Guideline on Risk Assessment for Traction Lifts

Electrical and Mechanical Services Department

The Government of the Hong Kong Special Administrative Region

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Foreword

Lift safety relies on regular examination and proper maintenance. With rapid technological advancements in recent years, modern lifts are equipped with more comprehensive safety devices compared to older models. Therefore, there is room for improvement and enhancement for lifts lacking essential safety devices. In this regard, the Electrical and Mechanical Services Department (EMSD) promulgated the "Guidelines for Modernising Existing Lifts" in 2011, introducing measures to enhance the safety of lifts lacking essential safety devices and recommending retrofitting of safety devices to ensure safer, more reliable and comfortable lift operation.

Ensuing safe and reliable lift operation, particularly for lifts lacking essential safety devices, is of paramount importance to the well-being of building occupants and visitors. Risk assessment of existing lift systems serves as a crucial tool for identifying potential risks and necessary remedial measures, as well as for effective planning of modernisation/replacement works to further enhance lift safety standards.

Objectives of risk assessment:

- to identify potential safety hazards and risks associated with the existing lifts;
- to assess the adequacy of existing operation and maintenance management; and
- to provide recommendations for mitigating identified risks and improving long-term lift safety.

A risk assessment highlights the strengths and weaknesses of a lift system. While essential safety components are in normal working conditions, there are still areas for improvement to reduce risks. This guideline provides specific short-term and long-term recommendations to address the potential risks and ensure that the lifts continue to operate safely for all users.

The Responsible Person for lifts, including building owners and facilities managers, are encouraged to review the risk assessment report thoroughly and implement the proposed risk reduction measures in a timely manner. Ongoing maintenance, testing, monitoring and modernisation / replacement plan are essential to sustain the safe and reliable operation of the lift installations in the long run.

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1 Scope

1.1 This document outlines the requirements for conducting risk assessment for traction lifts, including the fundamental requirements of assessment organisations, personnel and procedures. It offers guidance on the items to be assessed, their associated risk ratings, required actions, and comprehensive safety recommendation.

1.2 It is recommended that risk assessment be conducted for an existing lift under the following circumstance(s):

- The lift is not equipped with either a double brake system, unintended car movement protection device, ascending car overspeed protection device , car door mechanical lock and door safety edge; or
- The RP for the lift has safety concerns due to frequent breakdowns, poor contractor performance, serious incidents, etc; or
- The RP seeks to enhance the safety of the lift or to develop a more effective plan for modernisation works; or
- The lift lacking essential safety devices has not undergone a risk assessment within the past five years or within the time interval recommended by the recent assessment report.

1.3 This guideline applies to traction passenger lifts and freight lifts with a rated speed not exceeding 6.0 m/s. It may serve as a reference for traction passenger lifts and freight lifts with a rated speed greater than 6.0 m/s. However, it may not be applicable to inclined lifts, hydraulic lifts, service lifts, vertical platforms, and stair lifts.

1.4 Under special conditions, such as lifts intended for passengers with disabilities, fire emergencies, potentially explosive environments, extreme weather conditions, such as earthquakes, and the transportation of dangerous goods, additional requirements beyond those outlined in this guideline shall be considered.

2 References

This guideline serves as an implementation framework for the risk assessment of existing lifts. It is predominantly based on the Greater Bay Area Standard T/GDASE0027 – Specifications for Risk Assessment of Traction Lifts, along with relevant ordinances, codes of practice, guidelines and standards commonly adopted in Hong Kong.

2.1 Greater Bay Area Standard T/GDASE0027 – Specifications for risk assessment of traction lifts. The documents are available on the webpage of Guangdong-Hong Kong-Macao Greater Bay Area Standard Information Public Service Platform.

https://www.gbsrc.org.cn/

2021 version:
https://www.gbsrc.org.cn/showPdf?filePath=%2Fgba_files%2Ffiles%2FT_GDASE%200027-2021_cn.pdf

2.2 Relevant ordinances, code of practices and guidelines in Hong Kong:

- The Lifts and Escalators Ordinance (Cap. 618)
- Code of Practice on the Design and Construction of Lifts and Escalators (The Design Code)
- Code of Practice for Lift Works and Escalator Works (The Works Code)
- Quality Lift Service Recognition Scheme (QLSRS)
- Code of Practice for Building Works for Lifts and Escalators
- Design Manual Barrier Free Access

2.3 Other relevant standards:

- GB/T 20900 – Lifts (elevators), escalators and moving walks – Risk assessment and reduction methodology
- GB/T 24804 – Rules for the improvement of safety of existing lifts
- GB/T 31821 – 2015, Specification for discard of the main parts of lifts
- Lift Directive 2014/33/EU
- Machinery Directive 2006/42/EC
- ISO 14798 – Lifts (elevators), escalators and moving walks – Risk assessment and reduction methodology
- BS2655 – Specification for lifts, escalators, passenger conveyors and paternosters
- BS5655 – Lifts and service lifts
- EN81 series – Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods

3 Terminologies and Definitions

3.1 Existing Lift
A lift in service.

3.2 Service Lift
A fixed lifting device serving designated floors, comprising a car that, due to its structure and dimensions, is not intended for passenger entry.

3.3 Lift, Associated Equipment or Machinery
The complete lift system, including the lift machine, components, machine room, lift well.

3.4 Hazard
A source with the potential for harm.

3.5 Risk
The combination of the likelihood and consequence of a specified hazardous event occurring.

3.6 Risk Analysis
A systematic process of identifying hazards and assessing risks using available information.

3.7 Risk Evaluation
The process of determining whether risk reduction measures are required, based on the results of the risk analysis.

3.8 Detectivity
The likelihood of timely detection of non-compliant lift safety requirements or inadequate protective measures.

3.9 Overall Safety Level
The safety classification of a lift system, determined based on the risk assessment results of the lift, associated equipment or machinery.

3.10 Risk Assessment
The complete process of carrying out risk analysis and evaluation for the lift, associated equipment or machinery, taking into account usage, management and routine maintenance, to determine the overall safety level of the lift system and to propose appropriate risk reduction measures in accordance with the procedures outlined in this guideline.

Risk assessments provide a comprehensive analysis of risk levels and improvement recommendations, assisting supervisors in understanding the condition of the lifts and formulating improvement plans. In contrast, annual examinations solely determine compliance without assessing risk levels or providing recommendations. Therefore, in addition to periodic examination, risk assessments are instrumental in gaining a thorough understanding of lift operational conditions, thereby enhancing safety management.

4 Risk Assessor and Involved Parties

4.1 Risk Assessor

The Risk Assessor shall be independent, and his/her organisation shall possess suitable instruments, equipment and the corresponding quality assurance system to support the assessment work.

Under the Lifts and Escalators Ordinance (the Ordinance) (Cap. 618), personnel from the lift maintenance contractor, including registered lift engineers (RLEs) and registered lift workers (RLWs), are legally responsible for periodic examination of lifts. To minimise lift service disruption and achieve synergy, it is highly recommended that site inspection for risk assessment be carried out concurrently with periodic examination of lifts with load. The Risk Assessor may confirm the examination results, and carry out the site inspection for completion of the risk assessment items with assistance from RLWs.

Legal responsibility of Risk Assessor

Risk assessor, acting as independent third parties, are primarily responsible for providing risk analysis and recommendations, rather than being directly accountable for the maintenance or operational safety of lifts. As such, there are currently no specific laws regulating their legal responsibilities. The RLE remains the primary individual responsible for safety.

Qualification of Risk Assessor

The qualification of Risk Assessor shall:

a) Risk assessor must meet one of the following qualifications and have completed training recognized by the EMSD, as well as passed the examination:
   - be an RLE as defined under the Ordinance; OR
   - Be an expert who has obtained the "Professional Diploma Meister Lift and Escalator Engineering" from the Technological and Higher Education Institute of Hong Kong or an equivalent qualification; or
   - Be a lift inspector accredited by the State Administration for Market Regulation.

b) have completed training conducted by appropriate institution or organisation related to risk assessment of lifts, obtained accredited Risk Assessor Certification, and be familiar with technical requirements, standards, safety specifications and risk assessment procedures of lifts;

and

c) capable of ensuring fair implementation of risk assessment and resolving disputes on assessment results through fair arbitration.

To ensure the independence of risk assessments, Risk Assessors shall not be responsible for assessing lifts on which they have performance periodic examination within the two years preceding the commencement of the risk assessment to avoid preconceived judgement and unfairness.. All Risk Assessors are required to sign a declaration affirming their independence during the risk assessment process. Once qualified, the name, company name, company telephone number, telephone number, email address, registration number and registration expiry date, will be posted on the EMSD's webpage for public access.

4.2 Responsible Person for Lift

The RP for lifts refers to the owner or person who has the management or control of the lifts. The role and responsibilities of an RP for the risk assessment of lifts include:

a) causing a qualified Risk Assessor to conduct risk assessment;
b) preparing the basic documents related to the lifts;
c) communicating and coordinating with lift maintenance contractors and the engaged Risk Assessor/assessment team regarding the risk assessment;
d) acknowledging risk assessment reports;
e) following up on or implementing risk reduction measures based on the risk assessment results; and
f) reviewing the effectiveness of risk reduction measures for continuous improvement.

