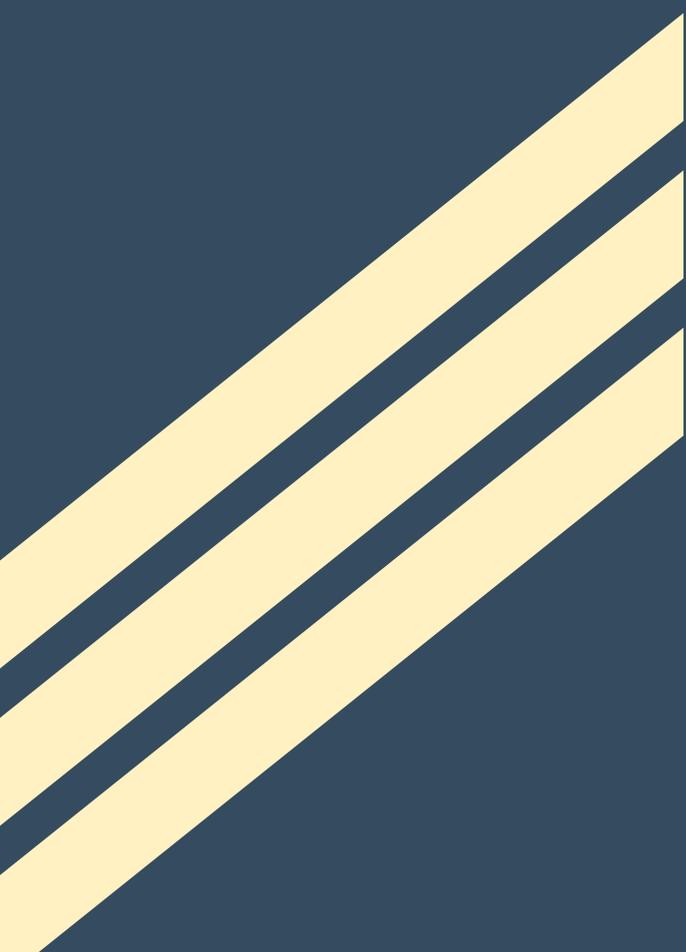


GOOD PRACTICES GUIDE FOR LIFT OWNERS





GOOD PRACTICES GUIDE

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▶ INTRODUCTION

Singapore is a densely populated country with many high-rise buildings. There are currently about 70,000¹ lifts in Singapore, and this number will continue to increase as vertical transportation equipment, such as lifts, have become essential to modern living.

The Building and Construction Authority (BCA), in close collaboration with industry stakeholders, regularly reviews the regulatory regime to ensure that it remains relevant and effective. Lift safety is a shared responsibility, and as an owner, you play an important role in ensuring that your lifts are well-maintained and comply with the regulations.



This guide identifies good practices in procuring, operating and maintaining lifts, so that you can make informed decisions and take necessary actions towards ensuring the safety of your lifts.

¹ Numbers are correct as of June 2019.

DISCLAIMER

This guide has been prepared by the BCA to provide practical information on the various best practices related to procuring, operating and maintaining lifts.

This guide does not provide:

- a legal interpretation of provisions in the Building Control Act (Cap. 29), Building Control Regulations 2003 and/or Building Maintenance and Strata Management (Lift, Escalator and Building Maintenance) Regulations 2016; and
- a substitute for independent legal advice.

Readers should seek independent legal advice with respect to any particular legal matter. The information presented in this guide is correct at point of publishing and the Commissioner of Buildings, BCA or any agency stated in this guide will not be responsible for any inaccurate or incomplete information in this guide or any reliance on or misinterpretation of any information contained in this guide by any party.

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Important Notice: The information provided in this guide is not intended to constitute legal advice.

A RESPONSIBLE LIFT OWNER

What Are the Good Habits of a Responsible Lift Owner?

You should ensure that...

- Every lift under your charge has a valid Permit-to-Operate (PTO) displayed within the lift car
- Every lift under your charge is regularly maintained by a registered lift service contractor according to the frequency required by law



Figure 1: Duties of Lift Owners

WHAT SHOULD I TAKE NOTE OF?

All new lifts must meet the requirements stipulated in the prevailing standards as prescribed under the Building Control Act. If you are carrying out major alteration or replacement works for any of your lifts, the works must also comply with the Building Maintenance and Strata Management (Lift, Escalator and Building Maintenance) Regulations 2016 ("BMSM Regulations") as well as the relevant parts of the prevailing standard.

In addition, your lifts must also comply with other required codes and regulations, such as but not limited to the following:

- BCA's "Code on Accessibility in the Built Environment" (if it is a publicly accessible lift)
- Latest Fire Code requirement from Singapore Civil Defence Force (SCDF)

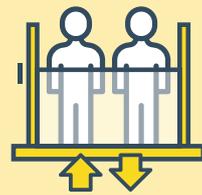
With effect from 1 July 2021, SS550:2020 will replace SS550:2009 as the acceptable solution in BCA's Approved Document for the design and installation of lifts under the Building Control Regulations. Projects whose first set of plans (either building plans or structural plans, whichever is earlier) is submitted to the Commissioner of Building Control for approval under the Building Control Act on or after 1 July 2021 must ensure that the lifts in the project are designed and installed in accordance with the relevant requirements in SS550:2020.

Here are the prescribed prevailing standards and earlier standards under the Building Control Act:



Passenger Lifts: Prevailing Standard – SS550:2020

Earlier Standards –
SS550:2009,
SS CP2:2000,
SS CP2: 1979



Vertical Platform Lifts: Prevailing Standards – EN-81-41:2010 and ASME 18.1-2014

Earlier Standards –
Directive 2006/42/EC,
Directive 98/37/EC,
Directive 89/392/EEC,
Directive 93/44/EEC



Stairlifts: Prevailing Standards – EN 81- 40:2008 and ASME 18.1-2014

Earlier Standards –
Directive 2006/42/EC,
Directive 98/37/EC,
Directive 89/392/EEC,
Directive 93/44/EEC



Home Lifts: Prevailing Standard – SS550:2020

Earlier Standards –
SS550:2009,
SS CP2:2000,
SS CP2: 1979,
Directive 2006/42/EC,
Directive 98/37/EC,
Directive 89/392/EEC,
Directive 93/44/EEC

I AM GETTING A NEW LIFT, WHAT SHOULD I CONSIDER?

