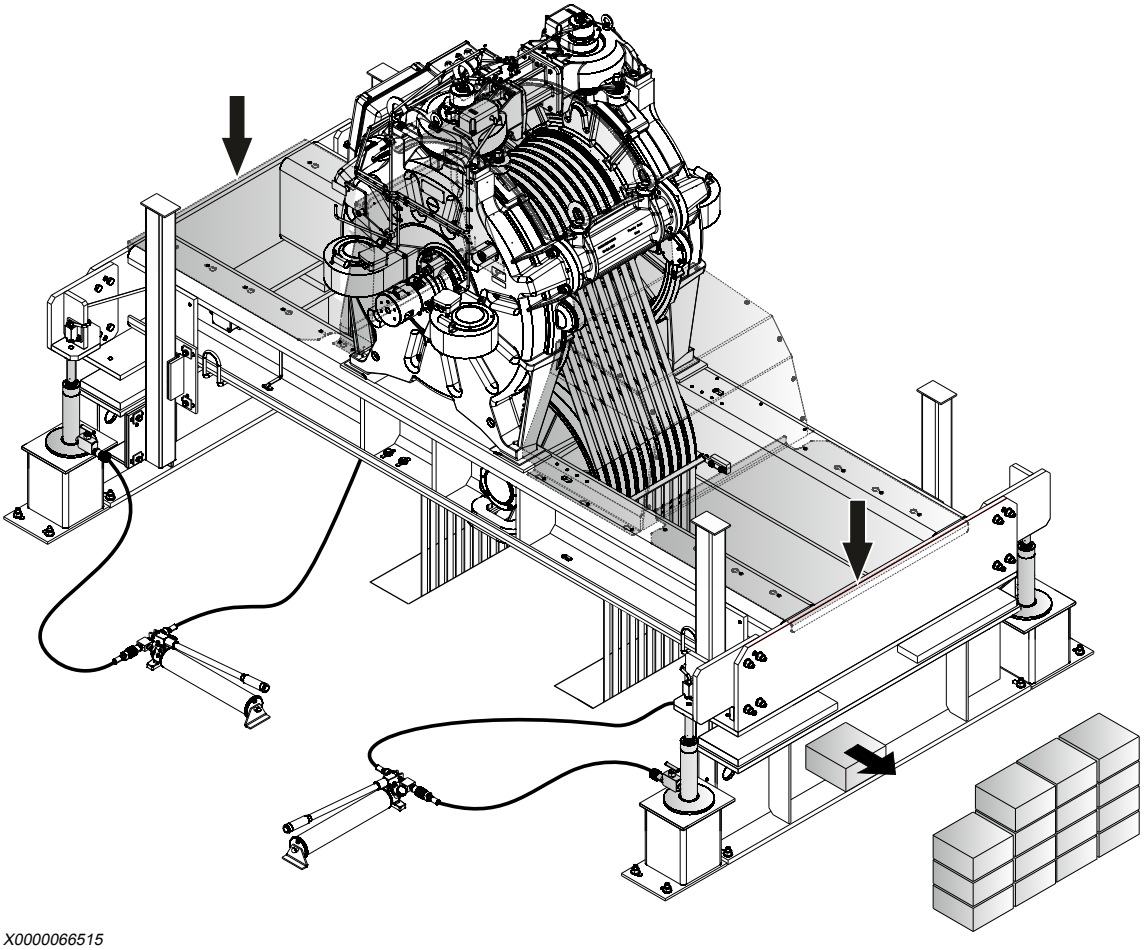
– *Remove hydraulic lifting tool (239)*
– *Emergency rescue using emergency side doors (242)*
– *Emergency rescue by emergency services (254)*

12.8.6.4 Remove hydraulic lifting tool

CAUTION: Risk of uneven raising and lowering. Do not raise or lower both bed plate ends at the same time. Always raise or lower one end at a time. All the time, follow the movement of the bed plate with tape measure and spirit level or equivalent. Follow the movement of the cylinders. All cylinders have to raise or lower the bed plate evenly so that one cylinder does not carry all the load.

---

1. Remove one layer of spacers from bed plate.



X0000066515

2. Open cylinder valves ¼ round and lower bed plate by opening pump valve slowly and carefully.

   Lower the bed plate to the spacers.

   NOTE: Landing velocity of the bed plate depends on opening of the pump valve.

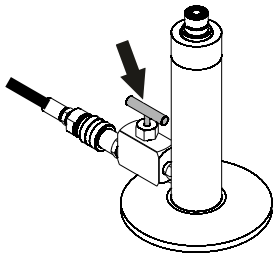
   Wait until cylinders are completely compressed.

   NOTE: Lower the bed plate approximately 20 mm per one end at the time.

3. Remove one layer of spacers under the cylinders.

4. Close the flow regulating valves (cylinder valves) by turning lever of the valve clockwise.

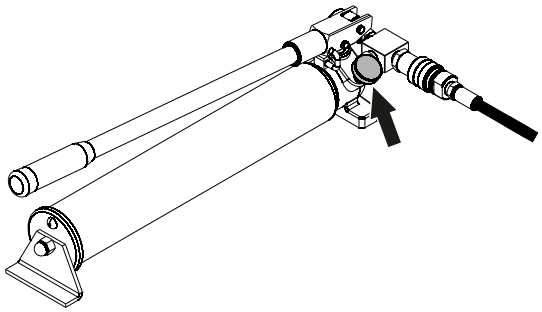
   Hand tighten valves, do not overtight.



X0000115378

5. Close the hand pump valves by turning adjusting knob clockwise.

   Hand tighten valves, do not overtight.



X0000066425

6. Pump the bed plate up by making 15-20 pumps per one end at the time to raise the bed plate evenly in all corners.

   Stop pumping when there is gap between bed plate and spacers and remove one layer of spacers.

7. Repeat procedure above until all spacers are taken away and the bed plate is on its original place.
8. Refix machine cables, if needed.
9. Reset safety switches from bed plate lifting points.

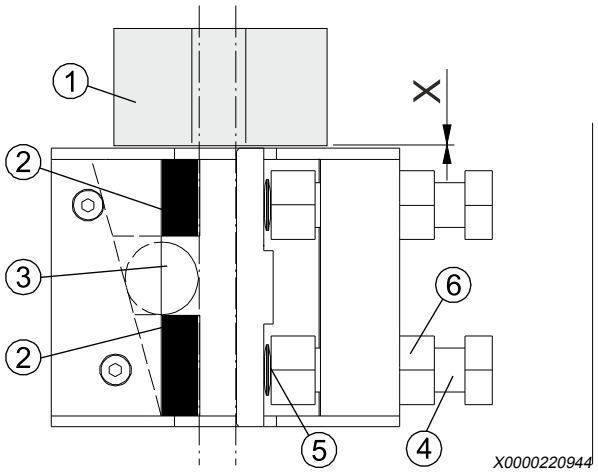
X0000067045 F.2

12.8.6.5 Finalize raising

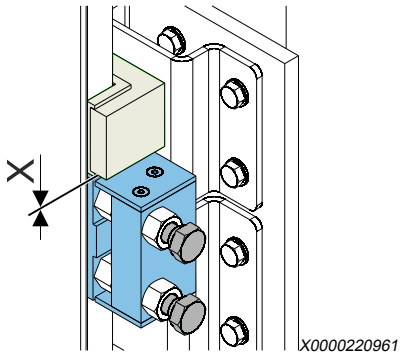
One technician on the lowest landing can perform the following steps.

1. Wait for a permission from the technicians in the machine room to enter the pit.

2. Put back the lockdown devices.



X0000220944



X0000220961

1. Place the lockdown devices 0 mm (X) below the upper sliding guide (1).
2. Check that the rubber pieces (2) and the roller (3) are in their correct places according to the figure.
3. Turn the screws (4) alternately until the fixing starts becoming tight (the spring washers (5) became compressed).
4. Check that the roller (3) is correctly located and locked between the guide rail and the lockdown device.
5. Loosen the screws (4) a quarter of a turn.
6. Tighten the lock nuts (6).

3. Exit the pit and inform technicians in machine room.
4. Continue according to work plan.

X0000067046 B.3

Related information

– Release passengers (car in door zone) (187)
– Reset overspeed governor (215)
– Use recall drive feature to move elevator car to door zone (216)
– Use manual brake releasing device to move car to door zone (door zone indicator operative) (217)
– Use manual brake releasing device to move car to door zone (door zone indicator inoperative) (220)
– Move car to door zone with pit rescue tool (50% load) (225)

12.9 Emergency rescue using emergency side doors

NOTE: 3 qualified persons needed:

– 1 in machine room
– 1 on rescue car roof
– 1 in rescue car

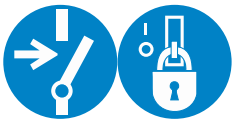
X0000076163 D.1

12.9.1 Secure trapped elevator car

1. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.

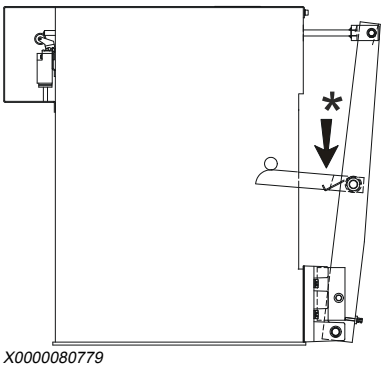


   NOTE: Place "Men at work - do not operate" signs next to the hoisting machine to inform others that the machine must not be operated.

2. Cut the safety circuit using the stop button in control cabinet.
3. Switch on the elevator shaft lighting (268).
4. Activate the overspeed governor (OSG).

   Hit to trigger the lever (*) with hammer.

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.



X0000080779

X0000066582 E.4

12.9.2 Drive rescue car next to trapped car (alternative methods below)

12.9.2.1 Drive rescue car with rescue drive controls

1. Load the rescue equipment from the machine room into the rescue car.

   For example rescue bridge.

2. Drive the rescue car to the same level as trapped car. Do a visual check to verify correct car position.

   If the trapped car is at the zone past the final floor level then the rescue car can be driven to the rescue position using the recall drive feature (RDF) from the machine room. This might require an additional rescue person. It requires also a direct communication line between the car roof and the machine room.

WARNING: If the trapped car cannot be safely reached, the emergency services must rescue the passengers from the trapped car.

X0000066583 C.2

Related information

– Set up rescue bridge (245)

12.9.2.2 Drive rescue car with inspection drive

1. Load the rescue equipment from the machine room into the rescue car.

   For example rescue bridge.

2. Drive the rescue car to the landing closest to the trapped car.
3. Position the car roof at the landing floor level.

   One rescue person must go to the rescue car roof and drive the car to rescue position on inspection. Other rescue personnel stay inside the car.

WARNING:

Pay attention to moving parts. Do not put any part of your body outside the car roof when the elevator car is moving. If driving upwards, remember to look up to make sure that you do not hit any equipment or elevator shaft ceiling.

