

Dedicated to People Flow™



OWNER'S MANUAL

KONE NanoSpace™

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(Business card)

KONE Equipment number	
Building name	
Building owner's name	
Code compliance of the equipment	
Date of equipment handover	
KONE customer service telephone number	
Signature of KONE representative	

TABLE OF CONTENTS

1	ABOUT THIS DOCUMENT	6
1.1	You now own a KONE NanoSpace™ machine-room-less elevator	6
1.2	Purpose of this document	6
1.3	Audience	7
1.4	National statutory requirements	7
1.5	Signs and symbols used in this document	7
1.6	Abbreviations	9
1.7	Related documents	10
2	RESPONSIBILITIES AND QUALIFICATIONS	11
2.1	Responsibilities	11
2.2	Qualifications	14
3	SAFETY	16
3.1	Prior to putting the elevator into service	16
3.2	Safety considerations	16
3.3	KONE as service provider	18
4	ENVIRONMENT	19
4.1	KONE's environmental policy	19
4.2	Building efficiency	19
4.3	Energy savings	19
4.4	Long lasting product	20
4.5	Materials used in the elevator	20
4.6	Packaging materials	20
4.7	Final disposal	21
5	KONE NANOSPACE™	22
5.1	Components	23
5.2	Safety equipment	26
6	USING YOUR ELEVATOR	27
6.1	Dos and don'ts	27
6.2	Transporting heavy loads	29
6.3	Events requiring the intervention of a competent person	29
6.4	Elevator stops between floors	30
6.5	Special elevators and components	31
7	MAINTENANCE	37
7.1	Safety	37
7.2	Shaft access monitoring (optional)	39
7.3	Maintenance program	40
7.4	Preventive maintenance	43
7.5	Before you contact KONE – maintenance by owner	46

8	SAFETY COMPONENT MAINTENANCE	49
8.1	UCM with doors open prevention according to EN 81-1 A3	50
8.2	Machine brakes	50
8.3	Overspeed governor OL35	54
8.4	Safety gear AQ32	59
8.5	Landing door lock ¹⁾	62
8.6	Car door lock	64
8.7	Polyurethane buffers	65
8.8	Ropes	67
8.9	Belts	69
8.10	Pit safety device	71
8.11	Top safety device	72
9	EXAMINATIONS AND TESTS AFTER IMPORTANT MODIFICATION OR ACCIDENT ACCORDING TO EN 81-1 ANNEX E	73
10	PERIODICAL INSPECTIONS ACCORDING TO EN 81-1 ANNEX E	74
10.1	Tools	75
10.2	Safety measures	77
10.3	Testing the pit safety device	78
10.4	Testing the car apron	81
10.5	Testing the pit ladder safety switch	82
10.6	Final limit switch tests	84
10.7	Buffer tests	89
10.8	Safety gear tests	100
10.9	Testing the belt tensioning device safety switches	105
10.10	Finalizing the maintenance	113
11	RESCUE OPERATIONS	115
11.1	Safety	116
11.2	Rescue categories	116
11.3	Contacting qualified personnel	117
11.4	Reassuring passengers	117
11.5	Rescue tools and equipment	118
11.6	Normal rescue	122
11.7	Technical rescue	123
11.8	After the rescue	152
	APPENDIX A. Safety space arrangement (SSA**E)	159
	APPENDIX B. Resetting the safety devices	162
	APPENDIX C. Safety buffers on the elevator car roof	165
	APPENDIX D. Safety devices in the pit	166
	APPENDIX E. Periodical tests for SSA**E devices	175
	APPENDIX F. Belt faults and criteria for belt replacement	181

APPENDIX G. Technical warranty terms	187
APPENDIX H. Cleaning	189

1 ABOUT THIS DOCUMENT

1.1 You now own a KONE NanoSpace™ machine-room-less elevator

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.

1.2 Purpose of this document

This document provides general guidance on the maintenance and usage of your elevator. By following this document 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 document is compiled according to the guideline of the EEA for new elevator deliveries by providing the following information:

- Instructions for normal use of the elevator
- General maintenance instructions
- Maintenance program
- Preventive maintenance checks
- Maintenance instructions for safety components
- Instructions for periodical inspections
- Instructions for rescue operations



NOTE! Store this document so that it is accessible to authorized persons if needed.

1.3 Audience

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

1.4 National statutory requirements

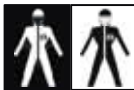
In addition to EU Lift Directive 95/16/EC, you may need to follow national statutory requirements that are not discussed in this document. Typical requirements include the following:

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

1.5 Signs and symbols used in this document

This document uses graphic symbols to point out procedures that require special attention.

Sign	Description
	Danger
	Warning
	Risk of electric shock
	Caution
	Notice
	Risk of falling

Sign	Description
	Risk of tripping
	Turn main power switch OFF
	Push the safety button
	Wear safety gloves
	Wear safety harness
	Two persons required for maintenance

1.6 Abbreviations

This document uses the following acronyms for some commonly-used terms and names:

BWT	Balancing weight
DOB	Door open button
DOM	Door opening monitor
DZI	Door zone indicator
DZ	Door Zone
EBD	Emergency battery device
EEA	European Elevator Association
KRM	KONE Remote Monitoring
LCEUI	Lift control electrification user interface in MAP
LED	Light Emitting Diode
iMAP	Integrated maintenance access panel (can also be referred to as MAP)
PU	Polyurethane buffer
RDF	Recall drive feature
SAM	Shaft access monitoring
SSA	Safety Space Arrangement

1.7 Related documents

Readers of this document must also take note of the following documentation:

- Local safety and maintenance documents
- EN 81-1: Safety rules for the construction and installation of lifts - Part 1: Electric lifts
- 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 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
- OM-13.25.001 KRM Emergency Phone, Owners manual

2 RESPONSIBILITIES AND QUALIFICATIONS

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

2.1 Responsibilities

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

The following table describes the roles of the individuals and groups central to the operation of your elevator.

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. ^{a)}
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.

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

2.1.1 Owner responsibilities

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

Table 2: Owner 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
- 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

2.1.2 Maintenance company responsibilities

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

Table 3: Maintenance company 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.

2.2 Qualifications

The following sections describe the required qualifications for each role in the maintenance of your elevator.

2.2.1 Qualified maintenance company

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

Table 4: Maintenance company qualifications

	A qualified maintenance company is defined in this manual 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.

2.2.2 Competent maintenance person

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

Table 5: Maintenance person qualifications

	A competent maintenance person is defined in this manual 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.

3 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, multiple ropes, locks, dynamic braking, 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.

3.1 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

3.2 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

3.3 KONE as service provider

KONE as the elevator manufacturer has the best understanding of the maintenance requirements of KONE elevators. KONE is committed to optimizing the equipment's performance in the following ways:

- Using skilled people backed by the latest technology
- Constantly developing new maintenance methods and techniques
- Offering tailored and optimized maintenance programs
- Training committed professionals to focus on the customer and his needs
- Delivering maintenance services that focus on maximizing equipment reliability, availability and safety
- Taking into consideration the particular, specific technical requirements of the equipment
- Paying attention to the specific needs of the building
- Providing 24/7 service

KONE service can provide you with the best service and value. As the designer and manufacturer of your elevator, we know the elevator's operating specifications and ensure optimal performance by maintaining the elevator in compliance with those specifications. With the help of the original wiring diagrams, installation manuals and technical drawings, we are the best experts on what, when and how to maintain and repair in your elevator. KONE service personnel are specifically trained to maintain your elevator with the help of our global technical support and the modern tools available to our maintenance teams at all times. KONE spare parts are available quickly through our global parts network and the parts for upgrades are designed specifically for your KONE elevator. KONE also offers global technical support to help you with any questions you have concerning your elevator.

With the help of the remote monitoring system you can establish a 24-hour connection between the elevator and KONE service. KONE service can constantly monitor your elevator and instantly detect any abnormal behavior using the remote monitoring system.

KONE service offers you 24-hour top quality call out service that ensures the correct functioning of your elevator. For more information, contact your local KONE service office. Contact information is provided in the beginning of this document.

Local KONE Service Centre

Contact information

(To be completed by local Front Line Unit / ESC)

You can also find contact information on the KONE website www.kone.com (Global Contact Directory).

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, together with the elimination of the machine room, 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, car and counterweight. 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 machine operates without lubricating oil. 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 Materials used in the 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	No
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.

4.6 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 an elevator. Packaging materials are sorted and recycled when local circumstances permit.

4.7 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

5 KONE NANOSPACE™

KONE NanoSpace™ combines belt drive and rope suspension to an elevator that maximises both vertical and horizontal space efficiency. KONE NanoSpace™ is designed for both new and existing buildings.

KONE NanoSpace™ eliminates the need for a separate machine room. In traditional elevator systems, the machinery of the elevator has been mounted in a machine room. This has taken up valuable rental space and sometimes dominated building design. Since the machine is located in the elevator shaft, these problems no longer exist.

The dual and slim balancing weight design minimizes the horizontal space. Instead of a single counterweight on one side of the shaft, KONE NanoSpace™ features two slim balancing weights on both sides of the shaft. This enables installing a larger car into the same shaft than with previous counterweight designs.

1. Machine
2. Elevator car
3. Balancing weights
4. Signalization
5. Automatic or swing doors
6. Overspeed governor
7. Safety gears
8. Brakes
9. Guide rails
10. Drive belts
11. Suspension ropes
12. Pit safety device
13. Integrated maintenance access panel and drive
14. Top safety device
15. Car apron
16. SAM (optional in the case of low headroom elevators)

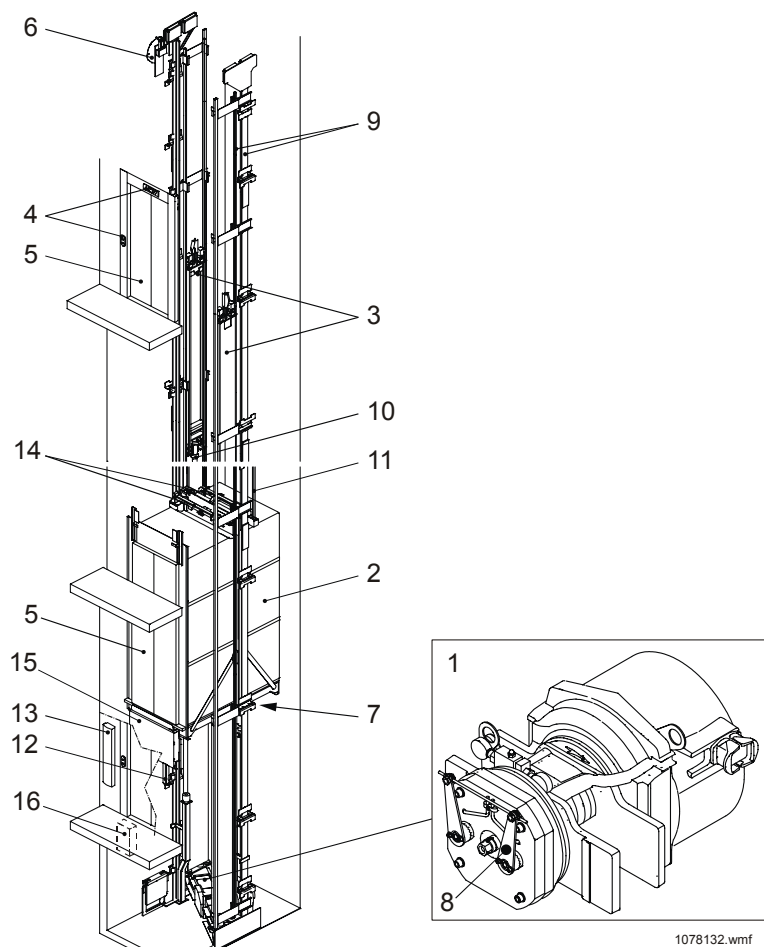


Figure 1. KONE NanoSpace™ components

1078132.wmf

5.1 Components

5.1.1 Machine

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

5.1.2 Elevator car

The elevator provides an enclosure for passengers so that they can be transported safely from floor to floor. The elevator car is surrounded by a car frame, which strengthens the elevator car.

5.1.3 Balancing weights

The balancing weights ensure traction between the shaft top diverting pulleys and the suspension ropes and which comprise a set of weights to balance the weight of the car and a proportion of the load in the car.

5.1.4 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. KONE Signalization System transfers these messages to the elevator network. The elevator network feeds control information to the control unit, which then drives the elevator according to user commands. If KRMS is used, the signalization system also operates as a connection between the elevator and the service company.

5.1.5 Elevator 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. The landing doors are also fitted with a special lock that keeps the doors closed and locked if the elevator car is not level at that landing floor.

5.1.6 Overspeed governor

The overspeed governor's function is to stop the elevator using the safety gear assisted by the machine brakes. The overspeed governor operates if the elevator car exceeds its rated speed locking the governor rope, which is attached to the safety gear. The safety gear then stops the elevator car. The governor is a mechanical device, so it is fully functional even during power failures.

5.1.7 Safety gear

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

5.1.8 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 motor.

5.1.9 Guide rails

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

5.1.10 Drive belts

The belts connect the drive of the machine to the balancing weights and suspension ropes.

5.1.11 Suspension ropes

The suspension ropes provide the suspension by connecting the elevator car to the balancing weights and drive belt. Each rope is capable of supporting the elevator with the safety factor according to the elevator standards.

5.1.12 Pit safety device

The pit safety device is used to provide safety space for maintenance personnel below the car. The pit safety device must be activated when entering the pit.

5.1.13 Integrated maintenance access panel and drive

The elevator emergency drive buttons and the car light supply switch are also located in the integrated maintenance access panel (iMAP). iMAP is typically located on the lowest floor beside the door. Due to its placement, it is extremely important that the iMAP door is closed and locked at all times. There should not be any flammable materials near iMAP.



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



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



5.1.14 Top safety device

The top safety device (car top buffers) is used to provide safety space for maintenance personnel above the car. The top safety device must be activated when entering the car roof.

5.1.15 Car apron

The car apron is a metal panel below the car door sill. It prevents people from falling to the elevator shaft in rescue situations.

5.1.16 Shaft access monitoring (SAM)

The elevator may be equipped with SAM that detects if someone has entered the shaft and prevents the car from moving.

5.2 Safety equipment

The elevator is provided with safety equipment.

You must maintain the safety components. For more information, see section 8 Safety component maintenance. The maintenance company is responsible for maintenance operations, which includes maintenance on the following items:

- Machine brakes
- Overspeed governor
- Safety gear
- Doors
- Elevator car and landing door lock
- Buffers
- UCM monitoring
- Top safety device (optional)
- Pit safety device

6 USING YOUR ELEVATOR

The following sections provide general tips on how to get the best use from the elevator in your building and what to do if the elevator malfunctions.

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 smoke while traveling in the elevator car.
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 press any of the elevator car buttons other than the level you require.
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.	Do not try to enter the elevator if the elevator doors are closing.
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.

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.

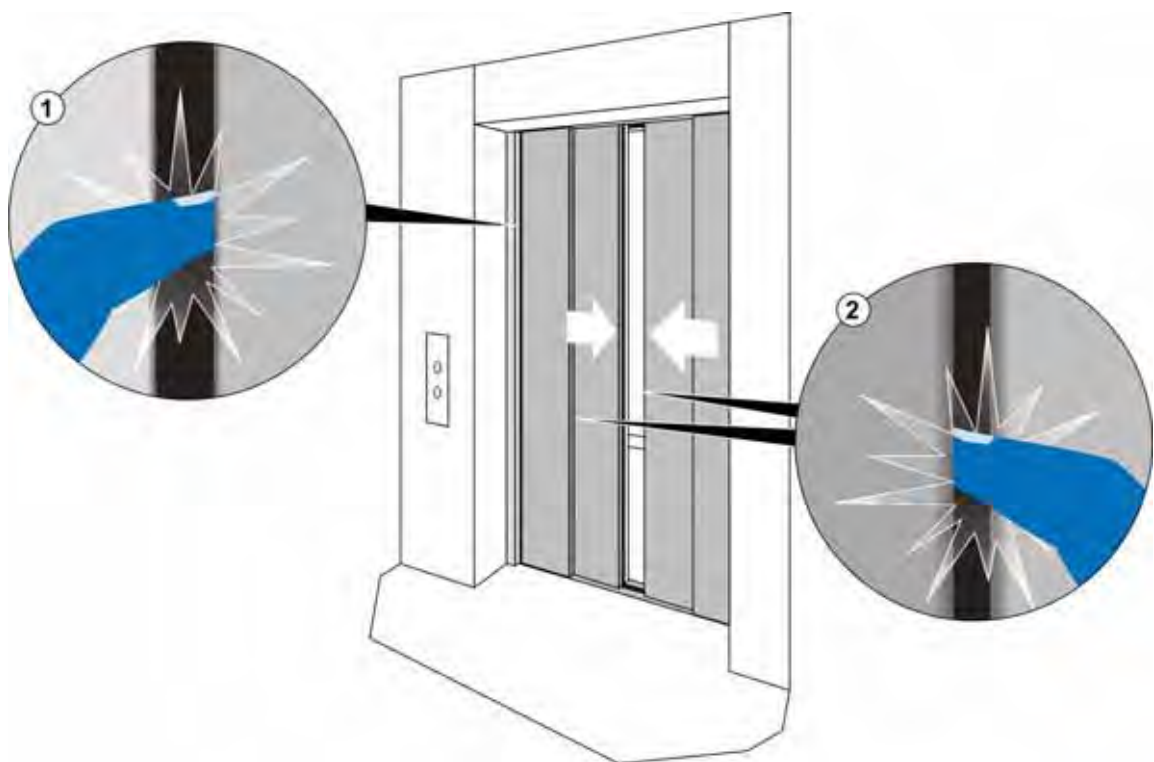


Figure 2. Door panel risk areas

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

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

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



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

6.4 Elevator stops between floors

If the elevator stops between floors due to, for example, a power failure, remain calm and follow the instructions below. By following the instructions you will ensure that you will not unintentionally cause a hazardous situation.

If the elevator stops between floors

Try to start the elevator using the car call button. If the elevator still fails to respond, perform the following actions:

1. Press the alarm button. An internal alarm bell sounds.
2. Stay calm and relax. There is no danger and there is adequate ventilation.
3. The elevator is equipped with KONE Remote Monitoring (KRM) communications. You have a direct voice connection to a service center. Follow the instructions given to you from the service center. For more information on KRM, see OM-13.25.001.



WARNING! Do not try to exit the elevator without the assistance of a trained person. It is very dangerous to attempt to exit the elevator by yourself. Wait for an authorized person to arrive on the scene and follow their instructions.

6.5 Special elevators and components

If your elevator is equipped with the features or components described in this section, follow these instructions.

6.5.1 Elevators for persons with disabilities (EN 81-70:2001)

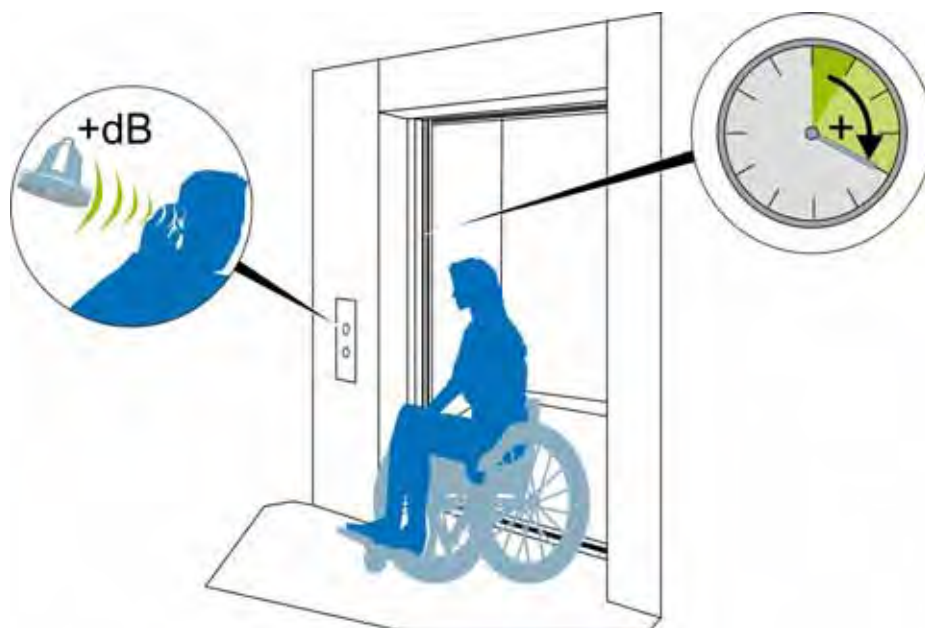


Figure 3. Elevator features for the disabled

There is no EU legislation requiring elevator accessibility for the disabled, but there is a recommendation to have at least one such elevator per building. Accessibility features are an investment in building value. KONE provides elevators to comply with EN 81-70:2001 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
- 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.

6.5.2 Firefighter elevators (EN 81-72)



Figure 4. Firefighter elevator

In big buildings with many people living or working inside, one or more elevators can serve as a firefighter elevator. The need for firefighter elevators has been clarified with the local fire authorities by the builder.

Where firefighter elevators are used, they must comply with the European standard EN 81-72. The firefighter elevator is primarily intended for passenger use. The firefighter elevator has additional protection, controls and signals which enable it to be used under the direct control of the fire service. When in fire service mode, only firemen are allowed to use the elevator.

1. Fire service mode is activated by the firefighters lift switch, located in the lobby intended to be used as the Fire Service Access Level (FSAL). Alternatively, fire service mode can be set to activate automatically by the fire detection system.
2. The switch is marked with a firefighter lift pictogram, white symbol on red background, and it is operated by means of the special emergency unlocking slot key.
3. In addition to the normal floor level markings in the elevator car, the FSAL is marked with a pictogram on or adjacent to the car operating panel buttons. FSAL indication is the same as shown above, but in a smaller size.



To reduce the risk of the entrance being obstructed when the elevator is required to operate in firefighting service, the use of the elevator for moving refuse or goods must be restricted.

The installer of the elevator must provide instructions to the owner, including details according to the table below. In practice, many of the preconditions will have been agreed with the owner before signing the elevator delivery contract.



NOTE! In case of fire, a correctly operating firefighter elevator enables firefighters to reach people requiring help as quickly as possible.

The owner of the elevator is recommended to ensure that the operation of the firefighter elevator is verified regularly according to local regulations and standards. KONE recommends to verify the operation once a year.

The following table describes the relevant EN 81-72 clauses for firefighter elevators.

Table 8: EN 81-72 clauses

EN 81-72 clause	Information
5.1	Environment/Building requirements. In practice this means the following main items: – Principle and layouts of fire protected lobbies – Principle and border temperatures during emergency – Common shaft requirements in the case of group elevators – Electric and electronic component protection in the fire protected lobby – Protected cabling and separated power supply with backup power supply for the firefighting elevator
5.2	Fundamental firefighters lift requirements, for example, size of car and normal use. Additionally, for example, the following items: – Serving every floor in the building, as well as "dummy" and restricted access floors (local variation exists which floors are served) – Protection against water with a proper sewage system in the shaft pit
5.4	Rescue of trapped firefighters in the lift car, for example, external rescue and self rescue procedures. In practice this means the following main items: – Trap door on the elevator car roof – Ladders located in the trap door/ceiling, depending on the elevator type – Ladders on the elevator shaft wall
5.8	Control systems, for example, description of functions. In practice this means the following main items: – Protection and isolation of electrical control system components within normal and firefighting elevator. Malfunction in regular elevator does not affect the firefighting elevator in the same group – Priority call when the elevator is activated in fire service mode

EN 81-72 clause	Information
5.9	Power supplies for firefighters lifts, for example, the owner's responsibility to maintain.
5.10	Changeover of electrical supplies, for example, the owner's responsibility to maintain.
5.12	Fire service communication system, for example, periodic testing. In practice this means testing the required two-way intercom system at regular intervals.

As these instructions may vary depending on the building and the installation, they are not included in this manual. The level of fire resistance of the walls and doors of the environment are defined by National Regulations. The installer of the elevator must provide order-specific instructions referring to standard EN 81-72 as applicable. Local fire authorities, for example, define the acceptable means of rescue of trapped firefighters.

6.5.3 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.

The "No entry" indication light 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.

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.

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



Figure 5. Elevator "No entry" indicators

6.5.4 Glass door panels

If the lower edge of the glass section on the door panel is situated lower than 1100 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.



Figure 6. Critical protection area

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 at all times.



NOTE! If you detect any abnormal behavior in any of the components of your elevator, contact your maintenance company immediately. Put the elevator out of service in dangerous situations and inform your maintenance company.



NOTE! If the elevator is equipped with safety space arrangement SSA**E devices, read *Appendices A – D* before maintaining the elevator.

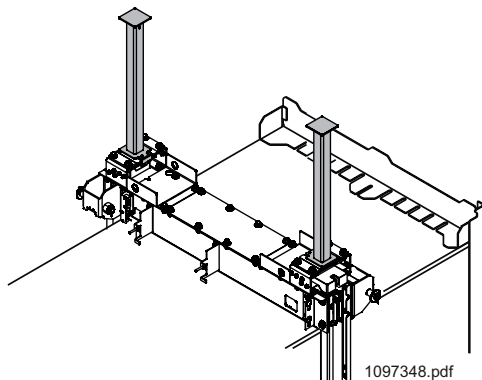


Figure 7. Example of SSA**E components

7.1 Safety

The following table describes the safety precautions you must take in the operation of your elevator.

Table 9: Elevator safety precautions

Safety precautions	Note
Develop and follow procedures that have assimilated the requirements of national elevator codes and other safety related regulations.	In case of 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 herein.	Refer to your local procedures to take the elevator out of use.
Follow the safe working methods defined herein. If you are uncertain of the method's safety, seek expert advice.	
Follow this instruction. Do not skip any steps within the sub-procedures. Skipping steps 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 safety 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.	

Safety precautions	Note
Use barriers to segregate your work area so that your work does not cause a hazard to others. Keep access ways and fire exits clear.	
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.	

7.2 Shaft access monitoring (optional)

The elevator may have an optional Shaft Access Monitor (SAM). It detects if someone has entered the shaft and prevents the car from moving. If the elevator has SAM and you open a landing door, for example to estimate where the car is, SAM prevents the elevator from moving and the fault F0089 displays until you reset SAM.



WARNING! SAM protects persons working in the shaft. Before you reset SAM, always verify that nobody is in the shaft.

Related information: APPENDIX B. Resetting the safety devices.

7.3 Maintenance program

The following table describes the maintenance program for your elevator, including the actions required for each maintenance item.

Do not exceed the recommended maintenance intervals. Local conditions and application rates may require more frequent maintenance intervals.



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

Table 10: Maintenance items and intervals (in months)

ITEM	INSPECTIO N	ACTIONS TO BE MADE IF NECESSARY		
		LUBRICATIO N	ADJUSTING	CLEANING
HOISTING MACHINE				
Belt guards	12			
Wear of drive belts	12			
Machine: Tightness of the fastenings	12			
Machine: Function of brake and manual release device	12			
Machine: Bearings	12			
Load weighing device	12			
SHAFT EQUIPMENT				
Guide rails and fixings	12	x (guide rails)	x (fixings)	x
Balancing weights: guide rollers and guide lubricators, if used	12			x
Balancing weights: rope suspension, diverting pulley, diverting pulley bearing	12	x	x	x
Overspeed governor and rope, tension weight: fixings, operation	12		x	x
Electrical installations and travelling cables	12			
Floor positioning devices	12		x	x
Limit switches	12		x	
Lighting, ventilation and drainage	12			x
Buffers	12			
Shaft pit: check that the pit bottom is dry	12			x
Water sensor	12			
Pit safety device	12			
Pit ladder	12			
SLING AND CAR EQUIPMENT				
Car sling: bolts/joints	12			
Fixing of car sling, insulators	12			
Guide shoe	12	x		
Guide lubricators, if used	12	x (re-filling)		
Mounting of suspension ropes	12		x	
Function of safety gear	12		x	x
Belt tensioning device	12		x	
Elevator documents	12			

ITEM	INSPECTION	ACTIONS TO BE MADE IF NECESSARY		
		LUBRICATION	ADJUSTING	CLEANING
Service drive operations	12			
Car roof (outside)	12			x
Electrical installations	12			
Surface of car walls	12			x
Car floor coatings	12			x
Car lighting and ventilation	12			x
Safety circuit: mechanical devices	12			
Safety circuit: electrical devices	12			
Push buttons and displays	12			
Emergency situation test: alarm devices and roof emergency hatch if used	12			
Handrails, mirrors and other car equipment	12			x
Car doors and gates: locking and operator	12	x	x 1)	x
Door way safety devices: curtain of light	12			x
FLOOR LEVEL EQUIPMENT				
Push buttons, displays	12			x
Door locks, guide shoes, sills, panels and fixings	12	x	x 1)	x
Door operation and equipment	12	x	x	x
Control system: Condition and operation of devices	12			
Control system: Cables and mountings	12			
Control system: UCM	12			
Control system: Stopping accuracy and relevelling	12		x	
Round trip counter	12 (see section 8.9)			
TEST DRIVE				
Operation, noise, ride comfort, stopping accuracy	12	x	x	x

¹⁾ The lock is not adjustable

7.4 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

Table 11: Preventive maintenance checks (minimum check interval = 1 year)

Item to be maintained	Procedures
Pit area	Ensure that the pit is clean, dry and free of debris. Remove the possible water from the pit bottom. Check that pit components are not wet. Ensure that the elevator shaft keeps dry.
Buffers	Check that the buffers are in good condition and fixed firmly in position.
Machine	Check that the machine is clean and operates smoothly.
Machine traction sheave and pulleys	Check for wear.
Drive belt	Check for wear, equal tension and elongation
Belt terminations	Check carefully for deterioration, wear and security. Check for fractures and tightness.
Diverter pulleys	Check the grooves for wear. Check bearings for wear
Electrical panels	Check that the cabinet is clean, dry, and free of dust and locked. Check wires for signs of breakage. Check that safety covers are in place.
Electric wiring	Check insulation to avoid dangerous situations. Check electrical continuity between the earth terminal and any elevator part potentially becoming electrically live. All wiring must be securely fastened.
Current, voltage and speed	Measure when necessary.
Signalization	Check the operation of push buttons and displays.
Overspeed governor	Note! After activating the car safety gears always move car upwards about 150 mm by recall drive (RDF) to allow releasing of safety gear. Check the operation of anticreeping device.
Elevator car	Check emergency lighting and alarm devices. Check decoration condition.
Car guide shoes	Check for wear, replace if needed. Check the lubricating equipment.
Landing entrances	Check every landing lock for smooth operation and security. Check that the doors run freely. Check for any excessive wear and gaps. Check emergency release mechanism, all pulleys and diverters and door ropes. Check the safety contact for proper operation.

Item to be maintained	Procedures
Final limit switches	Check for correct positioning and operation.
Car door operations	Check that the contacts work correctly. Check for free movement. Check for any excessive wear and gaps. Check emergency release mechanism, all pulleys, diverters and door belts. Check the closing force limiter and curtain of light or photo cell for proper operation.
Floor level	Check the stopping accuracy.
Machine run time limiter	Check for correct operation.
Machine protection devices	Check for correct operation.
Electric safety devices	Check all safety devices: – Car top stop button – Pit stop button – Overpeed governor slack rope switch – Safety gear switch – Run buttons in iMAP and in control unit at car roof – Pit safety device – Top safety device (optional) – Drive belt slack switches (2 pcs) – Water sensor (in the pit)
Alarm devices	Check for correct operation.
Low Pit and headroom devices (Safety Space Arrangement SSA**E)	Check the operation if applicable.
Emergency Battery Drive AB (optional)	The functionality of device can be tested in maintenance visit only if the elevator supply cable is equipped with separate connector (installed before battery drive unit).

7.5 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 will better retain your elevator's value 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 operations you must perform between service calls.

Check the following items before contacting KONE. This prevents unnecessary service calls and can place the elevator back in service without additional procedures:

- 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 the elevator is not in Fire Service mode
- 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

7.5.1 Changing tenant directory information sheet

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

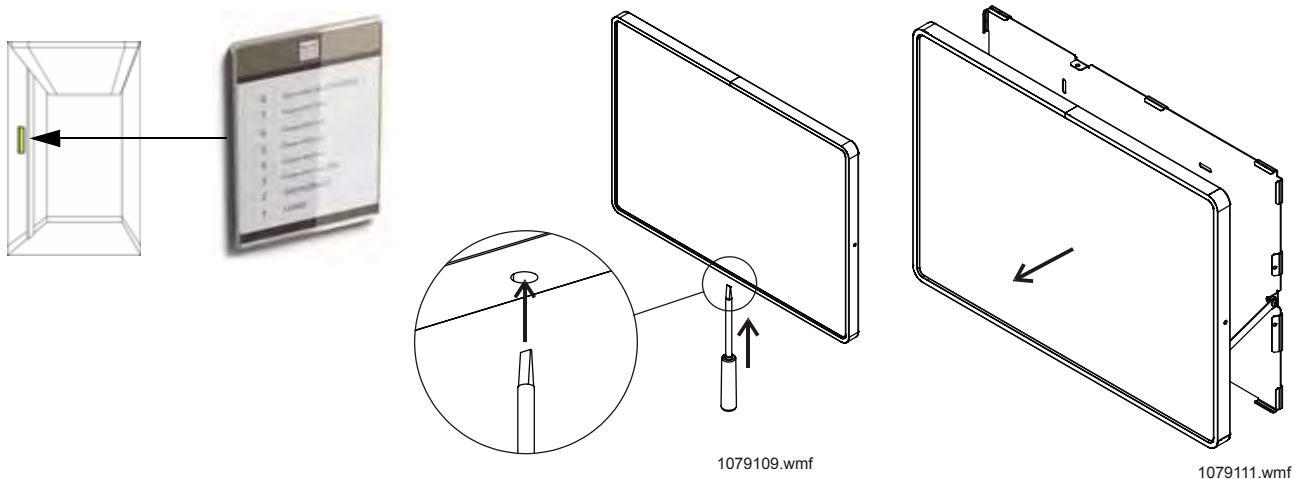


Figure 8. Tenant directory information sheet

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.

7.5.2 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.

7.5.3 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.

7.5.4 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 may 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.

7.5.5 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 ensure that this line is functional at all times, including for at least 1 hour during a power failure in the building.

7.5.6 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.

8 SAFETY COMPONENT MAINTENANCE



For periodical inspection tests of safety components, see section *10 Periodical inspections according to EN 81-1 Annex E*.

If you replace a safety component, perform the commissioning tests **according to EN 81-1, Annex E**. For more information, see section *10 Periodical inspections according to EN 81-1 Annex E*.

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.



NOTE! If the elevator is equipped with safety space arrangement SSA**E devices, read *Appendices A - D* before maintaining the elevator.

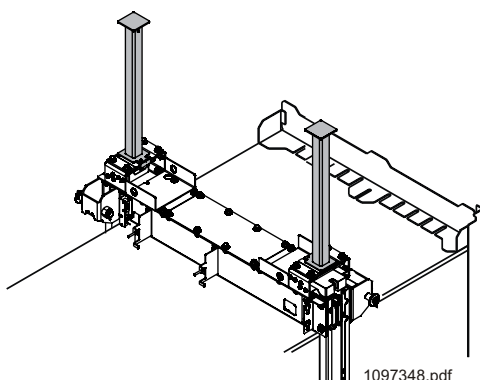


Figure 9. Example of SSA**E components

8.1 UCM with doors open prevention according to EN 81-1 A3

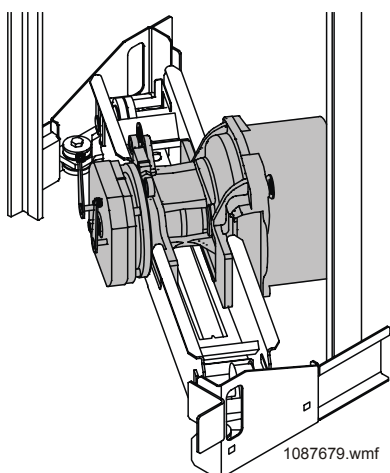
The elevator control system detects any unintended car movement (UCM), and stops the car with the machine brakes. The UCM detection is saved in the fault log and resetting can only be performed by a competent person.

To maintain UCM prevention, perform the regular machine brake maintenance and UCM periodical inspection. For more information, see section *10 Periodical inspections according to EN 81-1 Annex E*.

8.2 Machine brakes



The machine is a gearless synchronous machine driven by a variable frequency drive. The machine is located in the pit.



The following table describes the intervals at which you must check various elements of the machine and brakes.

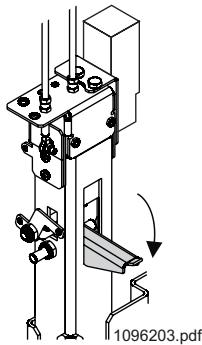
Table 12: Maintenance checking intervals

Object and maintenance procedure	Checking Intervals
Check the air gap (wearing of brake pads).	Once a year
Check the operation of manual brake opening device.	Once a year
Check the overall cleanness of the machine.	Once a year

8.2.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.
- Before entering the pit, ensure that the pit safety device is activated.
For more information, see APPENDIX D. Safety devices in the pit.



- Use the manual releasing device carefully because the elevator will accelerate very quickly to a high speed.



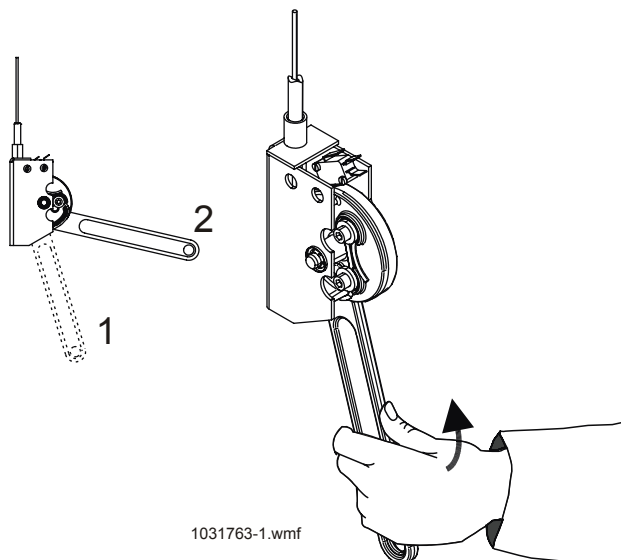
8.2.2 Checking the cleanness of the machine

Check visually the overall condition of the machine module:

- Machine should be clean of dust.
- No visual damage nor external objects should exist.
- The brake wire routing should be intact.
- Machine covers and the brake rubber cover should be in good condition.