4.3 Lift Maintenance Contractor

The lift maintenance contractor engaged by the RP holds responsible for both preventive maintenance and corrective maintenance of lifts. The role and responsibilities of the lift maintenance contractor for the risk assessment of lifts include:

a) providing the technical files of lifts and all necessary documents related to lift maintenance;
b) implementing risk reduction measures as per instructions given by RPs; and
c) If the lift maintenance contractor is also engaged by the RP to arrange the risk assessment, they must ensure that both a RLEs and RLWs are assigned to assist the Risk Assessor in conducting the assessment.

4.4 Registered Lift Engineer

An RLE is responsible for the periodic examinations of lifts under the Ordinance. If the lift maintenance contractor is also engaged by the RP to arrange the risk assessment, the roles and responsibilities of the RLE during the risk assessment process include

a) being present during the risk assessment;
b) providing the Risk Assessor with information on the methods and procedures of periodic examinations;
c) arranging and instructing RLWs to conduct the inspection and testing of lifts as required by the Risk Assessor; and
d) ensuring safety of periodic examinations as well as the inspection and testing of lifts as described in (c).

5 Risk Assessment

5.1 Workflow of risk assessment

The risk assessment process is shown in Figure 1. The process mainly involves preliminary preparation, determination of assessment aspects, risk analysis, risk evaluation, calculation of the overall safety level, recommendation of risk reduction measures, and compilation of a risk assessment report.

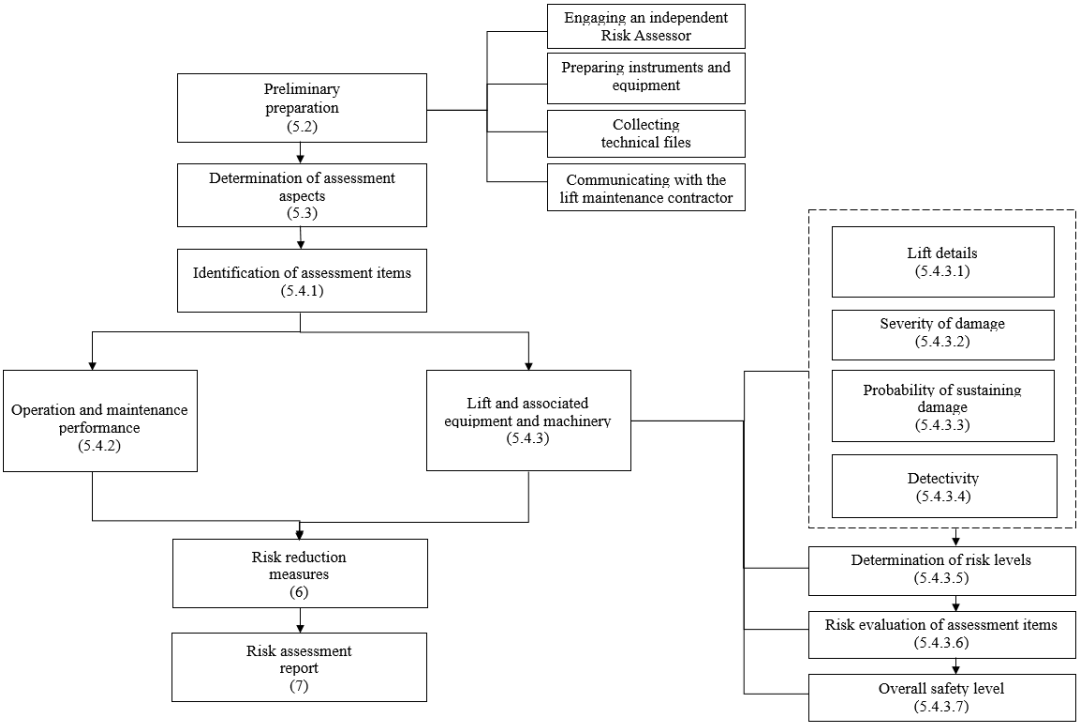

Figure 1: Process of risk assessment

5.2 Preliminary preparation

The preliminary preparation includes the following:

- RPs shall engage a Risk Assessor or assessment team three (3) to six (6) months before the periodic examination;
- RPs shall coordinate communication between the Risk Assessor or assessment team and the lift maintenance contractor regarding the risk assessment; and
- the Risk Assessor or assessment team shall prepare instruments and equipment, collect technical files, and communicate with the lift maintenance contractor and relevant parties on matters concerning risk assessment.

5.3 Determination of assessment aspects

5.3.1 Risk assessment covers the following aspects:

a) Operation and maintenance performance (based on the Quality Lift Service Recognition Scheme launched by the EMSD):
   (i) Level of lift modernisation;
   (ii) Record of lift operation; and
   (iii) Management of lift services.
b) Lift and associated equipment or machinery.

5.3.2 The Risk Assessor or assessment team shall consider the actual site and installation condition as well as the RP's requirements to add or delete the assessment aspects. Justifications for any modifications shall be included in the final assessment report.

5.3.3 RP may engage qualified assessment personnel directly or through maintenance contractors. However, if personnel are employed by a contractor, they must not be responsible for routine maintenance to ensure the independence of the assessment. All parties are required to sign a declaration to prevent conflicts of interest.

5.4 Risk analysis

5.4.1 Identification of assessment items

Based on the assessment aspects determined in Section 5.3, risk assessment items shall be identified one by one. Additional items may be included if necessary.

a) Level of lift modernisation are listed in Annex A;
b) Record of lift operation are listed in Annex B;
c) Management of lift services are listed in Annex C;
d) Lift and associated equipment or machinery are listed in Annex D;
e) For additional assessment aspects, the Risk Assessor or assessment team shall identify the corresponding assessment items and qualifying methodology with the agreement of RP before conducting the risk assessment.

5.4.2 Operation and maintenance performance

The operation and maintenance performance is assessed in three areas: "level of lift modernisation", "record of lift operation", and "management of lift services", with a maximum total score of 150 points (50 points for each area). Based on the total points obtained, the performance is classified into four assessment levels, with corresponding recommendations outlined in Table 1.

Table 1: Assessment levels and recommendations for operation and maintenance performance

Assessment level	Level 1 (Points scored: 136-150)	Level 2 (Points scored: 121-135)	Level 3 (Points scored: 101-120)	Level 4 (Points scored: 100 or below)
Recommendation	The performance is excellent. PRs should keep it up and consider taking appropriate measures to improve individual items.	The performance is good. RPs should keep it up and take appropriate measures to improve individual items.	The performance is fair. RPs are highly recommended to carefully review all assessment items and take appropriate measures to improve the performance.	RPs shall take immediate and appropriate measures to improve the performance and re-assess the situation within a reasonable timeframe (e.g. three years).

5.4.3 Lift and associated equipment or machinery

5.4.3.1 Lift details

Prior to assessing the risk of individual items, the lift details should be gathered as the basis for carrying out the risk assessment. The details include but are not limited to:

a) the type, service life and frequency of use of the lift;
b) special problems with the machine room (if any);
c) records of lift modernisation and major alterations;
d) complaints about the lift;
e) whether there were frequent breakdowns recently (in the past 6 months);
f) an increasing / a decreasing trend in the annual maintenance cost (including maintenance, repairs and replacement of spare parts) in the past 3 years; and
g) the supply of parts.

5.4.3.2 Severity of damage

By considering the damage caused to people, the lift system or the surrounding environment, the severity of damage can be categorised into the following levels:

a) Level 1: High – someone dies, the lift system becomes unserviceable or severe damage is caused to the surrounding environment;
b) Level 2: Medium – someone is seriously injured or suffers from a serious occupational disease, or major damage is caused to the lift system or the surrounding environment;
c) Level 3: Low – someone is slightly injured or suffers from a minor occupational disease, or minor

damage is caused to the system or the surrounding environment;

d) Level 4: Negligible – no one is injured or suffers from any occupational diseases, and no damage is caused to the lift system or the surrounding environment.

5.4.3.3 Probability of sustaining damage

The probability of sustaining damage can be calculated by evaluating the probability of failure in each safety requirement or protection measure, the probability of the occurrence of corresponding danger scenarios, the number and duration of exposure to the danger, and the efforts made to avoid or reduce damage. The probability of sustaining damage can be categorised into the following:

a) Level A: Highly probable – may occur frequently over the service life;
b) Level B: Probable – may occur several times over the service life;
c) Level C: Occasional – may occur at least once over the service life;
d) Level D: Rare – not likely to occur, but may occur over the service life;
e) Level E: Improbable – unlikely to occur over the service life;
f) Level F: Highly improbable – the probability is almost zero.

For lifts with poor performance, the probability of sustaining damage can be further adjusted upwards based on the severity of past damage.

5.4.3.4 Detectivity

The detectivity can be categorised into three levels according to the methods for detecting abnormal changes in the item status, which are shown in Table 2.

Table 2: Detectivity

Level	Description	Identification of Abnormalities	Measure	Example
①	It has been confirmed that no abnormalities will occur and pose danger.	No abnormalities occur.	No measures are required.	The lift shaft is intact and well protected.
	The lift has an automatic fault monitoring function to prevent danger.	During the service life of the lift, the automatic fault monitoring function can identify abnormalities and provide feedback.	Measures are automatically taken to avoid danger.	The brake is activated, or the braking force is being monitored.
②	Abnormalities can be identified through manual inspection to prevent danger.	During the service life of the lift, abnormalities can be identified through manual inspection (such as maintenance and regular inspection).	Measures are manually taken to avoid danger.	The reset function of the hydraulic buffer is effective.
③	It is difficult to identify abnormalities, and danger persists.	The lift does not have any automatic fault monitoring function, and it is difficult to identify abnormalities through manual inspection.	The danger persists until someone is exposed to the danger and harmed.	The inner layers of the steel ropes are broken.