---

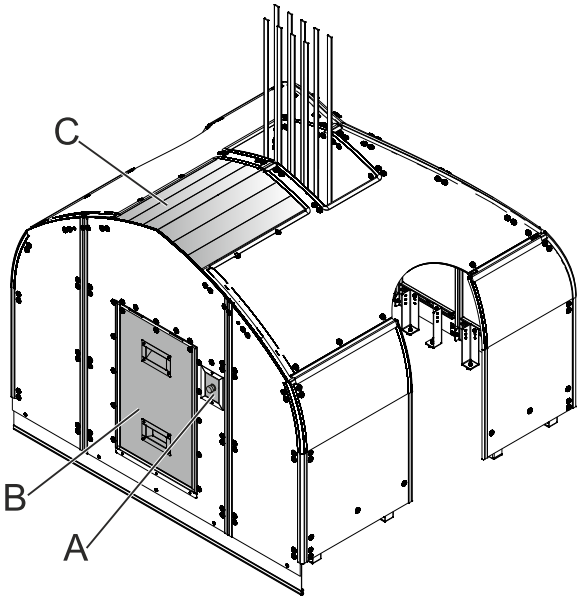
4. Push the stop button (A) down. If there is no accessible stop button, the main switch must be switched off, locked and tagged.

WARNING: Always use stop button(s) and inspection drive switch as required for work on car roof.

---

5. Open the hatch (B).
6. Switch on the car top light, if applicable.
7. Open the hatch (C).
8. Push down the car roof stop button.
9. Switch the elevator to inspection drive.

10. Release the stop button (A).



X0000097207

11. Close the hatch (B).
12. Release the car roof stop button.
13. Drive the rescue car to the same level as trapped car. Do a visual check to verify correct car position.

    If the trapped car is at the zone past the final floor level then the rescue car can be driven to the rescue position using the recall drive feature (RDF) from the machine room.

    This might require an additional rescue person. It requires also a direct communication between the car roof and the machine room.

    If the trapped car cannot be safely reached, the emergency services must rescue the passengers from the trapped car.
14. Push down the car roof stop button.

X0000066586 E.4

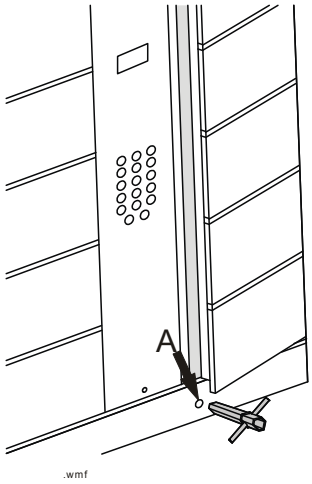
12.9.3 Set up rescue bridge

The illustrated rescue bridge is an example. Different designs exist.

WARNING: Make sure that you have received training on how to use the bridge.

---

1. Open the car emergency exit door from the key hole (A) using an emergency opening key.



X000026849

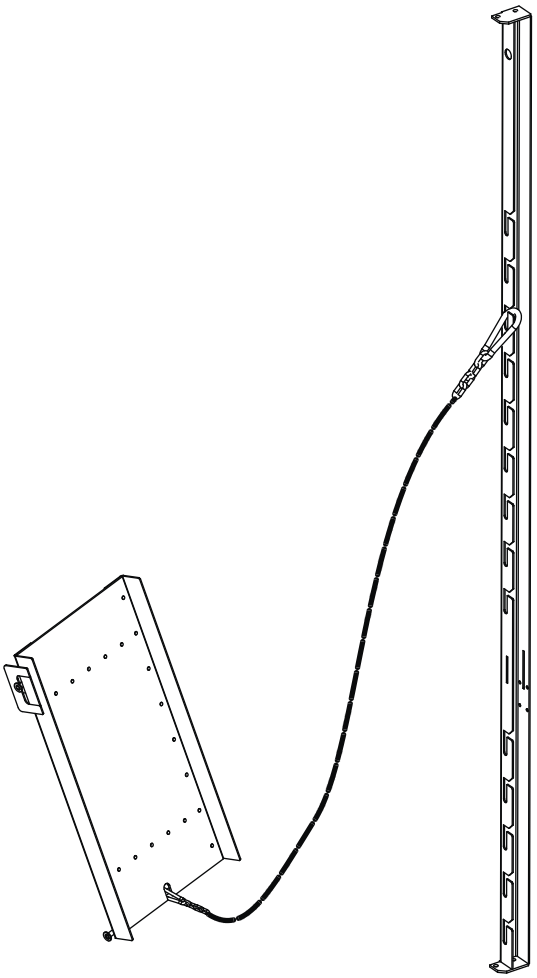
WARNING: Do not remove the safety bars behind the emergency door until you have installed the bridge and balustrades.

---

2. Switch on the emergency lighting outside the car near the emergency exit door.

   If applicable.

3. Install chain to the emergency bridge.
   Install the other end of the chain to the notch on vertical U-profile of the rescue car wall.



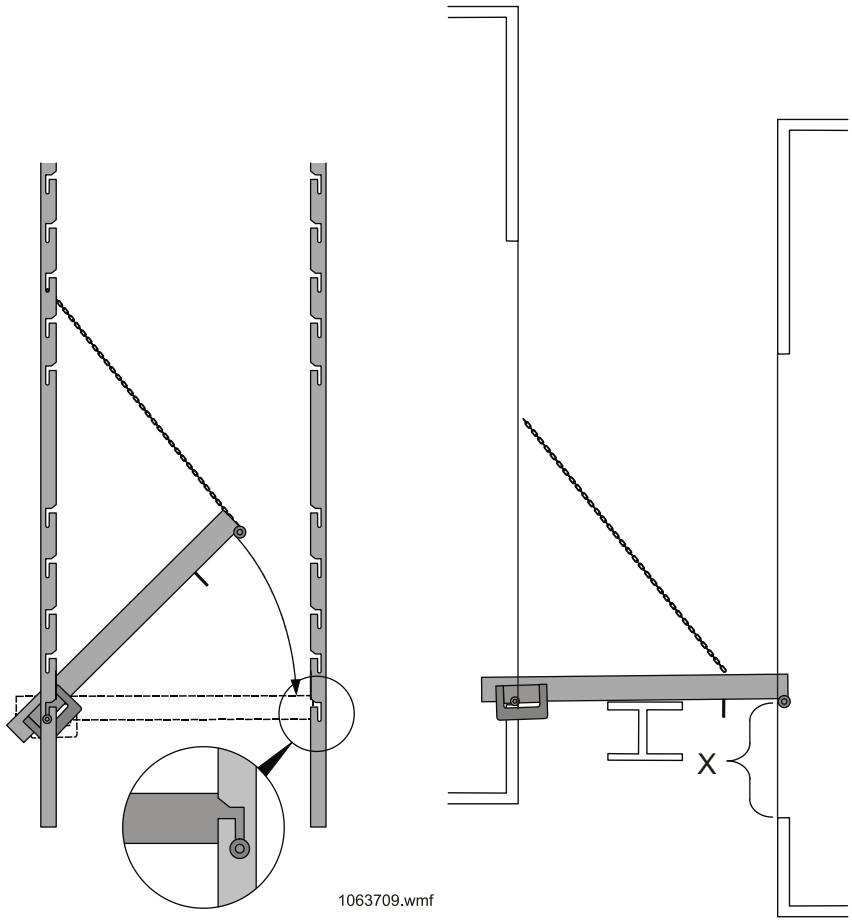
X000026850

4. Fix the end of the emergency bridge to the rescue car.
   Make sure that there is no gap between the rescue car door sill and the bridge.

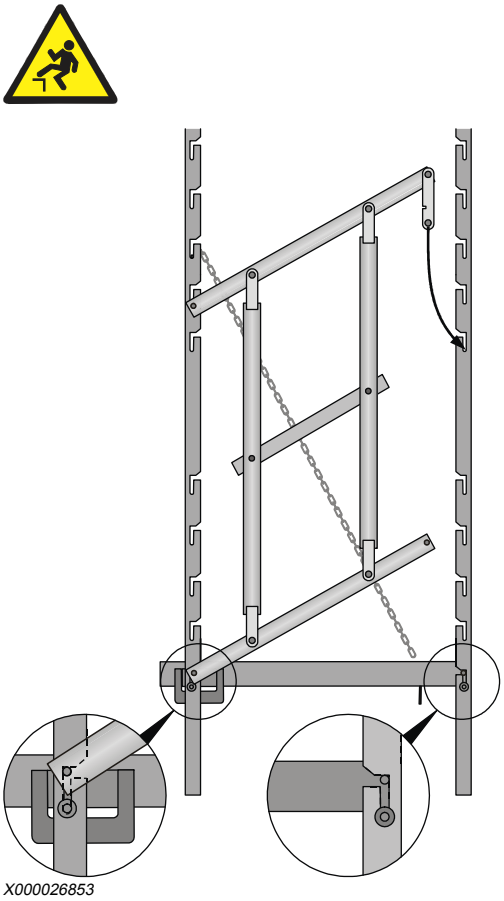
5. Lower the other end of the rescue bridge to the trapped car by using the chain.

   Make sure that the rescue bridge is securely attached to the trapped car.

   NOTE: If building structure blocks access between the cars, install the rescue bridge above or below the structure. The rescue bridge can be at different level than the rescue door sill (X).

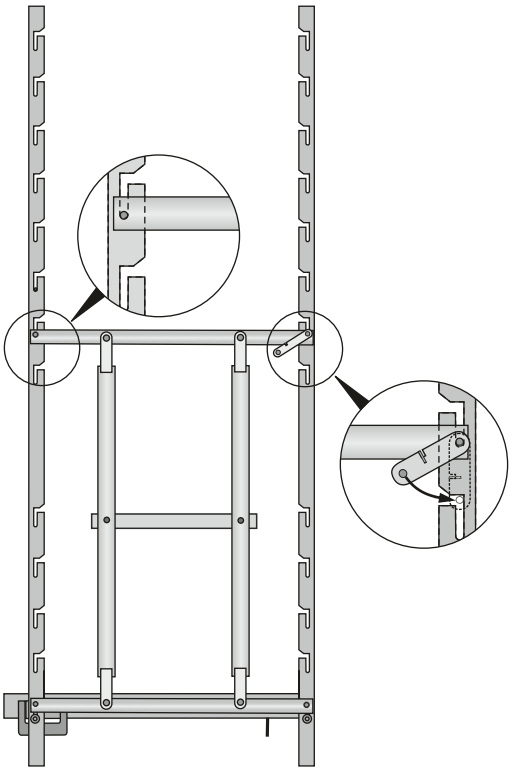


6. Attach balustrades beginning from the rescue car side.



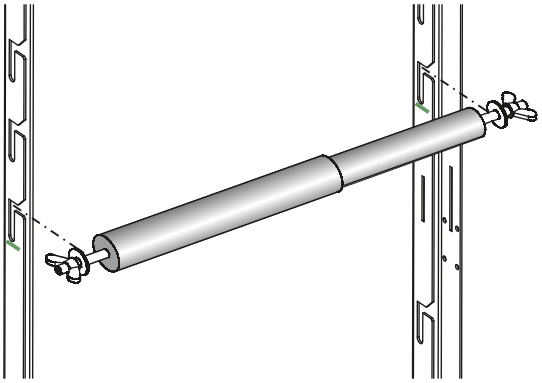
X000026853

7. Lock the cotter clips on the car wall. Remove the chain from the rescue bridge. Fix the chain to the notch on the car wall.