What Good Practices Should I Adopt When I Procure a New Lift?

Adopting good practices will...

- Reduce downstream lift breakdowns
- Allow for better planning and forecasting of maintenance schedules

PRE-QUALIFICATION

This is a two-step process generally carried out for larger projects. It will give you assurance that the contractors tendering for the job have the necessary experience and financial capability to carry out the job and deliver quality products that comply with the specifications, on time and on budget.

You should:

1. Invite potential contractors (tenderers) to submit information and documentation supporting the following:
 - **Qualifications** — Competency of technicians, supervisors and engineers
 - **Experience** — Track records and years of service of technicians, supervisors and engineers
 - **Financial Status**
2. Check documents and assign a score to each prospective tenderer based on their submissions. Those who score above a pre-determined point will be shortlisted to tender for the project.

TENDER EVALUATION

When choosing a contractor for the installation of your new lift, in addition to considering the cost criteria, you should also evaluate the tender based upon a weighted set of criteria such as **Performance, Reliability** and **Track Records**;

and allocate the score weightage based on how critical each criterion is to your needs.

The contractor should be able to fulfill the following evaluation requirements:

Performance

- ▶ Demonstrate necessary **technical knowledge** on installation, operation and maintenance of equipment
- ▶ Have the necessary **technical capability**, or **technical support** from the Original Equipment Manufacturer (OEM), to troubleshoot more complex problems



Reliability

- ▶ **Provide records** such as monthly fault rate and breakdown rate of the contractor's past contracts
- ▶ Review and consider **reliability of the equipment's main components**



Track Records

- ▶ **Provide track records on having installed lifts of similar make**, ISO and safety certifications, and insurance, among others.



OBTAINING A PERMIT-TO-OPERATE (PTO)

Once your new lift has been fully installed on site, you should have the following items, endorsed by the Professional Engineer (PE) (Mechanical or Electrical Engineering) supervising the installation works:

- A copy of the lift location plan
- Certificate of Supervision of Installation of Lift(s) (CSC04)

You should also carry out the following steps to obtain a PTO for your new lift:

- Engage a registered lift service contractor to carry out periodic maintenance and examination, inspection and testing of the lift, and a Specialist Professional Engineer (SPE) in the field of lift and escalator engineering to certify the lift.
- Log in to OPTO system to apply for a PTO. The application requires payment of a fee and inputs from the registered lift service contractor and SPE.
- Print out a copy of the PTO for each lift, and display it in a prominent position within the lift for operation.

You can find the step-by-step process flow chart in **Appendix D**.

Building and Construction Authority

 **PERMIT TO OPERATE**
BUILDING MAINTENANCE AND STRATA MANAGEMENT (LIFT, ESCALATOR AND BUILDING MAINTENANCE) REGULATIONS 2016 \ REGULATION 10

PTO-L-YY-000000

LIFT ID / LIFT NO.	
OWNER	
LOCATION OF LIFT	
SPECIALIST PROFESSIONAL ENGINEER (PE Reg. No.)	
DATE OF EXPIRY	

COMMISSIONER OF BUILDINGS

This is a computer generated print out.
No signature is required.

Scan to verify information or visit
www.bca.gov.sg/PTOEnquiry



Figure 2: Permit-to-Operate (PTO)

CHOOSING A SUITABLE MAINTENANCE CONTRACT

What Are the Different Types of Maintenance Contracts?

Maintenance services are generally classified into:

- **Comprehensive** maintenance contracts
- **Standard** maintenance contracts

COMPREHENSIVE MAINTENANCE CONTRACT

VS

STANDARD MAINTENANCE CONTRACT

Let's compare the two!

Pros

- For a fixed fee, this contract covers **servicing, maintenance, repairs** and **replacements** when required, within the lift's life expectancy or within the duration of the contract — excluding vandalism or parts that lift users have access to, such as buttons and lift interior.
- Lift service contractors offer different packages with different scopes of coverage, depending on your needs and budget.

Cons

- If there are no clear criteria, replacement of parts might be delayed due to cost cutting.

Pros

- Provides **standard checks** and **replacements of consumables**, such as lubrication oil.
- Much cheaper than a comprehensive maintenance contract.

Cons

- Replacement of worn out and defective parts will have additional cost to be borne by you.

MAINTENANCE CONTRACT EVALUATION

Upon deciding on the type of maintenance contract, you should evaluate the maintenance contract. Similar to the tender evaluation for new installations of lifts, the evaluation for maintenance contracts is based on **Performance, Reliability** and **Track Records**.

The contractor should be able to fulfill the following evaluation requirements:

Performance

- ▶ Demonstrate necessary **technical knowledge** on operation and maintenance of equipment
- ▶ Have the necessary **technical capability**, or **technical support** from the Original Equipment Manufacturer (OEM), to troubleshoot more complex problems
- ▶ Advise on **time required for performing periodic maintenance** and be capable of **dealing with emergencies** like mantrap and lift breakdowns*



Reliability

- ▶ **Submit breakdown and maintenance records** of similar lift models to demonstrate competency and capability in lift maintenance



Track Records

- ▶ Provide **track records** of having serviced lifts of similar make
- ▶ Provide **company details**, such as number of maintenance technicians per lift, current projects on hand, ISO and safety certifications, and insurance, among others



* You may also take other performance matrices into account, such as response time to incidents and breakdowns, and time taken to resolve them.

MAINTENANCE CONTROL PLAN

In the traditional model where repairs are only carried out when the lifts have broken down, the unavailability of replacement parts typically results in lengthy lift down time, while waiting for parts to be shipped from overseas. Furthermore, the breakdown of parts could also result in unsafe situations. To address the issue, it is strongly recommended for you and your lift service contractors to develop and agree to a Maintenance Control Plan (MCP).

A MCP is a schedule that clearly prescribes any major maintenance required, and replacement criteria for each component throughout the lifecycle of the lift. The replacement criteria for some components, such as the electronic parts, could be time-based while those for other components could be condition-based.

