

Common Findings from Lift and Escalator Inspections and Incidents



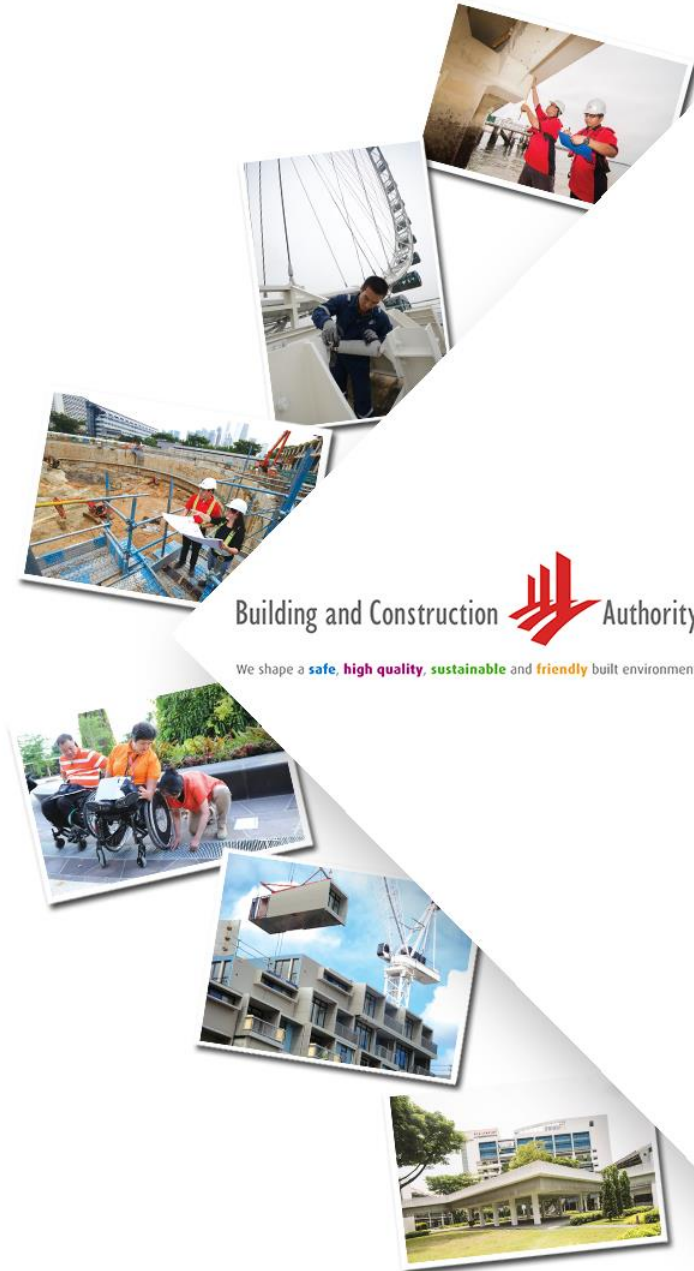
Presented by :

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Senior Engineer

Investigation and Enforcement Department

No. of Slides: 32

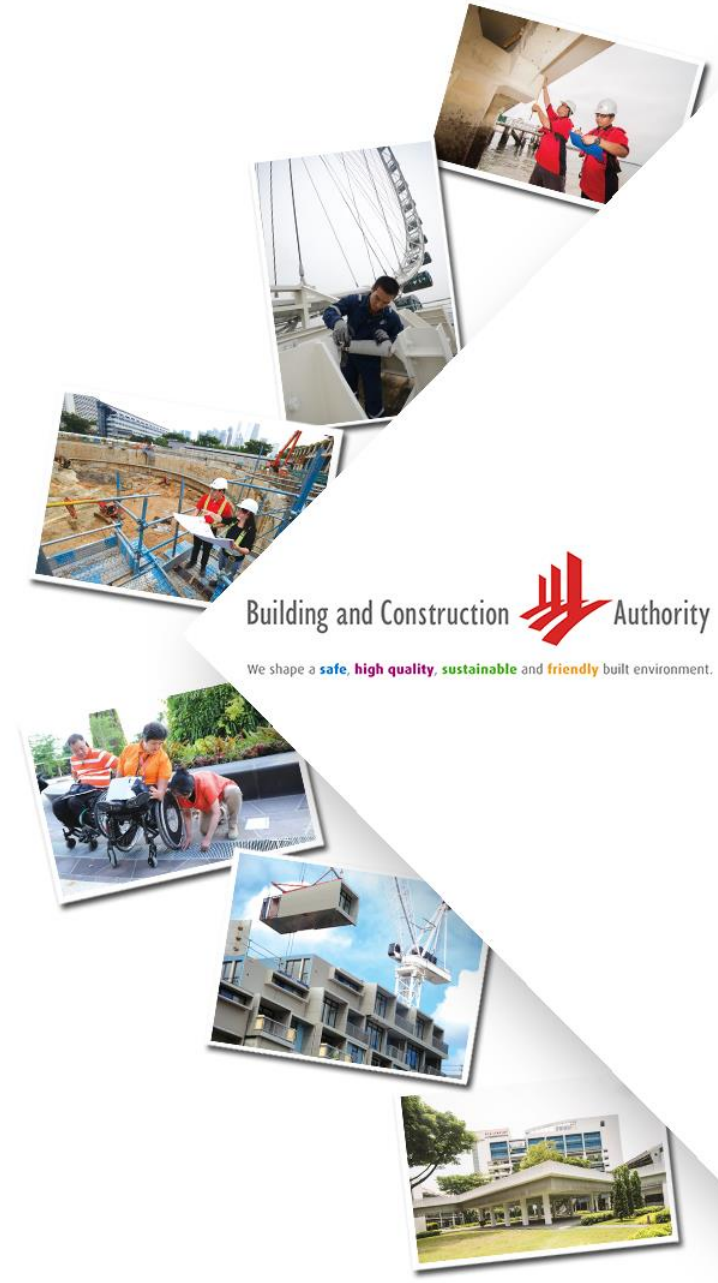


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2. 2019 Non-Compliance (NC) on Lift audits
3. 2019 Lift and Escalator incident finding



2019 Common Findings from Lift Inspections



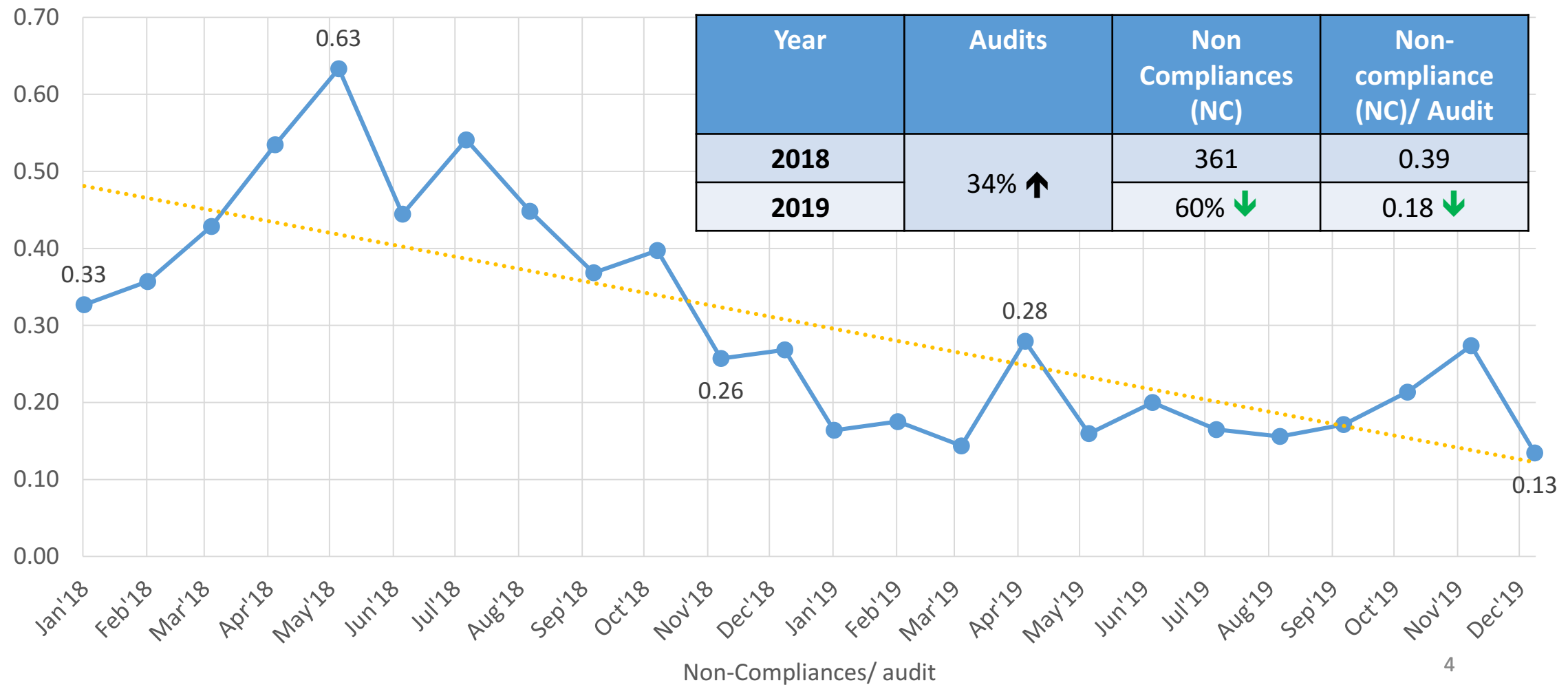
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2018 ~ 2019 Lift Industry Performance



