

# KONE MX10 MAINTENANCE PROCEDURES



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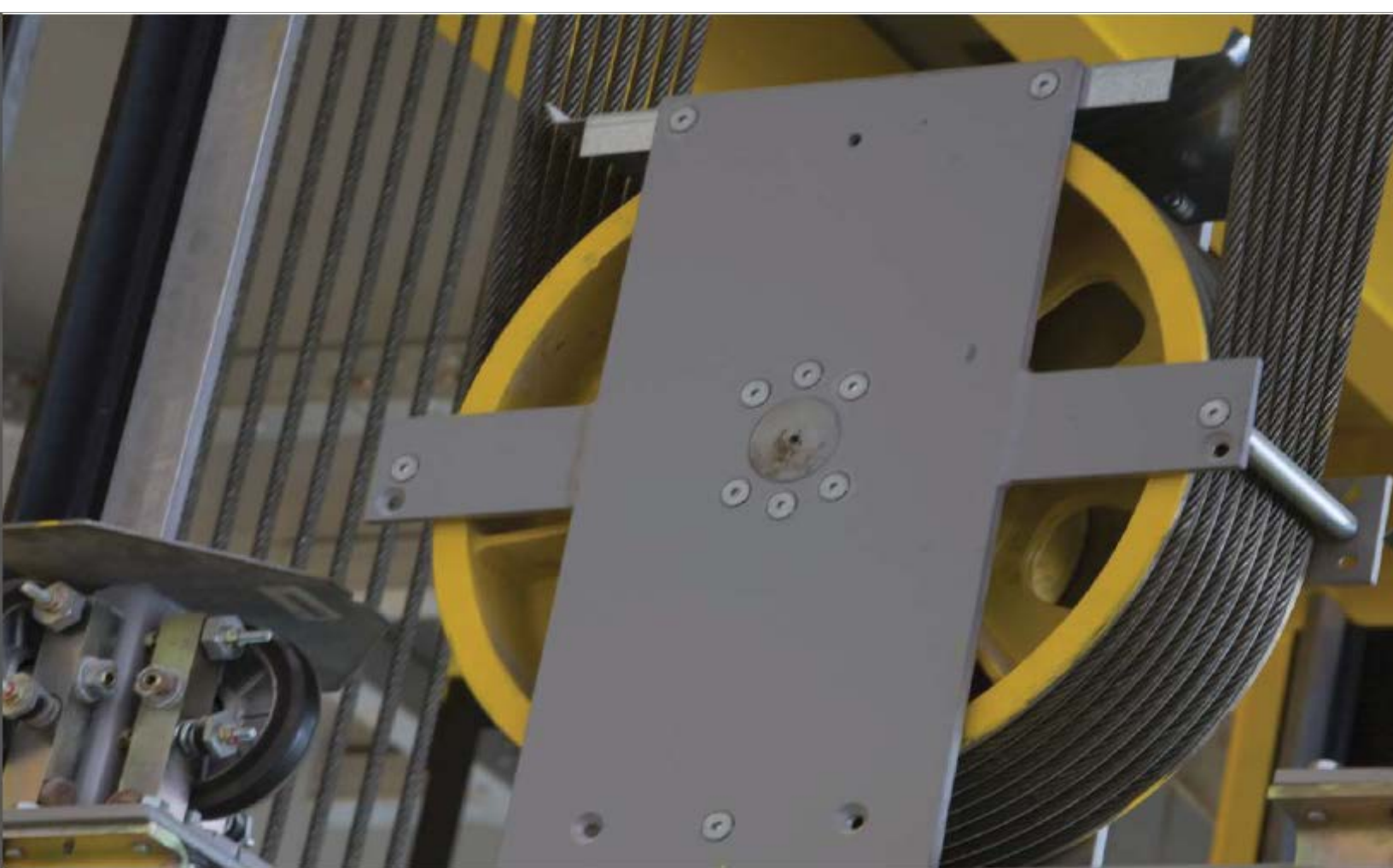
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# KONE MX10 & MX20

## MCP Maintenance Procedures



ASME A17.1-2013 / CSA B44-13 Code



### **Section 1: General Information**

#### **1.1 Warranties, Disclaimers and Notices**

##### **Illustration Notice:**

The illustrations in this manual are generic and may differ in some cases from the material used for the actual elevator.

##### **DISCLAIMER OF WARRANTIES AND LIABILITIES:**

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### 1.2 Introduction

#### You now own a KONE elevator, congratulations!

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

Safety and reliability are KONE's primary concerns and are strongly emphasized in the design, manufacturing, installation and maintenance processes of all KONE elevators. The revolutionary KONE elevator technology, together with KONE's quality, guarantee 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 provider. 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.

#### The scope of this manual

The purpose of this manual is to provide general guidance on the maintenance of your KONE EcoDisc® technology based elevator to ensure safety. By following the instructions in this manual you will ensure safe, comfortable and reliable elevator service for the elevator users in your building. You will also increase the service life of your elevator and thus better retain the value of your investment.

Maintenance instructions are updated based on the latest know-how related to elevator maintenance. KONE wants to ensure that all KONE products are safe to end-users, even if KONE is not the service provider, by providing these instructions.

Please, contact your local KONE sales office to ensure that you receive the latest information related to the elevator's maintenance.



#### NOTICE!

This manual should be stored so that it is accessible to authorized persons.

### 1.3 Owner's Responsibility:

The owner is responsible for ensuring that a competent elevator maintenance company or organization maintains the elevator(s) according to a predefined maintenance program.

Elevator work is for elevator professionals only. Elevator maintenance work involves many risks that unskilled people are not aware of.



### Maintenance organization:

A company, or part of a company, where competent maintenance personnel carry out maintenance operations on behalf of the owner of the installation.

### KONE Services

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 by

- 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 particular, specific technical requirements of the equipment
- paying attention to specific needs of the building use
- providing 24/7 service

Local KONE Service Center

Contact information

(To be completed by local Front Line unit)

The contact information can also be found on the KONE website [www.kone.com](http://www.kone.com) (Global Contact Directory).

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### 1.4 Safety

Refer also to KONE U.S. Safety Policy (SAFETY-01-003) and Elevator Industry Field Employees' Safety Handbook.

Safety precautions	Note
You should develop and follow procedures that have assimilated the requirements of national lift codes and other safety related regulations.	In case of conflict between the Code and the present instructions, a full risk assessment should be carried out and an appropriate course of action defined with the local regulator and company management.
The local safety codes and rules must be obeyed whenever possible.	Refer to your local procedures to take the elevator out of use.
Follow the safe working methods defined herein. In case you are uncertain of the method's safety, seek expert advice.	
Follow this instruction. Do not skip any step within the procedures; otherwise there may be a potentially dangerous situation which you have not considered.	<p>Warning signs highlight possible hazards.</p> <div></div> <p>Be sure that you have the latest maintenance instruction in use. If you are unsure please contact KONE.</p>
<p><b>ENSURE THAT ELECTRICAL EQUIPMENT AND CONDUCTORS ARE SAFELY DE-ENERGISED BEFORE WORKING ON THEM.</b></p> <p>A locking off system for main electric supply isolator or other system (for example fuse removal, locking and tagging system, etc. when applicable) must be agreed with person responsible for the building electrification.</p>	<p>Do not connect or disconnect any connectors when the power is ON.</p> <div></div>
Personal safety equipment must be available and used as required.	
Handle and dispose of waste materials in accordance with company procedures that have assimilated the regulations applicable to your country/state.	
Ensure that your work does not cause a hazard to others. In particular keep access ways and fire exits clear.	

### Special Signs and Notices

Example	Explanation
 <small>P15000026.wmf</small>	General warning, caution or risk of danger
 <small>P15000017.wmf</small>	Warning, risk of electric shock
	General mandatory action

### Electrical Safety.

The following five (5) steps must be taken in the specified order unless there are essential reasons for doing otherwise.

#### Take 5 Electrical When Working on Elevators

1. Disconnect power supply completely.
2. Secure power supply against re-connection.
3. Verify that installation is de-energized.
4. Check grounding requirements for special circumstances
5. Provide protection against adjacent live parts



### SECTION 2: ASME A17.1-2013 / CSA B44-13 Code Requirements

#### Section 8.6.1, 8.6.2 and 8.6.3: Maintenance, Repair and Replacement

Special attention should be paid to the following excerpts taken from Section 8.6 of the ASME A17.1-2013 / CSA B44-13 Safety Code for Elevators and Escalators. Section 8.6 outlines requirements for Maintenance, Repair and Replacement. Field employees performing Maintenance, Repair and Replacement should be familiar with this section of the code.

**Note:** Previous editions of the code do not include all of the following requirements. Check the edition of the Code in effect in your area for information regarding local requirements.

#### 8.6.1: General Requirements

##### 8.6.1.2.2: On-Site Documentation

**8.6.1.2.2 (a):** Up-to-date wiring diagrams detailing circuits of all electrical protective devices and critical operating circuits shall be available in the machinery space, machine room, control space, or control room as appropriate to the installation.

##### 8.6.1.5: Code Data Plate (reference to 8.9)

##### 8.9.1: Required Information

An individual data plate shall be provided and maintained for each unit. The data plate shall indicate the Code to be used for inspections and tests. The data plate shall indicate the Code and edition in effect at the time of installation. The data plate shall also indicate the Code in effect at the time of alteration and indicate the applicable requirements of 8.7.

Where the installation or alteration contains SIL Rated Devices the following wording “**Installation contains SIL Rated Devices**” shall be included on the data plate or on an additional plate located adjacent to the Code Data Plate.

##### 8.9.2: Location

The data plate shall be in plain view, securely attached to each main line disconnect or controller. It shall also be permitted to locate the data plate in the controller as long as it is in plain view with the controller door open. An additional data plate shall be installed in the vicinity of one of the starting switches on the exterior of escalators and moving walks.

##### 8.6.1.6: General Maintenance Methods and Procedures

##### 8.6.1.6.1: Making Safety Devices Inoperative

No person shall at any time make inoperative or ineffective any device on which the safety of users is dependent including any electrical protective device, except where necessary during tests, inspections, maintenance, repair, and replacement, provided the installation is first removed from normal operation. Such devices shall be restored to their normal operating condition in conformity with the applicable requirements prior to returning the equipment to service.

**8.6.1.6.2: Lubrication.** All parts of the machinery and equipment requiring lubrication shall be lubricated with lubricants equivalent to the type and grade recommended by the manufacturer.

Alternative lubricants shall be permitted when intended lubrication effects are achieved.

All excess lubricant shall be cleaned from the equipment. Containers used to catch leakage shall not be allowed to overflow.

### 8.6.1.6.3: Controllers, Wiring, and Wiring Diagrams

(a) The interiors of controllers and their components shall be cleaned when necessary to minimize the accumulation of foreign matter that can interfere with the operation of the equipment.

(b) Temporary wiring and insulators or blocks in the armatures or poles of magnetically operated switches, contactors, or relays on equipment in service are prohibited.

(c) When jumpers are used during maintenance, repair, or testing, all jumpers shall be removed and the equipment tested prior to returning it to service. Jumpers shall not be stored in the machine space, hoistway, or pit.

(d) Control and operating circuits and devices shall be maintained in compliance with applicable Code requirements (see 8.6.1.1.2).

(e) Substitution of any wire or current-carrying device for the correct fuse or circuit breaker in an elevator circuit shall not be permitted.

**8.6.1.6.4 Painting:** Care shall be used in the painting of the equipment to make certain that it does not interfere with the proper functioning of any component. Painted components shall be tested for proper operation upon completion of painting.

**8.6.1.6.5 Fire Extinguishers:** In jurisdictions not enforcing NBCC, Class “ABC” fire extinguishers shall be provided in elevator electrical machine rooms, control rooms, and control spaces outside the hoistway intended for full bodily entry, and walk-in machinery and control rooms for escalators and moving walks; and they shall be located convenient to the access door.

**8.6.1.6.6 Workmanship:** Care should be taken during operations such as torquing, drilling, cutting, and welding to ensure that no component of the assembly is damaged or weakened. Rotating parts shall be properly aligned.

### 8.6.1.7: Periodic Tests

**8.6.1.6.7: Signs and Data Plates:** Required signs and data plates that are damaged or missing shall be repaired or replaced.

**8.6.1.7.2: Periodic Test Tags:** A periodic test record for all periodic tests containing applicable code requirement(s) and date(s) performed, and the name of the person or firm performing the test, shall be installed so as to be readily visible and adjacent to, or securely attached to, the controller for each unit. The test record shall be in the form of a metal tag or other format designated by and acceptable to the authority having jurisdiction. If any of the alternative test methods contained in 8.6.4.20 were performed the test tag must indicate alternative testing was utilized for the applicable requirement.

**8.6.1.7.3:** No person shall at any time make any required safety device or electrical protective device ineffective, except where necessary during tests. Such devices shall be restored to their normal operating condition in conformity with the applicable requirements prior to returning the equipment to service (see 2.26.7).

## 8.6.2: Repairs

**8.6.2.1: Repair Parts.** Repairs shall be made with parts of at least equivalent material, strength, and design (see 8.6.3.1).

**Note:** It is very important to distinguish repair parts from replacement parts. Definitions of a repair and a replacement follow:



**Repair:** Reconditioning or renewal of parts, components, and/or subsystems necessary to keep equipment in compliance with applicable Code requirements.

**Replacement:** The substitution of a device or component and/or subsystems, in its entirety, with a unit that is basically the same as the original for the purpose of ensuring performance in accordance with applicable Code requirements.

**8.6.2.2: Welding and Design.** Welding and design of welding shall conform to 8.7.1.4 and 8.7.1.5.

**8.6.2.3: Repair of Speed Governors.** Where a repair is made to a speed governor that affects the tripping linkage or speed adjustment mechanism, the governor shall be checked in conformance with 8.6.4.19.2.

Where a repair is made to the governor jaws or associated parts that affect the pull-through force, the governor pull-through force shall be checked in conformance with 8.6.4.19.2(b). A test tag shall be attached, indicating the date the pull-through test was performed.

**8.6.2.4: Repair of Releasing Carrier.** When a repair is made to a releasing carrier, the governor rope pull-out and pull-through forces shall be verified in conformance with 8.11.2.3.2(b).

**8.6.2.5: Repair of Suspension and Compensating Means and Governor Ropes.** Suspension and compensating members and governor ropes shall not be lengthened or repaired by splicing (see 8.7.2.21).

**8.6.2.6: Repairs involving SIL Rated Device(s).** SIL Rated Device(s) used to satisfy 2.26.4.3.2, 2.26.8.2, 2.26.9.4(b), 2.26.9.5.1(b), and 2.26.9.6.1(b) shall:

(a) not be repaired in the field

(b) be permitted to be repaired in accordance with the provisions for repair where included in the listing/certification

(c) not be affected by other repair(s) such that the listing/certification is invalidated

### 8.6.3: Replacements

**8.6.3.1: Replacement Parts.** Replacements shall be made with parts of at least equivalent material, strength, and design.

**8.6.3.2: Replacement Suspension Means.** Suspension means, compensation means, and governor ropes shall be replaced when they no longer conform to the requirements of ASME A17.6. Replacement of suspension means, compensation means, and governor ropes shall conform to the requirements of ASME A17.6 as stated in 8.6.3.2.1 through 8.6.3.2.3.

**8.6.3.2.1:** For steel wire rope, ASME A17.6, Section 1.10 shall apply. NOTE (8.6.3.2.1): See Nonmandatory Appendix T for inspection and replacement of steel wire ropes.

**8.6.3.2.2:** For aramid fiber ropes, ASME A17.6, Section 2.9 shall apply.

**8.6.3.2.3:** For noncircular elastomeric-coated steel suspension members, ASME A17.6, Section 3.7 shall apply.

**8.6.3.3: Replacement of Suspension-Means Fastenings and Hitch Plates.** Replacement of suspension-means fastenings and hitch plates shall conform to the requirements in 8.6.3.3.1 through 8.6.3.3.5.

**8.6.3.3.1:** When the suspension-means fastenings are replaced with an alternate means that conforms to 2.20.9, load-carrying ropes shall be in line with the shackle rod.

**8.6.3.3.2:** Existing hitch plates that do not permit the load-carrying ropes to remain in line with the shackle rods shall have the replacement fastening staggered in the direction of travel of the elevator and counterweight, or the hitch plates shall be replaced.

**8.6.3.3.3:** Replacement hitch plates shall conform to 2.15.13 and shall provide proper alignment of load carrying ropes and shackle rods.

**8.6.3.3.4:** Replacement fastenings shall be permitted to be installed on the car only, the counterweight only, at either of the dead-end hitches, or at both attachment points.

**8.6.3.3.5:** Rope fastenings at the drum connection of winding-drum machines shall comply with 8.6.4.10.2.

### **8.6.3.4: Replacement of Governor or Safety Rope**

**8.6.3.4.1:** Governor ropes shall be of the same size, material, and construction as the rope specified by the governor manufacturer, except that a rope of the same size but of different material or construction shall be permitted to be installed in conformance with 8.7.2.19.

**8.6.3.4.2:** The replaced governor ropes shall comply with 2.18.5.

**8.6.3.4.3:** After a governor rope is replaced, the governor pull-through force shall be checked as specified in 8.11.2.3.2(b).

**8.6.3.4.4:** A test tag indicating the date when the pull-through test was performed shall be attached.

**8.6.3.4.5:** The safety rope shall comply with 2.17.12.4 and 2.17.12.5.

**8.6.3.4.6:** A new rope data tag conforming to 2.18.5.3 shall be installed at each rope replacement, and the date of the rope replacement shall be recorded in the maintenance records (8.6.1.4).

**8.6.3.5 Belts and Chains:** If one belt or chain of a set is worn or stretched beyond that specified in the manufacturer's recommendation, or is damaged so as to require replacement, the entire set shall be replaced. Spockets and toothed sheaves shall also be replaced if worn beyond that specified in the manufacturer's recommendations.

**8.6.3.6 Replacement of Speed Governor:** When a speed governor is replaced, it shall conform to 2.18. When a releasing carrier is provided, it shall conform to 2.17.15. The governor rope shall be of the type and size specified by the governor manufacturer. The governor shall be checked in conformance with 8.11.2.3.2. Drum-operated safeties that require continuous tension in the governor rope to achieve full safety application shall be checked as specified in 8.11.2.3.1 and 8.7.2.19.

### **8.6.3.7 Listed/Certified Devices**

**8.6.3.7.1:** Where a listed/certified device is replaced, the replacement shall be subject to the applicable engineering or type test as specified in 8.3, or the requirements of CSA B44.1/ASME A17.5. Hoistway door interlocks, hoistway door combination mechanical lock and electric contact, and door or gate electric contact, shall conform to the type tests specified in 2.12.4.1. The device shall be labeled by the certifying organization (see 8.6.1.1). In jurisdictions not enforcing NBCC, door panels, frames, and entrances hardware shall be provided with the instructions required by 2.11.18.

**8.6.3.7.2:** Where a component in a listed/certified device is replaced, the replacement component shall be subject to the requirements of the applicable edition of CSA B44.1/ASME A17.5 and/or the engineering or type test in 8.3. Hoistway door interlocks, hoistway door combination mechanical lock and electric contact, and door or gate electric contact, shall conform to the type tests specified in 2.12.4.1. The component shall be included in the original manufacturer's listed/certified device documentation or as a listed/certified replacement component (see 8.6.1.1).

Each replacement component shall be plainly marked for identification in accordance with the certifying organization's procedures. In jurisdictions not enforcing NBCC, door panels, frames, and entrances hardware shall be provided with the instructions required by 2.11.18.

NOTE (8.6.3.7): Devices that may fall under this requirement are included but not limited to hoistway door locking devices and electric contacts, car door contacts and interlocks, hydraulic control valves, escalator steps, fire doors, and electrical equipment.

### **8.6.3.8: Replacement of Door Reopening Device.**

Where a reopening device for power-operated car doors or gates is replaced, the following requirements shall apply:

- (a) The door closing force shall comply with the Code in effect at the time of the installation or alteration.
- (b) The kinetic energy shall comply with the Code in effect at the time of the installation or alteration.
- (c) When firefighters' emergency operation is provided, door reopening devices and door closing on Phase I and Phase II shall comply with the requirements applicable at the time of installation of the firefighters' emergency operation.

**8.6.3.9: Replacement of Releasing Carrier.** Where a replacement is made to a releasing carrier, the governor rope pull-out and pull-through forces shall be verified in conformance with 8.11.2.3.2(b).

### **8.6.3.10: Replacement of Hydraulic Jack, Plunger, Cylinder, Tanks, and Anticreep Leveling Device**

**8.6.3.10.1:** A hydraulic jack replacement shall be classified as an alteration and shall comply with 8.7.3.23.1.

**8.6.3.10.2:** A plunger replacement shall be classified as an alteration and shall comply with 8.7.3.23.2.

**8.6.3.10.3:** A cylinder replacement shall be classified as an alteration and shall comply with 8.7.3.23.3.

**8.6.3.10.4:** A tank replacement shall be classified as an alteration and shall comply with 8.7.3.29.

**8.6.3.10.5:** An anticreep leveling device replacement shall be classified as an alteration and shall comply with 8.7.3.31.3.

**8.6.3.11: Replacement of Valves and Piping.** Where any valves, pipings, or fittings are replaced, replacements shall conform to 3.19 with the exception of 3.19.4.6. Replacement control valves must conform to the Code under which it was installed.

**8.6.3.12: Runby and Clearances after Re-roping or Shortening.** The minimum car and counterweight clearances specified in 2.4.6 and 2.4.9 shall be maintained when new suspension means are installed or when existing suspension means are shortened. The minimum clearances shall be maintained by any of the methods described in 8.6.3.12.1 through 8.6.3.12.3 (see 8.6.4.11).

**8.6.3.12.1:** Limit the length that the suspension means are shortened.

**8.6.3.12.2:** Provide blocking at the car or counterweight strike plate. The blocking shall be of sufficient strength and secured in place to withstand the reactions of buffer engagement as specified in 8.2.3. If wood blocks are used to directly engage the buffer, a steel plate shall be fastened to the engaging surface or shall be located between that block and the next block to distribute the load upon buffer engagements.

**8.6.3.12.3:** Provide blocking under the car or counterweight buffer or both of sufficient strength and secured in place to withstand the reactions of buffer engagement as described in 8.2.3.

**8.6.3.12.4:** Provide the month and year the suspension means were first shortened. Appropriate data shall be recorded on the data tag (see 2.20.2.2.2).

**8.6.3.13: Replacement of Demarcation Lights:** Fluorescent lighting fixtures shall be permitted to be replaced by any type light source, except incandescent sources, and shall comply with all other applicable step demarcation lighting requirements under which the escalator was installed or altered.

### **8.6.3.14: Replacements involving SIL Rated Device(s) (See 1.3)**

(a) SIL Rated Device (see 1.3) used to satisfy 2.26.4.3.2, 2.26.8.2, 2.26.9.4(b), 2.26.9.5.1(b), or 2.26.9.6.1(b) shall not be affected by other replacement(s) such that the listing/certification is invalidated.

(b) Where a SIL Rated Device (see 1.3) used to satisfy 2.26.4.3.2, 2.26.8.2, 2.26.9.4(b), 2.26.9.5.1(b), or 2.26.9.6.1(b) is replaced, it shall be considered a replacement only when the replacement device is the original manufacturer's listed/certified SIL rated device or the original manufacturer's listed/certified SIL rated replacement device; otherwise it shall be considered an alteration [see 8.7.1.9(d)].

(c) Where a non-SIL Rated Device used to satisfy 2.26.4.3.1, 2.26.8.2, 2.26.9.4(a), 2.26.9.5.1(a), or 2.26.9.6.1(a) is replaced with SIL Rated Device, it shall be considered an alteration. [see 8.7.1.9(c)].

### **8.6.11: Special Provisions (Partial)**

**8.6.11.11 Examination After Shutdown Due to Traction Loss:** Where the traction-loss detection means has been actuated [see 2.20.8.1 and 8.6.1.2.1(g)], the elevator shall not be returned to service until a physical examination of the drive sheave and suspension means has been conducted. The elevator shall not be moved until all passengers are out of the elevator and the elevator is posted out-of-service. In addition to the suspension-means evaluation criteria in 8.11.2.1.3(cc), any suspension-means or drive-sheave condition that would adversely affect the traction capability of the system (see 2.24.2.3) shall be corrected before returning the elevator to service. NOTE: See lockout/tagout procedures in *Elevator Industry Field Employees' Safety Handbook* for procedure for removing the elevator from service.

**8.6.11.12 Examination After Safety Application:** After any safety application on a traction elevator has occurred, whether due to testing or during normal service, the driving-machine sheave, all other sheaves, where furnished, and retainers and suspension members shall be examined throughout their complete length to ensure that all suspension members are properly seated in their respective sheaves, and that no damage has occurred to sheaves, suspension members, or retainers. The elevator shall not be returned to service until this physical examination has been conducted and any repairs made, if necessary.

**8.6.11.14 Examination After Shutdown Due to Broken-Suspension-Member Detection Means:** After any application of the broken-suspension-member detection means, whether due to testing or during normal service, the driving-machine sheave, all other sheaves, where furnished, and retainers and suspension members shall be examined throughout their complete length to ensure that all suspension members are properly seated in their respective sheaves, and that no damage has occurred to sheaves, suspension members, or retainers. The elevator shall not be returned to service until this physical examination has been conducted and any repairs made, if necessary. Where a single suspension member has been damaged or broken, the entire suspension means shall be replaced in accordance with 8.6.3.2.

### 3 Maintenance Procedures

#### 3.1 Maintenance Procedures Inside the Car

##### 8.6.4.13.1 (c): Door reopening devices

Procedure
<b>Electronic detector</b> <ul style="list-style-type: none"> <li>• Check operation of the detector by placing an object in front of the device at several different heights while the door is in closing mode. The door should immediately stop and reverse direction.</li> <li>• Check to ensure the detector is securely fastened and properly aligned.</li> <li>• Check condition of external cables.</li> <li>• Remove covers from detector units (if applicable) and clean with a damp cloth or fine dry brush.</li> <li>• Check supply voltages.</li> <li>• Check all wiring connections and tighten as necessary.</li> <li>• Visually check internal components for signs of overheating or other damage.</li> <li>• Check sensitivity settings and adjust if the doors do not reopen promptly when an object is placed in front of the sensor.</li> <li>• Reinstall any covers previously removed and test the unit again for proper operation.</li> </ul>
<b>Photo-electric device</b> <ul style="list-style-type: none"> <li>• Check operation of the photo cells by placing an object in front of each cell while the door is in closing mode. The door should immediately stop and reverse direction.</li> <li>• Check to ensure the sending and receiving units are securely fastened and properly aligned.</li> <li>• Check condition of external cables.</li> <li>• Clean the sending and receiving units with a fine dry brush. Clean the lenses with a damp cloth, if necessary.</li> </ul>
<b>Mechanical edge</b> <ul style="list-style-type: none"> <li>• Activate the device by retracting the leading edge while the door is in closing mode. The door should immediately stop and reverse direction.</li> <li>• Check the security of all fastenings.</li> <li>• Check the retracting mechanism and lubricate pivot points with 30w oil, if necessary.</li> <li>• Check the condition of external cables.</li> <li>• Clean and adjust the unit, as required.</li> </ul>
<b>Door Open Button</b> <p>Press the door open button during the closing cycle. The door should open and then close after the door close time has elapsed.</p>

##### 8.6.4.13.1 (d): Vision panels and grills

Procedure	Note
Check to ensure clear, wired glass is installed and is securely fastened and is intact.	If unit was installed under A17.1-1990 or later code, ensure a vision panel grill is in place.



**8.6.4.13.1 (g): Astragals, resilient members, space & sight guards**

Procedure	Note
Check to ensure that the strike jamb bumpers and astragals are in place and are pliable.	Repair or replace worn, damaged or missing components, as required.

**8.6.4.13.1 (i): Clutches, engaging vanes, retiring cams, engaging rollers**

Procedure	Note
Clean components, as required.	
Check alignment of the clutch.	The clutch should be plumb. Adjust, as required.
Check the engaging (pick-up) rollers for proper engagement in the clutch and for proper running clearance. These dimensions should be the same at every floor.	<b>Note:</b> If the relationship of the pick-up rollers to the clutch vanes is changing frequently check to ensure the cab stabilizers have not become loose.
Check tension of the retiring cam drive belt or chain.	<ul style="list-style-type: none"> <li>Adjust or replace the drive belt or chain, as required</li> <li>Lightly lubricate the chain with chain oil.</li> </ul>

**8.6.4.13.2: Kinetic Energy and Closing Force for Automatic Doors (Horizontal)**

Procedure	Note
<b>Kinetic Energy for Automatic Doors (Horizontal)</b> To test the kinetic energy: <ul style="list-style-type: none"> <li>Check the time the leading edge of the door takes to travel the code zone during closing.</li> <li>Verify that the average door closing time for the doors is greater or equal to the minimum door closing time shown on the door operator data tag.</li> </ul>	<ul style="list-style-type: none"> <li>The code zone for side opening doors is measured at 2 in (50mm) from fully opened to 2 in (50mm) from fully closed positions.</li> <li>The code zone for center opening doors is measured at 1 in (25mm) from fully opened to 1 in (25mm) from fully closed positions.</li> <li>Adjust the doors, as required.</li> </ul>
<b>Closing Force for Automatic Doors (Horizontal)</b> <ul style="list-style-type: none"> <li>Park the car at floor level and start the doors in the closing direction. Allow the doors to start moving in the closing direction to about midway of their normal travel and stop them.</li> <li>Push a force measuring device designed for that purpose (KONE US45371) against the leading edge of the door, removing the stop so the door is held stationary by the gauge.</li> <li>Back the gauge off until the door is barely held stationary by the gauge and read the value. The closing force may not exceed 30lbf (135N).</li> </ul>	Adjust the closing force, as required.

### 8.6.4.15: Car Emergency System

Procedure	Note
Check the condition of all buttons, switches and visual indicators.	Replace any faulty components, as required.
<b>Two-way communication:</b> Place a call on the two-way communication device and ensure the call is responded to correctly, i.e., the call goes to a location staffed by personnel authorized to take appropriate action in an emergency situation.	If the call is not acknowledged within 45 seconds the call must be forwarded to an alternate location.
<b>Remote/local alarm system (e.g. KRMS, if applicable):</b> <ul style="list-style-type: none"> <li>Press the voice connection button in the car.</li> <li>Wait for a connection, and then perform a test connection to the call center.</li> </ul>	<ul style="list-style-type: none"> <li>Verify disconnection of the device following deactivation of the call by the call center.</li> <li>Verify that the connection automatically disconnects 20 seconds after initial voice notification if caller does not extend call.</li> </ul>
<b>Emergency stop switch:</b> Check to ensure the elevator stops promptly when the stop button/switch is activated. Check the condition and functionality of the device.	Replace the emergency stop switch if it is damaged or the markings are illegible.
<b>Audible Alarm:</b> Where the Alarm Button is localized inside the car, on top of the car or under the car, check operation of the audible alarm to ensure it can be heard outside the hoistway.	
<b>Ventilation system:</b> Examine and maintain the car ventilation system. <ul style="list-style-type: none"> <li>Ensure the fan is properly guarded and securely fastened.</li> <li>Clean the fan annually and lubricate the motor bearings with 30w motor oil (not applicable with sealed bearings).</li> </ul>	
<b>Emergency power:</b> Disconnect normal power and check to ensure the emergency light, audible alarm and two-way communication means operate properly on battery power.	<ul style="list-style-type: none"> <li>Use a voltmeter to verify output of the battery.</li> <li>The emergency power system must have the capacity to power the illumination and two-way communication means for 4 hours, and the audible alarm for 1 hour.</li> </ul>

### 8.6.4.16: Stopping accuracy

Procedure	Note
Check stopping accuracy at each floor in both directions. Floor stops should be maintained at ½" or less, above or below floor level.	Adjust floor stops, as required.