X000026854

8. Remove the safety bars from the rescue car emergency exit door opening.



X0000067559

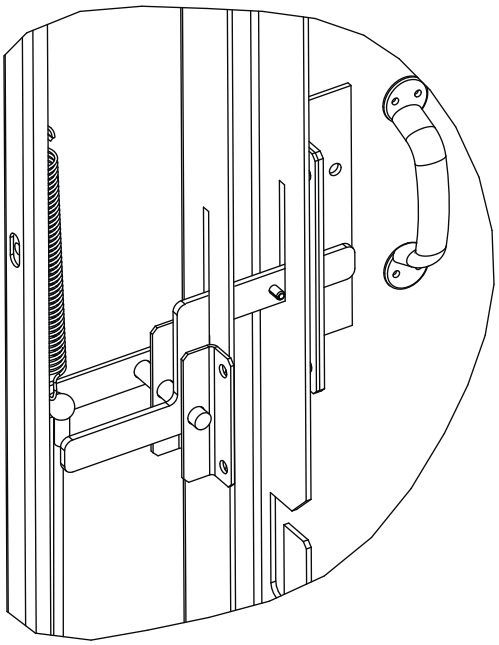
WARNING: Safety bars must be fixed at correct height. If not marked, mark the fixing points on the emergency exit door frame for reinstalling the bars.

X0000066607 C.4

12.9.4 Rescue passengers with rescue bridge

1. Open the emergency exit door outside the trapped car.

WARNING: Before opening the door, instruct the passengers to stay away from the door and not to rush out.



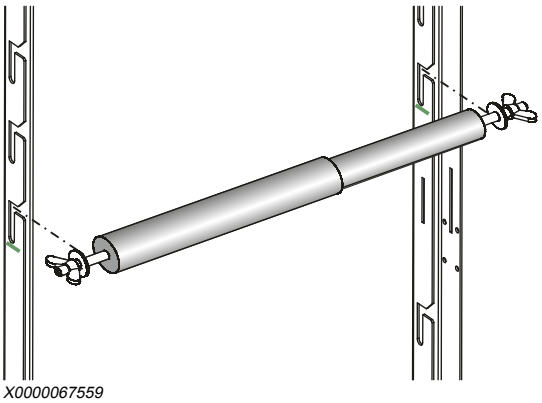
X000026856

CAUTION: Open the door carefully to avoid hitting passengers. Emergency exit door design can vary.

---

2. If not already marked, mark the fixing points of the safety bars on the emergency exit door frame.

   Remove the safety bars from the trapped car emergency exit door opening.



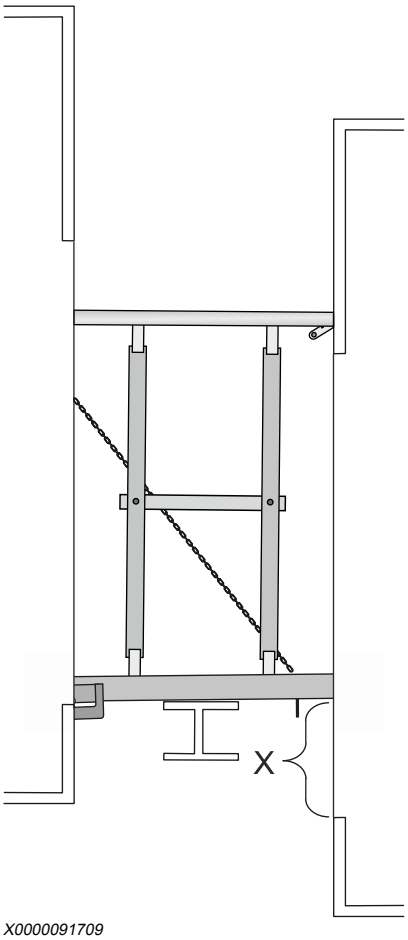
X0000067559

3. Enter the trapped car.

4. Help the passengers one by one across the bridge to the rescue car.

WARNING: Only one person at a time on the rescue bridge.

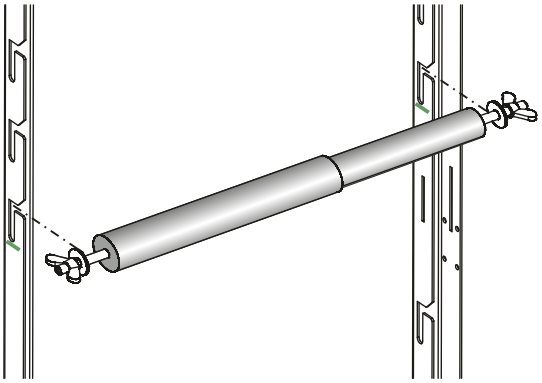
WARNING: If there is a gap (X) between the bridge and rescue door sill, instruct passengers to stay clear of the gap.



X0000091709

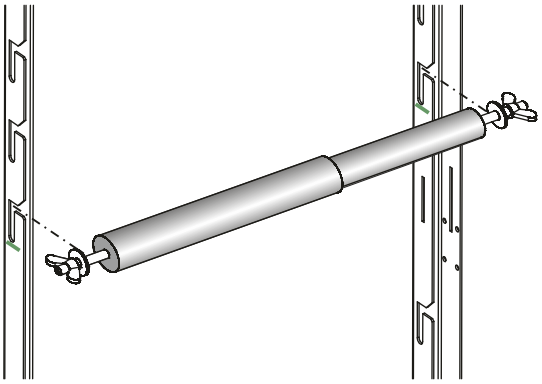
Make sure that the other passengers keep out of the rescue door area.

5. Install safety bars to the trapped car emergency exit door opening.



X0000067559

6. Close and lock the emergency door of the trapped car.
7. Enter the rescue car.
8. Install safety bars.



X0000067559

WARNING: Do not start removing the rescue bridge before the safety bars are in place!

---

9. Remove the balustrades of the rescue bridge. Remove the rescue bridge.
10. Close the emergency exit door.

    Switch off the emergency lighting (if applicable) outside the car near the emergency exit door.
11. Move the rescue car to the nearest landing.

    On inspection drive from the car roof or using rescue drive controls inside the car.

WARNING: Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving. If driving upwards, look up to make sure that you do not hit any equipment or elevator shaft ceiling.

---

12. Open the doors to let the passengers out of the rescue car.

    When the rescue car is empty of passengers, close the landing doors. If the rescue car was moved on inspection drive, move it to a suitable position and exit the car roof.

WARNING: Pay attention to moving parts. Do not put any part of your body outside the car roof when the car is moving. If driving upwards, look up to make sure that you do not hit any equipment or elevator shaft ceiling.

X0000066608 E.2

12.10 Emergency rescue by emergency services

NOTE: The site specific rescue plan defines the exact number of qualified persons needed.

NOTE: See site specific rescue plan for using rescue doors in shaft and ladder.

Three qualified persons needed:

– One inside car.
– One climbing between the car roof and emergency door to assist the passengers.
– One at the emergency door.

KONE specified rescue devices are stored in machine room. Fall protection equipment is provided by emergency services.

X0000076164 D.1

12.10.1 Secure trapped elevator car

1. Switch off the main switch (Q1).

   NOTE: When performing a rescue on an elevator which is part of an elevator group, make sure to isolate the correct supply (switch that is marked with the same number as the elevator).

   Lock and tag the main switch.

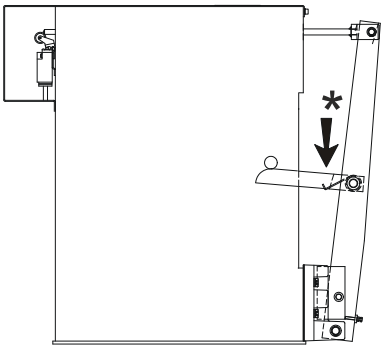
   NOTE: Place "Men at work - do not operate" signs next to the hoisting machine to inform others that the machine must not be operated.

2. Cut the safety circuit using the stop button in control cabinet.
3. Switch on the elevator shaft lighting (268).

4. Activate the overspeed governor (OSG).

   Hit to trigger the lever (*) with hammer.

WARNING: Watch out for your hands. The tripping lever will move very quickly when the spring is released.



X0000080779

X0000066582 E.4

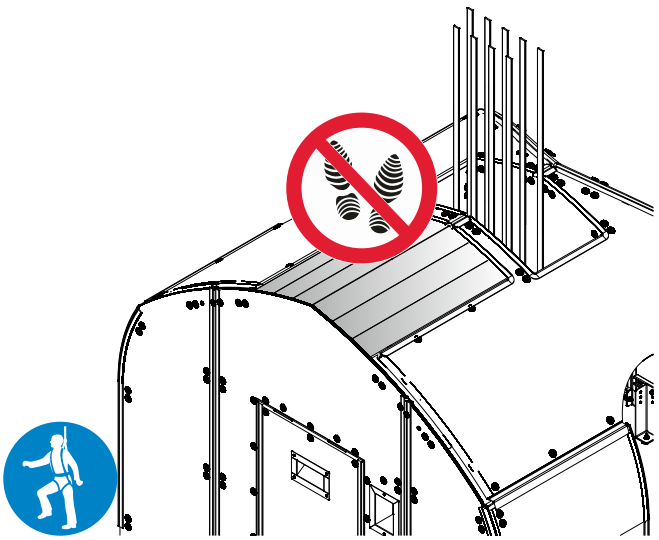
12.10.2 Access trapped car

NOTE: To locate the closest elevator shaft door related to the trapped elevator car, see the site-specific rescue plan. In addition to elevator landing doors, extra elevator shaft emergency doors can exist.

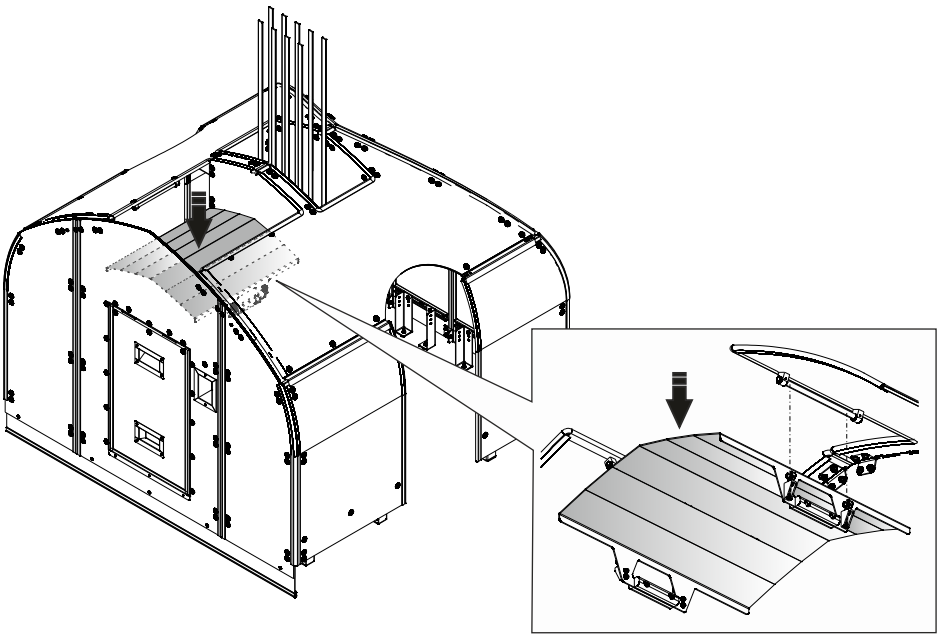
1. Attach life lines to a suitable point above the door.