5.4.3.5 Determination of risk levels

The risk level of each assessment item can be determined by comprehensively assessing the severity of damage, the probability of sustaining damage and the detectability. When the detectability is classified as level ①, the risk levels of assessment items are shown in Table 3.

Table 3: Risk levels with detectability classified as level ①

Probability of sustaining damage	Severity of damage			
	Level 1: High	Level 2: Medium	Level 3: Low	Level 4: Negligible
Level A: Highly probable	1A①	2A①	3A①	4A①
Level B: Probable	1B①	2B①	3B①	4B①
Level C: Occasional	1C①	2C①	3C①	4C①
Level D: Rare	1D①	2D①	3D①	4D①
Level E: Improbable	1E①	2E①	3E①	4E①
Level F: Highly improbable	1F①	2F①	3F①	4F①

When the detectability is classified as level ②, the risk levels of assessment items are shown in Table 4.

Table 4: Risk levels with detectability classified as level ②

Probability of sustaining damage	Severity of damage			
	Level 1: High	Level 2: Medium	Level 3: Low	Level 4: Negligible
Level A: Highly probable	1A②	2A②	3A②	4A②
Level B: Probable	1B②	2B②	3B②	4B②
Level C: Occasional	1C②	2C②	3C②	4C②
Level D: Rare	1D②	2D②	3D②	4D②
Level E: Improbable	1E②	2E②	3E②	4E②
Level F: Highly improbable	1F②	2F②	3F②	4F②

When the detectability is classified as level ③, the risk levels of assessment items are shown in Table 5.

Table 5: Risk levels with detectability classified as level ③

Probability of sustaining damage	Severity of damage			
	Level 1: High	Level 2: Medium	Level 3: Low	Level 4: Negligible
Level A: Highly probable	1A③	2A③	3A③	4A③
Level B: Probable	1B③	2B③	3B③	4B③
Level C: Occasional	1C③	2C③	3C③	4C③
Level D: Rare	1D③	2D③	3D③	4D③
Level E: Improbable	1E③	2E③	3E③	4E③
Level F: Highly improbable	1F③	2F③	3F③	4F③

5.4.3.6 Risk evaluation of assessment items

Each assessment item is evaluated by assigning one of three risk categories (I, II or III) according to the risk level determined in Section 5.4.3.5. The corresponding measures for each category are indicated in Table 6.

Table 6: Risk categories and corresponding measures

Risk category	Risk level	Measures needed
I	1A①, 1B①, 1C①; 2A①, 2B①; 3A①; 1A②, 1B②, 1C②, 1D②; 2A②, 2B②, 2C②; 3A②, 3B②; 1A③, 1B③, 1C③, 1D③; 2A③, 2B③, 2C③, 2D③; 3A③, 3B③, 3C③.	Risk reduction measures are needed to reduce the risk category.
II	1D①; 2C①, 2D①; 3B①, 3C①; 4A①, 4B①; 1E②; 2D②, 2E②; 3C②, 3D②; 4A②, 4B②, 4C②; 1E③; 2E③; 3D③, 3E③; 4A③, 4B③, 4C③.	Review is needed to determine the appropriateness of further risk reduction measures after considering the practicability of the solution and the social value. #
III	1E①, 1F①; 2E①, 2F①; 3D①, 3E①, 3F①; 4C①, 4D①, 4E①, 4F①; 1F②; 2F②; 3E②, 3F②; 4D②, 4E②, 4F②; 1F③; 2F③; 3F③; 4D③, 4E③, 4F③.	No measure is needed.

#: Society may not allow certain risks to remain. However, further measures may render the use or maintenance of lifts impractical or impossible.

Using the above risk evaluation method, both risk levels and risk categories can be determined for all assessment items related to the lift and associated equipment or machinery. The assessment results may require adjustment based on the actual situation.

5.4.3.7 Overall safety level

After determining the risk categories of all assessment items related to the lift and associated equipment or machinery, the overall safety score is calculated and the overall safety level are determined as follows:

a) Assign values to each risk category according to Table 7. Assume that v_i $(i = 1, 2, \cdots, n)$ is the value of the risk category corresponding to the i-th assessment item, where n is the total number of assessment items.

Table 7: Risk categories and assigned values

Risk category	I	II	III
v_i value	0 /※note	-1	1

Note: If the assessed lift presents a category I risk due to the lack of safety protection function during installation, the assigned value will be marked with ※.

b) The overall safety score "D" can be calculated using Formula (1):
Formula (1):

$$D = \begin{cases} \frac{\sum_{i=1}^{n} v_i}{n} \times 100 & \text{if } \forall v_i \neq 0 \text{ and } \sum_{i=1}^{n} v_i \geq 0 \\ 0, & \text{if } \exists v_i = 0 \text{ or } \sum_{i=1}^{n} v_i < 0 \end{cases}$$

Note: Items marked with ※ are excluded from the calculation of D.

c) Based on the score "D", the overall safety level and corresponding recommendation are determined as shown in Table 8. If the assessed lift has a category I risk marked with ※ and D is not less than 70, the overall safety level should be classified as level 4.

Table 8: Overall safety levels and recommendations

Overall safety score (D)	$D \geq 90$	$80 \leq D < 90$	$70 \leq D < 80$	$D \geq 70$ and there is a category I risk marked with ※	$D < 70$
Overall safety level	Level 1	Level 2	Level 3	Level 4	
Recommendation	It is advisable to take protective measures to eliminate or reduce risks.	Protective measures should be taken to eliminate or reduce risks.	Protective measures should be taken as soon as possible to eliminate or reduce risks.	A plan should be formulated to eliminate or reduce risks and optimise the lift; the plan should be effectively implemented.	It is recommended to stop using the lift. Operation may only resume after protective measures are implemented to eliminate or reduce risks.

6 Risk Reduction Measures

6.1 Individual items

6.1.1 Lift operation and maintenance

(i) Level of modernisation

It is highly recommended that RPs modernise or completely replace their lifts to install four essential safety components, namely the double brake system, ascending car overspeed protection device, unintended car movement protection device, as well as car door mechanical lock and door safety edge.

The Risk Assessor should point out the risks arising from the missing components in the risk assessment report, and taking the age and breakdowns of the lifts into consideration, recommend either modernisation or complete replacement of lifts lacking essential safety devices for the benefits of the RPs.

(ii) Lift operation

It is recommended that RPs liaise with the lift maintenance contractors for technical advice to improve the operational performance of their lifts.

(iii) Management of lift services

Based on the actual management and operational conditions on site, the Risk Assessor should make feasible follow-up recommendations to RPs for fulfilling the requirements in the risk assessment report.

6.1.2 Lifts and associated equipment or machinery

Based on the risk evaluation results of each item, and having regard to the relevant laws, regulations and policy requirements of Hong Kong, risk reduction measures can be implemented in accordance with the following principles:

a) For components with risk rated as Level I or Level II, measures such as repairs and adjustments should be

taken to eliminate or reduce the risk; however, if a component meets the discard criteria outlined in the technical conditions specified in GB/T 31821-2015, or the product's usage and maintenance instructions, it should be replaced with a new one to eliminate the risk.

b) For lifts that comply with the old factory standards, if they lack safety protection devices/measures, or those devices/measures do not meet the current standards, it is recommended that the RPs carry out a lift optimisation plan after comprehensively considering the potential risks, technical and economic feasibility, to introduce or improve safety protection devices/measures for eliminating or reducing the risks.

c) For components with risk rated as Level II, if the risk cannot be eliminated or reduced through relevant measures, countermeasures should be taken, such as enhancing regular maintenance, adding warning signs, and improving emergency plans and drills.

d) Under the following circumstances, special maintenance should be strengthened:
   - If lifts lack all of the four essential safety components, namely the double braking system, unintended car movement protection device, ascending car overspeed protection device, as well as car door mechanical lock and door safety edge[1], the following procedures should be included in the regular special maintenance twice a year:
     - Check and maintain the safety gear and overspeed governor;
     - Check the gearbox backlash;
     - Measure the vibration of the gearbox bearing; and
     - Dismantle and overhaul the gearbox at least once every five years.
   - If the machine shaft has a three-point bearing design, it should be inspected using non-destructive testing methods once every three year to ensure its safety.

[1] Only lifts equipped with both the car door mechanical lock and door safety edge meet this definition.

- For lifts equipped with an integrated brake coil that cannot be dismantled and overhauled during special maintenance, the brake coil should be replaced at the time specified by the manufacturer or within ten years, whichever is earlier.

6.2 Recommendations for the lift system

When making recommendations for risk reduction measures, the complexity and overall safety of the lift system, types of potential risks and their probability of occurrence, as well as financial feasibility of such measures should be considered.

- Subject to the type and on-site environment, a modern high-efficiency motor with VVVF drive and other energy-saving devices mentioned in the EMSD's Building Energy Code can be installed in lifts to enhance energy savings.

- The Risk Assessor should also inform RPs of the deadline for the next risk assessment. The interval between two risk assessments is usually 3 to 5 years. For lifts that: a) have been in operation for more than 30 years; b) lack all of the four essential safety components, namely the double braking system, unintended car movement protection device, ascending car overspeed protection device, as well as car door mechanical lockand door safety edge; c) score lower than 80 in the overall safety assessment; or d) the Risk Assessor deems close monitoring necessary, the interval is 3 years. Otherwise, the maximum interval is 5 years.