Clean the machine if needed. Remove the external objects if ones exist. Correct the fixing of brake wire if needed.

8.2.3 Checking the manual brake opening device

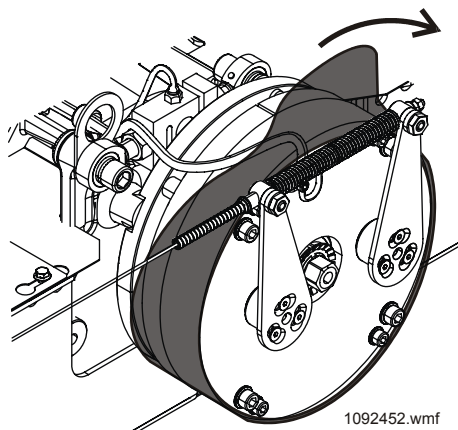


WARNING! Do not keep the brake open for more than 1 second at a time.

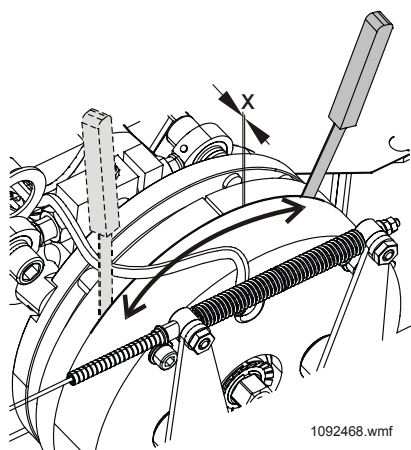
1. Install the lever to the manual brake releasing device. (1)
2. Open the brake slightly (2).
3. Check that the elevator moves by following the speed LEDs.
4. Check that the brake resets correctly after the test.
5. Check that the elevator relevels after testing the manual brake release system.

8.2.4 Checking the air gap

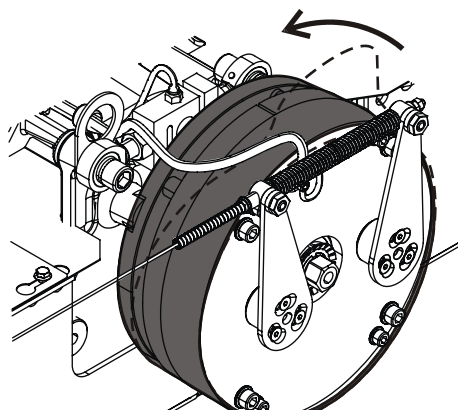
1. Push the rubber cover towards the traction pulley.



2. Measure the air gap (X) between the armature plate and electromagnet with feeler gauge.



- Air gap must be between 0.2 – 0.6 mm. If not, replace the brake.
3. Push back the rubber cover.



8.2.5 Performing one-sided brake test

For more information on performing the one-sided brake test, see section 10 Periodical inspections according to EN 81-1 Annex E.

8.3 Overspeed governor OL35

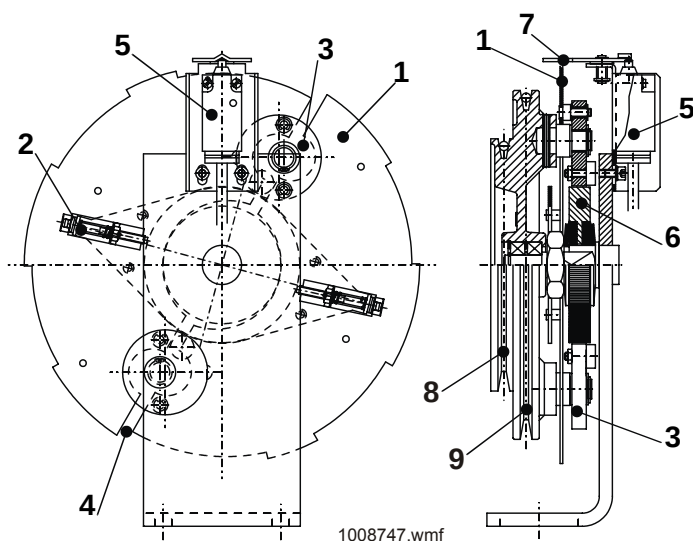


Figure 10.OL35 components

1	Flyweight	6	Trip wheel
2	Spring	7	Contact plate
3	Eccentric wheel	8	Test groove
4	Flyweight catch	9	Groove for normal use
5	Overspeed contact		

The following table describes the maintenance procedures for the OL35 components.

Table 13: Maintenance procedures

Maintenance procedure	Checking interval
Cleaning	Once a year or when needed
Check the condition of the flyweights and the springs.	Once a year
Check the operation of the overspeed contact.	Once a year
Check the operation of the tension weight contact.	Once a year
Check the wear of the rope groove.	Once a year

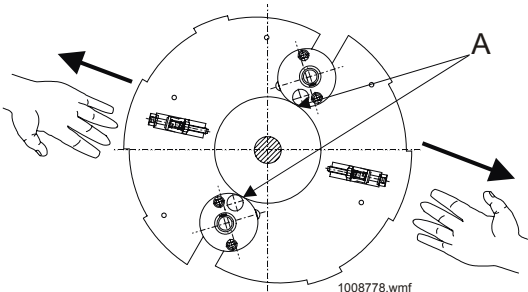
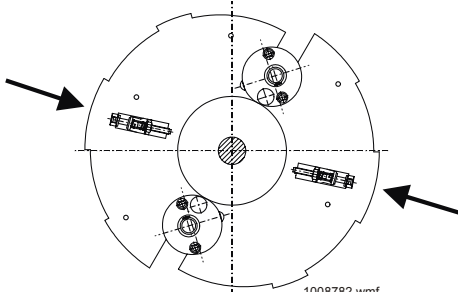
8.3.1 Safety measures

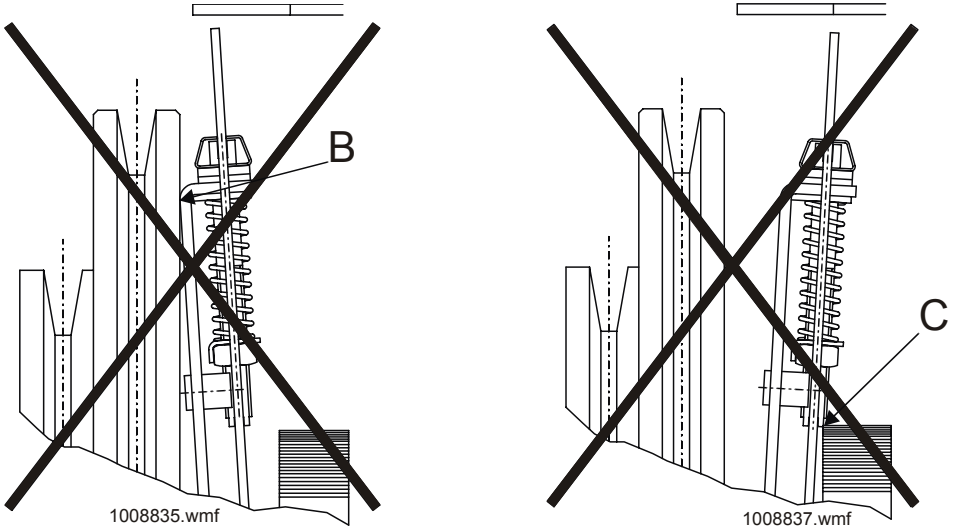
Observe the following conditions:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations assimilated into local instructions with due regard to risk
- Activate the emergency stop on machine or on car roof as applicable to prevent unexpected movement of the car
- Do not lubricate the overspeed governor, as lubrication may reduce the braking force
- Do not adjust or replace any parts of the overspeed governor, only the optional remote tripping system can be replaced
- After every operation of overspeed governor and safety gear, check that the overspeed governor and safety gear are operational

8.3.2 Checking flyweights and springs

The following table describes the actions you must perform to check flyweights and springs in OL35.

Step	Action	Illustration/Note
1	Check the springs.	A broken spring can cause unnecessary tripping of the overspeed governor. Dirty or rusty springs may increase the tripping speed.
2	Check the operation / vertical radial movement of the flyweights manually as follows: 1. Pull flyweights outwards. 2. Check that both of the eccentric wheels touch the tripping wheel (A). 3. Let the flyweights close by themselves. They must return easily without extra friction.	 

Step	Action	Illustration/Note
3	Check lateral movement of the flyweights while the elevator is running. The flywheel must not touch the governor pulley (B) or the tripping wheel (C).	

8.3.3 Checking rope groove wear

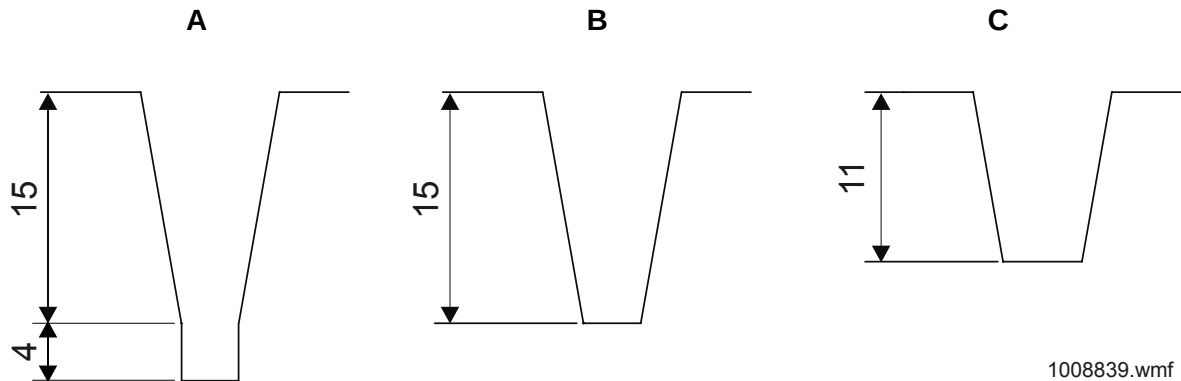
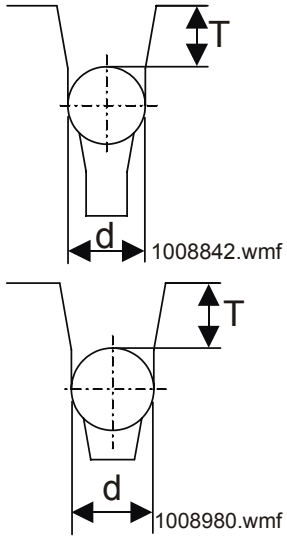
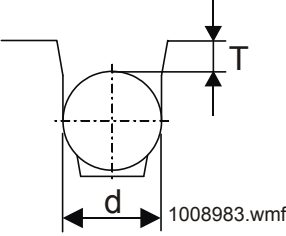


Figure 11. Groove types

You must replace the overspeed governor when the rope goes deeper into the groove than value (T). The following table shows the maximum (T) value for each rope diameter.

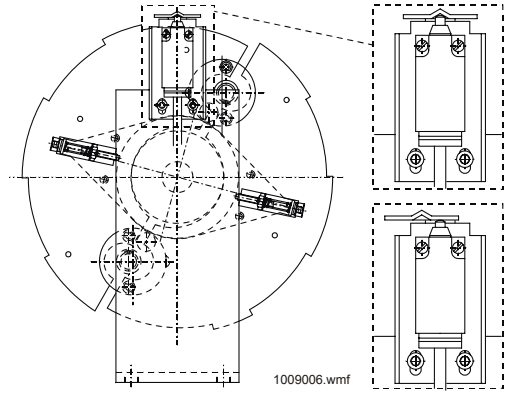
Table 14: Rope groove wear

Groove type	Rope diameter (d)	Maximum dimension (T)
	6 mm	8.5 mm
	6.5 mm	8 mm
	7 mm	7.5 mm
	8 mm	7 mm

Groove type	Rope diameter (d)	Maximum dimension (T)
	7 mm	3.5 mm
	8 mm	2.5 mm

8.3.4 Checking overspeed contact operation

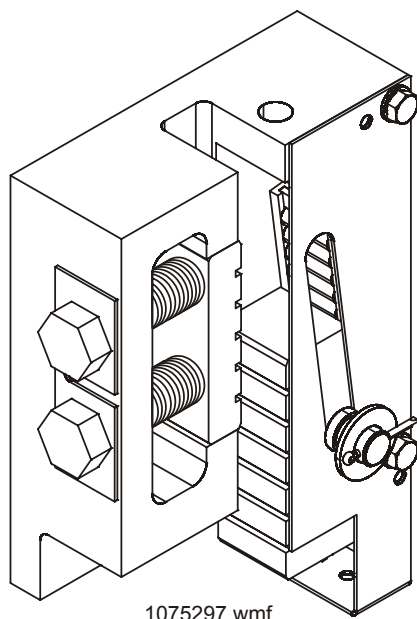
The following table describes the actions you must perform to check the overspeed contact operation in OL35.

Step	Action	Illustration/Note
1	Turn the contact plate so that the knob of the overspeed contact is not in the notch of the contact plate.	
2	Check that overspeed contact cuts the safety chain.	Elevator must not drive in normal or inspection drive mode.  NOTE! RDF bypasses the overspeed contact.

8.4 Safety gear AQ32



The following figure and table illustrate the maintenance schedule for safety gear AQ32.



Object and maintenance procedure	Checking Intervals
Check the operating condition of the safety gear.	Once a year
Check the operation of the safety gear contact.	
Check the system function Overspeed governor – Safety gear with empty car and at reduced speed.	Every other year unless for example dirty or humid circumstances require more frequent testing



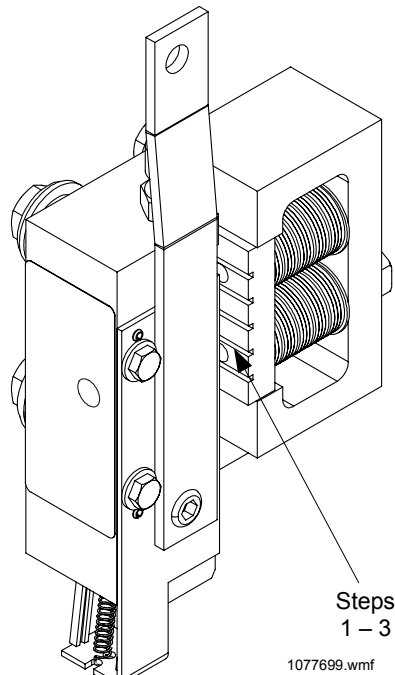
NOTE! Replace both safety gears as a pair after 12 trippings at 100% load, full speed.

8.4.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

8.4.2 Inspection of the safety gear and wedges



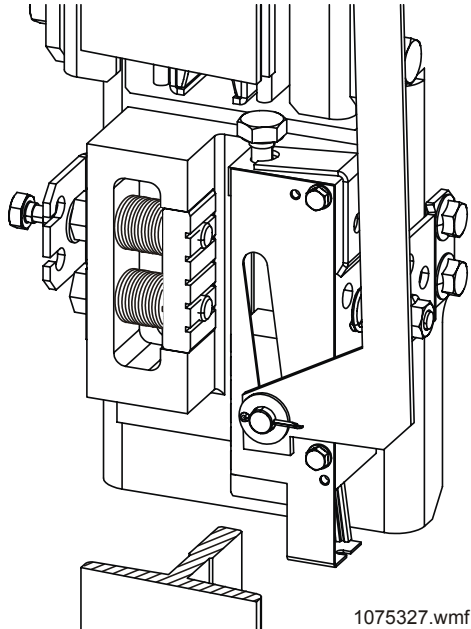
1. Clean the wedges if dusty and oily. Clean away iron scrap if it exists.
2. Check for cracks. The surface of the wedges must not have cracks.
3. Check the overall wear of the wedge. Replace both safety gears as a pair after 12 trippings, 100% load at full speed.
4. Check the governor rope fixing and the screw joint between the rope fixing and the lever. Check that the fixing screws are not loose and that the lever is not bent or broken.

8.4.3 Inspection of the safety gear sideward movement

1. Check that the safety gear can move sideways.
2. Ensure that the counter wedge can contact the guide rail when the safety gear engages.

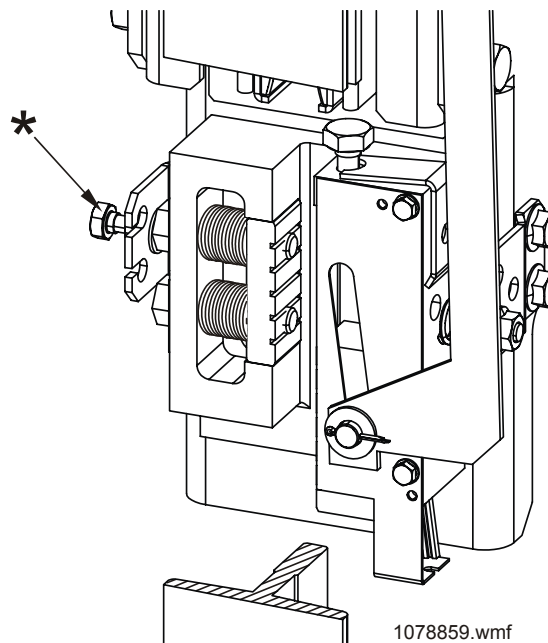
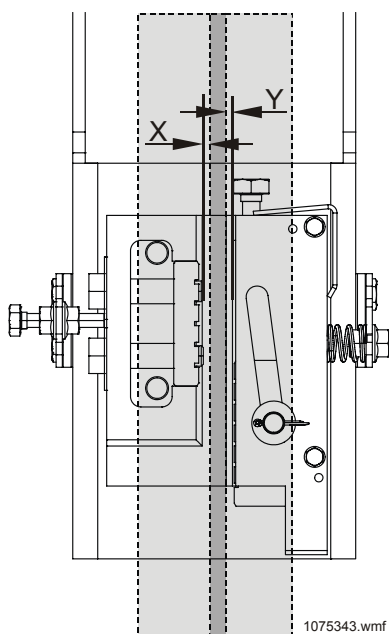
8.4.4 Checking the gripping wedge position

1. Check that the fixing for the lifting lever rests against the safety gear block and the gripping wedge is in position.



2. Correct gripping wedge position

Check the guide rail clearance on both sides. X and Y must be 2 – 3 mm. Adjust (*) if required.



8.5 Landing door lock¹⁾



Table 15: Landing door lock maintenance

Object and Maintenance Procedure	Checking Intervals
Check the lock function	Once a year

8.5.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

8.5.2 Checking the lock

The following table describes the maintenance procedures for your elevator's R1 low duty door and R2 mid duty door landing door lock.

Table 16: Landing door lock maintenance

Item to be maintained	Procedures
Landing door lock and contacts	Check the lock function. The lock is not adjustable. 1. Landing lock must keep the door closed, move freely and close by itself. 2. Safety circuit must be interrupted if the door opens. 3. Lock hook and beak must be a minimum of 7 mm (X) when contact operates. 4. Contact bridge must push the door contact surface a minimum of 3 mm (Y). 5. Free play between lock hook and lock beak must be a nominal 2 mm (Z). 6. Contacts (B,C) must be clean and have minimal wear, meaning metal visible. 7. Contact bridge must be aligned to the middle of contactor holes, not touching the hole edges. 8. Electrical terminations must be tight and secure. 9. Lock hook buffers (A) must be in place and have enough material to prevent noise. Lock hook must touch buffer. 10. Lock rollers must roll easily, not stick. 11. Lock gap must not impede the door contact function. 12. End buffers (D) must be intact and in one piece.

¹⁾ If not modernized (swing doors), see original manufacturer's documentation.

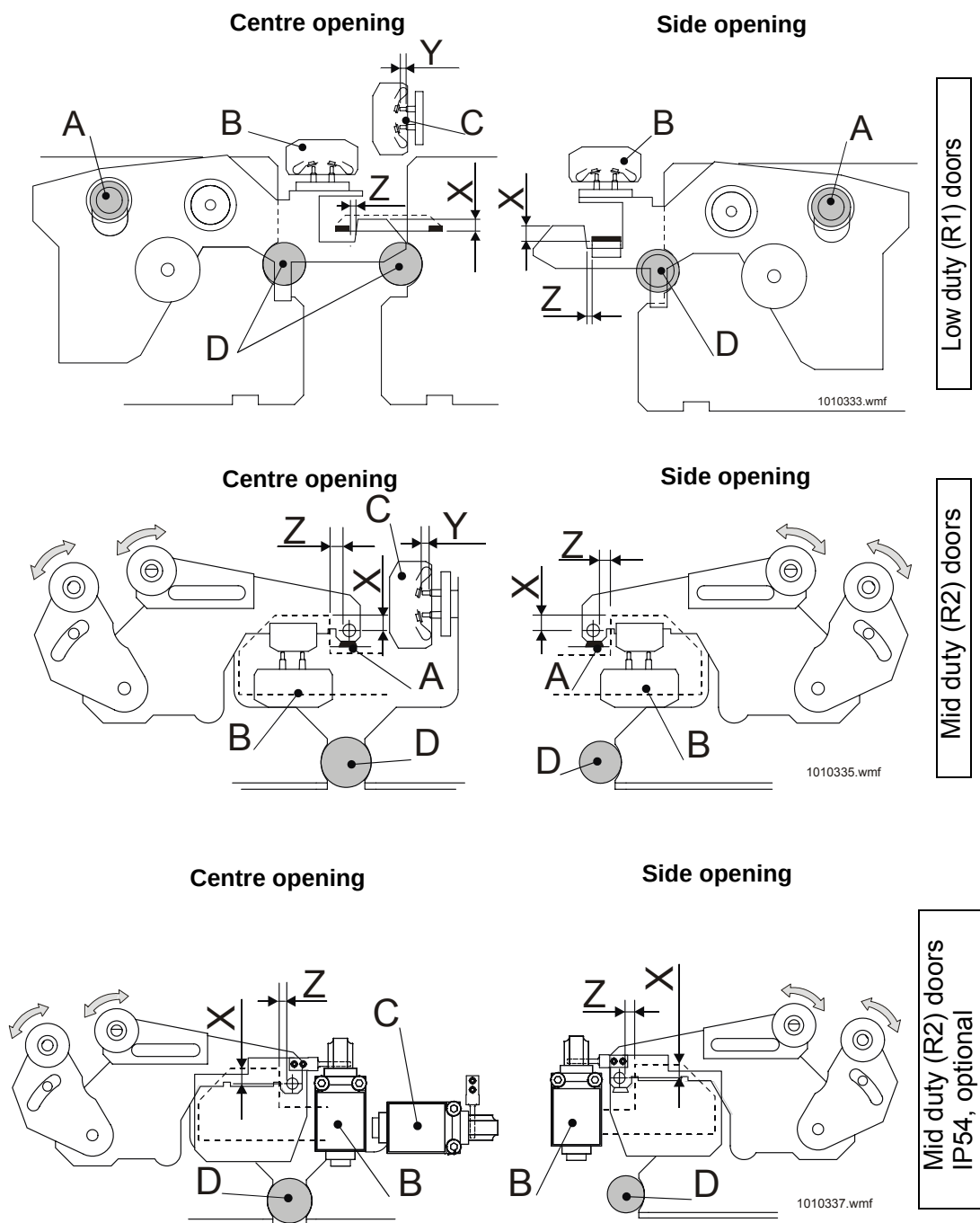


Figure 12.Landing door lock

8.6 Car door lock



Table 17: Car door lock maintenance

Object and Maintenance Procedure	Checking Intervals
Check the lock function	Once a year

8.6.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

8.6.2 Checking the lock

KONE can provide a car door lock when required to comply with safety code.

The following table describes the maintenance procedures for your elevator's car door lock.

Table 18: Car door lock maintenance

Item to be maintained	Procedures
Door lock and contacts	Check the lock function. The lock is not adjustable. 1. Car door lock must keep the door closed. 2. Safety circuit must be interrupted if the door opens. 3. Lock hook (B) and beak overlap must be a minimum of 7 mm (X) when contact operates. 4. Contact bridge must push the contact surface down a minimum of 3 mm (Y). 5. Free play between lock hook and lock beak must be a nominal 2 mm (Z). 6. Contacts must be clean and have minimal wear, meaning metal visible. 7. Contact bridge must be aligned to the middle of contactor holes, not touching hole edges. 8. Electrical terminations must be tight and secure. 9. Lock hook (B) must move freely when pushing lock vane (A).

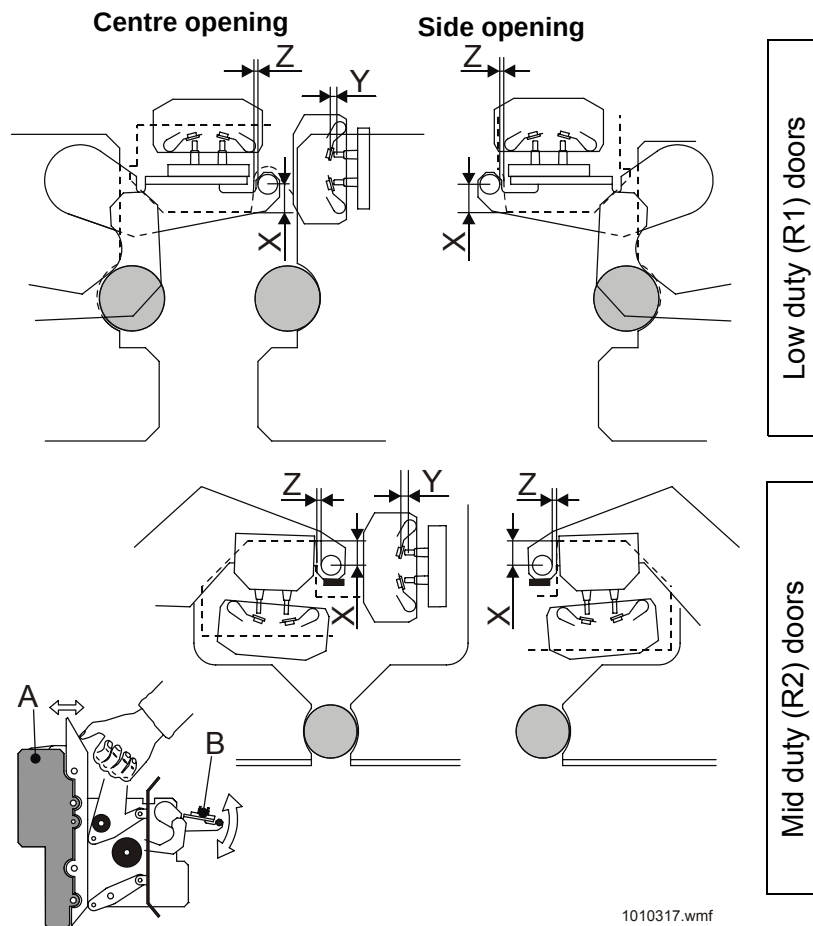


Figure 13. Car door lock

8.7 Polyurethane buffers



8.7.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

8.7.2 Checking the buffers

The following table describes the maintenance procedures for your elevator's polyurethane buffers.

Table 19: Polyurethane buffer maintenance

Object and Maintenance Procedure	Checking Intervals
Check the overall condition of the buffer structure.	Once a year

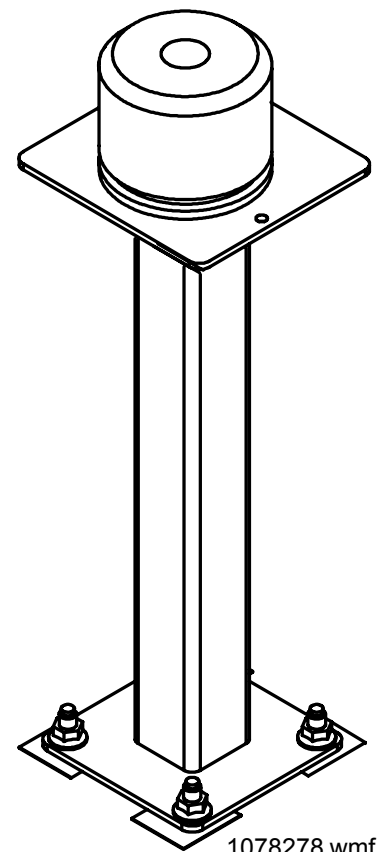
Inspection procedure

Check that the buffer is:

- Intact
- Securely fixed and not move when pushed firmly sideways
- Clean of dust and debris
- Not exposed to water, other liquids or chemicals
- Free of cracks or powdering
- Able to withstand a gentle hit with, for example, a hammer or wooden block or similar blunt object without suffering any damage

If any of the above conditions is not OK, replace the buffer.

If the buffer has clearly failed, remove the elevator from service until the buffer has been replaced.



8.8 Ropes



Check the ropes for:

- Visible breaks
- Incorrect tension

8.8.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

8.8.2 Checking visible breaks

Examination according to visible wire breaks - DIN 15020 sheet 2, transmission groups 2_m + 5_m

Rope specifications	Number of load bearing wires in outer layers		Number of visible wire breaks on a length of 6 x rope dia.	Number of visible wire breaks on a length of 30 x rope dia.
F819 S-FE 819S + FC(PP) 819S + FC(NF)		152	10	19
F819 W-FE		152	13	26
F819 S-FE DT		152	10	19
PAWO F3 and 819S + 87 + PP	7-20 mm 6.5 mm	15 114	10 6	19 12
PAWO F7	8-20 mm	152	13	26
PAWO F10	6-12 mm 13-22 mm	117 144	10 13	19 26
PAWO 819 W		152	13	26
PAWO 836 WS		288	24	48
PAWO F 4e		152	10	19
PAWO F 5e		114	6	12
PAWO F 1 and 619S + FC (PP)	6x19 6x19S 6x19W 8x19S	114 114 114 152	10 6 10 10	19 12 19 19

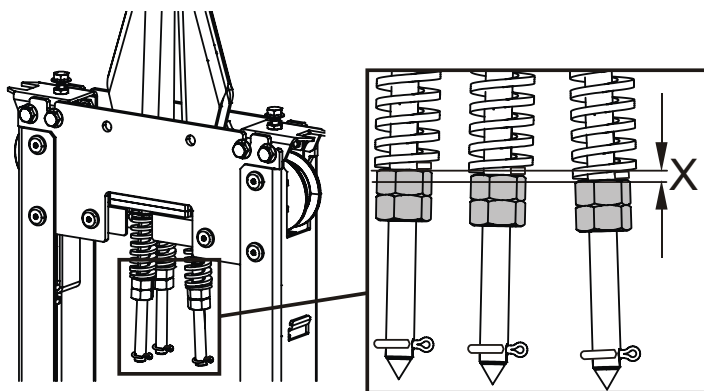
For further surveillance the prescriptions of DIN 15020 sheet 2 3.4 have to be observed.



NOTE! Check for the national discarding criteria and checking interval for the elevator hoisting ropes. If they are more restrictive than the above criteria, follow the national code.

8.8.3 Checking rope tension

Check the spring lengths of the suspension rope anchors at the balancing weight side. Washers at the rope ends should be at the same level. The maximum deviation (X) is 3 mm.



1092645.wmf

If suspension rope tension deviation exceeds 3 mm, rope tension must be equalized. Tighten the rope clips if needed.

8.9 Belts



Check the belts for:

- Wear and damage
- Incorrect tension
- Lifetime (round trip counter in iMAP displays less than 500 000 round trips)

8.9.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.

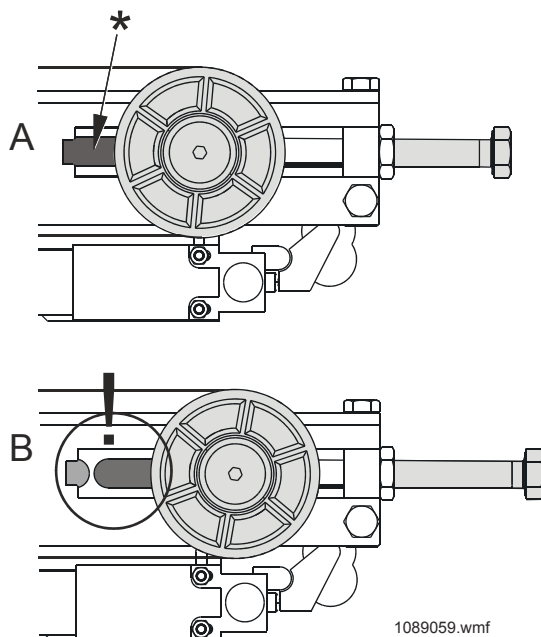
8.9.2 Checking belt condition

Check visually the condition of hoisting belts. No belt damages should occur. Refer to *APPENDIX F. Belt faults and criteria for belt replacement* for belt damage descriptions.

8.9.3 Checking belt tension

Check visually the belt tensioning device.

- The gas spring should have no leaks or other visual damage.
- The gas spring piston should be in correct position (*).



A. No need for adjustment

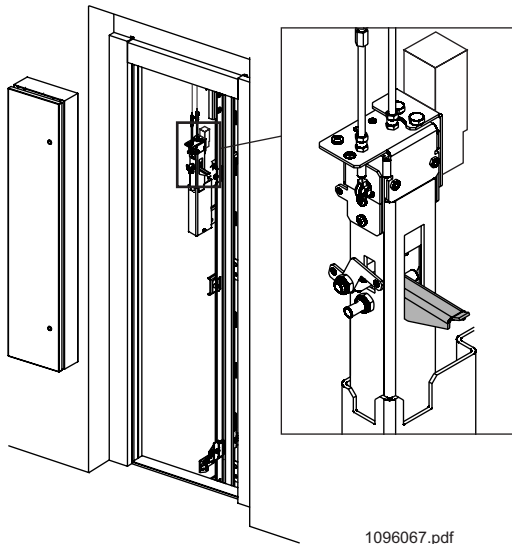
B. Needs adjustment

Replace the gas spring or shorten the tensioning rope, if needed.

8.10 Pit safety device



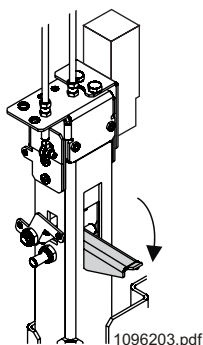
Opening the bottom floor landing door using the emergency opening key activates the pit safety device. It prevents the elevator car from descending to the working space in the pit. The pit safety device must be reset after returning to the landing.



8.10.1 Safety measures

Before starting work, note the following:

- All safety measures for normal elevator maintenance must be implemented and local safety regulations must be followed.
 - Before entering the pit, ensure that the pit safety device is activated.
- For more information, see APPENDIX D. Safety devices in the pit.



8.10.2 Checking the pit safety device



WARNING! Never enter to pit when pit safety device latch is not activated! For more information, see APPENDIX D. Safety devices in the pit.

Check that the pit safety device is:

- Intact, no loose fixings
- Clean

8.11 Top safety device



For more information on maintaining the top safety device, see Appendices A – D.

9 EXAMINATIONS AND TESTS AFTER IMPORTANT MODIFICATION OR ACCIDENT ACCORDING TO EN 81-1 ANNEX E

You must carry out examinations and tests after important modifications or after an accident to ascertain that your elevator continues to conform to standard. You must carry out these examinations and tests in accordance with EN 81-1 Annex E.



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 81-1 Annex E.

10 PERIODICAL INSPECTIONS ACCORDING TO EN 81-1 ANNEX E



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

According to EN 81-1 Annex E, the elevator must be periodically inspected to verify it is in good condition. 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 document are part of the local periodical inspection procedure, follow the instructions described in this document: All periodical examinations and tests must be carried out in accordance with EN 81-1 Annex E.

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



NOTE! The periodical tests should not, through their repetition, cause excessive wear or impose stresses likely to reduce the safety of the elevator. 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.



NOTE! If the elevator is equipped with safety space arrangement SSA**E devices, read *Appendices A – C* before inspecting the elevator.

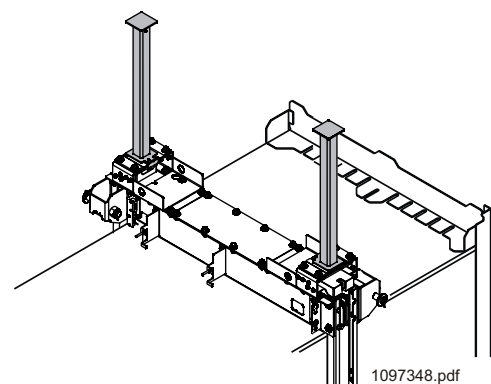
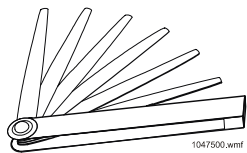
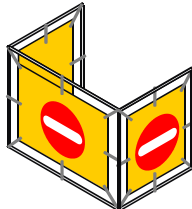
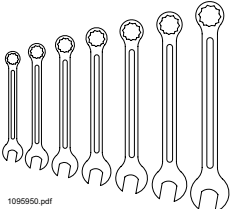
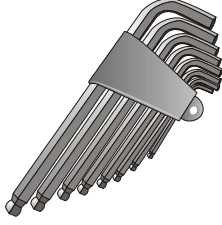
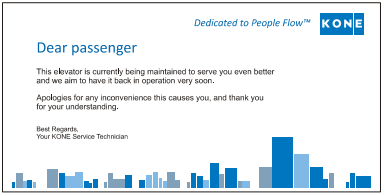


Figure 14. Example of SSA**E components

10.1 Tools

Tool	Illustration
Cut-resistant gloves	
Door blocking tool	
Feeler gauge set	 1047500.wmf
Locking set for main switch	
Stopping accuracy tool	
Safety fences	
Spanner set	 1095950.pdf

Tool	Illustration
Allen key set	
Maintenance signs	
Milled file	For removing safety gear grip marks.
Test weights, amount for 60 % load.	For testing the safety gears.

10.2 Safety measures



WARNING! Failing to complete the safety measures can cause death or serious injury.