   One life line for passengers and one for each rescue person who enters the elevator shaft.

   Passengers and rescue personnel must use personal fall protection equipment the whole time a fall hazard exists.



2. Open the spoiler hatch by pushing it down.



X0000097169

3. Lower the rescue equipment on the landing onto the car roof.
4. Open the car inner ceiling.

X0000066604 B.2

12.10.3 Open car inner ceiling

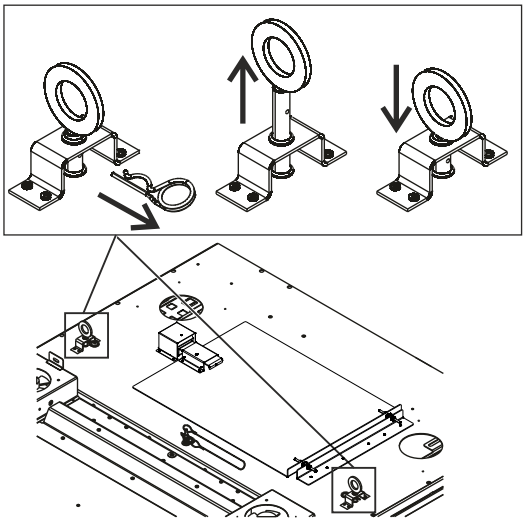
1. Warn the passengers before opening the ceiling.

Passengers must pay attention when the ceiling is lowered.

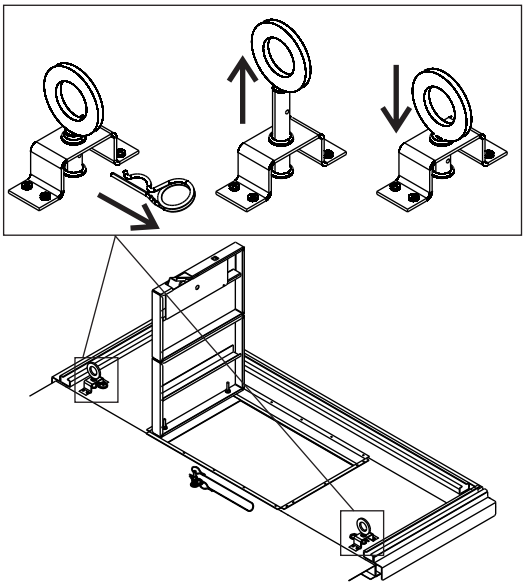
WARNING: Careless opening of the ceiling locks can cause injury to passengers.

---

2. Release the ceiling locks:
    1. Remove the cotter pin.
    2. Pull up the rings.
    3. Release the rings.



X0000090929



X000098785

Figure 49: Optional designs

NOTE: The ceiling locks are not opened yet, only released.

3. Open the ceiling locks:
    1. Remove the cotter pin.
    2. Pull up the safety wire to lift the ceiling upwards.
       Hold on to the safety wire.

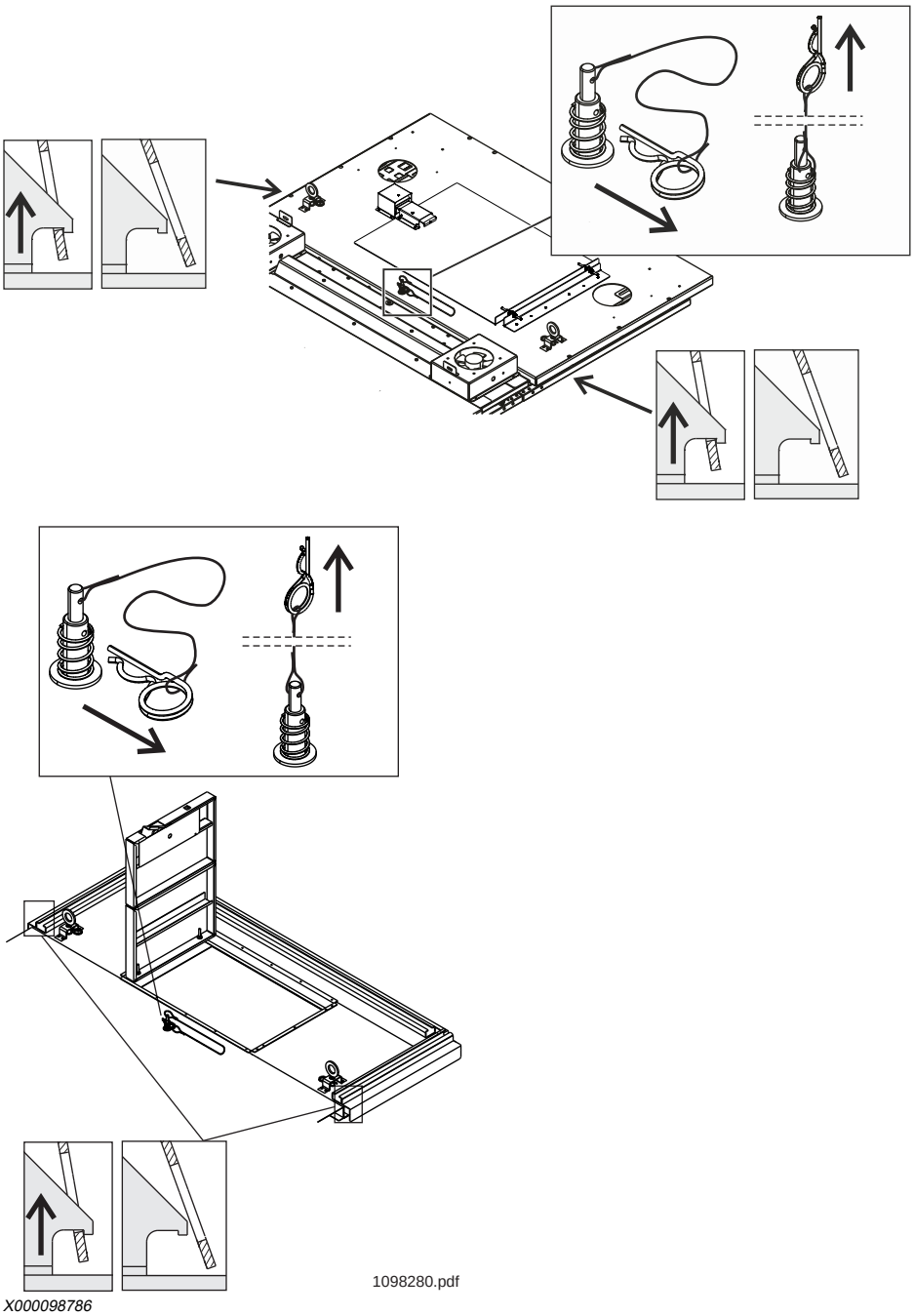


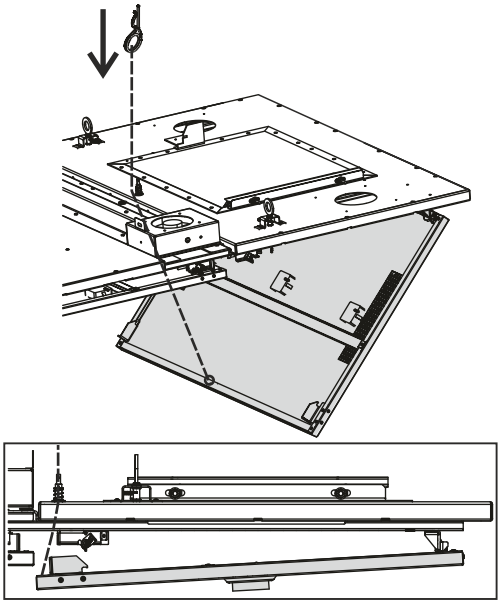
Figure 50: Optional designs

WARNING: The ceiling locks are now open, do not let the ceiling drop.

---

4. Lower the ceiling carefully down.

WARNING: Tell the passengers to pay attention and move away from the lowered ceiling.



X0000090925

X0000066605 F.2

12.10.4 Open trap door on car roof

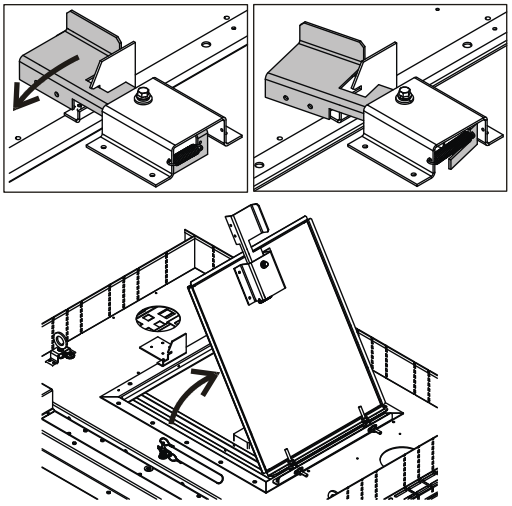
NOTE: The trap door design may vary depending on the roof type. The opening principle is similar.

WARNING: Wear protective cut-resistant safety gloves.

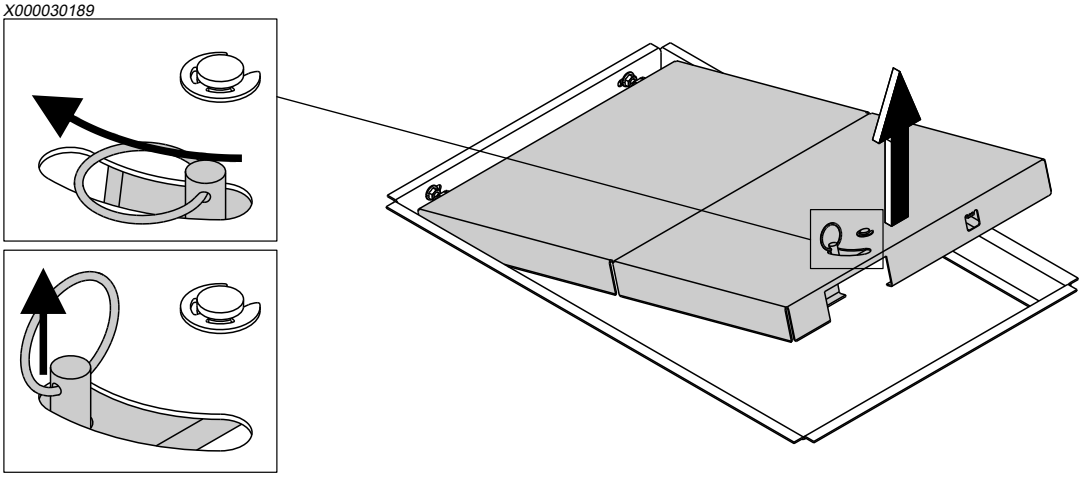
---

1. Open the trap door by releasing the locking mechanism.

2. Open the elevator car roof trap door.



X000030189



X0000060336

Figure 51: Optional designs

NOTE: Some elevator cars have only one integrated ceiling.