- All findings and recommendations in the risk assessment report must be seriously treated to ensure lift safety. During the annual examination, the RLE should carefully review the findings and recommendations in the previous risk assessment report, and indicate whether the RP has taken follow-up actions. The RLE has a legal responsibility to judge whether the lift remains safe to use. If major safety concerns are found, lift services must be suspended in accordance with the Lifts and Escalators Ordinance (Cap. 618) until the RP has adopted necessary risk reduction measures. The RLE must also report lifts with high risk to the EMSD so that the EMSD can follow up in a timely manner.

7 Risk Assessment Report

7.1 The risk assessment report shall include the condition of lift equipment, assessment aspects, assessment basis, instruments and equipment used, the risk level of assessment items, risk reduction measures, assessment conclusions and relevant reference materials.

7.2 Risk Assessors shall discharge their duties properly and ensure that the RPs for each and every item are clearly specified in the risk assessment reports. The assessment reports shall bear the signatures of assessors and the people who edit, review and authorise the reports, as well as the special or official seals of assessment organisations.

7.3 The risk assessment report should include the conclusions and suggestions of the assessment aspects, and cover the risk level, existing problems, and risk reduction measures of the assessment items.

7.4 The Risk Assessor should describe and explain the report to the RP, summarizing each assessment area and providing recommendations.

7.5 A template of risk assessment reports is given in Annex E and the format may be adjusted according to the requirements of employers.

7.6 Upon completion of the risk assessment, the Risk Assessor must submit and upload the report to the Digital Log-books System for Lifts and Escalators. To enhance overall safety management efficiency, the EMSD has implemented the Digital Logbook System to manage risk assessments. Through this platform, lift RPs, contractors, and EMSD can record, manage, and analyze relevant data, facilitating joint monitoring of lift conditions by all three parties. The Risk Assessor is required to use the system platform to submit the report. Contractors can access the risk assessment report via the platform to effectively plan resources. By adopting this system, RPs can gain a deeper understanding of lift conditions, improving facility management effectiveness. Additionally, EMSD can utilize big data analytics to formulate strategies that enhance regulatory efficiency.

7.7 Conflicts between risk assessment and annual examination

In instances where discrepancies arise between risk assessment and annual examination, written query can submit to EMSD within thirty (30) days of the risk assessment. EMSD will require evidence and conduct an investigation. If issues persist, the suitability and accountability of the Risk Assessor will be rigorously evaluated.

Annex A

Level of Modernisation

The Risk Assessor may adjust the assessment items, contents and requirements in accordance with the actual site situation.

Table A.1. List of assessment items of level of modernisation

No.	Items	Points scored (50 Points)
1.1	Installed double brake system	8 Points
1.2	Installed unintended car movement protection device	8 Points
1.3	Installed ascending car overspeed protection device	8 Points
1.4	Installed car door mechanical lock and safety edge	8 Points
1.5	Installed intercom and CCTV system	6 Points
1.6	Installed obstruction switch to protect suspension ropes	6 Points
1.7	Installed automatic rescue device or post-voltage-dip-operation means or automatic rescue device with equivalent functions	6 Points
1.8	Installed remote monitoring device	Extra 10 Points

Annex B

Lift operation

The Risk Assessor may adjust the assessment items, contents and requirements in accordance with the actual site situation.

Table B.1. List of assessment items of lift operation

No.	Items	Points scored (50 Points)
1.1	Average duration of service suspension due to failure (hours per month in the past 24 months in average) The duration of lift service suspension due to failure includes any duration of lift service suspension due to equipment failure and emergency maintenance (excluding the duration of service suspension due to routine maintenance, annual examination, scheduled maintenance and major alteration) i) 0 ~ 20 hours ii) 21 ~ 40 hours iii) 41 ~ 60 hours iv) 61 ~ 80 hours v) More than 80 hours	 25 Points 18 Points 13 Points 8 Points 0 Point
1.2	Average arrival time for failure related to passenger entrapment (minutes per time in the past 24 months in average) i) 0 ~ 30 minutes ii) 31 ~ 40 minutes iii) 41 ~ 50 minutes iv) 51 ~ 60 minutes v) More than 60 minutes	 15 Points 10 Points 7 Points 4 Points 0 Point
1.3	Average arrival time for failure unrelated to passenger entrapment (hours per time in the past 24 months) i) 0 ~ 1 hour ii) 1 ~ 1.5 hours iii) 1.5 ~ 2 hours iv) 2 ~ 3 hours v) More than 3 hours	 10 Points 7 Points 5 Points 3 Points 0 Point

Annex C

Management of lift services

The Risk Assessor may adjust the assessment items, contents and requirements in accordance with the actual site situation.

Table C.1. List of assessment items of management of lift services

NO.	Items	Points scored (50 Points)
1.1	Ensure compliance of lift maintenance and examination with legal requirements (total 7 points) 1) The registered contractor has conducted periodic maintenance for the lift at intervals of not more than one month 2) The registered engineer has conducted periodic examination for the lift at intervals of not more than 12 months 3) Examination with load has been conducted at intervals of not more than five years 4) All the above three maintenance and examination items have been completed	 2 points 2 points 2 points 1 point
1.2	Frequently conduct inspections to oversee the condition of the lift (total 7 points) 1) Inspect the condition of the lift operation 2) Inspect the condition of floor displays 3) Inspect the condition of the buttons of each floor and lift car 4) Inspect the level of lift floor 5) Inspect the ventilation fan and lighting of the lift car 6) Conduct testing on the performance of CCTV 7) Conduct testing on the alarm	 1 point 1 point 1 point 1 point 1 point 1 point 1 point
1.3	Properly manage the contractors' work (total 5 points) 1) Maintenance works have been carried out as scheduled 2) Notifications have been issued regarding lift suspension for conducting routine examination and annual examination, etc., and a mechanism for checking the identity documents of engineering workers has been established 3) Storage space has been provided for lift contractors 4) Request has been made to lift contractors for submission of documents relating to emergency repair 5) Follow-up action has been taken or written response has been made regarding contractors' comments and quotations, and a checklist for spare parts for repair has been kept	 1 point 1 point 1 point 1 point 1 point
1.4	Verify the records in the log book (total 5 points) Ascertain whether the records in the log book on all dates bear the signature of the representative of Responsible Person 1) No omission of signature 2) Maintenance schedule drawn up 3) Conduct maintenance as scheduled	5 points
1.5	Hold regular meetings with contractors (total 2 points) Meet with contractors no less than once in every 6 months over the past 24 months	2 points

1.6	Appoint a professional lift consultant, a registered lift engineer or an in-house engineer employed by the property management company to examine the work of lift contractors (total 4 points) 1) Appoint a professional lift consultant, a registered lift engineer or an in-house engineer employed by the property management company to examine the work of lift contractors 2) Review the examination report and results with the contractors after examining their work 3) Follow up on the progress of the work mentioned in the report after examining the work of contractors	 1 point 1 point 2 points
1.7	Ensure the cleanliness of the lift machine room, shaft and pit (total 5 points) 1) Cleanliness of the machine room 2) Cleanliness of the lift car 3) Cleanliness of the lift shaft 4) Cleanliness of the car top 5) Cleanliness of the lift pit	 1 point 1 point 1 point 1 point 1 point
1.8	Immediately assist trapped lift passengers (total 5 points) 1) Display in the lift machine room guidelines for assisting trapped lift passengers 2) Keep documents containing the conversations made when pacifying trapped passengers 3) Keep records of drills 4) Provide training on assisting trapped lift passengers 5) Know about the records of trapping incidents and releasing trapped passengers in the log book	 1 point 1 point 1 point 1 point 1 point
1.9	Properly handle users' complaints (total 5 points) 1) Draw up service indicators for handling complaints 2) Provide training on handling users' complaints 3) Conduct drills on handling users' complaints 4) Keep complete records of complaints 5) Keep records of follow-up on complaints	 1 point 1 point 1 point 1 point 1 point
1.10	The comfort of lift passengers and quality of physical environment of the lift car (including ventilation system, cleanliness, lighting, etc.) (total 5 points) 1) No odour nuisance detected in the lift car 2) Good ventilation in the lift car 3) Good lighting in the lift car 4) Steady operation of the lift car 5) Cleanliness of the lift car	 1 point 1 point 1 point 1 point 1 point

Annex D

Lift and associated equipment or machinery

Notes:

i) Assessment grading

The assessment items were grouped into 11 parts including landing door and car door, car and counterweight, lift machine, etc. Assessment grading shall be given to each items, La, Lb or Lc:

- La means the assessment item is in good condition, the probability of failure/hazard is low, thus, the risk level is at acceptable range. Generally, no extra measures/works need to be conducted on top of the routine maintenance and existing practices.
- Lb means the assessment item is in fair condition. Although it is not in immediate danger status and lift still be operated safely, the item has room for improvement or need close monitoring. Follow up actions, such as repairing, overhaul, re-conditioning or monitoring, have to be planned and executed in a short time.
- Lc means the assessment item is failure and in unsafe working condition. Remedial actions have to be carried out before it resume its operation safely.

ii) The assessment item and assessment scope mentioned in the table is not exhaustive, Assessor shall adjust, add or delete the assessment details based on the actual site situation in order to reflect the risks and hazards on site and the corresponding follow up actions needed.