NC/Audit

2018 ~ 2019 Industry Performance Trend



BMSM Regs 2016 - Maintenance Outcome (MO) under Part 1 of First Schedule



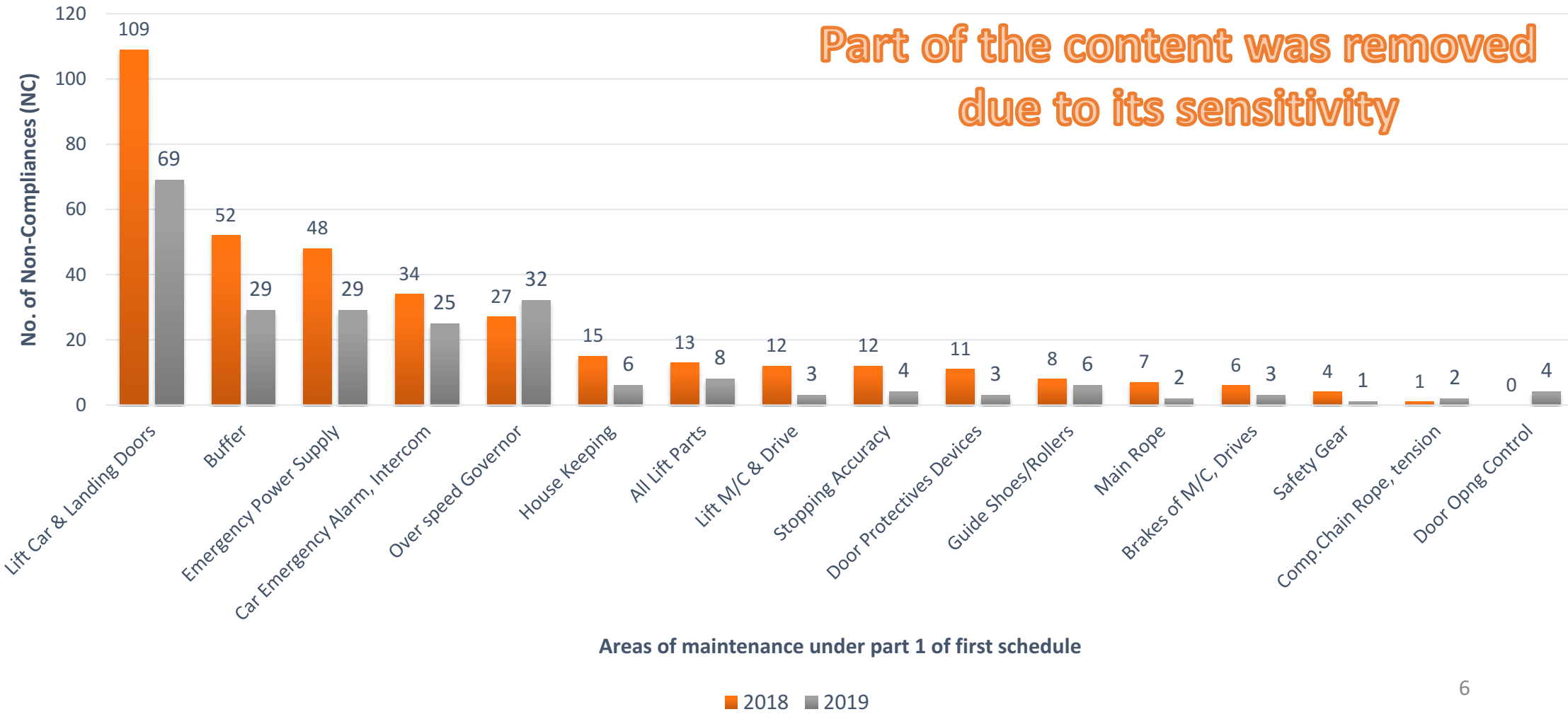
MO	Part 1 of first schedule -Maintenance Outcome	MO	Part 1 of first schedule -Maintenance Outcome
1.	Door open control	11.	Direct current machine
2.	Door protective Devices	12.	Overspeed governor
3.	Lift car doors and lift landing doors	13.	Main rope and compensation rope
4.	Lift car emergency Alarm	14.	Compensation rope and compensation rope sheave tie-down and tensioning
5.	Lift car intercom	15.	Buffer
6.	Emergency power supply for lift car lighting and Ventilation	16.	Controller and electrical system
7.	Movement of lift car	17.	Guide shoes or rollers of lift car and counterweight
8.	Housekeeping	18.	Safety gear
9.	Lift machine and drive (including motor, gear box, drive sheave and motor generator set)	19.	All lift parts
10.	Brakes of lift machine and drive	20.	Stopping or level accuracy

2019 Non-Compliances (NC) on Lift audits



BMSM, Maintenance Outcome (MO)

Part of the content was removed due to its sensitivity



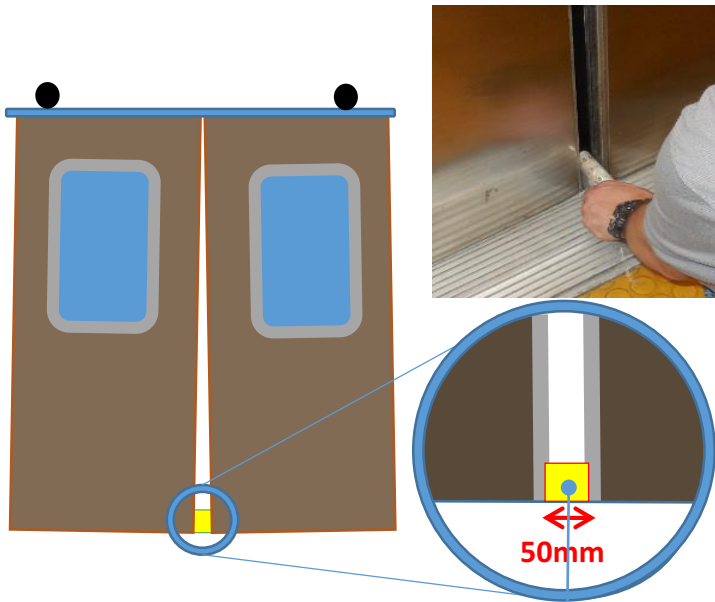
Areas of maintenance under part 1 of first schedule

MO 3. Lift car doors and lift landing doors

7%

High Risk

Lift car move with $\geq 50\text{mm}$ obstruction

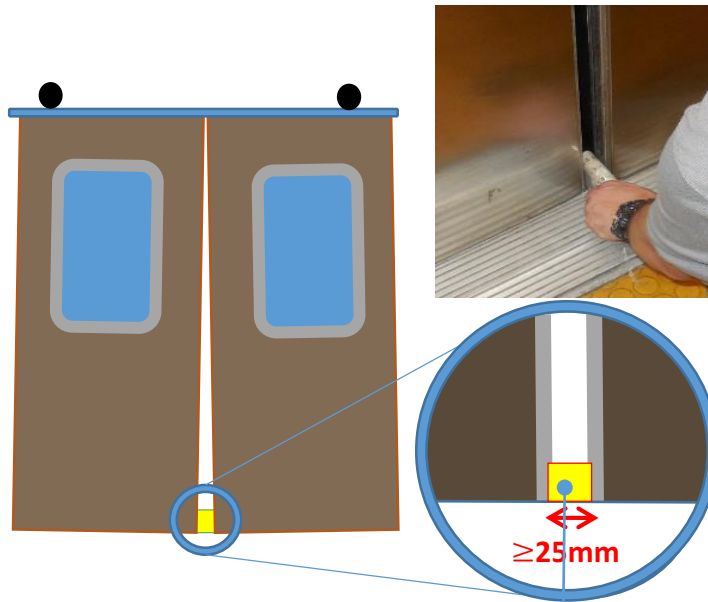


50mm gauge inserted between Car Doors, on top of Car Sill & Lift Car must not move.