You must plan all work carefully in order to avoid any safety hazards or damage to the product. Perform the following actions:

- Check that there is no one inside the car or in the elevator shaft during the safety inspection.
- Disconnect the landing calls using the user interface during the safety inspection, so that the inspection is not interrupted and passengers are not trapped in the elevator.
- Before going to the elevator car roof, push the car roof stop button down and turn the inspection drive unit to inspection drive before releasing the stop button.

Safety tests are to be carried out by authorized persons only.



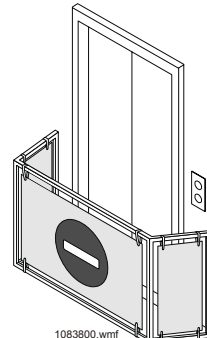
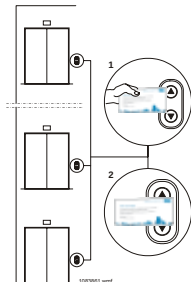
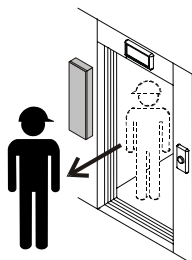
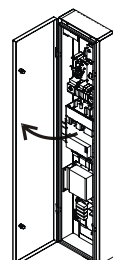
WARNING! Prior to carrying out any of the tasks described below ensure the following:

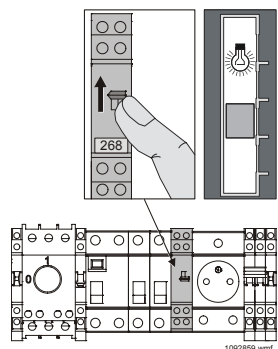
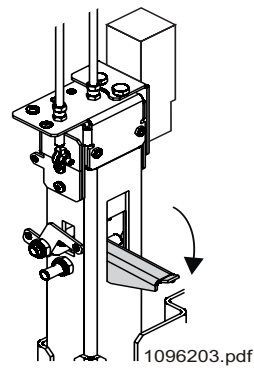
- There are visual "Under maintenance" signs on all the landings.
- Safety fences are used to prevent any unauthorized access to the working area.

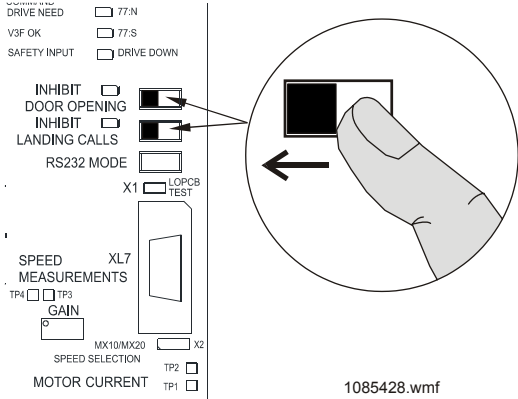
Step	Action	Illustration/Note
1	Travel in the elevator car to the topmost floor.	Put "Under maintenance" signs to all landings.
2	Prevent unauthorized access to the working area.	Use safety fences.

10.3 Testing the pit safety device

This section describes testing the operation of the pit safety device.

Step	Actions	Illustration/Note
1	Install safety fences to the bottom floor landing.	 1083800.wmf
2	Put "Under maintenance" stickers to all landings.	 1083801.wmf
3	Go to the MAP.	 1092759.wmf
4	Open the MAP.	 1083963.wmf

Step	Actions	Illustration/Note
5	Switch on the shaft lights (268).	 10922650.wmf
6	Make a car call from the bottom floor to the second floor and go to the landing.	 NOTE! If the maintenance access panel (MAP) is not on the bottom floor, close and lock the MAP.
7	Stop the elevator at a suitable position by operating the emergency opening key.	You must see the pit safety device from the landing.
8	Open the bottom floor landing door with emergency opening key.	
9	Check that the pit safety device is activated.	 1096203.pdf
10	Close the landing doors.	 Check that the landing doors are mechanically locked.
11	Go to the maintenance access panel.	
12	If applicable, reset the Shaft Access Monitor (SAM).	Refer to <i>APPENDIX B.1 Resetting the shaft access monitor (SAM)</i> .

Step	Actions	Illustration/Note
13	Make a landing call.	 The elevator must not move.
14	Disable the landing calls. LCEUI switch 261.	   1085428.wmf
15	Disable the door opening. LCEUI switch 263.	
16	Switch on the Recall Drive Feature (RDF).	POS 270.
17	Drive downwards on RDF until the elevator car stops.	 The pit safety device limit switch located on the car roof should stop the elevator car before the pit safety device activates the safety gear mechanically.
18	Try to drive downwards on RDF.	 The elevator must NOT move.
19	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

10.4 Testing the car apron



This section describes testing the operation of the car apron.

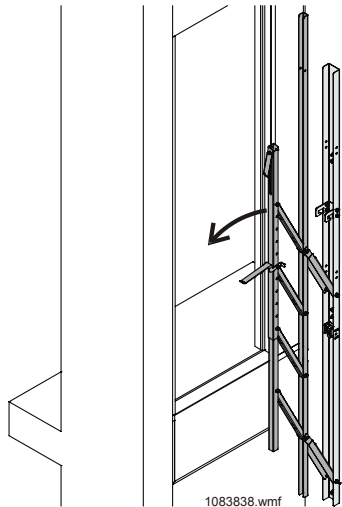
Step	Actions	Illustration/Note
1	Drive upwards on RDF until the elevator car is out of the pit safety device area and you have access to the car apron and the pit ladders (the next test will be the pit ladder safety switch test) from the bottom floor landing.	
2	Close and lock the maintenance access panel.	
3	Open the bottom floor landing door with the emergency opening key.	
4	Lower the car apron: 1. Open the locking mechanism. 2. Lower the apron.	
5	Close the landing doors.	Check that the landing doors are mechanically locked.
6	Go to the maintenance access panel (MAP).	
7	Check that the Recall Drive Feature (RDF) is on. (POS 270.)	
8	Reset the Shaft Access Monitor (SAM), if applicable.	Refer to <i>APPENDIX B.1 Resetting the shaft access monitor (SAM)</i> .
9	Reset the pit safety device.	Refer to <i>APPENDIX B.2 Resetting pit safety device</i> .
10	Switch off the Recall Drive Feature (RDF). (POS 270.)	The elevator car must not move. The car apron switch must prevent the releveling drive.

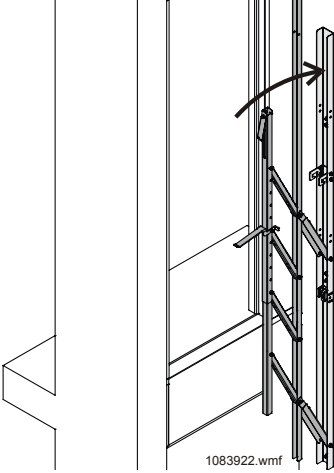
Step	Actions	Illustration/Note
11	Open the landing door with emergency opening key.	
12	Raise and lock the car apron.	1. Raise the car apron. 2. Close the locking mechanism.
13	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

10.5 Testing the pit ladder safety switch

This section describes testing the operation of the pit ladder safety switch.



Step	Action	Illustration/Note
1	Remove the pit ladders from the normal position.  NOTE! If there are support hooks in the ladders, do not install them to the sill groove. This will allow landing doors to close.	 1083838.wmf
2	Close the landing doors.	 Check that the landing door is mechanically locked.
3	Go to the Maintenance Access Panel (MAP).	
4	Check that the Recall Drive Feature (RDF) is on.	POS 270.
5	Reset the Shaft Access Monitor (SAM), if applicable.	Refer to <i>APPENDIX B.1 Resetting the shaft access monitor (SAM)</i> .

Step	Action	Illustration/Note
6	Reset the pit safety device.	Refer to <i>APPENDIX B.2 Resetting pit safety device</i> .
7	Switch off the Recall Drive Feature (RDF). (POS 270.)	 The elevator car must not move. The pit ladder safety switch must prevent the relevelling drive.
8	Close and lock the maintenance access panel.	
9	Open the bottom floor landing door by using emergency opening key.	
10	Set the pit ladders to normal position.	
11	Close the landing doors.	 Check that the landing door is mechanically locked.
12	Go to the maintenance access panel (MAP).	
13	Switch on the Recall Drive Feature (RDF). (POS 270.)	
14	Reset the Shaft Access Monitor (SAM), if applicable.	Refer to <i>APPENDIX B.1 Resetting the shaft access monitor (SAM)</i> .
15	Reset the pit safety device.	Refer to <i>APPENDIX B.2 Resetting pit safety device</i> .
16	Switch off the Recall Drive Feature (RDF). (POS 270.)	NOTE! The elevator starts the relevelling drive.
17	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

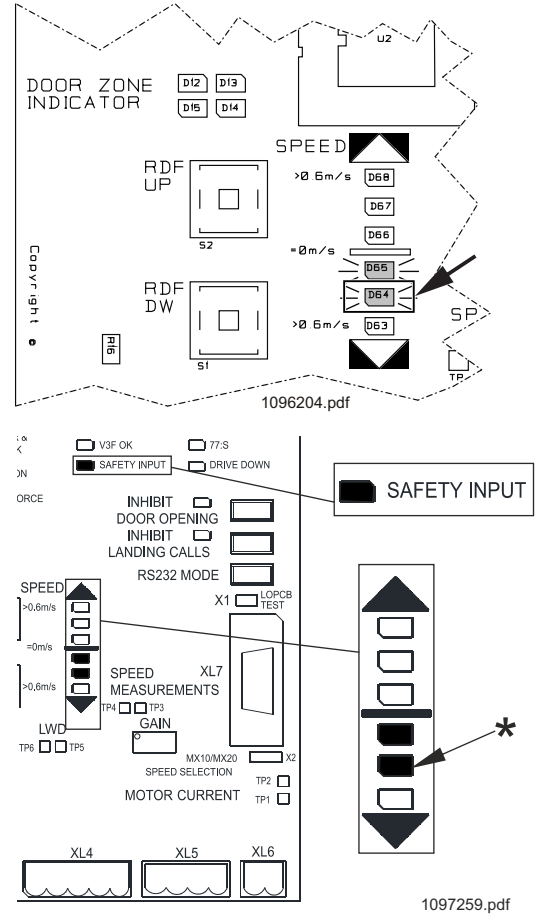
10.6 Final limit switch tests

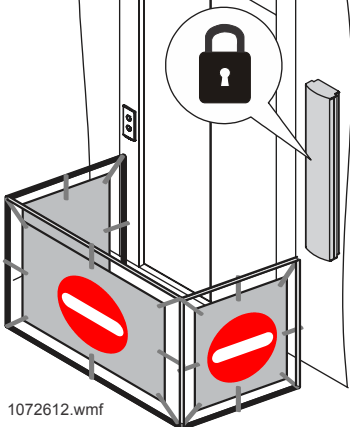
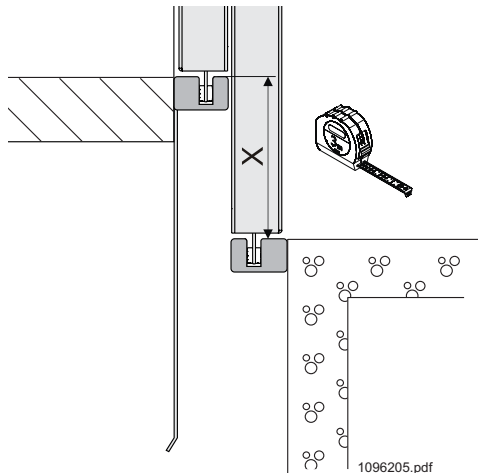


The following sections describe the final limit switch tests.

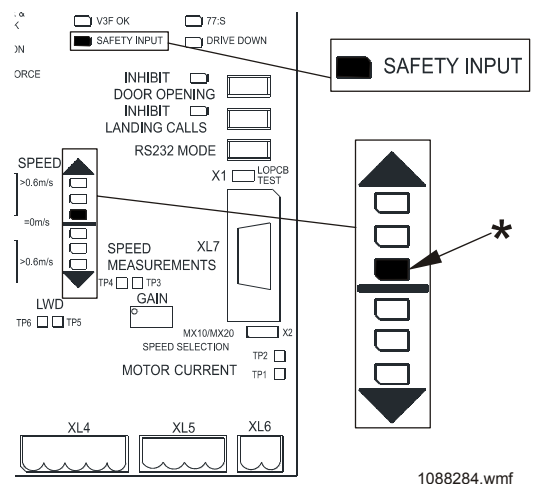
10.6.1 Testing the upper limit switch

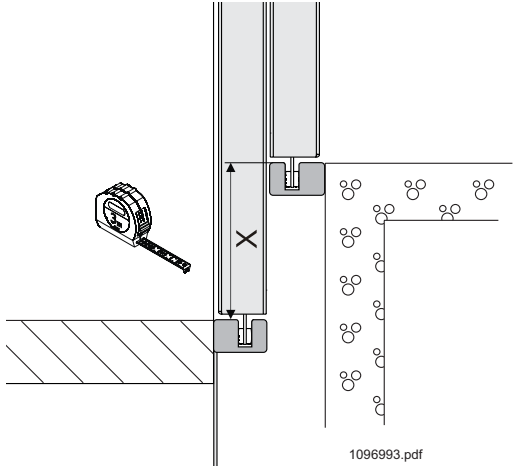
Step	Action	Illustration/Note
1	Enable the door opening.	LCEUI switch 263.
2	Make a car call to the bottom floor from the maintenance access panel.	
3	Let the doors open and switch on the Recall Drive Feature (RDF).	POS 270.
4	Close and lock the maintenance access panel.	
5	Load test weights to the car for at least 60% of the maximum rated load.	
6	Go to the maintenance access panel.	
7	Disable the door opening.	 LCEUI switch 263.
8	Switch off the Recall Drive Feature (RDF).	POS 270.
9	Make a car call to the topmost floor from the maintenance access panel.	
10	Switch on the Recall Drive Feature (RDF).	POS 270.
11	Drive upwards on RDF until the elevator car hits the buffers.	
12	Switch off the Recall Drive Feature (RDF).	POS 270.

Step	Action	Illustration/Note
13	Carefully open the machine brakes with the manual brake opening lever in the maintenance access panel (MAP). The elevator car moves down from the upper limit switch and the safety circuit LED (SAFETY INPUT, D49) goes on in LCEUI. When the LED goes on, close the brakes.  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 prevent the elevator from accelerating to overspeed. Release the brake release lever immediately if the second speed LED goes on. (D64 DOWN)  NOTE! RDF must be switched on before the elevator starts to relevel.	 1096204.pdf 1097259.pdf
14	Switch off the main switch. (220). Lock and tag.	

Step	Action	Illustration/Note
15	Close and lock the maintenance access panel.	 1072612.wmf
16	Go to the topmost floor.	
17	Open the landing door and measure the vertical sill-to-sill distance (X) to verify the limit switch location. NOTE! Opening the landing doors and car doors can be heavy when the elevator is in the door zone area. Use tape measure for the measurement. Record the measurement. Check that the measurement corresponds to the layout drawings.	 1096205.pdf
18	Close the doors.	
19	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

10.6.2 Testing the lower limit switch

Step	Action	Illustration/Note
1	Go to the maintenance access panel.	
2	Switch on the main switch. (220)	
3	Switch off the Recall Drive Feature (RDF).	POS 270.
4	Make a car call to the bottom floor from MAP.	
5	1. Carefully open the machine brakes with manual brake release lever in the MAP. The elevator car moves down and the safety circuit LED (SAFETY INPUT, D49) goes off in LCEUI. —  — 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 prevent the elevator from accelerating to overspeed. Release the brake release lever immediately if the second speed LED turns on (D67 UP). Only one speed LED should be on during the release (*). 2. When the safety circuit LED (SAFETY INPUT, D49) goes off in LCEUI, close the brakes and switch on the Recall Drive Feature (RDF). (POS 270).	
6	Switch off the main switch (220).	
7	Close and lock the maintenance access panel.	

Step	Action	Illustration/Note
8	Open the bottom floor landing door and measure the vertical sill-to-sill distance (X) to verify the limit switch location. NOTE! Opening the landing doors and car doors can be heavy when the elevator is in the door zone area. Use tape measure for the measurement. Record the measurement to note book. Check that the measurement corresponds to the layout drawings. After measurement, close the doors.	 1096993.pdf
9	Go to the Maintenance Access Panel (MAP).	
10	Check that the Recall Drive Feature (RDF) is on.	POS 270.
11	Switch on the main switch (220).	
12	Drive the elevator car on RDF to the floor level	
13	Enable door opening. LCEUI switch 263.	
14	Switch off the Recall Drive Feature (RDF).	POS 270.
15	Make a landing call.	
16	When doors are open, switch on the Recall Drive Feature (RDF).	POS 270.
17	Remove the test weights from the elevator car	
18	Drive the elevator car upwards on RDF away from the pit safety device zone.	
19	Switch off the Recall Drive Feature (RDF).	POS 270.
20	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

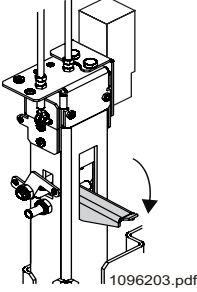
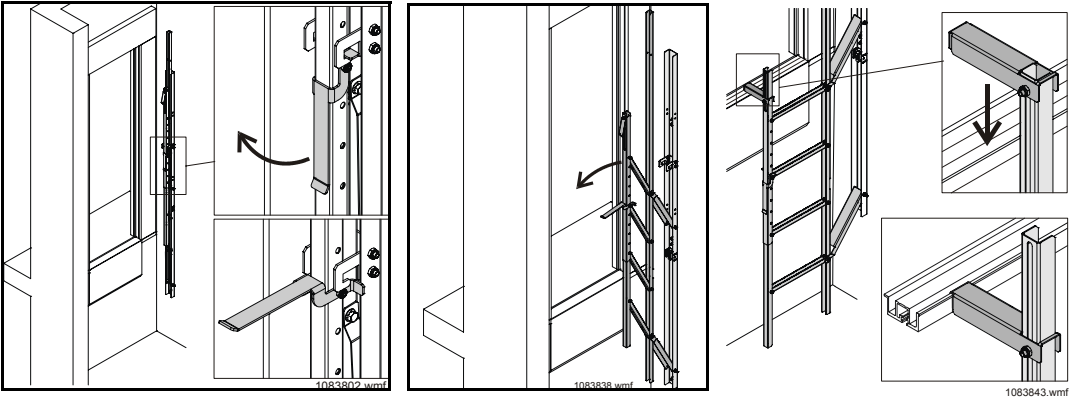
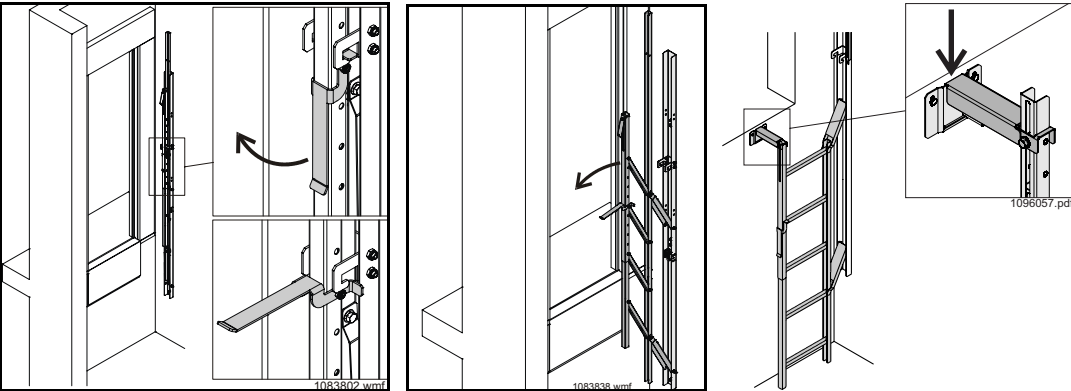
10.7 Buffer tests

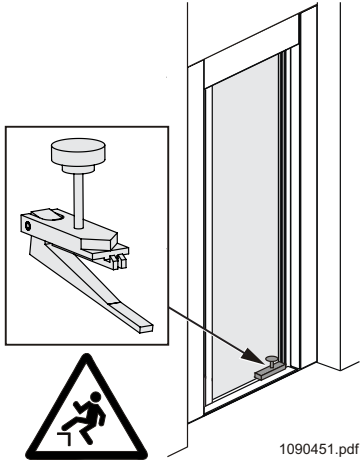
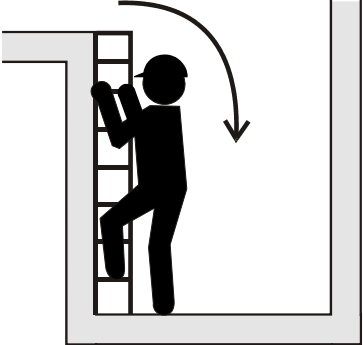
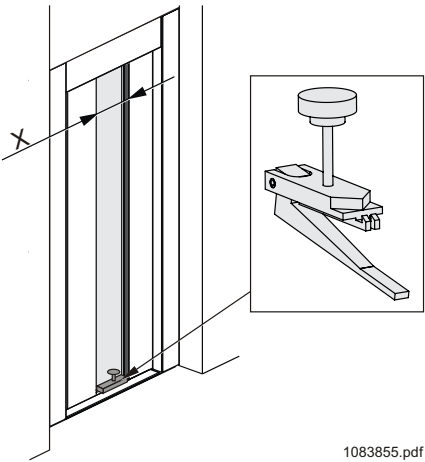


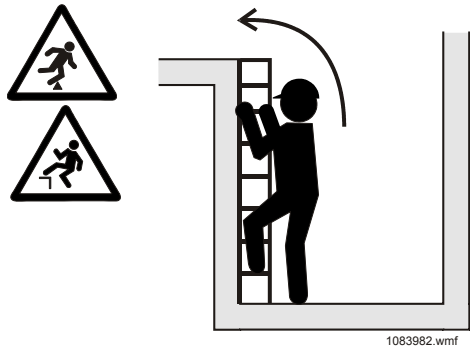
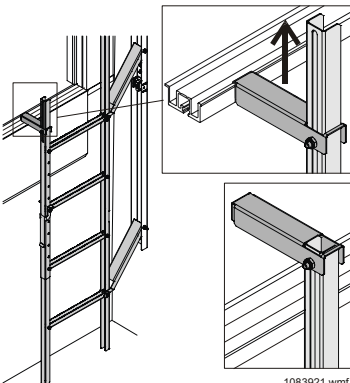
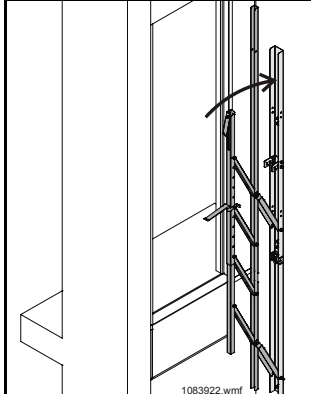
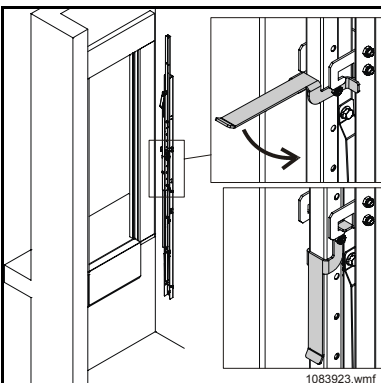
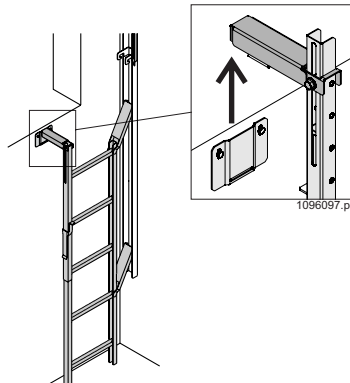
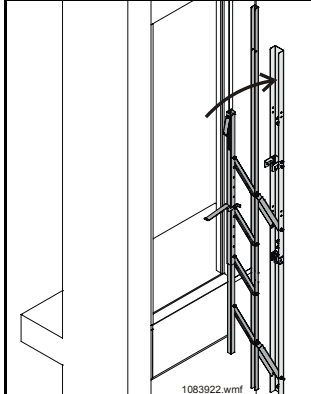
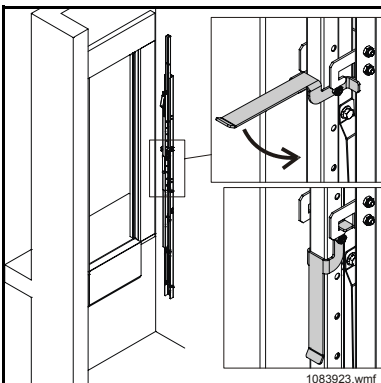
The following sections describe the buffer tests.

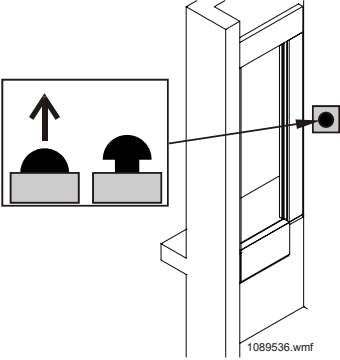
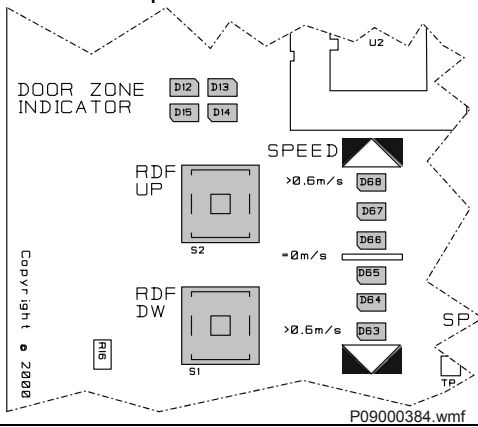
10.7.1 Testing the car buffers in pit

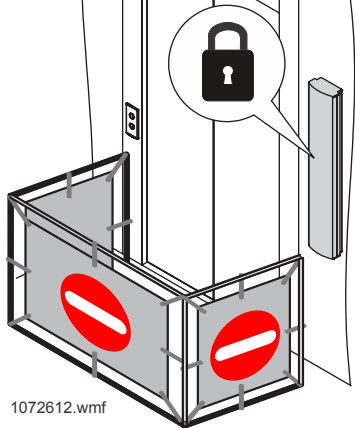
Step	Action	Note
1	Make a car call to the second floor from the Maintenance Access Panel (MAP).	
2	If the maintenance access panel (MAP) is not on the bottom floor, close and lock the MAP.	
3	Check that the pit stop switch operates. 1. Open the bottom floor landing door with the emergency opening key. 2. Standing on the landing, press the stop switch. 3. Close the landing doors and check that they are mechanically locked. 4. Go to the Maintenance Access Panel (MAP). * 5. Make a car call from the MAP. The elevator must not move. 6. Close and lock the maintenance access panel (MAP).	The elevator car should be on the second floor * Reset the pit safety device and Shaft Access Monitor (SAM, if applicable) according to APPENDIX B. Resetting the safety devices.
4	Open the bottom floor landing door with the emergency opening key.	
5	Standing on the landing, press the stop switch.	

Step	Action	Note
6	Check that the pit safety device is activated.	
7	Engage the pit ladders.	 Automatic doors  Swing doors 

Step	Action	Note
8	Block the landing doors fully open with door blocking tool.	 1090451.pdf
9	Go to the pit.  WARNING! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool.	 1083979.wmf
10	Block the landing doors slightly open with door blocking tool.	$X = 100 \text{ mm}.$  1083855.pdf
11	Check that the car buffers are in good condition.	Polyurethane buffers: check that there are no cracks or powdering.

Step	Action	Note
12	Go to the landing.	 1083982.wmf
13	Turn the pit ladders to normal position.	 Automatic doors  1083921.wmf  1083922.wmf  1083923.wmf Swing doors  1096097.pdf  1083922.wmf  1083923.wmf

Step	Action	Note
14	Release the pit stop switch.	
15	Close the landing doors.	 Check that the landing door is mechanically locked.
16	Go to the Maintenance Access Panel (MAP).	
17	Switch on the Recall Drive Feature (RDF).	POS 270.
18	Reset the Shaft Access Monitor (SAM), if applicable.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
19	Reset the pit safety device.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
20	Drive downwards on RDF until the car buffer is fully compressed and the elevator car stops.	Monitor the speed LEDs in LCEUI. 
21	Drive upwards on RDF to raise the elevator car from the buffer.	NOTE! You need enough space for moving between the bottom landing and the pit.

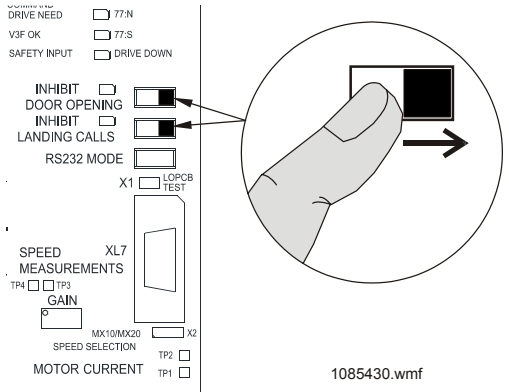
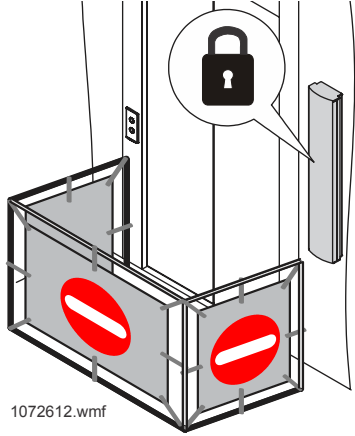
Step	Action	Note
22	Close and lock the maintenance access panel (MAP).	
23	Go to the pit. See steps 4 – 10.	
24	Check that the car buffers and car sling buffer plates are in good condition.	Polyurethane buffers: check that there are no cracks or powdering.
25	Go to the landing. See steps 12 – 15.	
26	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

10.7.2 Testing the buffers on the car roof

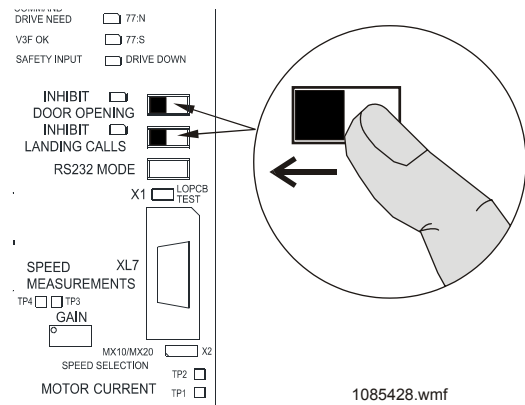


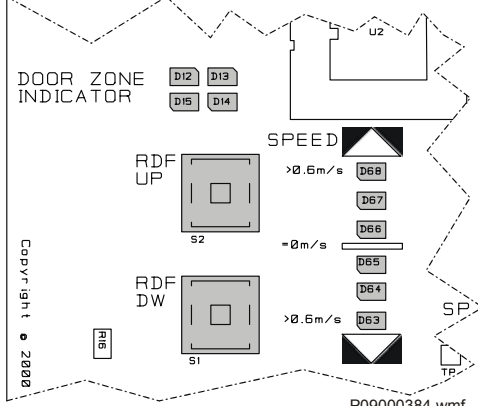
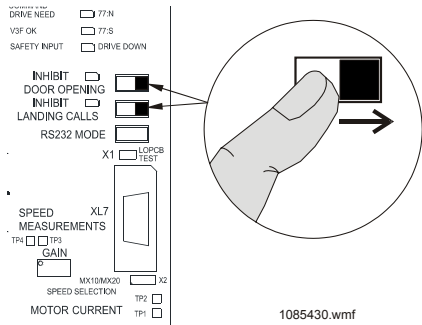
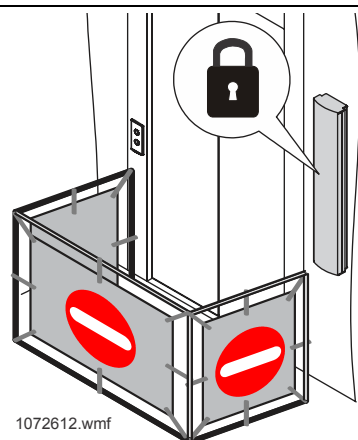
NOTE! For using the car top buffers, see APPENDIX C.

Step	Action	Note
1	Go to the maintenance access panel (MAP).	
2	Check that the Recall Drive Feature (RDF) is on.	POS 270.
3	Reset the Shaft Access Monitor (SAM), if applicable.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
4	Reset the pit safety device.	

Step	Action	Note
5	Enable the landing calls and the door opening.	LCEUI switches 261 and 263.  1085430.wmf
6	Switch off the Recall Drive Feature (RDF).	POS 270.
7	Close and lock the maintenance access panel (MAP).	 1072612.wmf
8	Travel in the elevator car to the topmost floor.	
9	Make a car call to the bottom floor and go to the landing.	
10	Stop the elevator at a suitable position by operating the emergency opening key.	Elevator car roof must be at a suitable height for safe moving between it and the topmost floor landing.

Step	Action	Note
11	Check the operation of the car roof stop switch. 1. Open the landing door with emergency opening key. 2. Check that the elevator car is in a suitable position. 3. Standing on the landing, press the stop switch. 4. Close the landing doors and check that it is mechanically locked. 5. Check that the stop switch cuts the safety circuit. (Make a landing call. The elevator must not move.) *	If the elevator has Shaft Access Monitor (SAM), it must be reset.
12	Check the operation of the inspection drive switch. 1. Open the landing door with 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 and check that it is mechanically locked. 5. Check that the inspection drive prevents the normal drive. (Make a landing call. The elevator must not move.) *	Related information: <i>APPENDIX B. Resetting the safety devices.</i> Make a car call from the Maintenance Access Panel (MAP). The elevator must not move. Close and lock the MAP.
13	Go to the elevator car roof. 	1. Open the landing door with emergency opening key. 2. Standing on the landing, press the stop switch. 3. Go to the elevator car roof. 4. Close the landing doors. 5. Check that the landing door is mechanically locked.
14	Check that the buffers are in good condition.	Polyurethane buffers: check that there are no cracks or powdering.

Step	Action	Note
15	Go to the landing. 	1. Slowly open the landing door so that no one steps in from the landing thinking that the elevator car has arrived. 2. Check that no one can enter the shaft from the landing. 3. Go to the landing. 4. Release the stop switch. 5. Switch off the inspection drive. 6. Close the landing doors. 7. Check that the landing door is mechanically locked.
16	Reset the Shaft Access Monitor (SAM), if applicable.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
17	Make a landing call to the topmost floor.	
18	Go to the maintenance access panel (MAP).	Use the elevator.
19	Disable the landing calls. LCEUI switch 261.	
20	Disable the door opening. LCEUI switch 263.	
21	Make a car call to the topmost floor from the maintenance access panel (MAP).	
22	Switch on the Recall Drive Feature (RDF).	POS 270.

Step	Action	Note
23	Drive upwards on RDF until the top buffers on the elevator car roof are fully compressed and the elevator car stops.	Monitor the speed LEDs in LCEUI. 
24	Drive downwards on RDF away from the top buffers.	
25	Switch off the Recall Drive Feature (RDF).	POS 270.
26	Make a car call to the floor where the maintenance access panel (MAP) is.	
27	Enable the landing calls and the door opening.	LCEUI switches 261 and 263. 
28	Close and lock the maintenance access panel (MAP).	

Step	Action	Note
29	Travel in the elevator car to the topmost floor.	
30	Make a car call to the bottom floor and go to the landing. Stop the elevator at a suitable position by operating the emergency opening key.	Elevator car roof must be at a suitable height for safe moving between it and the topmost floor landing.
31	Go to the elevator car roof. 	1. Open the landing door with emergency opening key. 2. Standing on the landing, press the stop switch. 3. Standing on the landing, switch on the inspection drive. 4. Go to the elevator car roof. 5. Close the landing doors. 6. Check that the landing door is mechanically locked.
32	Check that the top buffers are in good condition.	Polyurethane buffers: check that there are no cracks or powdering.
33	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.
34	Go to the landing. 	1. Slowly open the landing door so that no one steps in from the landing thinking that the elevator car has arrived. 2. Check that no one can enter the shaft from the landing. 3. Go to the landing. 4. Release the stop switch. 5. Switch off the inspection drive. 6. Close the landing doors. 7. Check that the landing door is mechanically locked.

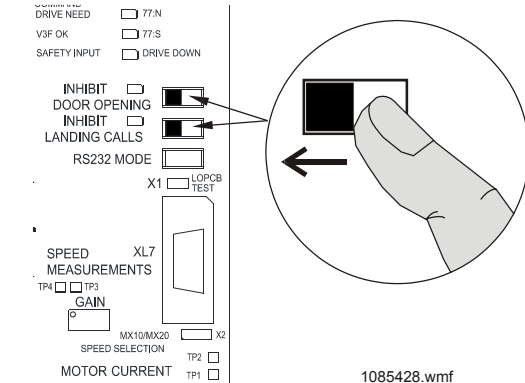
10.8 Safety gear tests

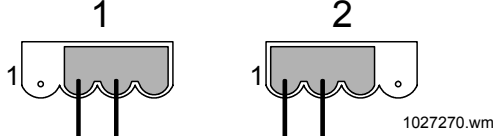
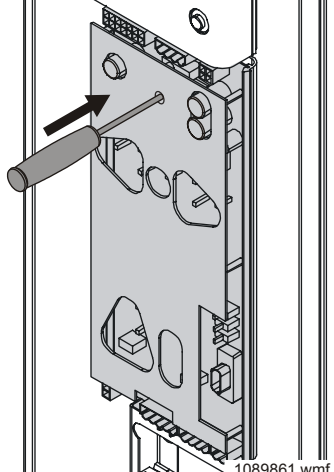


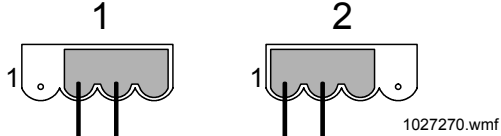
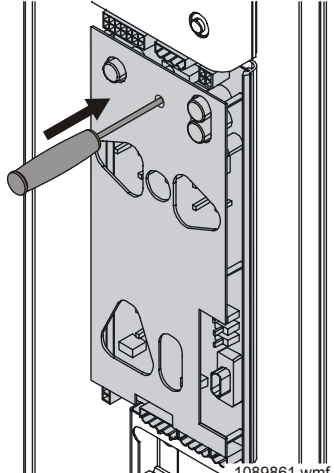
The following sections describe the safety gear tests.