The MCP will provide more certainty to you and your lift service contractor when a lift component requires replacement. This could facilitate you to plan and budget for the cost of the replacement, and the contractor could ensure that the components are ready for the replacement. The MCP will be the document to refer to in the case of a dispute between you and your lift service contractor on part replacement.

OPERATING YOUR LIFT SAFELY

What Do I Need to Know About Lift Safety?

Ensure that...

- Systems and measures are put in place to enhance safe use of lifts and prevent user-related incidents
- Feedback on lift malfunctions is taken seriously, so that lift service contractors can investigate and rectify issues promptly

GOOD PRACTICES FOR LIFT SAFETY YOU CAN ALSO FOLLOW



Equipment

Conduct daily basic checks to ensure lifts function properly. **Appendix B** provides you with a checklist of items that you could use to check your own lifts.



Audible Warnings

Provide lift car audible warnings (such as buzzer) to remind passengers to keep their fingers away when the lift car doors are opening and closing.



Signage

Display BCA's "Safe Use of Lifts" poster within or outside the lifts (See **Appendix E**) to remind users of desired and undesired behaviours when using lifts.



CCTV

Install sufficient number of CCTVs to meet the following minimum specifications:

- a. Capacity to record 24 hours a day, 7 days a week;
- b. Capture the lift car, lift car door(s) and in-car floor indicator;
- c. Frame rate of at least 6 frames per second;
- d. Video resolution of at least 352 x 240 pixels or CIF CCTV resolution; and
- e. Storage of video footage of at least 30 days.

Video recording is mandatory for lifts installed in projects where the first set of plans (either building plans or structural plans, whichever is earlier) is submitted to the Commissioner of Building Control for approval on or after 1 December 2017.



Performance Gauge

Track and monitor equipment breakdown rates to gauge lift performance. If you notice degradation in the equipment performance, you may wish to investigate to identify root causes and review the current maintenance programme.



WHAT TO DO IF A LIFT BREAKS DOWN



If the lift stalls and someone is trapped in the lift, you should:

- a Inform the lift service contractor
- b Advise the trapped person to stay calm and wait for help

Do not pry open the lift doors or otherwise attempt to free the occupants from the trapped lift by yourself.

WHAT SHOULD I DO WHEN A LIFT INCIDENT OCCURS



As a lift owner, you should take all public feedback seriously and ensure the lift service contractors rectify any issues promptly.

When an incident involves death or injury, or if failure of safety critical components occurs², you should do the following:

- a Inform your lift service contractor to carry out rescue works, or contact the Singapore Civil Defence Force (SCDF) in the event that your lift service contractor is unable to perform the rescue.
- b Immediately shut down and cordon off the incident lift to preserve the incident site.
- c Call BCA's incident numbers (9088 7289 or 9782 7296) as soon as practicable to inform of the incident. Please note that these incident numbers should be **strictly used for incident reporting only**.
- d Follow up with a completed **incident report** and attach the report through the **BCA Feedback/Enquiry page** within 24 hours of the incident.

You may wish to refer to **Appendix C** for more information on incident reporting.

² The list of lift incidents that require informing can be found at <https://www1.bca.gov.sg/regulatory-info/lifts-escalators/lifts-and-escalators-legislation/incident-notification>

MAINTENANCE AND REPAIR OF LIFTS

Do You Know the Importance of Proper Lift Maintenance?

Poor maintenance leads to...	Proper maintenance leads to...
Less efficiently run systems	Increased lift availability during operational hours
Higher chances of breakdowns	Reduced interruption to business
Longer downtimes to rectify problems and bring systems back online	Good standing of lift owner within the community

WHAT ARE MY RESPONSIBILITIES AS A LIFT OWNER DURING MAINTENANCE?

As a lift owner, you have the responsibility of ensuring proper maintenance of your lifts by a registered lift service contractor. You should:



- Ensure lifts are kept in a **proper state of repair**, in **safe working order** and meet the **Maintenance Requirements** stipulated in the **BMSM Regulations 2016** (See **Appendix A**).



- Keep **proper maintenance records** in connection with the lift for a period of at least 5 years, which include all instances of **breakdowns and incidents**, with as much detail about the **factors, causes** and **operating state** of the equipment and passengers (if any) written within.



- Ensure **adequate placement of barriers, barricades and warning signs** when lifts are not operational, and **before and during maintenance works**.
- Provide **space on site for barricade storage**.*

* Take note that contractors should also ensure an adequate number of maintenance personnel on site, with proper Personal Protection Equipment (PPE) and tools issued to each personnel.

WHAT SHOULD I DO WHEN TAKING OVER AN EXISTING LIFT?

When taking over an existing installation, you should:



Engage a registered lift service contractor, in conjunction with a SPE, to survey and ascertain that equipment are **in compliance with the code and standards intended**, as well as other **shortcomings which may affect safe usage** of the equipment, such as wear and tear.



Consider **modernising** the lift based on BCA's recommendations (**Refer to Pg 18**) to meet the latest requirements. You will need to engage a registered lift service contractor if you wish to carry out such modernisation works.



Obtain all relevant **drawings, documentation** and **passwords** from the previous owner or contractor.



Access the **OPTO system** and **apply for a transfer of ownership** for all lifts that were taken over.

HOW FREQUENTLY SHOULD I MAINTAIN MY LIFTS?

You are required to engage registered lift service contractors to maintain your lifts, in accordance with the maintenance requirements set out in the **BMSM Regulations 2016**.

The lift service contractor must carry out the maintenance works at a frequency not less than the following:

Type of equipment	Frequency of periodic maintenance
Home lift, vertical platform lift or stairlift	Based on manufacturer's recommended frequency (where available); OR Once every 3 months (whichever is more frequent)
Any other lift	Based on manufacturer's recommended frequency (where available); OR Once every month (whichever is more frequent)

WHAT DOES MAJOR ALTERATION OR REPLACEMENT (A/R) WORK FOR LIFTS CONSIST OF AND WHAT SHOULD I DO?

Before any major A/R is carried out, you must **access the Online Permit to Operate (OPTO) system and notify the Commissioner of Buildings** of the major A/R works required.