63%

Medium Risk

Lift car move with $\geq 25\text{mm}$ obstruction

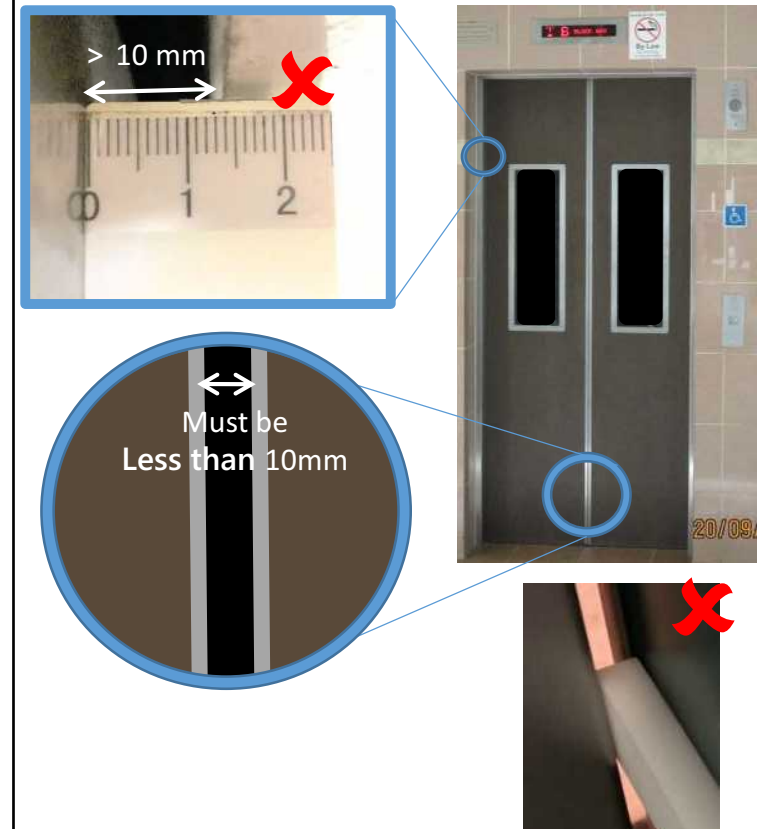


25mm gauge inserted between Car Doors, on top of Car Sill & Lift Car must not move.

30%

Low Risk

Car or Landing door gap $> 10\text{mm}$



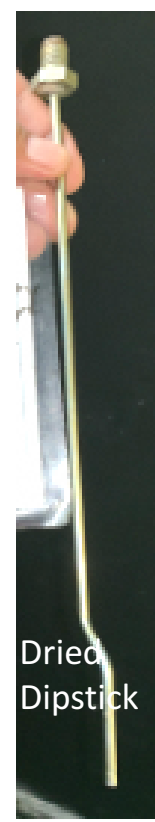
Restricted

MO 15. Buffers



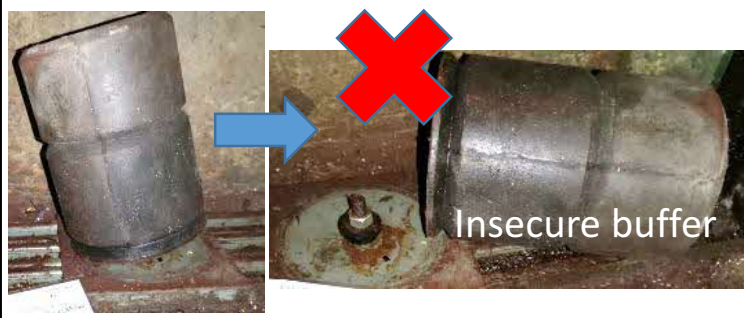
52% Low Risk

Insufficient oil level

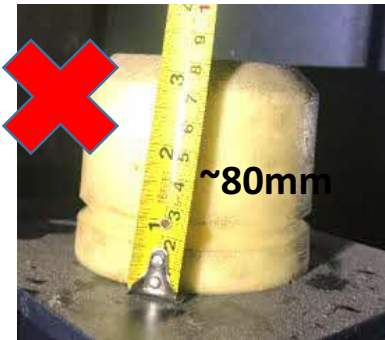


41% Medium Risk

Buffer insecure/
Stroke insufficient



Rated speed (m/s)	Stroke (mm)
up to 0.50	40
0.51 – 0.75	65
0.76 – 1.00	100

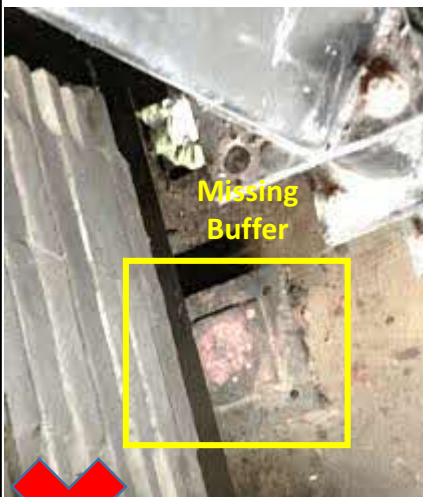


7% High Risk

Missing buffer,
Corroded Buffer.

Types of buffers

1. Springs for nominal speed $\leq 1.0\text{m/s}$
2. Non-linear (polyurethane) for $\leq 1.0\text{m/s}$
3. Hydraulic buffer all speeds



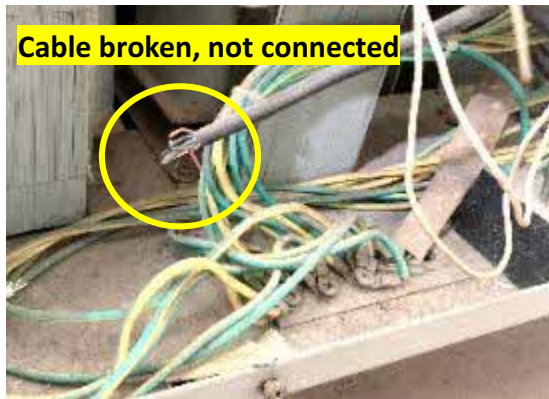
MO 6. Emergency power supply for lighting and Ventilation

Restricted



Medium Risk

Wrong/ Broken wire connection OR EBOPS Battery Flat



Light



Fan



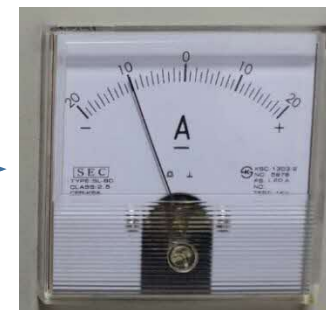
Alarm



Intercom

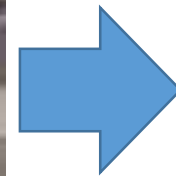


Press Test Button



Advisory - BCA/EMEG/GEN/2020/039

- ADVISORY ON SAFE MANAGEMENT MEASURES IN LIFTS
 - Ensure that **ventilation fan is able to function** as intended **during power failure** (especially during COVID Period).



MO 4 & 5. Lift car emergency Alarm, Intercom

Restricted

Low Risk



No intercom was installed OR No connection of Intercom

Emergency alarm & Intercom not functioning or either of the device is not working

CP2: 1979 – Clause 24.2 – A telephone, intercom system or other communication devices for communication with someone outside the lift shall be installed in every lift in all public buildings.

CP2: 2000 – Clause 12.2.2 – Where required, a telephone, intercom system or other communication devices for communication with someone outside the lift shall be installed in every lift.

SS550: 2009 – Clause 12.2.2 – A telephone, intercom system or other communication devices for communication with someone outside the lift shall be installed in every lift.