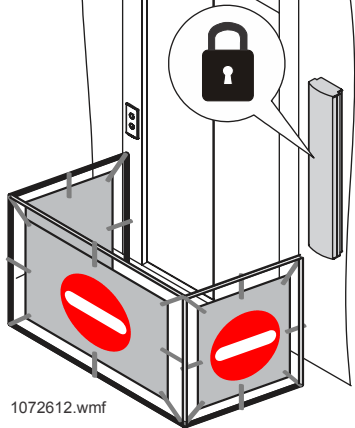


CAUTION! The safety gear must be tested with empty elevator car at inspection drive speed.

Step	Action	Illustration/Note
1	Go to the Maintenance Access Panel.	If the elevator has Shaft Access Monitor (SAM), reset it according to <i>APPENDIX B</i> .
2	Disable the landing calls. LCEUI switch 261.	 
3	Disable the door opening. LCEUI switch 263.	
2	Make a car call to two floors above the bottom floor from the Maintenance Access Panel (MAP).	
3	Switch on the Recall Drive Feature (RDF).	POS 270.
4	Drive on RDF so that the elevator car roof level is in the middle of the landing door.	
5	Close and lock the MAP.	
6	Go to the floor where the elevator is located and check the elevator car position.	1. Open the landing door slightly with emergency opening key. (Max. 100 mm.) 2. Check the elevator car position. 3. Close the landing doors. 4. Check that the landing door is mechanically locked.

Step	Action	Illustration/Note
7	Go to MAP.	If the elevator has Shaft Access Monitor (SAM), reset it according to <i>APPENDIX B</i> .
8	Move the plug of the XL8 connector from position 1 to test position 2.	 1. Normal position 2. Test position
9	Drive downwards on RDF for approximately 2 seconds and push the overspeed governor test button.	The elevator must stop immediately. 
10	Try to drive downwards on RDF to check that the safety gear is engaged.	The elevator car must not move downwards when the safety gear is engaged.
11	Switch off the Recall Drive Feature. (RDF).	POS 270.
12	Make a car call upwards from the maintenance access panel: the elevator car must not move.	 NOTE! The safety gear switch must cut the safety circuit.

Step	Action	Illustration/Note
13	Move the plug of the XL8 connector from position 2 to position 1.	 1. Normal position 2. Test position
14	Push the overspeed governor test button to reset the OSG.	
15	Make a car call upwards from the maintenance access panel: the elevator car must not move.	 NOTE! The safety gear switch must cut the safety circuit.
16	Switch on the Recall Drive Feature (RDF).	POS 270.
17	Release the safety gear by driving upwards on RDF.	
18	Drive the elevator car on RDF to a suitable position for going to the car roof.	

Step	Action	Illustration/Note
19	Close and lock the maintenance access panel.	 1072612.wmf
20	Go to the floor where the elevator is located.	1. Open the landing door with the emergency opening key. 2. Press the car roof stop switch. 3. Close the landing door and check that it is mechanically locked.
21	Go to MAP.	
22	Switch off the Recall Drive Feature (RDF).	POS 270.
23	Close and lock the MAP.	
24	Go to the elevator car roof. 	1. Open the landing door with the emergency opening key. 2. Standing on the landing, switch on the inspection drive. 3. Go to the elevator car roof. 4. Close the landing doors behind you. 5. Check that the landing doors are mechanically locked.
25	Raise the optional car top buffers to position for inspection drive, if applicable.	Refer to <i>APPENDIX C</i> .
26	Drive on inspection drive until you see the safety gear grip marks on the guide rails.	WARNING! Be extremely careful when driving upwards on inspection.

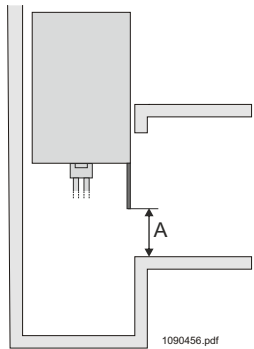
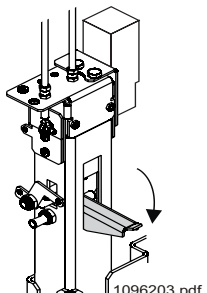
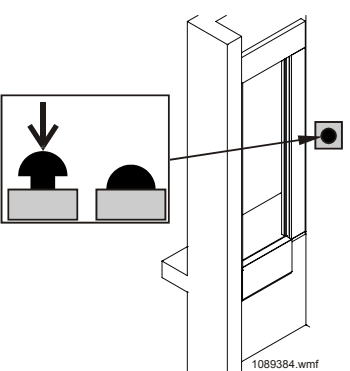
Step	Action	Illustration/Note
27	Check the length and the level of the grip marks on both sides.	The marks must be approximately on the same level. Otherwise the safety gears must be adjusted. If the safety gear does not stop the elevator immediately, the safety gears must be replaced.
28	Remove the safety gear marks using a file.	Removing the marks avoids excessive wear of guide shoes and roller guides.
29	Drive on inspection to a suitable level for going to the landing.	WARNING! Be extremely careful when driving upwards on inspection.
30	Go to the landing.	 1. Slowly open the landing door so that no one steps in from the landing thinking that the elevator car has arrived. 2. Check that no one can enter the shaft from the landing. 3. Go to the landing. 4. Lower down the optional car top safety buffers, if applicable. 5. Switch off the inspection drive. 6. Release the stop switch. 7. Close the landing doors. 8. Check that the landing door is mechanically locked. 9. Go to the MAP. 10. If applicable, reset the shaft access monitor (SAM). Refer to: APPENDIX B.1. (Page 162.)
31	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.

10.9 Testing the belt tensioning device safety switches

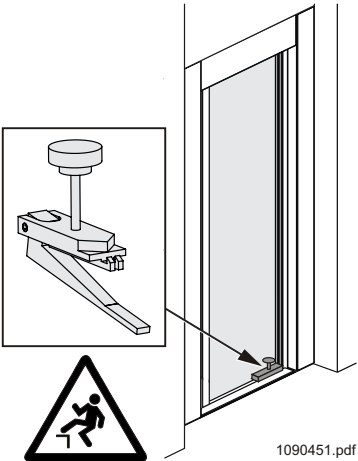
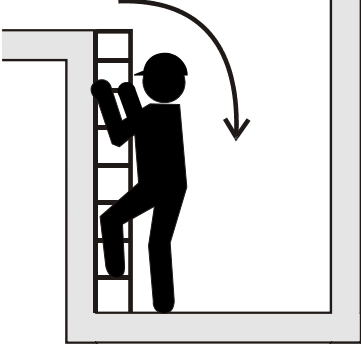
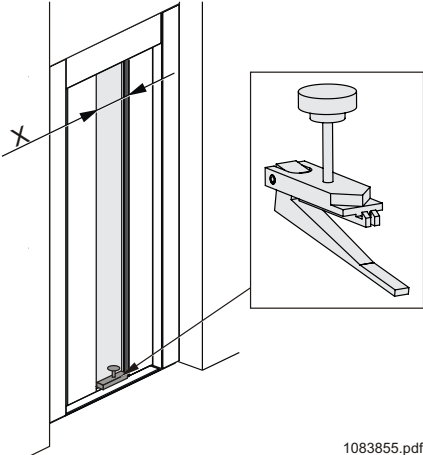


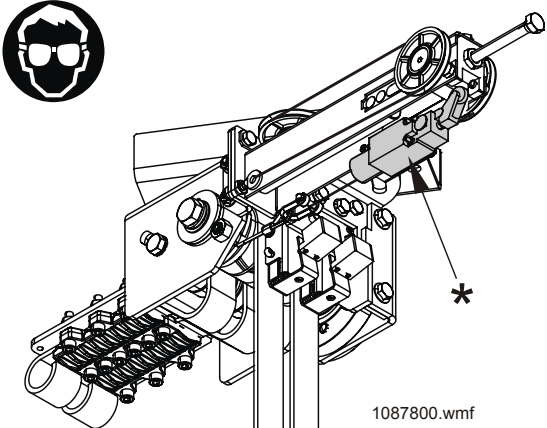
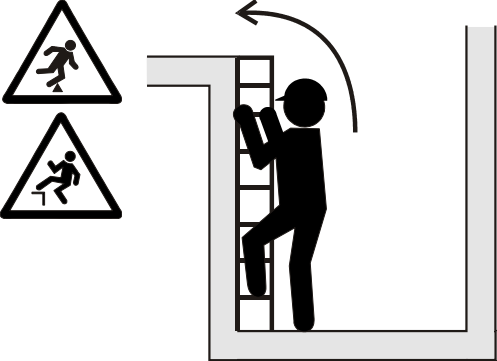
The following sections describe testing the operation of the belt tensioning device safety switches.

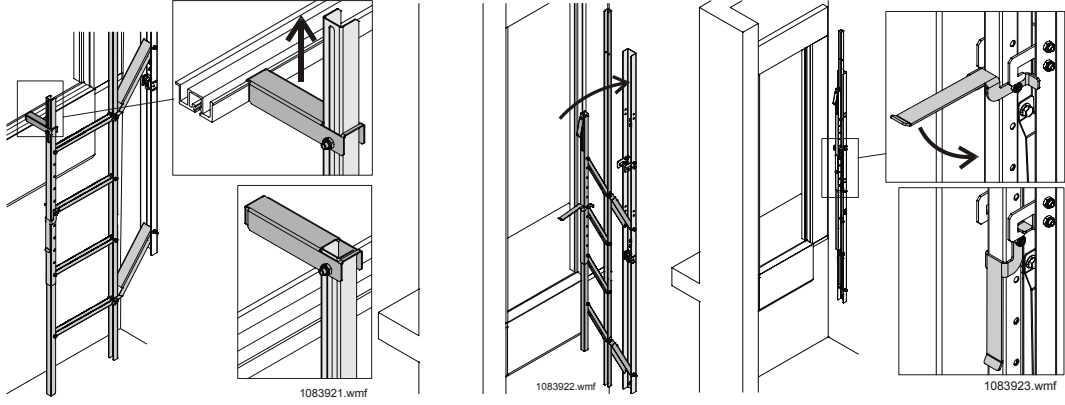
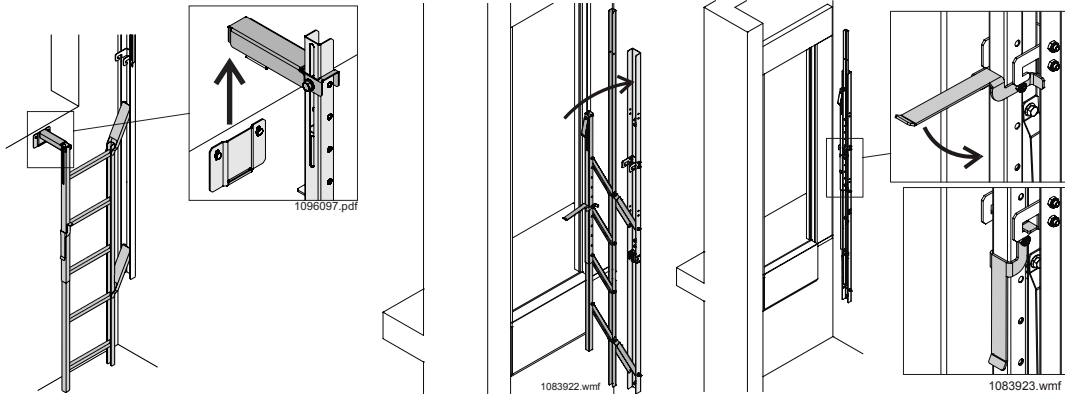
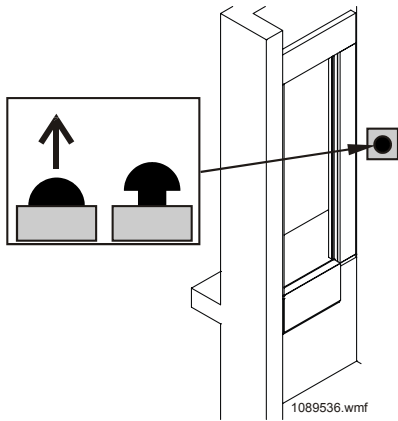
Step	Action	Illustration/Note
1	Enable the landing calls and the door opening.	LCEUI switches 261 and 263. DRIVE NEED ☐ 77.N V3F OK ☐ 77.S SAFETY INPUT ☐ DRIVE DOWN INHIBIT ☐ DOOR OPENING ☐ INHIBIT ☐ LANDING CALLS ☐ RS232 MODE ☐ X1 ☐ LOPCB TEST SPEED MEASUREMENTS TP4 ☐ TP3 ☐ GAIN ☐ MX10/MX20 ☐ X2 ☐ SPEED SELECTION ☐ TP2 ☐ MOTOR CURRENT ☐ TP1 ☐ 1085430.wmf
2	Close and lock the maintenance access panel.	1072612.wmf
3	Go to the bottom floor.	

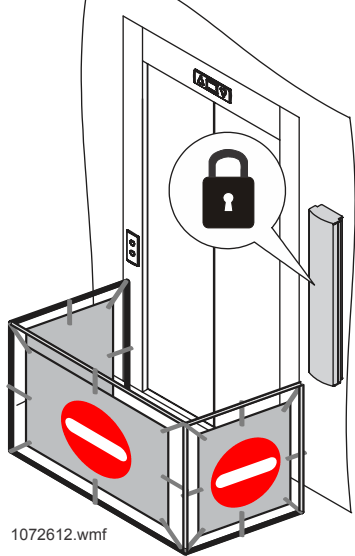
Step	Action	Illustration/Note
4	Make a car call from the bottom floor and go to the landing. Stop the elevator at a suitable position by operating the emergency opening key. Elevator car must be at a suitable height (A) for safe moving between the landing and the pit, and for accessing the belt tensioning device from the pit floor. Use work stool, if needed.	 1090456.pdf
5	Open the landing door with emergency opening key.	
6	Check that the pit safety device is activated.	 1096203.pdf
7	Check the position of the elevator car.	Elevator car must be at a suitable height for safe moving between the landing and the pit, and for accessing the belt tensioning device from the pit floor. Use work stool, if needed.
8	Standing on the landing, press the stop switch.	 1089384.wmf

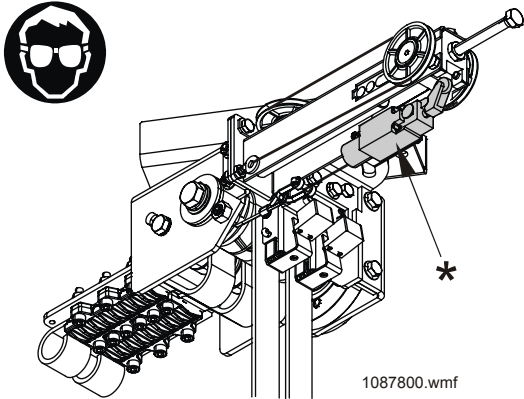
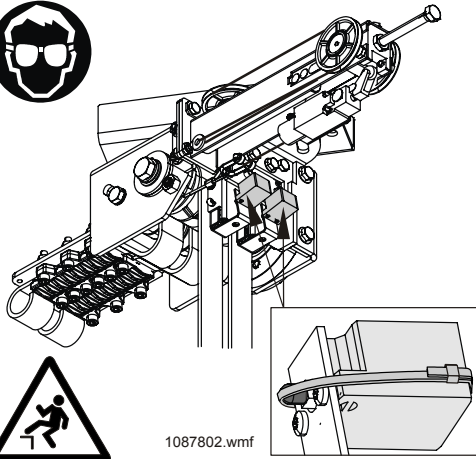
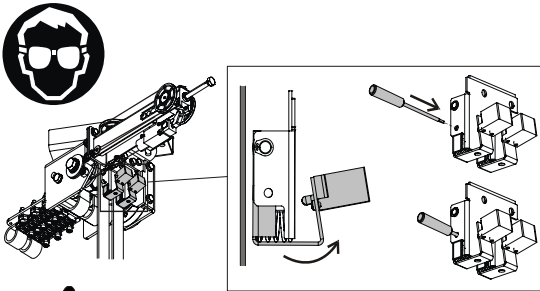
Step	Action	Illustration/Note
9	Install the pit ladders.	 Automatic doors Swing doors

Step	Action	Illustration/Note
10	Block the door to fully open position with door blocking tool.	 1090451.pdf
11	Go to the pit.  WARNING! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool.	 1083979.wmf
12	Block the door to slightly open position with door blocking tool.	X = 100 mm  1083855.pdf

Step	Action	Illustration/Note
13	Gather the needed tools and accessories from landing to pit.	
14	Activate the belt tensioning device gas spring switch. (*) 	 1087800.wmf
15	Go to the landing.	 1083982.wmf

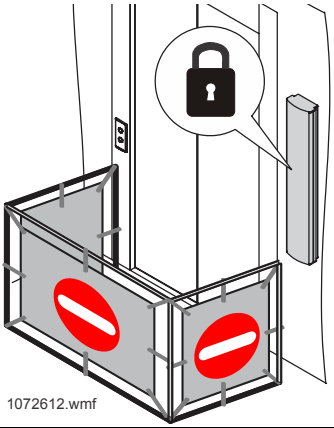
Step	Action	Illustration/Note
16	Remove the pit ladders.	Automatic doors  Swing doors 
17	Release the stop switch.	

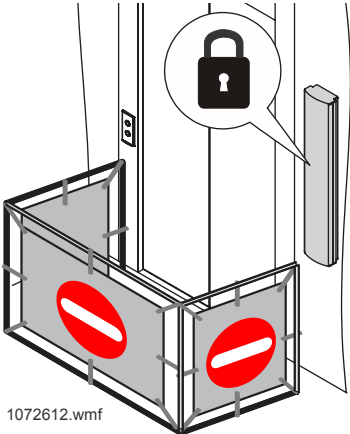
Step	Action	Illustration/Note
18	Close the landing doors.	 Check that the landing door is mechanically locked.
19	Go to the maintenance access panel (MAP). Open the MAP.	
20	Reset the Shaft Access Monitor (SAM), if applicable.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
21	Reset the pit safety device.	
22	Try to drive on normal drive.	 The elevator car must not move.
23	Make notes of the test.	After completing all tests, record the test date and all results in the elevator's log book at once.
24	Close and lock the maintenance access panel.	 1072612.wmf
25	Go to the pit. See steps 5 – 12.	

Step	Action	Illustration/Note
26	Set the belt tensioning device gas spring switch (*) to normal operation. 	 1087800.wmf
27	Activate one of the belt slack switches by using cable tie. Test both switches individually.   1087802.wmf	<u>Alternative method:</u> 1. Press the slack switches against the belts. 2. Put a small screwdriver to the hole on the side of the slack switch bracket.  1091994.wmf  NOTE! Use the original locking pin if available for the locking.
28	Go to the landing. See steps 15 – 18.	
29	Check that the belt slack switch prevents the elevator from moving. See steps 19 – 23.	 The elevator car must not move.
30	Go to the pit. See steps 5 – 12.	  
31	Remove cable tie from the belt slack switch. If you used the alternative method, then remove the screwdriver or locking pin. 	

Step	Action	Illustration/Note
32	Repeat the check with the other belt slack switch. See steps 27 – 30	
33	Remove cable tie from the belt slack switch. If you used the alternative method, then remove the screwdriver or locking pin.	
34	Go to the landing. See steps 15 – 18.	

10.10 Finalizing the maintenance

Step	Action	Note / Illustration / Method
1	Go to the maintenance access panel (MAP).	
2	Reset the Shaft Access Monitor (SAM), if applicable.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
3	Reset the pit safety device.	Related information: <i>APPENDIX B. Resetting the safety devices.</i>
4	Switch off the Recall Drive Feature (RDF).	POS 270.
5	Close and lock the maintenance access panel.	
6	Perform a test run for the elevator.	
7	Go to the Maintenance Access Panel (MAP).	
8	Switch on the Recall Drive Feature. (RDF)	POS 270.

Step	Action	Note / Illustration / Method
9	Mark the maintenance work to the elevator log book. NOTE! Maintenance logbook of the elevator is stored in a rack on the elevator car roof.	1. Drive downwards on RDF until the elevator car roof is at the second floor level. 2. Close and lock the maintenance access panel (MAP). 3. Go to the second floor. 4. Open the landing door with the emergency release key 5. Mark the maintenance work to the elevator log book. 6. Close the landing doors. 7. Check that the landing doors are mechanically locked. 8. Go to the maintenance access panel (MAP). 9. Switch off the Recall Drive Feature. (RDF) 10. If applicable, reset the shaft access monitor. (SAM) Related information: <i>APPENDIX B. Resetting the safety devices.</i>
10	Switch off the shaft lights. (268)	
11	Close and lock the maintenance access panel.	
12	Remove the tools.	
13	Clean the site.	
14	Remove the safety fences.	
15	Remove the "Under maintenance" signs.	
16	Return the elevator to normal use.	 WARNING! If any of the periodical test fails, the elevator must not be put into normal use before it has been repaired and it has passed all the tests.

11 RESCUE OPERATIONS



The following sections describe the actions and precautions you must take if you rescue trapped passengers from the elevator.



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.



NOTE!

1. Access to the bottom floor landing door must always be available for rescue personnel. Access to the second floor landing door must be available for rescue personnel if the maintenance access panel is installed in that floor (option). Access to any other floor including the topmost landing is not needed.
2. The KONE NanoSpace™ rescue belt clamp KM51025077 is designed to move the elevator car easily only small distance (to the next available door level up or down). To move the elevator car longer distances may require disconnecting and reinstalling the clamp several times.

11.1 Safety

Only trained and experienced elevator emergency personnel can rescue passengers from elevators.

When running a rescue operation on this type of elevator, the following safety rules are mandatory:

- When entering the elevator, ensure that others are not already working there
- Do not leave the open landing door unguarded
- Follow local safety regulations and KONE safety rules; no exceptions for unusual situations
- Do not release the mechanical brake when the elevator is in the door zone, indicated by the DZI illuminating
- Be careful when releasing the mechanical brake
- Keep in mind that DZI LEDs and speed and direction LEDs do not operate if the emergency battery is empty and normal power supply is unavailable.
- Do not move the car without direct supervision if passengers may be able to open the car doors
- If the landing door has to be opened manually, use only a specially designed triangle key



NOTE! If the elevator has SAM and you open a landing door to estimate where the car is, SAM prevents the elevator from moving until you reset SAM. For more information on resetting SAM, see section *APPENDIX B. Resetting the safety devices*.

11.2 Rescue categories

Rescue operations are divided into the following categories:

- Normal rescue: Allowed for trained maintenance personnel of the building or professional elevator personnel
- Technical rescue: Allowed for professional elevator personnel only
- Emergency rescue: Allowed for professional emergency personnel only, rescue in emergency situation

11.3 Contacting qualified personnel

Contact a trained person or a competent maintenance person at the earliest opportunity.



NOTE! 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

11.4 Reassuring passengers

Good communication between the passengers and responsible building personnel is extremely important. Inform the passengers of the following:

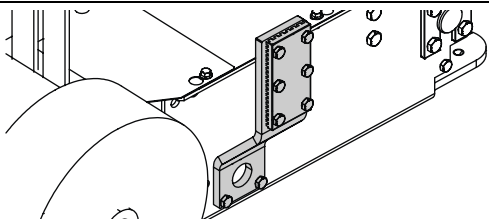
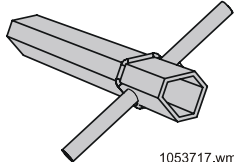
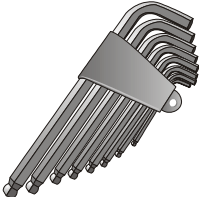
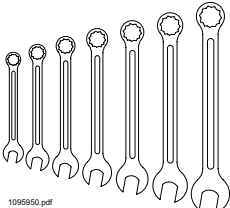
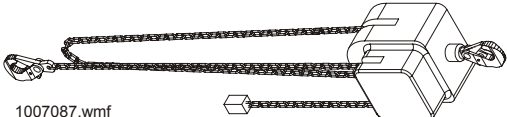
- They are safe and should remain calm
- Help is on the way to safely rescue them from the elevator car
- There is sufficient oxygen since the car is properly ventilated
- Passengers should stay away from the elevator door, so the doors can be opened safely

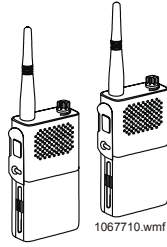
When direct communication is not possible, use the intercom or similar system.

Ask the passengers reassuring questions. At the same time you will obtain the following valuable information:

- How many passengers are inside the elevator car?
- Are passengers all right?
- Are the lights still functioning inside the elevator car?
- Is 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?

11.5 Rescue tools and equipment

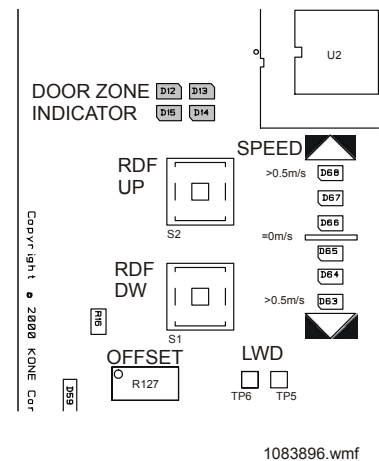
Tool	Illustration / Note
Door blocking tool Rescue belt clamp KM51025077	
Emergency opening key KM218628	 1053717.wmf
Allen key set	
Spanner set	 1095950.pdf
Chain hoist. Rated lifting capacity 1000 kg.	 1007087.wmf
Hoisting strap. Rated lifting capacity 1000 kg.	 1020763.wmf

Tool	Illustration / Note
Two-way radio communication set, mobile phones, walkie-talkies or other equivalent two way communication devices.	 1067710.wmf

11.5.1 Door zone indicator

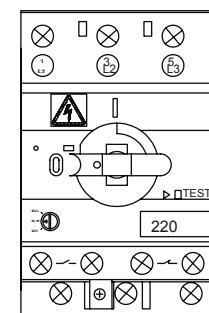
Door zone indicator must indicate that the elevator car is in a door zone before the car doors are opened. If the elevator car is not in a door zone, **trained elevator personnel** must move it to a door zone using technical rescue procedures. If technical rescue fails, emergency rescue by **specially trained emergency personnel** is needed.

NOTE! In rare cases the main power supply to the elevator is unavailable and the emergency battery is empty. In such case the position of the elevator car must be checked by opening the landing door slightly (maximum of 100 mm). Before opening the car doors it must be visually verified that the passengers can be assisted to the landing without causing a fall hazard.



11.5.2 Main switch

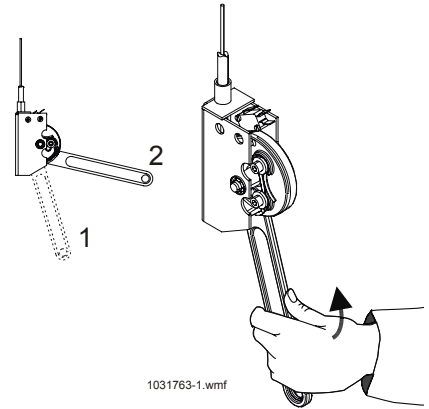
The main switch is used for switching electrical power to an elevator on or off.



11.5.3 Brake release lever

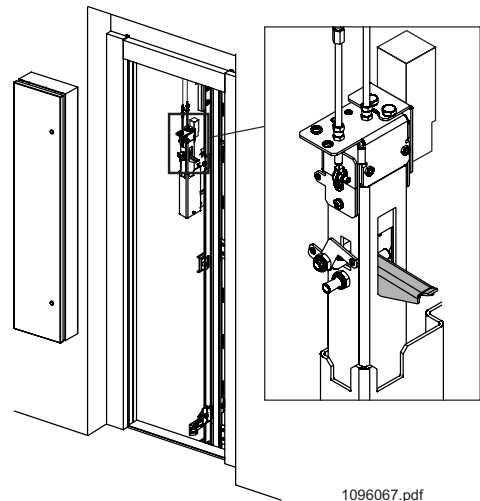
The brake release lever is used for releasing the hoisting machine brake manually.

1. Brake is closed (holding)
2. Brake is released (open)



11.5.4 Pit safety device

Opening the bottom floor landing door using the emergency opening key activates the pit safety device. The pit safety device prevents the elevator car from descending to the working space in the pit by activating the safety gears.



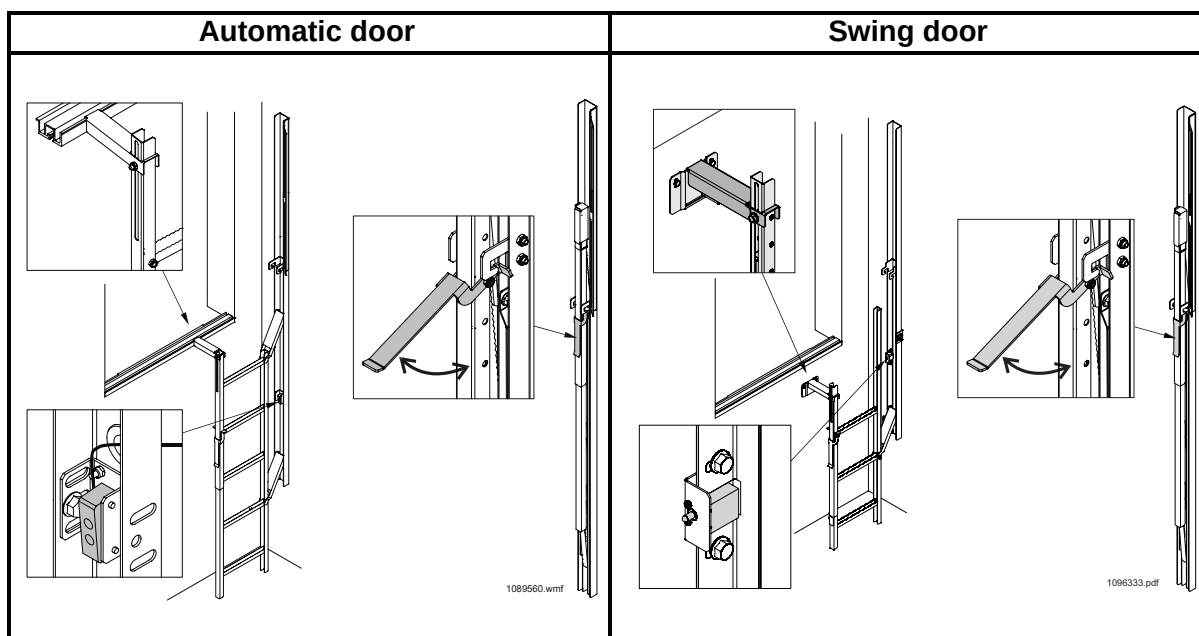
WARNING! Never enter the pit when the reset lever is turned to lower position (pit safety device not activated).

11.5.5 Pit ladders

Pit ladders are located on the shaft wall. They are equipped with safety switch.



NOTE! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool instead of the pit ladders.



11.5.6 Emergency Battery Drive EBD-AB

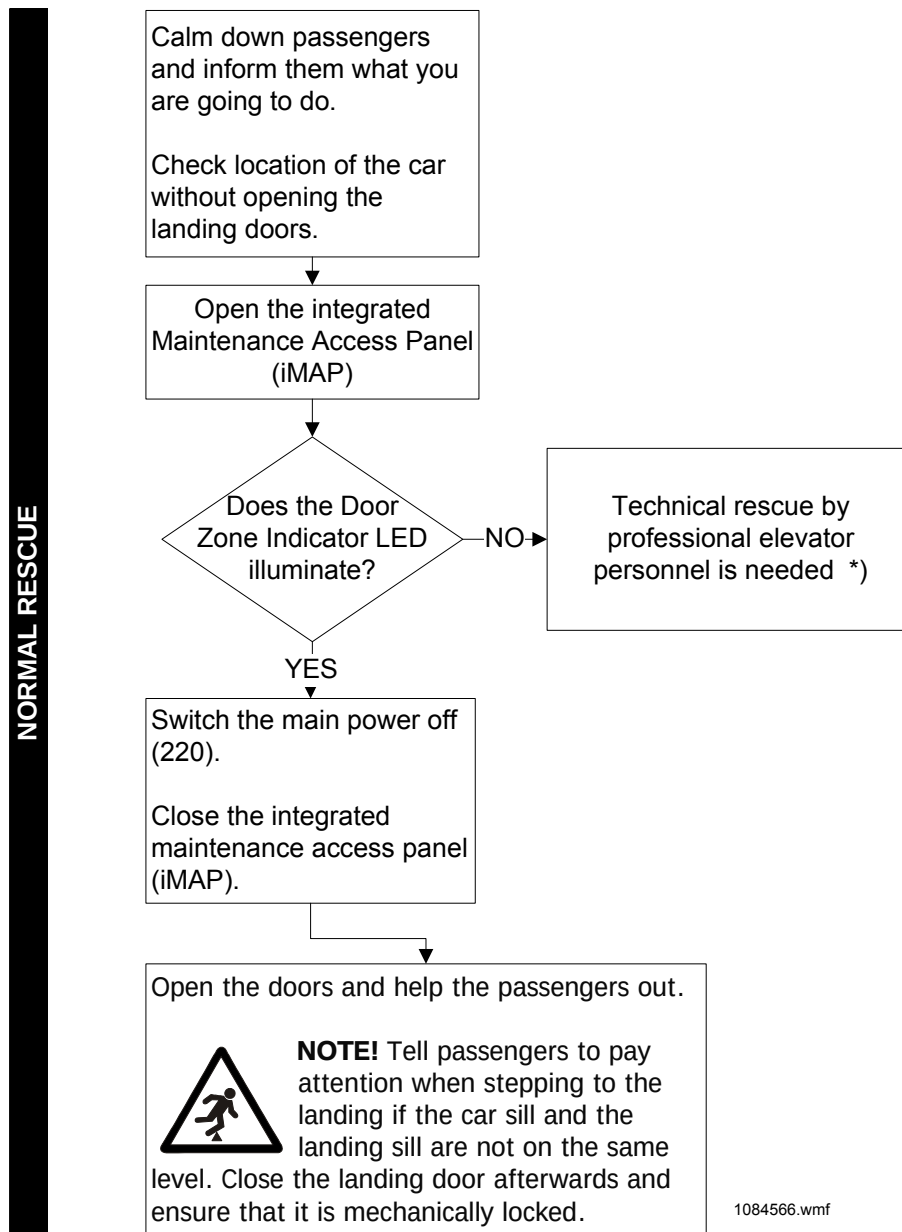


NOTE! This is an optional component.

The purpose of the emergency battery drive feature is to move the elevator car to the nearest floor in lighter direction when the elevator car has stopped between floors due to a power supply failure. The device is external to control panel and it operates automatically when the power supply fails.

The elevator moves at a low speed, and all safety functions are working. When the elevator car arrives to the floor, the doors open. The elevator resets into normal operation automatically when the power supply returns.

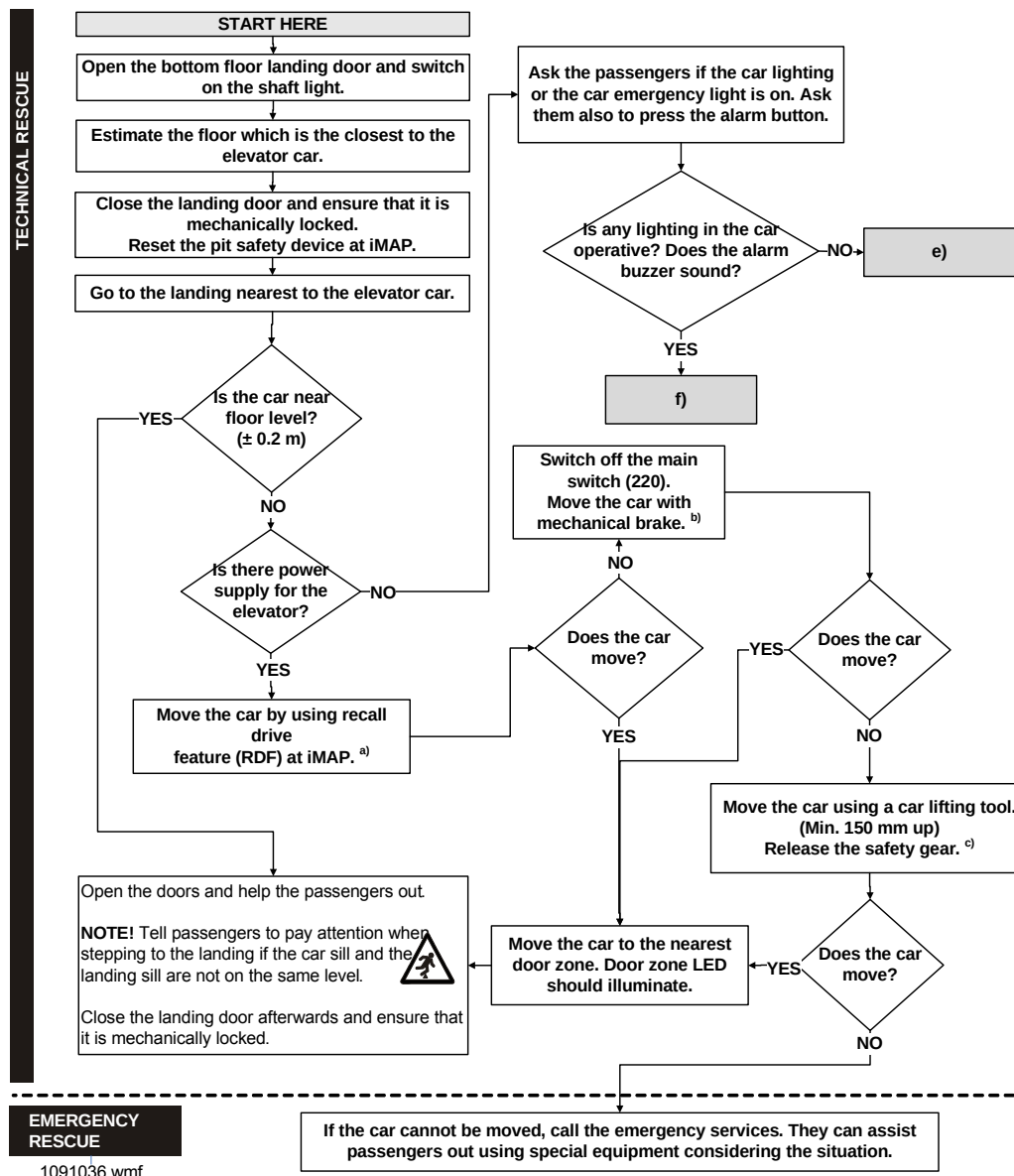
11.6 Normal rescue



*) See section 11.7 *Technical rescue*. (Page 123.)