As per Regulation 17(2) of the **BMSM Regulations 2016**, major A/R on a lift includes, but is not limited to, any of the following:

A

Changing, adding or removing any **safety device** of a lift

B

Changing the **mass of a lift car** (including lift car finishing)

C

Changing the **rated load or speed** of a lift

D

Changing the **travel distance** of a lift

E

Changing the **lift control operation** (including changing the software or type of driving machine or brakes)

F

Changing the **number, type or size of the hoisting ropes** supporting a lift car or its **counterweight**

G

Changing the **size of the guide rails** of a lift

H

Changing the **type of safety gear**

I

Changing the **lift landing and car door(s)**, lift car door drive and control

One-to-one replacements of parts with the same design and specification (e.g. arising from wear and tear) are not considered as major A/R work.

SAFE, SMART AND EFFICIENT LIFTS

Did you know that technological enhancements to lifts can bring about significant benefits, such as **time and cost savings**? Read on to find out more about these recent advances in lift technologies.

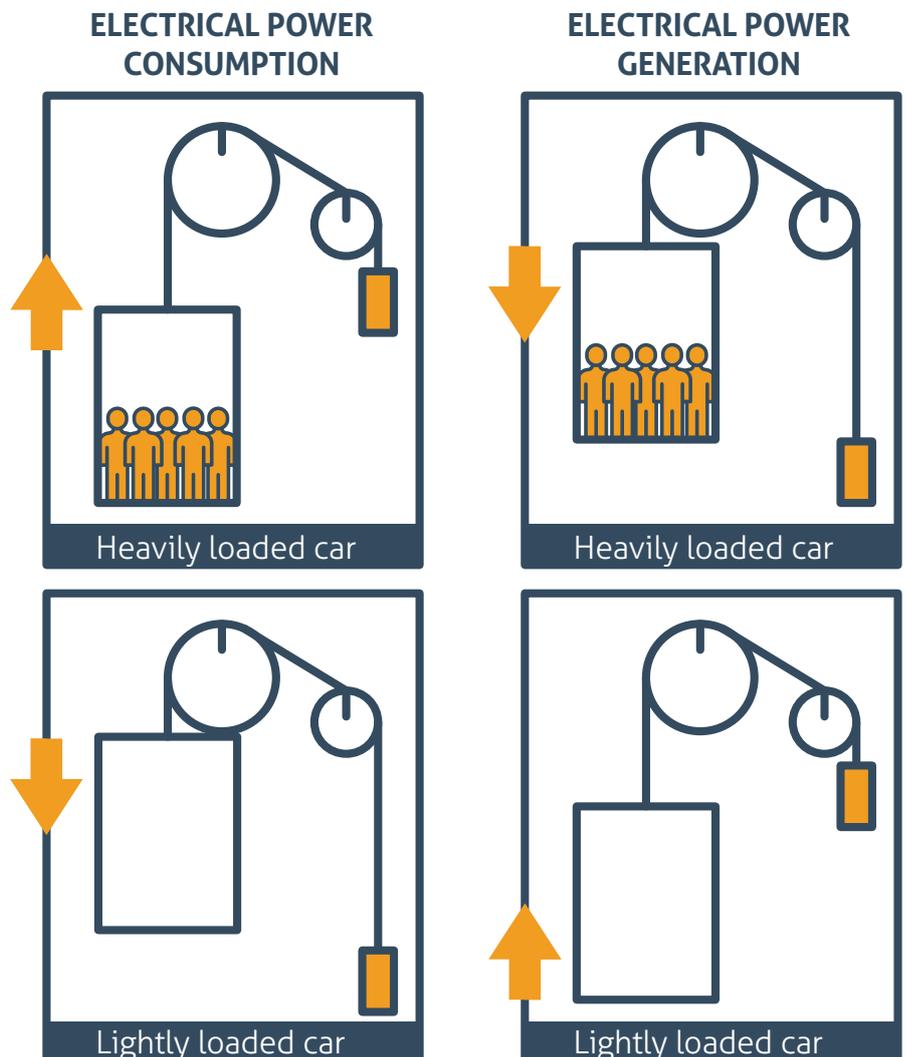
INTRODUCING ENERGY EFFICIENT LIFTS WITH REGENERATIVE DRIVE

A regenerative drive is a device which...

- Transmits power, which is distributed by a traction elevator
- Allows transmitted power to be reused by the building's power supply for other systems
- Saves up to 30% energy, compared to lifts without the device