Alarm



Intercom



MO 12. Overspeed governor

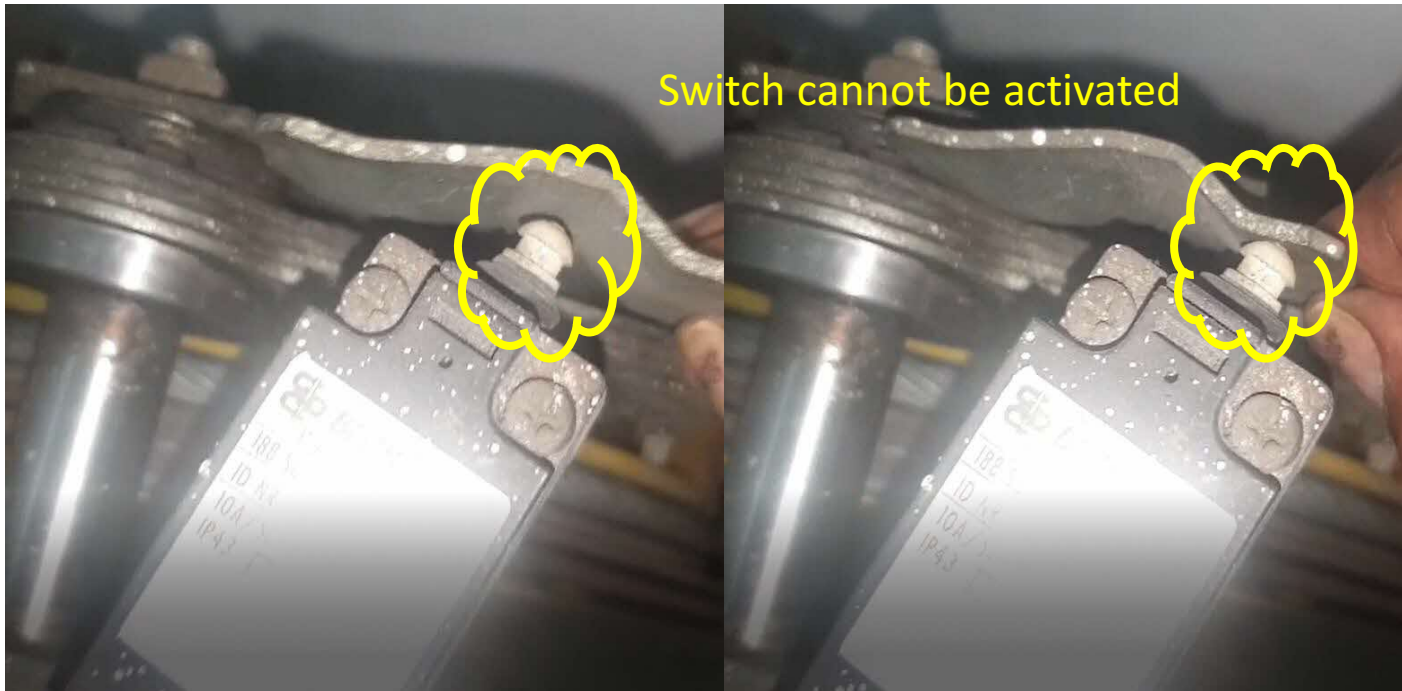
Restricted

44%

High Risk

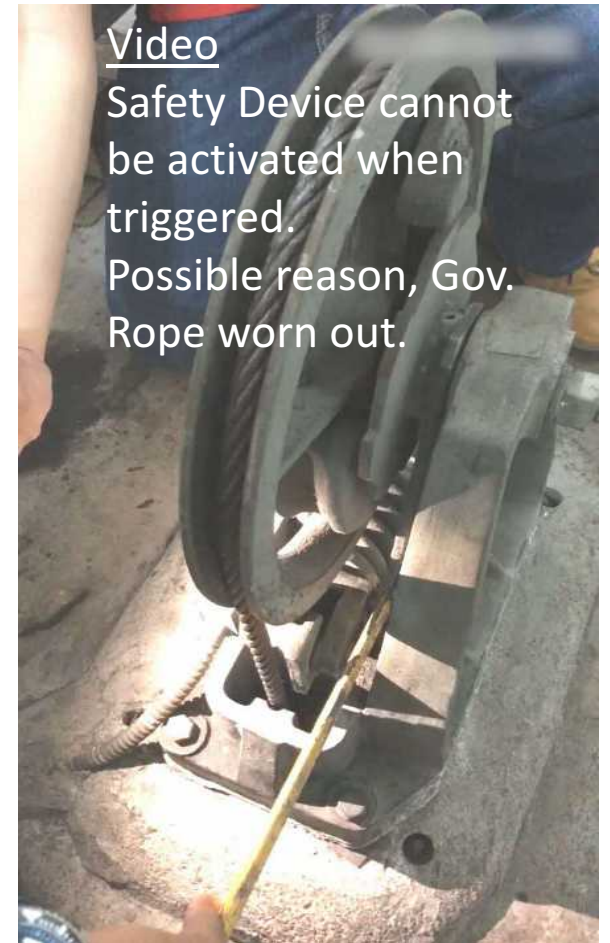
Electrical switch of governor is **misaligned, missing, tampered or bypassed** resulted in Overspeed governor was not able to activate the safety gear.

Governor switch misaligned/ bypass



Before activation

After activation



MO 12. Overspeed governor

Restricted

44%

High Risk

Restricted movement of the parts in the governor

Video – Overspeed Gov. with restricted parts, not sufficiently lubricated.



Video – Overspeed Governor with restricted parts, not sufficiently lubricated.

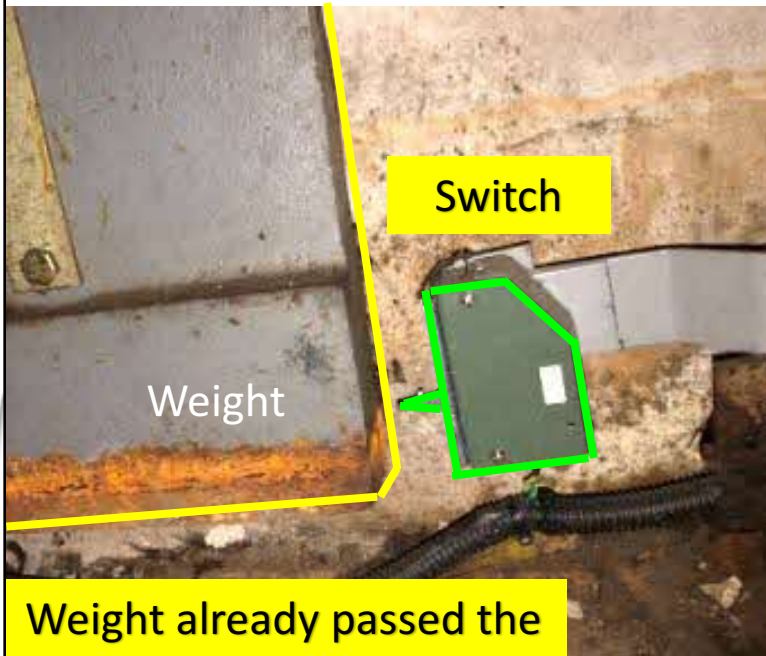


MO 12. Overspeed governor (tension pulley)