Note: Safety assessment personnel shall determine the risk level and risk category according to the method given in section 4.5 of GB/T 20900-2007, taking into comprehensive consideration the actual condition of the equipment (including failure frequency, service life, etc.), environment and other factors.

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
D.1 Lift well, machine rooms and pulley rooms							
1.1	Exclusive use of the well, machine and pulley rooms	La: The lift machine and its associated equipment are installed in a dedicated room.	①	3	E	III	Lift machine and pulley rooms shall only store associated parts and tools of lift at designated areas in order to minimise the potential risk of site to the labour.
		Lc: Equipment, such as cable ducts, cables, or devices not related to the lift, is present in the machine and pulley rooms.			D	II	
1.2	Lighting and power sockets	La: Electric lighting with an intensity of at least 200 lux at floor level in machine rooms and at least 50 lux at 1.0 m above the car roof and pit floor; power sockets in machine rooms and pulley rooms are in good condition.	②	3	E	III	Enhance the lighting intensity and install power sockets to fulfill the requirement.
		Lc: Electric lighting intensity is less than 200 lux at floor level in machine rooms; less than 50 lux at 1.0 m above the car roof and pit floor; or power sockets in machine rooms and pulley rooms are broken.			D	II	
1.3	Metal brackets or hooks installation	La: The metal brackets or hooks installed at machine room roof or beam are in good condition; the safe working load labeling is intact.	①	3	E	III	Regularly test and check the metal brackets or hooks and show the safety working load in the vicinity.
		Lc: The metal brackets or hooks installed at machine room roof or beam are damaged; or their safe working load labeling is not clear.			D	II	
1.4	Pit ladder	La: Pit ladder (provided while no other access to the pit) is intact.	①	3	E	III	Provide an intact pit ladder for the access of lift pit and ensure the ladder does not invade lift operation area.
		Lc: No pit ladder while no other access to the pit; or the ladder intrudes into the travel of the lift.			D	II	
1.5	Temperature control and ventilation	La: Ambient temperature of machine rooms is kept between 5~40 ℃; machine rooms have good ventilation, stale air extracted from other parts of the building is not directly discharged into the	②	3	E	III	Install proper ventilation to maintain the ambient temperature of machine rooms keep between 5~40℃

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
		machine rooms.					
		Lc: Ambient temperature of machine rooms is lower than 5℃ or higher than 40℃; or stale air extracted from other parts of the building is directly discharged into the machine rooms.			D	II	
1.6	Access to well, machine rooms and pulley rooms	La: Access to machine rooms and pulley rooms or access to emergency operation spaces and landing doors are clear, and no need to go through private space.	①	3	E	III	Ensure the machine rooms and pulley rooms or emergency operation spaces and landing doors are accessible.
		Lc: Access to machine rooms and pulley rooms or access to emergency operation spaces and landing doors are clear, and no need to pass through private space.			D	II	
1.7	Access doors, emergency doors, trap doors and inspection doors	La: When all the following requirements met: a) emergency doors do not open towards the inside of the well; b) doors be provided with a key-lock, capable of being closed and locked without a key; be openable from inside the well without a key; c) electrical safety devices installed to prove the closing status of the doors.	②	1	E	III	Modification of emergency doors, access trap doors, inspections doors as per the requirements.
		Lc: One or more than one of the following conditions exists: a) emergency doors open towards the inside of the well; b) doors not provided with a key-lock; or have to be closed and locked with a key; have to open with a key from inside the well if doors are locked; c) electrical safety devices to prove the closing status of the door have not been installed.			D	II	

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
1.8	Condition of access doors, emergency doors, trap doors & inspection doors	La: Door panels have good appearances, free of rust, perforation, or deformation; the door locks and surrounding have good appearances, door locks are firmly mounted.	②	3	E	III	Recondition of access and emergency door, access trap doors, inspection doors to fulfill the requirement.
		Lb: Door panels are severely corroded, perforated; or door panels are severely deformed; or door locks and surrounding are rusty; or door locks are not firmly mounted.			D	II	
1.9	Warning notice of machine rooms and pulley rooms	La: The warning notices on the outside of the machine room door are intact and clear.	②	3	E	III	Provide a clear and intact warning markings on the outside of the machine room door.
		Lc: The warning notices on the outside of the machine room door are damaged or difficult to identify.			D	II	
1.10	The gap between car door and the wall of well	La: There is a car door lock and the car door lock function is normal; or the horizontal distance between the inner surface of the well and the sill, door frame of the car or closing edge of car sliding doors does not exceed 0.15 m, over the full height of the well.	①	1	F	III	Installation of car door lock. If the car door lock is not installed, the functional test of door lock shall be conducted in all landing floors.
		Lc: There is no car door lock, or the car door lock is ineffective; and the horizontal distance between the inner surface of the well and the sill, door frame of the car or closing edge of car sliding doors exceeds 0.15 m, over the full height of the well.			D	I	
1.11	Protection of space accessible to people at the bottom of the	La: Counterweight buffers are mounted on solid piles extending to solid ground or safety gears on counterweights are provided.	①	1	F	III	Installation of counterweight safety gears if counterweight buffers are not mounted on solid piles.
		Lc: Counterweight buffers are not mounted on solid piles extending to solid ground nor safety gears are provided on counterweights.			D	II	

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	pit						
1.12	Well enclosed and protection	La: The well is totally enclosed except for the necessary openings.	①	2	F	III	To ensure that the lift well is totally enclosed except for the necessary openings.
		Lc: Openings other than the necessary ones exist.			C	I	
1.13	The guardrails of machine rooms with different floor levels	La: Guardrails of steps or stairs provided and intact, when the machine room floor comprises a number of levels differing by more than 0.50 m.	①	3	E	III	To provide guiderails of steps or stairs as per requirement.
		Lc: Guardrails of steps or stairs not provided or damaged, when the machine room floor comprises a number of levels differing by more than 0.50 m.			D	II	
1.14	Covers of recesses on machine room floor	La: Recesses with a depth of more than 0.05 m and a width between 0.05 m and 0.50 m wide on the floor of the machine rooms are covered.	①	3	E	III	To provide suitable covers of recesses on the floor of machine room.
		Lc: Recesses with a depth of more than 0.05 m and a width between 0.05 m and 0.50 m wide on the floor of the machine rooms are not covered.			D	II	
1.15	Openings on machine room floor	La: Flange protruding at least 50 mm above finished floor is adopted for the floor opening of the machine room.	①	2	F	III	To provide suitable covers of recesses on the floor of machine room.
		Lc: Flange is not adopted or the flange protruding less than 50 mm above finished floor for floor opening of the machine room.			D	II	
1.16	Noise of machine rooms	La: For lifts with a rated speed no more than 2.5 m/s, the average noise level in the machine room is less than 70 dB; for lifts with a rated speed more than 2.5 m/s, the average noise level in the machine room is less than 75 dB.	②	4	D	III	To check the moving parts in the machine room and carry out necessary rectification.
		Lb: For lifts with a rated speed no more than 2.5 m/s, the average			B	II	

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
		noise level in the machine room is between 70~80 dB; for lifts with a rated speed more than 2.5 m/s, the average noise level in the machine room is between 75~85 dB.					
		Lc: For lifts with a rated speed no more than 2.5 m/s, the average noise level in the machine room is higher than 80 dB; for lifts with a rated speed more than 2.5 m/s, the average noise level in the machine room is higher than 85 dB.			A	II	
1.17	Protection of rotation components	La: Effective protection against potentially hazardous and reachable rotating parts has been provided.	②	3	E	III	To provide suitable protective guard for rotation components.
		Lc: Effective protection against potentially hazardous and reachable rotating parts has not been provided or is damaged.			B	I	
1.18	Devices for emergency and test operations while the machine is in the well	La: Electric lighting intensity is not less than 200 lux at emergency operating panel; the intercom system, dynamic test devices, display devices showing the direction of the car, and display devices showing whether the car has reached the unlocking zone and the car moving speed are functioning normally.	②	2	F	III	To provide proper lighting, intercom system and associated devices for emergency and test operations while the machine is in the well.
		Lb: Electric lighting intensity at emergency operating pane is smaller than 200 lux.			E	II	
		Lc: The intercom system, dynamic test devices, display devices to show the direction of the car, and display devices to show whether the car has reached the unlocking zone and the car moving speed are functioning abnormally.			C	I	
D.2 Landing Door and Car Door							
2.1	Gap between	La: Gap between door panels is not more than 6 mm.	②	3	E	III	To adjust the gap between door panels

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	door panels of landing door and car door	Lb: Gap between door panels is not more than 10 mm.			C	II	of landing door and car door to fulfill the requirement.
		Lc: Gap between door panels is more than 10 mm.			B	I	
2.2	The horizontal distance between the car sill and the landing door sills	La: The horizontal distance between the car sill and the landing door sills does not exceed 35 mm.	②	3	E	III	To adjust the horizontal distance between the sill of the car and sill of the landing doors.
		Lc: The horizontal distance between the car sill and the landing door sills exceeds 35 mm.			C	II	
2.3	Corrosion of landing doors and car doors	La: The total corroded area of landing doors or car doors is less than 40 cm^2; or the partly pitting or "rust pit" areas smaller than 15 cm^2.	②	1	F	III	To recondition the landing doors or car doors to fulfill the requirement.
		Lb: The total corroded area of landing doors or car doors is between 40~100 cm^2; or the partly pitting or "rust pit" areas between 15~30 cm^2.			E	II	
		Lc: The total corroded area of landing doors or car doors is greater than 100 cm^2; or exist partly pitting or "rust pit" areas greater than 30 cm^2.			D	I	
2.4	Mechanical strength of landing doors and car doors	La: When a static force of 300 N, being evenly distributed over an area of 5 cm^2 at any part of the door panels when they are in the locked position, elastic deformation is less than 15 mm; no permanent deformation; and does not affect the opening and closing of the door.	②	1	F	III	To replace/ repair the landing doors and car doors to fulfill the requirement.
		Lc: Serious deformation occurs or fail in the strength test.			C	I	
2.5	Operation	La: Smooth opening and closing of landing doors and car doors.	②	3	E	III	To adjust the door operation