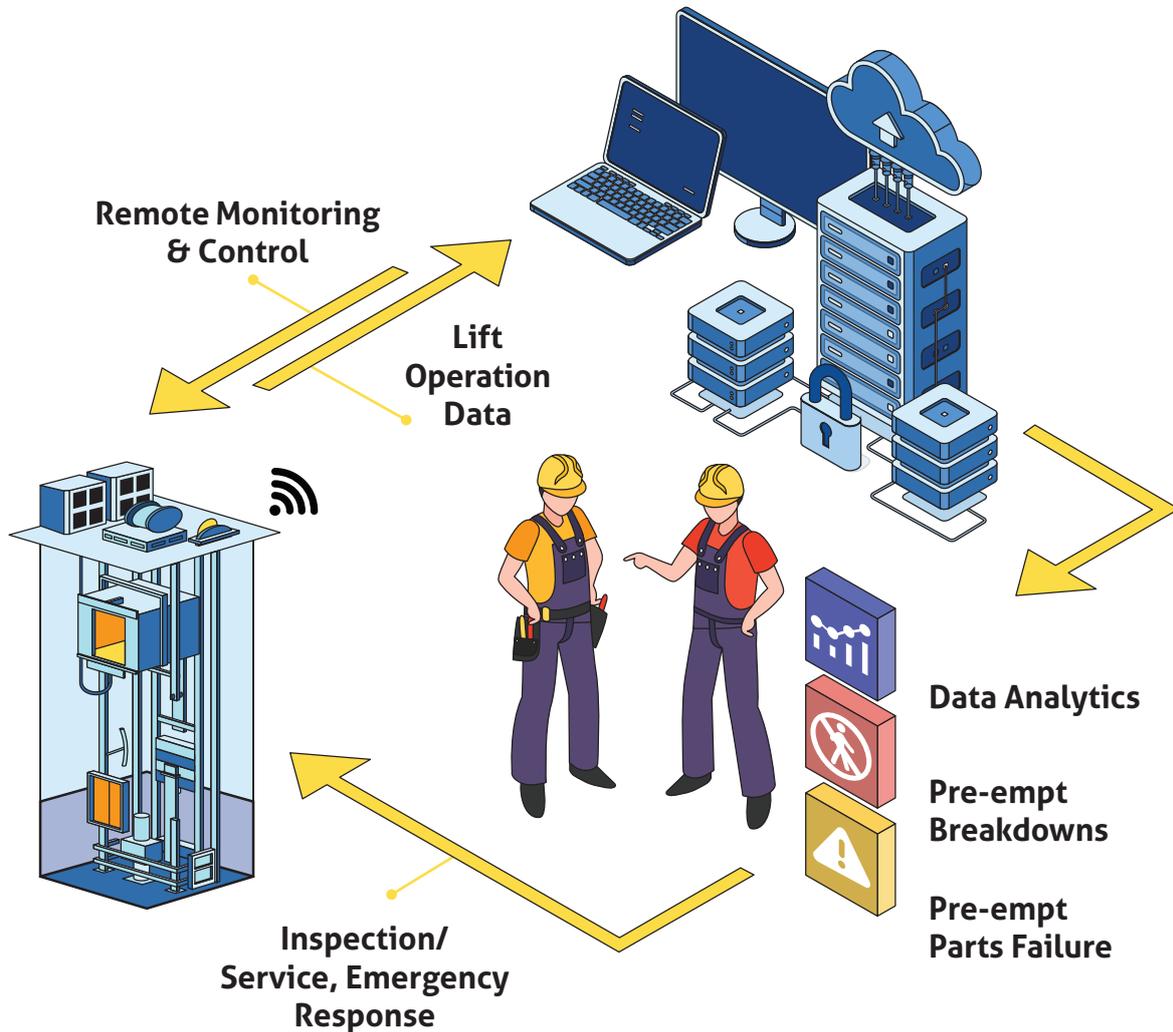
HOW DO REGENERATIVE DRIVES WORK?

- Traction drive machines with regenerative drive function as power generators
- Energy is generated when:
 - a) Lift travels down with a heavy car load
 - b) Lift travels up with a light car load
- Energy is transmitted to a power distributor by a regenerative converter
- Power distribution converter feeds energy back to the building's electrical network



INTRODUCING REMOTE MONITORING AND DIAGNOSTICS (RM&D)

The possibility of remote monitoring and diagnostics for lifts is quickly becoming a reality, and may be widely adopted in the near future. Speak to your lift maintenance contractors to evaluate how your existing lifts may tap on this new technology.



Benefits

Remote monitoring and diagnostics allows you to...



Predictive Maintenance

- Analyse and anticipate when lift components might fail and replace them before they do, with the help of a lift contractor



Real-Time Information

- Know your lift status and performance at all times



Better Reliability and Uptime

- Ensure unforeseen breakdowns happen less frequently, which decreases the number of mantrap cases
- Technicians will also be able to quickly identify problems during breakdowns and bring the lift back into operation within a shorter time

Information Monitored

Remote monitoring typically monitors information such as:

- **Lift movement**
- **Position**
- **Car and landing calls**
- **Lift status**
- **Door motion**
- **Lift faults**

More sophisticated systems allow you to obtain information such as the **total hours of maintenance per unit, total cumulative breakdowns, total cumulative repair hours and failure rates**, which can enable identification and possible correlations of problems.

MODERNISE YOUR LIFTS

Modernisation is the process of upgrading certain parts of a lift so that it is able to utilise newer technology, increasing efficiency and user safety. In certain cases, you may also wish to consider a complete overhaul of your lift.

Why Modernise?

If your lift is old, it could result in...



Deterioration of Performance



Difficulty in obtaining parts or obsolete parts



Longer lead time for replacement parts



Costlier maintenance

WHAT NEEDS TO BE MODERNISED?

Replace or upgrade safety critical components such as...

- **Controller equipment**
- **Hoist machines**
- **Electrical wiring**
- **Governor systems**
- **Additional safety features (up to par with current Codes and Standards)**

New lift components and parts which require less maintenance needs are also highly encouraged, to reduce maintenance burden. Please refer to **Appendix G** for the list of Lift Parts with Less Maintenance Needs.

Due to constraints such as site condition and equipment incompatibility, you should **engage a consultant or a registered lift service contractor to conduct a feasibility study** of the existing installation and conditions before modernising your lift. You should also consider factors such as **space availability, technical feasibility and cost implications**.

WHICH OF MY LIFTS SHOULD I MODERNISE?

Older lifts (more than 15 years) are highly recommended to be considered for modernisation. You should include the following eight (8) items, which are not found in older lifts, based on the advisory issued by BCA on 3 October 2016 (Refer to **Appendix F**).

1

Ascending Car Overspeed Protection (ACOP)

Stops the lift car in the event of uncontrolled upwards overspeeding

2

Unintended Car Movement Protection (UCMP)

Arrests unintended movement of the lift car away from the landing zone, which prevents passengers from getting hurt while entering or exiting the lift car

3

Slacken Governor Rope Electrical Safety Device

Monitors the status of the governor rope — if the rope slackens beyond its allowable limits, it will initiate a stop of the lift car movement

4

Light Curtains as a Door Protective Device, with Its Nudging Mode De-Activated

Allows lift doors to reopen when an obstruction is detected in between, without touching the obstruction

5

Electrical Safety Interlocking for Multi-Panel Door

Ensures that multi-paneled lift cars can move only if all panels have been fully closed

6

Car Apron

Prevents passengers from falling into the lift pit during emergency evacuation, when the car has stopped above the lift landing

7

Telephone, Intercom System or Other Communication Device

Enables notification or direct communication with personnel who can activate an emergency response, allowing them to ascertain condition of passengers and provide reassurance

8

Automatic Rescue Device (ARD)

Enables the lift to automatically move to the nearest floor and allow trapped passengers to exit the lift, in the event of power failure

APPENDIX A

Sample Monthly Maintenance Checklist



Lift Monthly Maintenance Checklist

Location: _____ Date: _____

Checked by: _____ Lift No.: _____ [] Passenger / Service Lift
 _____ [] Goods Lift

Lift Checklist

1. "Door open" button functional at all times while doors are open at landing level.
2. Door protective devices (such as mechanical safety edge/ light curtain) reopen doors when activated.
3. Lift car doors and lift landing doors:
 - a) Lift car movement must only be allowed when lift car doors are closed and landing doors are closed and locked, and the allowable clearances for the gaps should not be more than:

Additionally, the lift car should not move, or should cease movement if an obstruction of 25mm or more is between the lift car door panels. For entrance heights more than 2.1m, the obstruction size can be increased by 3mm for every 0.5m increment in height.