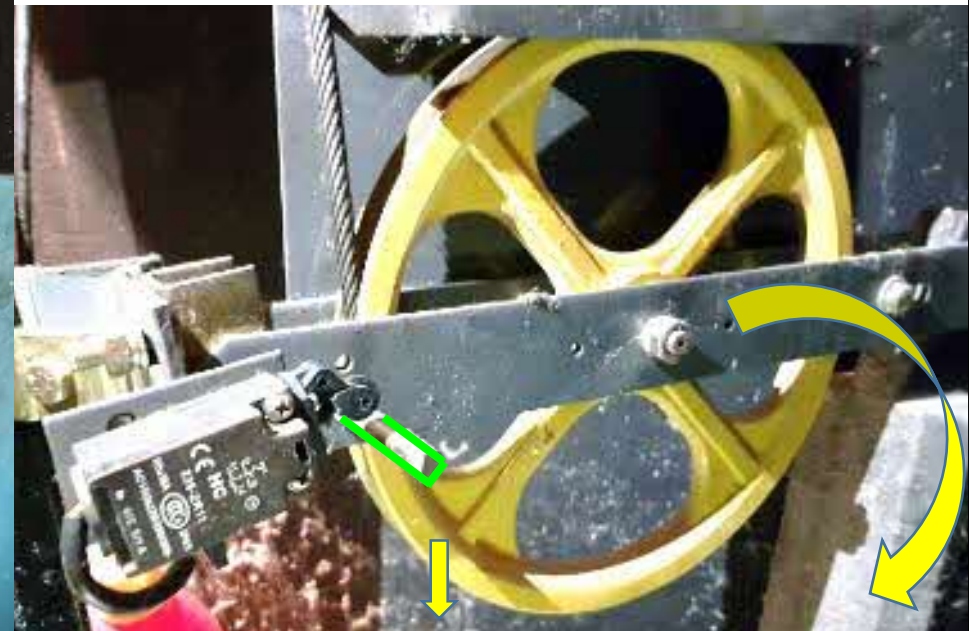
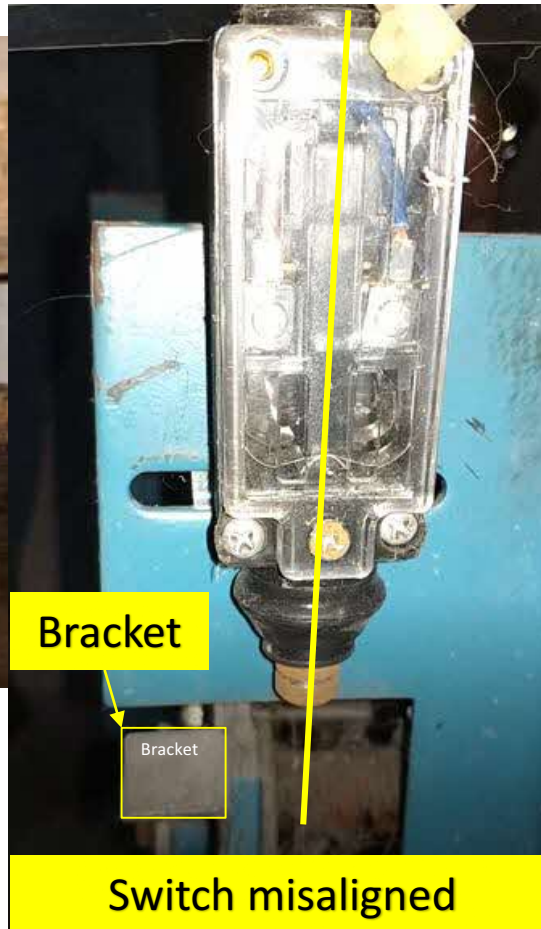
56%

Medium Risk

Governor rope **slack switch** is faulty, damaged, contains missing parts or **misaligned**



Weight already passed the switch. Misalignment.



Switch installed wrongly. Switch will never be triggered.

Restricted

MO 12. Overspeed governor (tension pulley)

56%

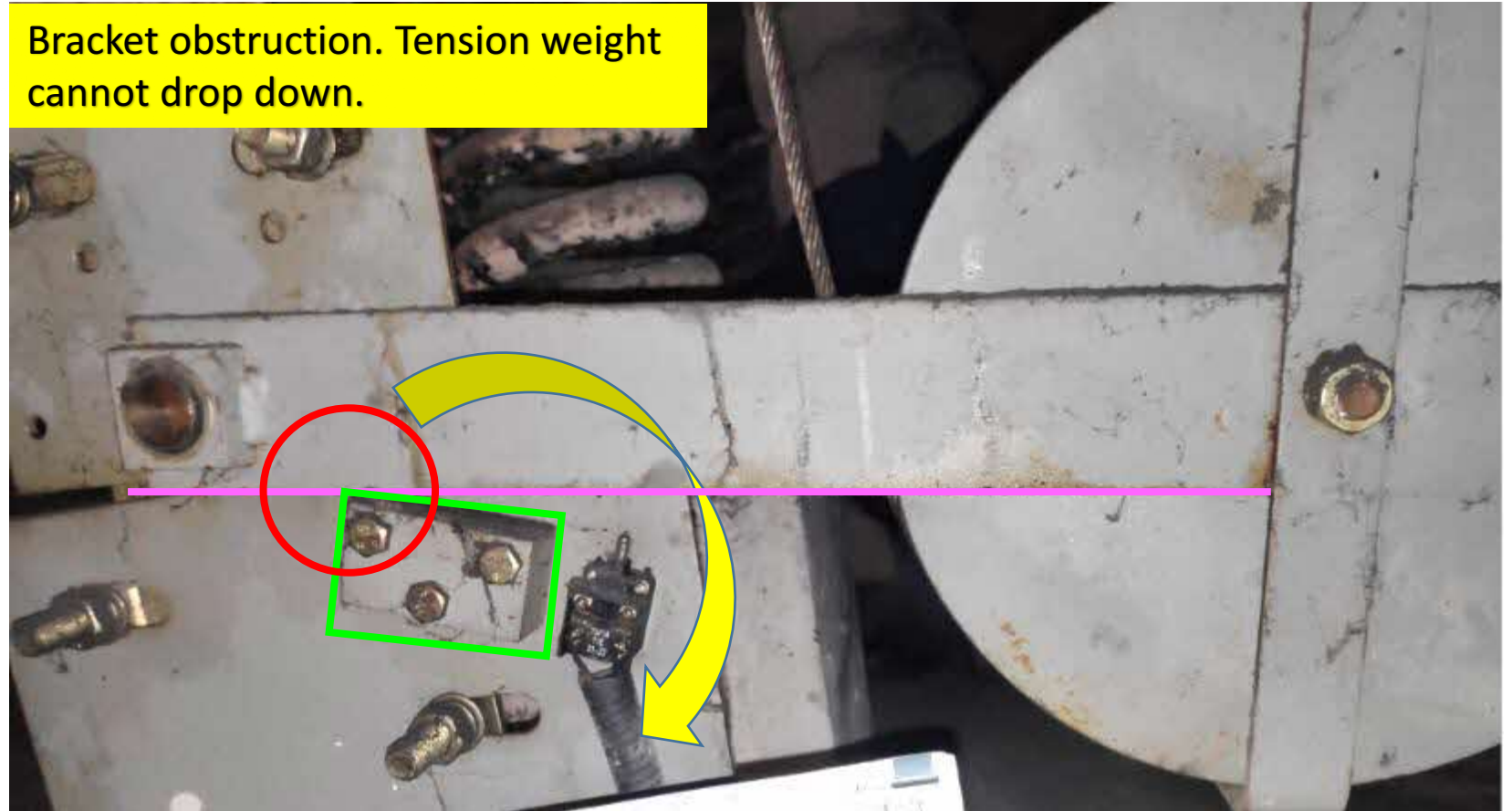
Medium Risk

Governor rope **slack switch** is faulty, damaged, contains missing parts or **misaligned**

Video showing slacken rope



Bracket obstruction. Tension weight cannot drop down.



Restricted

MO 12. Overspeed governor (tension pulley)

56%

Medium Risk

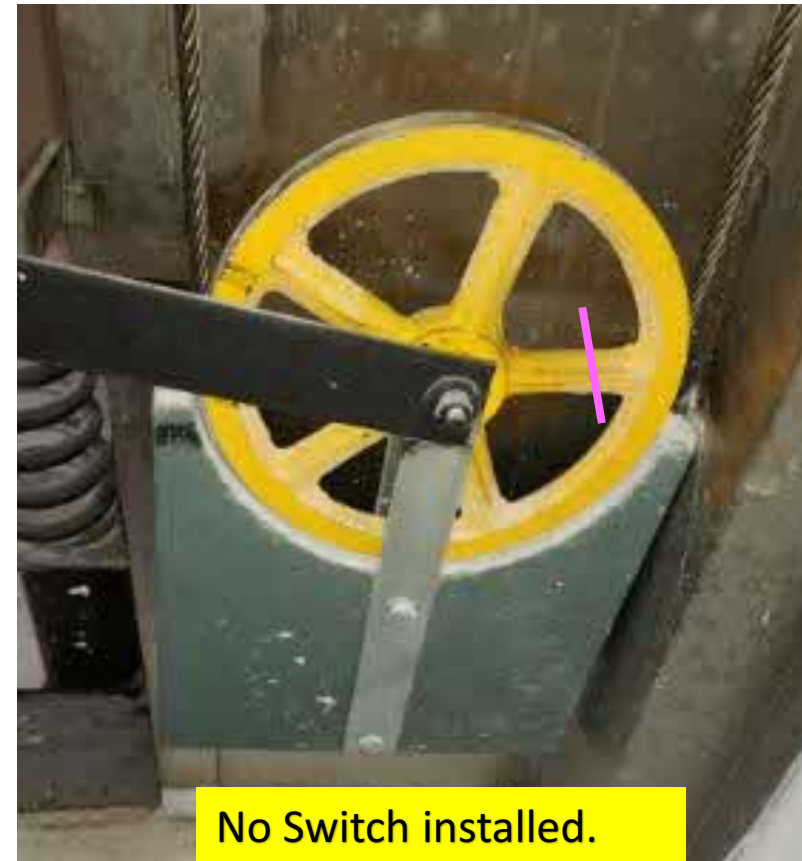


Governor rope **slack switch** is faulty, damaged, **contains missing parts** or misaligned

Under CP2:2000 & SS550:2009 – clause 8.1.5, **The breakage or slackening of the governor rope shall cause the motor to stop by means of an electric safety device.**



- No Switch installed.
- Fixed on Bracket. No Tensioning



No Switch installed.