11.7 Technical rescue

Rescue chart part 1 of 3



a) See section 11.7.1 Moving the elevator car using Recall Drive Feature (RDF) (Page 126.)

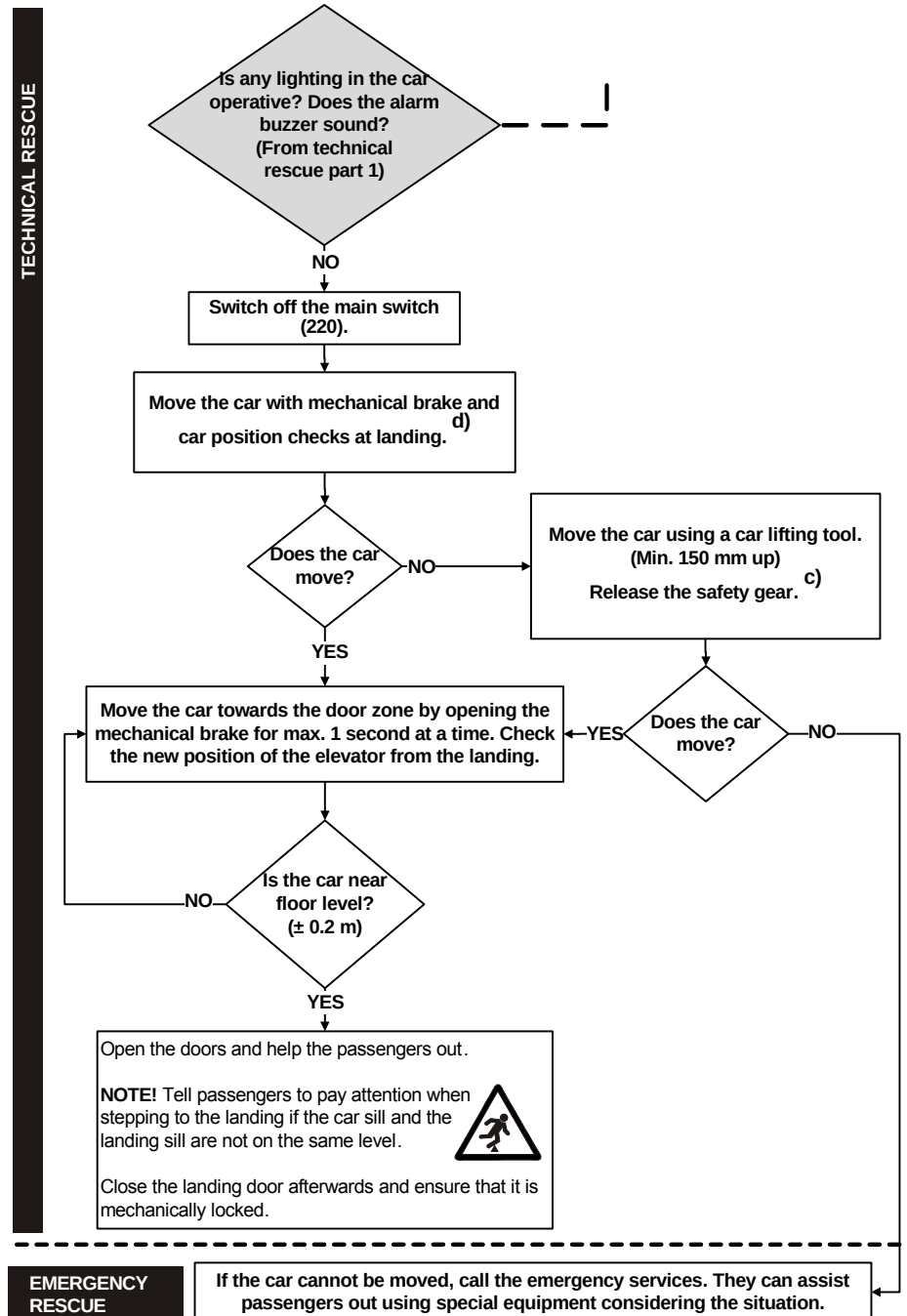
b) See section 11.7.4 Moving the elevator car using the manual brake releasing device. (Page 140.)

c) See section Moving the elevator car with lifting equipment. (Page 135.)

e) See Technical rescue chart part 2 of 3. (Page 124.)

f) See Technical rescue chart part 3 of 3. (Page 125.)

Technical rescue chart part 2 of 3

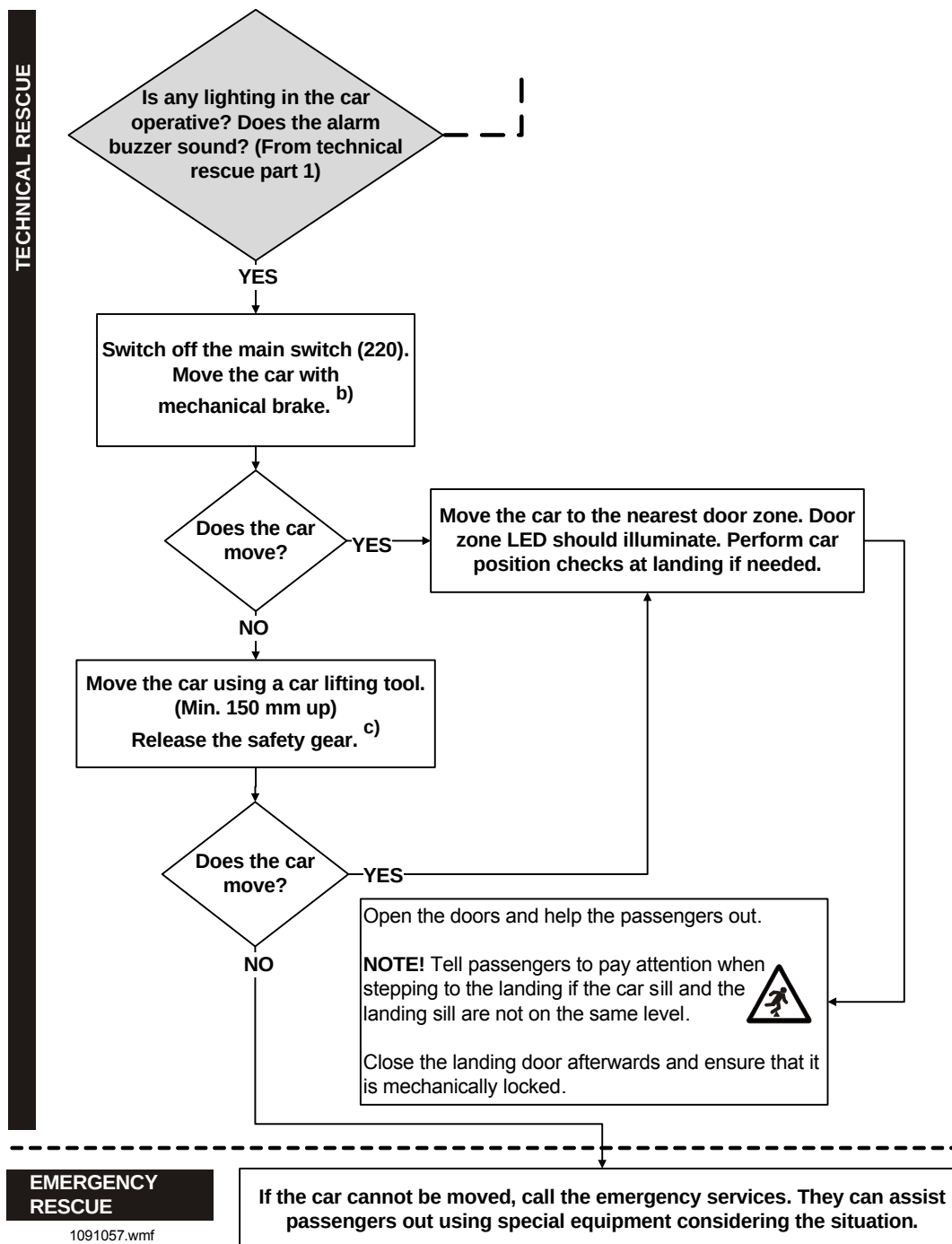


1091037.wmf

c) See section Moving the elevator car with lifting equipment (Page 135.)

d) See section 11.7.5 Moving the elevator car using the manual brake releasing device with car position checks at landing (Page 146.)

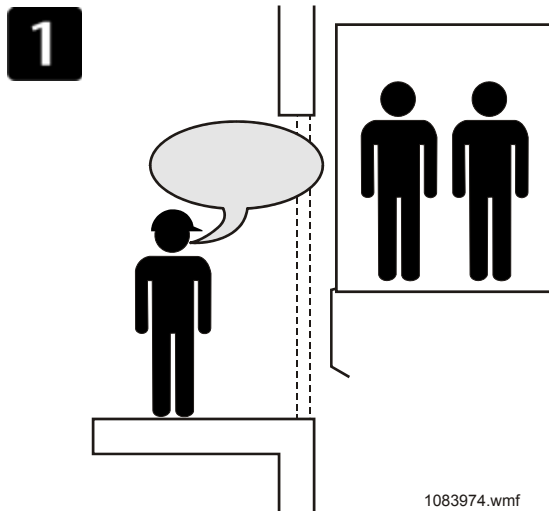
Technical rescue chart part 3 of 3



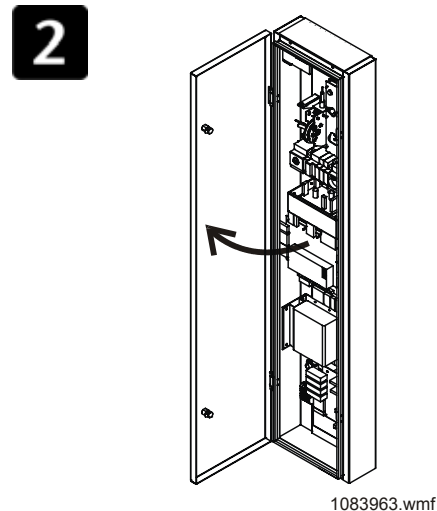
b) See section 11.7.4 Moving the elevator car using the manual brake releasing device (Page 140.)

c) See section Moving the elevator car with lifting equipment (Page 135.)

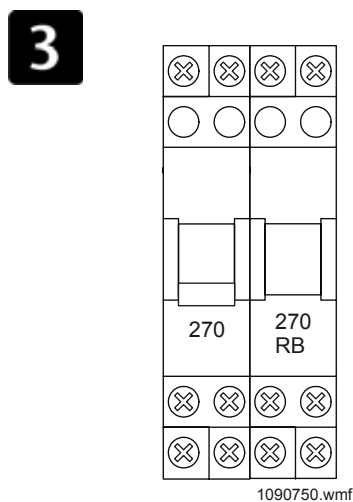
11.7.1 Moving the elevator car using Recall Drive Feature (RDF)



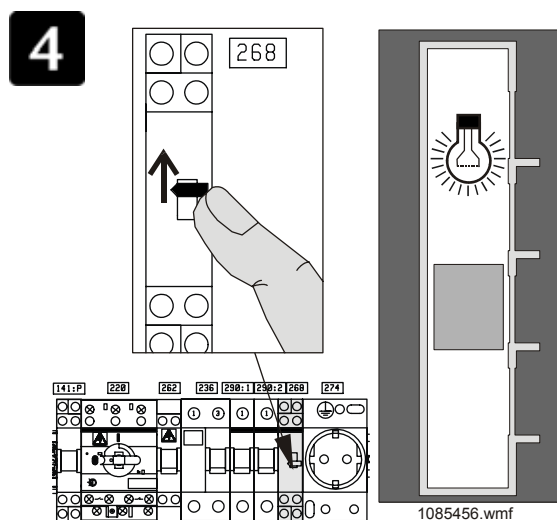
Inform the passengers that you are about to move the elevator car in order to let them out and they must stay calm and not try to do anything by themselves.



Open the maintenance access panel.



Switch on the Recall Drive Feature. (POS 270.)



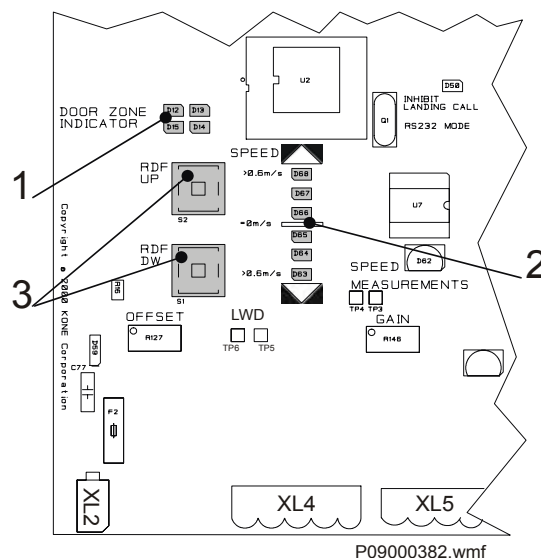
Switch on the shaft lights. (268)

5

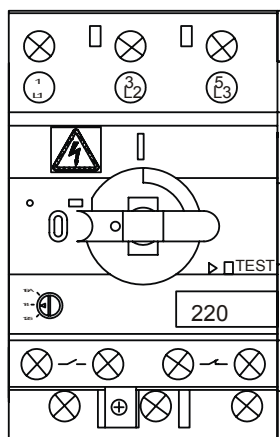
Push the RDF run button 270 RB together with direction button (3) RDF UP or RDF DW to drive the elevator car to nearest door zone.

6

Check from the direction and speed indicator that the elevator car is moving. (2)
The elevator car is on the door zone, when the DZI LEDs turn on. (1)

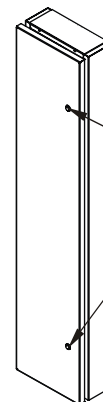
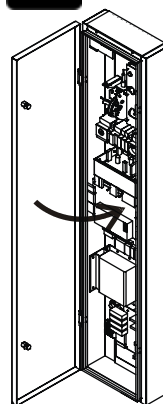


7



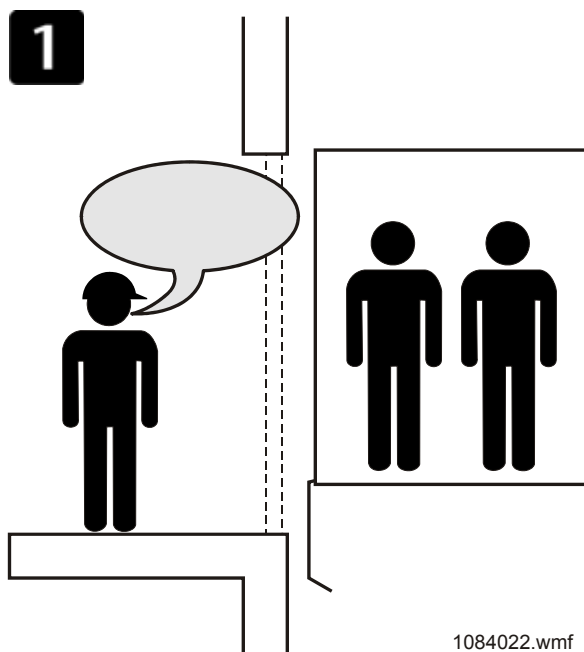
Switch off the main switch. (220)

8



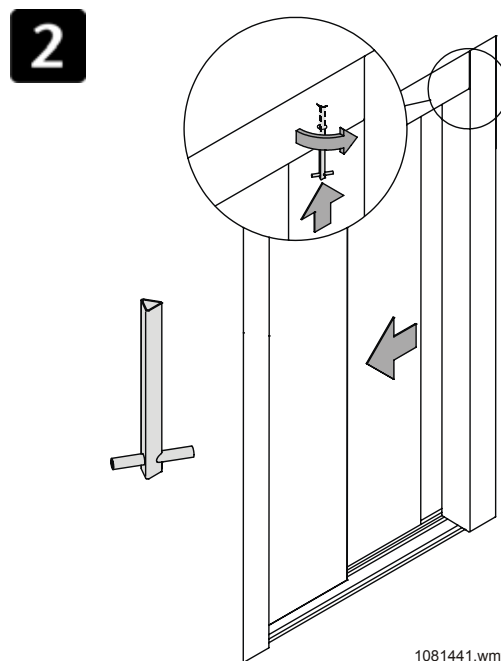
Close and lock the maintenance access panel.

Rescue procedures when the elevator car is in door zone



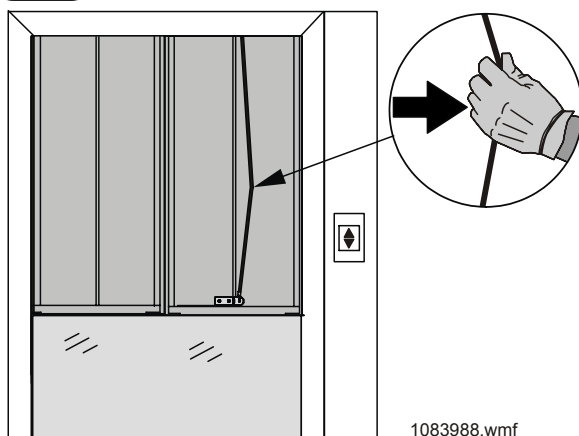
Inform the passengers about how to act when you open the doors:

- They must stay calm.
- They must obey the instructions you give.
- They must stay away from the car door when you open it.
- They must to exit the elevator car one by one.



Open the landing door with emergency opening key.

3



If the car door does not open when opening the landing door, you can open it by pulling the wire rope and manually pushing or pulling the car door.

WARNING! Use protective cut-resistant safety gloves.



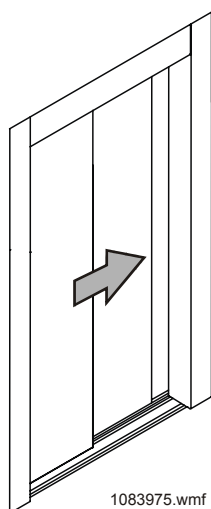
4



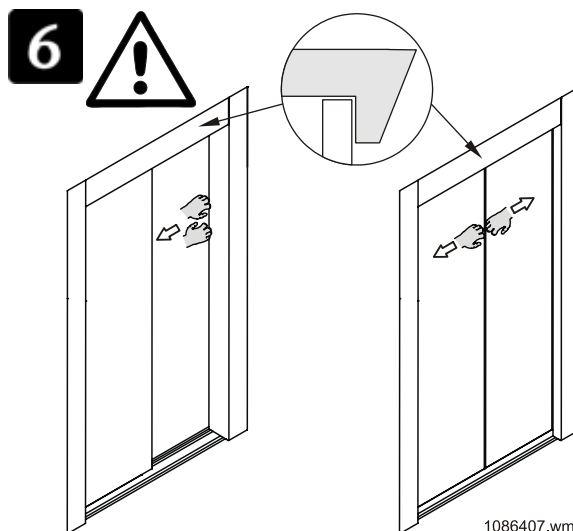
Assist the passengers out from the elevator car.

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

5



6



Check that the doors are mechanically locked.

11.7.2 Moving the elevator car with lifting equipment



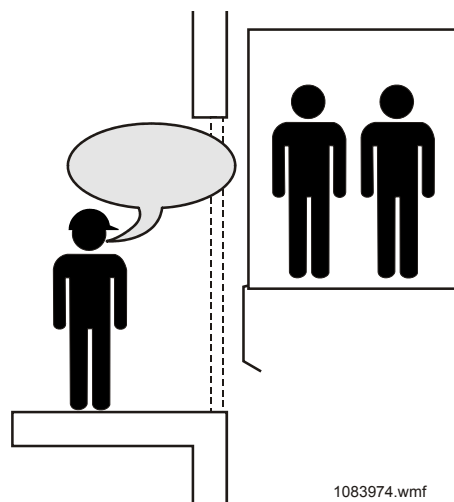
NOTE! This task requires two maintenance persons. One person stays on the landing and operates the devices in maintenance access panel. One person goes into the pit and operates the lifting equipment. Use two-way radio communication sets if the maintenance access panel is located at the second lowest floor.



WARNING! Use protective cut-resistant safety gloves.

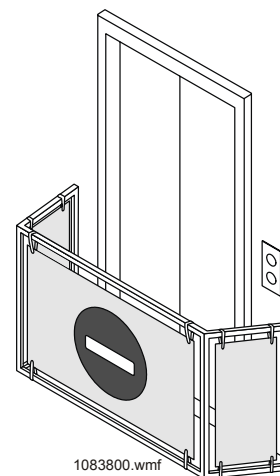
Going to the pit

1



1083974.wmf

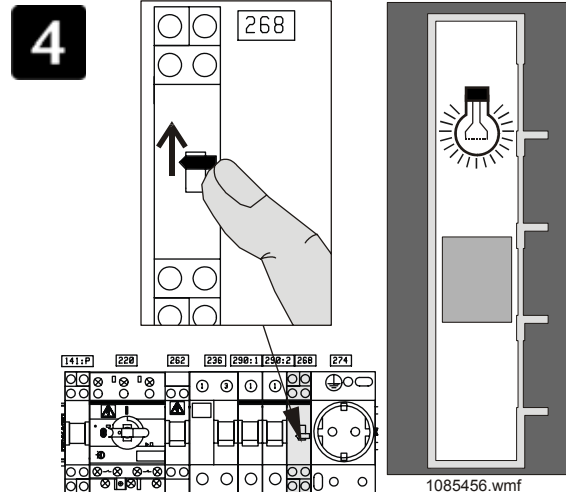
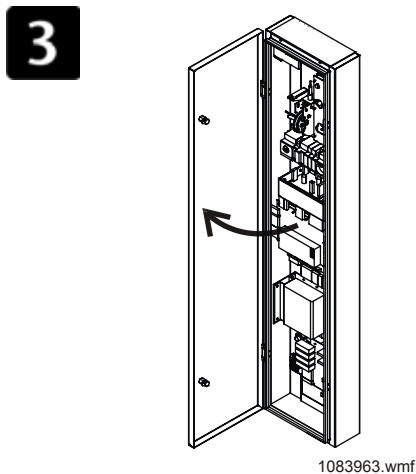
2



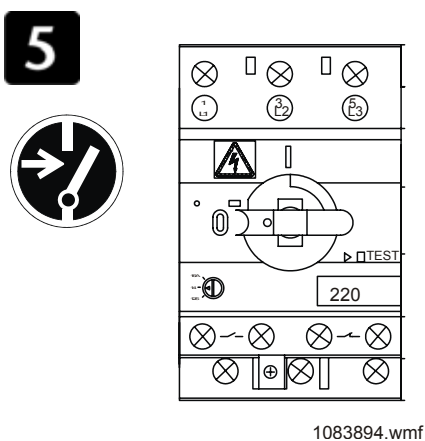
1083800.wmf

Inform the passengers that you are about to move the elevator car in order to let them out and they must stay calm and not try to do anything by themselves.

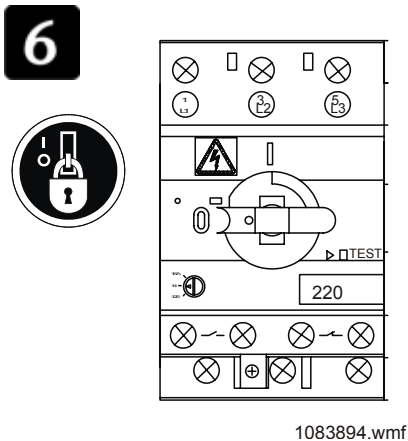
Install the safety fences where needed.



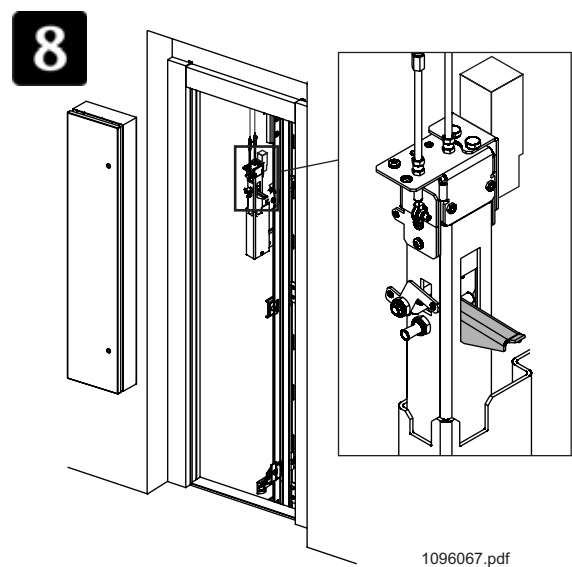
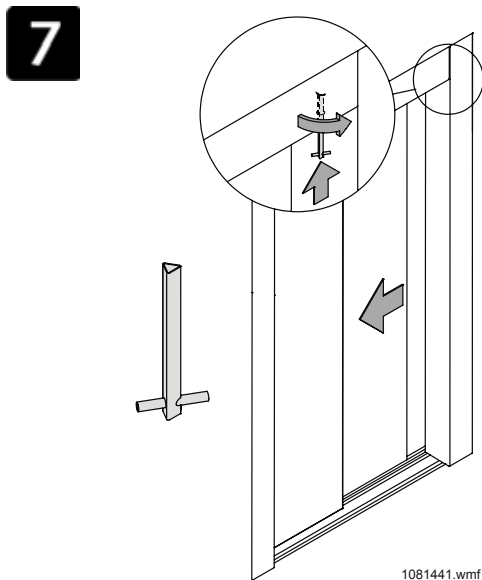
Switch on the shaft lights. (268)



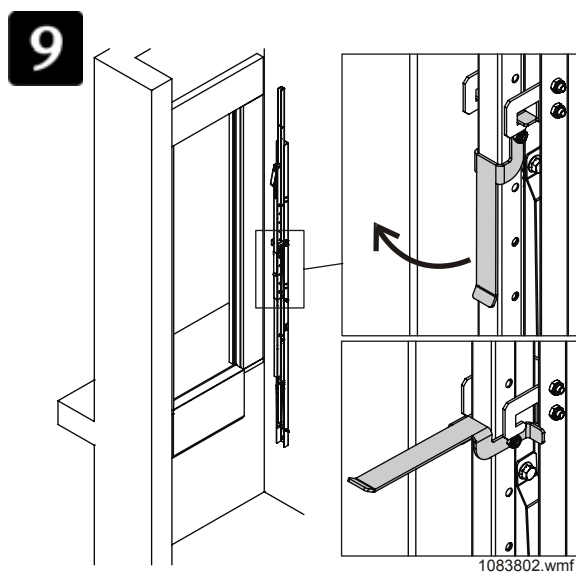
Switch off the main switch. (220)



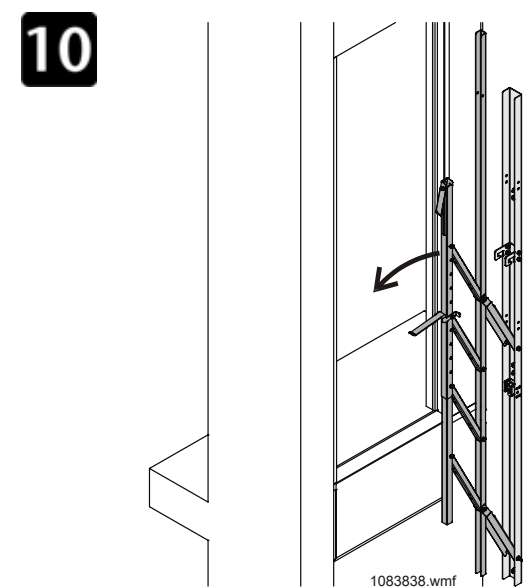
Lock and tag.



WARNING!
Check that the safety device has triggered.

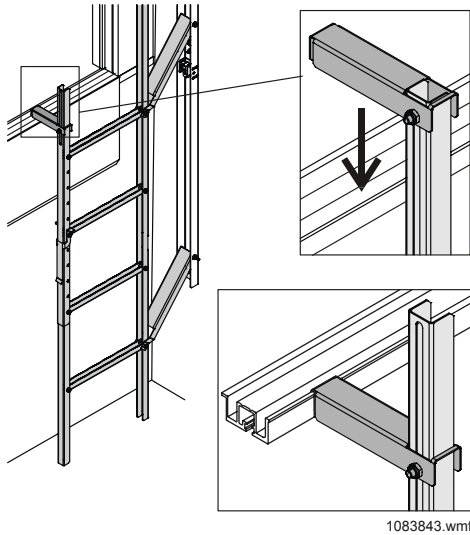


Install the ladder.

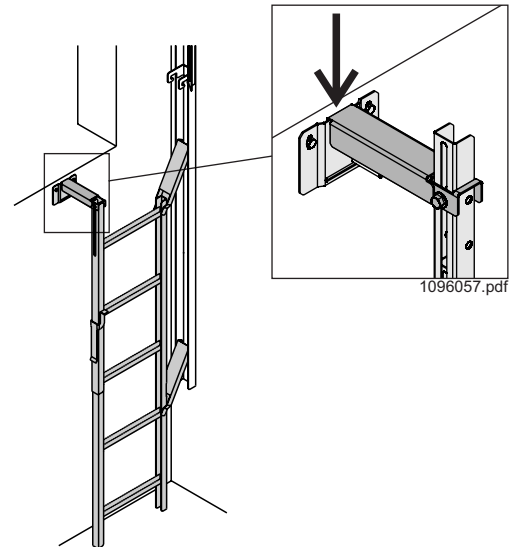


11

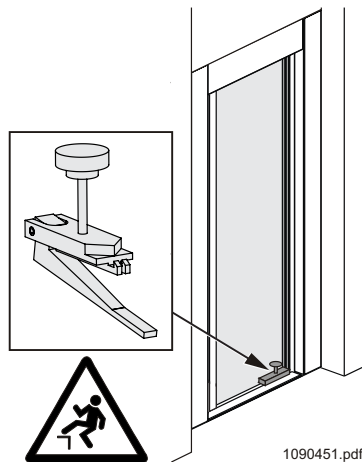
Automatic door



Swing door

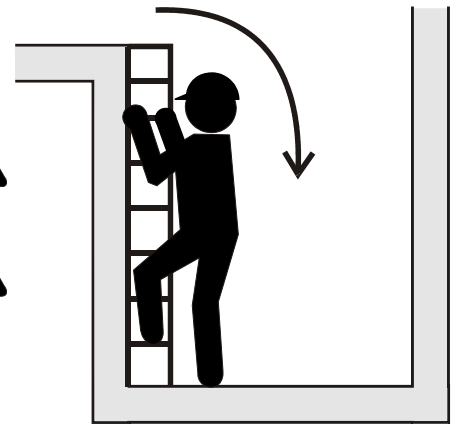


12



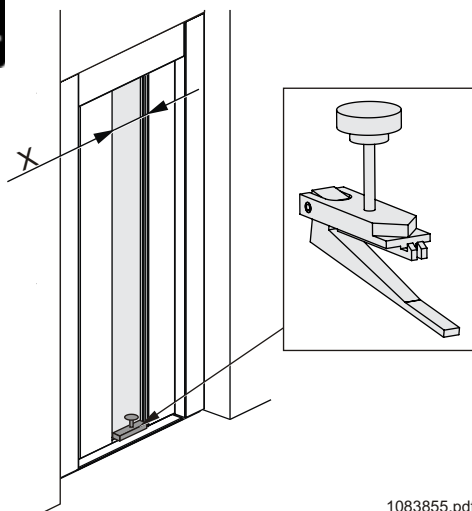
Block the door to fully open position with door blocking tool.

13



1083979.wmf

14



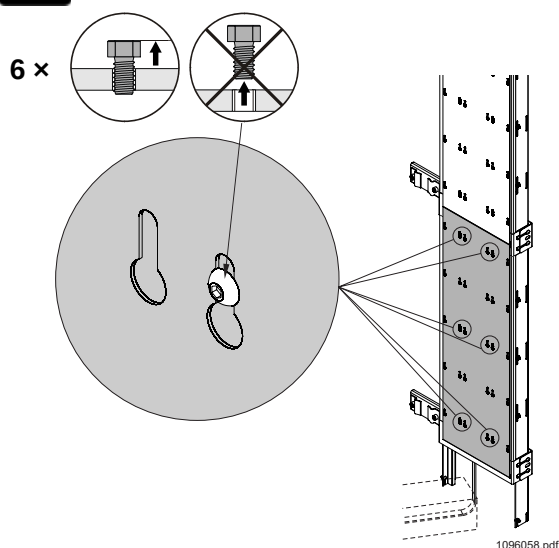
Block the door to fully slightly position with door blocking tool.

$x = 100 \text{ mm}$.

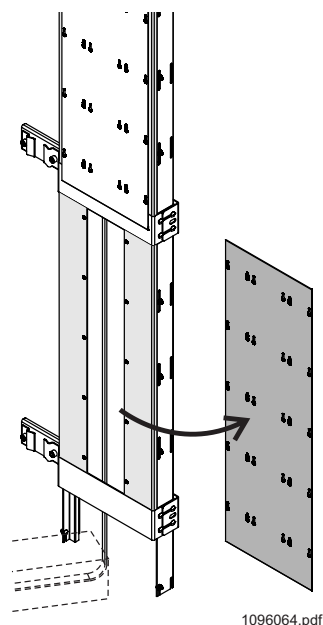
WARNING! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool.

Removing the balancer weight screen

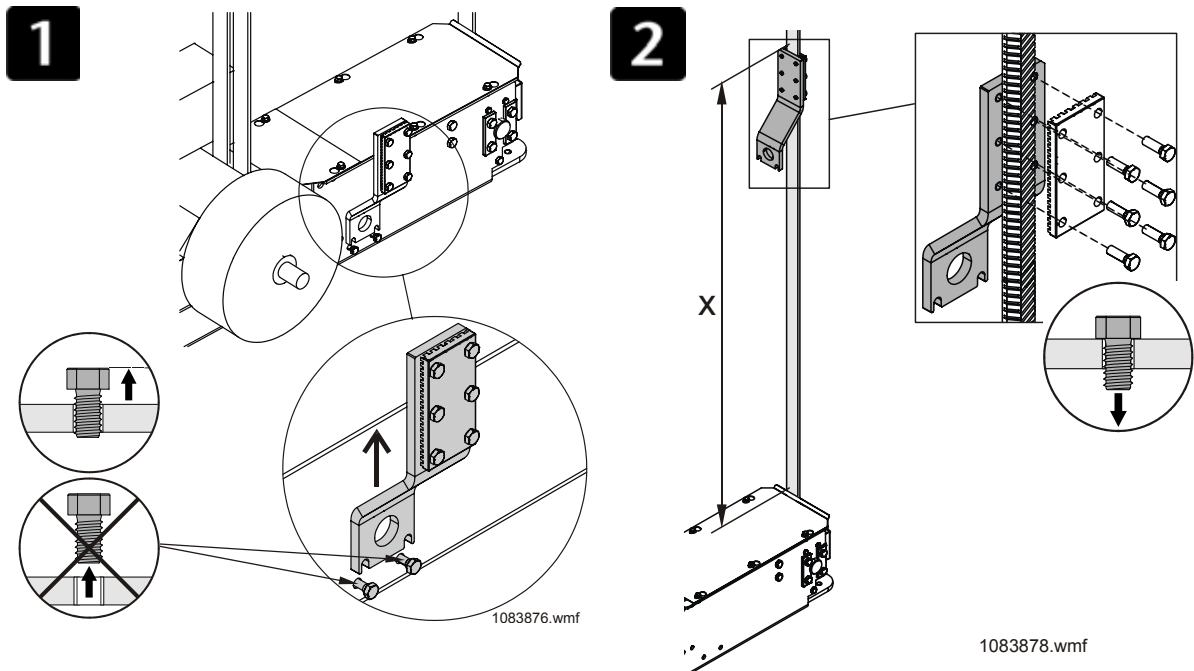
1



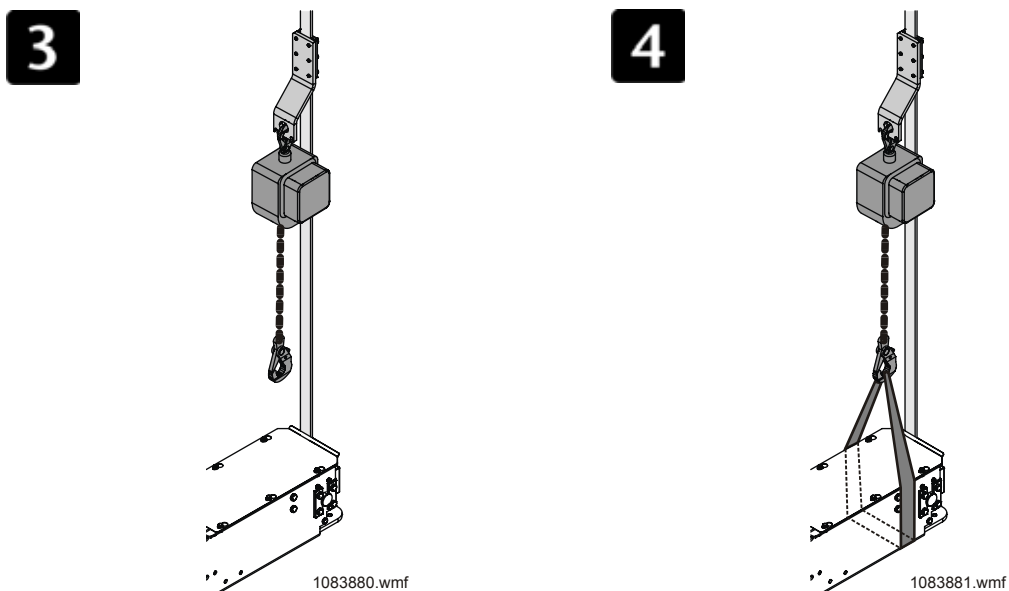
2



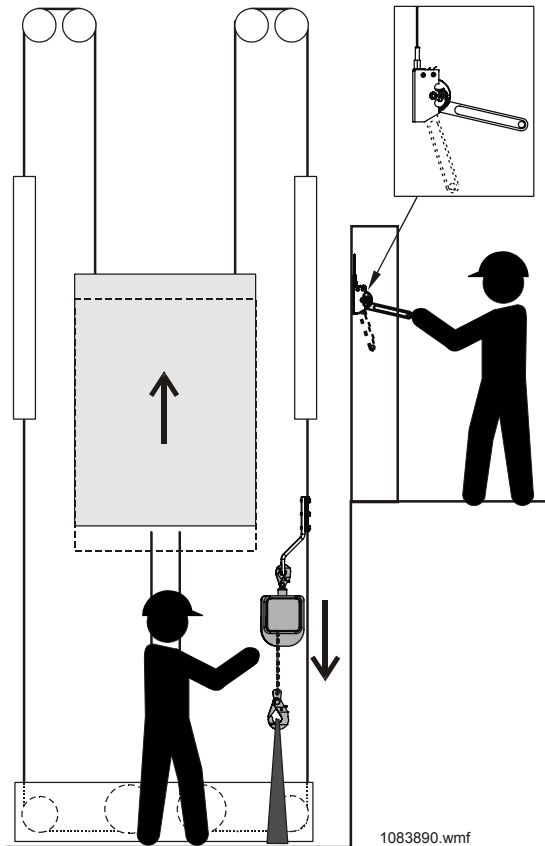
Moving the elevator car with lifting equipment



NOTE!
Attach the clamp as high as possible. (x)



5



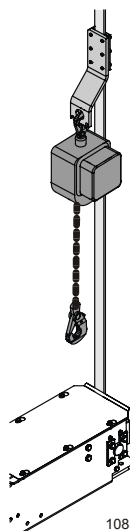
1083890.wmf

WARNING! This task requires two maintenance technicians. Clear and reliable communication between the maintenance technicians must be established. If the maintenance access panel is located at the second floor, use intercom, walkie-talkies, mobile phones or other two-way communication devices. Test the communication devices before trying to move the elevator car. If the communication is lost, stop working immediately.