Location of gap	Allowable clearance (mm)
Between lift car door panels	≤12
Between landing door panels	≤10
Between lift car door panel and lintel, jamb and sill	≤10
Between panels for multi-panel doors	≤10

- b) There must be no signs of excessive wear and tear of lift car doors and lift landing doors, inclusive of their components.
4. Lift car emergency alarm, when pressed, must be audible from outside the lift well and the designated floor as defined in the standard that the lift was designed to.
5. Lift car intercom, if available, must function as intended.
6. A light, fan, alarm and intercom for the lift car must be functional when the normal power supply is disrupted.
7. Abnormal sounds or vibrations must not occur during any lift car movement.
8. Machinery, machinery space, lift pit, hoistway and lift car top must be kept clean, tidy and free from discarded items and debris.
9. Lift machine must be sufficiently lubricated and securely mounted with no oil leakage.
10. Brakes must not be contaminated with any oil or grease, and when activated, must cause the lift car to slow down, stop and stay at stopping position.

11. Overspeed governor must function as intended and be able to activate the lift safety gears at all times when the lift is in operation.
12. All ropes must not show any sign of excessive wear and tear. The main rope must be properly and equally tensioned.
13. The compensation rope and compensation rope sheave tie-down must be properly tensioned and guided at all times, in accordance with the manufacturer's recommendations.
14. For oil buffers, there must be sufficient oil in the buffer — as indicated by the oil level gauge — in accordance with the manufacturer's recommendations. Buffer must provide effective cushioning upon impact to protect passengers in lift car at all times when lift is in operation.
15. Safety gear and safety switches must be maintained and function as intended at all times when lift is in operation.
16. Lift car and counterweight must be guided by guide shoes or rollers at all times and must not cause wear and tear of guide rails.
17. The level of corrosion and wear and tear of all parts of lift must not affect the safe operation of the lift.
18. The stopping accuracy of the lift car floor must be ±10mm from the intended landing floor.
19. Lift car false ceiling (if any) must be fully secured and fastened to the car frame.
20. Ground and earth of controller, electrical systems and circuit boards must be firmly secured and controller must initiate immediate stopping of lift car and prevent lift movement under any condition that is unsafe.
21. Safety switches must function as intended at all times when lift is in operation.
22. Controller, electronic and electrical systems, wirings and circuit boards must be free from defects and function at all times when lift is in operation.
23. Wirings in controller, electronic and electrical systems must be free from defects.
24. Carbon brush length must be within the tolerance recommended by the manufacturer and insulation at carbon brush holder must not show any carbon particle build-up which may cause flash-over and burning and commutator must be free from any foreign deposit and must not cause any sparking when in operation.