**3.2 Maintenance Procedures in the Machine Room****8.6.1.2.2 (a): Wiring diagrams**

Procedure	Note
Check to ensure legible, up-to-date wiring diagrams are available on-site.	Notify your supervisor if complete wiring diagrams are not available.

**8.6.1.2.2 (b): SIL rated devices**

Procedure	Note
If SIL rated E/E/PES electrical protective devices are installed:	<ul style="list-style-type: none"><li>• Ensure wiring diagrams document the SIL rated devices.</li><li>• Ensure the SIL rated devices are marked accordingly.</li><li>• Ensure maintenance, repair and testing documentation for the devices is available on-site.</li></ul>
If software is integral to the SIL rated device, check to ensure the software version is as noted in the manufacturer's technical documentation.	<ul style="list-style-type: none"><li>• Upgrade the software if necessary.</li><li>• For KONE drive units the software versions should be as noted below:<ul style="list-style-type: none"><li>– KDM SW version 101.00, and later</li><li>– DCBG SW version 2.64, and later</li></ul></li></ul>

**8.6.1.5 (See 8.9): Code data plate**

Procedure	Note
Check to ensure a data plate has been provided and is maintained for each unit.	<ul style="list-style-type: none"><li>• The data plate shall indicate the Code to be used for inspections and tests</li><li>• The Code and edition in effect at time of installation.</li><li>• The data plate shall also indicate the Code in effect at the time of alteration and indicate the applicable requirements of 8.7.</li><li>• The data plate shall be in plain view, securely attached to each main line disconnect or controller.</li></ul>



**8.6.1.6.3 (a)(b)(c): Controllers and Wiring**

Procedure	Note
Clean the interior of the control panel as necessary.	Remove all spare parts and other foreign matter that could possibly interfere with operation of the equipment.
Check for temporary wiring and insulators or blocks in the armatures or poles of any magnetically operated switches, contactors or relays.	Remove, if present.
Check to ensure that any temporary jumpers have been removed.	Jumpers must not be left in machine rooms or control spaces.

**8.6.1.6.3 (d): Check relays in controllers and drive units**

Procedure	Note
<ul style="list-style-type: none"><li>• Check contact surfaces for excessive burning and wear.</li><li>• Check contacts for proper wipe and alignment.</li><li>• Check relay armatures and Christmas tree stems for free movement and proper seating.</li><li>• Check operation of reverse phase relay; relay must drop with loss of power.</li><li>• Check coils for signs of overheating.</li><li>• Check to ensure contact arc shield blowouts are in place and are in good condition.</li><li>• Check wire connections for tightness.</li><li>• Check relay shunts for wear.</li><li>• Check to ensure proper relay mounting.</li></ul>	Clean, lubricate, adjust or replace components as required.

**8.6.1.6.3 (d) Check contactors in controllers and drive units**

Procedure	Note
Check contactors for the following conditions: <ul style="list-style-type: none"><li>• Binding</li><li>• Obstructions</li><li>• Carbon buildup</li><li>• Proper air gaps</li><li>• Contact pressure</li><li>• Contact wipe</li><li>• Excessive burning and wear</li><li>• Proper mounting</li></ul>	Clean, lubricate, adjust or replace components as required.

**8.6.1.6.3 (e): Fuses and fuse holders**

Procedure	Note
Check to ensure control fuses are securely mounted, are making good electrical contact, and are sized properly.	Never replace fuses with wire or current-carrying devices.

**8.6.1.6.5: Fire extinguisher**

Procedure	Note
Check the expiration date on the fire extinguisher, if present.	Notify a supervisor if it is out of date.

**8.6.4.1.2: Hoist rope lubrication**

Procedure	Note
Examine the hoist ropes and look for the following conditions: <ul style="list-style-type: none"><li>ropes are dry or the lubricant is stiff</li><li>red dust on the ropes or on the floor</li><li>metal dust under the drive sheave or pulleys</li><li>sheave grooves are dry (no oil film on fingertip when wiping)</li></ul>	If any of the conditions in the procedure are found, lubricate the ropes using Kone wire rope lubricant (Part # US45786001).

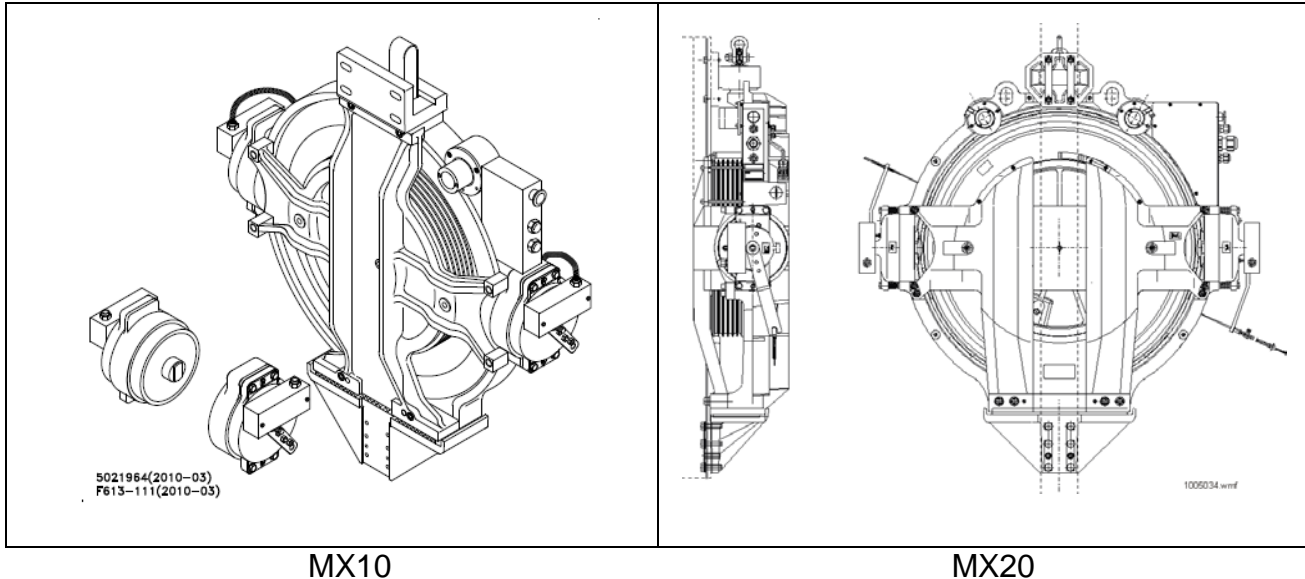
### 8.6.4.6: Brakes

#### Note

**8.6.4.6.2 / 8.6.4.6.3:** If any part of the driving machine or emergency brake is changed or adjusted that can affect the holding capacity or decelerating capacity of the brake, it shall be adjusted and checked by means that will verify its proper function and holding capacity.

A test complying with 8.6.4.20.4 shall be performed.

### MX10 & MX20 Brake Maintenance



### General Maintenance Information for MX10 and MX20 Brakes

- MX10 and MX20 machines are equipped with two independent direct acting brakes. The brakes must always be adjusted separately.
- The center nut must be checked during routine maintenance and prior to any brake adjustment to verify the washer is loose under the center nut when the brake is set. As the brake shoe wears, the center nut moves in with the brake shoe and can bottom against the brake body, preventing the brake from setting fully. Loosen the center nut as needed until the washer under the nut turns freely.
- There are four adjusting screws per brake. The adjusting screws are held in place by locking plates. The locking plates must always be in place during elevator operation to prevent the adjusting screws from changing.
- Adjusting the brake is a four-corner procedure. Any adjustment must be made evenly on the four screws. Turning one screw significantly more than the others will cause the brake to bind internally and the brake will not pick consistently.
- The adjusting screws are very sensitive. A  $\frac{1}{4}$  turn corresponds to a .010 in. [.25 mm] change in air gap.
- For MX10 and MX20, the emergency brake is the brake closest to the motor junction box. The emergency brake will be marked with an identifying label.
- Always put elevator on cartop inspection for MX10 and MX20 applications

### Brake Maintenance Safety: MX10 and MX20

- General KONE safety regulations are to be followed during the work. All safety measures signified for normal elevator maintenance are to be implemented and local safety regulations followed.
- Use carefully the manual brake release because the elevator will accelerate very quickly to a high speed.
- Use the stop switch in the vicinity of machine or main switch to prevent an unexpected movement of the elevator.
- Check that the motor cables are safely de-energized.

#### The following safety items must be complete prior to starting the actual work

1. Drive the elevator to the suitable position and block it using the blocking device on the car roof. **NOTE:** Mind the step when exiting the top of the car (if needed, use an approved workbench as an extra step at the landing level).

In case the brake does not operate, use the rescue equipment or counterweight lifting device to position the car in the correct position. **NOTE:** Follow local practice to inform customer and end users.

2. Switch OFF the main switch (220)
3. Lock and tag the main switch
4. Keep the control panel / maintenance access panel closed and locked.
5. Erect barricades at the hoistway entrance.

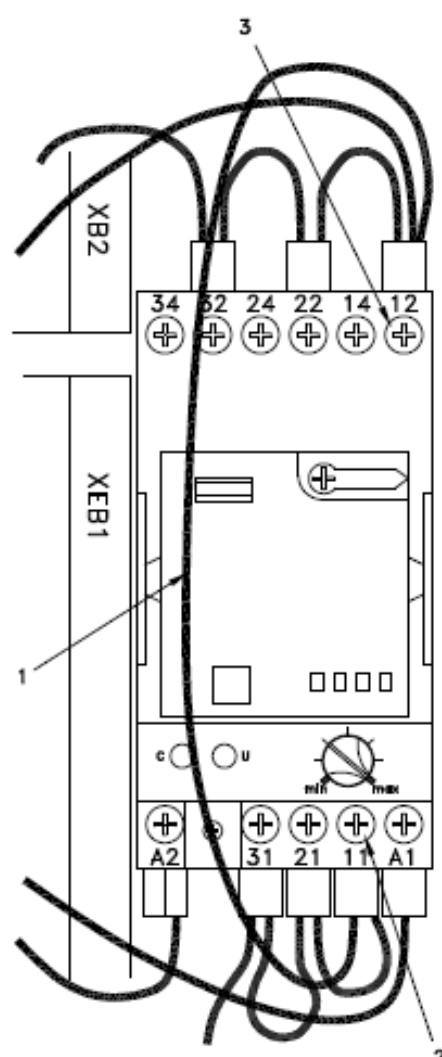


Inverter drives usually remain energized for about 5 minutes after power has been disconnected. **DO NOT** work on the drive, hoisting motor or braking resistor until you have verified that this energy has been discharged. Test equipment must be set to the 1000 VDC range. The test equipment must be checked before and after the test to ensure that it functions correctly.

### Tools required for brake adjusting: MX10 and MX20

- 0.05 mm (0.002 in) feeler gauge
- 0.1 mm (0.004 in) feeler gauge
- 5 mm Allen wrench
- 19 mm open end wrench
- 17 mm open end wrench
- Medium Phillips screwdriver
- Electrical brake opening tool

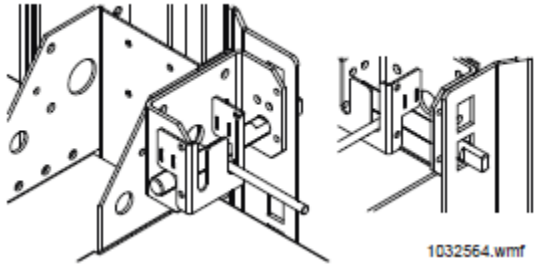
### Disable brake economy: MX10 and MX20

Procedure	
<ul style="list-style-type: none"> <li>• <b>V3F25 drive:</b> Disable brake economy on main brake module 388:1 and emergency brake module 388:2.</li> <li>• <b>ReSolve:</b> Disable brake economy on brake module 388:1.</li> </ul>	
<ol style="list-style-type: none"> <li>1. Turn <b>OFF</b> controller power.</li> <li>2. Remove brake module front cover by loosening screws on side and removing cover.</li> <li>3. Install 18 AWG jumper (1) between terminal 11 (2) and terminal 12 (3) on brake module.</li> <li>4. Put label on brake module cover stating "This module has been modified to disable brake economy."</li> <li>5. Turn <b>ON</b> controller power</li> <li>6. <b>MX10 and MX20 with V3F25 drive:</b> Run the elevator and measure voltage at J4 connector to verify the voltage reads approximately 200VDC.</li> </ol> <p><b>ReSolve:</b> Run elevator and measure voltage at J4 connector. Refer to wiring diagrams for voltage at J4.</p>	 <p>5010671(2005-08)</p> <p><i>Brake module with 18 AWG jumper (1) installed between terminals 11 (2) and 12 (3).</i></p>

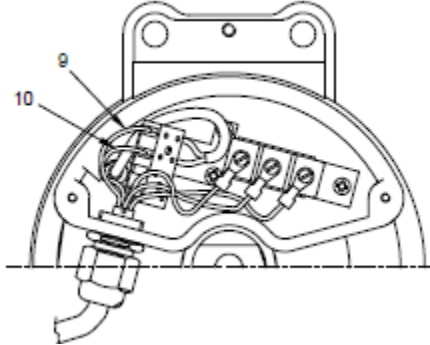
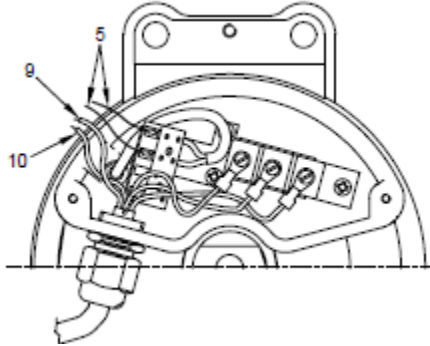
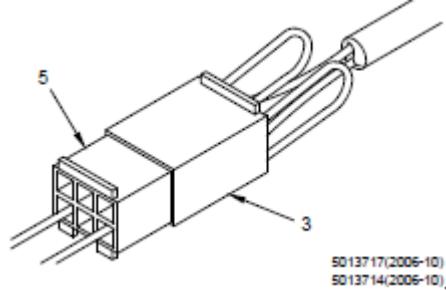
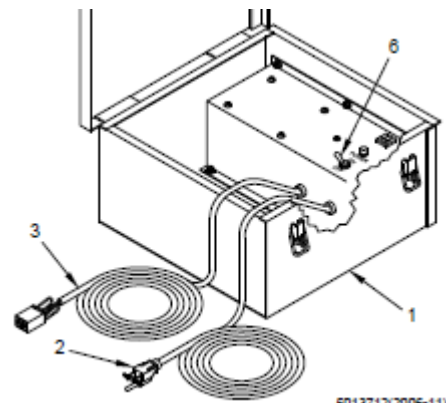
### Set emergency brake hold time: MX10 and MX20

Procedure	Note
1. Set UI 5-10 to 2.	This action sets emergency brake hold time to 2 seconds.

### Safety measures: MX10 and MX20

Procedure	Note
1. Drive empty car to top landing.	
2. Switch elevator to inspection mode.	
3. Drive car on inspection to suitable working position to have access to brakes and so car is aligned with car blocking device.	
4. Engage car blocking device.	
5. Exit car roof.	
6. Turn OFF main switch.	
7. Leave pin of car blocking device loose, so possible movement of car is noticeable during brake test.	

### Connect MX electrical brake opening tool: MX10 and MX20

Procedure	Note
1. Enter car roof.	
2. Remove cover from one brake.	
3. Disconnect from terminal strip two wires (9) (10) coming from controller.	
4. Connect pin ends of connector cable (5) to terminal strip where two wires (9) (10) were removed.	
5. Plug other end of pin connector cable (5) into connection cable (3) from brake opening tool (1).	 <p>5013717(2006-10) 5013714(2006-10),</p>
6. Check that toggle switch (6) is in OFF position.	 <p>5013712(2006-11),</p>
7. Connect power supply cable (2) to 110 volt outlet on car top.	

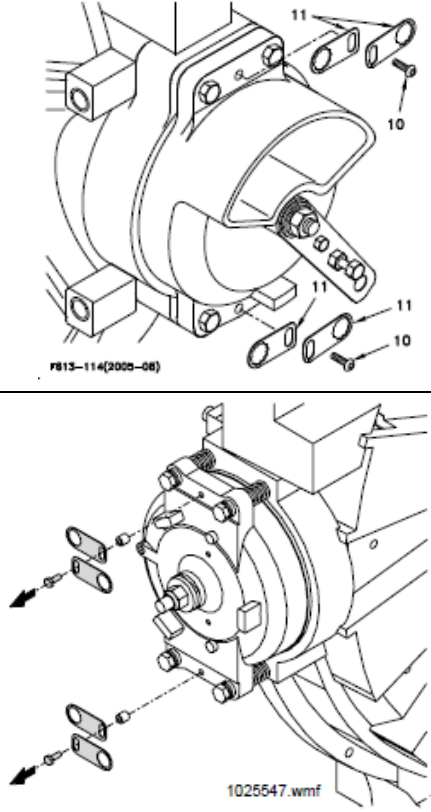
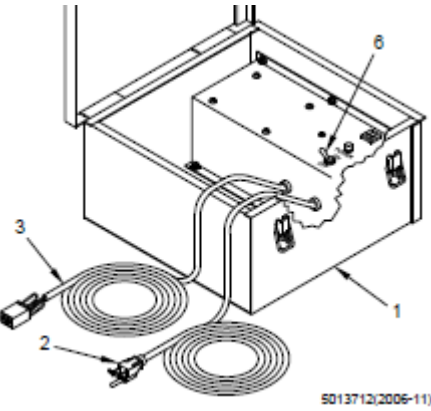
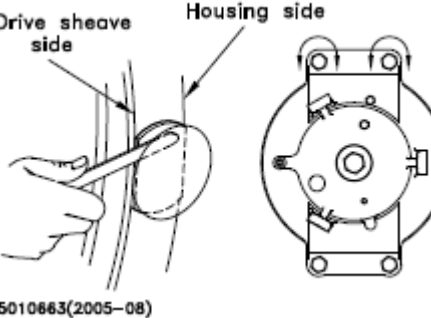


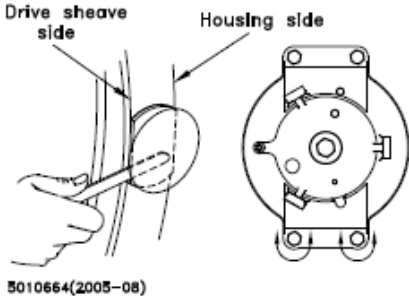
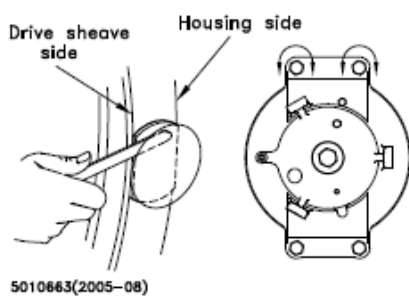
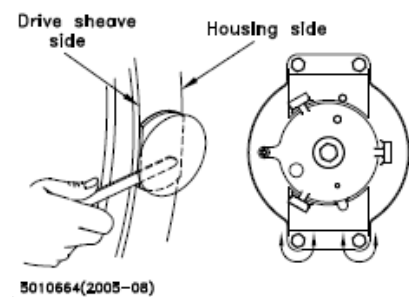
### Check brake air gap: emergency and main brake: MX10 and MX20

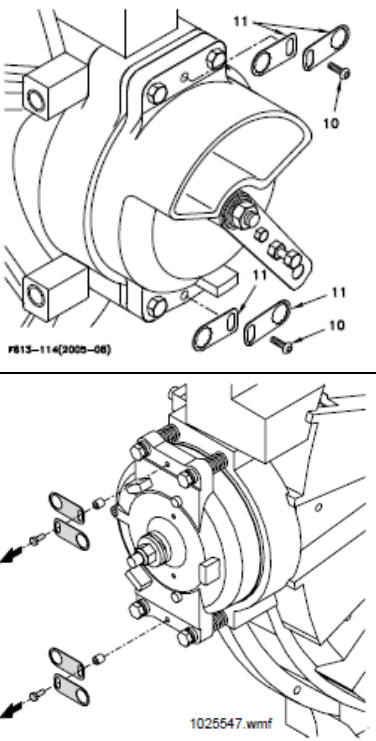
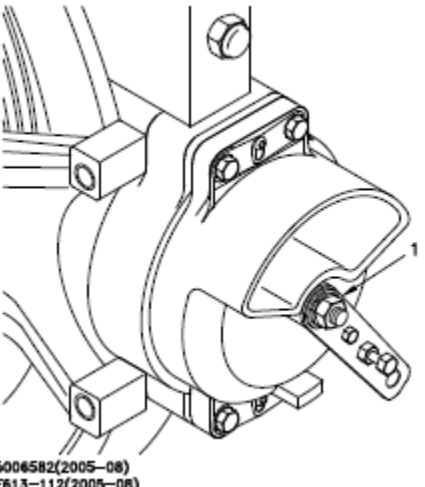
Procedure	Note
<p>1. Move toggle switch (6) on tool (1) to ON to open the brake.</p> <p><b>WARNING!</b> Open only one brake at a time!</p> <p><b>WARNING!</b> If the brake release cable is too tight, when one brake is opened, there is a risk of opening simultaneously the other brake!</p> <p><b>WARNING!</b> Before removing electrical covers, ensure that the power is switched OFF.</p>	<p>5013712(2006-11)</p>
<p>2. Measure the air gap between the brake lining and the drum by sliding a feeler gauge round the air gap.</p> <ul style="list-style-type: none"> <li>If the air gap is less than 0.05mm or more than 0.10mm (air gap &lt; 0.05mm or air gap ≥ 0.10mm) adjust the air gap (see next section).</li> <li>If the air gap is within 0.05-0.10mm, brake adjustment is not necessary.</li> </ul>	<p>0.05 mm &lt; 0.10 mm</p> <p>asg0405014c.wmf</p>
<p>3. Move toggle switch (6) on tool (1) to OFF to close the brake.</p>	<p>5013712(2006-11)</p>
<p>4. Repeat the brake air gap check for the other brake (if not already done).</p>	
<p>5. Disengage the car blocking device. 6 Ensure that the manual brake release.</p>	



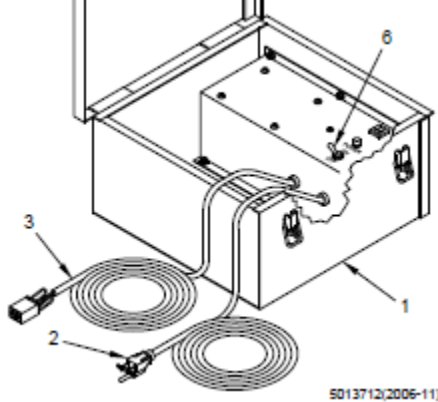
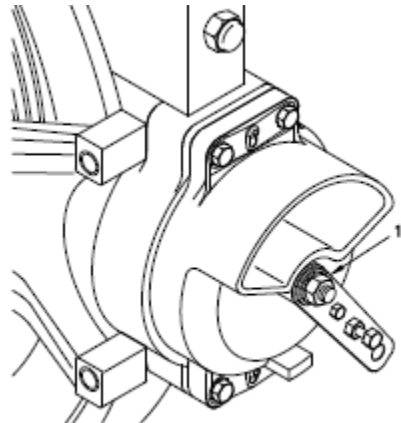
### Adjust brake air gap: emergency and main brake: MX10 and MX20

Procedure	Note
<p>1. Remove locking plates.</p> <ul style="list-style-type: none"> <li>MX10: Remove screws (10) to remove locking plates (11) from adjusting screws.</li> <li>MX20: Remove the plates that lock the adjustment screws.</li> </ul> <p>Mind the sleeves under the locking plates.</p>	
<p>2. Open the brake with the MX electrical brake opening tool. (Move toggle switch (6) on tool (1) to ON to open brake.)</p> <p><b>Note:</b> Only open one brake at a time.</p>	
<p>3. Adjust air gap at upper end, both sides.</p> <ul style="list-style-type: none"> <li>Housing side: Adjust air gap to 0.004 inch [0.10 mm].</li> <li>Drive sheave side: Adjust air gap to 0.004 inch [0.10 mm].</li> </ul>	

Procedure	Note
<p>4. Adjust air gap at lower end, both sides.</p> <ul style="list-style-type: none"> <li>Housing side: Adjust air gap to 0.002 inch [0.05 mm].</li> <li>Drive sheave side: Adjust air gap to 0.002 inch [0.05 mm].</li> </ul>	
<p>5. Return to upper end and adjust air gap, both sides.</p> <ul style="list-style-type: none"> <li>Housing side: Adjust air gap to 0.002 inch [0.05 mm].</li> <li>Drive sheave side: Adjust air gap to 0.002 inch [0.05 mm].</li> </ul>	
<p>6. Return to lower end and adjust air gap, both sides.</p> <ul style="list-style-type: none"> <li>Housing side: Adjust air gap to 0.002 inch [0.05 mm].</li> <li>Drive sheave side: Adjust air gap to 0.002 inch [0.05 mm].</li> </ul>	
<p>7. Pick and drop brake several times, observing how it picks. Brake should pick smoothly with no hesitation or step and set with an acceptable noise level.</p>	<p>If there is hesitation or step in pick, brake may need adjusting or replacement.</p> <ul style="list-style-type: none"> <li>Hesitation or step in pick indicates binding in brake. Turn adjusting screws slightly to allow brake to pick freely.</li> <li>If brake cannot be made to pick smoothly and consistently, it may be necessary to replace brake assembly.</li> </ul> <p>If brake sets with excessive noise, brake may need further adjustment AFTER ensuring that brake shoe is not dragging.</p> <ul style="list-style-type: none"> <li>If brake sets with unacceptable noise level, four adjusting screws can be adjusted equally to reduce air gap and minimize brake set noise. Caution! Making this adjustment risks brake shoe dragging on drum at high spots.</li> </ul>

Procedure	Note
<p>8. Reinstall locking plates.</p> <p><b>MX10</b></p> <p>Reinstall top and bottom locking plates (11) to secure adjustment screws (10), taking care not to change position of adjusting screws (10).</p> <p><b>MX20</b></p> <p>Reinstall top and bottom locking plates to secure adjustment screws, taking care not to change position of adjusting screws.</p>	
<p>9. After adjusting brake air gap, brake switch must be adjusted.</p>	<p>Adjust brake switch any time air gap is changed using procedure found in section titled: ADJUST BRAKE SWITCH, FINE ADJUSTMENT</p>
<p>10. Check center nut (1), verifying that washer under nut is loose and turns freely. If washer does not turn freely, center nut (1) is preventing brake from setting fully and will reduce brake holding torque. Loosen center nut (1). If center nut (1) is too loose, manual release will not open brake. Tighten center nut (1), but do not over tighten. Washer must turn freely.</p>	
<p>11. After adjusting brake, run car several long runs, then stop. Feel around brake and drum for warm spots. Warm spots indicate brake shoe is dragging on drum. Readjust brake as necessary to eliminate brake dragging on drum.</p>	

### Adjust other brake: MX10 and MX20

Procedure	Note
1. Move electrical brake release tool to other brake and connect.	
2. Close the brake with the MX electrical brake opening tool. Move the toggle switch (6) on tool (1) to OFF to open close the brake.	 <p>5013712(2006-11)</p>
3. Adjust brake using procedure found in previous section titled: <b>ADJUST EMERGENCY AND MAIN BRAKES.</b>	
4. After adjusting brake air gap, adjust brake switch using procedure found in section titled: <b>ADJUST BRAKE SWITCH, FINE ADJUSTMENT.</b>	Adjust brake switch any time air gap is changed.
5. After adjusting brake, reconnect main and emergency brake coils to permanent connections.	
6. Check center nut (1), verifying that washer under nut is loose and turns freely. If washer does not turn freely, center nut (1) is preventing brake from setting fully and will reduce brake holding torque. Loosen center nut (1). If center nut (1) is too loose, manual release will not open brake. Tighten center nut (1), but do not over tighten. Washer must turn freely.	 <p>5006582(2006-08) F613-112(2005-08)</p>
7. Test manual release operation by opening brake using manual release. Verify brake opens and car moves. If manual release does not operate correctly, adjust manual release according to procedure found in section titled: <b>ADJUST MANUAL BRAKE RELEASE.</b>	

### Adjust manual brake release: MX10

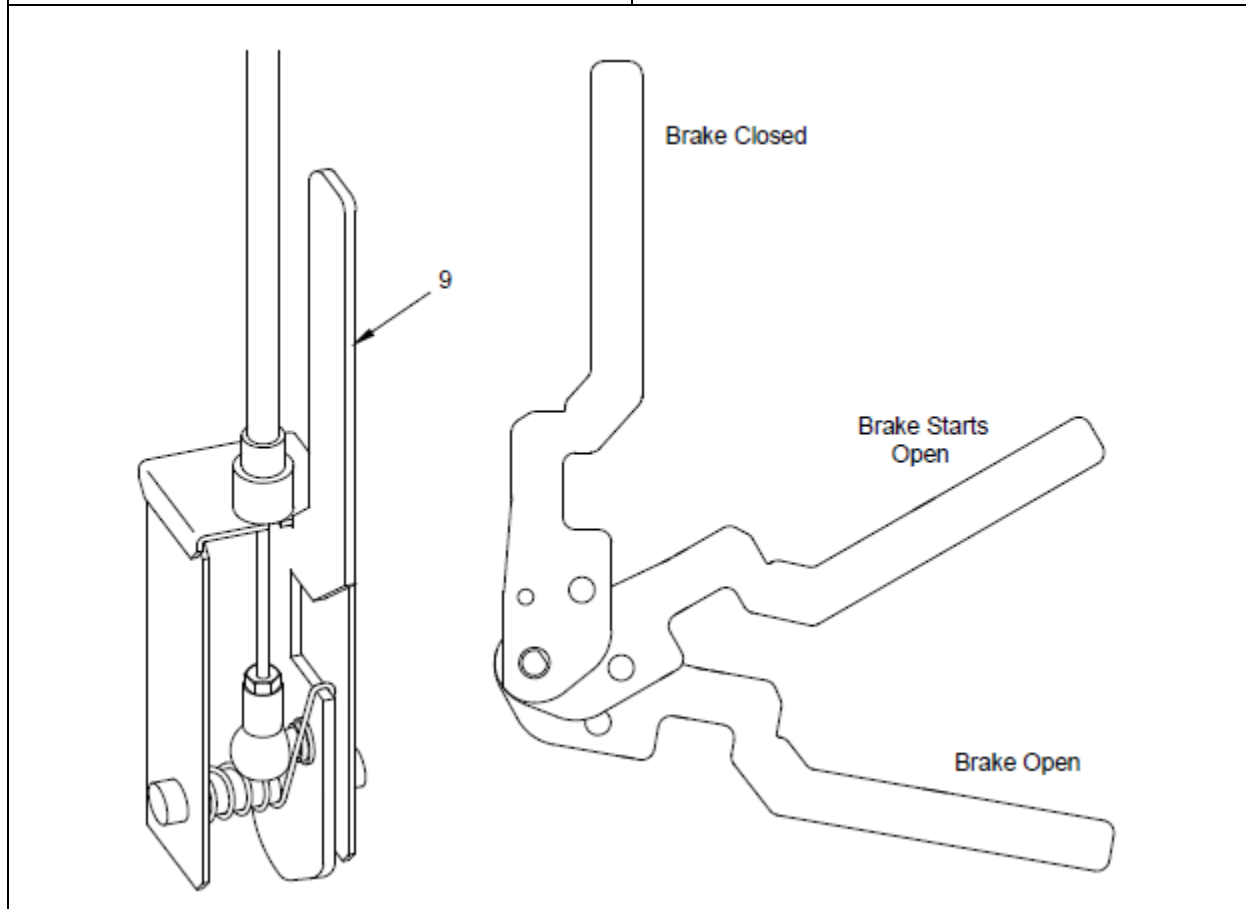
Procedure	Note
<p>1. Adjust brake levers (1) parallel to the brake face using set screw (2).</p> <p>2. Make sure washer (3) is not tight. It must be free to rotate.</p>	<p>5006583(2004-06)</p>
<p>3. Adjust end nut (4) so that levers at both sides lean against set screws (2), and bushings (5) are sitting flush inside levers.</p> <p>4. Tighten jam nut (6).</p>	<p>5006584(2004-06)</p>

### Adjust manual brake release: MX20

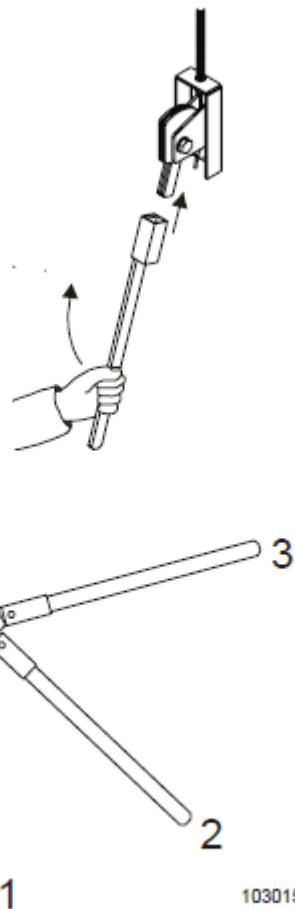
Procedure	Note
1. Loosen the center nut (1) fully before fitting the brake lever (3) and then tighten it slightly. Fit the setting screw (2) tight but without forcing the brake lever.	
2. Tighten the test screw (4).	
3. Adjust the center nut (1) so that the test screw (4) slightly touches the brake body while pressing the lever by hand.	
4. Loosen the test screw (4).	
5. Ensure that the washer (5) is not tight. It must be free to rotate.	
6. Tighten the nut at the brake lever until the wire is stretched.	