Restricted

MO 14. Compensation rope & compensation rope sheave tie-down and tensioning

Medium Risk

Compensation rope or chain **too low & touching or rubbing** the pit floor



Restricted

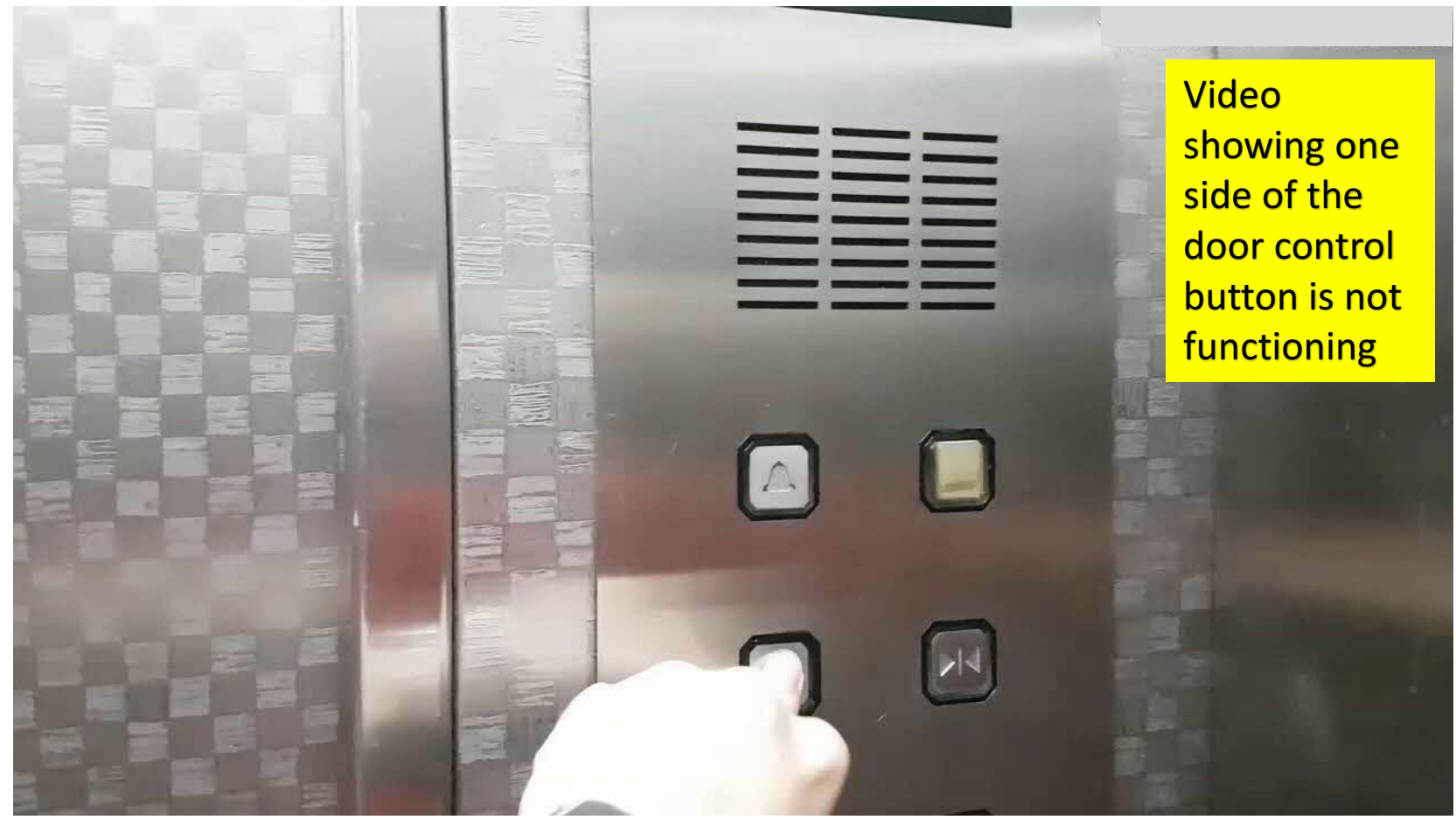
MO 1. Door Open Control

Restricted

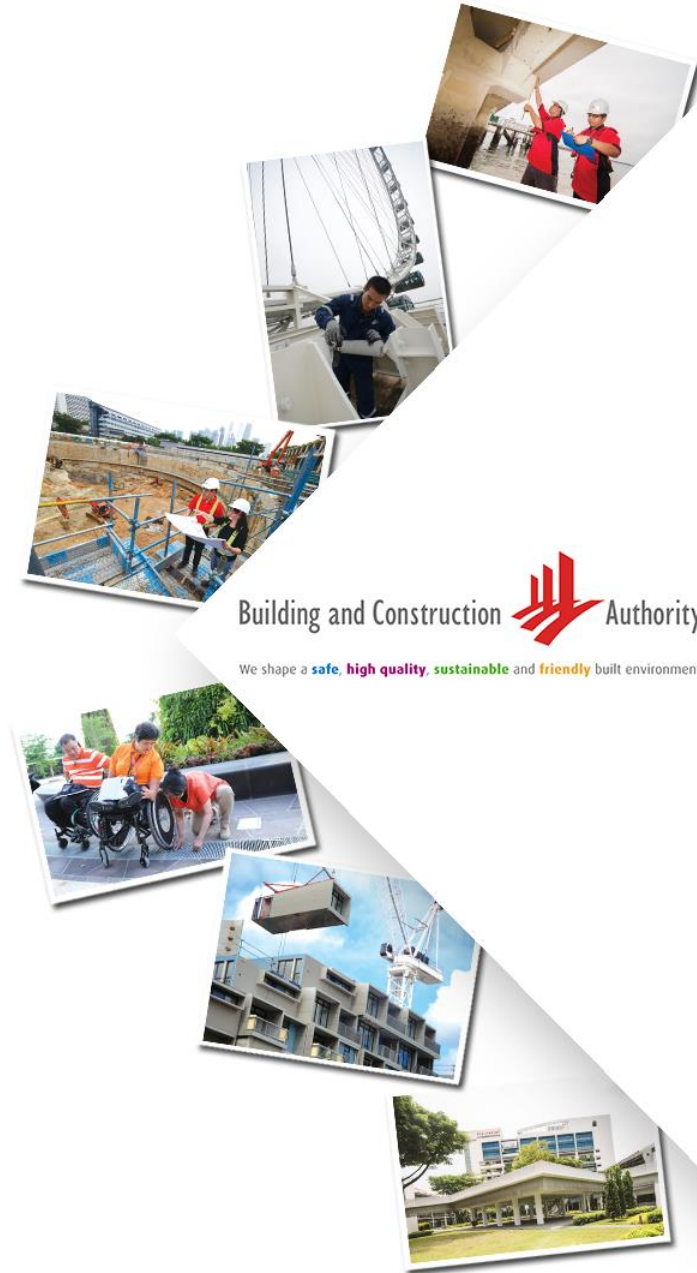
Low Risk



Doors failed to stay open/ re-open when door open button in the car is pressed.