APPENDIX B

Sample Owner's Daily Operations Checklist



Lift Daily Checklist

Location: _____ Date: _____

Checked by: _____ Lift No.: _____

Type of Unit

[] Passenger / Service Lift [] Goods Lift

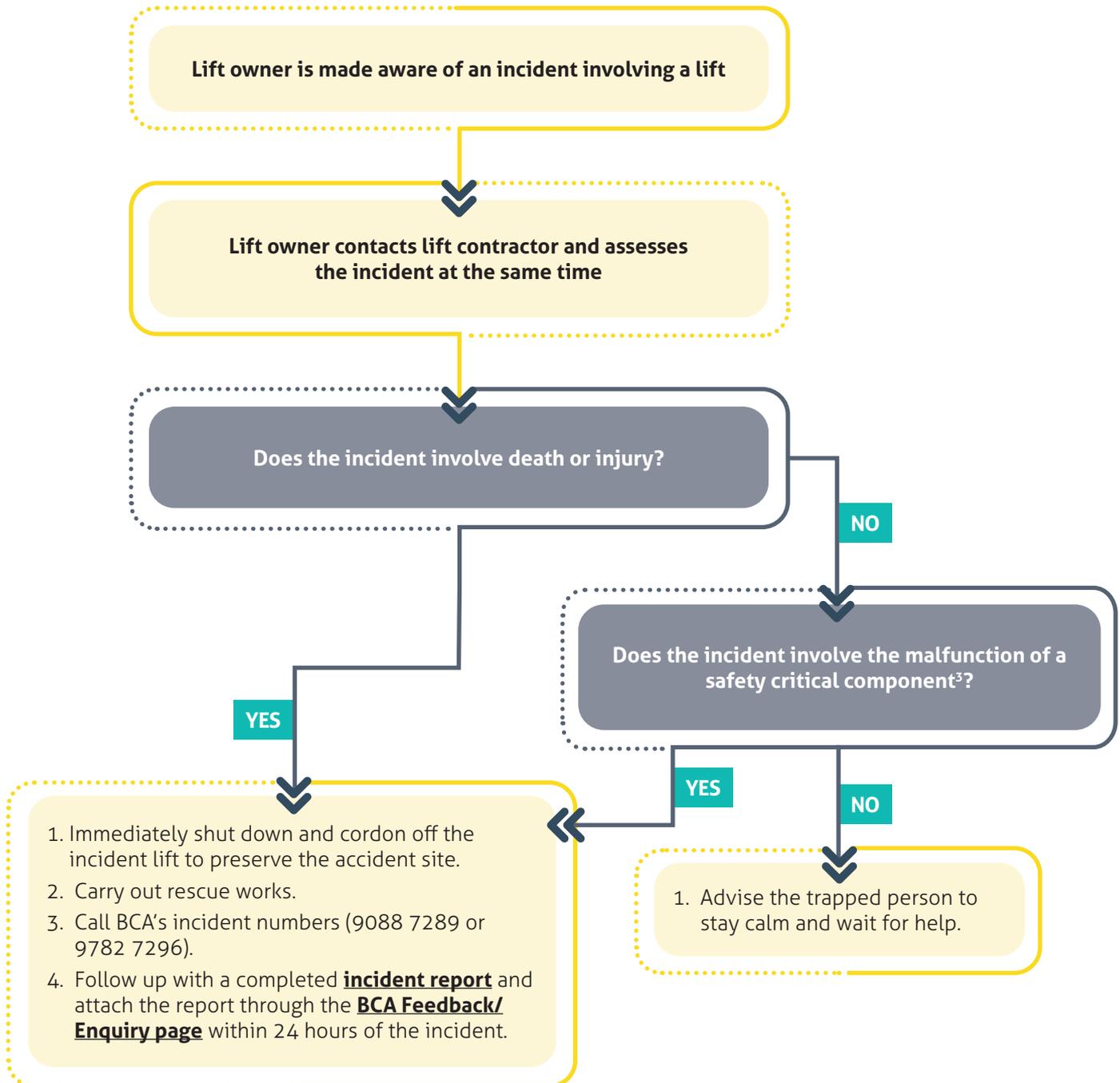
Lift Checklist

1. Are the doors secured at each level? Are there any openings?
2. Are car(s) level within 10mm (+/-) at each level?
3. Does the mechanical safety edge and/or light curtain function properly?
4. Does the car door open between floors?
5. Is the car roof hatch secured against unauthorised opening from within the car?
6. Are the alarm bell and emergency intercom operational?
7. Is the Permit-to-Operate (PTO) shown clearly in the car?
8. Are proper warnings shown in all lifts (eg. "Maximum load" of number of persons and/or weight)?
9. Is the lift clean and free of debris?

Comments:

APPENDIX C

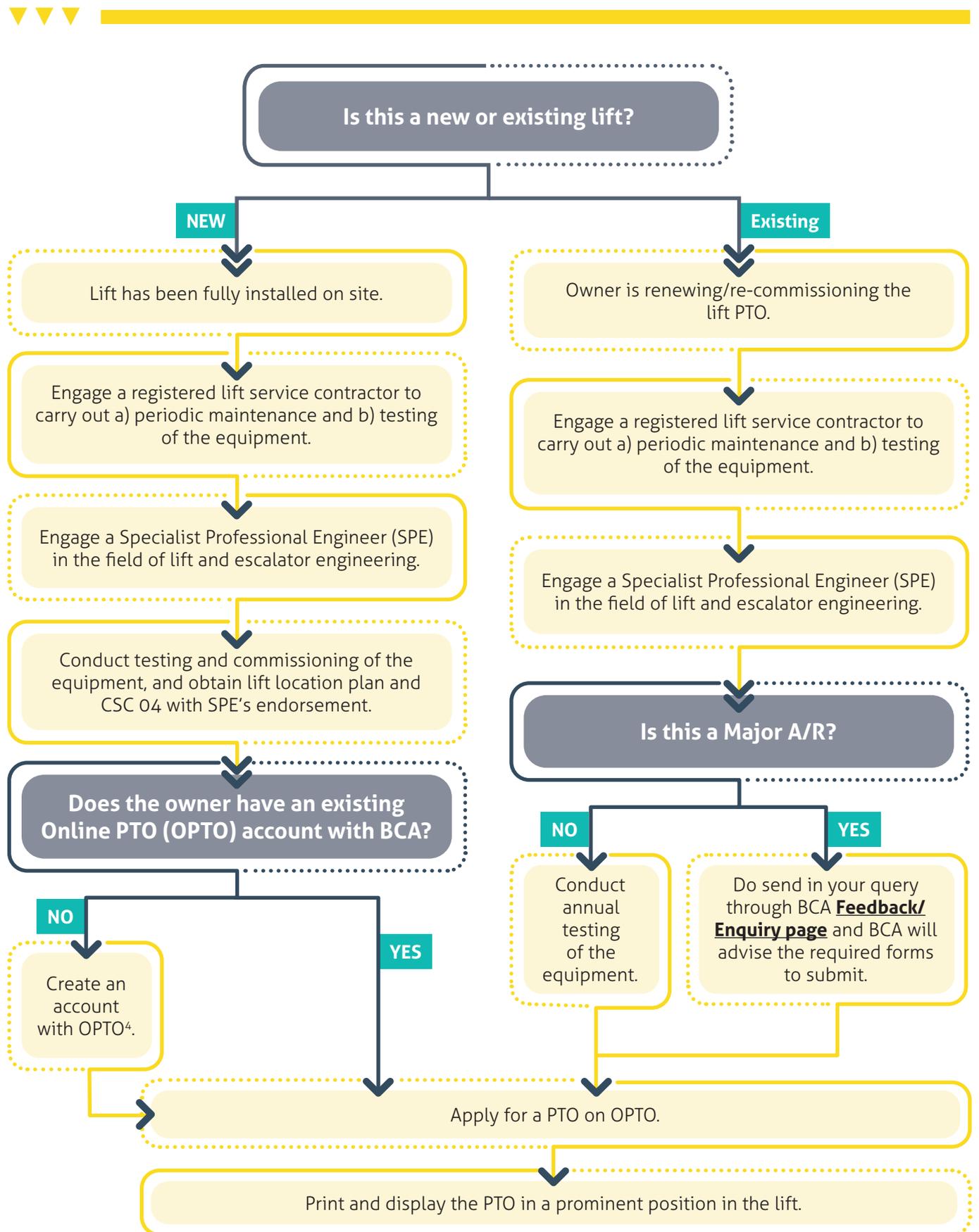
What to Do During a Lift Incident



³ The list of safety critical components that require informing can be found at: <https://www1.bca.gov.sg/regulatory-info/lifts-escalators/lifts-and-escalators-legislation/incident-notification>

APPENDIX D

How to Apply for a Permit-to-Operate (PTO)



⁴ Details on how to create an account and use the OPTO system can be found at: <https://eservices.bca.gov.sg/Onlinepto/UserGuide.pdf>

APPENDIX E

BCA's Poster on Safe Use of Lifts

SAFE USE OF LIFTS

Observe these dos and don'ts when using lifts.