### Test manual brake release: MX10

Procedure	Note
1. Test brake function by pushing in on pin to release brake handle (9).	<b>NOTE!</b> Any further adjustments must be done from cable end nut (4), not from center nut.
2. Make sure brake handle (9) returns to brake closed position by itself.	<b>NOTE!</b> If brake handle (9) does not return, check brake cable and aluminum tube for sharp radii, twists and other blockages.



## Test manual brake release: MX20

Procedure	Note
<p>1. Check the brake function by installing the brake release lever and pulling it to the brake open position (3).</p> <p><b>Any further adjustments must be done by the cable end nut, not by the center nut!</b></p>	 <p>1030155.wmf</p> <p>1. Brake closed 2. Brake starts to open 3. Brake open</p>
<p>2. Ensure that the lever returns to the “brake closed” position (1) by itself.</p> <p><b>NOTE!</b> If brake handle (9) does not return, check brake cable and aluminum tube for sharp radii, twists and other blockages.</p>	



### Adjust brake switch, fine adjustment: MX10 and MX20

Procedure	Note
<b>NOTE! If using electrical brake release (EBR), manual brake release cable is not required.</b>	
1. Remove cover on brake switch box.	
2. Pick brake electrically using MX electrical brake opening tool.	
3. Loosen lock nut (if present) and turn screw A clockwise until you hear a click <b>NOTE!</b> If switch appears to already be tripped, turn screw A counterclockwise and listen for click. If switch clicks, turn adjustment screw clockwise until it clicks again. Proceed to next step. <b>NOTE!</b> If screw A bottoms before you hear a click, follow procedure found in section titled: <b>ADJUST BRAKE SWITCH, COARSE ADJUSTMENT: MX10.</b>	
4. Turn screw A counterclockwise and stop when you hear a click.	
5. Turn screw A clockwise and stop when you hear a click.	
6. Fine tune the setting by turning screw A clockwise an additional one-eighth turn. Test for reliability by turning the brake tool on and off several times to exercise the switch.	
7. Secure adjustment screw A with lock nut if present, or if not, seal head of screw to metal switch bracket utilizing chemical sealant such as fingernail hardener, paint or commercial sealant.	
8. Install cover on brake switch box.	

### Adjust brake switch, coarse adjustment: MX10 and MX20

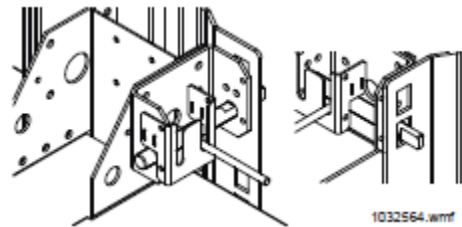
Procedure	Note
<b>Coarse adjustment is required only if it is not possible to adjust brake switch using procedure in section titled: ADJUST BRAKE SWITCH, FINE ADJUSTMENT: MX10 and MX20.</b>	
1. Loosen lock nut (if present) and adjust contact horizontally using screw A.	
2. Loosen screw B a little.	
3. Loosen screw C enough that contact can be moved by hand.	
4. Push up contact end.	
5. Push contact down until you hear a click.	
6. Push contact up again and stop when you hear a click.	
7. Tighten screws, first C and then B.	
8. Complete brake switch adjustment using procedure found in section titled: <b>ADJUST BRAKE SWITCH, FINE ADJUSTMENT: MX10 and MX20</b>	

### One-sided Brake Test: MX10 and MX20

Procedure	Note
1. Position the empty car so that the blocking pin of <b>car blocking device</b> is at the bottom of the slot in the <b>blocking plate</b> .	
2. Engage the car blocking device.	
3. Mark the position of the traction sheave (brake drum) on the motor body.	
4. Open the brake fully using the MX Electrical brake opening tool. (Move toggle switch (6) on tool (1) to ON to open the brake.)  <b>WARNING!</b> Open only one brake at a time!  <b>WARNING!</b> If the brake release cable is too tight, when one brake is opened, there is a risk of opening simultaneously the other brake!  <b>WARNING!</b> Before removing electrical covers, ensure that the power is switched OFF.	
5. Wait for a minute.  Check for movement of the safety pin in the slot of the blocking plate.	<p>If the brake test fails (the car moves until the safety pin hits the top of the slot), initiate corrective measures. The brake system must pass the test before the elevator is put back in service.</p> <p>Leave the elevator out of service until the brakes are operating properly and the brake test is passed!</p>
6. Close the brake using the MX Electrical brake opening tool.  (Move the toggle switch (6) on tool (1) to OFF to close the brake.)	

Procedure	Note
7. Repeat steps 1...7 to the other brake.	
8. If both brake tests succeeded, disengage the car blocking device.	
9. <b>Ensure that the manual brake release works properly:</b>  Go to sections: <b>Adjusting the manual brake releasing device</b> and <b>Testing the manual brake releasing device</b> .	

### Brake test after brake replacement and adjustment: MX10 and MX20

Procedure	Note
1. Inhibit landing calls and door opening.	
2. Nobody is allowed to stay in the car or in the elevator shaft during the test.	
3. Position the empty car so that the blocking pin of car blocking device is in the center of the slot of the blocking plate.	
4. Engage the blocking pin.	
5. Mark position of the traction sheave (brake wheel) on the motor body.	
6. Leave from the car roof.	
7. Open brake using electric brake tool.	
8. Wait about one minute. Check for movement of the traction sheave (brake wheel).	There must not be visible movement of the traction sheave (car). If the elevator does not pass the brake test, initiate corrective measures as follows. Brake system must pass the test before the elevator is put back in service.
9. Remove brake tool.	
10. Repeat previous steps on other brake.	
11. Disengage the car blocking device.	
12. With car at bottom floor, load 125% rated load in the car.	WARNING! Car may move as weight is added.
13. Open one brake electrically.	

Procedure	Note
14. Wait one minute.	
15. Release brake.	There must not be visible movement of the traction sheave (car).
16. Open other brake electrically.	
17. Wait one minute.	
18. Release brake.	There must not be visible movement of the traction sheave (car).
<b>Note: If brake fails to hold 125%, burnish the brake as follows.</b>	
1. Remove weights from the car until it is approximately 75% loaded. (For 2500 lb capacity this will be about 1900 lbs.)	
2. With car on inspection operation move it up to approximately mid-hoistway.	
3. Operate manual brake release to let the car slowly slide through the brake for one or two floors. The action of the brake shoe sliding against the brake drum will burnish the brake.	
4. After burnishing is complete, re-check brake adjustment and perform brake test with 125% load again.	
<p>A list of possible reasons that could cause a brake test failure follow:</p> <ul style="list-style-type: none"> <li>• Incorrect brake adjustment</li> <li>• Center nut of brake too tight</li> <li>• Brake release wire too tight</li> <li>• Dirt on brake pads</li> <li>• Worn-out brake pads</li> <li>• Damaged brake shoe bearing</li> <li>• Incorrect balancing (counterweight too heavy)</li> </ul> <p>If the failure is not caused by lubricant contamination, order new parts.</p> <p>If the brake drum and brake pads are contaminated by lubricant leakage:</p> <ul style="list-style-type: none"> <li>• Source of lubricant leakage is other than the machine (for example guide rail or rope oil) – order new parts and remove the source of lubricant leakage</li> <li>• Source of lubricant leakage is the machine – order complete new machine</li> </ul>	

### 8.6.4.8: Cleaning and condition of the Machine Room

Procedure	Note
<b>8.6.4.8.1:</b> Sweep the machine room floor. Clean up any oil or grease.	Notify a supervisor if water is present.
<b>8.6.4.8.2:</b> Parts should be neatly organized and stored in a cabinet.	Used parts should be discarded.
<b>8.6.4.8.3:</b> Remove any flammable liquids which have a flashpoint of less than 110°F (44°C).	Oily rags should be discarded according to hazardous material guidelines.
<b>8.6.4.8.4:</b> Check to ensure the machine room door is closed and locked.	
<b>8.6.4.8.5:</b> Do not use machinery or control spaces located in the hoistway for storage.	

### 8.6.4.12: Governor

#### OL35 Overspeed Governor

Governor components	
<ol style="list-style-type: none"> <li>1) Flyweight</li> <li>2) Spring</li> <li>3) Eccentric wheel</li> <li>4) Flyweight catch</li> <li>5) Overspeed contact</li> <li>6) Trip wheel</li> <li>7) Contact plate</li> <li>8) Test groove</li> <li>9) Groove for normal use</li> </ol>	<p>1008747.wmf</p>
Maintenance Procedures and Safety Measures	
<p><b>Maintenance Procedures</b></p> <ol style="list-style-type: none"> <li>1. Check the condition of the flyweights and springs.</li> <li>2. Check the operation of the overspeed contact.</li> <li>3. Check the operation of the tension weight contact.</li> <li>4. Check the condition of the pulley (Main) bearings.</li> <li>5. Check the wear of the rope groove.</li> <li>6. <b>8.6.4.12.1:</b> Examine the governor to ensure the governor seal is present and intact.</li> <li>7. <b>8.6.4.12.2:</b> Clean the entire governor, removing all grease, oil and dirt. Ensure the governor is free from contaminants or obstructions, or both, that interfere with operation or function, including the accumulation of rope lubricant or materials, or both, in the grooves of governors or sheaves.</li> </ol>	<p><b>Safety Measures</b></p> <ul style="list-style-type: none"> <li>• Activate the emergency stop on machine or on car roof (as applicable) to prevent unexpected movement of the car.</li> <li>• <b>Do not lubricate the overspeed governor.</b> Lubrication may reduce the braking force.</li> <li>• <b>Do not adjust or replace any parts of the overspeed governor.</b> (Only optional remote tripping system can be replaced).</li> <li>• After every operation of overspeed governor and safety gear check that overspeed governor and safety gear are operational.</li> <li>• <b>If KONE safeties are installed, a product specific KONE SAFETY GEAR APPLICATIONS RECORD must be affixed to the controller, on which all full load safety applications that occur at rated speed or governor tripping speed must be entered.</b></li> </ul>

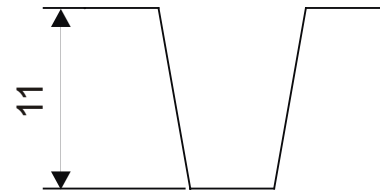
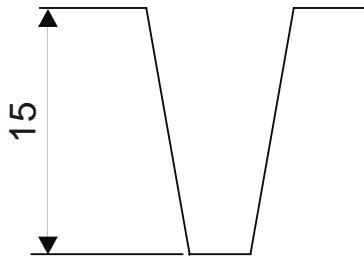
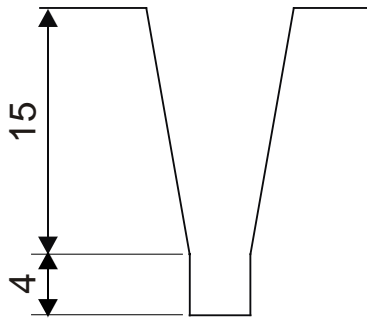


### Check the flyweights and springs (OL35)

Procedure	Note
Check the springs	A broken spring can cause unnecessary tripping of the overspeed governor. Dirty/rusty springs may increase the tripping speed!
<p>Check the operation / vertical (radial) movement of the flyweights manually:</p> <ul style="list-style-type: none"> <li>• Pull flyweights outwards</li> <li>• Check that both of the eccentric wheels touch the tripping wheel (Picture A below)</li> <li>• Let the flyweights close by themselves. They <b>MUST</b> return easily without extra friction (Picture B below)</li> </ul>	
<p>A.</p>	<p>B.</p>
<ul style="list-style-type: none"> <li>• Check lateral movement of the flyweights while the elevator is running:</li> <li>• The flywheel <b>MUST not</b> touch the governor pulley (Picture C below) or the tripping wheel (Picture D below)</li> </ul>	
<p>C.</p>	<p>D.</p>

### Check wear of the rope groove (OL35)

#### Groove types

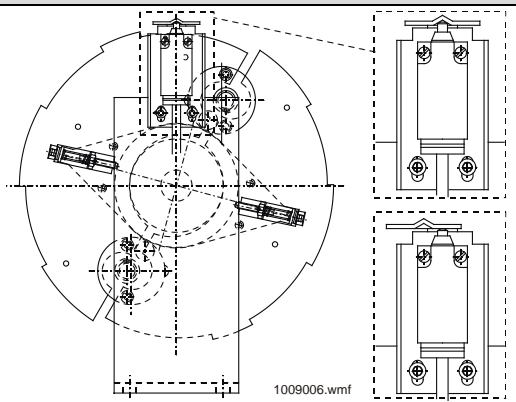


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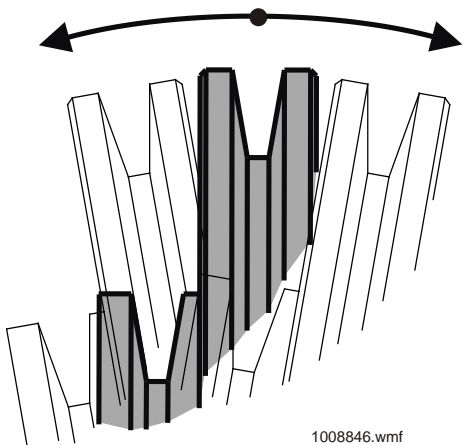
The overspeed governor **MUST be replaced** when the rope goes deeper into the groove than value (T) given in the table below

Groove type	Rope diameter (d)	Maximum dimension (T)
<p>A</p>	6 mm	8.5 mm
	6.5 mm	8 mm
	7 mm	7.5 mm
	8 mm	7 mm
<p>B</p>	7 mm	3.5 mm
	8 mm	2.5 mm
	8 mm	2.5 mm
<p>C</p>	7 mm	3.5 mm
	8 mm	2.5 mm

### Check operation of the overspeed contact (OL35)

Procedure	Note
1. Turn the contact plate (1) 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.	<p>Elevator must not drive in the normal or inspection drive mode.</p> <p><b>NOTE!</b> Recall drive mode (RDF) bypasses the overspeed contact</p>

### Check the pulley bearings (OL35)

Procedure	Note
1. Push and pull the pulley in the axial direction, use your hand.	<p>Maximum free play +/- 1 mm measured on outside diameter of the 200 mm pulley.</p> 
2. Check that the pulley does not move in the axial direction (No free play).  If there is axial free play the governor must be replaced.	

## Maintenance procedures for OL100 & OL120 Overspeed Governors

Governor components	
<ol style="list-style-type: none"> <li>1. Flyweight</li> <li>2. Spring</li> <li>3. Eccentric wheel</li> <li>4. Flyweight catch</li> <li>5. Rope brake device</li> <li>6. Overspeed contact</li> <li>7. Trip wheel</li> <li>8. Contact plate</li> <li>9. Tripping lever</li> </ol>	
Maintenance Procedures and Safety Measures	
<p><b>Maintenance Procedures</b></p> <ol style="list-style-type: none"> <li>1) Cleaning (especially the flyweight springs and rope brake)</li> <li>2) Check the condition of the flyweights and the springs</li> <li>3) Check the operation of the overspeed contact</li> <li>4) Check the operation of the tension weight contact (if provided)</li> <li>5) Check the condition of the (Main) bearings</li> <li>6) Check the wear of the rope groove</li> </ol>	<p><b>Safety Measures</b></p> <ul style="list-style-type: none"> <li>• All safety measures for normal elevator maintenance must be implemented and local safety regulations assimilated into local instructions with due regard to risk.</li> <li>• Activate the emergency stop switch in control panel or on machine (if provided) to prevent unexpected movement of the car.</li> <li>• <b>Do not lubricate the overspeed governor.</b> Lubrication may reduce the braking force.</li> <li>• After every operation of overspeed governor and safety gear check that overspeed governor (and safety gear) is operational.</li> <li>• <b>Do not adjust or replace any parts of the overspeed governor.</b> If the overspeed governor is not properly adjusted, please contact the factory.</li> </ul>

### Check the flyweights and springs (OL100 and OL120)

Procedure	Note
1. Check the springs.	A broken spring can cause unnecessary tripping of the overspeed governor. Dirty/rusty springs may increase the tripping speed!
2. Check the operation / vertical (radial) movement of the flyweights manually: <ul style="list-style-type: none"> <li>• Pull flyweights outwards.</li> <li>• Check that the both eccentric wheels touch the tripping wheel (Picture A).</li> <li>• Let the flyweights close by themselves. They <b>MUST</b> return easily without extra friction (Picture B).</li> </ul>	
<p>A.</p>	<p>B.</p>
<p>Check lateral movement of the flyweights while the elevator is running.</p> <p>The flywheel <b>MUST not</b> touch the governor pulley (Picture C) or the tripping wheel (Picture D).</p>	

### CHECK WEAR OF THE ROPE GROOVE (OL100 and OL120)

Visual check at least once a year. The total rope groove depth (D) **must** not exceed the value in the figure on this page.

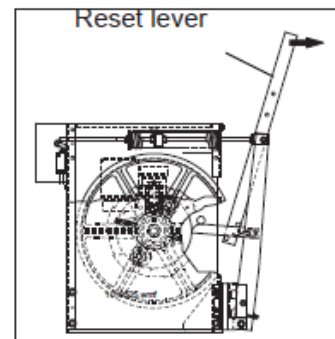
### CHECK OPERATION OF THE OVERSPEED CONTACT (OL100 and 120)

Check the function of the overspeed contact at every service visit, at least once a year.

### CHECK ROPE BRAKE DEVICE (OL100 and 120)

Check the function of the rope brake device (every second year) when checking the system function Overspeed governor – Safety gear).

Mind your hands, the reset lever will hit very fast when the spring is released!



### CHECK PULLEY & BEARINGS (OL100 and OL120)

Checking interval: Once a year.

Procedure	Note
1. Push and pull the pulley in the axial direction, use your hand.	
2. Check that the pulley does not move in the axial direction (No free play). If there is axial free play the governor must be replaced.  <b>Wear of the rope groove:</b> <b>OL100: <math>D \leq 12.5</math> mm</b> <b>OL120: <math>D \leq 16.0</math> mm</b>	<p>Maximum free play +/- 1.5 mm measured on outside diameter of the 300 mm pulley.</p>

### 8.6.4.17: Ascending Overspeed and Unintended Movement Device

Procedure	Note
<ul style="list-style-type: none"><li>Manually operate all components to ensure proper operation.</li><li>Lubricate all pivot points, gears, bushings and bearings, as required.</li><li>For units equipped with the Hollister-Whitney Rope Gripper refer to Document ID OM-01.03.090.</li></ul>	For manufacturer specific instructions refer to the OEM document included in the Maintenance Control Program documentation.



### 3.3 Maintenance Procedures on the Car Top

#### 8.6.4.1: Suspension and Compensating Wire Ropes

##### Hoist and comp rope condition

Procedure	Note
Check hoist and compensating ropes for: <ul style="list-style-type: none"><li>• excessive wear</li><li>• breaks</li><li>• rouge</li><li>• proper diameter</li></ul>	<b>Note:</b> Refer to A17.2 and/or A17.6 for additional information about checking the condition of the hoist and compensating ropes.

##### 8.6.4.1.1: Hoist and comp rope cleaning

Procedure	Note
Clean the hoist and compensating ropes annually in preparation for an examination of the ropes. <ul style="list-style-type: none"><li>• Manual cleaning – Wear leather gloves to prevent injury from broken wires. Use a bristle brush (not a wire brush) soaked in gear oil to remove any buildup of dirt from the cables. Remove excess oil with a heavy cloth rag.</li><li>• Auto-lubricator: Follow the manufacturer's recommendations.</li></ul>	<b>Note:</b> Do not use a cleaning solution as it will damage the internal lubrication of the rope.

##### 8.6.4.1.3: Hoist rope tension

Procedure	Note
Check the tension of the hoist ropes with the top of the cab approximately halfway between the top landing and the counterweight. Use one of the following two methods. <ol style="list-style-type: none"><li>1) Measure each rope with a hoist rope tension measuring tool. All hoist ropes must have equal tension.</li><li>2) Check the tension by pulling each hoist rope in succession with an index finger. Measure the distance each rope deflects using a fixed reference point.</li></ol>	<b>Note:</b> Suspension members are considered to be equally tensioned when the smallest tension measured is within 10% of the highest tension measured.

### 8.6.4.2: Governor rope

Procedure	Note
<p><b>8.6.4.2.1:</b> Clean the governor rope annually.</p> <p>Wear leather gloves to prevent injury from broken wires. Remove any lint or dirt from the governor rope with a heavy cloth rag.</p> <p><b>8.6.4.2.2:</b> Do <b>NOT</b> lubricate the governor rope. If lubrication has been applied, the ropes must be cleaned or replaced, and then the governor and safety tested.</p>	<p><b>Note:</b> Do not use a cleaning solution, as it will damage the internal lubrication of the rope.</p>

### 8.6.4.3: Guide rail lubrication

Procedure
<p><b>8.6.4.3.1:</b> Lubricate the guide rails as noted on the crosshead data plate, if present.</p> <p><b>8.6.4.3.2:</b> If a data plate is not present, ensure the guide rails are properly lubricated when slide guides are installed. Do not lubricate guide rails on elevators with roller guides installed.</p> <ul style="list-style-type: none"><li>• On KONE traction elevators with slide guides installed use KONE guide rail lubricant ISO 320 (part # US53940001) or an equivalent. It is important that you use a lubricant that contains no extreme pressure additives. These additives can adversely affect the performance of the safeties.</li><li>• On KONE hydraulic elevators with slide guides containing nylon inserts use NyLube lubricant (part # US506911002).</li><li>• Check the oil level in the guide rail lubricators, if provided. Add oil, if necessary.</li></ul> <p><b>8.6.4.3.3:</b> If rail lubricants other than those recommended by the manufacturer are used, a safety test must be performed to demonstrate that the safety functions as required.</p> <p><b>8.6.4.3.4:</b> Clean the guide rails. Remove any lint, dirt and accumulation of lubricant.</p> <p>Ensure there is a means to collect excess lubricant at the base of the rails. Empty / clean the container.</p> <p><b>8.6.4.3.5:</b> Do not use rust-preventive compounds such as paint, mixtures of graphite and oil, and similar coatings to the face of the guide rails, unless recommended by the manufacturer.</p>

### 8.6.4.7: Cleaning of Hoistways and Pits

Procedure	Note
<p><b>8.6.4.7.1:</b></p> <p><b>Hoistway:</b> Ensure the hoistway is clean. Dirt, lint and excess oil in the hoistway, particularly on the rails and brackets, should be removed. The counterweight, sills and headers should be free of an accumulation of dirt. The bottom and sides of the car should be free of lint and oil.</p>	<p>Notify a supervisor if a full hoistway cleandown must be performed.</p>

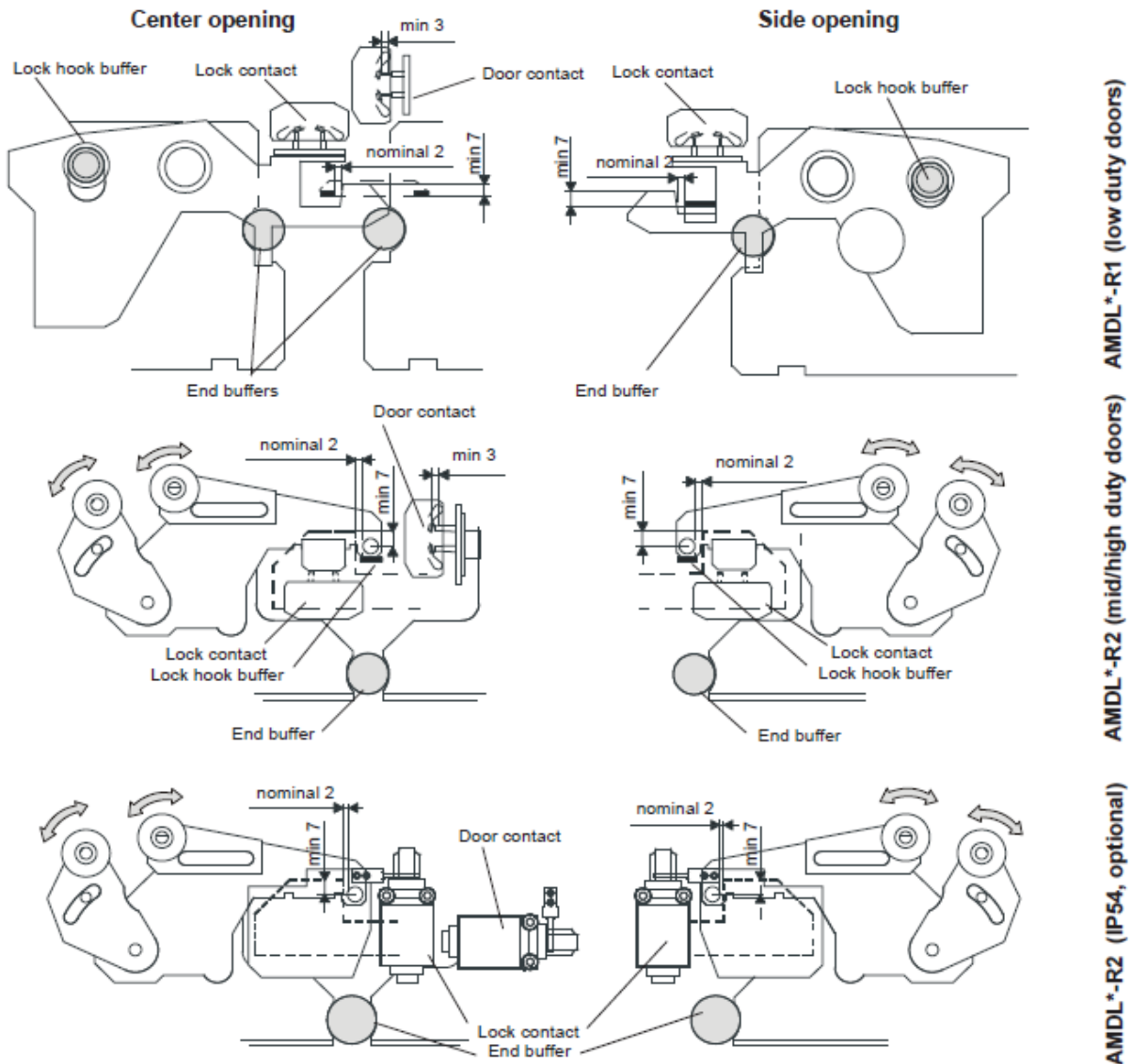
### 8.6.4.9: Cleaning of Car Tops

Procedure	Note
Wipe down the car top. Remove debris.	Do not use the car top for storage of lubricants, parts, tools or other items.