2019 Lift and Escalator Incident findings

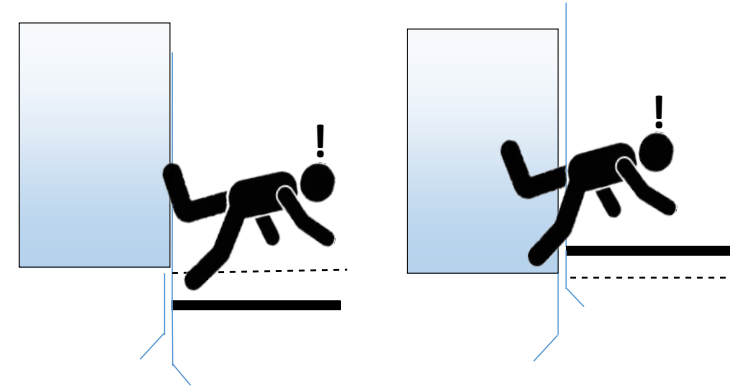


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2019 lift incident findings due to equipment failure

Equipment failure includes,

- Levelling of lift car (Drive or inverter failure etc.);
- Door protective Devices not functioning –
Multibeam/ Light curtain failure.
- Ceiling fixtures fell inside car; ▶
- Drive or brake malfunction; ▶



Ceiling fixtures to be mechanically fastened

BCA Advisory, APPBMSMA-2017-04

- Fixtures and fittings must be **secured by appropriate mechanical fasteners**, such as screws, bolts and rivets.
- **Adhesive tapes, glue are not acceptable.**



Ceiling fixtures to be mechanically fastened



Case Study

A 50 years old woman head was struck by a metal bracket that fell from the ceiling. while travelling up in the lift.

- This metal bracket was used to support an acrylic sheet (false ceiling)
- The center of the metal bracket was secured to the acrylic sheet using double sided tape
- The tape give way and dropped down and injured the lady.
- Rectification
 - metal brackets were then secured to the acrylic sheet using bolts.



Double sided
tape



Bolts

Drive or brake malfunction



Lift overrun in the up direction at the top terminal landing



2019 escalator incident findings due to equipment failure

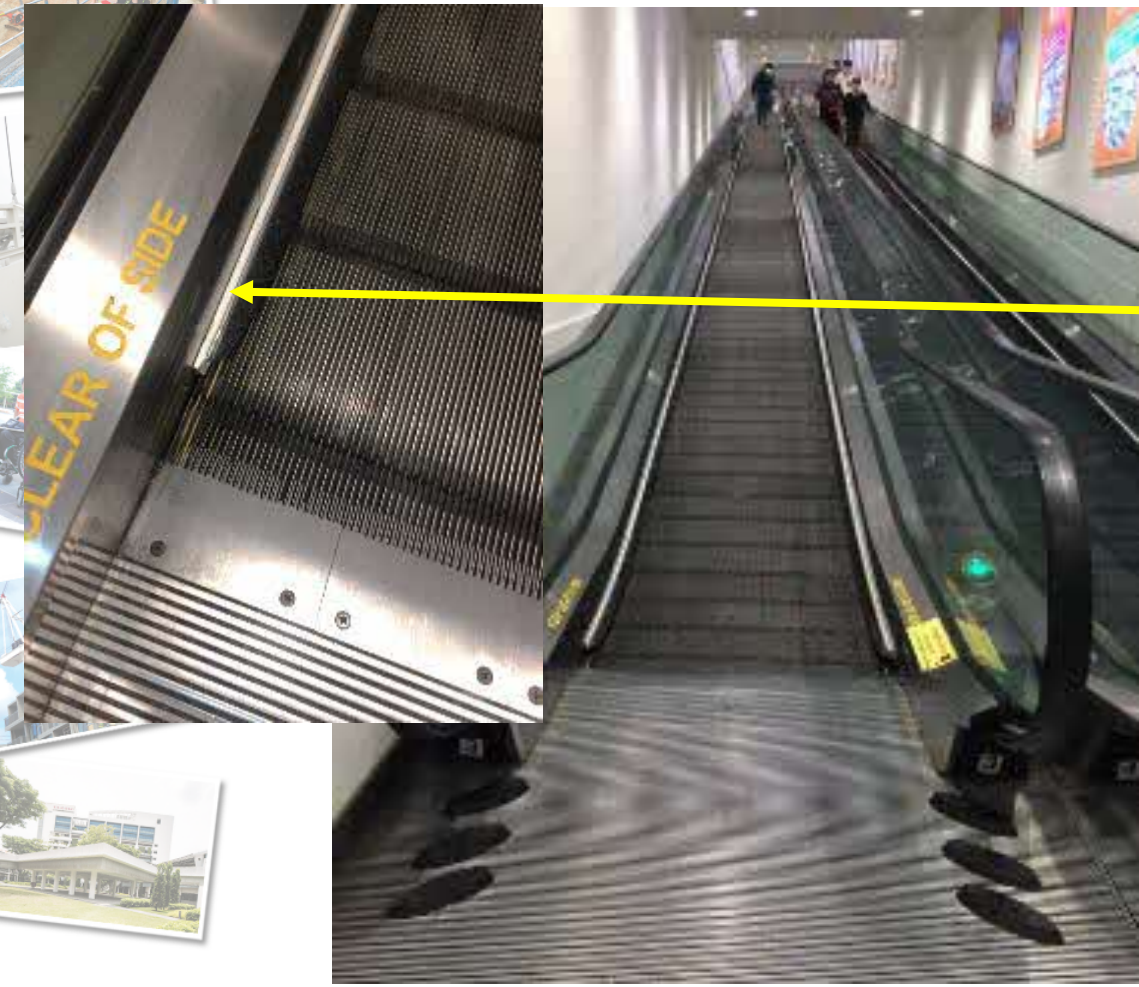
Equipment failure includes,

- Sharp edge on the skirt brush deflector. ▶
- Handrail malfunction; ▶

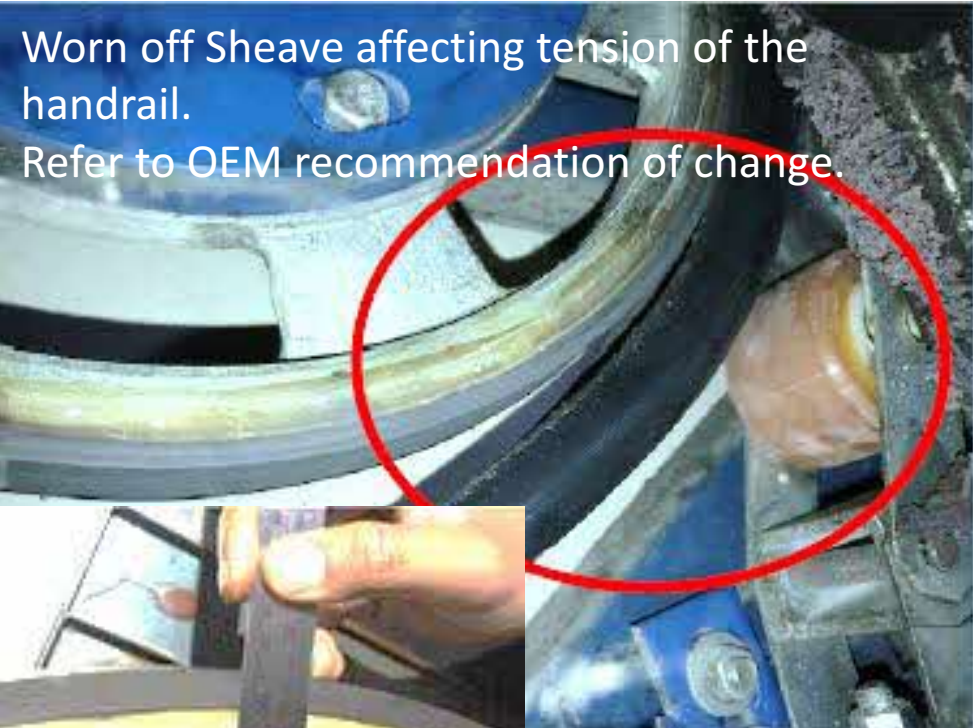


Sharp edges on the skirt brush deflector

Passenger heel suffered a cut with sharp edges sighted from the traveller skirt brush deflector.
- Supermarket trolley constant hitting the side of the skirting causing sharp edges to be formed.



Tell-Tale sign of Handrail Malfunction



Worn off Sheave affecting tension of the handrail.
Refer to OEM recommendation of change.