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	stability of landing doors and car doors	Lb: Shaking while opening and closing of landing doors or car doors;			C	II	mechanism to fulfill the requirement.
		Lc: Seriously shaking while opening and closing of landing doors or car doors; unstable operation speed; and cannot be repaired.			B	I	
2.6	Operation noise of landing doors and car doors	La: Noise level is not greater than 65 dB.	②	4	D	III	To adjust the door operation mechanism to fulfill the requirement.
		Lc: Noise level is greater than 65 dB.			C	II	
2.7	Door drive performances	La: Door drive works reliably.	①/② (see note 1 below)	4	E	III	To replace/ repair the door drive unit if necessary.
		Lc: Door drive works abnormally.			C	III/ II	
2.8	The engagement depth of the door gibs and sills (see note 2 below)	La: Engagement depth is not less than the design value of the manufacturer, or not less than 75% of the depth of the sill groove.	②	1	F	III	To adjust/ replace the door gibs to fulfill the requirement.
		Lc : Engagement depth is less than the design value of the manufacturer; if there is no design value of the manufacturer, it is less than 75% of the depth of the sill groove.			B	I	
2.9	Landing door sills	La: No fracture, welding cracks, severe abrasion, or corrosion occurs at landing door sills; no obvious deformation of sill groove.	②	1	F	III	To replace/ repair door landing door sills to fulfill the requirement.
		Lc: Fracture, welding cracks, severe abrasion, or corrosion occurs at landing door sills; or the door sill groove has deformed which affects the normal operation of the doors or leads to the derailment of the door gib.			C	I	
2.10	Door sliders	La: The door slider should be fixed and reliable, without obvious	②	3	D	III	To replace/ repair the door sliders to

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	abrasion and fixed	deformation, abrasion, rust and other defect.					fulfill the requirement.
		Lc: The door slider not fixed and reliable, severe deformation, abrasion, rust or other defect occurs.			E	II	
2.11	Sill support channels	La: No serious deformation or corrosion occurs on the sill support channels.	②	1	F	III	To replace/ repair the sills support channel to fulfill the requirement.
		Lc: Serious deformation or corrosion occurs on the sill support channels.			E	II	
2.12	Automatic closing device for landing door	La: Automatic closing device function reliable and effective.	②	1	F	III	To replace/ repair the automatic closing device for landing doors to fulfill the requirement.
		Lc: Automatic closing device function unreliable or not effective.			C	I	
2.13	The engagement depth of locking element of landing door and car door locking devices	La: The engagement depth is not less than 7 mm.	②	1	F	III	To replace/ repair the landing doors and car doors locking devices to fulfill the requirement.
		Lc: The engagement depth is less than 7 mm.			C	I	
2.14	Electric safety devices for verification of closing and locking of landing doors	La: Electric safety devices are intact and effective.	①/② (see note 1 below)	1	F	III	To replace/ repair the electric safety devices to ensure the locking devices for landing doors and car door are working properly.
		Lc: Electric safety devices are ineffective; or are damaged that may affect function.			A	I	

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	and car doors						
2.15	Door safety edge for automatic doors	La: Door safety edge is functioning effectively.	②	3	E	III	To replace/ repair the door safety edge to fulfill the requirement.
		Lc: Door safety edge is ineffective.			B	II	
2.16	Force to open the car doors in unlocking zone	La: Force to open the car doors is not greater than 300 N.	②	3	E	III	To adjust the door operation mechanism to fulfill the requirement.
		Lc: Force to open the car doors is greater than 300 N.			C	I	
2.17	Car door restrictor mechanism	La: Car door restrictor mechanism is effective.	②	1	F	III	To provide suitable car door restrictor mechanism to fulfill the requirement.
		Lc: Car door restrictor mechanism is ineffective or a car door restrictor mechanism is not provided.			D	I	
Note 1: ① refers to there is corresponding self-monitoring, ② refers to the absence of self-monitoring. **Note 2:** The assessment item can be marked as ※ Item.							
D.3 Car and counterweight							
3.1	Emergency alarm device	La: Emergency alarm device is intact, functioning effectively.	②	3	E	Ⅲ	To replace/ repair the emergency alarm device to fulfill the requirement.
		Lc: Emergency alarm device is ineffective.			C	Ⅱ	
3.2	Car closed circuit television	La: Car closed circuit television is working properly.	②	4	E	III	To install/ replace/ repair the CCTV system to fulfill the requirement.
		Lc: No car closed circuit television or car closed circuit television does not work properly.			C	II	
3.3	Car lighting	La: Electric lighting with an intensity of at least 100 lux on the car operation panels and 1 m above the floor.	②	3	E	Ⅲ	To modify the car lighting to fulfill the requirement.
		Lc: Electric lighting with an intensity of lower than 100 lux on the car operation panels or 1 m above the floor.			C	Ⅱ	
3.4	Car roof	La: Car roof balustrade intact; warning signs or notices for the	②	1	F	Ⅲ	To install/ repair the car roof balustrade

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	balustrade	danger of falling or leaning against the balustrade are clearly shown.					and provide suitable warning signs or notices.
		Lc: Car roof balustrade missing or damaged; warning signs or notices damaged.			B	Ⅰ	
3.5	Car roof inspection device	La: Car roof inspection device function is intact, normal and effective.	②	1	F	Ⅲ	To replace/ repair the car roof inspection device to fulfill the requirement.
		Lc: Car roof inspection device function is missing or ineffective.			A	Ⅰ	
3.6	Corrosion of car sling	La: No obvious corrosion.	②	1	F	Ⅲ	To repair/ recondition the car sling to fulfill the requirement.
		Lc: Corrosion over 1 mm, weld cracks, serious corrosion, etc.			E	Ⅱ	
3.7	Deformation of car sling	La: No obvious deformation.	②	2	F	Ⅲ	To replace/ repair the car sling to fulfill the requirement.
		Lc: The upper beam, lower beam and vertical beam of the car sling have deformation or multiple partial deformation.			E	Ⅱ	
3.8	Fastening of connection parts of car sling and aging of buffer rubber at bottom of car	La: The connection bolts on the car sling are firmly connected; the welding position of the car sling has no cracking; low degree aging of buffer rubber; no obvious deformation.	②	2	F	Ⅲ	To repair the connecting parts of car slings and replace the aging rubber buffers if necessary to fulfill the requirement.
		Lb: There are local connection loosening or slight cracks or other potential dangers.			E	Ⅱ	
		Lc: Obvious loosening or cracking at connection parts; obvious aging or deformation.			C	Ⅰ	
3.9	Corrosion of car body	La: No obvious corrosion.	②	2	F	Ⅲ	To replace/ recondition the car body to fulfill the requirement.
		Lc: The car walls and car roof are seriously corroded and perforated, or damaged and perforated, and the diameter of the perforation is greater than 10 mm.			C	Ⅰ	
3.10	Deformation of the car walls,	La: No obvious deformation, fracture, corrosion or perforation at the bottom of cars; no visible crack on glass car walls and car roof.	②	2	F	Ⅲ	To replace/ repair the car walls, car roof and the bottom of the car to fulfill the

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
	car roof and the bottom of the car	Lc: Serious deformation, fracture, corrosion or perforation at the bottom of the car; visible crack appears on glass car walls and car roof.			C	Ⅰ	requirement.
3.11	Car ceiling fixing	La: The decoration of the car ceiling is well fixed.	②	2	F	Ⅲ	To fix the decoration of the car ceiling firmly.
		Lc: The decoration fixing structure of the car ceiling is damaged and there is a risk of falling.			C	Ⅰ	
3.12	Car apron	La: The car apron is fixed firmly; no obvious corrosion.	②	1	F	Ⅲ	To replace/ recondition the car apron to fulfill the requirement.
		Lc: Car apron is not firmly fixed or serious corrosion appears.			E	Ⅱ	
3.13	Balance factor	La: Balance factor is between 0.4~0.5.	②/③ (see note below)	1	F	Ⅲ	To re-balance the lift system to fulfill the requirement.
		Lc: Balance factor is smaller than 0.4 or greater than 0.5.			B	Ⅰ	
3.14	Condition of counterweight sling	La: Counterweight structure is intact and in good condition.	②	1	F	Ⅲ	To replace/ repair the counterweight sling to fulfill the requirement.
		Lc: Serious deformation occurs at counterweight sling, rendering the guide shoes or counterweight safety gears cannot work properly; the deformation of straight beam and bottom beam of the counterweight sling cannot guarantee the reliable fixation of the counterweight blocks in the counterweight frame; unable to tighten the counterweight.			B	Ⅰ	
3.15	Corrosion of counterweight sling	La: No obvious corrosion is found on counterweight sling.	②	1	F	Ⅲ	To replace/ recondition the counterweight sling to fulfill the requirement.
		Lc: Counterweight sling was seriously corroded, the thickness of the cross-section of the major load-taking structure is corroded exceeding 10% of the design thickness.			B	Ⅰ	
3.16	Counterweight block	La: Counterweight blocks do not show obvious deformation or cracking, no damage to counterweight coating materials.	②	3	F	Ⅲ	To replace/ repair the counterweight to fulfill the requirement.