### 8.6.4.13(a): Hoistway door interlocks or mechanical locks and electric contacts

#### AMD Hoistway Door Interlocks

AMD<sup>\*</sup>-R1 (low duty doors) and AMD<sup>\*</sup>-R2 (mid/high duty doors) settings



### AMD Hoistway door interlocks: Maintenance procedures

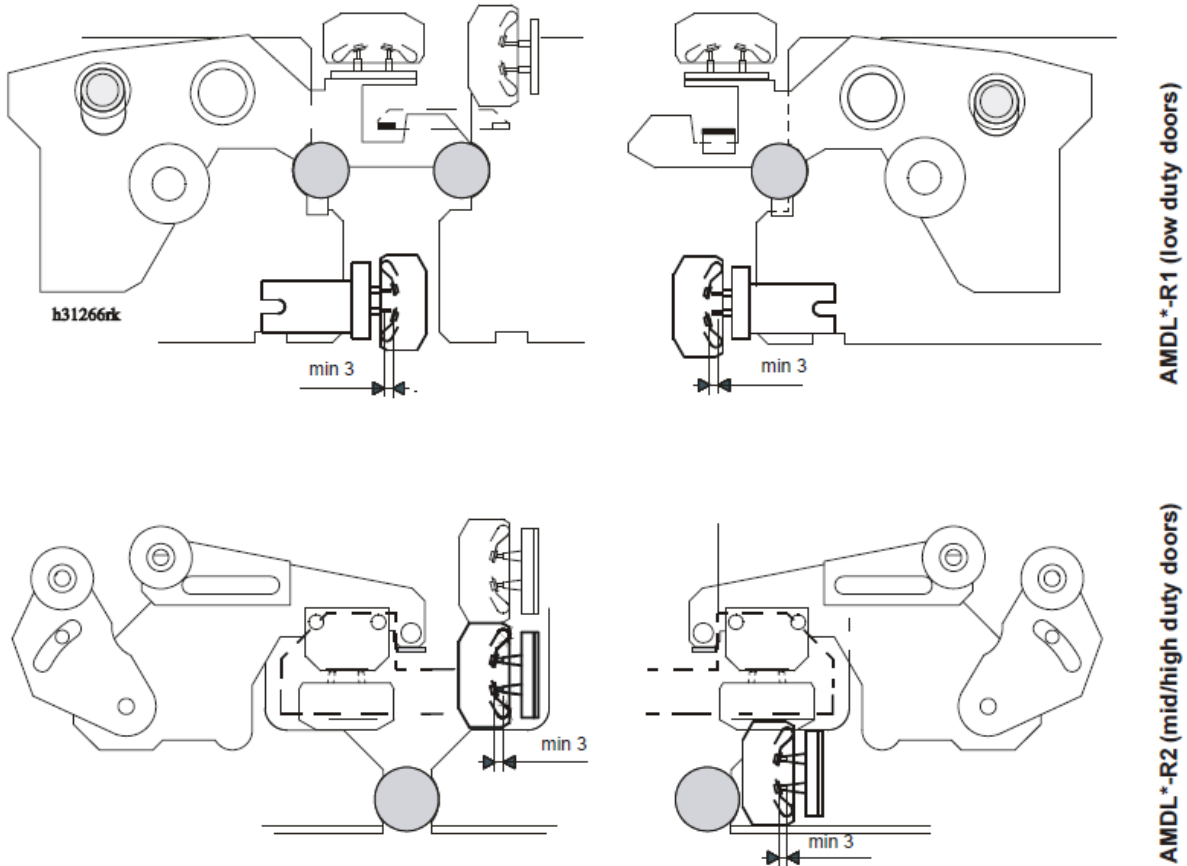
Procedures
Refer to the drawings on the previous page while performing these procedures.
<p><b>Check interlock circuit integrity</b></p> <ul style="list-style-type: none"><li>• Open a landing door and attempt to move the elevator downward (block the door open, if necessary). The elevator should not move.</li></ul> <p><b>Check mechanical function of the interlock</b></p> <p>Check the lock function (<b>Note!</b> The lock is not adjustable)</p> <ul style="list-style-type: none"><li>• Check the latching/locking mechanism for proper alignment and function. Ensure the locked door and door contacts do not open when the door is pushed or pulled by hand.</li></ul> <p>Check to ensure:</p> <ul style="list-style-type: none"><li>– The lock hook and peak overlap when contact operates must be a minimum of 7 mm.</li><li>– The contact bridge should push the door contact surface a minimum of 3 mm.</li><li>– Play between lock hook and lock beak should be 2 mm (nominal).</li></ul> <p><b>Clean the interlock contacts</b></p> <ul style="list-style-type: none"><li>• Clean the interlock contacts. Check for pitting, burning or excessive wear. Replace the contacts, as required.</li><li>• Check for proper contact separation when the hook lifts.</li><li>• Clean the shorting bar contact surface.</li></ul>

#### 8.6.4.13.1 (e): Hoistway door unlocking devices and escutcheons

Procedures
<p>Ensure the function of emergency opening device:</p> <ul style="list-style-type: none"><li>• The lock can be opened using the emergency opening key.</li><li>• The lock returns to closed position by itself after an emergency opening.</li></ul>

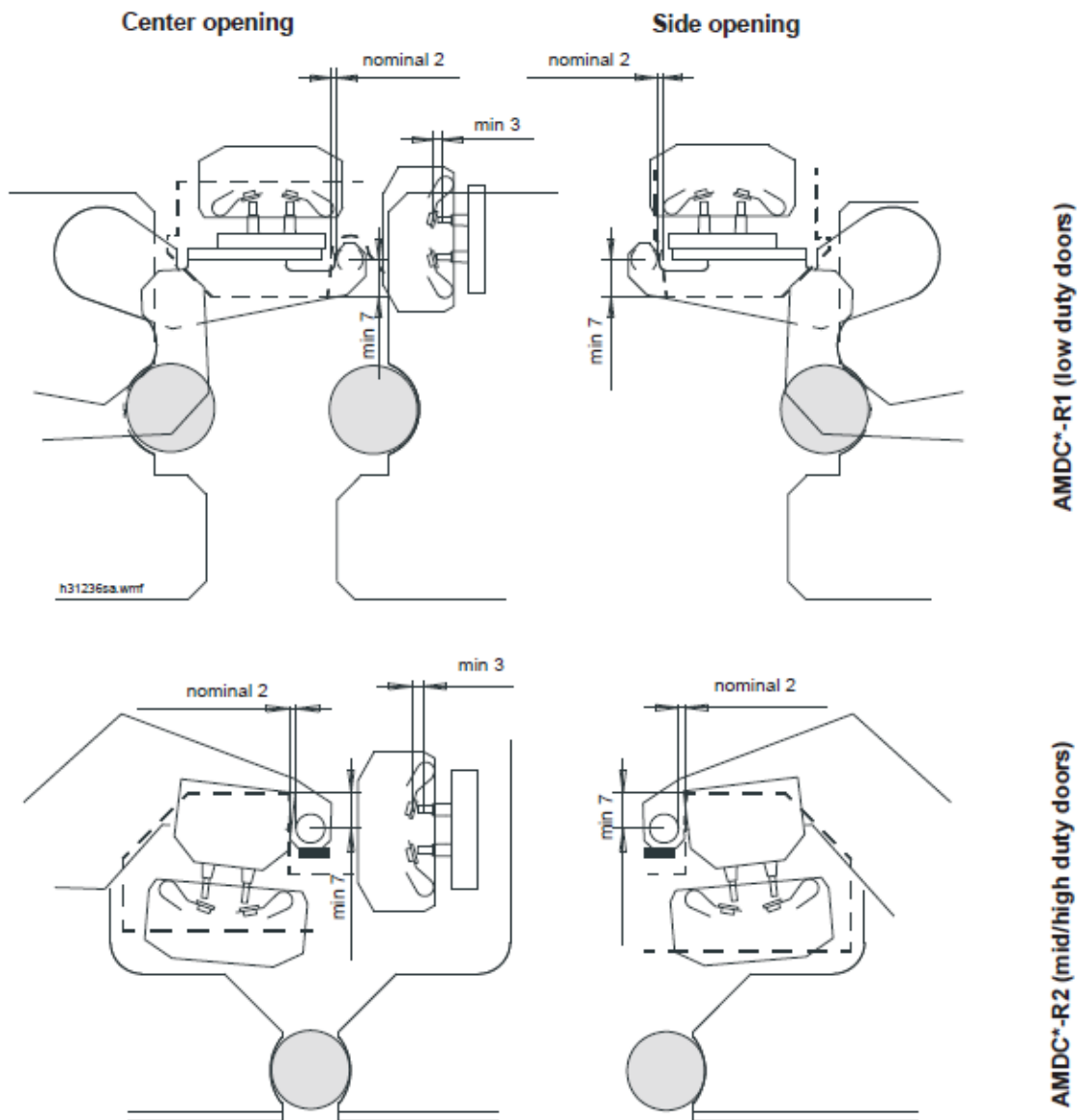
### Door opening monitoring (DOM)

Procedure
<p>Check the landing door lock monitoring contacts.</p> <p>The contact bridge should push the door contact surface down a minimum of 3 mm (See below).</p>



### 8.6.4.13.1 (b): Car door lock

Procedure
<p><b>Door lock and contacts:</b></p> <p>Check the car door lock function (<b>Note!</b> The lock is not adjustable).</p> <ul style="list-style-type: none"> <li>• Lock hook and peak overlap when contact operates must be a minimum of 7 mm.</li> <li>• The contact bridge should push the door contact surface down a minimum of 3 mm.</li> <li>• Play between the lock hook and beak should be 2 mm (nominal).</li> <li>• Clean car door lock contacts.</li> </ul>

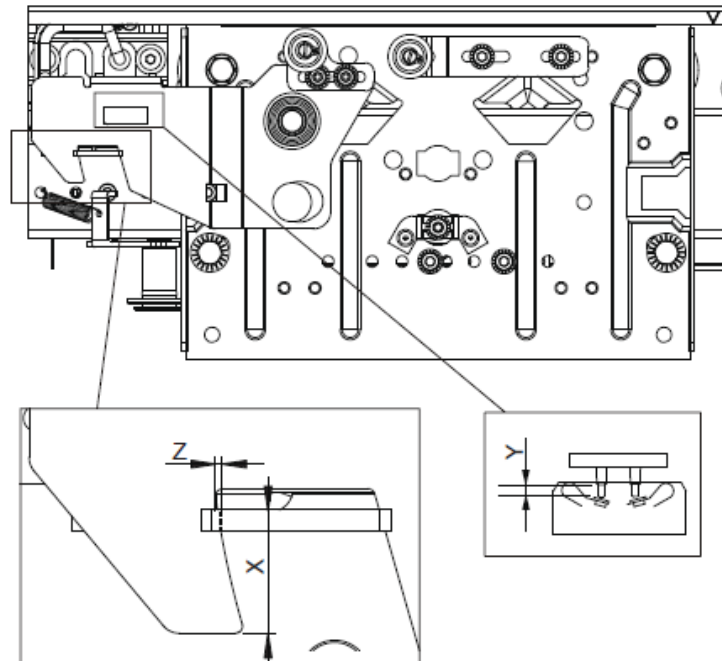


### KES Hoistway Door Interlocks

#### Maintenance procedures for KES190 (MDS1) lock

##### Door lock and contacts

Procedure	Note
<p>Operation of the following items should be as follows:</p> <ul style="list-style-type: none"> <li>• Landing lock must keep door closed, move freely and close by itself.</li> <li>• Safety circuit must be interrupted if the door opens.</li> <li>• Lock hook and beak must overlap a minimum of 7 mm (X), when contact operates.</li> <li>• Contact bridge should push the door contact surface a minimum of 2 mm (Y).</li> <li>• Free play between lock hook and lock beak should be nominal 2 mm.</li> <li>• Contacts should be clean and have minimal wear (metal visible).</li> <li>• Contact pins of contact bridge should be aligned to the middle of contactor holes (not touching the hole edges, A-A).</li> <li>• Electrical terminations should be tight and secure.</li> <li>• Check that lock rollers can roll easily (not stuck).</li> </ul>	





### 8.6.4.13 (i): Clutches, engaging vanes, retiring cams, and engaging rollers

Procedure	Note
<p>Operation of the following items should be as follows:</p> <ul style="list-style-type: none"> <li>• Lock rollers should be in the middle of coupler vanes.</li> <li>• Door coupling system should engage properly, engagement with rollers.</li> <li>• Door coupling system should operate quietly.</li> <li>• Lock rollers should rotate freely.</li> </ul>	

### 8.6.4.13.1 (f): Hangers, tracks, door rollers, up-thrusts, safety retainers

Procedure
<p><b>Examine and maintain the hanger tracks</b></p> <ul style="list-style-type: none"> <li>• Clean tracks of dirt and lubrication build-up, especially at the point the door rollers stop when the door lock is latched.</li> <li>• Check the condition of the tracks. Look for worn rolling surfaces, especially at the point the interlock hook engages the interlock box. Replace tracks, if required.</li> <li>• Lubricate tracks on freight elevators with 30w motor oil, as necessary.</li> <li>• Check alignment of the tracks relative to the sills. Adjust the tracks if they are not parallel to the sills.</li> </ul>

### 8.6.4.13.1 (h): Sills, bottom guides, fastenings, condition, engagement

Procedure
<p><b>Check hoistway door gibs, brackets, fire tabs and sills.</b></p> <ul style="list-style-type: none"> <li>• Check door gibs and fire tabs for excessive wear and proper sill penetration. Adjust or replace as required.</li> <li>• Check fastenings. Tighten as required.</li> </ul> <p><b>Check sills</b></p> <ul style="list-style-type: none"> <li>• Check for excessive wear.</li> <li>• Remove debris from sill.</li> <li>• Check fastenings. Tighten as required.</li> </ul>

### 8.6.4.13.1 (J): Interconnecting means

Procedure
<ul style="list-style-type: none"><li>• Check the condition and alignment of relating cables and sheaves.</li><li>• Clean, adjust or replace as required.</li></ul>

### 8.6.4.13 (k): Door closers, where required

Procedure
<ul style="list-style-type: none"><li>• Open each landing door manually and ensure it is self-closing. The door should close automatically after being stopped at any point in its travel.</li></ul>

### 8.6.4.13.1 (l): Maintain the door opening restriction device (passenger elevators)

Procedure
<ul style="list-style-type: none"><li>• <b>On elevators installed under A17.1b-1980 through A17.1-2010/CSA-B44-10</b>, check to ensure the elevator doors cannot be fully opened manually when the elevator is more than 18 inches above or below the landing. If the result of the above test is satisfactory, stop the elevator beyond 18 inches above or below the landing and attempt to manually open the doors. The doors should open no more than 4 inches.</li><li>• <b>On elevators installed under A17.1-2013/CSA-B44-13 and later editions</b>, check to ensure the elevator doors cannot be fully opened manually when the elevator is more than 7 inches above or below a landing. Adjust the device as necessary to maintain code required dimensions. If the result of the above test is satisfactory, stop the elevator within 3 inches above or below the landing and attempt to manually open the doors. The doors should open.</li><li>• Ensure the restrictor is securely fastened and properly aligned. Adjust as necessary to maintain proper operation.</li><li>• Lubricate pivot points annually with bearing oil.</li></ul>

## 3.4 Maintenance Procedures Outside the Hoistway

### 8.6.4.13.1 (e): Hoistway door unlocking devices and escutcheons

Procedure
<p>Ensure the function of emergency opening device:</p> <ul style="list-style-type: none"><li>• The lock can be opened using the emergency opening key</li><li>• The lock returns to closed position by itself after an emergency opening</li></ul>

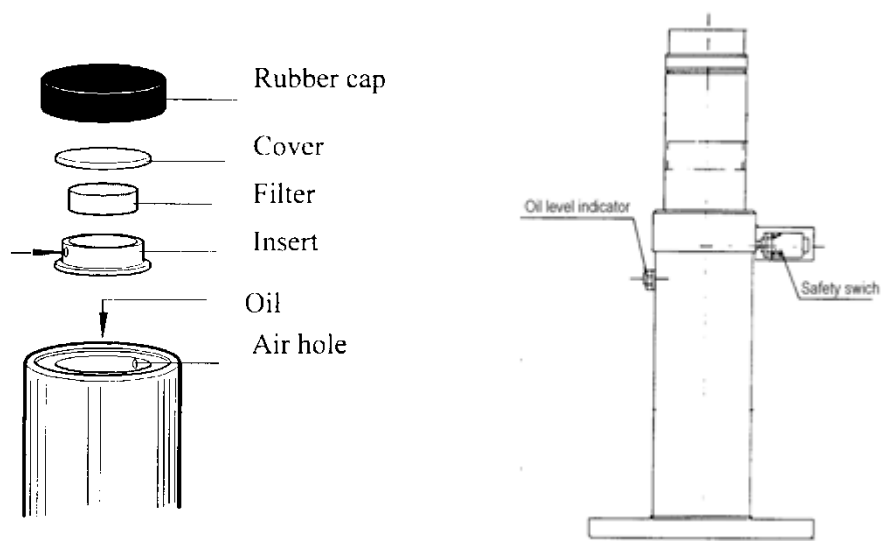
### 8.6.4.4: Hoistway access switches

Procedure
<p>Check hoistway access switches for proper operation. Ensure they cannot be operated outside the code defined zones noted below:</p> <ul style="list-style-type: none"><li>• <b>Lowest landing:</b> Car travel in the up direction is limited to the point where the bottom of the platform guard is even with the hoistway entrance header.</li><li>• <b>Landing other than the lowest landing:</b> Car travel in the down direction is limited to the height of the crosshead above the car platform. Car travel in the up direction must be limited to the distance the platform guard extends below the car platform.</li></ul>

### 3.5 Maintenance Procedures in the Pit

#### 8.6.4.4: Maintenance Procedure for Oil Buffers (if installed)

Procedure	Service Intervals
Check the oil level	Once a year
Drive the car or counterweight on the buffer and check to ensure the piston returns to its normal position.	Once a year
Check to ensure the safety switch operates properly.	Once a year



#### Oil Filling

**8.6.4.4.1:** Check the oil level from the oil level indicator (see the figure on the right).

- If the oil level does not reach the oil level indicator, disassemble the piston top (see the figure on the left) and fill in oil (OB buffers: ISO VG46, OLEO and YH buffers: ISO VG68).
- Install the piston top parts and let the buffer rest (piston compressed 40...50 mm).
- Re-check the oil level from the oil level indicator.
- If much oil (1 liter/year) is needed replace the buffer.
- Clean the pit if there has been an oil leak and handle the waste in line with a sound environmental policy.

**8.4.4.4.2:** Clean the buffer plungers. Remove any paint or other substance that could possibly interfere with its proper operation.

- Check alignment of the buffers to the strike plates. Correct any misalignment.
- Check security of all buffer fastenings. Tighten as required.

**8.6.4.4.3:** Do not store additional buffer oil in the pit or on the car top.

**NOTE!** Make sure that the hole is on the opposite side of the air hole when assembling.

### 8.6.4.4: Maintenance Procedure for Polyurethane buffers

Procedure	Service Intervals
Drive the car or counterweight on and off the buffer and check to ensure the buffer returns to its normal position and form.	Once a year
Check to ensure the buffer is not cracked or powdering after the load is removed.	Once a year
Check the overall condition of the buffer structure.	Once a year

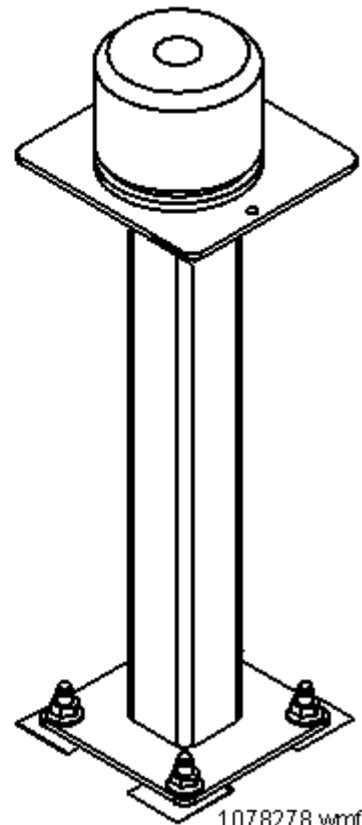
#### Inspection procedures:

1. Clean from dust and debris.
2. Check that buffer is securely fixed.  
(push buffer firmly sideways).
3. Check that there are no cracks or powdering.
4. Check that the buffer is not exposed to water,  
other liquid or chemicals.



**TIP:** If guide rail oil is dripping on to the buffer, it can be protected for example with a plastic bag (not recommended for scenic type glass shaft elevators).

Buffer must be replaced if any of the above conditions is not OK.



### 8.6.4.5: Safeties

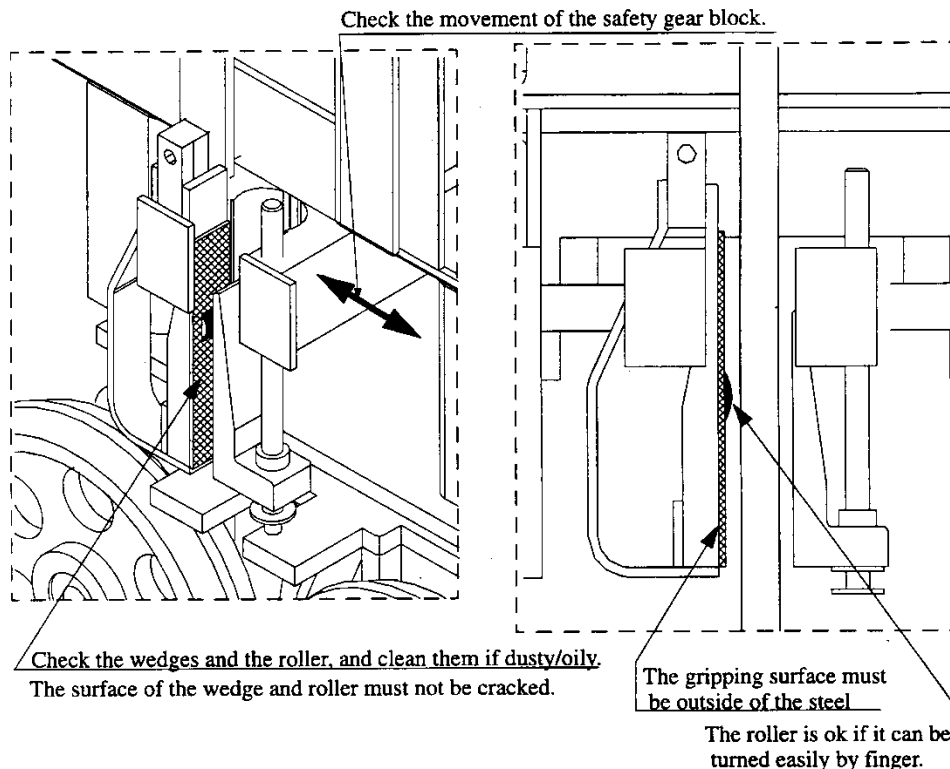
#### Maintenance Procedures: Safety Gears SGB01, 02, 03, 04, 05, 06, 07 AND AQ11B, C, D

**NOTE!** If KONE safeties are installed, a product specific KONE SAFETY GEAR APPLICATIONS RECORD must be affixed to the controller, on which all full load safety applications that occur at rated speed or governor tripping speed must be entered.

All safety components must be inspected after each application to monitor wear. The safety spring block and shoes/wedges must be replaced according to the information on the KONE SAFETY GEAR APPLICATIONS RECORD.

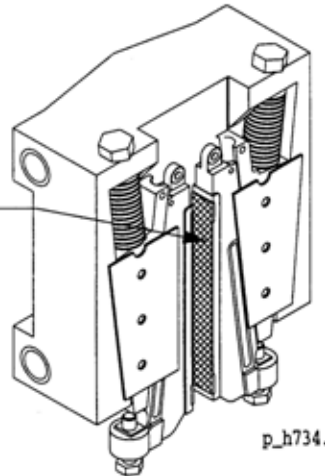
Procedure	Note
Check the operating condition of the safety gear.	Wedges must be clean and move freely.
Check the operation of the safety gear contacts.	Clean and adjust contacts, if necessary.
Check system function of the <b>Overspeed governor and Safety gear</b> with an empty car and at reduced speed. <b>Safety measure:</b> After every operation of the overspeed governor and safety gear check that both are operational before placing the elevator back in normal service.	Clean every other year unless, for example, dirty or humid circumstances require more frequent testing. 

#### Inspection of the safety gear and wedges

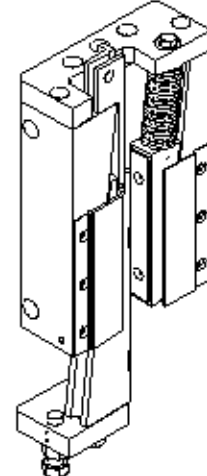


SGB01, SGB02, SGB03, SGB05, AQ11B, AQ11C and AQ11D

Check the wedges and clean them if dusty/oily.

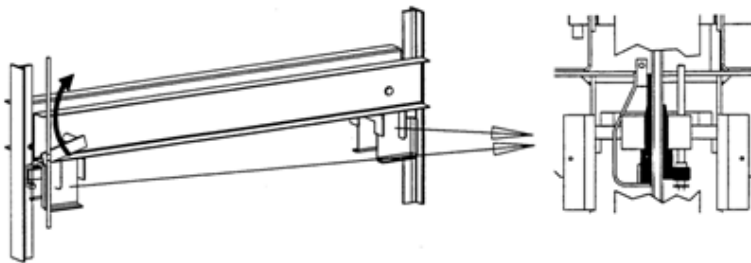


SGB06 AND SGB07



SGB04

### Inspection of the governor rope fixing and synchronization



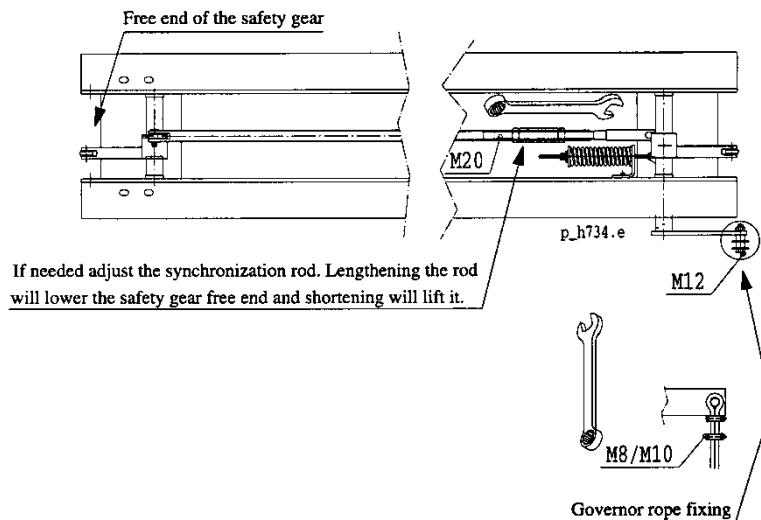
**Note!**  
Guide rails **must not be lubricated** with SGB04, SGB06 and SGB07 safety gears.

Lift the lever up and check that the wedges of the safety gear start to move and grip exactly at the same time on both ends. Also check the operation of the safety gear switch.

**NOTE!** It is important that the wedges return back to the normal position after lifting up.

Check the governor rope fixing and the screw joint between the rope fixing and the lever

- check that the fixing screws are not loose
- check that the lever is not bent or broken





**8.6.4.5: Safeties (continued)**

Procedure
<p><b>8.6.4.5.1</b></p> <p>Clean the governor rope releasing carrier, the safety linkage, and the safety dogs and wedges. Remove any paint, rust, corrosion or other foreign material that could possibly interfere with the correct operation of the safety mechanisms.</p> <p><b>8.6.4.5.2</b></p> <ul style="list-style-type: none"> <li>• Examine the releasing carrier and ensure the spring tension of the releasing carrier is sufficient to prevent the governor rope from pulling out of the carrier during the normal starting and stopping of the elevator. Also check to ensure the governor rope will pull out of the releasing carrier when the governor sets.</li> <li>• Examine the safety dogs or wedges (safety clamps) to ensure they do not touch or ride on the guide rails during normal elevator operation. Clearance on both sides of the rails should be approximately the same and should meet the following requirements: <ul style="list-style-type: none"> <li>– On elevators built after the 1955 ANSI code the clearance between the safety's rail-gripping faces must not be less than the thickness of the guide rail plus 9/64 inch there must be a minimum of 1/16 inch between either side of the rail and the rail-gripping face.</li> <li>– On elevators built before the 1955 ANSI Code the clearance between the safety's rail-gripping faces must be less than the thickness of the guide rail plus 3/32 in.</li> <li>– On elevators with wood guide rails the distance between the safety's rail-gripping faces must not be less than the thickness of the rail plus ¼ inch.</li> </ul> </li> <li>• Manually move the safety dogs or wedges to ensure they operate freely and smoothly. Remove any dirt or corrosion to ensure smooth operation.</li> <li>• Examine the safety linkage and lift rods to ensure they move freely with the proper clearance. If necessary, lightly lubricate the lift rods and pivot points with bearing oil.</li> </ul>

**8.6.4.7: Cleaning of Hoistways (Pit)**

Procedure	Note
<p><b>Pit:</b> Remove all debris from the pit. The pit should be broom clean and should not be used for storage purposes.</p> <p><b>8.6.4.7.2:</b> Landing blocks or pipe stands may be stored in the pit. If they are, ensure that they are stored in a manner that does not interfere with operation of the elevator and does not present any safety hazard for anyone working in the pit.</p> <p><b>8.6.4.7.3:</b> If the pit has an access door, ensure it is closed and locked.</p> <p><b>8.6.4.7.4:</b> Check the pit floor for an accumulation of water or oil.</p>	<p>Notify a supervisor if either is present.</p>

### 8.6.4.11: Car and CW run-by

Procedure
<p>Check the car and CW run-by to verify they meet code requirements. Note exclusions below:</p> <p><b>8.6.4.11.1:</b> The car and counterweight runby shall be permitted to be reduced, provided the car or counterweight does not strike the buffer, the top car clearances are not reduced below that required at the time of installation or alteration, and the final terminal stopping device is still operational.</p> <p><b>8.6.4.11.2</b> Where spring-return oil buffers are provided and compression was permitted with the car at the terminals the buffer compression shall not exceed 25% of the buffer stroke.</p>

### 8.6.4.18: Examine compensating sheave and switch

Procedure
<ul style="list-style-type: none"><li>• Examine and clean the compensating sheave and ensure it has not reached its upper or lower limits of travel. Adjust, if required.</li><li>• Lubricate sheave bearings.</li><li>• Check to ensure the sheave moves freely. Lubricate the sheave frame with KONE bearing grease (# US59623), if required.</li><li>• Check operation of the compensating sheave switch to ensure it is mounted securely, operates freely and removes power to the driving machine when actuated.</li></ul>

### 8.6.4.22: Maintenance of Seismic Devices (if applicable)

Procedure
<p><b>8.6.4.22.1:</b> Examine the seismic switch to ensure it is clean, securely mounted and activates as designed.</p> <p><b>8.6.4.22.2:</b> Examine the counterweight displacement switch to ensure it is clean, securely mounted and aligned, and activates as designed.</p>

### **4 Test Procedures (ASME A17.1–2013/CSA B44-13)**

This safety inspection procedure was developed according to ASME A17.1 Code and KONE Corporation safety policies.

Possible differences between this instruction and local safety regulations must be considered. This will prevent any safety hazards or damage to the product.