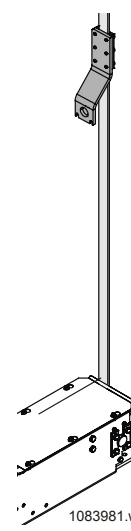
1. Open the brake.
2. Operate the chain hoist to up direction in order to pull the balancer weight downwards approximately 150 mm, immediately after brake opening.
3. Close the brake immediately after moving the elevator car.
4. Ensure that the safety gears are released.

6

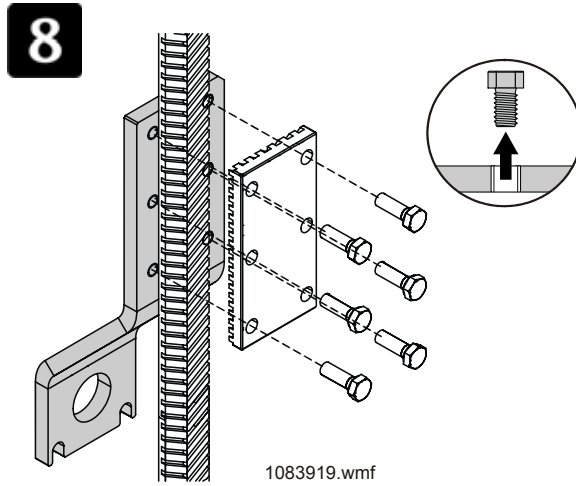


1083880.wmf

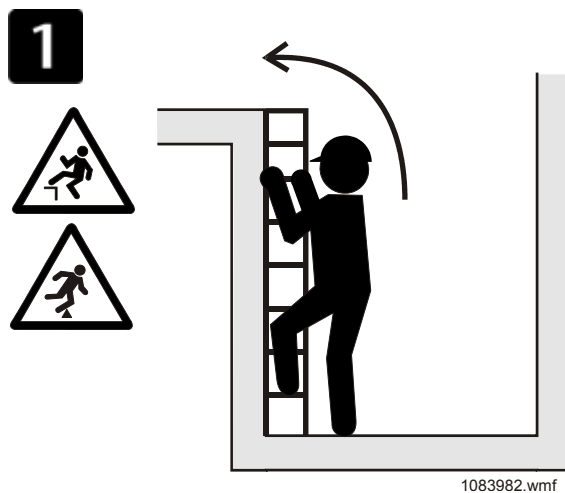
7



1083981.wmf



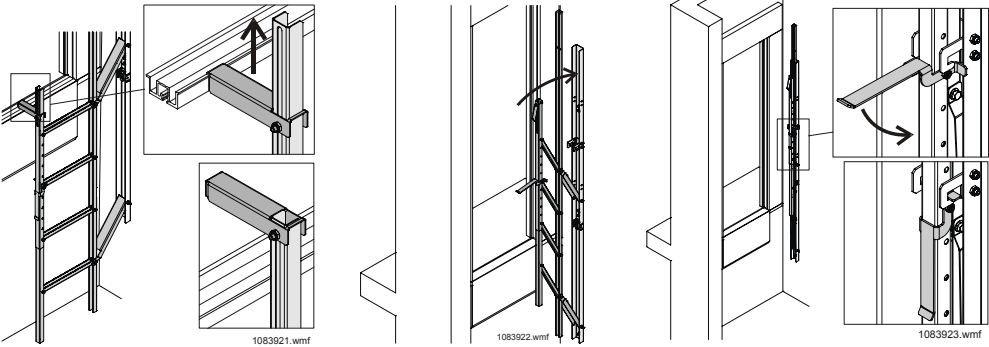
Going to the landing



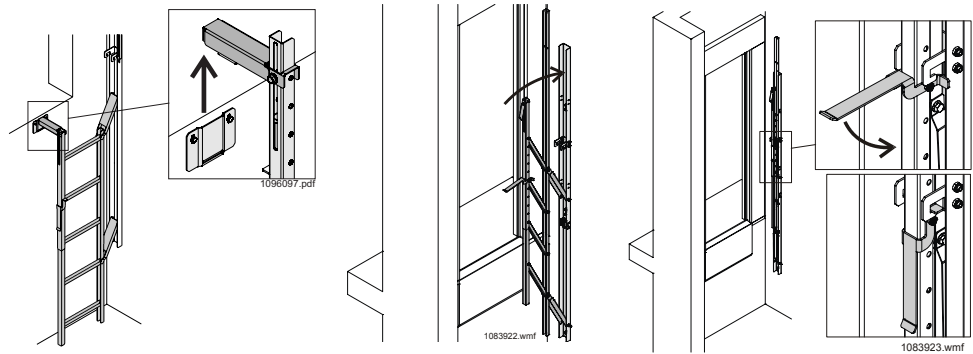
NOTE! Remove the tools and accessories to the landing.

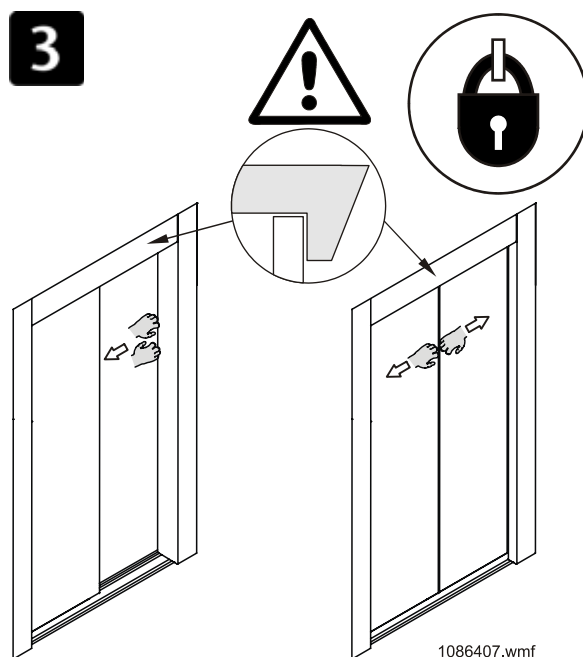
2

Automatic doors



Swing doors





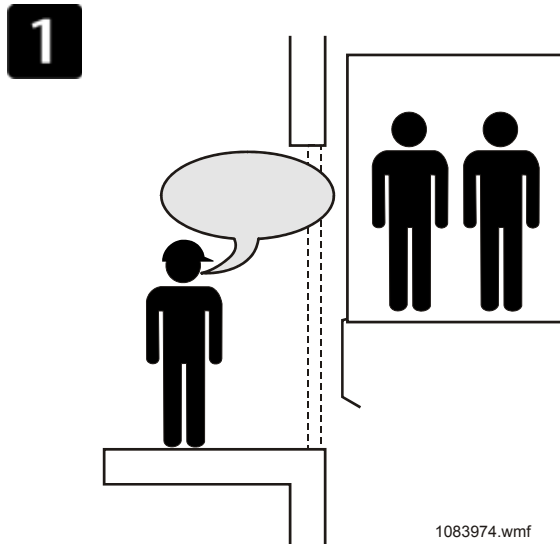
Close the landing door and check that it is mechanically locked.

11.7.3 Moving the elevator car to door zone

When the elevator car has been released from safety gear, you can move it to door zone by using the manual brake releasing device. Select one of the following:

- Section 11.7.4 Moving the elevator car using the manual brake releasing device. (Page 140.)
- Section 11.7.5 Moving the elevator car using the manual brake releasing device with car position checks at landing. (Page 146.)

11.7.4 Moving the elevator car using the manual brake releasing device



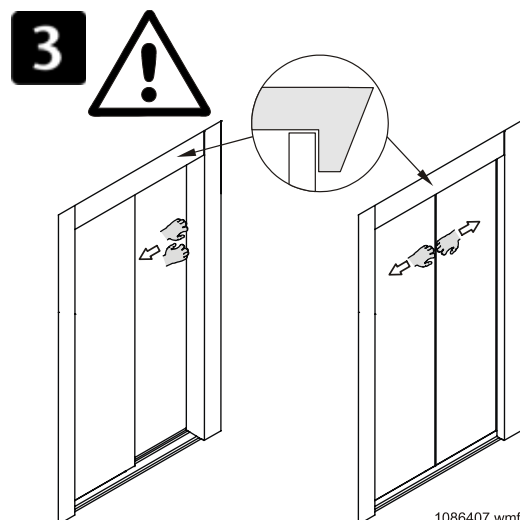
Inform the passengers that you are about to move the elevator car in order to let them out and they must stay calm and not try to do anything by themselves.

2

Ask the passengers if the car light or car emergency lighting is on.

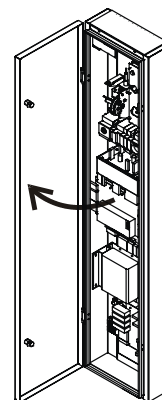
If the normal power supply to the elevator is unavailable but the car emergency light is on, the emergency lighting battery is operative. It supplies power also to the door zone LEDs and speed and direction LEDs in the LCE user interface.

NOTE! Battery status can also be checked by pushing the alarm button in car operating panel: If alarm buzzer sounds or a call to the service center is successful, the battery operates.



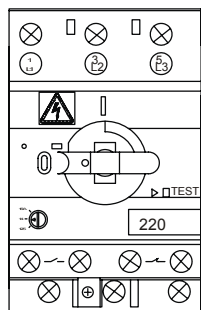
Check that car and landing doors are closed and mechanically locked.

4



Go to the maintenance access panel.

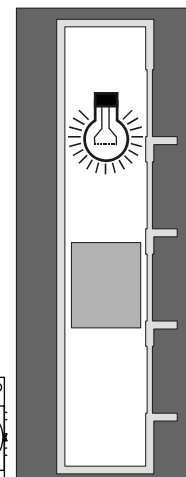
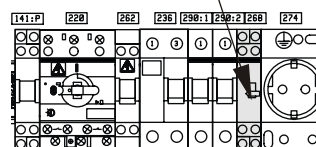
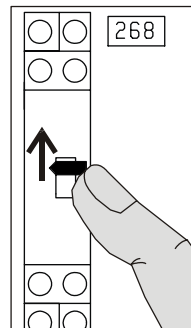
5



1083894.wmf

Switch off the main switch. (220)

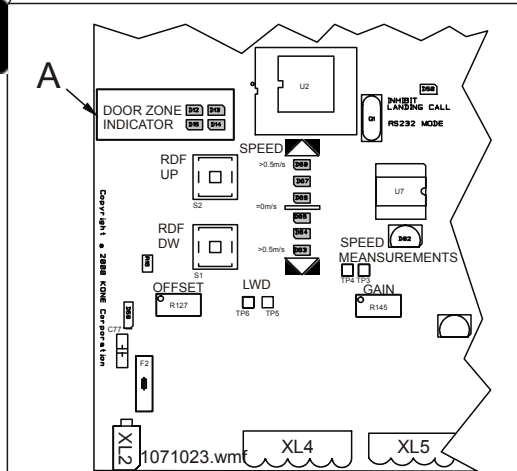
6



1085456.wmf

Switch on the shaft lights. (268)

7



9.wmf

Check the elevator car position.



WARNING! Never open the brakes when the elevator car is in door zone. DZ LEDs are on when the elevator car is in door zone. (A)



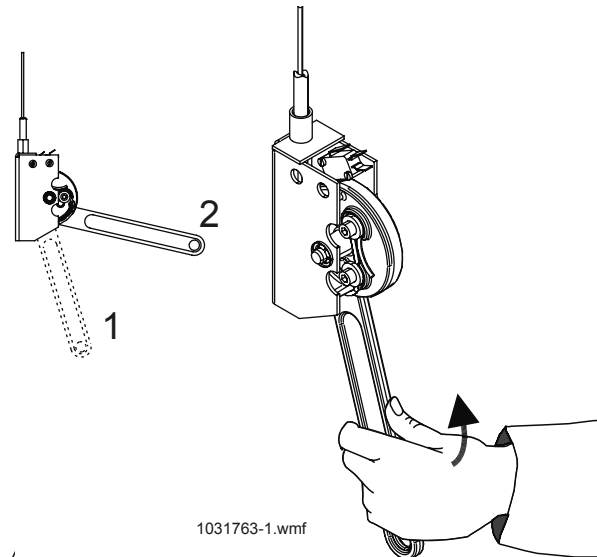
WARNING! If the emergency battery is inoperative, you cannot monitor elevator car position or movement from the LCE user interface LEDs. Go to section 11.7.5 *Moving the elevator car using the manual brake releasing device with car position checks at landing.* (Page 146.)

8

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

Pull the brake release lever to release the mechanical brakes. (2)

Keep the brakes open maximum 1 second and then release the lever to close the brakes. (1)



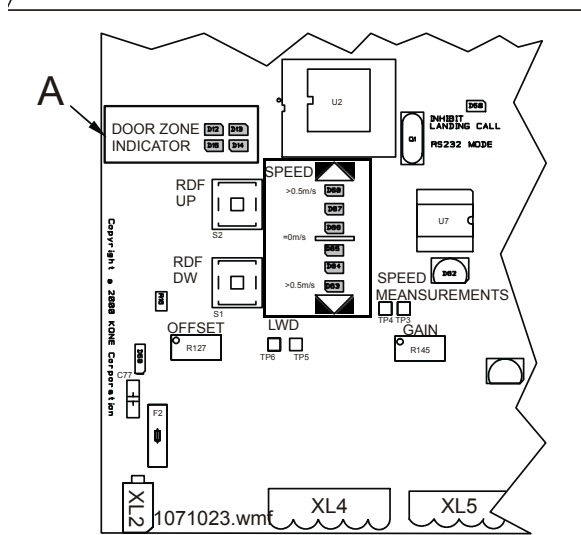
Observe from the speed and direction indicator LEDs and DZ LEDs.



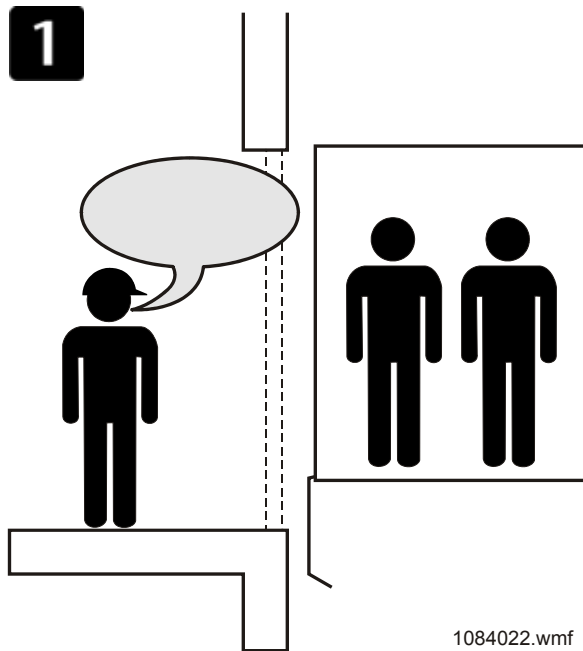
WARNING! The speed can increase fast when you open the brake. Never keep the brakes open more than 1.0 second to prevent the elevator from accelerating to overspeed. Never open the brakes when the elevator car is in door zone.

Release the lever immediately if:

- The DZI LEDs (A) turns on.
- The second speed LED in UP (D67) or DOWN (D64) direction turns on.

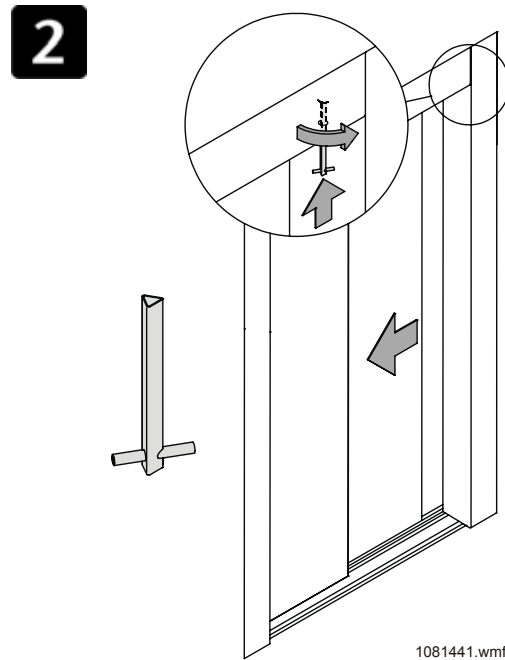


Rescue procedures when the elevator car is in door zone



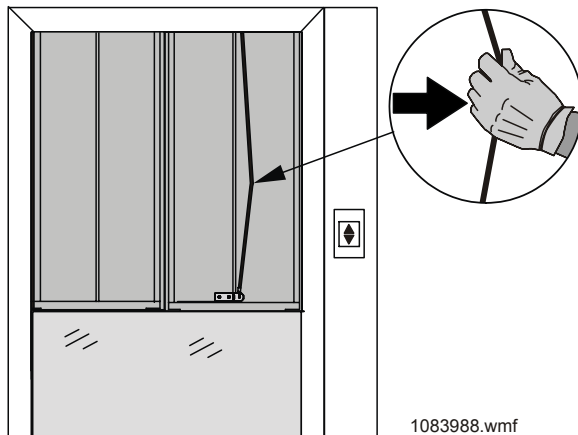
Inform the passengers about how to act when you open the doors:

- They must stay calm.
- They must obey the instructions you give.
- They must stay away from the car door when you open it.
- They must to exit the elevator car one by one.



Open the landing door with emergency opening key.

3



If the car door does not open when opening the landing door, you can open it by pulling the wire rope and manually pushing or pulling the car door.

WARNING! Use protective cut-resistant safety gloves.



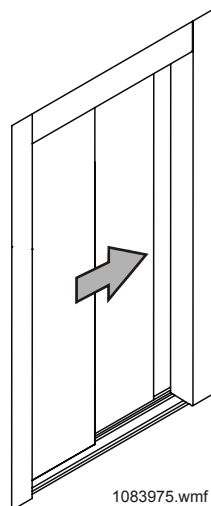
4



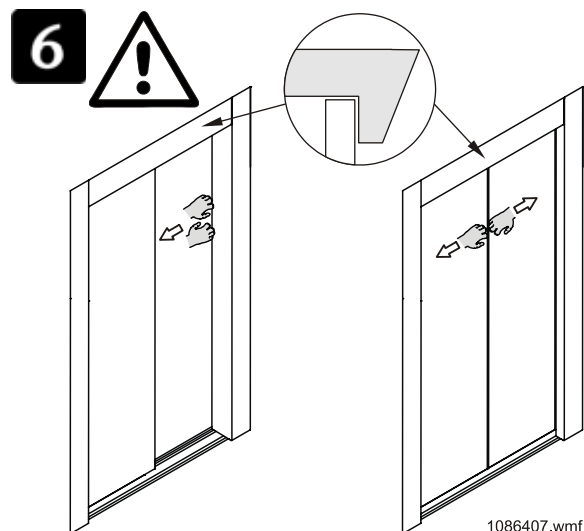
Assist the passengers out from the elevator car.

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

5



6



Check that the doors are mechanically locked.

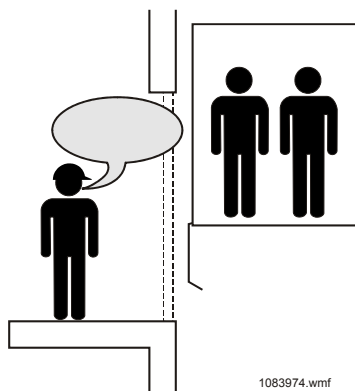
11.7.5 Moving the elevator car using the manual brake releasing device with car position checks at landing

This section describes moving the elevator car to a door zone using the manual brake releasing device when the speed and direction LEDs and door zone LEDs do not operate. It is an unlikely situation but can occur if for example emergency lightning battery has run out.



WARNING! Manual brake release must be used with extreme care. After each short brake opening sequence the position of the elevator car must be checked with direct visual check.

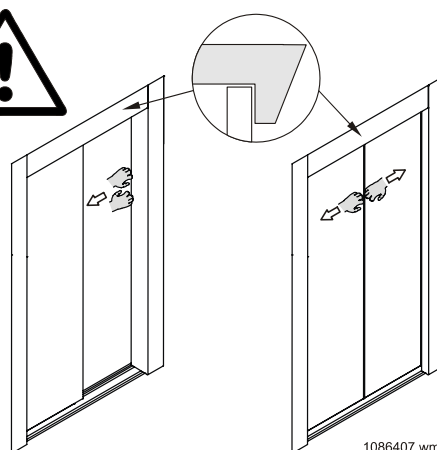
1



1083974.wmf

Inform the passengers that you are about to move the elevator car in order to let them out and they must stay calm and not try to do anything by themselves.

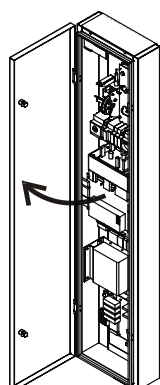
2



1086407.wmf

Check that landing doors are closed and mechanically locked.

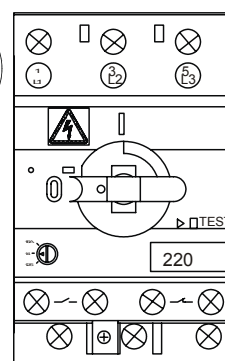
3



1083963.wmf

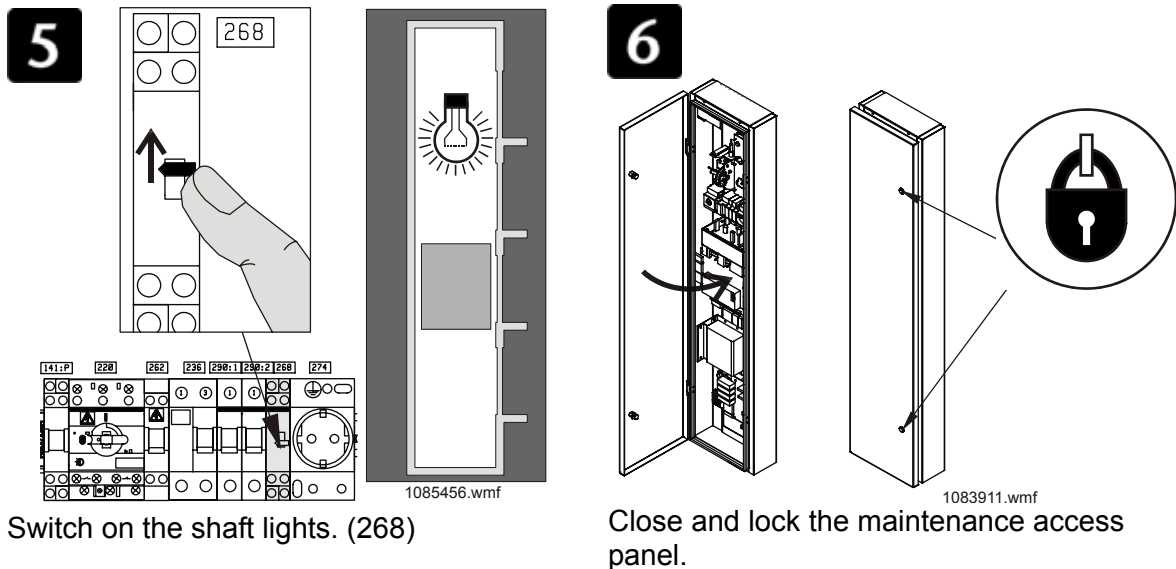
Open the maintenance access panel.

4



1083894.wmf

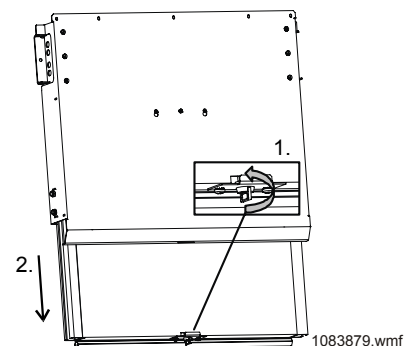
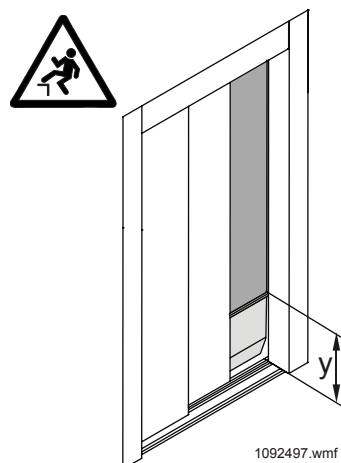
Switch off the main switch. (220)



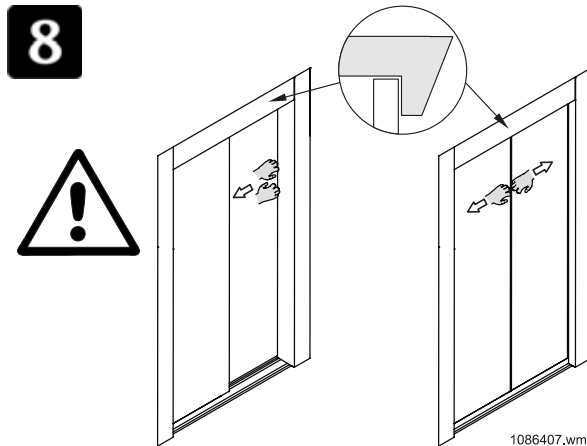
7

Check the elevator car position.

1. Open the landing doors with emergency opening key, maximum opening width 100 mm.
2. Check the elevator car position. Dimension Y between the landing floor and the car floor must be 0.2 m or less. There should be no gap between the landing floor and car apron. If the apron is extendable, open it to full height, and check the distance again:
 - If there is no gap, and Y is 0.2 m or less, proceed to section *Rescue procedures when the elevator car is in door zone* (page 150).
 - If there is still gap, or Y is more than 0.2 m, proceed to next step.



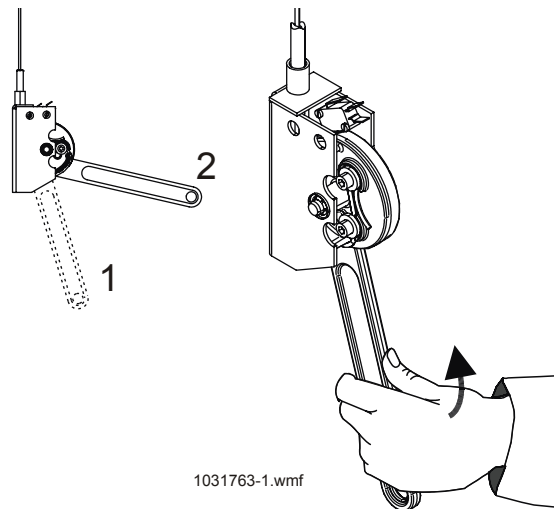
Lowering the car apron:
1. Open the locking mechanism.
2. Lower the apron.



Close the landing doors. Check that the landing doors are mechanically locked.

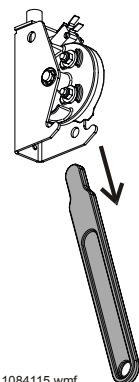
9 Go to the maintenance access panel.

- 10**
- Open the brakes step by step to move the elevator car.
1. Install the lever to the manual brake releasing device.
 2. Pull the brake release lever to release the mechanical brakes. (position 2)
 3. Keep the brakes open maximum of 1 second and then release the lever to close the brakes. (position 1)



WARNING! 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. Never open the brakes when the elevator car is in door zone.

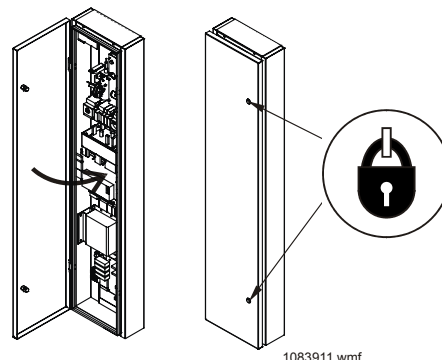
11



1084115.wmf

Remove the brake release lever.
Store the brake release lever inside the maintenance access panel.

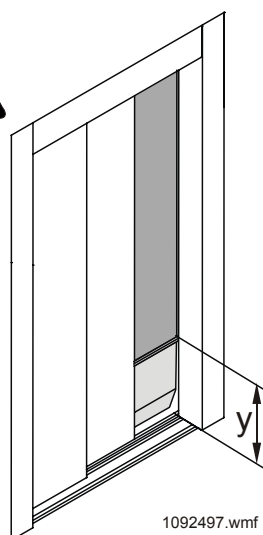
12



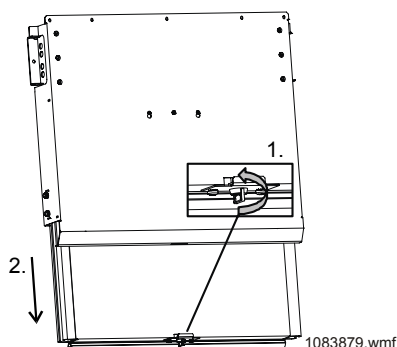
1083911.wmf

Close and lock the maintenance access panel.

13



1092497.wmf



1083879.wmf

Lowering the car apron:
1. Open the locking mechanism.
2. Lower the apron.

Check the elevator car position:

1. Open the landing doors with emergency opening key, maximum opening width 100 mm.
2. Check the elevator car position.
Dimension Y between the landing floor and the car floor must be 0.2 m or less. There should be no gap between the landing floor and car apron. If the apron is extendable, open it to full height, and check the distance again:
 - If there is no gap, and Y is 0.2 m or less, proceed to section *Rescue procedures when the elevator car is in door zone* (page 150).
 - If there is still gap, or Y is more than 0.2 m, proceed to next step.
3. Close the landing doors.
4. Check that the landing doors are mechanically locked.

NOTE! If the elevator car does not move when releasing the mechanical brakes, there may be a balanced load in the elevator car.

Select one of the following:

A: Ask the passengers to change their positions in the elevator car and maybe also to jump. Then repeat steps 7 – 12.

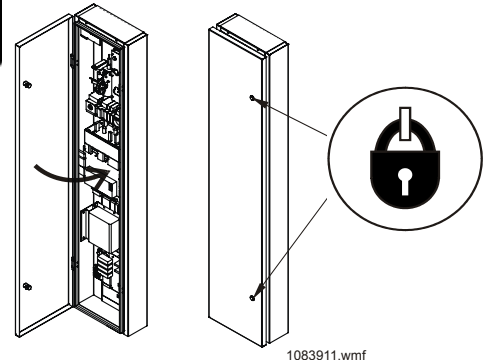
B: Use the car lifting equipment, see section 11.7.2 *Moving the elevator car with lifting equipment* (Page 130.)

14

Repeat steps 7 – 12 until the elevator car arrives to door zone.

NOTE! The elevator car must be near floor level (± 0.2 m)

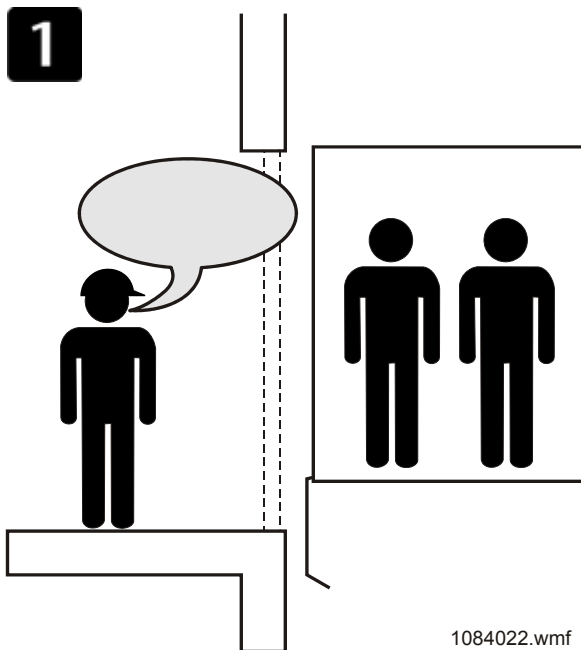
15



Close and lock the maintenance access panel.

Rescue procedures when the elevator car is in door zone

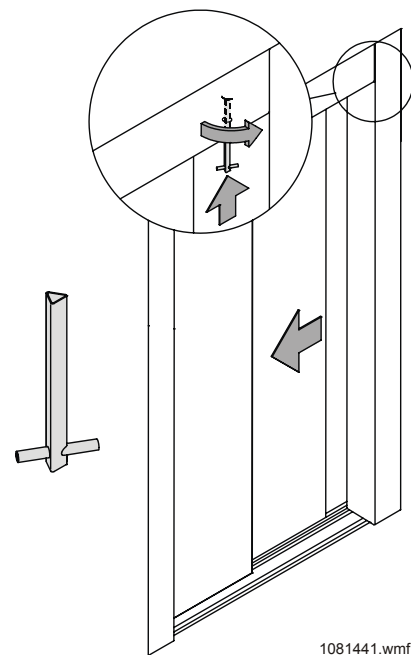
1



Inform the passengers about how to act when you open the doors:

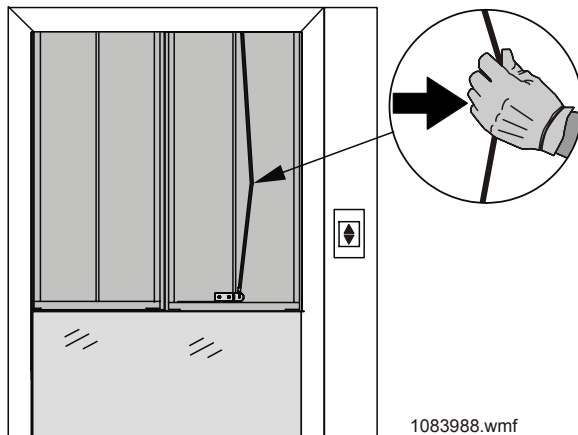
- They must stay calm.
- They must obey the instructions you give.
- They must stay away from the car door when you open it.
- They must to exit the elevator car one by one.

2



Open the landing door with emergency opening key.

3



If the car door does not open when opening the landing door, you can open it by pulling the wire rope and manually pushing or pulling the car door.

WARNING! Use protective cut-resistant safety gloves.



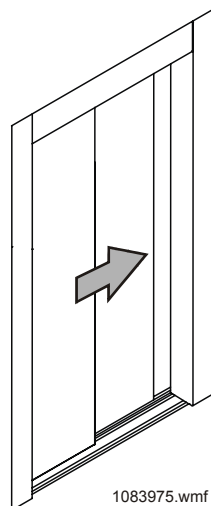
4



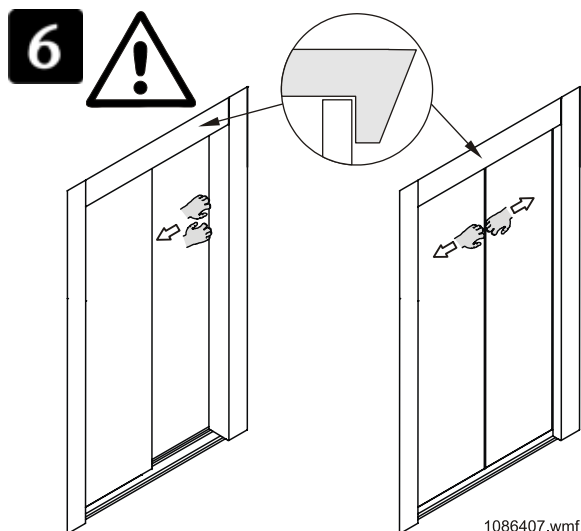
Assist the passengers out from the elevator car.