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
		Lc: Counterweight blocks show obvious serious deformation or cracking; counterweight coating is broken, and the inner material may leak out.			D	Ⅱ	
3.17	Counterweight protection screen in the pit	La: Counterweight protection screen in the pit are intact.	②	1	F	Ⅲ	To provide/ repair the counterweight protection devices in pit to fulfill the requirement.
		Lc: Counterweight protection screen in the pit is missing or damaged.			D	Ⅰ	
3.18	Counterweight guide shoes	La: Counterweight guide shoes do not show obvious deformation or cracking, abrasion quantity does not exceed the allowable design value.	②	3	F	Ⅲ	To replace/ repair the counterweight guide shoes to fulfill the requirement.
		Lc: Counterweight guide shoes show obvious deformation or cracking, or degree of abrasion exceeds the allowable design value.			D	Ⅱ	
Note: ② refers to the assessment project has counterweight blocks number identification or testing; ③ refers to the assessment project absence of counterweight blocks number identification and testing.							
D.4 Suspension means and Compensation Means							
4.1	Steel wire ropes abrasion	La: The diameter of the steel wire rope is not smaller than 94% of the nominal value.	②	1	F	Ⅲ	To replace the steel wire ropes to fulfill the requirement.
		Lb: The diameter of the steel wire rope is not smaller than 90% of the nominal value;			E	Ⅱ	
		Lc: The diameter of the steel wire rope is smaller than 90% of the nominal value.			D	Ⅰ	
4.2	Steel wire ropes	La: There is no cage shape distortion, strand extrusion, kink, partial flattening or bending of the steel wire ropes.	②	1	F	Ⅲ	To replace the steel wire ropes to fulfill the requirement.

<table>
<tr><th rowspan="2">Item No.</th><th rowspan="2">Assessment Item</th><th rowspan="2">Classification Index</th><th colspan="4">Reference Value of Risk Evaluation</th><th rowspan="2">Possible Recommendations as Improvement</th></tr>
<tr><th>Detectivity</th><th>Severity</th><th>Probability</th><th>Risk Categories</th></tr>
<tr><td></td><td>deformation or damage</td><td>Lc: There is cage shape distortion, strand extrusion, kink, partial flattening or bending of the steel wire ropes.</td><td></td><td></td><td>D</td><td>I</td><td></td></tr>
<tr><td rowspan="2">4.3</td><td rowspan="2">Steel wire ropes corrosion</td><td>La: No obvious corrosion on the steel wire rope is found.</td><td rowspan="2">②</td><td rowspan="2">1</td><td>F</td><td>Ⅲ</td><td rowspan="2">To replace the steel wire ropes to fulfill the requirement.</td></tr>
<tr><td>Lc: Steel wire ropes are seriously corroded and rust filled in the gap between the strands.</td><td>D</td><td>I</td></tr>
<tr><td>4.4</td><td>Steel wire ropes broken wires condition</td><td>
<table>
<tr><td rowspan="2">La: The number of broken wires of various forms in the outer strand of a wire rope in one lay length is less than or equal to the requirements in the following table:Broken wire form</td><td colspan="3">Steel wire rope types</td></tr>
<tr><td>6×19</td><td>8×19</td><td>9×19</td></tr>
<tr><td>Evenly distributed on the outer rope strand</td><td>≤12</td><td>≤15</td><td>≤17</td></tr>
<tr><td>Concentrated on one or two outer rope strands</td><td>≤6</td><td>≤8</td><td>≤9</td></tr>
<tr><td>Adjacent broken wires on an outer rope strand</td><td>≤3</td><td>≤3</td><td>≤3</td></tr>
<tr><td>Broken wires at valley</td><td>0</td><td>0</td><td>0</td></tr>
<tr><td colspan="4">Note: The reference length of the number of broken wires mentioned above is a rope lay, which is about 6d (d represents the nominal diameter of the wire rope).</td></tr>
</table>
</td><td>②/③ (see note below)</td><td>1</td><td>F</td><td>Ⅲ</td><td>To replace the steel wire ropes to fulfill the requirement.</td></tr>
</table>

<table>
<tr><th>Item No.</th><th>Assessment Item</th><th>Classification Index</th><th colspan="4">Reference Value of Risk Evaluation</th><th>Possible Recommendations as Improvement</th></tr>
<tr><th></th><th></th><th></th><th>Detectivity</th><th>Severity</th><th>Probability</th><th>Risk Categories</th><th></th></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="2">Lb: The number of broken wires of various forms in the outer strand of wire rope in one lay length is between the requirements in the following table:Broken wire form</td><td colspan="3">Steel wire rope types</td></tr>
<tr><td>6×19</td><td>8×19</td><td>9×19</td></tr>
<tr><td>Evenly distributed on the outer rope strand</td><td>13 - 24</td><td>16 - 30</td><td>18 -34</td></tr>
<tr><td>Concentrated on one or two outer rope strands</td><td>7-8</td><td>9-10</td><td>10-11</td></tr>
<tr><td>Adjacent broken wires on an outer rope strand</td><td>4</td><td>4</td><td>4</td></tr>
<tr><td>Broken wires at valley</td><td>1</td><td>1</td><td>1</td></tr>
<tr><td colspan="4">Note: The reference length of the number of broken wires mentioned above is a rope lay length, which is about 6d (d represents the nominal diameter of the wire rope).</td></tr>
</table>
</td><td></td><td></td><td>E</td><td>Ⅱ</td><td></td></tr>
<tr><td></td><td></td><td>
<table>
<tr><td rowspan="2">Lc: The number of broken wires of one of the various forms in the outer strand of wire rope in one lay length is more than the requirements in the following table:Broken wire form</td><td colspan="3">Steel wire rope types</td></tr>
<tr><td>6×19</td><td>8×19</td><td>9×19</td></tr>
<tr><td>Evenly distributed on the outer rope strand</td><td>>24</td><td>>30</td><td>>34</td></tr>
<tr><td>Concentrated on one or two outer rope strands</td><td>>8</td><td>>10</td><td>>11</td></tr>
<tr><td>Adjacent broken wires on an outer rope strand</td><td>>4</td><td>>4</td><td>>4</td></tr>
<tr><td>Broken wire form</td><td>>1</td><td>>1</td><td>>1</td></tr>
<tr><td colspan="4">Note: The reference length of the number of broken wires mentioned above is a rope lay, which is about 6d (d represents the nominal diameter of the wire rope).</td></tr>
</table>
</td><td></td><td></td><td>D</td><td>Ⅰ</td><td></td></tr>
</table>

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability	Risk Categories	
4.5	Damage of the coating of ropes (belts)	La: No deformation (such as bulging, cracking, indentation, crease, depression, etc.) observed in the coating layer, and no protrusion or exposure is observed in the carrier.	②	2	F	Ⅲ	To replace the coating ropes (belts) to fulfill the requirement.
		Lc: The coating layer is deformed (such as bulging, cracking, indentation, crease, depression, etc.), or the carrier is broken, protruded or exposed.			C	Ⅰ	
4.6	Reduction in the diameter or thickness of the coating of ropes (belts)	La: The measured diameter (measured thickness) relative to the nominal diameter (nominal thickness) of the coating of ropes (belts) did not reduce to the minimum allowable value provided by the manufacturer.	②	1	F	Ⅲ	To replace the coating ropes (belts) to fulfill the requirement.
		Lc: The measured diameter (measured thickness) relative to the nominal diameter (nominal thickness) of the coating of ropes (belts) have reduced to less than the minimum allowable value provided by the manufacturer;			D	Ⅰ	
4.7	Fastening of rope termination device	La: Ropes or belts fixed firmly, no looseness, double nuts, bolts and other means fixed firmly, or babbitt alloy casting well connected, no disc shape protrusion.	②	1	F	Ⅲ	To fix the termination of ropes or belts firmly to fulfill the requirement.
		Lc: Ropes or belts are not fixed firmly, babbitt alloy casting loosened.			D	Ⅰ	
4.8	Corrosion condition of rope termination device	La: No corrosion or slight surface corrosion exists at the rope terminations;	②	1	F	Ⅲ	To replace/ recondition the ropes/ belts termination devices to fulfill the requirement.
		Lb: The surface corrosion area of the rope terminations is large, or the partial corrosion is deep;			E	Ⅱ	
		Lc: The rope terminations are seriously corroded, affecting the load bearing ability.			D	Ⅰ	