This section contains the testing requirements for the KONE KCM831 elevators equipped with KDL16L or KDM drive and LCE electrification. Contact your supervisor if you are unsure of the exact procedures to be used for the test you are performing, or if you have any questions regarding these procedures.

#### **Safety**

All work must be planned to avoid any safety hazards or damage to the product. Follow this instruction carefully to avoid potentially dangerous situations.

Verify there is NO ONE INSIDE THE CAR OR IN THE HOISTWAY.

DO ALL TESTING WITH HALL CALLS INHIBITED AND AUTOMATIC DOOR OPERATOR INHIBITED WHERE POSSIBLE. In this mode the elevator is out of group control. This prevents the inspection from being interrupted, and passengers being trapped in the car.

BEFORE GOING TO THE CAR ROOF, PUSH the car roof STOP BUTTON.

Before resetting the stop button, TURN THE INSPECTION DRIVE UNIT TO "INSPECTION" POSITION.

## 4.1 CATEGORY 1 TRACTION ELEVATOR TEST PROCEDURE

### 8.6.4.19.1: OIL BUFFERS

#### Category 1 inspection of oil buffers

- Check to ensure that the hardware holding buffers is in place and is tight.
- Check oil level in buffer to ensure it is within the minimum and maximum limits.

**If the oil is too high or too low, correct to the proper level.**

Check to ensure that the plunger is clean, rust-free, and does NOT have excessive side play.

#### Category 1 testing of oil buffers

Test spring return and gravity return type oil buffers by fully compressing the plunger. Release the plunger and make sure it returns to a fully extended position within 90 seconds.

**To compress a buffer, place a suitable piece of 4x4 wood block beneath the car or counter weight and buffer, then run car or counterweight down at inspection speed.**

Record the completion of the annual oil buffer test on a KONE annual test tag. This tag must be attached to the buffer with wire. Also record all work completed on a Safety Test Form.

### 8.6.4.19.2: SAFETIES

#### Category 1 inspection of safeties

Check the car and counterweight guide shoes and their fasteners to make certain they are properly secured, aligned, and adjusted. Check slide guides or rollers for excessive wear.

Check the clearance between the guide rail and each safety-gripping face.

- The clearance between the safety's rail-gripping faces must not be less than the thickness of the guide rail plus 9/64 inch there must be a minimum of 1/16 inch between either side of the rail and the rail-gripping face.

Check the crosshead pivot points and linkage for lost motion, loose or missing set screws, and excessive friction. Also check the adjustment of the finger rods and rollers.

**If there is any lost motion in the actuation lever, adjust to eliminate that lost motion. Lost motion and inertia of the governor-rope system may cause the safety to apply unnecessarily under normal starting conditions.**

With the elevator car platform located at a convenient height, check the safety mechanism from the pit. The following conditions must be present.

- Rollers must be in place.
- Finger rods must be in a position to pick up the rollers.
- When the governor rope is pulled to move the finger rods, the roller must move upward freely into the highest wedged positions in the safety block.

**Warning: A safety can fail if there is a jam between the roller and safety block. Check the roller operation several times to make sure that the rollers fall toward the guide rail. When the finger engages the roller, there should not be any tendency for the roller to fall away from the guide.**

- Finger rods are adjusted so the rollers engage at the same time when wedged between the roller pocket and guide rail.

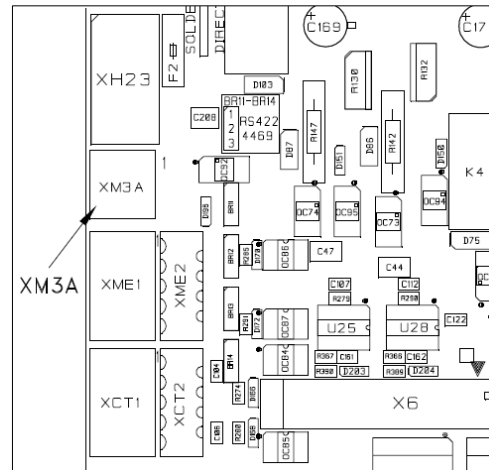
Check the safeties to make certain the safety operated switch (SOS) contacts will open before the safety jaws or rollers contact the guide rails. Open the switch manually and attempt to run the elevator to verify it will not run with the SOS contacts open.

Check to see if the self-releasing mechanism, on self-releasing Type A and Type B safeties, is clean, lubricated, and corrosion-free.

## Category 1 Test of Car Safeties

- 1) Put car on machine room inspection by putting switch 270 DOWN.

- 3) Temporarily jumper governor overspeed switch by jumpering LCEADON2 XM3A/1-3.

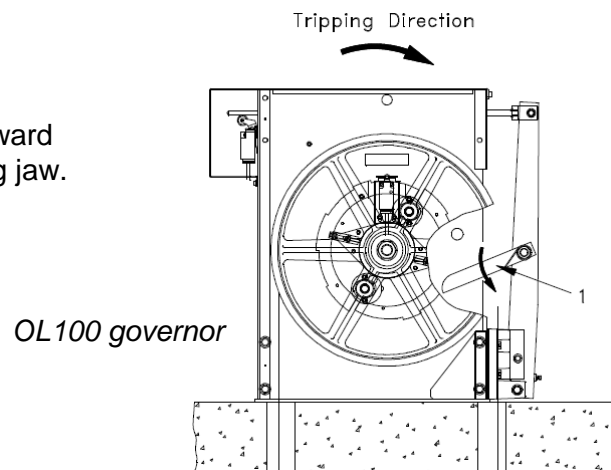


- 4) Run car down on inspection and manually trip governor as follows.

### a) EcoSystem MR

- **OL100 governor:**

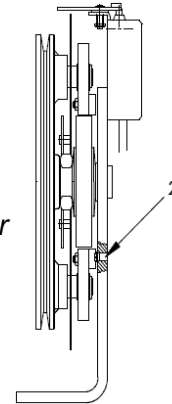
While car is running down, hit downward on governor tripping lever (1), setting jaw.



- **OL35 governor:**

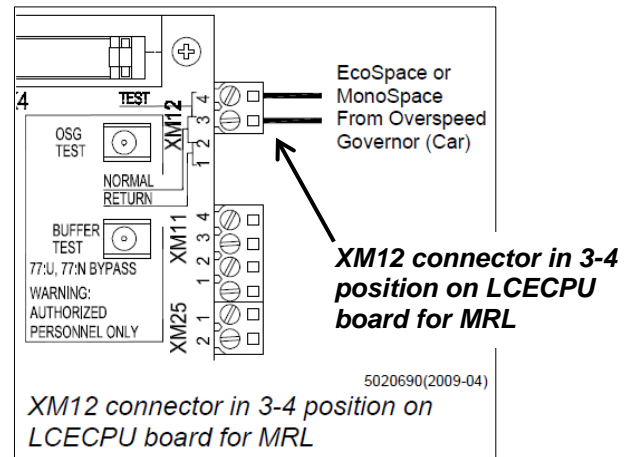
While car is running down, push screwdriver through hole (2) in side of governor until governor sets.

OL35 governor

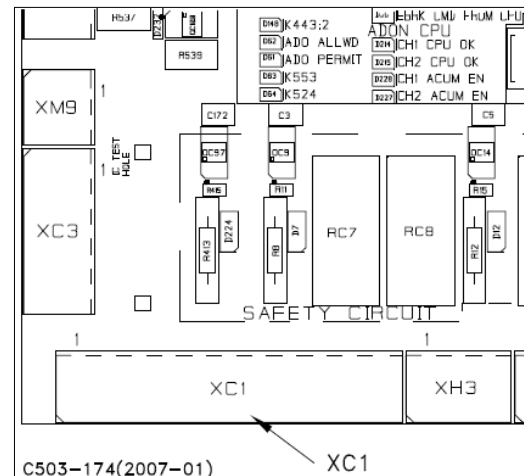


b) **MRL**

- Move 2-pin XM12 connector on LCECPU to test, 3-4 position.
- With car running down, push OSG TEST button until governor sets.



- 5) Temporarily jumper safety plank switch by jumpering LCEADON2 XC1/3-5.



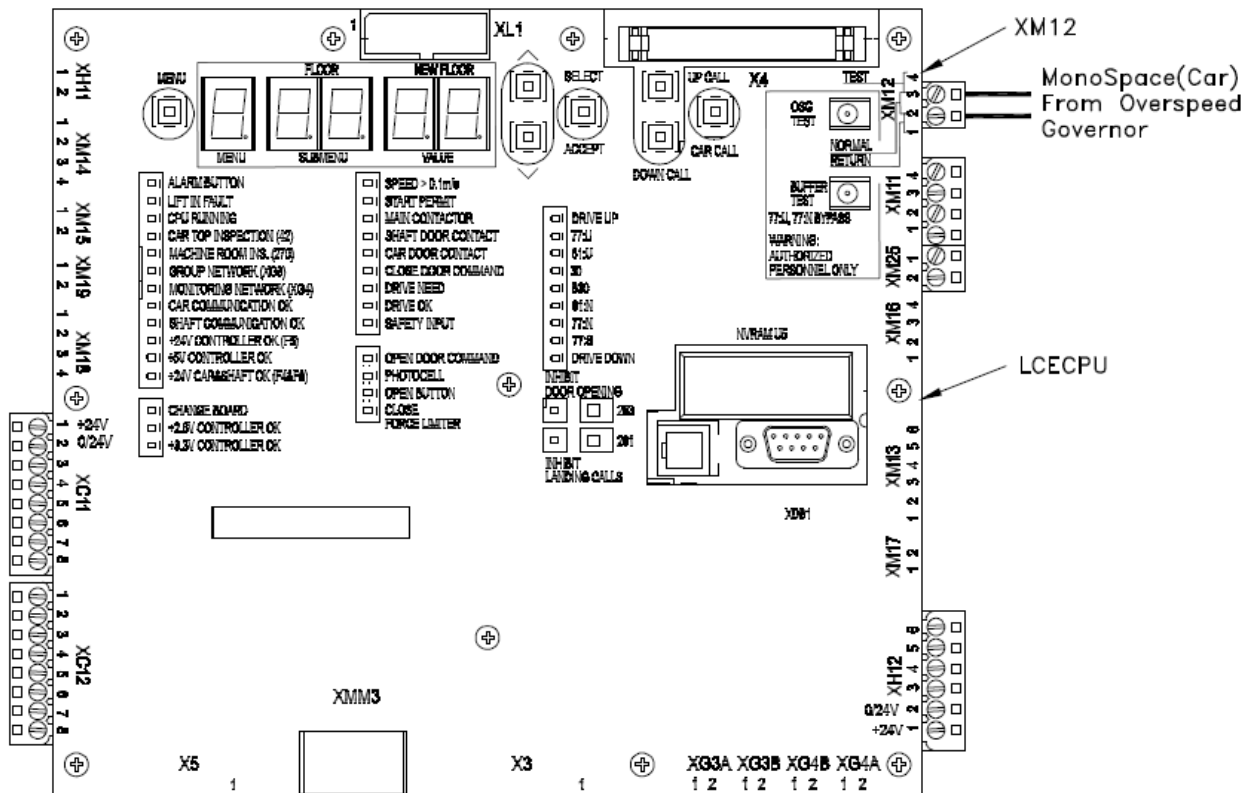
- 6) Run elevator DOWN on inspection and verify that safeties hold load and machine either slips traction or stalls to determine if set was successful.
- 7) Check that car has stopped level.
- 8) Reset governor and safety by running elevator UP on inspection from machine room.

## EcoSystem MR

- Safety will reset immediately when elevator moves up.
- *OL35 governor*: Mechanically resets when car moves up. Manually reset the electrical switch.
- *OL100 governor*: Use lever provided with governor to open jaw and reset tripping lever. Manually reset the electrical overspeed switch.

## MRL

- Safety will reset immediately when elevator moves up.
- OL35 governor mechanically resets when car moves up.
- Reset electrical overspeed switch by moving 2-pin XM12 connector on LCECPU to XM12/1-2 position and push OSG TEST switch. Electrical switch will reset.
- Move XM12 connector to NORMAL position, XM12/2-3.



- 9) If counterweight safeties are present perform following steps.
  - Remove test weights from elevator.
  - Perform steps 4 through 8 for counterweight safety.
  - Run car UP to set safeties and DOWN to reset safeties.
  - Perform step 6 by running car up on inspection and verify machine either slips traction or stalls.

- 10) Remove temporary governor overspeed switch jumper at LCEADON2 XM3A/1-3.
- 11) Remove temporary safety plank switch jumper at LCEADON2 XC1/3-5.
- 12) Run elevator on inspection and see that all safety circuits have made up.
- 13) Run elevator on normal operation and verify car runs normally.

### **8.6.4.19.3: GOVERNOR**

#### **Category 1 inspection of governor**

**OPEN** the mainline switch.

Make a general inspection of the governor-rope system, including the condition of the governor, governor rope, governor-rope tension sheave assembly, and the releasing carrier. Make sure all mountings are secure.

Check the rope type to see if it is the type of rope identified on the governor marking plate.

**Note: Governor ropes must not be lubricated.**

With the governor weights extended (spread apart by hand) check to see if all governor components, including the rope-gripping jaws, operate freely. There must NOT be any restriction of motion.

Check all bearings, pins, governor-rope jaws, and rubbing surfaces to see if they are properly lubricated, free of paint, and are not worn excessively.

#### **Category 1 testing of governor**

**CLOSE** the mainline switch.

Open the governor overspeed (stopping) switch and make sure the elevator cannot be operated. Reset the governor overspeed switch and operate the car at normal speed in each direction. Check to determine if the following possible PROBLEMS exist.

- Governor rope slides on the sheave groove when the car is started or stopped.
- Governor sheave has eccentric or lateral motion.
- Governor rope does NOT run free of the governor jaw at all times.

After testing the governor, the following tasks must be completed.

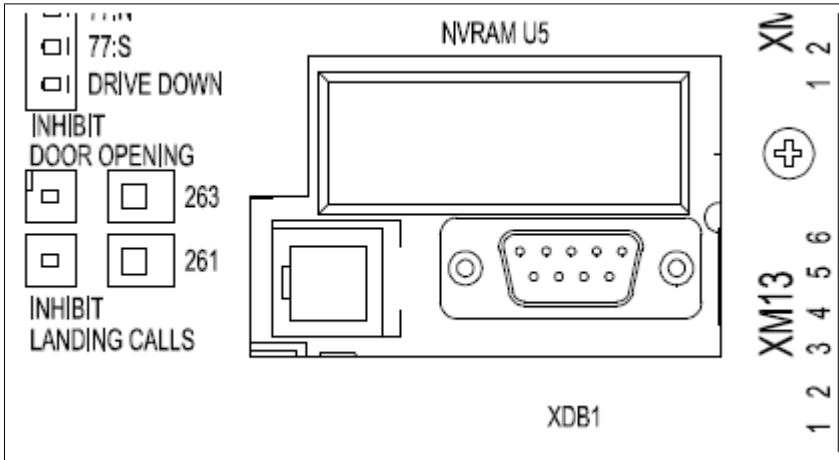
- Restore the governor release carrier.
- Reset and inspect the governor.
- Fill out a metal test tag and attach it to the governor with a wire.
- Record all work completed on a Safety Test Form, and return it to your KONE Service Superintendent.



### 8.6.4.19.5: NORMAL AND FINAL TERMINAL STOPPING DEVICES

#### **Test NTS (Normal Terminal Stop): Bottom**

- 1) Drive elevator to the top terminal floor.
- 2) Put elevator on inspection.
- 3) Disable landing calls and doors by sliding LCECPU switches 263 and 261 to left.



**Note:** Ensure no passengers are in car.

- 4) Activate **NTS Test Down**.

- Set UI menu 6-72-7

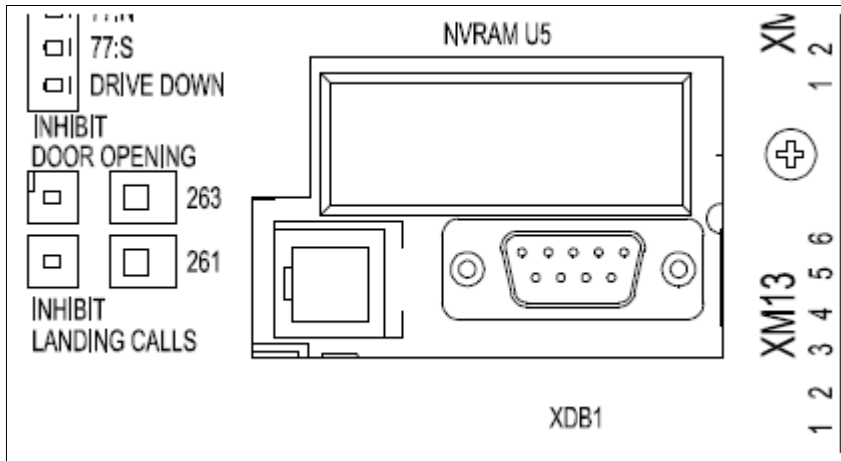
**Note:** Overrides normal stopping means.

- 5) Take elevator off inspection.
- 6) Back out of menu 6 until car position displays on user interface.
- 7) Give car call to the bottom terminal floor.
- 8) No further intervention is required. Car runs to the bottom floor and performs an NTS stop at the bottom floor.
- 9) Elevator must stop within the door zone at the bottom floor.
  - Fault codes 150, and/or 151 and/or 152 appear on user interface.

**Note:** Fault 26 may appear a few seconds after stop, and will clear a few seconds later.

### Test NTS (Normal Terminal Stop): Top

- 1) Drive elevator to the bottom terminal floor.
- 2) Put elevator on inspection.
- 3) Disable landing calls and doors by sliding LCECPU switches 263 and 261 to left.



**Note:** Ensure no passengers are in car.

- 4) Activate **NTS Test Up**.

- Set UI menu 6-72-6

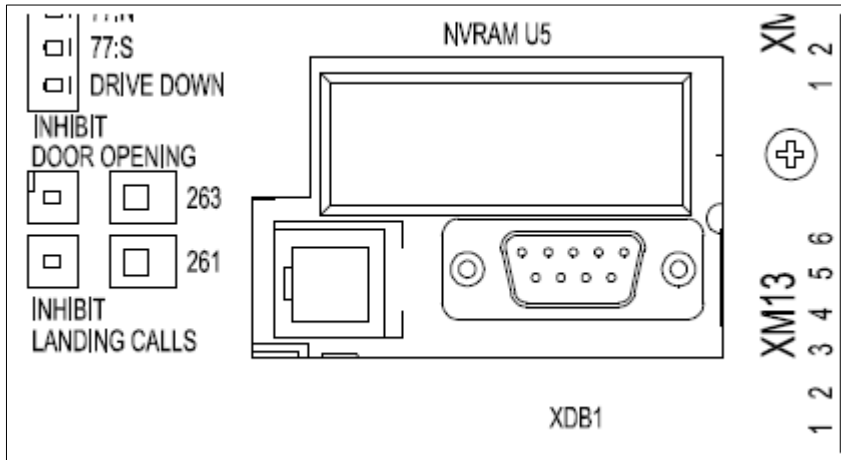
**Note:** Overrides normal stopping means.

- 5) Take elevator off inspection.
- 6) Back out of menu 6 until car position displays on user interface.
- 7) Give car call to top terminal floor.
- 8) No further intervention required. Car runs to top floor and performs an NTS stop at the top floor.
- 9) Elevator must stop within door zone at top floor.
  - Fault codes 150, and/or 151 and/or 152 appear on user interface.

**Note:** Fault 26 may appear a few seconds after stop, and will clear a few seconds later.

### Test ETS (Emergency Terminal Stop): Bottom

- This test is not required for car speeds 200 FPM (1.0 m/s) or less.
  - This test is not required if elevator is equipped with ETSL switches.
- 1) Drive elevator to the top terminal floor.
  - 2) Put elevator on inspection.
  - 3) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.



**Note:** Ensure no passengers are in car.

- 4) Set UI menu 6-72-4, **Car Buffer Test**

**Note:** Overrides normal stopping means.

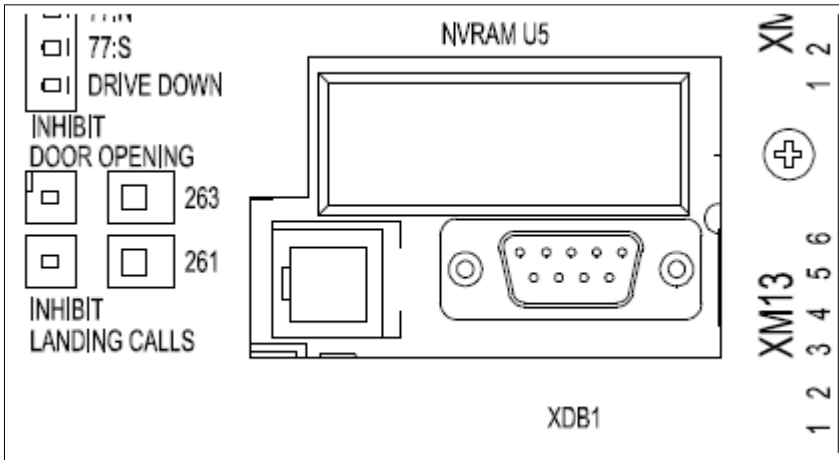
- 5) Take elevator off inspection.
- 6) Back out of menu 6 until car position displays on user interface.
- 7) Give car call to bottom terminal floor.
- 8) After 77:U turns off, press **and hold** Buffer Test button.

**Note:** Overrides NTS

- 9) Elevator runs full speed to ETS switch and makes a brake stop. Car slides to a stop, and may contact buffer and final limit switch.
- 10) If car slides to buffer and final limit switch:
  - Put car on inspection.
  - Temporarily place jumper on the final limit (LCEADON2 XH1/1-5).
  - Run car up above final limit.
  - Remove temporary jumper from the final limit (LCEADON2 XH1/1-5)
  - Run and test elevator.

### Test ETS (Emergency Terminal Stop): Top

- This test is not required for car speeds 200 FPM (1.0 m/s) or less.
  - This test is not required if elevator is equipped with ETSL switches.
- 1) Drive elevator to bottom terminal floor.
  - 2) Put elevator on inspection.
  - 3) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.



**Note:** Ensure no passengers are in the car.

- 4) Set UI menu 6-72-3, **Counterweight Buffer Test**.

**Note:** Overrides normal stopping means.

- 5) Take elevator off inspection.
- 6) Back out of menu 6 until car position displays on user interface.
- 7) Give car call to top terminal floor.
- 8) After 77:N turns off, **press and hold** Buffer Test button.

**Note:** Overrides NTS

- 9) Elevator runs full speed to ETS switch and makes a brake stop. Car slides to a stop, and may contact final limit. Counterweight frame might contact counterweight buffer.
- 10) If car slides to final limit switch, and counterweight to buffer:
  - Put car on inspection.
  - Temporarily jumper the final limit (LCEADON2 XH1/1-5).
  - Run car down below final limit.
  - Remove temporary jumper from (LCEADON2 XH1/1-5).
  - Run and test elevator.

### **8.6.4.19.6: FIREFIGHTER'S EMERGENCY OPERATION**

#### **Category 1 testing of Firefighter's Service**

##### ***Phase I while elevator is moving***

Place several floor calls in the car. While the elevator is moving up, have the person at the designated level place the Phase I switch in the "ON" position. The following conditions must be true.

- The car stops and reverses without opening the doors, returns to the designated level and parks with power-operated doors open. If there is more than one entrance at the designated landing, only the doors serving the lobby with the fire recall switch open.
- The in-car stop switch or emergency stop switch is inoperative.
- Call-registered lights and directional lanterns are inoperative.
- Position indicators in the car, designated level and central control station are inoperative. All other position indicators function.
- The in-car door open button is rendered inoperative when the elevator moves away from the landing.
- Car call and hall buttons are inoperative.
- The visual and audible signals operate and stay on until car is at the designated level.

##### ***Phase I operation with doors open***

Place the Phase I switch to the "OFF" position and move the elevator to another floor. With the doors in the open position turn the Phase I switch to the "ON" position. The following conditions must be true.

- Door reopening devices sensitive to smoke or flame become inoperative immediately. In these situations the door closing speed is reduced so that the kinetic energy is reduced to 21/2 ft-lb.
- The emergency stop switch or in-car stop switch is rendered inoperative as soon as the car moves away from the landing.
- The in-car door open button is rendered inoperative as soon as the car moves away from the landing.

##### ***Phase I operation (Top of car operating device and hoistway access switch)***

While operating from top of car, have the Phase I key switch placed in the "ON" position. The following conditions must be true.

- An audible signal sounds.
- The emergency stop switch remains functional.
- The top-of-car operating device maintains control of the elevator.
- The hoistway access switch maintains control of the elevator.

##### ***Phase II operation***

With Phase I activated and the car at the designated or alternate landing, place the Phase II key switch in the "ON" position. Operate the car and to ensure the following conditions are true.

- The elevator responds only to the car buttons, and not to hall calls.
- All corridor call buttons, door open and close buttons, and directional lanterns are inoperative. All landing position lanterns are inoperative. All landing position indicators, except at the designated landing and central alarm and control facility, are inoperative. Car position indicators are operative.

- The in-car stop switch or emergency stop switch is inoperative while the car is in motion.
- Doors do not open automatically at any floor except the main floor or alternate level.
- Power-operated doors can only be opened by continuous pressure on the door open button, and if released before the doors are in the normal "OPEN" position, the doors will close automatically without delay.
- Fully open power-operated doors can only be closed by the use of an in-car close button.
- If two entrances can be opened and closed at the same landing, separate door open and close buttons are provided for each entrance.
- All door reopening devices are inoperative (except the door open button). Full speed closing is permitted.
- "CALL CANCEL" button is labeled and when activated, will cancel all calls and cause the car to stop at or before the next available landing.
- Floor selection buttons are provided and functional for all landings without restrictions.
- Moving car will stop at the next landing with a car call registered and remaining car calls will be canceled.

Make sure the Phase II operation cannot be deactivated after it has been activated. Turn the main floor key to the ON position, and the in-car switch to ON. Take the car to any floor. Turn the main floor key to the OFF position, or if a smoke detector is activated to the BYPASS position and make sure the Phase II operation is maintained until the car is returned to the main floor.

Place a car call above the main floor and while in motion press the "Call Cancel" button and verify that all calls are cancelled and the car stops at or before the next available landing.

Turn the main floor switch to the OFF position, or BYPASS if a smoke detector is activated. Take the car to a floor above the main floor and turn the in-car switch to the ON position. Make sure the Phase II operation does not operate even if the main floor switch is in the ON position or a smoke detector is activated.

To test the alternate level, turn the main floor key operated switch to the OFF position, and activate the smoke detector. If the smoke detector at a designated level is activated, the elevator should return to an alternate level designated by an enforcing authority unless the Phase 1 switch is activated. Make sure the car returns to the alternate level.

To test the HOLD feature, place the car on Phase II with the key switch in the HOLD position and remove the key. Verify the car remains at the landing and the door close button is inoperative.

### **8.6.4.19.7: STANDY- BY EMERGENCY POWER**

#### **Category 1 testing of stand-by (emergency power)**

**NOTE: Testing of stand-by (emergency) power is performed with NO LOAD in the car.**

If a stand-by (emergency) power switch is installed, run the elevator to the floor where that switch is installed. Remove elevators (s) from normal service and transfer the system to stand-by power to operate the car(s) with no load. Test the switch which overrides sequence operation, if one is provided. To do this, make several trips and stops, and use a tachometer in the machine room to check the speed of the car(s). Make sure the elevator is running at normal speed (particularly in the up direction). The speed must not exceed 125% of the rated speed.

If a separate power absorption means is used to absorb regenerative power, such as a resister bank, it must be connected on the load side of the elevator. If more than one elevator is designed to operate from the same power source simultaneously, test their simultaneous operation.

### 8.6.4.19.8: POWER OPERATION OF DOOR SYSTEM

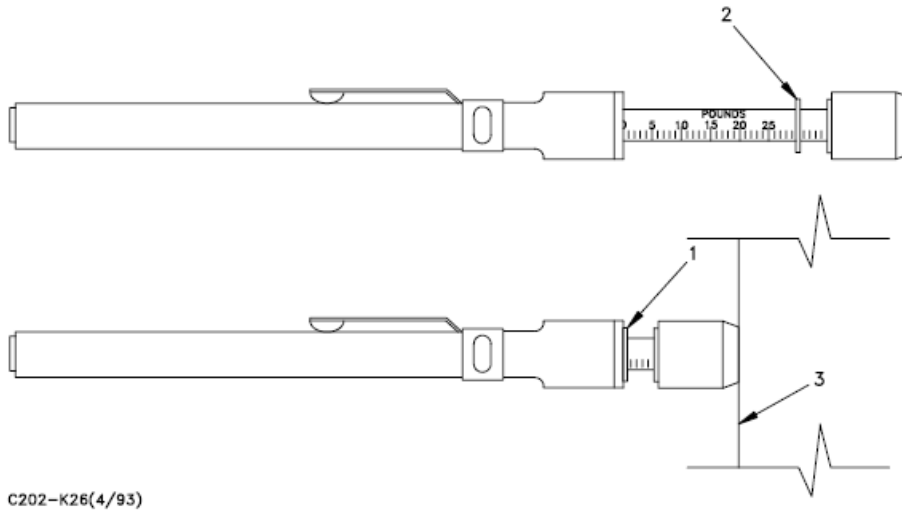
#### Category 1 testing of door closing force (AMD 1.5)

The force necessary to prevent closing of the hoistway door (or the car door or gate if power operated) from rest shall not exceed 30 lbs. This force shall be measured on the leading edge of the door with the door at any point between one third and two thirds of its travel.

To prevent doors from reopening when close force limit is reached, disconnect wire from AMD 1.5 terminal X1/31 (Reopen) and temporarily connect it to X1/G.

Do not attempt to measure the force of a moving door, stop it first! Closing force of the door must be measured from a door at rest.

- 1) Stall the door at midpoint of travel in the closing direction.
- 2) Put a force measuring device against the leading edge of the door (part # 45371: see picture of device below).



- 3) Back off gauge until door starts moving. Read pounds of force on gauge and record the measurement.
- 4) Adjust potentiometer R161 labeled CLOSE FORCE to measure no more than 30 lbs. of force.
  - a. Clockwise rotation of R161 increases closing force
  - b. Counterclockwise rotation of R161 decreases closing force
- 5) Repeat steps 1-5 until proper closing force is achieved.
- 6) When adjustment is complete reconnect wire that was earlier removed from AMD 1.5 terminal X1/31 (Reopen) and connected to X1/G.
- 7) Before placing car in service test close force limit by stalling doors while they are closing. Door(s) must reopen when stalled.

**NOTE! Do not allow the door to strike the scale with an impact. A false reading could result.**

If the elevator was installed under the A17.1-2000/B44 or later code, or has a door operator data plate containing this information, verify that the closing time in the code zone is not less than the minimum time shown on the data plate.