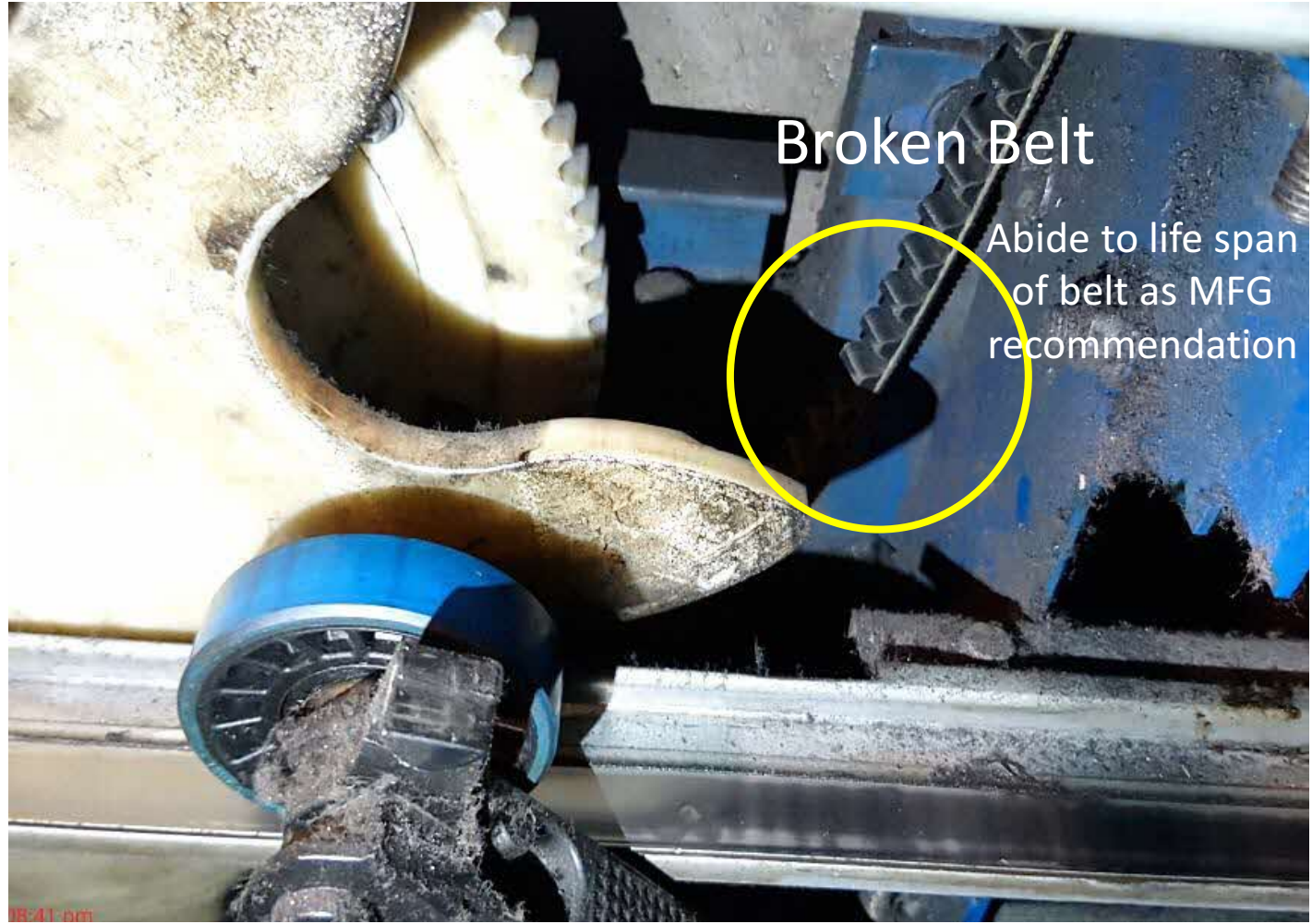


Wear & tear of handrail. Refer to OEM recommendation.



Clean up the foreign particles under handrail.

Tell-Tale sign of Handrail Malfunction



“SOME” possible tell-tale sign of Handrail condition

Tell-tale signs that an escalator’s handrail tensioning not improperly adjusted

- a. Handrail feels hot to touch during operation;
- b. Handrail speeds are not synchronised with the escalator steps;
- c. Handrail have visible wear marks.

Some of the maintenance checks you should cover

- a. Check handrail running speed using Tachometer etc.
- b. Check handrail tension
Ensure adjustments for pressure rollers/belt/chain are appropriate;
Ensure that chain sag distance is within OEM’s recommendation.

Lift & Escalator Incidents

- Equipment failure due to MO non-compliance could have been prevented by compliance with MO.
- **Safety means cannot be bypassed**. For safety reason, shut down the lift or escalator till the part(s) has been replaced.
- Fixtures and fittings must be secured by appropriate mechanical fasteners, such as screws, bolts and rivets.

Responsibility of registered L&E contractors

L & E Maintenance Scope of Work

Ensure the safe and proper operations of the L&E installation and should be carried out by a competent person.

Scope includes,

- Lubrication and cleaning of the L&E equipment;
- Inspection and check for the normal proper operation of the L&E equipment **including all necessary settings and adjustments;**

Responsibility of registered L&E contractors

c. Repair or replacement of L&E components or parts that is required due to wear and tear.

I. Contractor to ensure proper documentation on parts replacement request to owner even it is under comprehensive maintenance, (eg. Service records).

II. Quotation must be promptly sent and promptly follow-up.

III. Documentation must be produce when requested.

Responsibility of SPEs

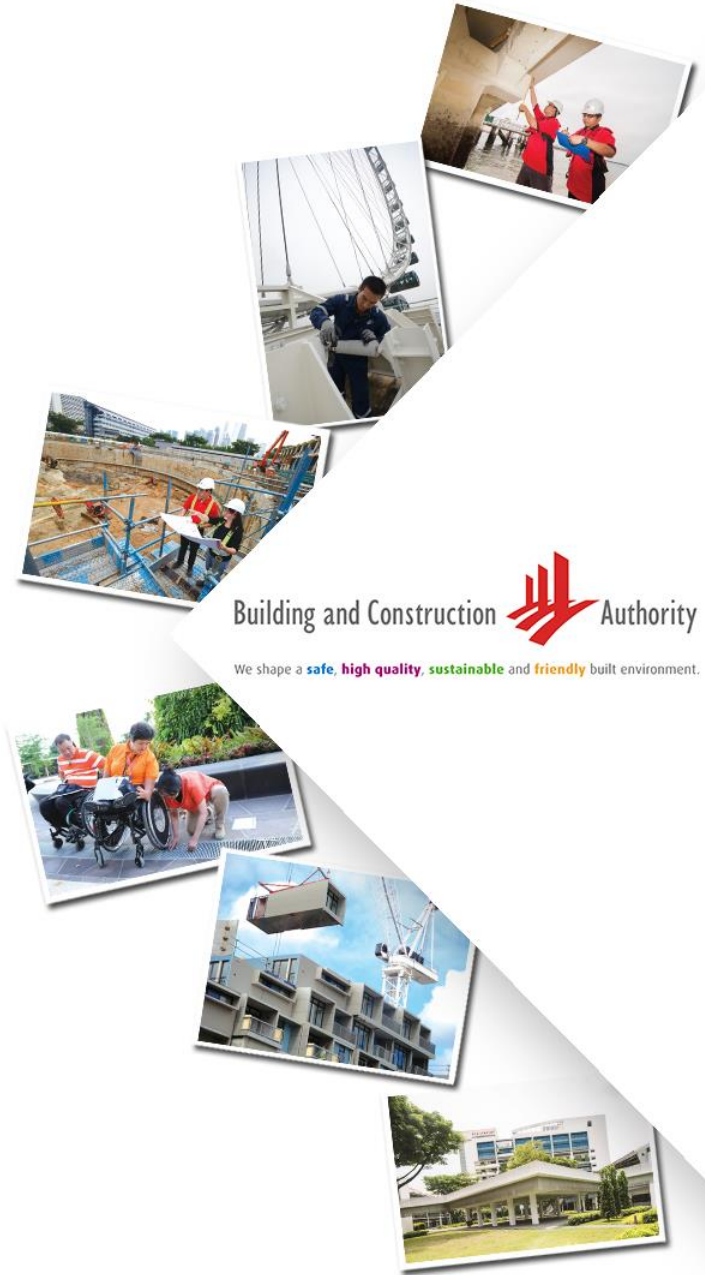
Building Control Act

Under the Building Control Act, for Temporary Occupation Permit (TOP)/ Certificate Of Statutory Completion (CSC) purposes, the Commissioner of Building Control requires the submission of a CSC04 pursuant to regulation 42(2)(g) or regulation 43(3)(d) of the Building Control Regulations, in which a **SPE is required to declare that he has supervised the installation** of the lift or escalator, and that the design and installation of the lift or escalator complies with the Code or standard indicated in the CSC04. If the lift or escalator does not comply, then it is a **potential offence** under section 43A of the Building Control Act (submission of declaration false in a material particular).

Restricted

End

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