3. Continue the rescue operation according to site specific rescue plan.

X0000066609 C.2

12.11 Finalize rescue

1. Ask the passengers what happened. Write down the name of each rescued passenger.
2. Clear possible cause for the fault situation.

   For example, power failure, repairable fault or not.
3. Lower the rope compensator back to compensation ropes. Remove the bottle jack (if used).
4. Move elevator car to the bottom landing.
5. Locate the lockdown devices back to position. Tighten the fixing bolts.
6. Exit the pit. Release the pit stop button (if applicable).

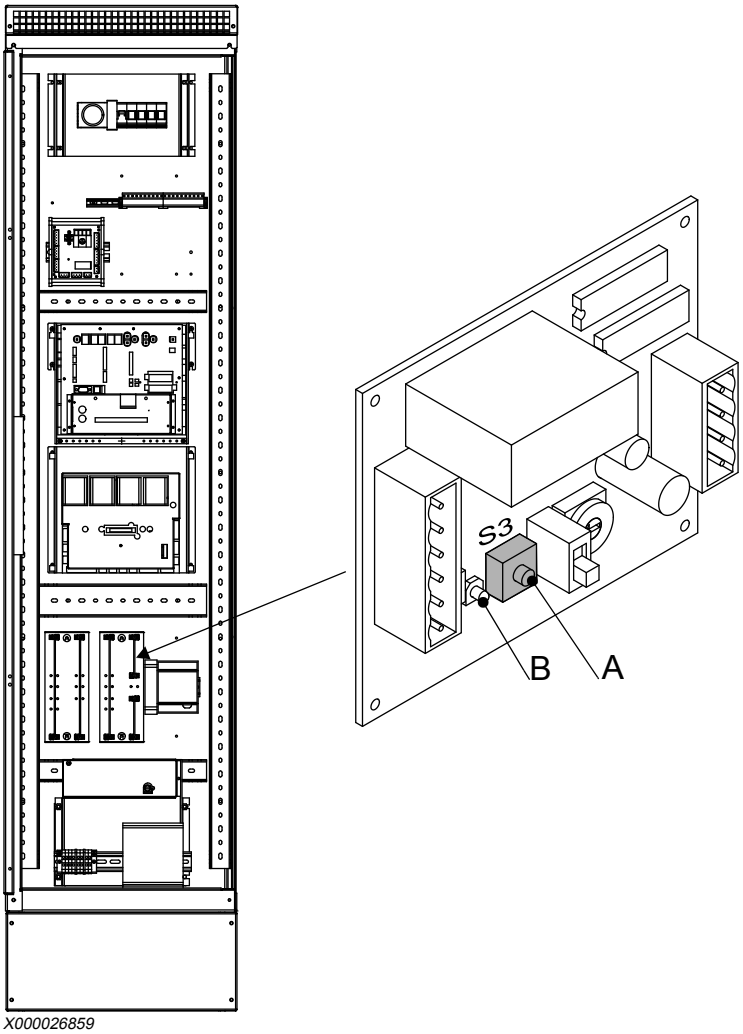
7. Check if the trapped elevator can be returned to normal service.

   If not, start corrective maintenance actions for the elevator.

8. Move the rescue equipment back to the machine room.
9. Mark the fault situation to the log book. Record to logbook how many persons were in the elevator cars and if safety gear was activated.
10. Make sure the safety of the elevator before taking it into normal use after rescue (safety check).

    Find the root cause for the failure and do not take the elevator in use if not fixed. Do safety checks and make sure that the elevator is safe to put in normal use.

11. Reset the remote alarm system by pushing the reset button (A) on the LCERAL board until the indicator light (B) switches off.



X000026859

12. Remove all tools and equipment such as rope clamps. Clean the site.

    If used, pack the hydraulic lifting tool to boxes for storage.

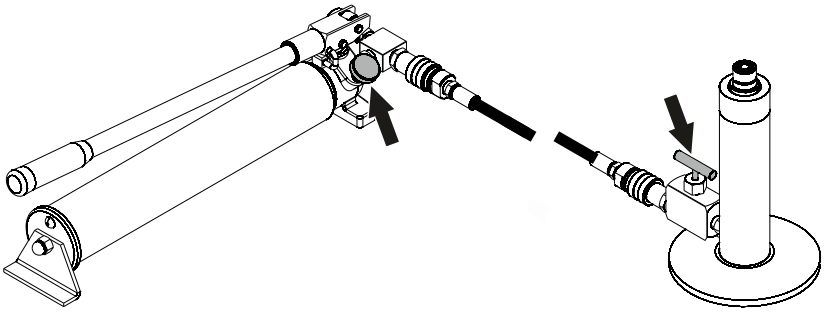
13. Inspect and report the rescue according to EN 81-20.

X0000066610 G.2

12.11.1 Pack hydraulic lifting tool

1. Check that cylinders are in their initial positions.

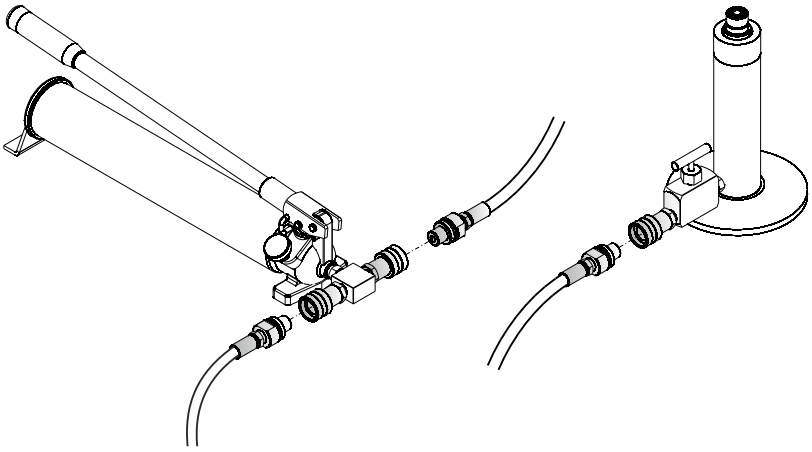
   If not, turn the pump valve to the landing position by turning it counterclockwise and turn the lever of the flow regulating valves (cylinder valves) counterclockwise as much as needed.



2. Close the flow regulating valves (cylinder valves) by turning the lever of the valve clockwise.
3. If a pressure gauge is included to the system, check that there is no pressure on the system.

   If the pressure gauge displays that the system is pressurized, check that the gauge works.

   Lift and land the cylinders as many times as needed to release all pressure. Check that the cylinders are in their initial positions, the flow regulating valve (cylinder valve) is closed and the hand pump valve is turned counterclockwise.
4. Remove hoses from the cylinders and the pump.



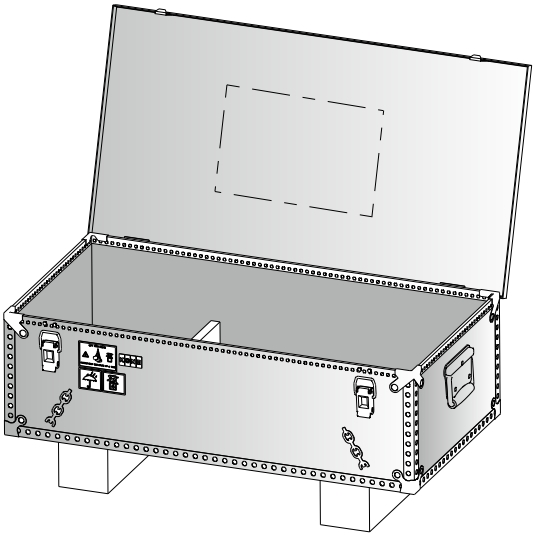
X0000100286

5. Put protective covers back to hoses, inlets of the cylinders and outlets of the pump.

X0000100207

6. Pack lifting plates to the storage box.

7. Pack the hydraulic components to the storage box.



X0000100247

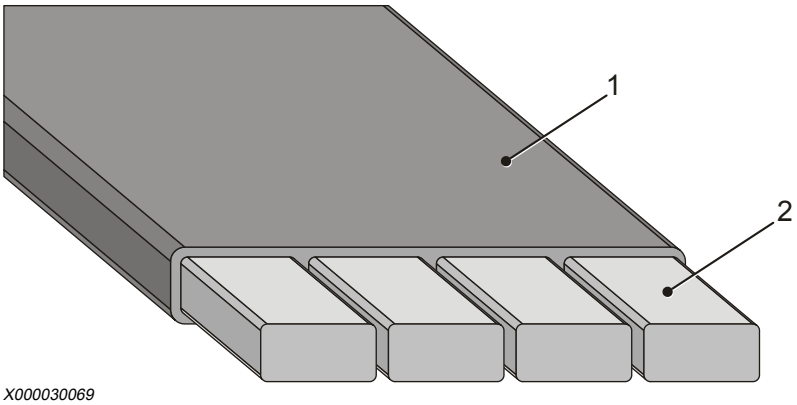
CAUTION: Risk of sprain. Two technicians are recommended to lift the packages. Move the packages without the tools if they are too heavy.

X0000100091 D.1

APPENDIX A. KONE ULTRAROPE VISUAL CHECK AND REPLACEMENT CITERIA

A.1 KONE UltraRope®

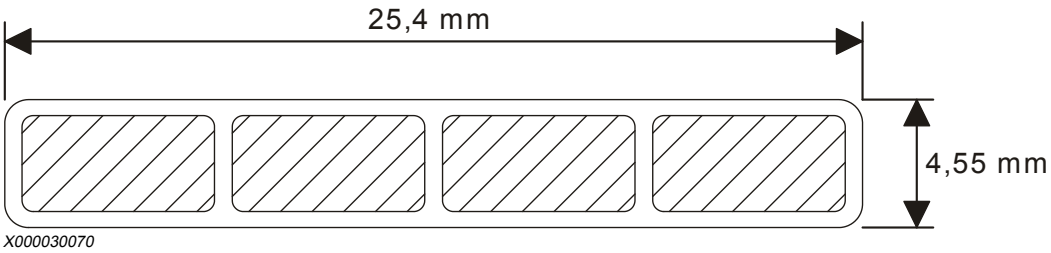
This section describes the parts of a KONE UltraRope®. It is a construction of four carbon fiber reinforced polymer (CFRP) bars which are covered in thermoplastic polyurethane (TPU).



X000030069

1. Coating
2. CFRP

Figure 52: Concept of KONE UltraRope®



X000030070

Figure 53: Nominal dimensions of KONE UltraRope®

X000030071 B.2

A.2 Replacement criteria

- LCECMD indicates rope change needs.
- The LCE main floor start counter (4_7) exceeds the limit.
- The rope is 15 years old.
- The rope has moved 10 mm with respect to the terminal wedges.
- Severe damage found in visual rope check.

X0000096422 A.17

Related information

– Check LCEUI for LCECMD related fault codes (265)
– Main floor start counter criterion (266)
– Rope age criterion (266)
– Terminal creep criterion (267)
– Visual rope inspection (276)

A.3 Warranty claim instructions

If any of the replacement criteria is fulfilled within warranty, make a warranty claim and give at least the following details of the damage:

– A description of the damage.
– Photos of the damage.
– Which rope has been damaged.
– The car position when the damage is visible and where it can be seen (for example car roof, machine room or pit).