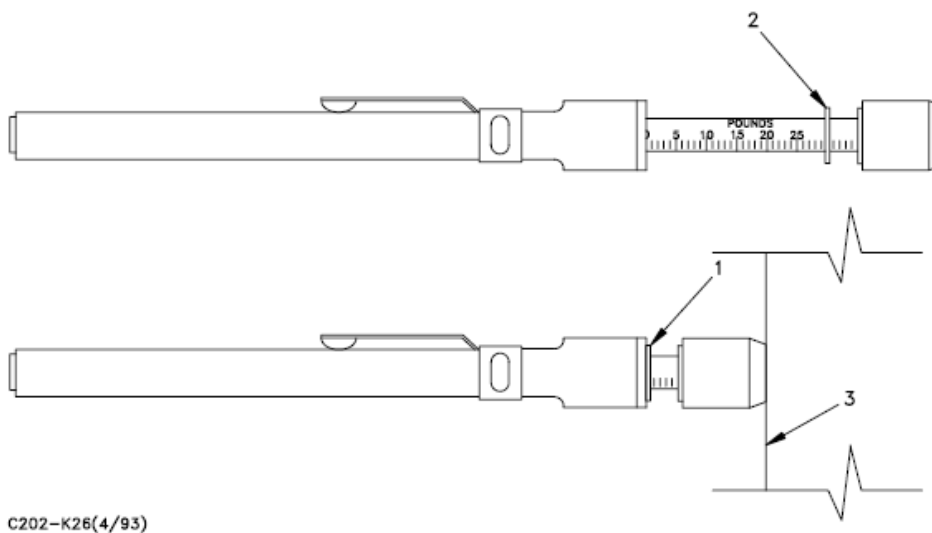
### Category 1 testing of door closing force (AMD 2.0)

The force necessary to prevent closing of the hoistway door (or the car door or gate if power operated) from rest shall not exceed 30 lbs. This force shall be measured on the leading edge of the door with the door at any point between one third and two thirds of its travel.

To prevent doors from reopening when close force limit is reached, disconnect wire from AMD 2.0 terminal X1/31 (Reopen) and temporarily connect it to X1/G.

Do not attempt to measure the force of a moving door, stop it first! Closing force of the door must be measured from a door at rest.

- 1) Stall the door at midpoint of travel in the closing direction.
- 2) Put a force measuring device against the leading edge of the door (part # 45371: see picture of device below).



- 3) Back off gauge until door starts moving. Read pounds of force on gauge and record the measurement.
- 4) Adjust potentiometer R161 labeled CLOSE FORCE to measure no more than 30 lbs of force. Closing force does not need to be exactly 30 lbs however, it shall not exceed 30 lbs.
- 5) Clockwise rotation of R161 increases closing force
- 6) Counterclockwise rotation of R161 decreases closing force
- 7) Repeat steps 1-5 until proper closing force is achieved.
- 8) When adjustment is complete reconnect wire that was earlier removed from AMD 2.0 terminal X1/31 (Reopen) and connected to X1/G.
- 9) Before placing car in service test close force limit by stalling doors while they are closing. Door(s) must reopen when stalled.

**NOTE! Do not allow the door to strike the scale with an impact. A false reading could result.**

If the elevator was installed under the A17.1-2000/B44 or later code, or has a door operator data plate containing this information, verify that the closing time in the code zone is not less than the minimum time shown on the data plate.



### **8.6.4.19.9: BROKEN ROPE, TAPE OR CHAIN SWITCH**

#### **Category 1 testing of broken rope, tape or chain switch**

While in the inspection mode on the car top, operate the broken rope, tape or chain switch and attempt to move the car using the top-of-car operating device.

### **8.6.4.19.10: FUNCTIONAL SAFETY OF SIL RATED DEVICE(S)**

Check the functionality of all E/E/PES electrical protective devices to ensure they operate as designed.

### **8.6.4.19.11: ASCENDING CAR OVERSPEED PROTECTION AND UNINTENDED CAR MOVEMENT DEVICES.**

#### **Category 1 Check of Ascending Car Overspeed Protection Device**

- 1) Verify governor has been tested and electrical switch will open at correct speed.
- 2) Manually operate governor electrical switch.
- 3) Verify following actions occur:
  - Both K464 relays on ADON2 drop.
  - Main contactor 201 drops or will not energize.
  - Emergency brake drops or will not energize.
  - Faults 177 and 178 appear on UI.

If all preceding actions occur, ascending car overspeed protection is functioning correctly.

#### **Category 1 Testing of Ascending Car Overspeed Device**

##### **WARNING**

This is a two-person test. To prevent serious injury, one person must be posted at elevator entrance to ensure that no unauthorized people enter elevator during test.

##### **WARNING**

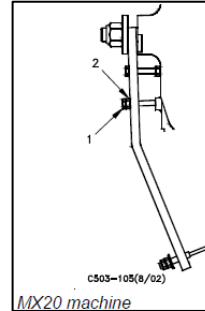
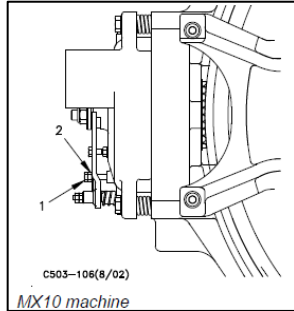
Exercise extreme caution when performing this test on elevators with short hoistways. Do not allow elevator to run full speed into overhead.

**Perform ascending car test only after verifying that ascending car function is functioning correctly.**

- 1) Make sure car is empty.
- 2) Disable hall calls by using inhibit landing calls switch on CPU.
- 3) Disable doors by using inhibit door opening switch on CPU.
- 4) Give a car call to bottom terminal landing.
- 5) After elevator arrives at bottom floor, put elevator on machine room inspection, switch 270 down.
- 6) Turn off power.

7) **EBR:** Open the C01 connection to remove 230VAC from the EBR UPS.

- **Manual brake release:** Temporarily disable emergency brake release lever as follows to keep manual release handle from opening emergency brake.
- **MX10 and MX20 machines:** Run screw (1) down completely on emergency brake. If necessary remove nut (2).



8) Remove dynamic braking function by removing U and V motor leads from terminal block located at top of controller. When 214 relay is available, manually pushing the relay also disables dynamic braking function.

9) Unplug car encoder cable from XCT1 terminal on ADON2 board.

10) Unplug motor encoder input from XME1 connector on ADON2 board.

11) Turn on elevator power.

12) Pull XH2 connector on ADON2. This effectively opens the hoistway interlock circuit.

13) Press 270:U and 270:RB (safe) buttons.

- Emergency brake should pick.

**WARNING!** During following procedures, elevator will move rapidly when brake is opened. Be prepared to release manual release lever if emergency brake does not drop and/or car does not slow down after tripping governor electrical switch.

**Do not allow elevator to run into overhead.**

14) While holding in 270:U and 270:RB buttons and with emergency brake open, manually open main brake by pulling manual release lever, or turn SWM key switch if EBR.

- Car will move up from bottom floor.
- Elevator should accelerate quickly and trip electrical overspeed switch on governor.
- Emergency brake should drop.

15) Continue holding main brake open using manual release lever or SWM on EBR.

- Emergency brake slows car.
- Faults 177 and 178 (and some others) appear.

**Note:** Test is successful if emergency brake drops and car retards.

16) Release manual release lever, or SWM on EBR, and 270:U button after emergency brake sets and stops elevator.

17) Turn off elevator power.

18) Reset governor electrical switch.

- 19) Reconnect car encoder to terminal XCT1 and motor encoder input to terminal XME1 on ADON2 board.
- 20) Reconnect motor leads to terminals U and V at terminal block located at top of controller.
- 21) Reconnect XH2 at ADON2.
- 22) Turn on elevator power.
- 23) Restore emergency brake operation as follows: Back out test screw on emergency brake. **If EBR:** Reconnect C01 connector, power supply for UPS.
- 24) Run elevator on inspection.
- 25) Turn machine room inspection switch 270 up.
- 26) Run elevator on automatic.
- 27) Enable doors and hall calls.

### Category 1 Check of Unintended Car Movement Device.

**Perform this check prior to performing unintended movement test to verify ACUM is turned on and functioning correctly.**

**This check is not normally required as part of a safety inspection.**

- 1) **Capture elevator and put car on machine room inspection.**
- 2) **Unplug XEB1 connector at ADON2 board.**
- 3) Run elevator either direction on machine room inspection.
  - a) Elevator should run approximately 6 inches [150 mm] and drop either or both 464 relays, drop 201 main contactor, and drop both main and emergency brakes.
  - b) Faults 179 and/or 180 appear on UI.

Check is successful if both of these actions occur; ACUM is on and functioning correctly.

Note: If car does not stop and faults 179 and/or 180 do not appear, ACUM is not turned on. Turn on ACUM following procedures in installation manual.

- 4) Reset 179 and/or 180 faults by pressing yellow reset button on ADON2 board.
- 5) Repeat test for opposite direction. Same results should occur.
- 6) Reset 179 and/or 180 faults again by pressing yellow reset button on ADON2 board.
- 7) Replace XEB1 connector at ADON2 board.
- 8) Run elevator and verify elevator operates normally.

### Category 1 Test of Unintended Car Movement Device

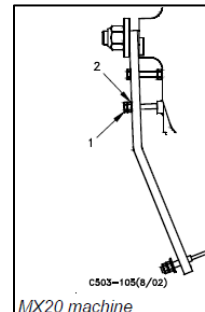
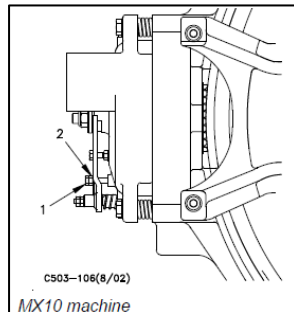
**Test empty car at bottom floor**

#### **WARNING**

**This is a two-person test. One person must stand at elevator door to control access to elevator and another person will be in machine room.**

**Perform unintended movement function check prior to performing the following test to verify that ACUM is turned on and functioning correctly.**

1. Guard first floor landing with guards (or landing where test will be performed if other than first floor) so no people can enter elevator during test.
2. Make sure car is EMPTY.
3. Disable hall calls using INHIBIT CALLS switch on CPU.
4. **EBR:** Open the C01 connection to remove 230VAC from the EBR UPS.
  - **Manual brake release:** Temporarily disable emergency brake release lever as follows to keep manual release handle from opening emergency brake.
  - **MX10 and MX20 machines:** Run screw (1) down completely on emergency brake. If necessary remove nut (2).



- 5) Set parameter EBRAKE HOLD TIME, menu 5-10 to 30 seconds.
- 6) Place car call to bottom terminal landing.
- 7) After the elevator starts, hold the main brake open as follows:
  - If EBR:** Turn the SWM key switch only. **Do not** turn SWE knob switch.
  - If Manual Release:** Pull manual release lever, and continue to hold open until test is complete.
    - Elevator will arrive at floor, stop and electrically release brake. Main brake will not set.
    - Elevator will roll back.
    - ACUM will activate and drop emergency brake.
    - Faults 179 and/or 180 appear on user interface (some other faults may also appear).

**Note:** With permission from inspecting authority, this test can be performed with car doors closed.

**WARNING!** Car will move up rapidly when brake is released. Be prepared to release manual release handle if elevator does not stop within 10 feet [3 m] of travel.
- 8) Release manual release handle, or SWM key switch, after emergency brake sets and stops elevator.
- 9) Put elevator on MACHINE ROOM INSPECTION by putting switch 270 down.
- 10) Verify following on ADON2 board.
  - Red LED's labeled fault ch1 and/or fault ch2 are ON.
  - Yellow LED at end of relay K464:2 is OFF.
- 11) Measure distance from car sill to bottom floor sill.
  - Sill-to-sill distance must be less than 48 inches [1220 mm].

12) In machine room, attempt to run elevator on INSPECTION.

- Elevator must NOT run.

13) Reset relay K464:2 by pushing yellow reset button.

- Red fault ch1 and fault ch2 LED's will turn OFF.

14) Cycle controller power to clear any other faults.

15) Verify the car runs on INSPECTION.

16) Remove guards from in front of entrances.

17) Reset EBRAK HOLD time menu 5-10;

- **MX10:** 2 seconds
- **MX20:** 5 seconds.

### **8.6.4.19.12: TRACTION LOSS DETECTION MEANS**

1) Capture elevator and disable landing calls and door movement by sliding LCECPU switches 263 and 261 to left.

**Note:** Ensure no passengers are in car.

2) Drive elevator to a floor where floor-to-floor distance to next floor above is at least 8 feet (2.5 m).

**Alternate method:** For elevators equipped with V3F25 drives or if there are no floor-to-floor distances greater than 8 feet (2.5 m), switch to machine room inspection and power down and disconnect 61:U and 61:N signals at LCECPU XC11/5 and 6.

Note: Disconnecting 61:U and N signals allows elevator to run past next floor without resetting TLD supervision.

3) Switch to machine room inspection.

4) Verify parameter A.17 Compliance Year, 7-43 =7 or higher.

5) Set parameter TLD supervision time, 5-15=10. Cycle controller power.

**Note:** Can only be set while on machine room inspection.

6) Set inspection speed, 6-20 to 0.2 or lower. Save using 6-99=1. (This is not possible with V3F25 drives.)

7) Unplug ADON2 connector XCT.

8) Run elevator on machine room inspection in up direction. A successful test is after about 10 seconds:

- a) Elevator makes an immediate stop and drops brakes.
- b) Fault 0002 appears on UI.
- c) Elevator will not run on machine room inspection or normal operation.

9) Cycle controller power and verify:

- a) Fault 0002 is present.
- b) Elevator will not run on machine room inspection or on normal operation.

10) Reset TLD by turning TLD reset key switch to RESET for one second and then to NORMAL.

- 11) Verify fault 0002 clears and that elevator will run on machine room inspection.
- 12) Return TLD supervisions as follows:
  - a) Set TLD supervision time, 5-15 to 45 or time in seconds to travel length of hoistway plus 10, whichever is smaller. Set to 20 (minimum setting) for travel times less than 10 seconds. Cycle controller power.
  - b) Set Inspection speed, 6-20 to 0.3. Save using 6-99-1.
  - c) Reconnect ADON2 XCT connector.
  - d) Reconnect 61:U and 61:N (if previously disconnected) to LCECPU XC11/5 and 6.
- 13) Run and test elevator on both inspection and normal operation.

### **8.6.4.19.13: BROKEN SUSPENSION MEMBER – RESIDUAL STRENGTH DETECTION MEANS**

#### **Category 1 testing of broken-suspension-member device**

Where broken-suspension-member means are provided, simulate a broken suspension member and ensure the safety circuit opens and the elevator will not operate.

### **8.6.4.19.15: EMERGENCY COMMUNICATIONS**

Check the condition of all buttons, switches and visual indicators. Replace any faulty components, as required.

- 1) **Two-way communication:** Place a call on the two-way communication device and ensure the call is responded to correctly, i.e.
  - a) Call goes to a location staffed by personnel authorized to take appropriate action in an emergency situation
  - b) If the call is not acknowledged within 45 seconds the call must be forwarded to an alternate location.

#### **2) Remote/local alarm system (e.g. KRMS, if applicable):**

Press the voice connection button in the car. Wait for a connection, and then perform a test connection to the call center. Verify disconnection of the device following deactivation of the call by the call center. For elevators installed under A17.1-2013 and later editions, verify that the connection automatically disconnects 20 seconds after initial voice notification if the caller does not extend the call.

### **8.6.4.19.16: MEANS TO RESTRICT HOISTWAY OR CAR DOOR OPENING**

- On elevators installed under A17.1b-1980 through A17.1-2010/CSA-B44-10, check to ensure the elevator doors cannot be fully opened manually when the elevator is more than 18 inches above or below a landing.
- If the result of the above test is satisfactory, stop the elevator beyond 18 inches above or below the landing and attempt to manually open the doors. The doors should open no more than 4 inches.
- On elevators installed under A17.1-2013/CSA-B44-13 and later editions, check to ensure the elevator doors cannot be fully opened manually when the elevator is more than 7 inches above or below a landing. Adjust device as necessary to maintain code dimensions.
- If the result of the above test is satisfactory, stop the elevator within 3 inches above or below the landing and attempt to manually open the doors. The doors should open.

## 4.2 CATEGORY 5 TRACTION ELEVATOR TEST PROCEDURE

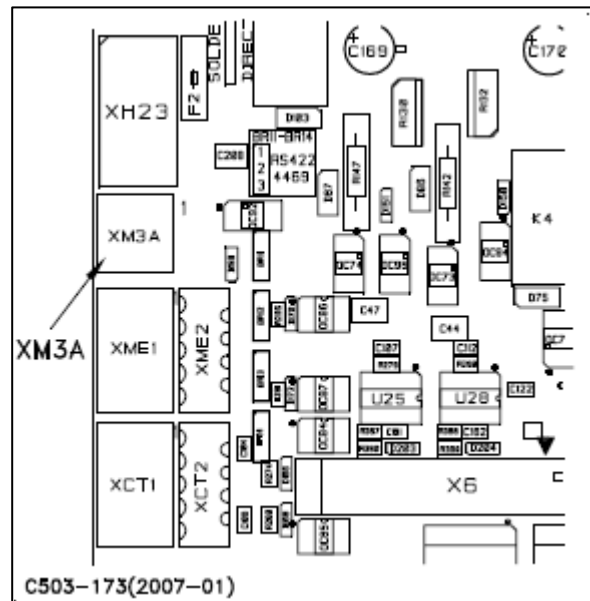
### RULE 8.6.4.20.1: CAR AND COUNTERWEIGHT SAFETIES

#### Functional Check of Car Safeties

- *Perform this check only after performing governor trip speed test.*
- *This check should be performed to verify safeties are working before any overspeed car or counterweight safety test.*
- *This check is not normally required as part of a safety inspection.*

- 1) Load elevator cab with 100% capacity load.
- 2) Put car on machine room inspection by putting switch 270 DOWN.

- 3) Temporarily jumper the governor overspeed switch by jumpering LCEADON2 XM3A/1-3.

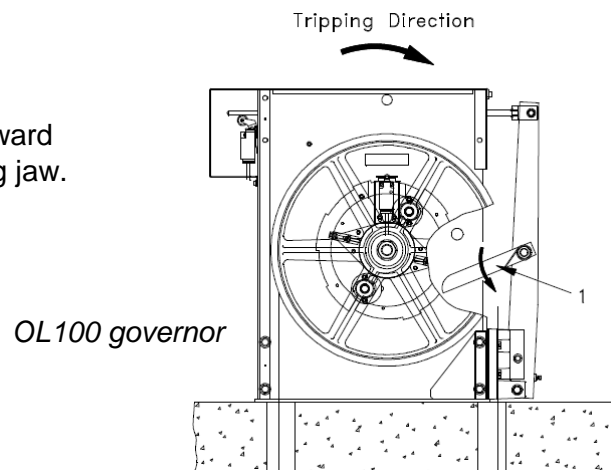


- 4) Run car down on inspection and manually trip governor as follows.

#### b) EcoSystem MR

- **OL100 governor:**

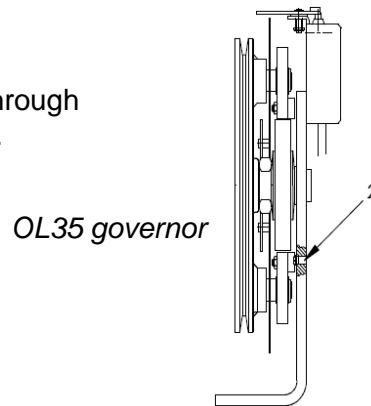
While car is running down, hit downward on governor tripping lever (1), setting jaw.





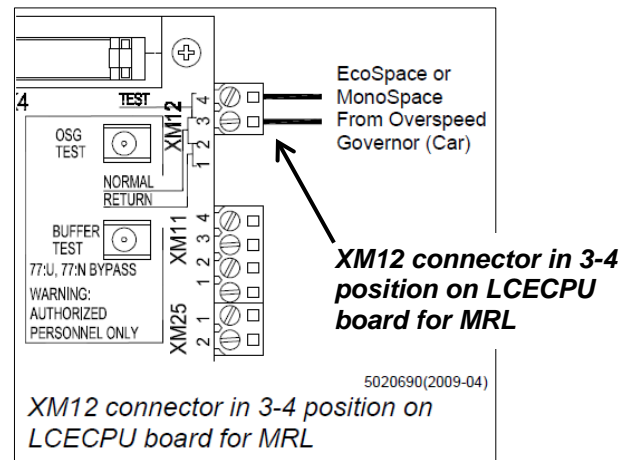
- **OL35 governor:**

While car is running down, push screwdriver through hole (2) in side of governor until governor sets.

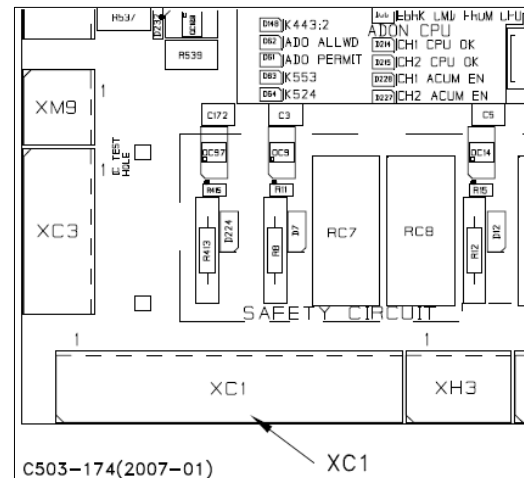


b) **MRL**

- Move 2-pin XM12 connector on LCECPU to test, 3-4 position.
- With car running down, push OSG TEST button until governor sets.



- 5) Temporarily jumper safety plank switch by jumpering LCEADON2 XC1/3-5.



- 6) Run elevator DOWN on inspection and verify that safeties hold load and machine either slips traction or stalls to determine if set was successful.
- 7) Check that car has stopped level.
- 8) Reset governor and safety by running elevator UP on inspection from machine room.

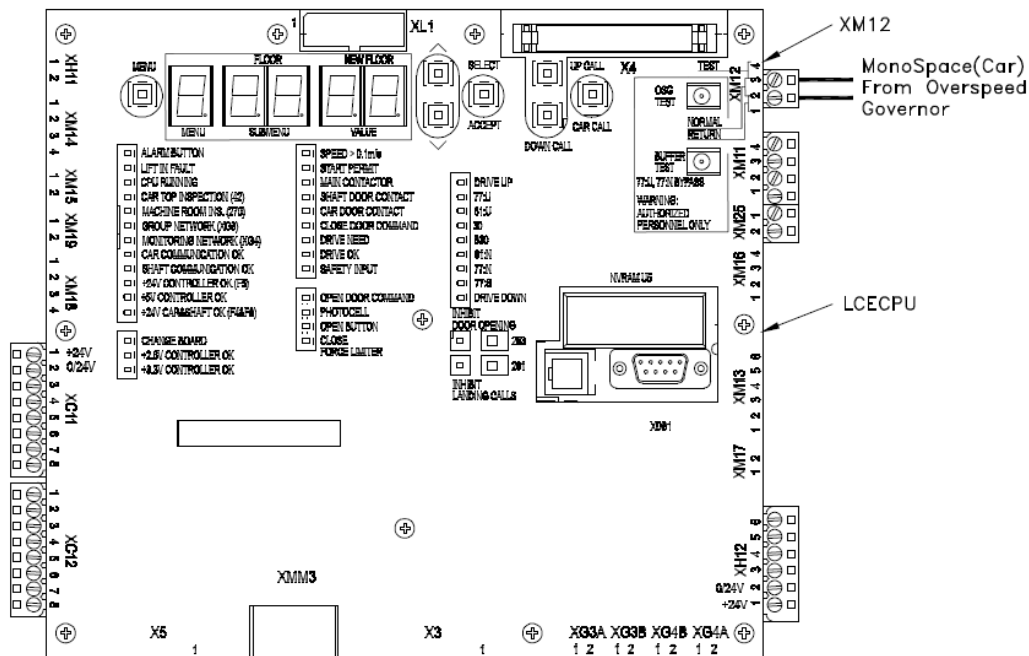


## EcoSystem MR

- Safety will reset immediately when elevator moves up.
- *OL35 governor*: Mechanically resets when car moves up. Manually reset the electrical switch.
- *OL100 governor*: Use lever provided with governor to open jaw and reset tripping lever. Manually reset the electrical overspeed switch.

## MRL

- Safety will reset immediately when elevator moves up.
- OL35 governor mechanically resets when car moves up.
- Reset electrical overspeed switch by moving 2-pin XM12 connector on LCECPU to XM12/1-2 position and push OSG TEST switch. Electrical switch will reset.
- Move XM12 connector to NORMAL position, XM12/2-3.



- 9) If counterweight safeties are present perform following steps.
  - Remove test weights from elevator.
  - Perform steps 4 through 8 for counterweight safety.
  - Run car UP to set safeties and DOWN to reset safeties.
  - Perform step 6 by running car up on inspection and verify machine either slips traction or stalls.
- 10) Remove temporary governor overspeed switch jumper at LCEADON2 XM3A/1-3.
- 11) Remove temporary safety plank switch jumper at LCEADON2 XC1/3-5.
- 12) Run elevator on inspection and see that all safety circuits have made up.
- 13) Run elevator on normal operation and verify the car runs normally.

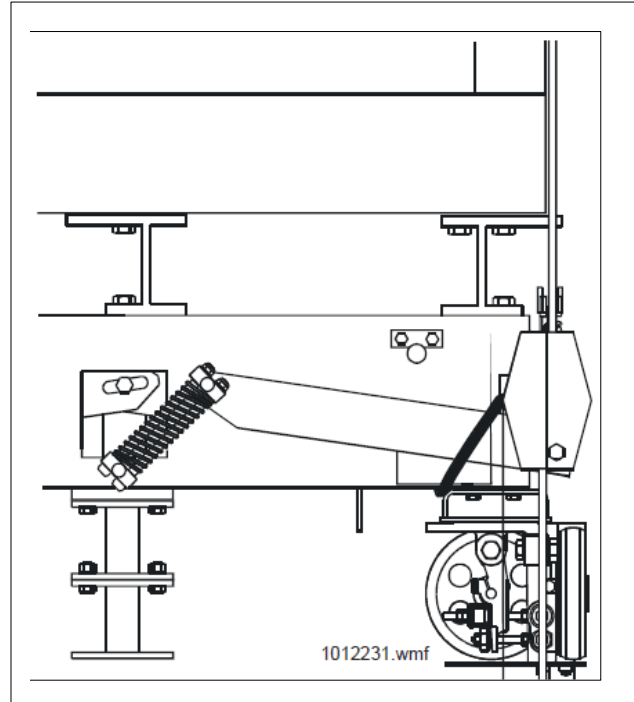
### Category 5 Testing of Car Safeties

#### WARNING

Prior to performing 100% load overspeed car safety test, perform functional check of car and counterweight safeties, and verify safeties hold a full load, set evenly and do not rack the car.

- 1) Prepare elevator for car safety test by performing following steps.

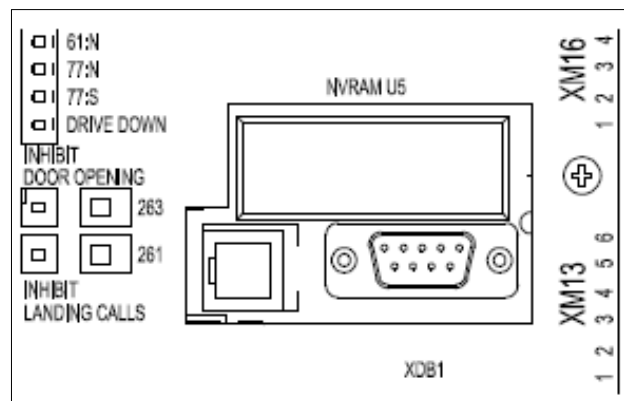
- Tie down counterweight safeties (if present) so they do not accidentally set during safety test.
- Tie up door restrictor so door can be opened without hall door present.
- Block clutch open using blocking screw provided with clutch.
- Tie down governor tail sheave so it cannot jump out of bracket when safeties set.
- Tie down counterweight tail sheave if present.



- 2) Load test weights equal to 100% of the capacity load into the car.

- 3) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note: Ensure no passengers are in the car.**



- 4) Move elevator to upper part of hoistway.
- 5) Put elevator on machine room inspection by putting switch 270 DOWN

6) Access Menu 6-3 and increase elevator speed to higher than the governor tripping speed.

- 1.1 m/s for 150 FPM
- 1.5 m/s for 200 FPM
- 2.5 m/s for 350 FPM

**Note: Back out of 6 menu so a bottom landing call can be set up.**

7) Put car on automatic by setting switch 270 UP.

8) Give car a call to the bottom landing. **Note: Car will move down rapidly until the safeties set.**

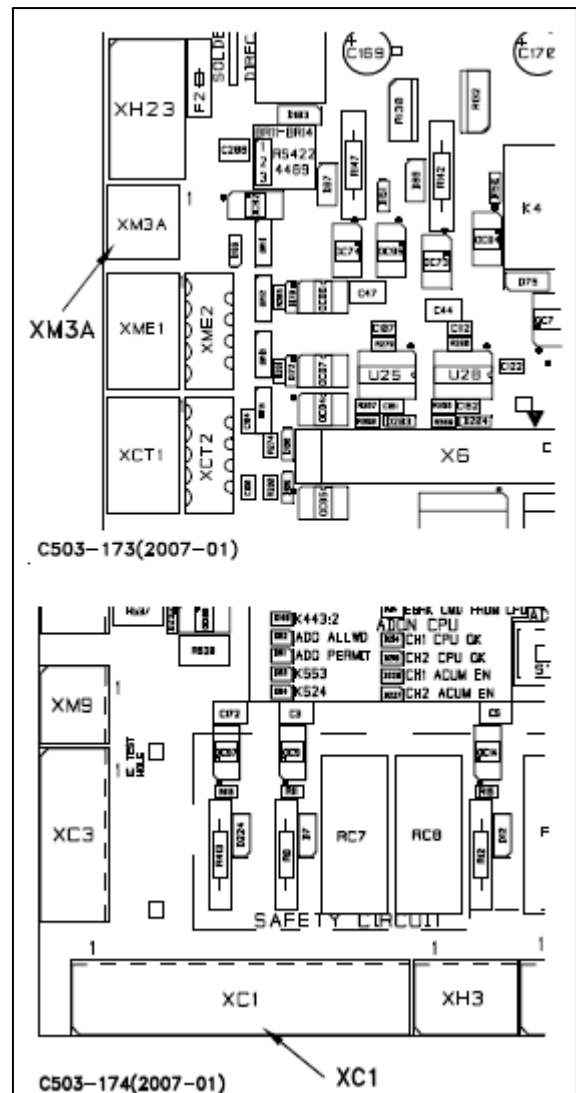
9) Install temporary jumpers.

- LCEADON2 XM3A/1-3: Jumpers electrical overspeed switch.
- LCEADON2 XC1/3-5: Jumpers safety plank switch.

10) Enable **Enhanced release from safety gear (6-72=11)**.