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

5



6



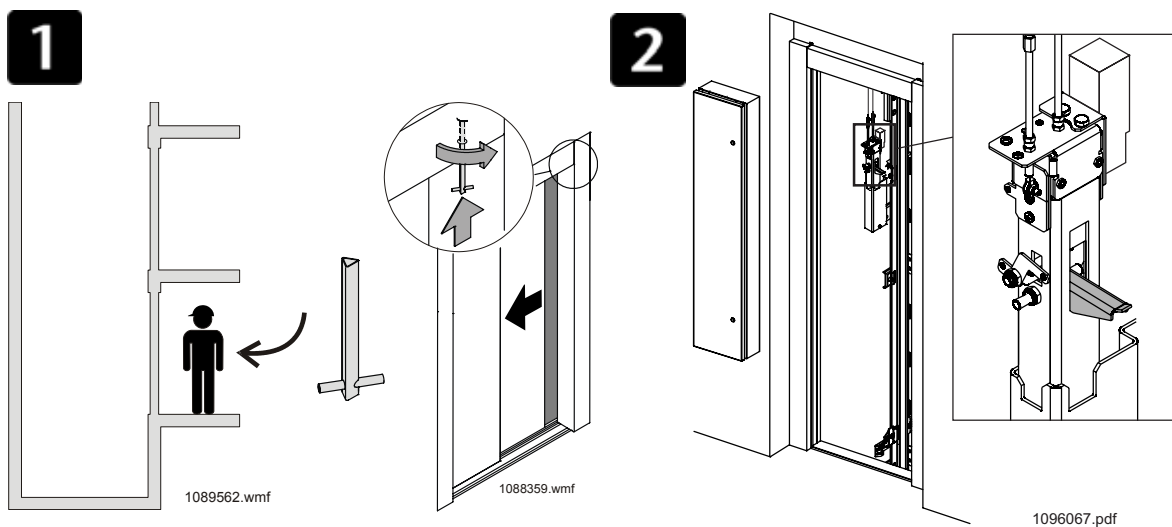
Check that the doors are mechanically locked.

11.8 After the rescue

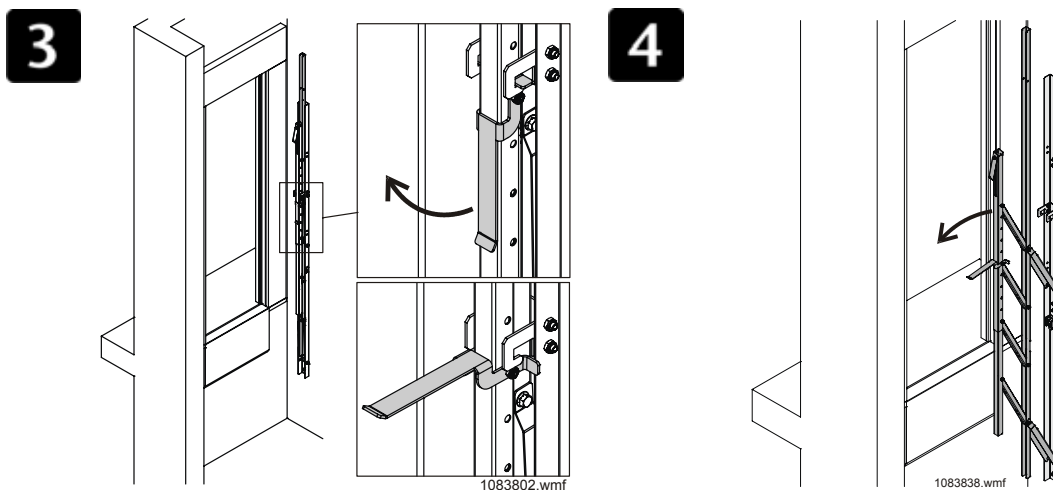
This section describes how to store the rescue clamp if it has been used, reset the pit safety device and shaft access monitor (SAM), and how to reset the alarm on LCERAL board.



WARNING! Use protective cut-resistant safety gloves.



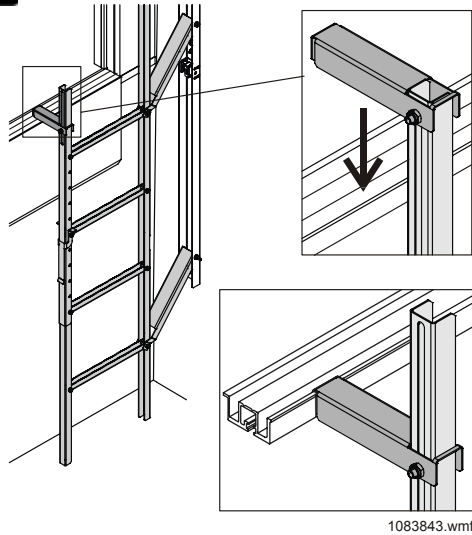
Check that the safety device has triggered.



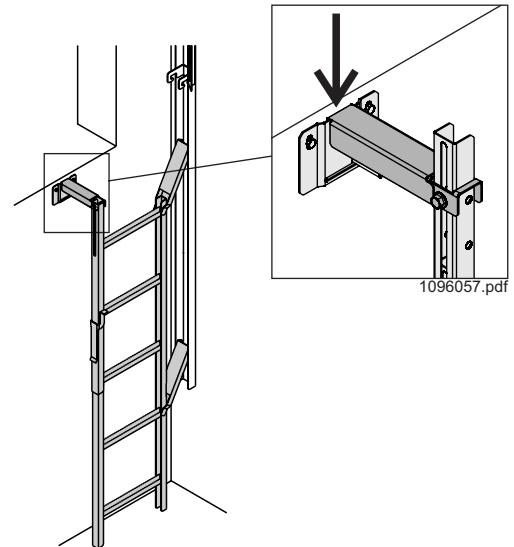
Install the ladder.

5

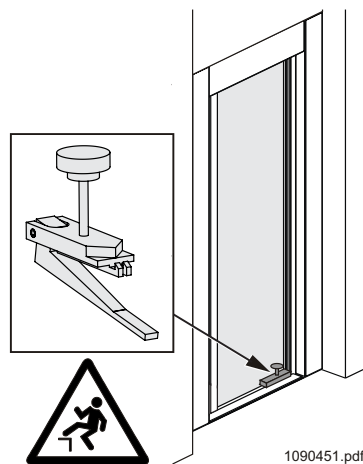
Automatic door



Swing door

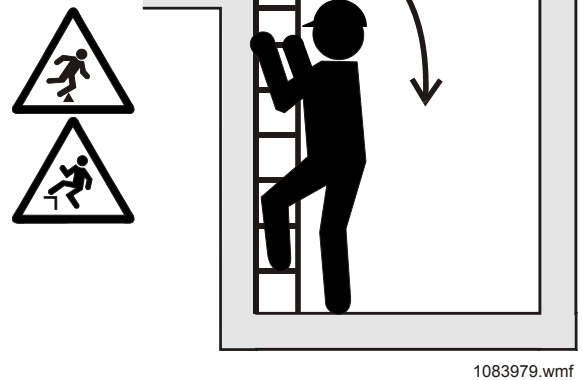


6

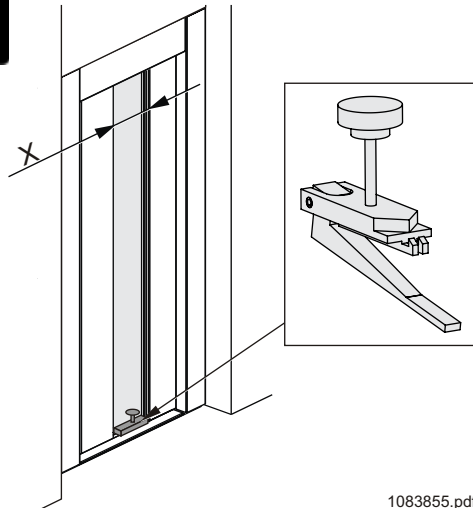


Block the door to fully open position with door blocking tool.

7



8



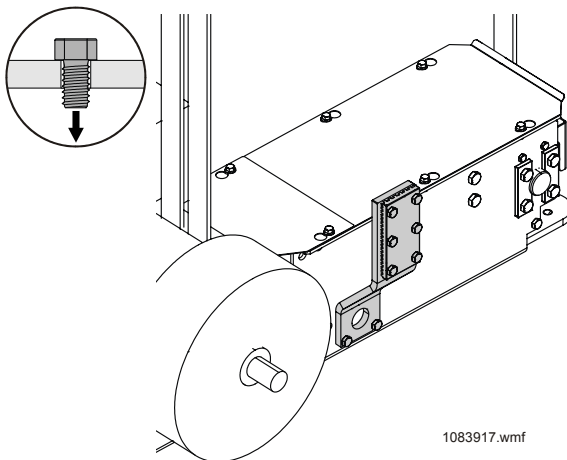
Block the door to fully slightly position with door blocking tool.

$x = 100 \text{ mm}$.

WARNING! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool.

1083855.pdf

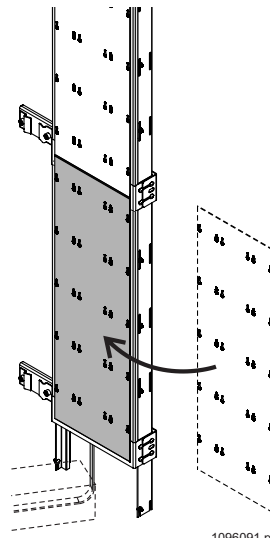
9



1083917.wmf

Fix the rescue clamp back to hoisting unit.

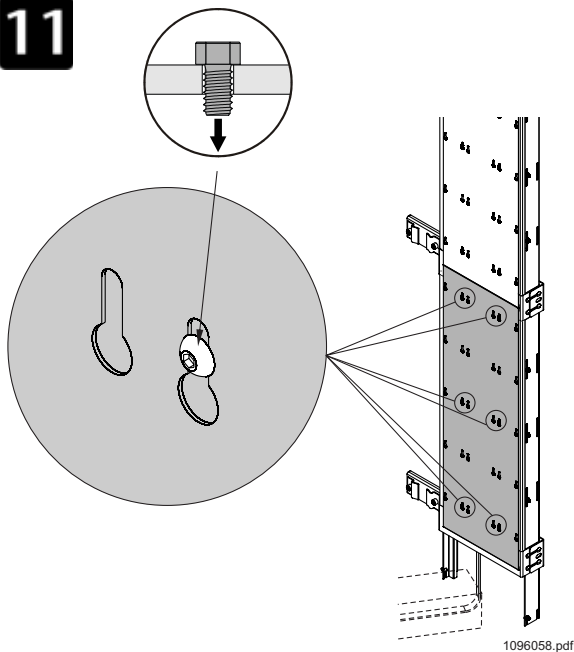
10



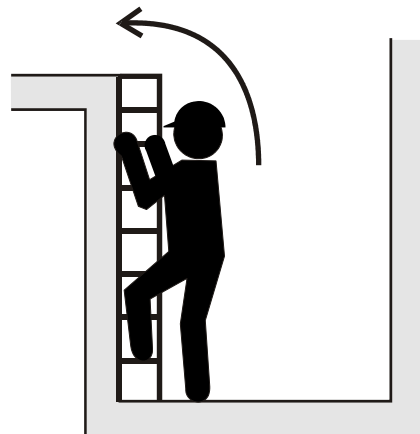
1096091.pdf

Install the balancer weight screen.

11



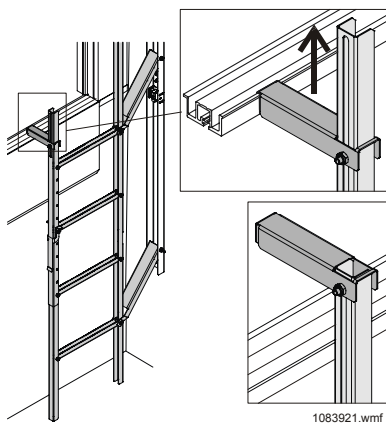
12



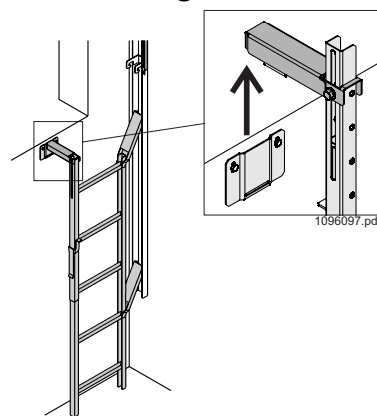
1083982.wmf

13

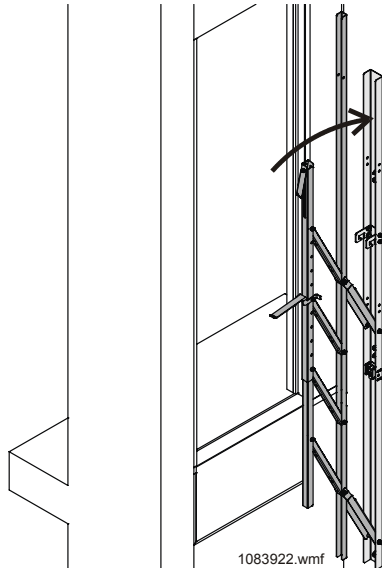
Automatic door



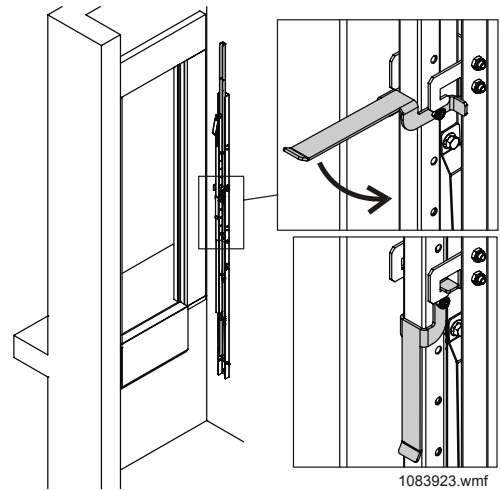
Swing door



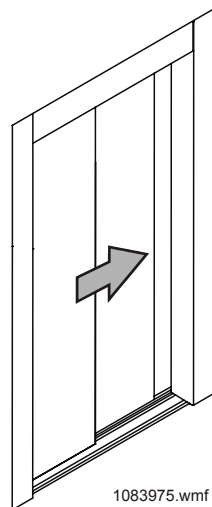
14



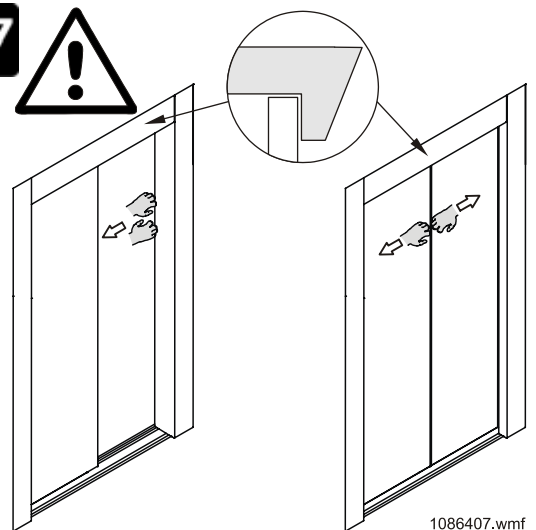
15



16

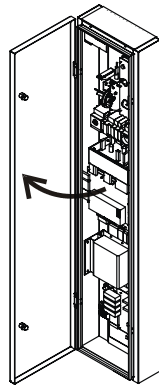


17



Check that the landing doors are
mechanically locked.

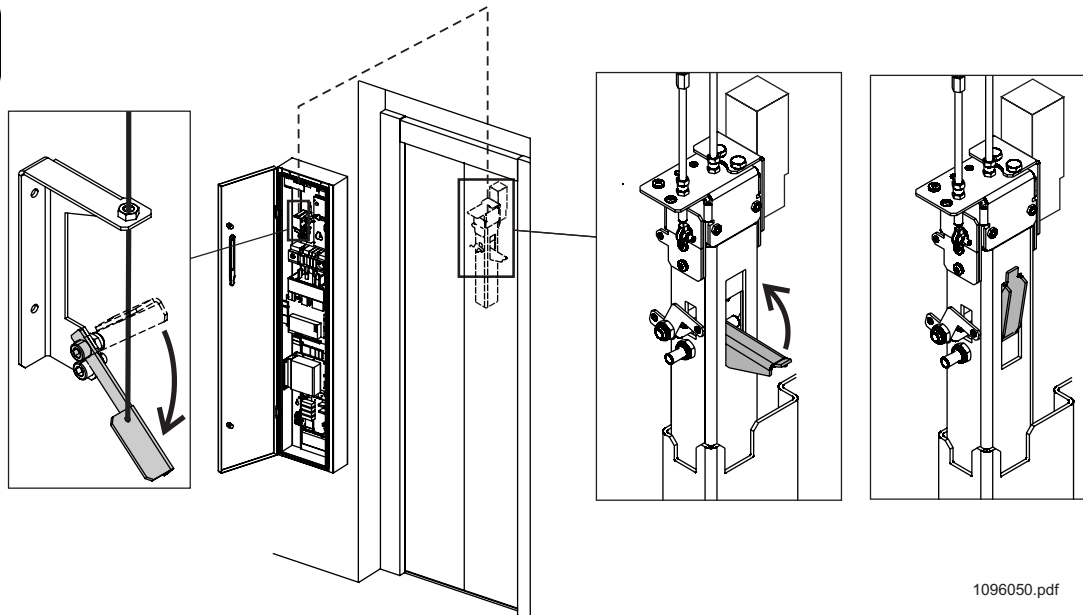
18



1083963.wmf

Open the maintenance access panel.

19

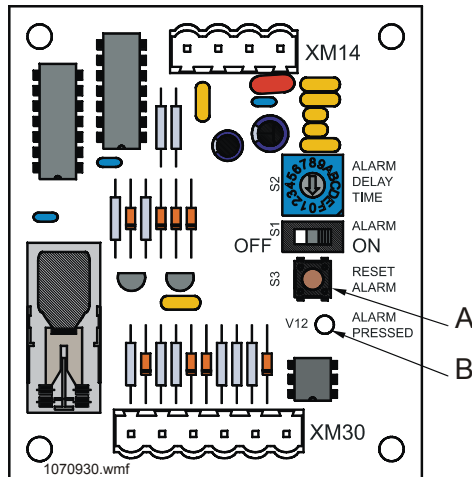


1096050.pdf

Reset the pit safety device and Shaft Access Monitor (SAM), if applicable.

1. Switch on the Recall Drive Feature (RDF). (POS 270.)
 2. Press lever in the maintenance access panel down.
 3. If the elevator is equipped with SAM, reset it by pressing simultaneously RDF RUN 270:RB + SAM reset 141:P button in maintenance access panel for at least 5 seconds, until the SAM reset signal sounds
 4. Drive the elevator car upwards by using Recall Drive Feature (RDF). At the same time press simultaneously RDF buttons 270:UP, 270:RB and 134:S for at maximum of 3 seconds to reset the pit safety device.
- CAUTION!** Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.
5. Switch off the Recall Drive Feature (RDF). (POS 270.)

20



21

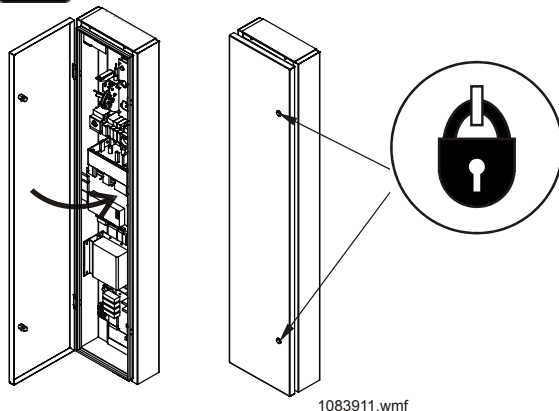
Check if the elevator can be returned to normal use.

Refer to the elevator level fault finding instruction if needed.

Reset the alarm. If the maintenance access panel is equipped with LCERAL board, locate it and reset in a following way:

1. Push the RESET button (A) in the LCERAL board to reset the alarm.
2. Check that the alarm LED (B) turns off.

22



Close and lock the maintenance access panel.

APPENDIX A. SAFETY SPACE ARRANGEMENT (SSA**E)



This section describes the SSA**E devices.



NOTE! In addition to the described SSA**E instructions, all safety measures for normal elevator maintenance must be implemented and local safety regulations followed.

A.1 SSA**E (option)

SSA**E devices are used in elevators where the space in the headroom differs from the minimum required by EN 81-1. SSA**E ensures a temporary safe working space for personnel installing, maintaining or inspecting the elevator. SSA**E complies with the requirements of EN 81-21. The safety space is ensured with hinged safety buffers on the car roof and shaft access monitoring (SAM).

Correct safety procedures must be followed when working on the car roof or in the pit of such elevators.

- Maintenance; Due to final inspection drive limits, it is possible to maintain the landing door of the lowest floor only by using ladders.
- Inspection; It is not possible to test the opening of the lowest and topmost landing doors by using the inspection drive. The opening of the lowest and topmost landing doors have to be tested in normal use or manually.
- Rescuing trapped passengers; If shaft access monitoring has activated and is stopping the elevator movement, reset it. Follow the general elevator type dependent rescue instruction. See also section A.4 Working with elevator with SSA**E.

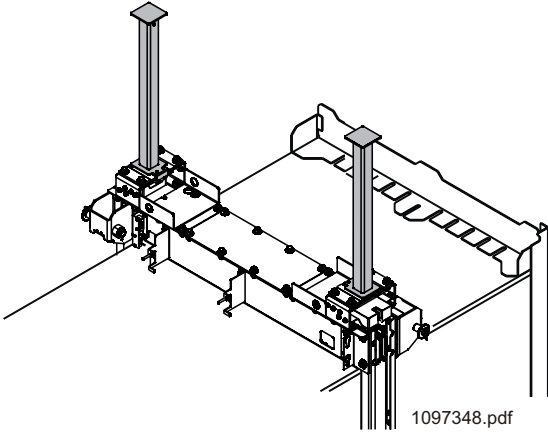
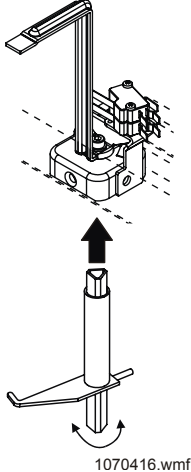
A.2 Identifying SSA**E

This section describes how to identify if your elevator is equipped with SSA**E.

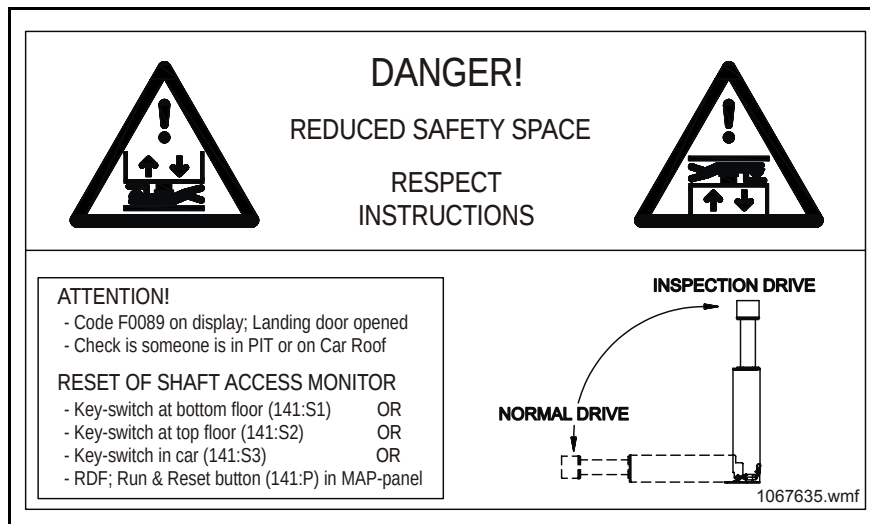
SSA** equipment

The temporary safe working space is created with the following additional SSA**E equipment:

- Landing door emergency opening device with detection switches.
- Shaft access monitoring (SAM) control and memory unit.
- Safety buffers on the car roof.
- Connection box on the car roof.

Car top buffer(s)	Landing door emergency opening device with detection switches
	
To run on inspection or normal drive, all buffers must be in the same position, either horizontally (normal drive) or vertically (inspection drive).	A landing door opening at any floor with the emergency opening key is detected regardless where the elevator is standing (detected even if the elevator is at landing).

Stickers and warning signs



If the elevator is equipped with SSA**E, the sticker above is attached to the following locations:

- Shaft access monitor
- Buffers
- Car top connection box
- Maintenance access panel

Additionally, on the roof has the following warning sign:



APPENDIX B. RESETTING THE SAFETY DEVICES



This section describes how to reset the shaft access monitor, the pit safety device, and both two at the same time.

B.1 Resetting the shaft access monitor (SAM)

This section describes resetting the shaft access monitor (SAM).

To reset the Shaft Access Monitor (SAM):

1. Check that nobody is in the shaft.
 2. Check that none of the stopping devices are not in STOP position.
 3. Check that all devices providing safety spaces are in position for normal drive.
 4. Check that all landing doors and possible trap doors are closed.
 5. Check that the +24 VDC power supply for SAM is available.
 6. Reset SAM by:
 - Pressing the SAM reset 141:P button in Maintenance Access Panel (MAP), or
 - Turning the SAM reset key switch (141:S2) on the topmost landing door frame
- NOTE!** Keep the button pressed or key in reset position for at least 5 seconds.

The SAM reset signal sounds and the elevator returns to normal operation. If SAM does not reset, RDF is on or a safety component, for example, overspeed governor or safety gear, may be cutting the safety chain.

7. If the Recall Drive Feature (RDF) is on or the safety chain is open, reset SAM as follows:

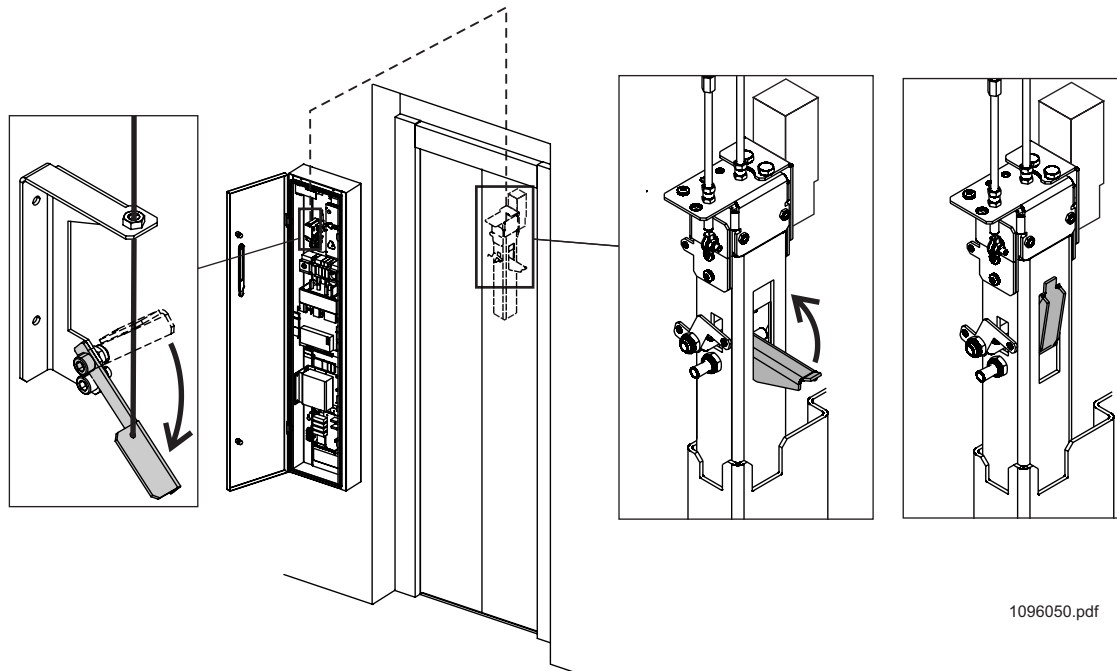
NOTE! Keep the RDF RUN 270:RB button pressed throughout this procedure.

 - A. Simultaneously press RDF RUN 270:RB + SAM reset 141:P button in MAP until the SAM reset signal sounds.
 - B. If you need to move the car, release the SAM reset 141:P button and while still pressing the RDF RUN button, press the RDF direction button RDF UP or RDF DW.

B.2 Resetting pit safety device

The pit safety device must be reset after returning to the landing:

1. Go to the Maintenance Access Panel (MAP).
2. Switch on the Recall Drive Feature (RDF). (POS 270.)
3. Press down the reset lever.



1096050.pdf

4. Drive upwards on RDF: Press simultaneously RDF RUN 270:RB, RDF 270:UP and 134:S for at maximum of 3 seconds to reset the pit safety device.

CAUTION! Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.

5. Switch off the Recall Drive Feature (RDF). (POS 270.)

The pit safety device is now reset.

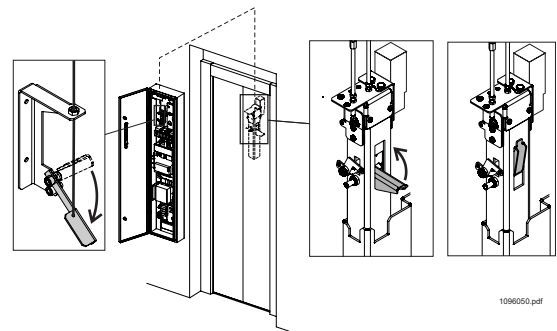
NOTE! This procedure does not apply to elevators which have the shaft access monitor (SAM). If the SAM has detected access to shaft, it must be reset at the same time with the pit safety device.

B.3 Resetting the pit safety device and shaft access monitor (SAM)

This section describes how to reset the pit safety device after returning to the landing, if the elevator has shaft access monitor (SAM).

1. Check that Recall Drive Feature (270) is on.
Switch it on, if it is off.
2. Check that main switch (220) is on. Switch it on, if it is off.
3. Press down the reset lever in the maintenance access panel. (A)
4. Reset SAM by pressing simultaneously RDF RUN 270:RB + SAM reset 141:P button in MAP for at least 5 seconds, until the SAM reset signal sounds.
5. Drive upwards on RDF: Press simultaneously RDF RUN 270:RB, RDF 270:UP and 134:S for at maximum of 3 seconds to reset the pit safety device.
CAUTION! Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.
6. Switch off the RDF (270).

The SAM and the pit safety device are now reset.



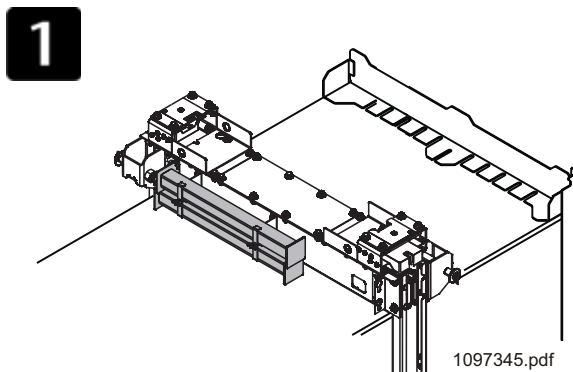
APPENDIX C. SAFETY BUFFERS ON THE ELEVATOR CAR ROOF

C.1 Safety buffers on the elevator car roof

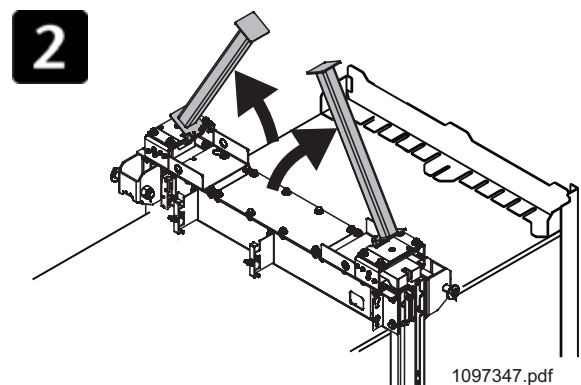


NOTE! These components are optional.

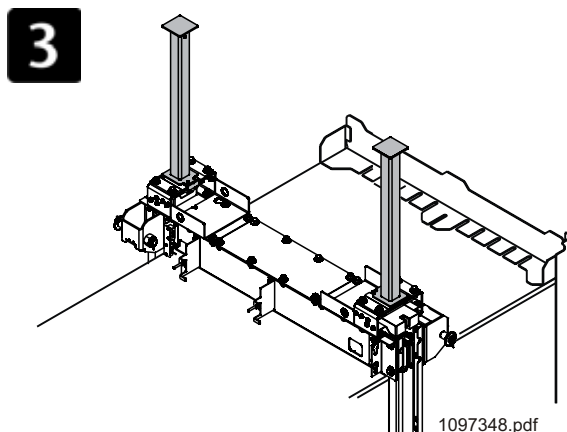
The car top buffers have minor differences between release 1.0 and 1.1 that have no effect to the use of the buffers.



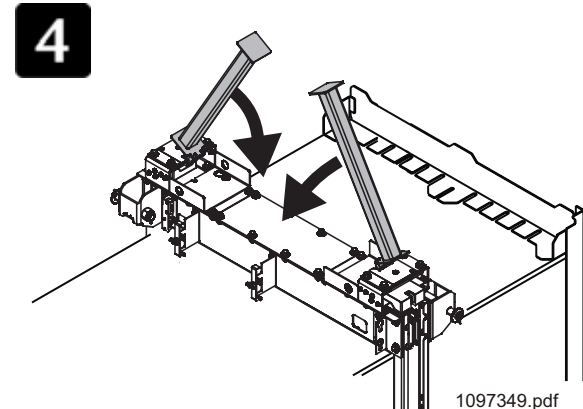
Keep all buffers in the horizontal position to run on normal drive.



Raise the car top buffers. Check that the buffers are locked to upright position.



Keep all buffers in the vertical position to run on inspection drive.



Lower the car top buffers to return the elevator back to normal drive.

APPENDIX D. SAFETY DEVICES IN THE PIT



This section describes how to check the pit stop switch, go to from the bottom floor landing to the pit, how to go to from the pit to the bottom floor landing, how to reset the pit safety device in elevators without shaft access monitor (SAM), and how to reset the pit safety device in elevators with shaft access monitor (SAM).

D.1 Checking the pit stop switch

This section describes testing the pit safety device and the stop switch in the pit.

WARNING! Wear personal protective equipment.



1. Open the landing door with the emergency release key.
2. Check that the elevator car is in a suitable position.
3. Standing on the landing, push down the stop switch.
4. Close the landing doors and check that they are mechanically locked.
5. Make a landing call. The elevator must not move.¹⁾

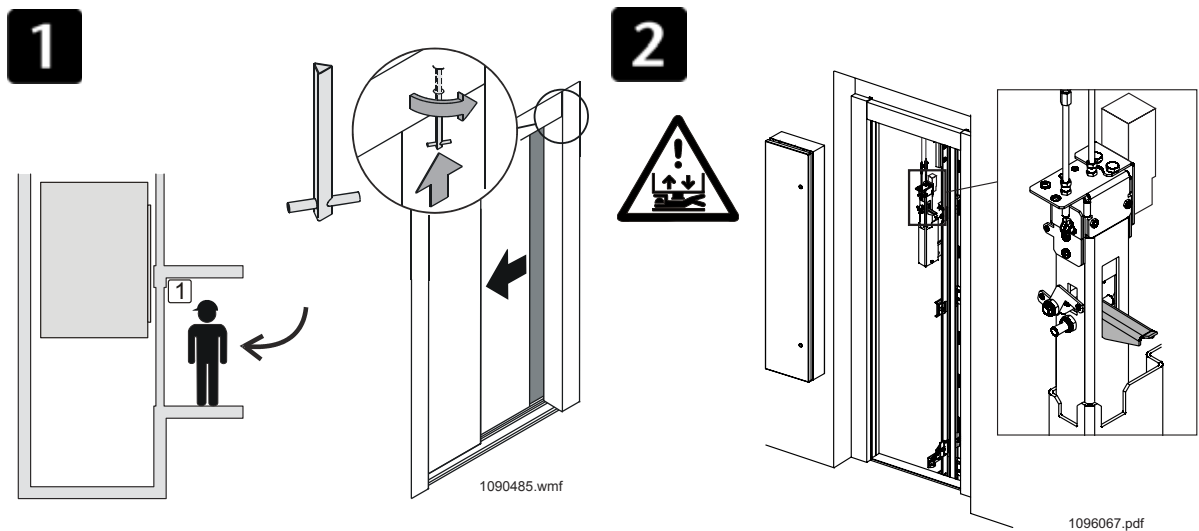


WARNING! If the stop switch does not operate correctly, find out what caused the malfunction and repair the elevator.

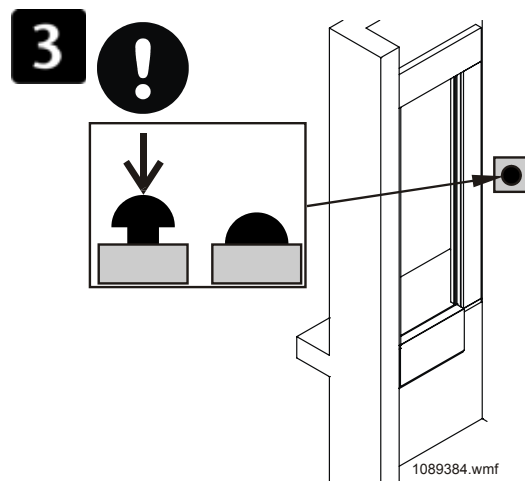
1) If the elevator has Shaft Access Monitor (SAM), go to the Maintenance Access Panel (MAP) and reset the SAM: Simultaneously press RDF RUN 270:RB + SAM reset 141:P button in MAP until the SAM reset signal sounds. Make a car call from the Maintenance Access Panel (MAP). The elevator must not move. Close and lock the MAP.

D.2 Going to the pit

This section describes going from the bottom floor landing to the pit.



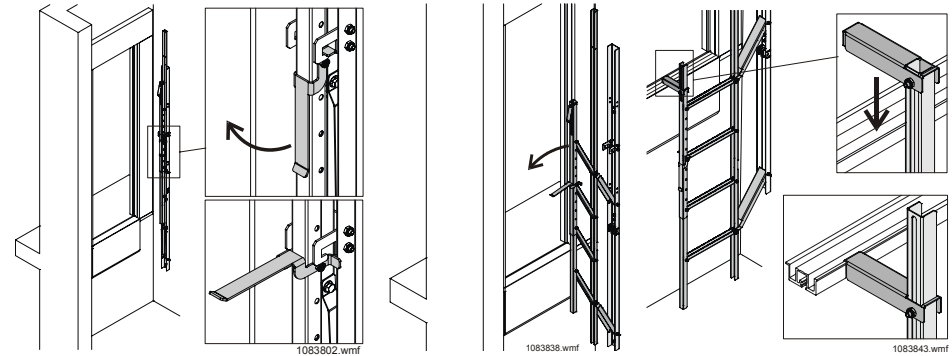
WARNING! Check that the pit safety device is activated.