If the lift stalls, press the alarm and wait for rescue.

Supervise young children.

Do not use body parts to stop lift doors from closing.

Stay away from lift doors as thin objects like loose clothing and straps can get caught.

Brought to you by:
Building and Construction Authority

APPENDIX F

BCA's Advisory on the Modernisation of Existing Lifts to Enhance Reliability and Performance



We shape a **safe**, **high quality**, **sustainable** and **friendly** built environment.

Our Ref : APPBMSMA-2016-04

Building Plan & Management Group

03 Oct 2016

See distribution

Dear Sir/Madam

ADVISORY ON THE MODERNISATION OF EXISTING LIFTS TO ENHANCE RELIABILITY AND PERFORMANCE

Aim

This advisory seeks to encourage all lift owners to consider modernising existing lifts to enhance their reliability and performance. Existing lifts refer to electric passenger and goods lifts which were installed based on the prevailing standards¹ at the time of building plans submission and approval.

Modernisation of existing lifts

2 Due to technology advancements and revisions in standards and codes over the years, older existing lifts may not be installed with the latest features which are found in newer lifts. While existing lifts, with proper use, regular maintenance and inspections, are safe for operation, they can be further enhanced to make them on par with the newer lifts.

List of proposed items for modernisation

3 To modernize older lifts, BCA has reviewed the new technologies available for enhanced safety, reliability and performance, and recommends a list of 8 items for the modernisation of existing lifts in Singapore. The 8 proposed items (see [Annex A](#)) are based on BCA's earlier consultation with the industry, and benchmarked against the Safety Norms for Existing Lifts (SNEL) implemented by the European countries. BCA also took into consideration the observations from lift inspections conducted by our officers over a period of time.

4 The recommendations were shared with and supported by both local and international experts at BCA's recent inaugural International Panel of Experts (IPE) meeting on Lifts and Escalators.

¹ Singapore Standard CP2 or SS550 (Singapore Standard Code of Practice for the Installation, Operation and Maintenance of Electric Passenger and Goods Lifts)

APPENDIX G

Lift Parts with Less Maintenance Needs

S/ No	Existing lift components	Alternatives to existing lift components	Improvement/Advantages
1	Hydraulic Lift	Traction MRL Lift	a) Environmentally friendly (less heat generated, lower noise, lower energy consumption) b) Ease of maintenance
2	AC1, AC2 Lift Relay Logic Controller	PCB based controller E.g. Variable Voltage Variable Frequency (VVVF) Lift Controller with newer technology	a) Reduces number of electrical components b) Elimination of Floor Selector and selector tape - More reliable - Ease of maintenance - Better landing accuracy - Better ride comfort c) Environmentally friendly (less heat generated, lower noise, lower energy consumption)
3	ACVV Lift Controller	VVVF Lift Controller with latest technology	Improves ride quality and levelling accuracy
4	Traction Machine with Gear Box	Permanent Magnet Synchronous Motor (PMSM) Machine	a) No gear box oil to check/top up b) No oil leaking from the gear box - Fewer parts to maintain - Ease of maintenance c) Environmentally friendly (less heat and noise generated)
5	EBOPS/ARD non-maintenance free batteries (e.g. Plante, Nickel-Cadmium)	EBOPS/ARD with maintenance free batteries	Does not require top up of battery water
6	Bulb type Indicator	LED/LCD Indicator	a) Maintenance free b) Energy saving
7	Bulb type Button	LED Button	a) Maintenance free b) Energy saving
8	Door motor with cam switch	Door motor with PCB Door Controller and door position sensors	a) Reduces number of components (switches) that require adjustment b) Reduces wear and tear parts (uses sensor instead of cam switch)
9	Car cage with Fluorescent lighting	Use LED Tube or Bulb	Energy saving
10	Car top lighting with Fluorescent lighting	Use LED Tube or Bulb	Energy saving

The list of Lift Parts with Less Maintenance Needs is meant to serve as a guide for lift owners. When considering the alternatives to existing lift components in the list, it may require one or more components in the existing lift system to be changed. Actual improvements/advantages after switching to the alternatives will vary from different suppliers. Lift owners are encouraged to discuss with their lift suppliers and/or lift service contractors on the actual benefits, performance, reliability, cost, timeline, etc.

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Glossary

1. **Apron** – Smooth vertical part extending downwards from the sill of the landing or car entrance.
2. **Automatic Rescue Device (ARD)** – A battery-operated device which will bring the lift to the nearest landing and open both the lift landing and car doors in the event of power failure.
3. **Buffer** – Resilient stop at the end of travel, and comprising a means of braking using fluids or springs (or other similar means). Generally, there are two types of buffers, namely, energy accumulation type (e.g. using springs) and energy dissipation type (e.g. using fluids).
4. **Car** – The load-carrying unit including its platform, car frame, enclosure and car door or gate.
5. **Counterweight** – A weight or series of weights to counter-balance the weight of the lift car and part of the rated load.
6. **Door, car or landing** – The moveable portion(s) of the car or lift well entrance which close the opening, providing access to the car or landing. It consists of one or more panels, which may be equipped with a vision panel.
7. **Guide rails** – Rigid components which provide guiding for the car and the counterweight.
8. **Lift Machine** – Unit including the motor which drives and stops the lift.
9. **Overspeed Governor** – Device which, when the lift attains a predetermined speed, causes the lift to stop, and if necessary causes the safety gear to be applied.
10. **Rated Load (Capacity)** – The load for which the equipment has been built.
11. **Rated Speed** – The speed of the car for which the equipment has been built.
12. **Rope, Hoisting (Suspension)** – Wire rope used to raise and lower a lift car or its counterweight or both.
13. **Safety Gear** – A mechanical device for stopping, and maintaining stationary on the guide rails, the lift car or counterweight in case of overspeeding or breaking of suspension.
14. **Travel** – The distance between the bottom and top lift landings served.