**NOTE: Parameter 6-72-11 sets up a pulsing action which rocks the car off the safeties.**

- Run the elevator up on inspection until safeties reset, not more than three feet.



### 11) Reset governor.

#### EcoSystem MR

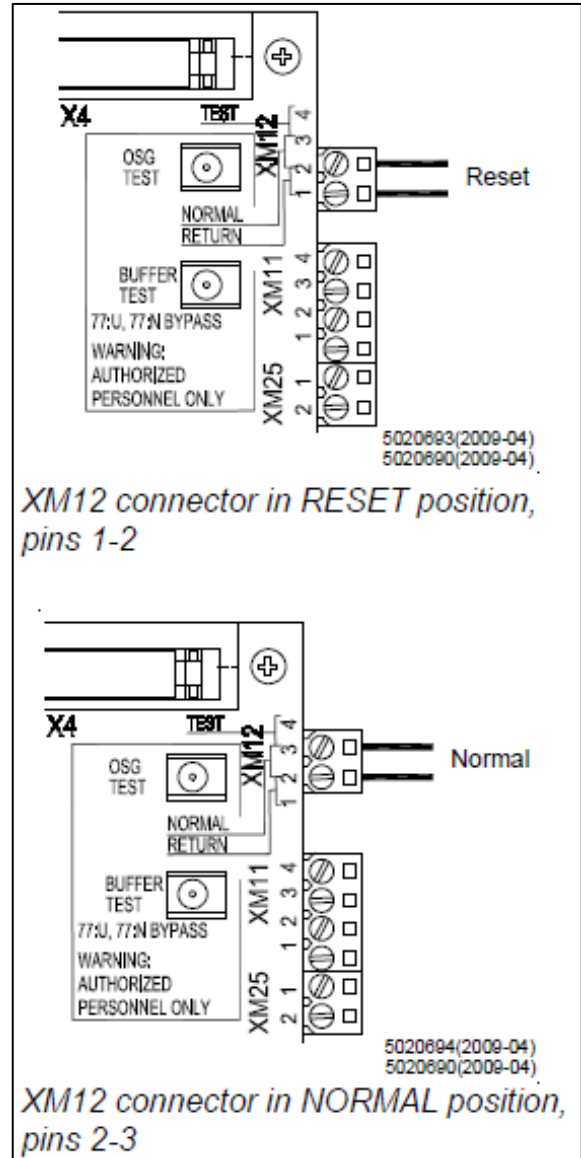
- *OL100 governor:* Use lever provided with governor to reset mechanical jaw. Manually reset electrical overspeed switch.
- *OL35 governor:* Mechanical portion automatically resets when car runs up. Manually reset electrical switch.

#### MRL

- Mechanical portion resets automatically when car runs up.
- Reset electrical overspeed switch by moving XM12 2-pin connector on LCECPU to XM12/1-2,

**RESET (RETURN)**, position and push OSG test button. This resets electrical overspeed switch.

- Return XM12 2-pin connector to XM12/2-3, **NORMAL**, position.



### 12) Remove temporary jumpers previously installed.

- LCEADON2 XM3A/1-3: Jumpers electrical overspeed switch.
- LCEADON2 XC1/3-5: Jumpers safety plank switch.

### 13) Run car to location where you can access the car roof.

### 14) Run car on top-of-car inspection to location where safeties set.

- Measure slide and check that it is within tolerance for car speed. If slide is not within tolerance, refer to appropriate installation instruction:

**Note: If slide is not within tolerance, the AQ-32 safeties must be replaced as they are not field adjustable.**

### 15) Clean any damage to rails that might have been caused by safety set.

- Check counterweight and verify that counterweight tie downs are secure against weights.

- 16) Run elevator to convenient floor and remove test weights.
- 17) Remove tie down on counterweight safeties, if applicable.
- 18) If counterweight safeties are present, proceed with counterweight safeties test now.
- 19) If no counterweight safeties, remove following:
  - Tie-up from door restrictor
  - Blocking screw from door operator
  - Tie down from governor tail sheave
- 20) Run car on normal operation.
- 21) Following completion of the test:
  - Inspect the governor inspect for any damage.
  - Check to ensure the platform is within 3/8" of level.
  - Check the rails for damage and dress any scored surfaces.
  - Examine the driving-machine sheave and all other installed sheaves, retainers and suspension members throughout their entire length to ensure all suspension members are properly seated in their respective sheaves, and that no damage has occurred to sheaves, suspension members, or retainers. The elevator shall not be returned to service until this physical examination has been conducted and any necessary repairs completed.
  - Permanently attach a metal test tag to the safety with a wire. Record the date of the test on this tag.

**NOTE! If KONE safeties are installed, a product specific KONE SAFETY GEAR APPLICATIONS RECORD must be affixed to the controller, on which all full load safety applications that occur at rated speed or governor tripping speed must be entered.**

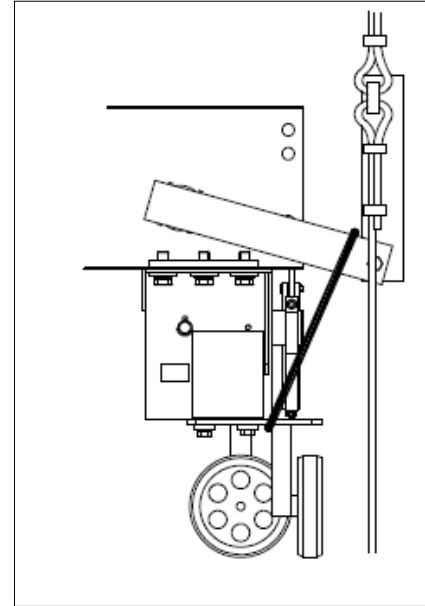
All safety components must be inspected after each application to monitor wear. The safety spring block and shoes/wedges must be replaced according to the information on the KONE SAFETY GEAR APPLICATIONS RECORD.

### Category 5 Overspeed Counterweight Safety Test

#### WARNING

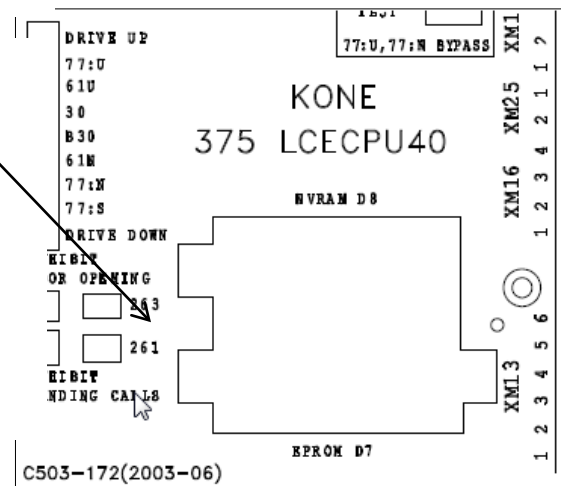
Prior to performing overspeed counterweight safety test, perform functional check of car and counterweight safeties, and verify safeties hold a full load and set evenly.

- 1) Prepare elevator for counterweight safety test by performing following steps:
  - Tie down the car safeties so they do not accidentally set during the safety test.
  - Tie up door restrictor so door can be opened without the hall door being present.
  - Block clutch open using blocking screw provided with clutch.
  - Tie down the governor tail sheave for both the car and the counterweight so they cannot jump out of the bracket when the safeties set.
  - Make sure there is no person on the elevator, and the car is empty.



- 2) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note:** Ensure no passengers are in car.



- 3) Move the elevator to lower part of the hoistway.
- 4) Put the elevator on machine room inspection by putting switch 270 DOWN.
- 5) Turn off controller power and lock and tag disconnect.
- 6) Disconnect the motor leads at U, V, W in controller.
- 7) Manually open the brake.
  - Counterweight will drop and safeties will set.
- 8) Reconnect the motor leads at U, V and W in controller.

- 9) Install temporary jumper LCEADON2 XM3A/1-3 to jumper the electrical overspeed switch.
- 10) Remove lock out tag and turn ON controller power.
- 11) Run the car down on machine room inspection until the safeties reset.
  - Run the car down no more than two feet.

**Note:** It may be necessary to turn on enable traction test to give an additional boost to get car off safeties. Traction test resets after each start. Several attempts may be required to get car off safeties; traction test must be set

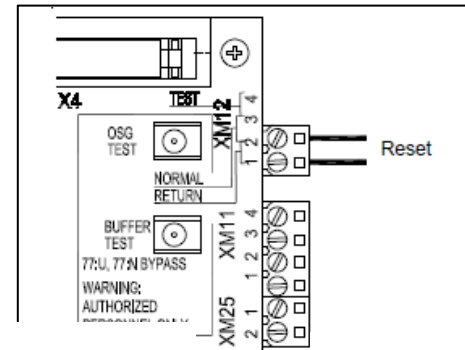
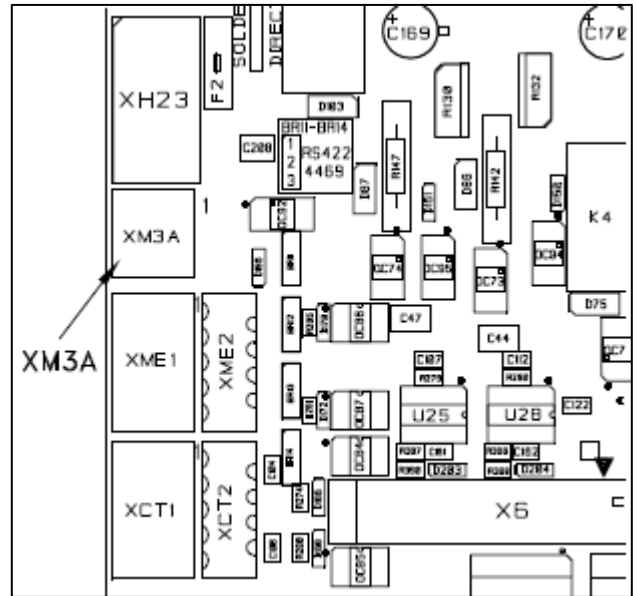
- 12) Reset governor as follows:

### EcoSystem MR®

- *OL100 governor:* Use lever provided with governor to reset mechanical jaw. Manually reset electrical overspeed switch.
- *OL35 governor:* Mechanical portion automatically resets when car runs up. Manually reset electrical switch.

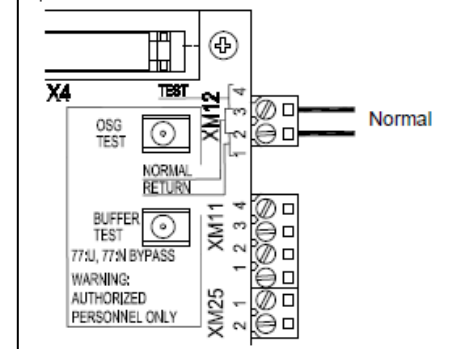
### MRL:

- Mechanical portion resets automatically when car runs down.
- Locate XM12 2-pin connector for counterweight governor. Plug connector into XM12/1-2 **RESET (RETURN)** position and push OSG test button.
- Unplug counterweight governor XM12 2-pin connector and reinstall XM12 2-pin connector from car governor to XM12/2-3 **NORMAL** position.



5020890(2009-04)

*XM12 connector in RESET position, pins 1-2*



5020890(2009-04)

*XM12 connector in NORMAL position, pins 2-3*

- 13) Remove temporary jumper LCEADON2 XM3A/1-3.
- 14) Run car to location where you can access the car roof.
- 15) Run car on top of car inspection to location where safeties set.



- 16) Measure slide and check that it is within tolerance for car speed. If slide is not within tolerance, refer to appropriate installation instruction:
  - **AM-07.04.015**, PROGRESSIVE TYPE SAFETY GEAR SGB01, SGB02, SGB03, and SGB05.
  - **AM-07.04.019**, PROGRESSIVE SAFETY GEAR SGB06 and SGB07.
  - **AM-07.04.024**, PROGRESSIVE SAFETY GEAR SGB08.
- 17) Clean any damage to rails that might have been caused by safety set.
  - Check counterweight and verify that counterweight tie downs are secure against weights.
- 18) Remove tie down on car safeties.
- 19) Remove following:
  - Tie up from door restrictor
  - Blocking screw from door operator
  - Tie down from governor tail sheaves
- 20) Run car on normal operation.

### **8.6.4.20.2: GOVERNOR**

#### **Category 5 testing of governor**

##### **Perform governor trip speed test:**

- 1) Capture car as follows, depending on equipment.

##### **EcoSystem MR®**

- Run elevator to top floor and put elevator on machine room inspection by putting switch 270 DOWN.

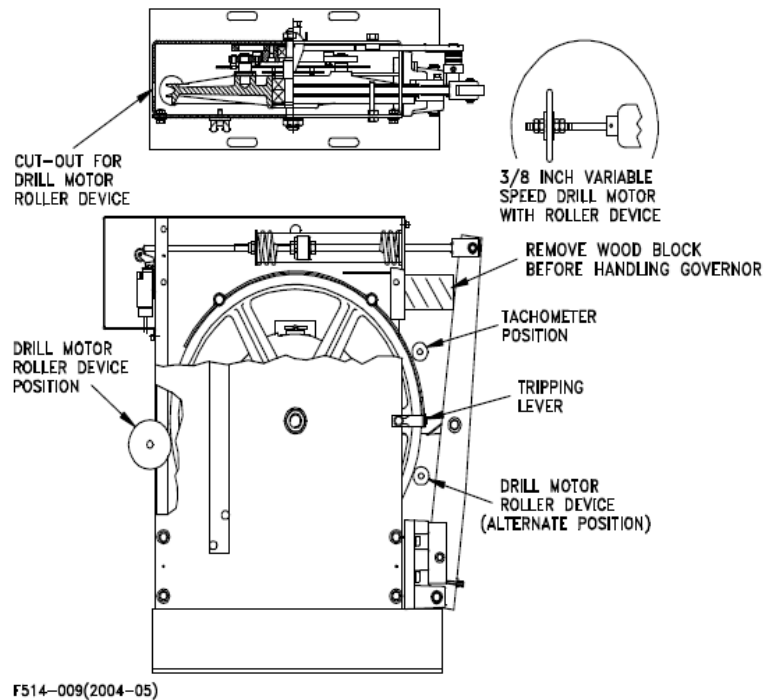
##### **MRL**

- Capture the elevator at the top floor.
  - Access the car roof.
  - Put the car on top of car inspection.
  - Run the elevator to a level where the governor can be accessed and the car top blocking device can be engaged.
  - Engage the car top blocking device.
  - Activate top of car stop switch.
- 2) Lock and tag out main line disconnect for elevator.
  - 3) Block up governor tension weight to minimize weight on governor rope.
  - 4) At governor, pull cable slack around sheave.

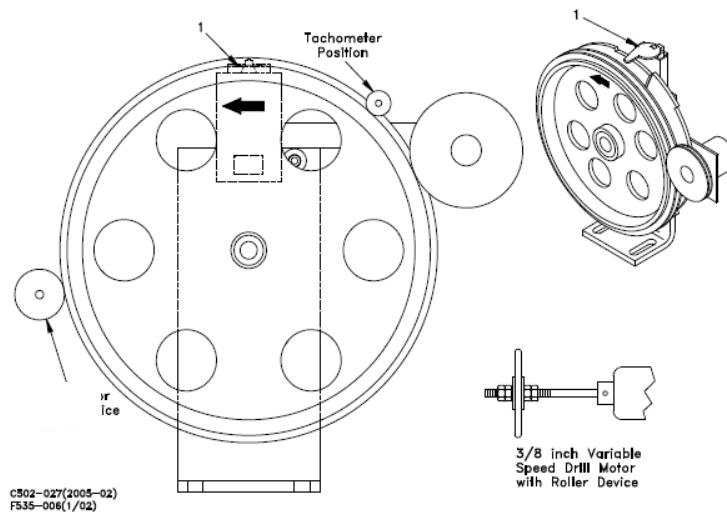


5) Perform following measurement procedure three times and record speed each time.

- Use drill motor and rubber wheel to slowly increase speed of governor.
- Use handheld tachometer to measure speed.
- Continue increasing speed until electrical overspeed switch trips.
- Measure and record trip speed.



*OL100 governor*



*OL35 governor*

- 6) Compare speed measurements to governor **electrical** trip speed recorded on governor nameplate.
  - All three speed measurements should be approximately equal.
  - If electrical trip point is within tolerance, proceed to next step.
  - If electrical trip point is not within tolerance, governor must be replaced.
- 7) Use same procedure as above to check mechanical trip speed three times and record results.
- 8) Compare speed measurements to governor **mechanical** trip speed recorded on governor nameplate.
  - All three speed measurements should be approximately equal.
  - If mechanical trip point is within tolerance, proceed to next step.
  - If mechanical trip point is not within tolerance, governor must be replaced.
- 9) Once governor trip points are confirmed, replace governor rope on governor sheave.
- 10) Unblock governor tension weight.
- 11) Reset the tension weight switch.
- 12) Make sure governor rope is hanging freely.
- 13) Make sure governor jaw is reset (OL 100 only).
- 14) Reset governor electrical overspeed switch.
- 15) If there is a counterweight governor, test electrical and mechanical trip points using above procedure.
- 16) If all speed trip points are satisfactory, remove lock and tag, and turn on mainline disconnect.
- 17) Check operation.

### **EcoSystem MR®**

- Run car on machine room inspection and verify car runs.

### **MRL**

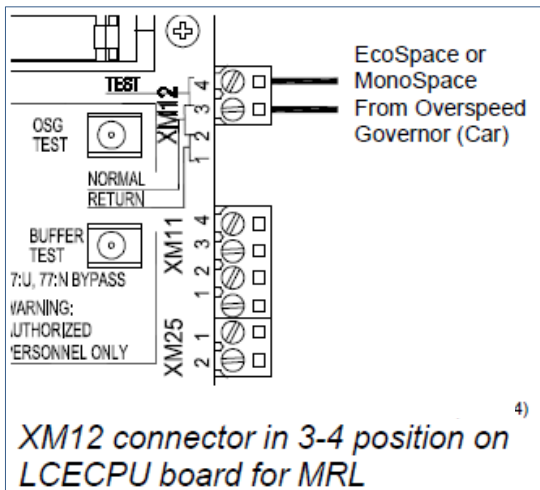
- Disengage car top locking device.
- Run the car top back to floor level and step off the car top.
- Turn off the top of car inspection.
- Return car to normal operation.

### Governor pull-through safety test

- 1) Run car up using hoistway access and gain access to pit.
- 2) Turn off pit stop switch.
- 3) Turn off and lock out mainline disconnect.
- 4) Disconnect governor rope from safety gear lever.
- 5) Fasten clamp with force gauge.
- 6) **EcoSystem MR®**
  - *OL35 governor:* Open flyweight by hand so it contacts trip wheel.
  - *OL100 governor:* Hit tripping lever downward so jaw sets.

#### MRL

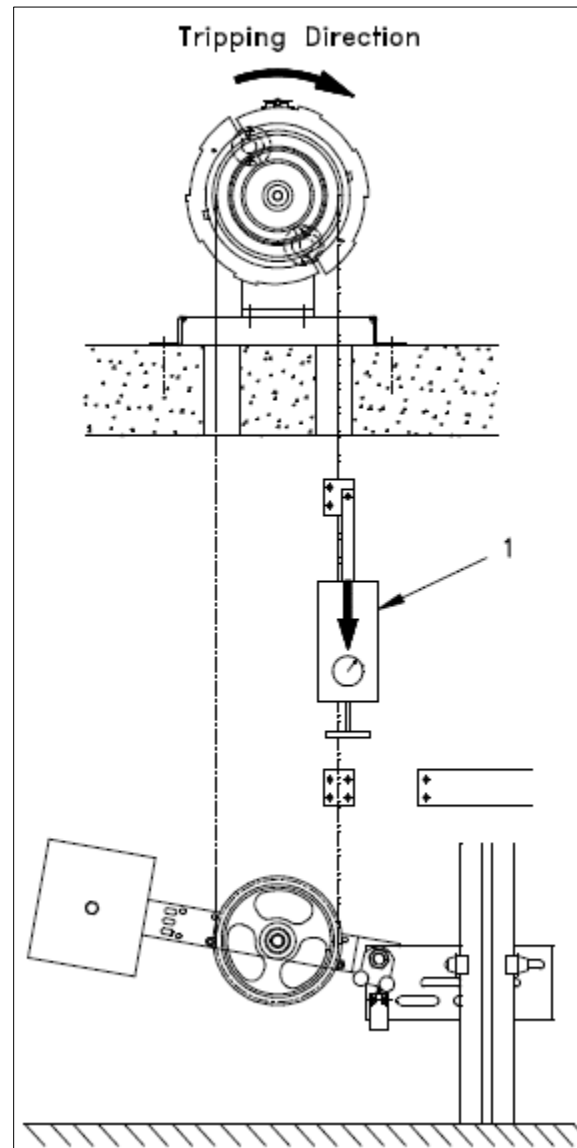
- Move XM12 connector on LCECPU to 3-4 position.



- One person pushes OSG TEST button, while second person pulls governor rope. Governor will engage.
- First person releases OSG TEST button.

**Note:** Person holding governor rope must not release tension, otherwise governor will reset

- 7) Connect a come-along to force gauge.
- 8) Use come-along to pull down on force gauge (1) in tripping direction until governor rope starts to move.



9) Record value of force required to move rope.

- This value is pull through force. Verify pull through force is within tolerance on governor data tag.

10) Reset governor as follows:

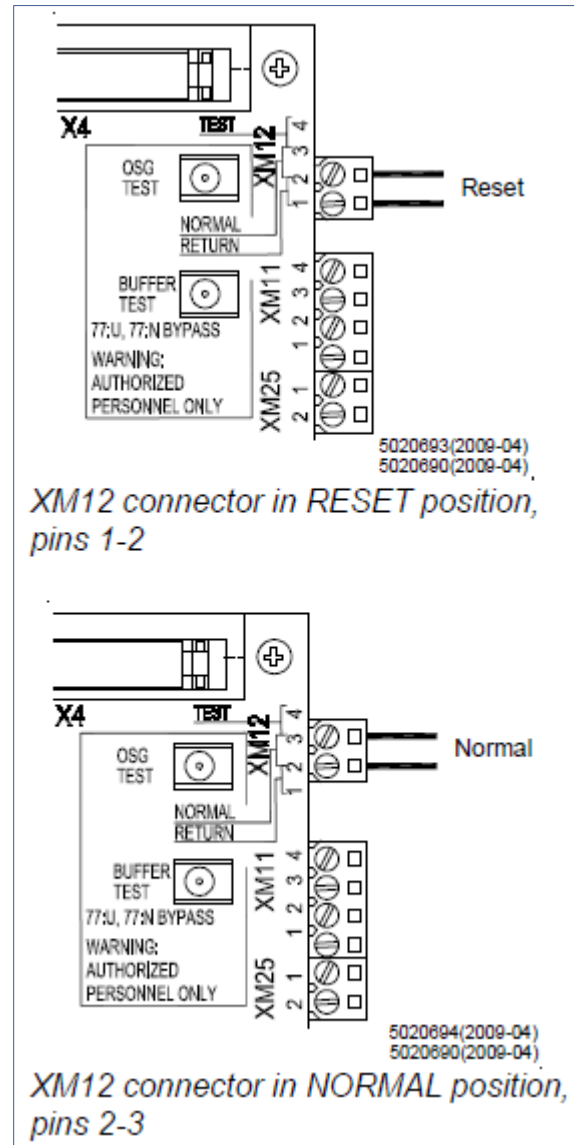
### EcoSystem MR®

- OL100: Use lever provided to reset tripping lever. Reset electrical switch manually.
- OL35: Rotate governor upward to mechanically reset governor. Manually reset electrical switch.

### MRL

- Rotate governor upward to mechanically reset governor.
- Reset electrical switch by moving XM12 2-pin connector to XM12/1-2 **RESET (RETURN)** position and push OSG TEST button to reset governor electrical switch.
- Move 2-pin connector back to XM12/2-3 **NORMAL** position.

- 11) Reattach governor rope to safety gear.
- 12) If counterweight governor, perform same test using above procedures.
- 13) Turn on pit switch.
- 14) Turn on mainline disconnect.
- 15) Return elevator to normal position.



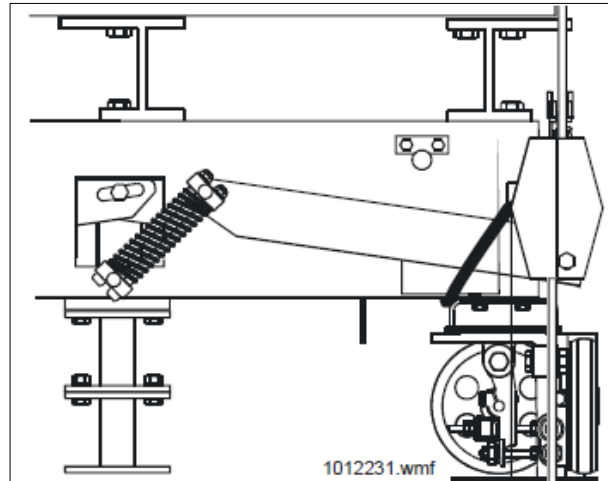
### 8.6.4.20.3: OIL BUFFERS

#### Category 5 testing of full stroke car oil buffers

Test is not normally required for elevators with spring or neoprene buffers.

If testing an elevator equipped with reduced stroke buffer, refer to section: *Perform buffer test, car: reduced stroke buffer.*

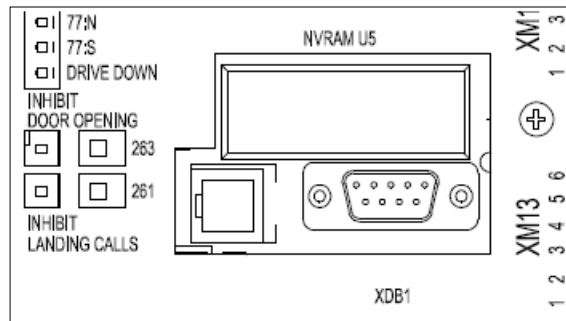
- 1) If there is a counterweight safety, tie down the counterweight safety lever to prevent counterweight safety from engaging.



- 2) Place a full load on the car.
- 3) Drive the elevator to the top terminal floor.
- 4) Put the elevator on inspection.

- 5) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note:** Ensure no passengers are in the car.



- 6) Temporarily jumper bottom 136:N switch. (LCEADON2 XH23/1-3). **Note: Overrides ETS switch.**
  - If using ETSL, temporarily remove XME and XCT connectors from ETSL board1, so that ETSL boards do not see the car (OSG) encoder or motor encoder signals. **Note: Overrides ETSL switch.**
- 7) Activate **Car Buffer Test**.
  - Set UI menu 6-72-4. **Note: Overrides normal stopping means.**
- 8) Back out of menu 6 until car position displays on User Interface.
- 9) Take elevator off inspection.

- 10) Give car call to bottom terminal floor.
- 11) After 77:U turns off, **press and hold** Buffer Test button.
  - Elevator will now perform a car buffer test. **Note: Overrides NTS.**
- 12) Put elevator on machine room inspection.
- 13) Run elevator off buffer as follows:
  - Temporarily jumper LCEADON2 XH1/1-5 (final limit).
  - Run car off buffer.
  - Remove temporary jumper from LCEADON2 XH1/1-5 (final limit).
  - If using ETSL, reconnect XCT1 and XME1 on ETSL board 1.
  - Remove temporary jumper from LCEADON2 XH23/1-3 (136:N).
  - Verify that car buffer returns to full extension within 90 seconds
  - Remove full load from car.
  - Cycle controller power to reset any faults if necessary.
  - Remove counterweight safety tie down, if any.

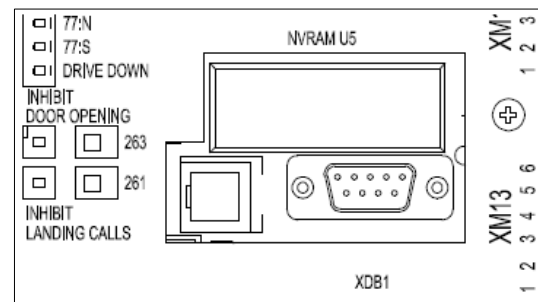
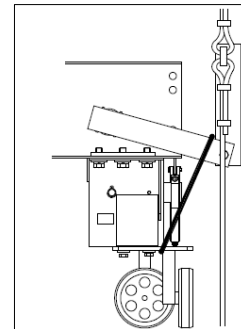
### Category 5 testing of full stroke counterweight oil buffers

Test is not normally required for elevators with spring or neoprene buffers.

If testing an elevator equipped with reduced stroke buffer, refer to section: *Perform buffer test, counterweight: reduced stroke buffer.*

- 1) Tie down the car safety.
- 2) Ensure that car is empty.
- 3) Drive elevator to bottom terminal floor.
- 4) Put elevator on inspection.
- 5) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note:** Ensure no passengers are in car.

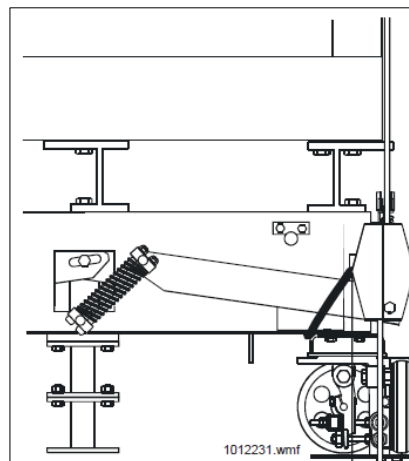


- 6) Temporarily jumper top 136:U switch. Terminal XH23/1-2 on LCEADON2). **Note: Overrides ETS switch.**
  - If using ETSL, temporarily remove XME and XCT connectors from ETSL board1, so that ETSL boards do not see the car (OSG) encoder or motor encoder signals. **Note: Overrides ETSL switch.**
- 7) Activate **Counterweight Buffer Test**.
  - Set UI menu 6-72-3. **Note: Overrides normal stopping means (part 1).**
- 8) Take elevator off inspection.
- 9) Back out of menu 6 until car position displays on User Interface.
- 10) Give car call to top terminal floor.
- 11) After 77:N turns off, **press and hold** Buffer Test button.
  - Elevator will now perform a counterweight buffer test. **Note: Overrides NTS.**
- 12) Put elevator on machine room inspection.
- 13) Run counterweight frame off buffer.
  - Temporarily jumper LCEADON2 XH1/1-5 (final limit).
  - Run counterweight off buffer.
  - Remove temporary jumper from LCEADON2 XH1/1-5 (final limit).
  - Remove temporary jumper from LCEADON2 XH23/1-2 (136:U).
  - If ETSL board is used, reinstall XCT1 and XME1.
  - Verify that counterweight buffer returns to full extension within 90 seconds.
  - Cycle controller power to reset any faults if necessary.
  - Remove the car safety tie down.

### Category 5 testing of reduced stroke car oil buffers

Perform test only on elevators equipped with ETSL and reduced stroke buffers.