In case a replacement rope is needed, it can be ordered from KONE GSS.

X0000100971 B.4

Related information

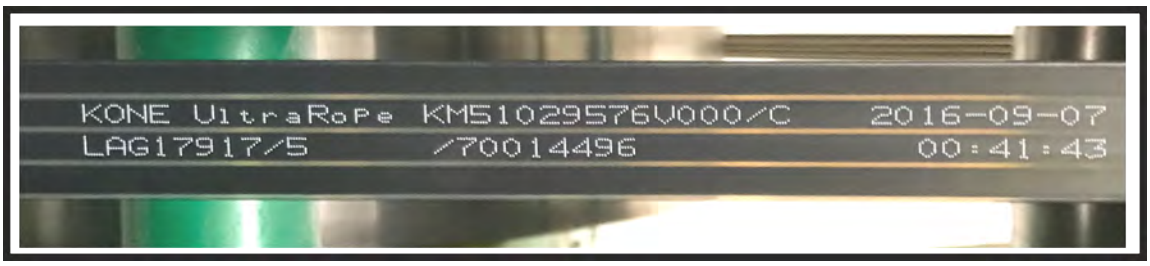
– Check LCEUI for LCECMD related fault codes (265)

A.4 Order instructions for replacement UltraRope®

In case of other than warranty cases, a replacement rope can be ordered from KONE GSS. When ordering a new rope, provide the following details of rope damage:

– A description of the damage.
– Photos of the damage.
– Which rope is damaged.
– The car position when the damage is visible and where it is viewed (for example, car roof, machine room or pit).

If possible, check the number and manufacturing date on the rope and include it in the details.



X0000259351

X0000254291 A.4

A.5 Check LCEUI for LCECMD related fault codes

If the LCEUI in control cabinet displays fault F0243 or F0243 and F0245 together, rope condition monitoring (LCECMD) on car roof has indicated a rope issue and you must go to the car roof to check LCECMD and read more detailed information on the issue.

CAUTION: Before moving the car (with F0245), check the ropes visually (machine room). If the ropes are clearly cut, stop fault finding and make warranty claim to replace the ropes.

The following table lists the LCECMD related fault codes in LCE.

Table 22: KONE UltraRope® related LCE fault codes

LCE fault code	Description	Elevator behaviour
F0243	Warning level from KONE UltraRope® condition monitoring LCECMD	Elevator in normal service
F0243 and F0245	Fault level from KONE UltraRope® condition monitoring LCECMD	Elevator out of service
	NOTE: The elevator cancels all calls and drives to the closest landing. It lets people out and switches to out of service mode.	

X0000081079 B.2

Related information

– Warranty claim instructions (265)
– Rope visual inspection instructions and criteria (267)

A.6 Main floor start counter criterion

The LCE UI menu 4_7 (main floor start counter) displays how many times the elevator has stopped at the main floor or driven past the main floor. The allowed counter limits depend on how many diverting pulleys there are, refer to below table.

Table 23: Main floor start counter limits as function of the amount of diverting pulleys.

Amount of diverting pulleys	Main floor start counter limit
2	4 000 000
1	6 000 000
0	12 000 000

The allowed limits must not be exceeded. If the counter is close to the limit or the limit has been exceeded, the ropes must be replaced.

X0000081362 B.2

Related information

– Order instructions for replacement UltraRope® (265)

A.7 Rope age criterion

The rope manufacturing date is printed on the rope coating. During installation, the rope manufacturing date is also written to the elevator delivery documents. The delivery documents are in the hoisting machine room.

The ropes must not be more than 15 years old, counting from the manufacturing date. If the ropes are nearly 15 years old or exceed the limit, the ropes must be replaced.

X0000081365 B.2

Related information

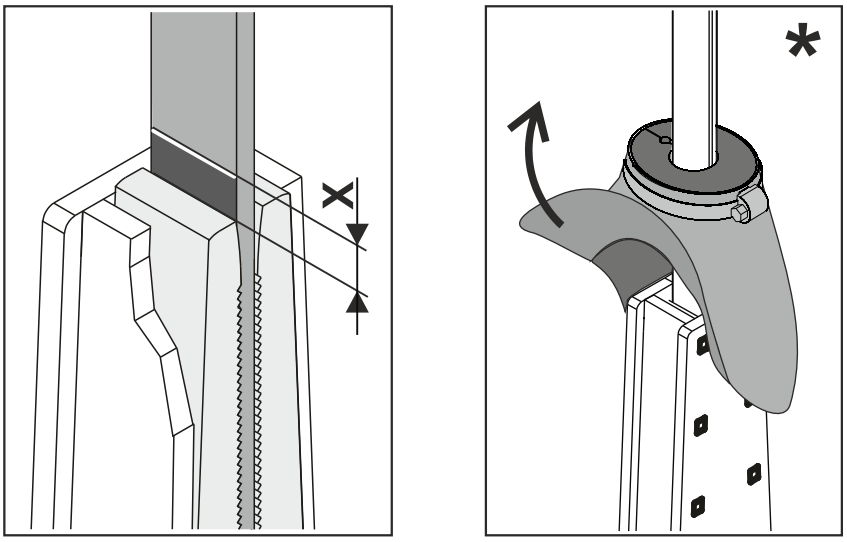
– Order instructions for replacement UltraRope® (265)

A.8 Terminal creep criterion

During the installation a reference line has been drawn on the ropes at the terminal. The distance from the line to the wedges must not exceed 10 mm.

If the wedges are close to 10 mm or exceed this limit within warranty period, make a warranty claim. If outside the warranty, new ropes can be ordered according to instructions.

NOTE: Rope housing wedges can be slightly different in heights inside housing because of manufacturing tolerances.



X000029788

X0000095908 B.2

Related information

– Warranty claim instructions (265)
– Order instructions for replacement UltraRope® (265)

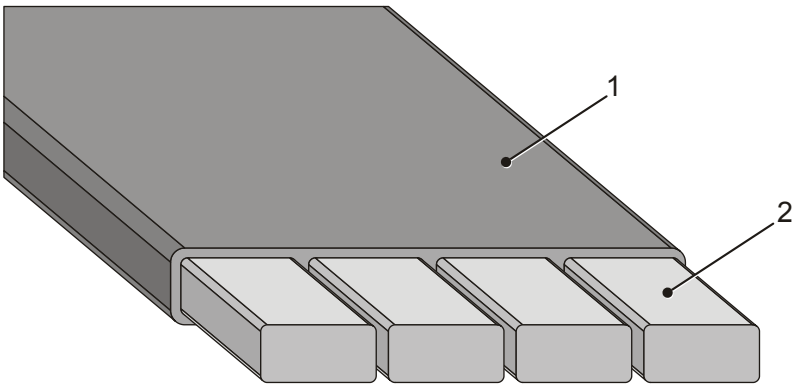
A.9 Rope visual inspection instructions and criteria

X0000102797 A.2

Related information

– Check LCEUI for LCECMD related fault codes (265)

A.9.1 Damage classification



X000030069

1	Coating
2	CFRP (carbon fiber reinforced polymer)

Figure 54: KONE UltraRope® construction

X0000096423 C.3

A.9.1.1 Severe damage

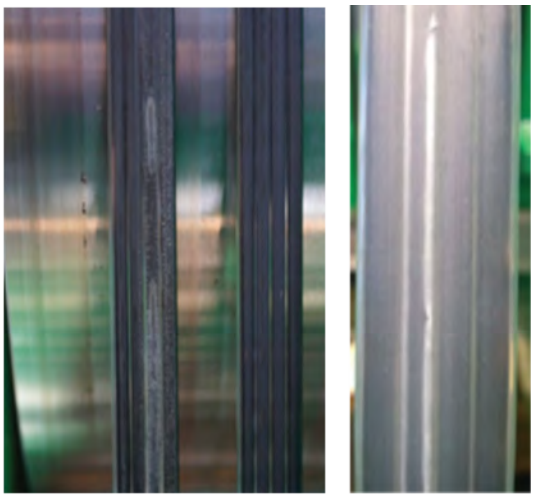
– The CFRP is damaged.
– The CFRP is openly exposed more than 10 mm in any direction.
– The CFRP is visible through a TPU rip more than 15 mm in any direction.
– The coating has debonded from the CFRP more than 100 mm / m.
– The rope has transverse, local damage.
– TPU has a crack penetrating through the rope thickness.

Remedy:

– Make a warranty claim (the rope must be replaced).
– Fill in the rope condition checklist.

Instructions:

– Inspect the other ropes, too.
– Find out what is causing the damage and prevent it in the future.



X0000257913

Figure 55: Coating has debonded for more than 100 mm / m

Possible causes:

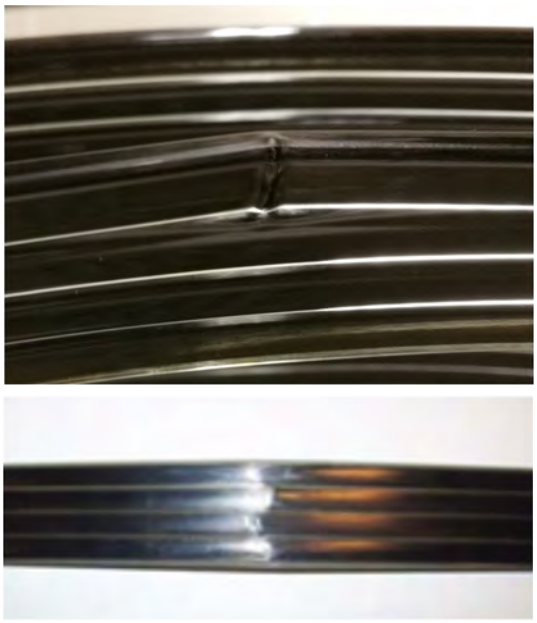
– Elevator impacts such as emergency stops.
– Propagation of carbon fiber reinforced polymer (CFRP) damage.

X0000257940

Figure 56: Coating has melted and CFRP has been damaged

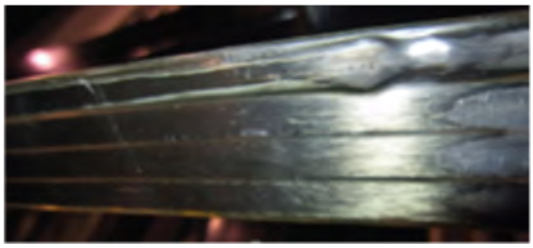
Possible cause:

– Excessive sliding between the rope and the traction sheave.



X0000257971

Figure 57: Transverse CFRP damage



X0000257973

Figure 58: Discontinuity in surface smoothness due to CFRP damage

X0000257978

Figure 59: Loss of material

X0000257980

Figure 60: Abrasive wear / loss of material

X0000257989

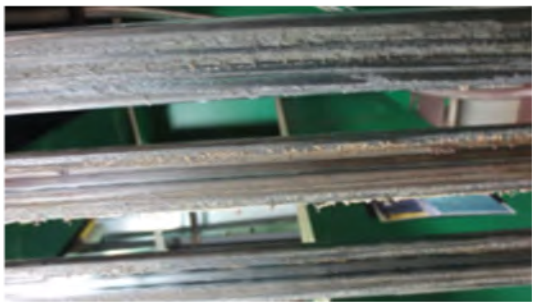
Figure 61: Local loss of load bearing material

X0000257991

Figure 62: Fibers sticking out

Possible causes:

– The rope has been bent in too tight radius.
– The carbon fibers are worn.
– An object has been between the rope and the pulley.
– Harsh contact with a foreign object.