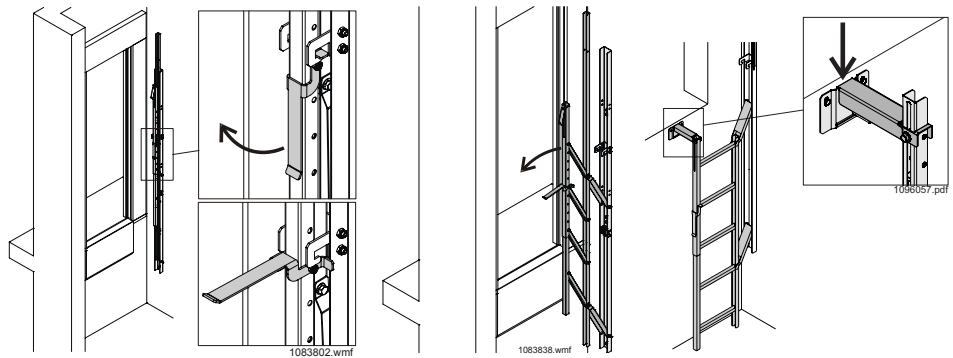
Press the pit stop switch.

4

Automatic doors

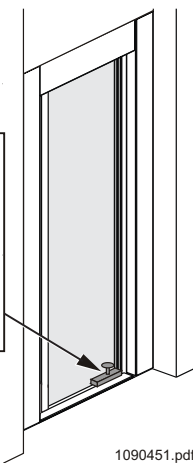
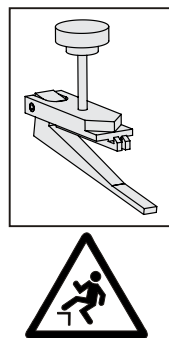


Swing doors



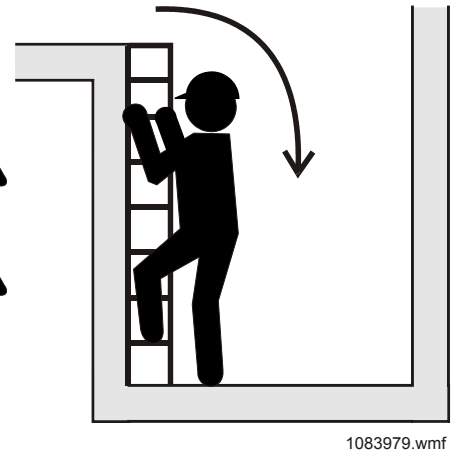
Install the pit ladders.

5

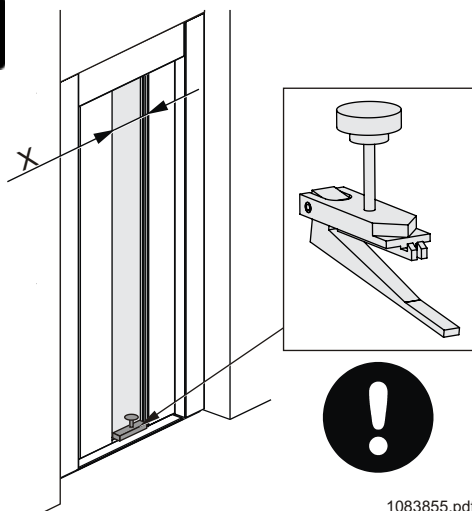


Block the door to fully open position with door blocking tool.

6



7



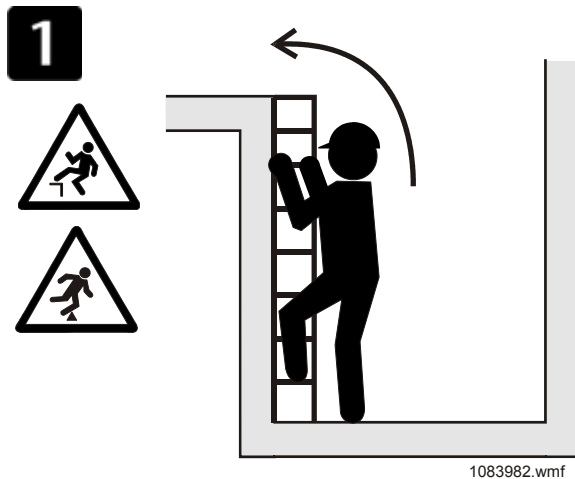
Block the door to fully slightly position with door blocking tool.

$x = 100 \text{ mm}$.

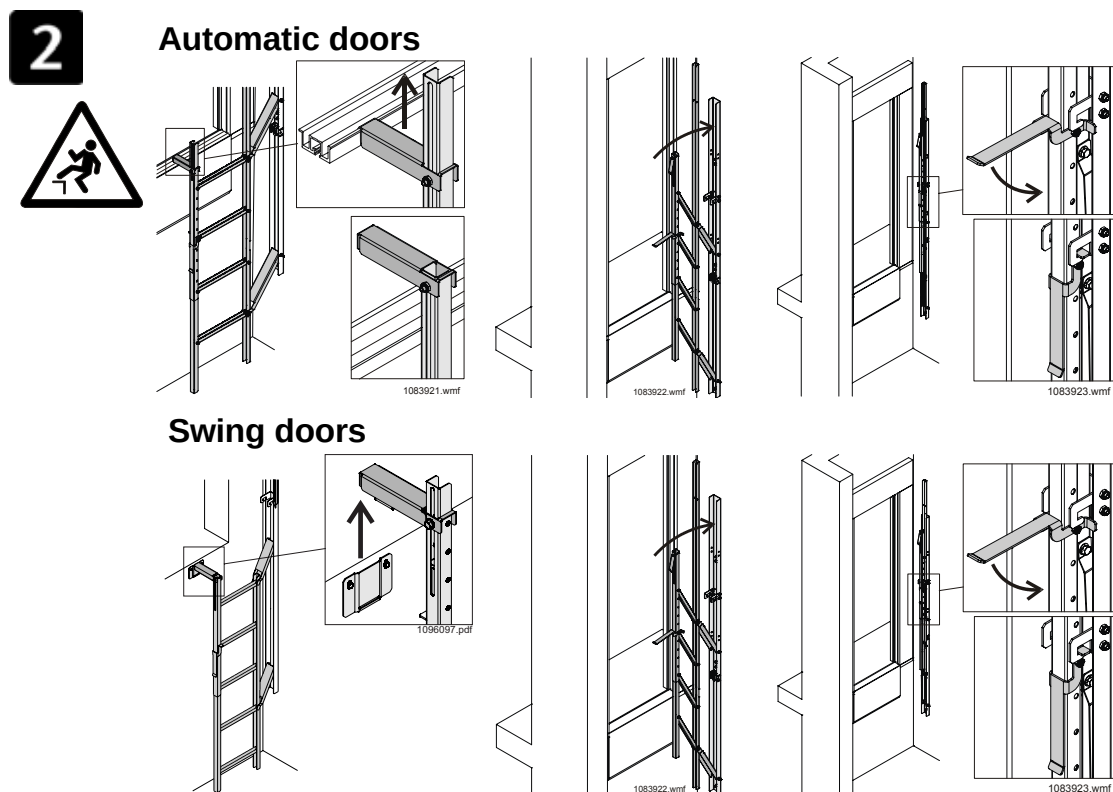
WARNING! In elevators with the smallest pits, the pit ladders must be returned to the storage position after climbing to the pit. When fixed to the door sill, the pit ladders interfere with the required safety space in the pit. To block the doors, use the door blocking tool.

D.3 Going to the landing

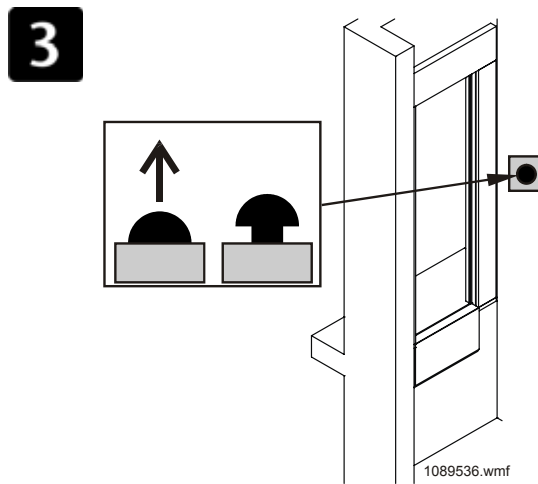
This section describes going from the pit to the landing.



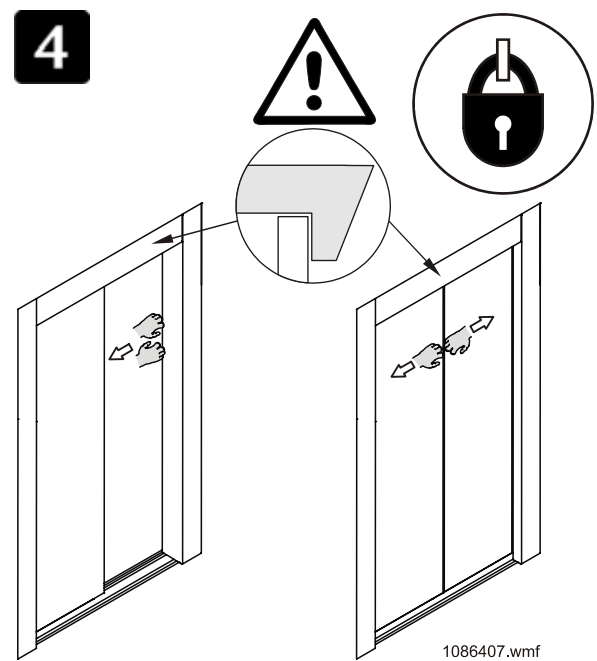
NOTE! Lift the tools and accessories to the landing.



Turn the pit ladders to normal position.



Release the pit stop switch.



Close the landing door and check that it is mechanically locked.

D.4 Resetting the shaft access monitor (SAM)

This section describes resetting the shaft access monitor (SAM).

To reset the Shaft Access Monitor (SAM):

1. Check that nobody is in the shaft.
2. Check that none of the stopping devices are not in STOP position.
3. Check that all devices providing safety spaces are in position for normal drive.
4. Check that all landing doors and possible trap doors are closed.
5. Check that the +24 VDC power supply for SAM is available.
6. Reset SAM by:
 - Pressing the SAM reset 141:P button in Maintenance Access Panel (MAP), or
 - Turning the SAM reset key switch (141:S2) on the topmost landing door frame**NOTE!** Keep the button pressed or key in reset position for at least 5 seconds.

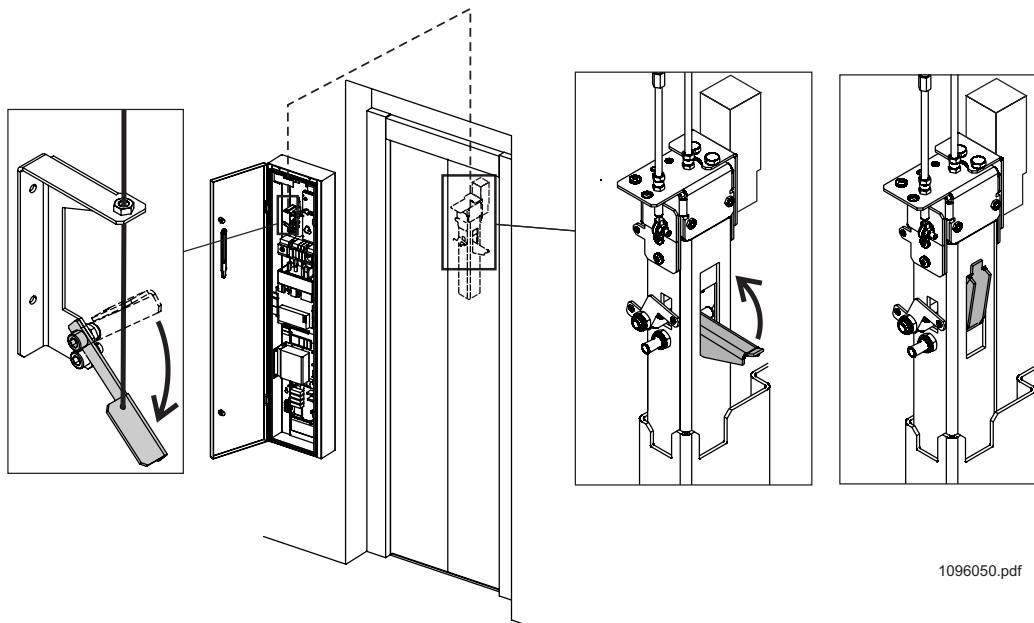
The SAM reset signal sounds and the elevator returns to normal operation. If SAM does not reset, RDF is on or a safety component, for example, overspeed governor or safety gear, may be cutting the safety chain.

7. If the Recall Drive Feature (RDF) is on or the safety chain is open, reset SAM as follows:
NOTE! Keep the RDF RUN 270:RB button pressed throughout this procedure.
 - A. Simultaneously press RDF RUN 270:RB +SAM reset 141:P button in MAP until the SAM reset signal sounds.
 - B. If you need to move the car, release the SAM reset 141:P button and while still pressing the RDF RUN button, press the RDF direction button RDF UP or RDF DW.

D.5 Resetting pit safety device

The pit safety device must be reset after returning to the landing:

1. Go to the Maintenance Access Panel (MAP).
2. Switch on the Recall Drive Feature (RDF). (POS 270.)
3. Press down the reset lever.



4. Drive upwards on RDF: Press simultaneously RDF RUN 270:RB, RDF 270:UP and 134:S for at maximum of 3 seconds to reset the pit safety device.

CAUTION! Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.

5. Switch off the Recall Drive Feature (RDF). (POS 270.)

The pit safety device is now reset.

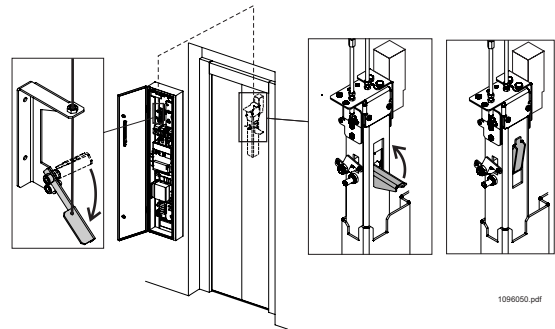
NOTE! This procedure does not apply to elevators which have the shaft access monitor (SAM). If the SAM has detected access to shaft, it must be reset at the same time with the pit safety device.

D.6 Resetting the pit safety device and shaft access monitor (SAM)

This section describes how to reset the pit safety device after returning to the landing, if the elevator has shaft access monitor (SAM).

1. Check that Recall Drive Feature (270) is on.
Switch it on, if it is off.
2. Check that main switch (220) is on. Switch it on, if it is off.
3. Press down the reset lever in the maintenance access panel. (A)
4. Reset SAM by pressing simultaneously RDF RUN 270:RB + SAM reset 141:P button in MAP for at least 5 seconds, until the SAM reset signal sounds.
5. Drive upwards on RDF: Press simultaneously RDF RUN 270:RB, RDF 270:UP and 134:S for at maximum of 3 seconds to reset the pit safety device.
CAUTION! Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.
6. Switch off the RDF (270).

The SAM and the pit safety device are now reset.



APPENDIX E. PERIODICAL TESTS FOR SSA**E DEVICES



E.1 SSA**E component tests (option)

Safety space arrangement SSA**E is an optional feature. For more information on identifying and using the SSA**E devices, see APPENDIX A. Safety Space Arrangement SSA**E. devices – working with elevator with insufficient pit and shaft top spaces.

Testing the landing door opening detectors

Two persons are recommended to perform this test. The first person tests the landing doors on all landings and the second person resets shaft access monitoring (SAM) after each test. The SAM reset possibilities are as follows:

- SAM reset (141:P) button in the MAP
- Key switch (141:S1) on the bottom landing
- Key switch (141:S2) on the topmost landing
- Key switch (141:S3) in car

Step	Action	Illustration/Note
1	Travel in the car to the topmost floor.	
2	When the doors are open, turn the landing door emergency opening device with a triangle key.	SAM activates and prevents the automatic closing of the doors. 
3	Reset SAM.	Use the key switch on the topmost landing.  NOTE! Keep the key switch activated for at least 5 seconds.

Step	Action	Illustration/Note
4	Travel down in the car floor-by-floor and repeat the test above in all floors.	Reset the shaft access monitor after every floor test. Use the topmost landing key switch or the reset procedure in MAP (described in <i>APPENDIX B.1 on page 162</i>).  NOTE! Keep the reset active for at least 5 seconds. If you use the MAP reset procedure, close and lock the MAP after every reset.
5	Repeat the door opening detector test also at the bottom floor.  NOTE! At the bottom floor, door emergency opening activates also the pit safety device. Reset the pit safety device and SAM after closing the doors.	1. Switch on the RDF (270). 2. Press lever in the maintenance access panel down. 3. If the elevator is equipped with SAM, reset it by pressing simultaneously RDF RUN 270:RB + SAM reset 141:P button in MAP for at least 5 seconds, until the SAM reset signal sounds. 4. Drive the elevator car upwards on RDF. At the same time press simultaneously RDF buttons 270:RB and 134:S for at maximum of 3 seconds to reset the pit safety device. CAUTION! Do not press the buttons any longer than 3 seconds to avoid damaging the coil of the reset device.
6	Record the test results to note book.	

Testing the shaft access monitor battery



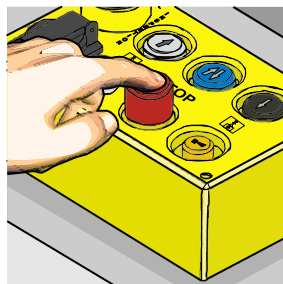
Step	Action	Illustration/Note
1	Travel in the car to MAP floor.	
2	Make a landing call to the MAP floor.	Allow the doors to open and ensure that there are no passengers in the car.
3	Open the MAP. Make a power break by switching the main switch 220 in MAP off and on.	If the battery is operative, the elevator returns to normal operation. If not, check the shaft access monitor battery. Replace if needed.
4	Record the test results to note book.	

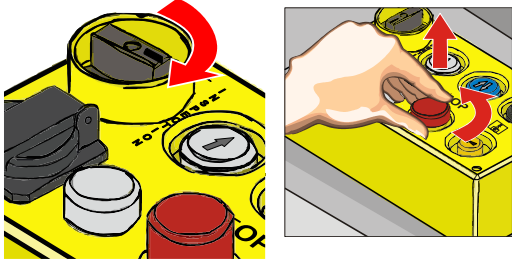
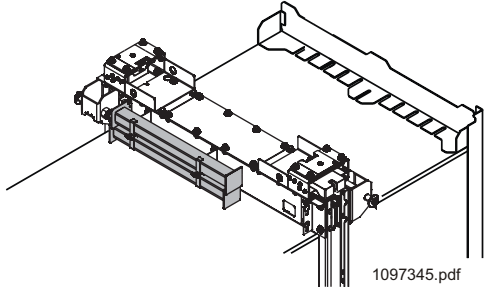
Testing car roof safety buffers

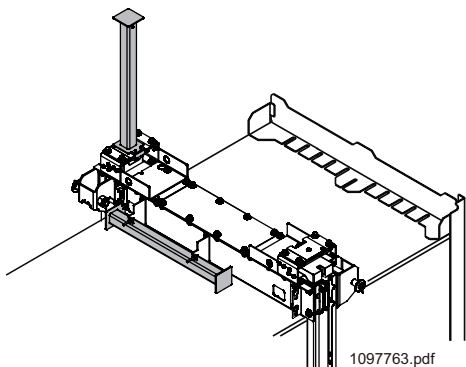
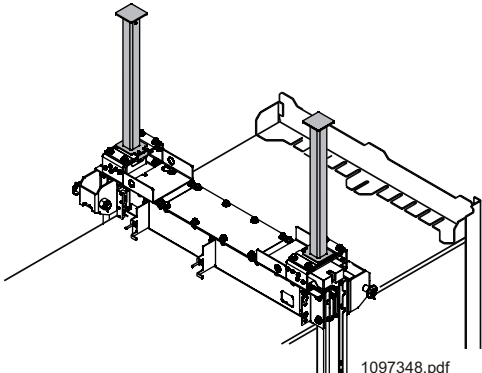
Table E1. Positions of the safety devices and capability of each driving mode.



Buffers on car roof (1/2)		Inspection	Normal
Down	Down	No	Yes
Up	Up	Yes	No
Up	Down	No	No
Down	Up	No	No

Step	Actions	Illustration/Note
1	Go to the MAP.	
2	Open the MAP.	
3	Switch on the RDF (270).	
4	Drive the elevator car on RDF so that you have an access to the car roof.	
5	Use the emergency opening key to open the landing door.	
6	Check that the elevator car is in suitable position for accessing the car roof.	Reposition the elevator car with RDF if needed until the position is suitable.
7	Press the car roof stop switch.	
8	Close the landing door and check that it is mechanically locked.	
9	Go to MAP. Switch off the RDF (270).	
10	Close and lock the MAP.	

Step	Actions	Illustration/Note
11	Go to the elevator car roof. 	1. Open the landing door with emergency opening key. 2. Standing on the landing, press the stop switch. 3. Go to the elevator car roof. 4. Close the landing doors behind you. 5. Check that the landing doors are mechanically locked.
12	Close the landing door and check that it is mechanically locked.	
13	Switch on the inspection drive. Release the car roof stop button.	
14	Try to drive the elevator on inspection drive.  NOTE! Drive downwards at all phases of the car top buffer test.	The elevator must NOT move.  1097345.pdf
15	Remove one top buffer from the storage position. Try to drive the elevator on inspection drive.	The elevator must NOT move.

Step	Actions	Illustration/Note
16	Place the buffer to upright position. Try to drive the elevator on inspection drive.	The elevator must NOT move. 
17	Remove the other car top buffer from the storage position. Try to drive the elevator downwards on inspection drive	The elevator must NOT move
18	Place the buffer to upright position. Try to drive the elevator on inspection drive.	The elevator should move. 
19	Place the buffers to storage position.	
20	Go to the landing. 	1. Slowly open the landing door so that no one steps in from the landing thinking that the elevator car has arrived. 2. Check that no one can enter the shaft from the landing. 3. Go to the landing. 4. Release the stop switch. 5. Switch off the inspection drive. 6. Close the landing doors. 7. Check that the landing doors are mechanically locked.
21	Go to the MAP. Open the MAP.	

Step	Actions	Illustration/Note
22	Reset the shaft access monitor (SAM) by using the reset button in MAP.	Press simultaneously RDF RUN 270:RB + SAM reset 141:P button for at least 5 seconds, until the SAM reset signal sounds
23	Give car call by using LCEUI.	The elevator should move.
24	Switch on the RDF (270).	
25	Drive the elevator car on RDF so that you have access to the car roof.	
26	Open the landing door by using the emergency opening key.	
27	Fill in the maintenance logbook while standing at landing. (Maintenance logbook of the elevator is stored in a rack on the car roof.).	All test results shall be copied from notebook to logbook. Logbook signed and stored in its rack.  1087319.wmf
28	Close the landing door and check that it is mechanically locked.	
29	Go to MAP floor. Open the MAP.	
30	Reset Shaft Access Monitor (SAM), if applicable.	Refer to APPENDIX B.
31	Switch off the RDF (270).	
32	Return the elevator back into service. Close and lock the MAP.	

APPENDIX F. BELT FAULTS AND CRITERIA FOR BELT REPLACEMENT

This section describes the usual belt faults, how to check the belt condition and criteria for belt replacement.

Mark the maintenance visit and amount of stars to the logbook. The maintenance logbook is located on the car roof.



NOTE! Belt replacement interval: 500000 round trips or 10-years.

See the belt component sticker on the iMAP door for elevator specific belt information.

Belt type:	
Batch NO:	Length / m:
Replacement interval: Years / 500 000 round trips	
Installation date (Month/Year): / 20	
Next replacement (Month/Year): / 20	

F.1 External or internal corrosion (metal dust)

Metal dust around belt(s).

Appearance	Possible root cause	Action
External corrosion 	1. Corrosion on traction sheave.	1. Clean traction sheave. No need for other actions.
Internal corrosion 	1. Normal effect during the aging of the belt.	1. No need for actions

F.2 Belt tooth jumping

Appearance	Possible root cause	Action
	1. Overload due to machine situation. 2. Lack of initial tension. 3. Damaged / incorrectly adjusted jump guard.	Remove the elevator from service immediately! Replace the belt. 1. Prevent the recurring of the situation. 2. Correct initial tension. 3. Adjust jump guard

F.3 Belt side abrasion

- Damaged polyurethane coating.
- Strands exposed on side of the belt.

Appearance	Possible root cause	Action
	1. Bad pulley alignment. 2. Presence of particles between belt and protective covers or damaged pulley / traction sheave. 3. Loosen/damaged protective covers.	Remove the elevator from service immediately! Replace the belt. 1. Adjust alignment. 2. Remove particles. Check pulleys and traction sheave and replace if damaged. 3. Check protective covers.

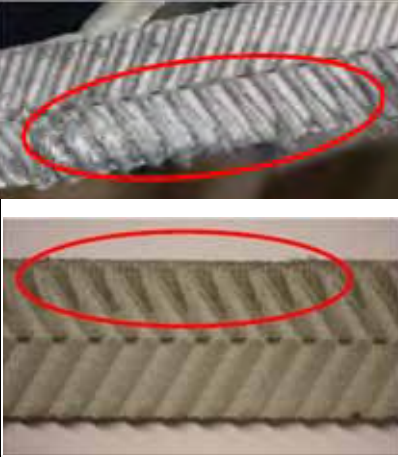
F.4 Belt back abrasion

- Belt tooth abrasion / missing teeth

Appearance	Possible root cause	Action
	1. Presence of particles between belt and protective covers or damaged pulley / traction sheave. 2. Loosen/damaged protective covers.	Remove the elevator from service immediately! Replace the belt. 1. Remove particles. Check pulleys and traction sheave and replace if damaged. 2. Check protective covers.

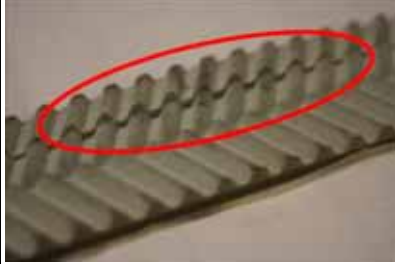
F.5 Belt tooth abrasion

– Belt tooth abrasion / missing teeth

Appearance	Possible root cause	Action
	1. Presence of particles between belt and pulley / traction sheave. 2. Belt jumping. 3. Loosen / damaged protective covers 4. Overload due to machine situation.	Remove the elevator from service immediately! Replace the belt. 1. Remove particles. Check pulleys and traction sheave and replace if damaged. 2. See section F.2 Belt tooth jumping. 3. Check protective covers. 4. Prevent the recurrence of the overload.

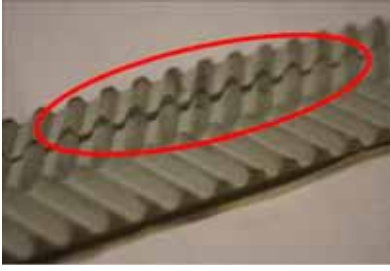
F.6 Belt breakage

– Horizontal / vertical belt breakage

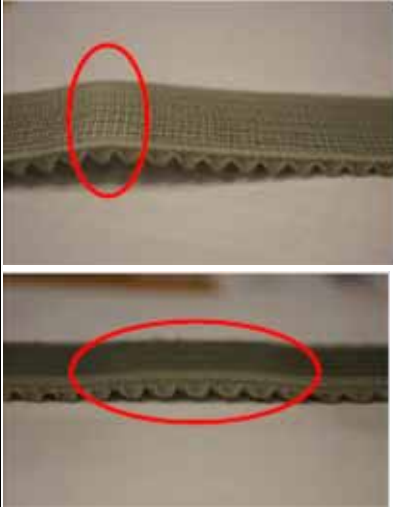
Appearance	Possible root cause	Action
	1. Presence of particles between belt and pulley / traction sheave. 2. Loosen / damaged protective covers 3. Overload due to machine situation. 4. Belt damaged during the installation.	Remove the elevator from service immediately! Replace the belt. 1. Remove particles. Check pulleys and traction sheave and replace if damaged. 2. Check protective covers. 3. Prevent the recurrence of the overload.

F.7 Wire breaks

- Wire break on surface

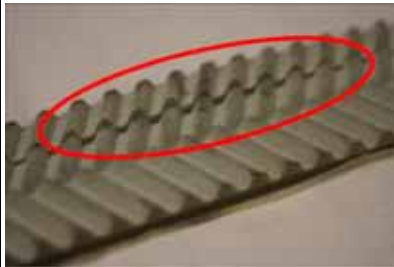
Appearance	Possible root cause	Action
	1. Presence of particles between belt and pulley / traction sheave. 2. Bending fatigue.	Remove the elevator from service immediately! Replace the belt. 1. Remove particles. Check pulleys and traction sheave and replace if damaged.

F.8 Local bend

Appearance	Possible root cause	Action
	1. Improper installation. 2. Bending life time reached. 3. Belt folded or twisted.	Remove the elevator from service immediately! Replace the belt.

F.9 Foreign particles on belt

- Foreign particles on the belt surface, for example bolts, macadam and so forth.

Appearance	Possible root cause	Action
	Loosen/damaged protective covers.	Remove the elevator from service immediately! If the belt is damaged, replace it. Check protective covers. Remove particles. Check pulleys and traction sheave, replace if damaged.

APPENDIX G. 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.

G.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.

G.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.

G.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.

G.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.

G.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.

G.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.

APPENDIX H. CLEANING

Cleaning is an important aspect of elevator maintenance. It is essential that the elevator car and the visible elevator components on the landings, especially the sill grooves, are cleaned on a regular basis.

It is also essential that the elevator car and the visible elevator components on the floors be cleaned on a regular basis. The elevator car contains special materials, some of which are not resistant to powerful cleansers, for example, solvents. When cleaning the operating panels, follow the instructions given for car operating panels.



NOTE! Always follow the material safety data sheet instructions for the cleanser to prevent adverse health effects.



CAUTION! Do not use strong solvents, corrosive or strong alkaline substances when cleaning the elevator car. These substances can damage the interior materials. Acetone and thinners are particularly harmful to plastic parts in the elevator car.



CAUTION! Never use excessive amounts of water. When instructed to use water, only use a moist cloth or similar. Do not use moist cloths that include magnesium chloride or sodium chloride as they are harmful for stainless steel surfaces.



WARNING! Do not attempt to clean the insides of the elevator shaft, MAP or the control cabinet. This must be left to trained maintenance personnel.

H.1 Cleaning the walls

The following table describes the methods and substances required to clean the walls of your elevator.

Table 20: Cleaning the walls

Material	Method	Cleaning substance
Coated metal	Use a soft cloth, careful rinsing and drying of the surface.	Use water and neutral soap. Avoid solvents, for example, acetone, toluene, ethyl acetate, trichloroethylene or perchloroethylene.
Metal laminate	Use a soft cloth. Do not use abrasive sponges.	Use water and small amounts of neutral cleaning fluid. For resistant stains, use a mildly abrasive detergent. Do not use abrasive, acetone or strong alkaline conventional cleaning agents.
Real wood laminates	Use a soft, damp cloth.	Do not use, for example, abrasive cleaners, powders, scouring pads, steel wool or sandpaper, as they will mar, etch, corrode and permanently discolor real wood surfacing products.
Recycled and wood laminates	Use a soft cloth. Do not use abrasive sponges.	Use water and small amounts of neutral cleaning fluid. Do not use solvents, as they will melt the coating.
Glass and mirrors	Use a soft duster. Avoid scratches from dry dirt or dust.	Use a general window cleaner. Do not use abrasives.

H.2 Cleaning the ceilings

The following table describes the methods and substances required to clean the ceilings of your elevator.

Table 21: Cleaning the ceilings

Material	Method	Cleaning substance
Coated metal	Use a soft cloth, careful rinsing and drying of the surface.	Use water and neutral soap. Avoid solvents, for example, acetone, toluene, ethyl acetate, trichloroethylene or perchloroethylene.
Stainless steel	Use a clean sponge, soft cloth or soft fibre brush, then rinse in clean water and dry.	Use soap, detergent or dilute (1%) ammonia solution in warm clean water. For finger prints, use detergent and warm water. For stubborn spots, stains and light discoloration, use mild, non-scratching creams and polishes.

Material	Method	Cleaning substance
Polycarbonate	Use a soft duster.	Use general cleaners. Do not use strong solvents, for example, acetone, as they will melt the ceiling.
Acrylic plastic	Use a spray detergent and wait 10 - 15 minutes. Wipe away with damp cloth. Do not rub with dry cloth or abrasive sponges.	Use domestic dishwashing detergents. Do not use detergents containing acetone or ammonia.

H.3 Cleaning the floors

The following table describes the methods and substances required to clean the floors of your elevator.

Table 22: Cleaning the floors

Material	Method	Cleaning substance
Wood laminates, recycled laminates, real wood	Use a vacuum cleaner, broom or antistatic cloth. Always use a damp cloth, never wet. Do not use abrasive sponges.	Use mild, non-abrasive detergent; domestic abrasive creamy detergents; ammonia; methylated spirit mixed with water. For difficult stains, for example, tar, ink, shoe polish, lipstick or nail-polish, use a clean soft cloth moistened with nail-polish remover (acetone), methylated spirit or other domestic solvent. For dry glue residue, use nail-polish remover (acetone). For materials like chewing gum and candle wax, leave to get completely hard then gently scrape it off. Do not use abrasive detergents, floor waxes or polishes, soapy detergents, or excessive water on the working area.
Composite stone	Use a vacuum cleaner, broom or antistatic cloth. Do not use abrasive sponges.	Use water with small amount of neutral cleaning fluid. For extraordinary cleaning, use an alkaline detergent. Follow the instructions provided with the detergent in question.
Rubber, vinyl	Use a vacuum cleaner or broom. Use a wet cloth for the cleaning operation.	Use water with a small amount of detergent (2 dl of detergent per 10 litres of water). Remove stains while they are still fresh. Do not use washing machines with abrasive discs.

H.4 Cleaning the handrails and buffer rails

The following table describes the methods and substances required to clean the handrails and buffer rails of your elevator.

Table 23: Cleaning the handrails and buffer rails

Material	Method	Cleaning substance
Stainless steel	Use a clean sponge, soft cloth or soft fibre brush, then rinse in clean water and dry.	Use soap, detergent or dilute (1%) ammonia solution in warm clean water. For finger prints, use detergent and warm water. For stubborn spots, stains or light discoloration, use mild, non-scratching creams and polishes.
Anodized aluminium	Use a soft duster.	Use general cleaners.
Wood	Use a clean sponge, soft cloth or soft fiber brush, then rinse in clean water and dry.	Use mild, non-abrasive detergent; domestic abrasive creamy detergents; ammonia; methylated (spirit) mixed with water. For difficult stains, for example, tar, ink, shoe polish, lipstick or nail-polish, use a clean soft cloth moistened with nail-polish remover (acetone), methylated spirit or other domestic solvent. For dry glue residue, use nail-polish remover (acetone). For materials like chewing gum and candle wax, leave to get completely hard then gently scrape it off. Do not use abrasive detergents, floor waxes or polishes, soapy detergents, or excessive water on the working area.

H.5 Cleaning the seats

The following table describes the methods and substances required to clean the seats, if present, of your elevator.

Table 24: Cleaning the seats

Material	Method	Cleaning substance
Wood laminates, recycled laminates	Use a vacuum cleaner, broom or antistatic cloth. Always use a damp cloth, never wet. Do not use abrasive sponges.	Use mild, non-abrasive detergent; domestic abrasive creamy detergents; ammonia; methylated (spirit) mixed with water. For difficult stains, for example, tar, ink, shoe polish, lipstick and nail-polish, use a clean soft cloth moistened with nail-polish remover (acetone), methylated spirit or other domestic solvent. For dry glue residue, remove with nail-polish remover (acetone). For materials like chewing gum and candle wax, leave to get completely hard then gently scrape off. Do not use abrasive detergents, floor waxes or polishes, soapy detergents, or excessive water on the working area.
Anodized aluminium	Use a soft duster.	Use general cleaners.

H.6 Cleaning the signalization

The following table describes the methods and substances required to clean the signalization.



NOTE! Always cover the buttons before cleaning the surrounding parts with liquids or strong solvents.



CAUTION! Do not use strong or hydrocarbon solvents. They damage the buttons.

Table H1. Cleaning the signalization

Material	Method	Cleaning substance
Coated metal	Use soft cloth, accurate rinsing and drying of the surface	Water and neutral soap. Avoid solvents such as acetone, toluene, ethyl acetate, trichloroethylene, perchloroethylene.
Stainless steel	Use a clean sponge, soft cloth or soft fibre brush, then rinse in clean water and dry.	Soap, detergent or dilute (1%) ammonia solution in warm clean water can be used. In case of finger prints, use detergent and warm water. For stubborn spots, stains, light discoloration use mild non scratching creams and polishes.
Brass	Use soft duster. Do not use abrasives. Avoid scratching.	Lacquer cleaner, for example, hard wax (without polishing effects).
Polycarbonate	Use soft duster	General cleaners. Never use strong solvents such as acetone as they will melt the surface.
Acrylic plastic	Spray detergent and wait 10 - 15 minutes. Wipe away with damp cloth. Do not rub with dry cloth or abrasive sponges.	Domestic dishwashing detergents. Do not use detergents containing acetone or ammonia.
Buttons	Use a moist soft duster.	General cleaners. Never use strong solvents, such as acetone, as they will melt the buttons.

H.7 Cleaning the tenant directories

The following table describes the methods and substances required to clean the tenant directories of your elevator.

Table 25: Cleaning the tenant directories

Material	Method	Cleaning substance
Polycarbonate	Use a soft duster.	Use general cleaners. Do not use strong solvents, for example, acetone, as they will melt the surface.
Anodized aluminium	Use a soft duster.	Use general cleaners.