- 1) If there is a counterweight safety, tie down the counterweight safety lever to prevent counterweight safety from engaging.

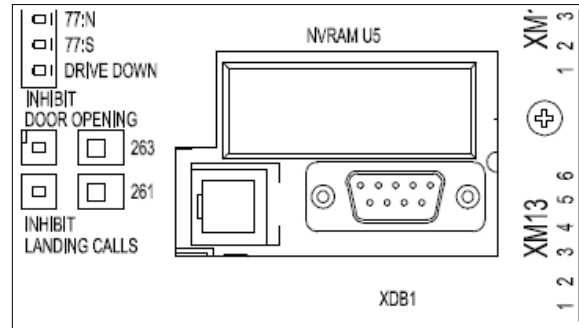


- 2) Capture elevator and load test weights equal to 100% load.

- 3) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note:** Ensure no passengers are in the car.

- 4) Drive elevator to top terminal floor.



- 5) Reduce elevator speed to buffer striking speed.

- Put elevator on machine room inspection by setting switch 270 DOWN.
- Access menu 6-3 and set to buffer striking speed:

**Sets car speed to buffer striking speed.**

Buffer Striking Speed	Original Car Speed
1.68 m/s	350 FPM
2.01 m/s	500 FPM
2.88 m/s	700 FPM

**Buffer striking speed is listed on buffer data plate.**

**Always verify buffer striking speed.**

- Access menu 6-99 and select 1 to save.

- 6) Back out of menu 6 and return car to automatic.

- 7) Press **Select/Accept** button twice to show car speed.

- Run elevator on long runs and see that elevator is running at buffer striking speed:

Buffer Striking Speed	Original Car Speed
1.68 m/s	350 FPM
2.01 m/s	500 FPM
2.88 m/s	700 FPM

**Sets car speed to buffer striking speed.**

**Buffer striking speed is listed on buffer data plate. Verify buffer striking speed.**

- After verifying car speed is at buffer striking speed, press **menu** button once to turn off car speed.

- 8) Return elevator to top floor

- 9) When elevator arrives at top floor, put car on machine room inspection by putting switch 270 DOWN.

- 10) Temporarily remove the XME and XCT connectors from ETSL board 1, so that the ETSL boards do not see the car (OSG) encoder or the motor encoder signals. **Note: Overrides ETSL.**

- 11) Activate **Car Buffer Test**:

- Set UI menu 6-72-4. **Note: Overrides normal stopping means.**

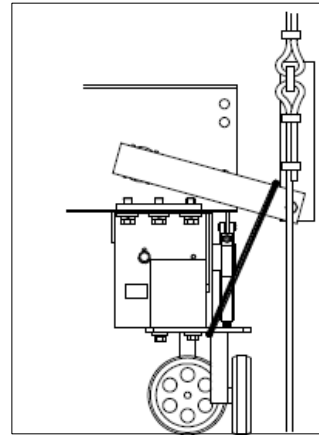


- 12) Back out of menu.
- 13) Return elevator to normal operation by putting switch 270 UP.
- 14) Register call to bottom terminal floor.
  - Car will start.
- 15) After 77:U turns off, **press and hold** buffer test button.
  - Elevator will run onto buffer. **Overrides NTS.**
- 16) Run elevator off buffer using following procedure:
  - Reconnect the XME and XCT connectors on the ETSL board 1.
  - Cycle controller power to reset ETSL faults, if any.
  - Put elevator on machine room inspect by setting switch 270 DOWN.
  - Temporarily jumper final limits, LCEADON2 XH1/1-5.
  - Run elevator up above final limit.
  - Remove temporary jumper from LCEADON2 XH1/1-5.
  - Cycle controller power to clear any outstanding faults.
- 17) Remove all test weights.
- 18) Return elevator to contract speed:
  - Put elevator on machine room inspection by setting switch 270 DOWN.
  - Access menu 6-2 and set to contract speed:
    - 350 FPM: 1.78 m/s
    - 500 FPM: 2.54 m/s
    - 700 FPM: 3.5 m/s
  - Access menu 6-99 and select 1 to save.
  - Remove tie down from counterweight safety.
  - Verify buffer returns to full extension within 90 seconds
- 19) Run and test elevator.
- 20) Enable doors and hall calls.

### Category 5 testing of reduced stroke counterweight oil buffers.

Perform this test only on elevators equipped with ETSL and reduced stroke buffers.

- 1) Tie down car safety.

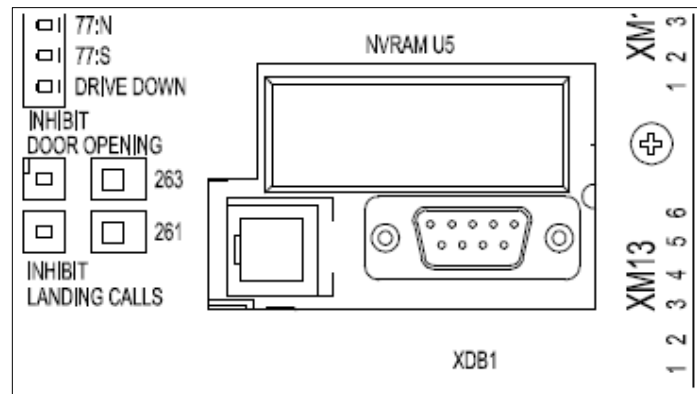


- 2) Capture elevator and ensure no one is on elevator.

- 3) Ensure elevator cab is empty.

- 4) Disable hall calls and car calls by sliding *LCECPU switches 263 and 261 to left.*

**Note: Ensure no passengers are in car.**



- 5) Drive elevator to bottom terminal floor.

- 6) If elevator speed is already reduced, proceed to step below: *Return elevator to bottom floor.*

If not, reduce elevator speed to buffer striking speed as follows.

- Put elevator on machine room inspection by setting switch 270 DOWN.
- Access menu 6-3 and set to buffer striking speed:

Buffer Striking Speed	Original Car Speed
1.68 m/s	350 FPM
2.01 m/s	500 FPM
2.88 m/s	700 FPM

**Sets car speed to buffer striking speed.**

**Buffer striking speed is listed on buffer data plate. Verify buffer striking speed.**

- Access menu 6-99 and select 1 to save.

- 7) Back out of menu 6 and return car to normal operation.

8) Press **Select/Accept** button twice to display car speed.

- Run elevator on long runs and see that elevator is running at buffer striking speed:

Buffer Striking Speed	Original Car Speed
1.68 m/s	350 FPM
2.01 m/s	500 FPM
2.88 m/s	700 FPM

**Buffer striking speed is listed on buffer data plate. Verify buffer striking speed.**

- After verifying car speed is at buffer striking speed, press **menu** button once to turn off car speed.

9) Return elevator to bottom floor. 10.

10) When elevator arrives at floor, put car on machine room inspection by putting switch 270 DOWN.

11) Temporarily remove XME and XCT connectors from ETSL board 1. With these connectors removed, the ETSL boards do not see the car (OSG) encoder or motor encoder signals.

**Overrides ETSL switch.**

12) Activate **Counterweight Buffer Test**: • Set UI menu 6-72-3.

**Note: Overrides normal stopping means.**

13) Back out of menu.

14) Return elevator to normal operation by putting switch 270 UP.

15) Register call to top terminal floor.

- Car will start.

16) After 77:N turns off, **press and hold** buffer test button.

- Elevator will run onto buffer.
- Compress buffer fully.

**Note: Overrides NTS**

17) Run elevator off buffer using following procedure:

- Reconnect the XME and XCT connectors on ETSL board 1.
- Cycle controller power to reset ETSL faults, if any.
- Put elevator on machine room inspection by setting switch 270 DOWN.
- Temporarily jumper final limit: LCEADON2 XH1/1-5.
- Run elevator up above final limit.
- Remove temporary jumper from LCEADON2 XH1/1-5.
- Cycle controller power to clear any outstanding faults.

### 18) Return elevator to contract speed:

- Put elevator on machine room inspection by setting switch 270 DOWN.
- Access menu 6-3 and set to contract speed:
  - 350 FPM: 1.78 m/s
  - 500 FPM: 2.54 m/s
  - 700 FPM: 3.5 m/s
- Access menu 6-99 and select 1 to save.
- Remove tie down on car safety.
- Verify buffer returns to full extension within 90 seconds.

### 19) Run and test elevator.

### 20) Enable doors and hall calls.

#### **8.6.4.20.4: DRIVING-MACHINE BRAKES**

#### **Category 5 testing of braking system**

##### **Main brake check**

Perform this functional test prior to performing any tests with 125% load to verify brakes will independently hold 125% load (150% load for Class C2 loading).

This test is not normally required as part of a safety inspection.

- 1) Run elevator to bottom floor and allow doors to open.
- 2) As soon as doors are open, put car on machine room inspection.
- 3) Load car with 125% load (150% load for Class C2 loading).
- 4) From controller, stand positioned to observe movement of car (hoist ropes, drive sheave, cab) and press one direction button. A successful test is when the elevator does not move.
  - **Emergency brake should open and car should not move.**
  - **If car cannot hold 125% load with main brake, brake must be checked and made to hold 125% load before performing 125% down run test.**
- 5) Proceed to check emergency brake if main brake passes test.

##### **Emergency brake check**

- 1) Elevator should still be on inspection and at bottom floor.
- 2) Connect electric brake release box to the main brake. Electric brake release box will be used to open main brake.
  - **If equipped with EBR:** SWM key switch will be used to open main brake.
  - **Note: Open C01 connector and turn on UPS power to enable EBR.**

### 3) Power the controller.

- From controller, stand positioned to observe movement of car (hoist ropes, drive sheave, cab) and open main brake using either the electric brake release box or EBR. A successful test is when the elevator does not move.
- **Main brake should open and car should not move.**
- **If car cannot hold 125% load with emergency brake, brake must be checked and made to hold 125% load before performing any further tests.**

### 1) If emergency brake passes check, return connections to original state.

## Relevel test with 150% load for Freight elevators with Class C2 loading

**Perform this test only on Freight elevators designed for Class C2 loading.**

- 1) With elevator loaded with 150% load, manually open the brake and allow elevator to drift 1 - 2 inches (25.4- 50.8 mm).
- 2) Release the brake and allow elevator to relevel.
- 3) Elevator must relevel the 150% load, and hold the load at floor level.

## 125% Lower and Hold test

**Prior to performing 125% lower and hold test, perform 125% load brake functional check and verify each brake independently holds 125% load.**

- 1) Move the elevator to an upper landing from where the car can accelerate down and reach maximum speed.
- 2) Use switch 270 to put the car on machine room inspection while doors are still open.
- 3) Use switches 261 and 263 on LCECPU to inhibit landing calls and door opening.

***Note: Overrides the 110% load limit and prevents doors from opening.***

- 4) Load car with 125% of nominal load.
- 5) Check user interface menu 5-1. Menu should display about 125.
- 6) Put the car on automatic. The car may relevel.
- 7) Run car down to bottom floor. ***Note: Make sure car runs down and stops at bottom floor.***
- 8) Slide CPU switch 263 to the right and open doors by registering "at floor" car call.
- 9) Remove test weights from car.
- 10) Check menu 5-1. Verify loadweigh reads 0% after test weights are removed, +/- 5%.

For additional information, refer to appropriate AM for loadweighing information.

### Category 5 testing of braking system: Integrated Control Solution (ICS)

#### Main brake check

Perform this functional test prior to performing any tests with 125% load to verify brakes will independently hold 125% load (150% load for Class C2 loading).

This test is not normally required as part of a safety inspection.

- 1) Run elevator to bottom floor and allow doors to open.
- 2) As soon as doors are open, put car on machine room inspection.
- 3) Load car with 125% load (150% load for Class C2 loading).
- 4) From MAP cabinet, stand positioned to observe speed and direction display and press one direction button.
  - A successful test is when the elevator does not move.
  - **Emergency brake should open and car should not move.**
  - **If car cannot hold 125% load with main brake, brake must be checked and made to hold 125% load before performing 125% down run test.**
- 5) Proceed to check emergency brake if main brake passes test.

#### Emergency brake check

- 1) Elevator should still be on inspection and at bottom floor.
- 2) Run elevator on inspection until car top is level with the top landing.

Access terminal block in SEP panel and switch main and emergency brake wiring at terminals MB+, MB- and EB+, EB-.
- 3) Power the controller.
- 4) From MAP cabinet, stand positioned to observe movement of car (hoist ropes, drive sheave, cab) and open main brake using either the electric brake release box or EBR.

A successful test is when the elevator does not move.

**Note: Main brake should open and car should not move.**

**If car cannot hold 125% load with emergency brake, brake must be checked and made to hold 125% load before performing any further tests.**
- 5) If emergency brake passes check, return connections to original state.

### Relevel test with 150% load for Freight elevators with Class C2 loading

**Perform this test only on Freight elevators designed for Class C2 loading.**

- 1) With elevator loaded with 150% load, manually open the brake and allow elevator to drift 1 - 2 inches (25.4- 50.8 mm).
- 2) Release the brake and allow elevator to relevel.
- 3) Elevator must relevel the 150% load, and hold the load at floor level.

### 125% Lower and Hold test

**Prior to performing 125% lower and hold test, perform 125% load brake functional check and verify each brake independently holds 125% load.**

- 1) Move the elevator to an upper landing from where the car can accelerate down and reach maximum speed.
- 2) Use switch 270 to put the car on machine room inspection while doors are still open.
- 3) Use switches 261 and 263 on LCECPU to inhibit landing calls and door opening.

***Note: Overrides the 110% load limit and prevents doors from opening.***

- 4) Load car with 125% of nominal load.
- 5) Check user interface menu 5-1. Menu should display about 125.
- 6) Put the car on automatic. The car may relevel.
- 7) Run car down to bottom floor.

***Note: Make sure car runs down and stops at bottom floor.***

- 8) Slide CPU switch 263 to the right and open doors by registering "at floor" car call.
- 9) Remove test weights from car.
- 10) Check menu 5-1. Verify loadweigh reads 0% after test weights are removed, +/- 5%.

***Note: For additional information, refer to appropriate AM for loadweighing information.***

### 8.6.4.20.5: For Future Use

### 8.6.4.20.6: EMERGENCY TERMINAL STOPPING AND SPEED- LIMITING DEVICES

#### ETSL board functional check

**ETSL is required for all elevators equipped with reduced stroke buffers and for speeds > 700 FPM.**

- 1) Capture elevator and inhibit hall calls and door operation.
- 2) Drive car to middle of hoistway. Elevator must be outside ETSL switch area and location must be selected so elevator is able to accelerate to ETSL tripping speed.
- 3) Disconnect connectors on one ETSL board at a time.
  - XSWB for driving DOWN test
  - XWST for driving UP test
- 4) Give call to terminal floor. Elevator will stop upon reaching ETSL tripping speed.
- 5) Reconnect connector to ETSL board.
- 6) Repeat test in opposite direction.
- 7) Repeat test for second ETSL board if present.

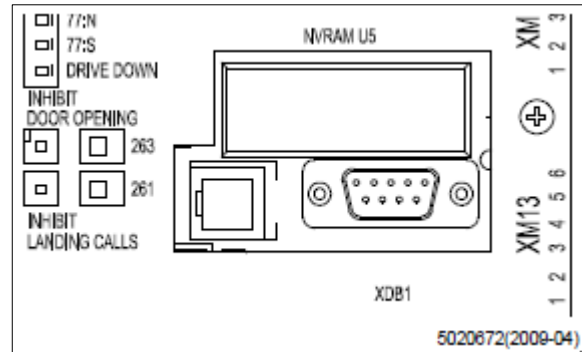
### Test ETSL: bottom, with 100% load

ETSL is required for all elevators equipped with reduced stroke buffers and for speeds > 700 FPM.

Perform ETSL board functional check prior to testing ETSL.

- 1) Capture elevator.
- 2) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note: Ensure no passengers are in car.**



- 3) Drive elevator to top terminal floor.
- 4) Load elevator with 100% capacity load.
- 5) Put car on machine room inspection by putting switch 270 DOWN.
- 6) Set UI menu 6-72-4, **Car Buffer Test**.  
**Note: Overrides normal stopping means.**
- 7) Back out of menu.
- 8) Turn off inspection.
- 9) Register a call to bottom terminal floor.
  - Car will start.
- 10) After 77:N turns off, **press and hold** buffer test button. Elevator will continue running down.

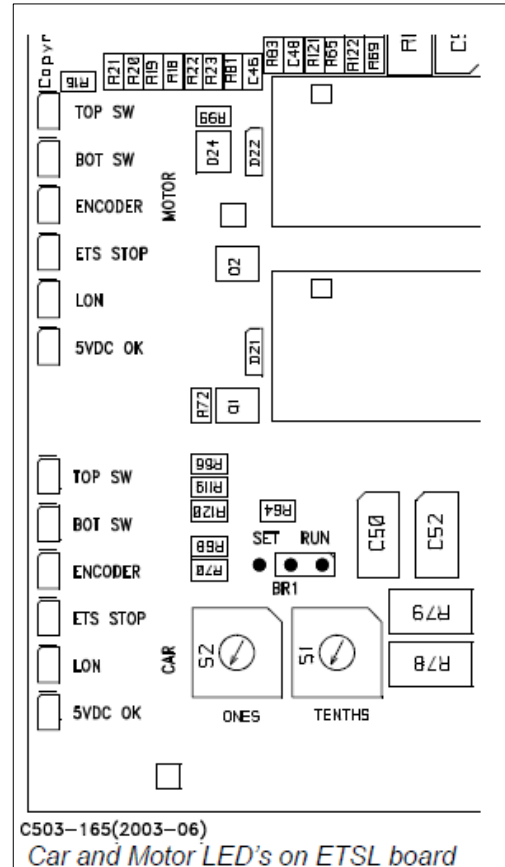


### 11) Watch ETSL LED's CAR BOT Switch and MOTOR BOT switch on ETSL board.

- As soon as CAR BOT switch and MOTOR BOT switch LED's turn on, car will drop main brake and slide to a stop.
- Fault 217 appears on user interface.
- If elevator stops short of bottom floor, elevator will recover and level into floor.

If elevator slides onto final limit switch perform following steps.

- Put elevator on inspection, 270 switch DOWN.
- Temporarily jumper LCEADON2 XH1/1-5.
- Run elevator up above final limit.
- Remove temporary jumper from LCEADON2 XH1/1-5.
- Return elevator to normal operation.
- Verify buffer returns within 90 seconds.



### Test ETSL: top, empty car

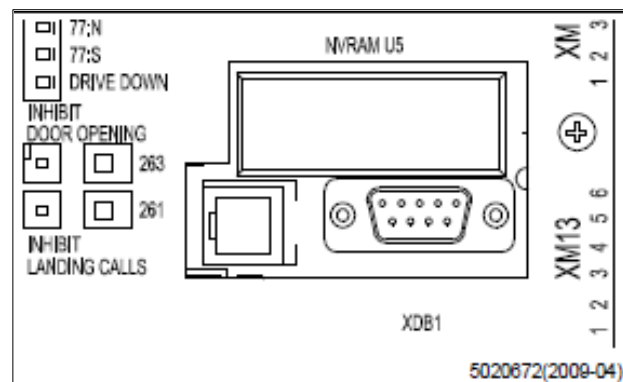
ETSL is required for all elevators equipped with reduced stroke buffers and for speeds > 700 FPM.

Perform ETSL board functional check prior to testing ETSL.

#### 1) Capture elevator.

#### 2) Disable hall calls and car calls by sliding LCECPU switches 263 and 261 to left.

**Note: Ensure no passengers are in car.**



#### 3) Drive elevator to bottom terminal floor.

#### 4) Remove any test weights. Car must be empty.

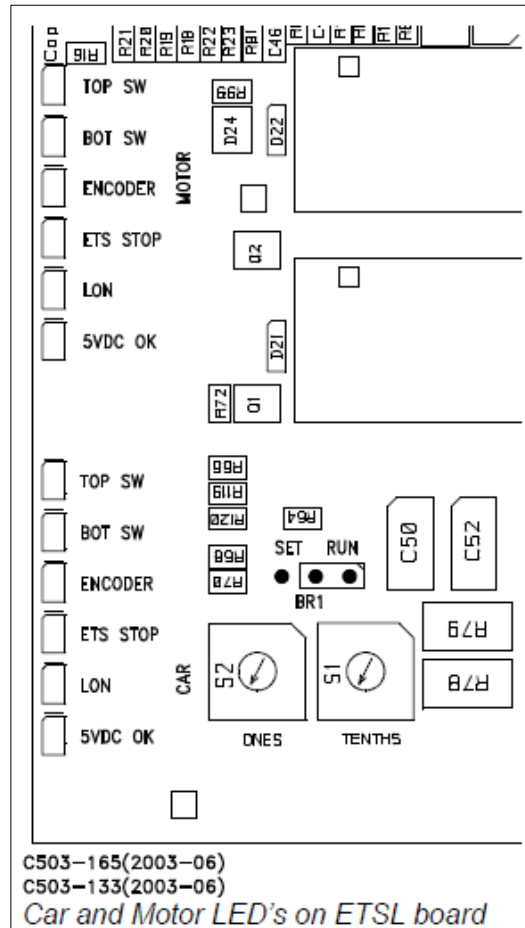
- 5) Put car on machine room inspection by putting switch 270 DOWN.
- 6) Set UI menu 6-72-3, **Counterweight Buffer Test**.  
**Note: Overrides manual stopping means.**
- 7) Back out of menu 6.
- 8) Turn off inspection.
- 9) Register a call to top terminal floor.
  - Car will start.
- 10) After 77:N turns off, **press and hold** buffer test button.
  - Elevator will continue running up.

**Note: Overrides NTS.**

- 11) Watch ETSL LED's CAR TOP switch and MOTOR TOP switch on ETSL board.
  - As soon as CAR TOP switch and MOTOR TOP switch LED's turn on, car will drop main brake and slide to a stop.
  - Fault 217 will appear on the UI.
  - If elevator stops short of top floor, elevator will recover and level into floor.

If elevator slides onto final limit switch (151:U) perform following steps.

  - Put elevator on inspection, 270 switch DOWN.
  - Temporarily jumper LCEADON2 XH1/1-5.
  - Run elevator down below final limit.
  - Remove temporary jumper from LCEADON2 XH1/1-5.
  - Return elevator to normal operation.
  - Verify buffer returns within 90 seconds.



### 8.6.4.20.7: POWER OPENING OF DOORS

Examine the power opening of the doors. Make sure power opening can occur only when the car is with 18" of the landing.

**WARNING! Prevent persons from attempting to enter elevator during following tests by guarding the entrance at the landing where the tests will be performed.**

- 1) Show that the door zone is 150 mm (6 inches) long. Make actual measurement of the door zone.
- 2) With elevator on normal operation, run the elevator to a floor and allow the doors to open.  
With doors open, manually open the brake and allow the elevator to drift **UP** 1-2 inches (25.4 - 50.8 mm).  
Successful test: elevator should re-level with doors open.  
**Note:** With EBR: disconnect C01 connector to allow EBR to open brakes with power on.
- 3) With elevator on normal operation, run the elevator to a floor and allow the doors to open.  
With doors open, manually open the brake and allow car to drift out of door zone, 3 - 4 inches.  
Successful test: elevator should close the doors and then re-level into floor.
- 4) With elevator on normal operation, run elevator to a floor and allow doors to open.  
Successful test: elevator is substantially at floor level **BEFORE** doors are fully open.

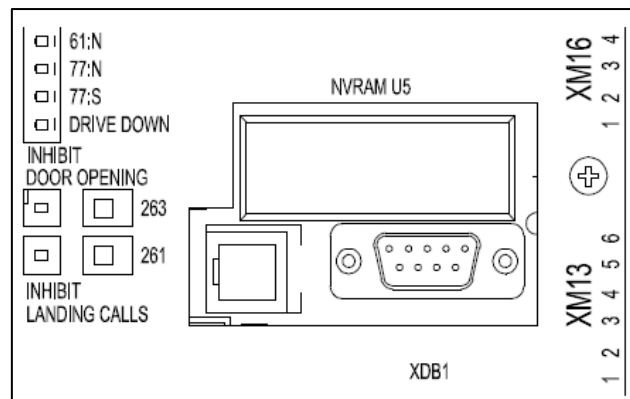
### 8.6.4.20.8: LEVELING ZONE AND LEVELING SPEED

#### WARNING

**This is a two-person test. To prevent serious injury, one person must be posted at elevator entrance to ensure that no unauthorized person enters elevator during test.**

- 1) Disable hall calls by sliding LCECPU switch 261 to left.

**Note:** Ensure no passengers are in car.



- 2) Turn off power.
- 3) Change param set-run slider switch on ADON2 board to SET.
- 4) Turn on power.
- 5) Access SL1 speed setting at UI menu 5-20-9 and change value to 1.

**Note:** Lowers door zone supervision speed to 2 FPM.

- 6) Check parameter **ACL doors open allowed**, UI menu 1-97 and set value to 1 if not already set to 1.
- 7) Turn off power.
- 8) Change param set-run slider switch on ADON2 board to RUN.
- 9) Load test weights equal to between 20% and 40% of full load.
- 10) Turn on power.
- 11) Run elevator to floor where second person is controlling entrance, allow elevator to land normally, and open door.
- 12) Put elevator on independent service (PRC). If PRC is not available, block electronic edge to prevent doors from closing.
- 13) With door open, carefully open brake:
  - By pulling manual release lever.
  - By using EBR (CO1 connector must be open for EBR to operate with power on).Allow car to drift away from floor no more than one inch.

**Note:** Do not drift car more than 4 inches or ACUM will trip.

**Note:** Elevator should attempt to re-level with doors open.
- 14) Elevator will attempt to re-level.

As soon as re-level speed exceeds 0.01m/s (2 FPM), elevator will stop.

  - Fault 166 appears.
  - Elevator may attempt to re-level a maximum of 3 times and stop each time speed exceeds 0.01 m/s (2 FPM)

Test is successful when the elevator stops and fault 166 appears.
- 15) Turn off power.
- 16) Change param set-run slider switch on ADON2 board to SET.
- 17) Turn on power.
- 18) Access SL1 speed setting at UI menu 5-20-9 and change value to 65.
- 19) Turn off power.
- 20) Change param set-run slider switch on ADON2 board to RUN.
- 21) Remove test weights.
- 22) Turn on power.
- 23) Run and test elevator.
- 24) Return elevator to service by turning on inhibit hall calls switch.

### **8.6.4.20.9: INNER LANDING ZONE**

**WARNING! Prevent persons from attempting to enter elevator during following tests by guarding the entrance at the landing where the tests will be performed.**

- 1) Show that the door zone is 150 mm (6 inches) long. Make actual measurement of door zone.
- 2) With elevator on normal operation, run elevator to a floor and allow doors to open.
  - **Note: With EBR: disconnect C01 connector to allow EBR to open brakes with power on.**
  - With doors open, manually open the brake and allow elevator to drift **UP** 1 - 2 inches (25.4 - 50.8 mm).
  - Successful test: elevator should relevel with doors open.
- 3) With elevator on normal operation, run elevator to a floor and allow doors to open.
  - With doors open, manually open the brake and allow car to drift out of door zone, 3 - 4 inches.
  - Successful test: elevator should close the doors and then relevel into floor.
- 4) With elevator on normal operation, run elevator to a floor and allow doors to open.
  - Successful test: elevator is substantially at floor level **BEFORE** doors are fully open.

### **8.6.4.20.10: BRAKING SYSTEM, TRACTION, AND TRACTION LIMITS**

#### **Category 5 testing of emergency stopping device**

**Prior to performing 125% load high speed brake stop test, perform 125% load brake functional check and verify each brake independently holds 125% load.**

- 1) Move the elevator to an upper landing from where the car can accelerate down and reach maximum speed.
- 2) Use switch 270 to put the car on machine room inspection while doors are still open.
- 3) Use switches 261 and 263 on LCECPU to inhibit landing calls and door opening, and override 110% load limit.
- 4) Load car with 125% of nominal load.
- 5) Check user interface menu 5-1. Menu should display about 125.
- 6) Put car on automatic. Car may relevel.
- 7) Register a call to the bottom floor.
- 8) Allow the elevator to accelerate to full speed. As soon as elevator reaches full speed pull XM1 connector on ADON2 board opening the safety circuit.

**A successful test is:**

- The main contactors open and the brake drops.
  - The elevator slides to a stop on the brake and holds the load.
  - **WARNING! Do not stop the elevator by opening the mainline disconnect while the elevator is running full speed as this may cause a flash over.**
- 9) After the car stops, reconnect the XM1 connector on the ADON2 board.
  - 10) Move the car to a suitable floor and enable the doors by sliding switch 263 to the right. Remove the test weights.

### Traction test: car

- 1) From machine room, drive car to top floor.
- 2) Put car on machine room inspection.
- 3) Temporarily overconnect the final limits by placing jumper on LCEADON2 board XH1/1-5
- 4) Drive elevator UP until counterweight fully compresses buffer.
- 5) Drive elevator UP until either the ropes slip, or the motor stalls.
  - Hoist ropes must not go slack.
  - Must not lift elevator cab.

If additional boost is needed to slip traction, set UI menu 6-72-1.

- 6) Run elevator back to floor level.
- 7) Remove jumper on LCEADON2 board XH1/1-5.
- 8) Run and test elevator.

### Traction test: counterweight

- 1) From machine room, drive car to bottom floor.
- 2) Put car on machine room inspection.
- 3) Temporarily overconnect the final limits by placing jumper on XH1/1-5 on LCEADON2 board.
- 4) Drive elevator DOWN until car fully compresses buffer.
- 5) Drive elevator DOWN until either the ropes slip, or the motor stalls.
  - Hoist ropes must not go slack.
  - Must not lift counterweight.

If additional boost is needed to slip traction, set UI menu 6-72-2.

- 6) Run elevator back to floor level.
- 7) Remove jumper from XH1/1-5 on LCEADON2 board.
- 8) Run and test elevator.

### 8.6.4.20.11: EMERGENCY BRAKE

#### Category 5 testing of emergency brake

- 1) Elevator should be on inspection and at bottom floor.
- 2) Connect electric brake release box to the main brake. Electric brake release box will be used to open main brake.

**If equipped with EBR:** SWM key switch will be used to open main brake.

**Note:** Open C01 connector and turn on UPS power to enable EBR.

- 3) Power the controller.
- 4) From controller, stand positioned to observe movement of car (hoist ropes, drive sheave, cab) and open main brake using either the electric brake release box or EBR. A successful test is when the elevator does not move.
  - Main brake should open and car should not move.
  - If car cannot hold 125% load with emergency brake, brake must be checked and made to hold 125% load before performing any further tests.
- 5) If emergency brake passes check, return connections to original state.

### ***Approvals and version history***

Compiled by: Sheila McIntosh/Learning Management & Performance Development

Checked by: Dick Morrical/Service Development and Support

Approved by: Jay Dietz/Senior Vice President - Service

Issue	Date	Description of change	Ref CR	Approved by
-	2014-12-15	First issue		Jay Dietz