X0000258008

Figure 63: Coating has come off by more than 100 mm / m

Possible causes:

– Elevator impacts such as emergency stops.
– Excessive wear from sliding.

X0000254284

Figure 64: Crack penetrates whole thickness of rope

Possible cause:

– Propagation of CFRP damage.

X0000088650

Figure 65: Coating has worn excessively, signs can include carbon dust on and inside rope

Possible cause:

– Excessive abrasive wear.

X0000257926 A.8

Related information

– *Warranty claim instructions (265)*
– *Rope condition checklist (278)*

A.9.1.2 Minor damage

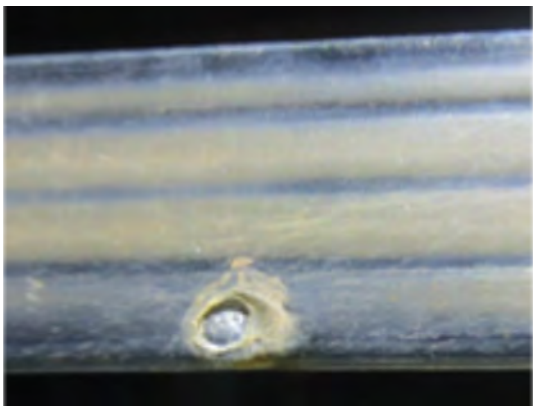
– The CFRP is not damaged but openly exposed less than 10 mm in any direction.
– The CFRP is not damaged but visible through a TPU rip less than 15 mm in any direction.
– The coating has debonded from the CFRP less than 100 mm/m.
– Spots where foreign objects or loose material have been removed.

Remedy:

– Fill in the rope condition checklist.
– Highlight and follow up.

Instructions:

– Inspect the other ropes, too.
– Find out what is causing the damage and prevent it in the future.
– Remove the foreign object carefully, if needed.

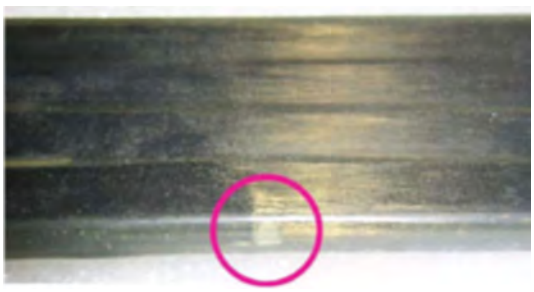


X0000257998

Figure 66: CFRP is openly exposed for less than 10 mm

Possible causes:

– An object has been between the rope and the pulley.
– Damage from a foreign object or manufacturing defect.



X0000258014

Figure 67: Coating has debonded for less than 100 mm / m

Possible cause:

– Elevator impacts such as emergency stops or accidental damage from tools.

X0000258012 A.5

Related information

– *Warranty claim instructions (265)*
– *Rope condition checklist (278)*

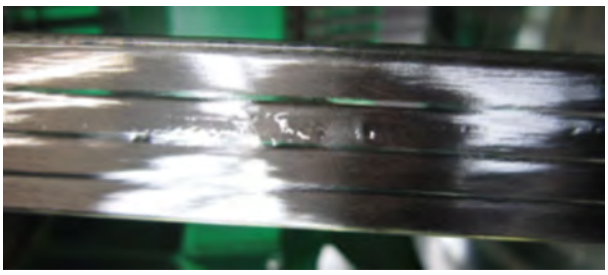
A.9.1.3 Normal wear

During the manufacturing, installation and elevator use there can be scratches, dents, bubbles and other marks in the thermoplastic polyurethane (TPU). They are not critical to the rope and do not require actions.

– Minor scratches and wear in the TPU.
– Bubbles in the TPU.
– Rope surface is dirty.

Remedy:

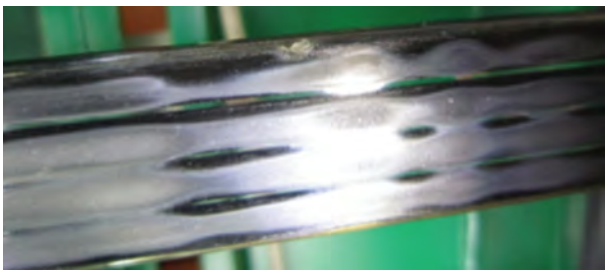
– No actions needed.
– If it's necessary to clean the rope, use water, Würth R1 Universal Cleaner 0893125005 or Würth Pineline Power Wash 0893012090.



X0000258045

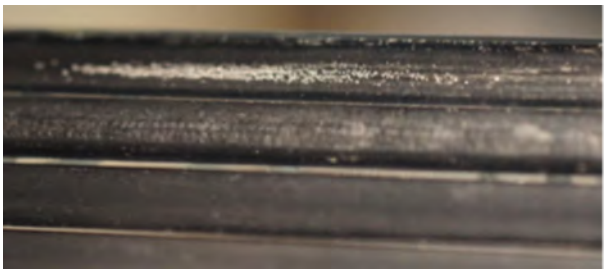
Figure 68: Small surface irregularities

Possible cause: manufacturing.



X0000258028

Figure 69: Normal surface wear pattern



X0000258047

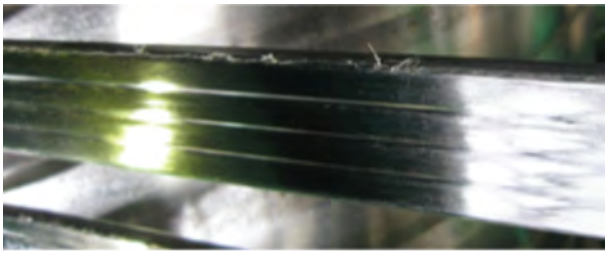
Figure 70: Small bubbles embedded in rope

Possible cause: manufacturing.

X0000258032

Figure 71: Single white line running parallel to CFRP on rope wide surface for a small distance

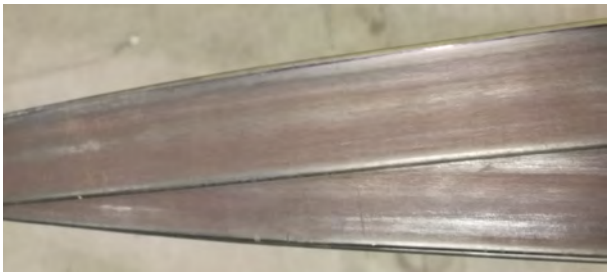
Possible cause: manufacturing.



X0000258034

Figure 72: Small hairs of TPU sticking from rope surface

Possible cause: manufacturing or installation.



X0000258050

Figure 73: Rope surface is worn and dirty

X0000258023 A.2

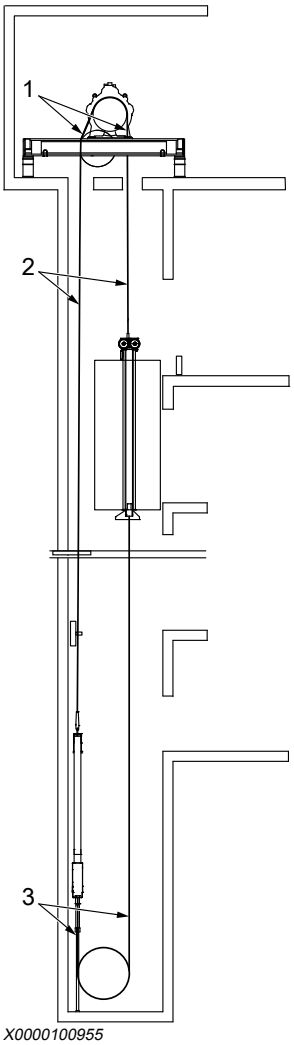
Related information

– *Warranty claim instructions (265)*
– *Rope condition checklist (278)*

A.9.2 Visual rope inspection

Depending on the situation, do one of the following:

– Look for damage indicated by the LCECMD or
– Inspect all the ropes for any damage or
– Go through the checklist to follow up on previous findings.



X0000100955

1. Suspension ropes in machine room.
2. Suspension ropes.
3. Compensation ropes.

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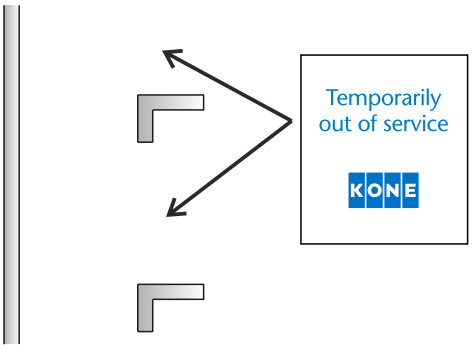
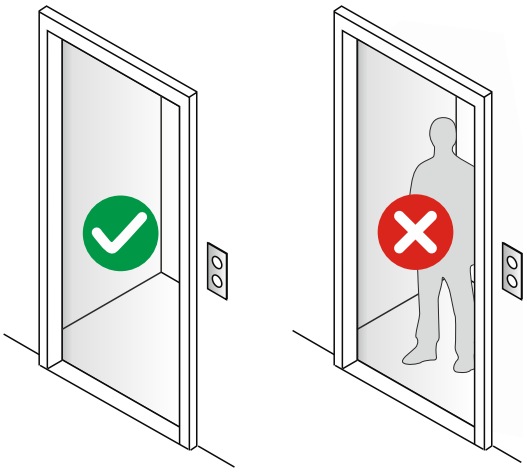
A.9.2.1 Take elevator out of use

1. Place 'Out of service' signs to all landings.



X0000091647

2. Drive the elevator car to the floor closest to the controller.
3. Make sure that the elevator car is empty (or both car when applicable).

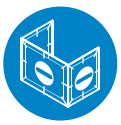


X0000091662

4. Switch on recall drive feature (RDF), if necessary.

   It depends on your upcoming task, whether it is necessary or not.
5. Disable the landing calls and door openings, if necessary.

   It depends on your upcoming task, whether it is necessary or not.
6. Place safety fences to working floors to prevent unauthorized access.



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A.9.2.2 Check suspension rope

1. Go to machine room.
2. Check the ropes.
3. Move the elevator car to a suitable position for entering the roof.
4. Go on the elevator car roof.
5. Check the ropes that go to machine room openings.

6. Drive down with inspection drive approximately 5 meters and stop.
7. Check the ropes.
8. Repeat driving down 5 meters, checking, and marking the damages.

X0000096101 A.8

Related information

– Rope condition checklist (278)
– Safety (38)
– Prepare equipment and safety (55)
– Take elevator out of use (277)

A.9.2.3 Check compensation rope

1. Drive down with inspection so that you see the bottom of CWT.
2. Check the ropes.
3. Repeat driving down 5 meters, checking, and marking the damages until you are on the lowest landing level.
4. Exit the car roof and go to the pit.
5. Check the ropes.
6. Exit the pit.

X0000096102 A.5

Related information

– Rope condition checklist (278)
– Safety (38)
– Prepare equipment and safety (55)
– Take elevator out of use (277)

A.10 Rope condition checklist

Make sure there is only one Rope Condition Checklist per elevator at a time.

Inspect the ropes and write down each finding on this list.

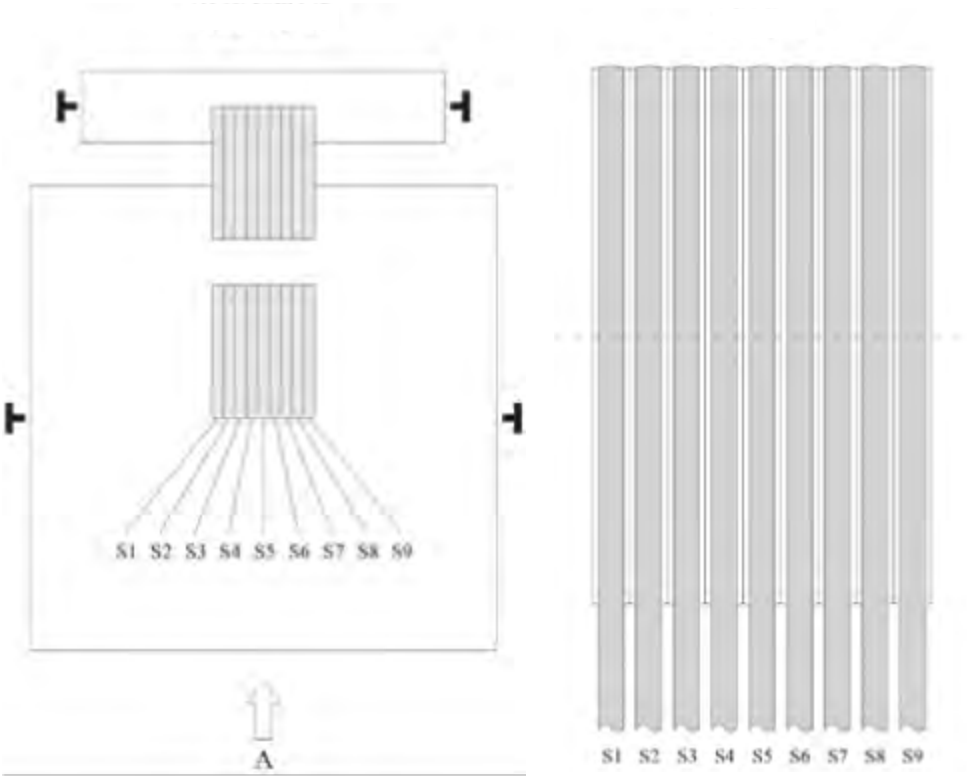
If nothing is found, mark the date and note "No findings".

If you find minor or severe damage, fill in the rope condition checklist:

– The date
– Which rope is damaged
– The car position when the damage is visible, based on for example, the floors or rescue doors
– Where the damage can be seen at that car position, for example, car roof, machine room or pit
– A brief description of the finding
– Is it a severe or minor damage
– Highlight the spot on the rope with a white marker pen.
– Mark the location in the elevator shaft.

– Carefully remove any embedded objects or loose material. Inspect the damage.
– If a rope is damaged, inspect the other ropes at the same location as well.
– Find out what is causing the damage and prevent it in the future.

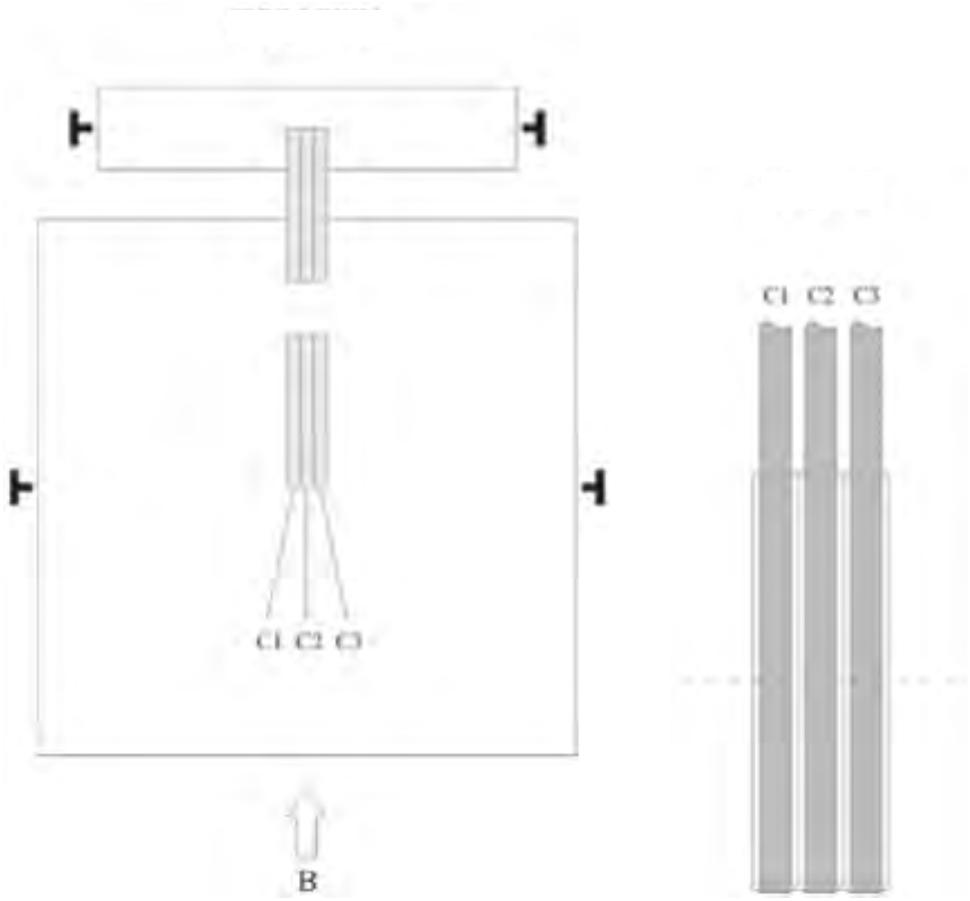
Rope ID: The ropes are numbered from left to right (1, 2, 3..) when looking at the machinery or compensator from the car side. Suspension ropes are marked S1, S2, S3... and compensation ropes C1, C2, C3... See figures below for detailed instructions



X0000089825

Figure 74: Suspension rope identification instructions

The ropes are numbered from left to right (S1, S2, S3..) when looking at the machinery from the car side.



X0000089816

Figure 75: Compensation rope identification instructions

The ropes are numbered from left to right (C1, C2, C3..) when looking at the compensator from the car side.

Table 24: KONE Equipment Number: _____

Date	Rope ID	Car position	Where can the damage be seen at the given car position (X)				Description of the finding	Damage (X)	
			Car roof	Machine room	Pit floor	Other		Minor	Severe

Table 24 KONE Equipment Number: _____ (continued)

Date	Rope ID	Car position	Where can the damage be seen at the given car position (X)				Description of the finding	Damage (X)	
			Car roof	Machine room	Pit floor	Other		Minor	Severe

Table 24 KONE Equipment Number: _____ (continued)

Date	Rope ID	Car position	Where can the damage be seen at the given car position (X)				Description of the finding	Damage (X)	
			Car roof	Machine room	Pit floor	Other		Minor	Severe

Table 24 KONE Equipment Number: _____ (continued)

Date	Rope ID	Car position	Where can the damage be seen at the given car position (X)				Description of the finding	Damage (X)	
			Car roof	Machine room	Pit floor	Other		Minor	Severe

Table 24 KONE Equipment Number: _____ (continued)

Date	Rope ID	Car position	Where can the damage be seen at the given car position (X)				Description of the finding	Damage (X)	
			Car roof	Machine room	Pit floor	Other		Minor	Severe

X0000089096 A.24

APPENDIX B. TECHNICAL WARRANTY TERMS

KONE warrants that the elevator is to the best of its knowledge free from defects caused by faulty design, material or workmanship, which prevent the electrical or mechanical functioning of the elevator.

B.1 Enforcement of warranty

The owner shall notify KONE in writing of any defect in the elevator, which the owner has detected and requires to be corrected. Such notice shall be made without delay, but in any case within fourteen (14) days of detecting the defect and before the end of the Warranty Period. The notice shall contain a description of the defect and its probable cause. KONE shall be given an opportunity to inspect a claimed defect. If, after appropriate tests and inspections by KONE or on behalf of KONE, the elevator is found to have a defect that falls under this warranty, exclusive remedy shall be made, at the option of KONE, either by repairing the defect at the facilities of KONE, or by supplying the replacement parts free of charge to the owner. Repairs shall be performed, at KONE's discretion, by KONE or a third party.

The cost of dismantling and installing a repaired or replaced part furnished under this warranty is expressly excluded from KONE's liability.

B.2 Preconditions for warranty

This warranty is given on the condition that the elevator is in all respects erected, operated, handled, serviced and maintained properly, in accordance with KONE's instructions and under normal operating conditions.

Without limiting the above, KONE shall specifically have no responsibility for damages of any kind as a result of one of the following events:

1. The repair or replacement of the elevator or any part thereof becomes necessary due to normal wear and tear, vandalism, accident or negligence or otherwise without any fault of KONE;
2. the Product has been used for the transport of goods and machinery in cases where the Product is intended primarily for the transport of people;
3. repairs, alterations or adjustments to the elevator have been performed by the owner or a third party without KONE's prior written consent; or
4. KONE has purchased the part from an identified manufacturer and resold it to the owner under the manufacturer's original warranty and such warranty no longer covers the defect.

B.3 Defective parts

The defective parts replaced in accordance with this warranty shall, at KONE's request, be placed at KONE's disposal. The owner shall bear the cost and risk of transport of defective parts to KONE's plant, or to the nearest KONE service station, and KONE shall bear the risk and cost of transport of the repaired or replacement parts to the owner, to the same extent born by KONE in the contract with respect to the delivery of the elevator.

B.4 Warranty period

The warranty period for any part or parts of the elevator shall be eighteen (18) months from ex works delivery of the elevator, or twelve (12) months from the date installation of the elevator is completed and handed over to the owner as stated on the first page of this manual, whichever period expires first.

An extension of twelve (12) months to the warranty period is given, under the same terms and conditions as those applicable to the original elevator parts, to parts replaced or repaired under this warranty. This paragraph shall not be construed as extending the period of this warranty as described in the paragraph above.

B.5 Payments due by the owner

Any moneys due to be paid by the owner to KONE shall be paid in full, and KONE shall credit the owner for any warranty claims separately, if necessary. Should the owner make any deductions, KONE shall forthwith be discharged from the performance of its obligations under this warranty until such deduction has been made up in full by the owner.

B.6 Exclusive warranty

The foregoing warranty is exclusive and in lieu of all other warranties, whether express or implied, including but not limited to any warranty of merchantability or of fitness for a particular purpose.

X0000088313 A.2