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4.9	Whether the springs of the rope termination deformed and cracked	La: The springs have no obvious permanent deformation or crack.	②	1	F	Ⅲ	To replace the damaged springs to fulfill the requirement.
		Lc: Obvious deformation or crack defect is found on the springs.			E	Ⅱ	
4.10	The support of the rope terminations device	La: The support of the rope termination device has no obvious deformation or corrosion.	②	1	F	Ⅲ	To replace/ repair the support of the end device to fulfill the requirement.
		Lc: The support of the rope termination device shows severe deformation or corrosion.			D	Ⅰ	
4.11	Diverter pulleys and its supporting device	La: Diverter pulleys and its supporting devices are intact.	②	1	F	Ⅲ	To replace/ repair the diverter pulleys and its supporting devices to fulfill the requirement.
		Lc: Diverter pulleys and its supporting devices show serious deformation or obvious crack. Grooves of plastic diverter pulleys are broken.			D	Ⅰ	
4.12	Compensating chains (ropes)	La: For coated compensation chains (ropes), no peeling, serious cracking, or abrasion of the coating material; for un-coated compensation chains, no serious corrosion or weld detachment at the chain rings.	②	1	F	Ⅲ	To replace the compensating chains (ropes) if necessary to fulfill the requirement.
		Lc: For coated compensation chains (ropes), peeling, serious cracking, or abrasion of the coating material occurs; for un-coated compensation chains, serious corrosion or weld detachment at the chain rings occur;			D	Ⅰ	
4.13	Compensating chains (ropes) guide device	La: No obvious deformation or defect of the guide rollers.	②	1	F	Ⅲ	To replace/ recondition the compensating chains (ropes) guide device if necessary to fulfill the
		Lc: Guide rollers show deformation, defect, severe abrasion or blockage.			E	Ⅱ	

Item No.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
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							requirement.
Note: ② refers to the inner layer broken wire cannot be found, maintenance has broken wire detection requirements; ③ refers to there is no broken wire detection requirements in maintenance.							

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D.5 Essential Safety Devices							
5.1	Safety gears operation reliability	La: Smooth and reliable action; can pass the overspeed governor - safety gear linkage test.	②	1	F	III	To re-adjust/ repair the safety gears and associated linkages to fulfill the requirement.
		Lc: Unreliable action; fail in the overspeed governor - safety gear linkage test.			D	I	
5.2	Safety gears braking capacity and deceleration	La: Safety gear is tested at inspection/reduced speed according to "Code of Practice for Lift Works and Escalator Works". Alternatively, Safety gears shall be able to stop the descending car with rated load or counterweight when it reaches the speed of the overspeed governor; or to clamp the guide rail to stop the car or counterweight when the suspension is broken. The average deceleration of progressive safety gears should be between 0.2gn~1.0gn. *The full load and full speed test could be refer to"Code of Practice for Lift Works and Escalator Works"	②/③ (see note 1 below)	1	C	III	To re-adjust/ repair the safety gears and associated linkages to fulfill the requirement.
		Lc: Safety gears are not able to stop the descending car at inspection/reduced speed according to "Code of Practice for Lift Works and Escalator Works" or with rated load or counterweight			D	I	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		when it reaches the speed of the overspeed governor; or not able to clamp the guide rail to stop the car or counterweight when the suspension is broken. The average deceleration of progressive safety gears is small than 0.2gn or larger than 1.0gn. *The full load and full speed test could be refer to"Code of Practice for Lift Works and Escalator Works"					
5.3	Agility of safety gears	La: Components action is smooth.	②	1	F	III	To re-adjust/ repair the safety gears and associated linkages to fulfill the requirement.
		Lb: Slightly resisted while components are in action.			E	II	
		Lc: Seriously resisted while components are in action.			D	I	
5.4	Levelness of car after safety gears activation	La: Car becomes levelled without obvious tilting after safety gears activation.	②	2	E	III	To re-adjust/ repair the safety gears and associated linkages to fulfill the requirement.
		Lc: Car tilts after safety gears activation.			D	II	
5.5	Consistency of gap between safety gear wedges and guide rail working surfaces	La: Good consistency at gaps between safety gear wedges and guide rail working surfaces.	②	2	E	III	To re-adjust/ repair the safety gears and associated linkages to fulfill the requirement.
		Lc: Obvious deviation is founded at gaps between safety gear wedges and guide rail working surfaces.			D	II	
5.6	Reliability of overspeed governor action	La: When all the following requirements met: 1) rope clamping mechanism can clamp the rope tightly; 2) gap between clamps and overspeed governor rope should not be larger than 3 mm (or the designed value of manufacturer); 3) the tripping speed of the overspeed governor meets the requirements; 4) the safety switch on the overspeed governor is effective.	②	1	F	III	To re-adjust/ repair the overspeed governor to fulfill the requirement.

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		Lc: One of the following conditions exists: 1) rope clamping mechanism cannot clamp the rope tightly, which cannot ensure triggering of the safety gears; 2) gap between clamps and overspeed governor rope cannot be maintained to less than 3 mm (or the designed value of manufacturer); 3) the tripping speed of the overspeed governor does not meet the requirements; 4) the safety switch on the overspeed governor is ineffective.			D	I	
5.7	Lubrication of overspeed governor rotating parts	La: Rotating parts are well lubricated.	②	1	F	III	To lubricate the rotating parts of overspeed governor to fulfill the requirement.
		Lc: Rotating parts show serious blockage.			D	I	
5.8	Overspeed governor protection guards	La: Protection guard is provided.	②	2	E	III	To provide suitable protection devices for overspeed governor to fulfill the requirement.
		Lc: Protection guard is missing or broken.			D	II	
5.9	Abrasion of overspeed governor steel wire ropes	La: Steel wire ropes diameter is not smaller than 94% of the nominal value.	②	1	F	III	To replace the governor steel wire rope to fulfill the requirement.
		Lb: Steel wire ropes diameter is not smaller than 90% of the nominal value.			E	II	
		Lc: Steel wire ropes diameter is smaller than 90% of the nominal value.			D	I	
5.10	Tensioning device of overspeed governor	La: Tensioning device intact; tension check switch is intact and effective.	②	1	F	III	To replace/ repair the tensioning device of overspeed governor to fulfill the requirement.
		Lc: One of the following conditions exists: 1) The tensioning pulleys are deformed or cracked; 2) bearings of tensioning pulleys shaft broken;			D	I	

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		3) defect or serious abrasion of ropes groove of tensioning pulleys; 4) mechanical structure of the tensioning device is seriously deformed; 5) tension check switch damaged or dysfunctional.					
5.11	Presence of ascending car overspeed protection means	La: Ascending car overspeed protection means is equipped.	②	1	F	III	To install ascending car overspeed protection device to fulfill the requirement.
		Lc: Did not equipped with ascending car overspeed protection means.			D	I	
5.12	Reliability of ascending car overspeed protection means	La: smooth and reliable action; can effectively stop empty car ascending at rated speed.	②/③ (see note 2 below)	1	F	III	To check and test to ensure the ascending car ovespeed protection device is functioning properly.
		Lc: Unsmooth action or ineffective; cannot effectively stop empty car ascending at rated speed.			D	I	
5.13	Presence of unintended car movement protection means	La: Unintended car movement protection means is equipped.	②	1	F	III	To install unintended car movement protection device to fulfill the requirement.
		Lc: Did not equipped with unintended car movement protection means.			D	I	
5.14	Reliability of unintended car movement protection means	La: Smooth and reliable action; the travel distance at the test speed is not larger than the allowable design value;	②/③ (see note 2 below)	1	F	III	To check and test to ensure the unintended car movement protection device is functioning properly.
		Lc: Unsmooth action or ineffective; the travel distance at the test speed is larger than the allowable design value.			D	I	
5.15	Abrasion of brake linings	La: The abrasion of brake linings does not exceed the limiting value of design manual;	②/③ (see note 3 below)	1	F	III	To check/ test and replace (if necessary) the brake linings to ensure the brake system is functioning properly.
		Lc: The abrasion of brake linings does exceed the limiting value of design manual.			D	I	

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5.16	'Star delta (motor)' protection function (if any)	La: 'Star delta (motor)' protection function is effective.	②/③ (see note 4 below)	2	F	III	To equip with star sealing protection function to fulfill the requirement.
		Lc: 'Star delta (motor)' protection function is ineffective.			E	II	
Note 1: ② refers to there is a load test in the last five years; ③ refers to there is no load test in the last five years. **Note 2:** ② refers to holding test in the periodical inspection test; ③ refers to no test in the periodical inspection test. **Note 3:** ② refers to the rope clip device is not used; ③ refers to rope clip device has been used. **Note 4:** ② means that the project is included in the maintenance inspection project; ③ means that the project is not included in the maintenance inspection project.							
D.6 Guide Rail							
6.1	Damage of guide rails	La: No obviously damage on guide rail surface.	②	3	E	III	To repair/ replace of guide rails to fulfill the requirement.
		Lb: Partial corrosion on the guide rails.			D	II	
		Lc: Severe mechanical damage on guide rail surface.			B	I	
6.2	Alignment and distortion of guide rails	La: The alignment of guide rails are good.	②	3	F	III	To repair/ replace of guide rails to fulfill the requirement.
		Lc: Distortion exists on whole or part of guide rails.			D	II	
6.3	Cleanliness of guide rails' working surfaces	La: No dust and scum is found on the guide rail working surfaces;	②	3	F	III	To clean the guide rails working surfaces to fulfill the requirement.
		Lc: Oil stain and dust is accumulated on the guide rail working surfaces, which affects the operation of guide shoes.			D	II	
6.4	Fasteners on guide rails	La: Guide rail clips are fastened; the guide rail brackets are intact.	②	3	F	III	To check the guide rails brackets are intact and the guide rails are fixed firmly to the bracket.
		Lc: The fixing bolts of guide rail clips are loose, or the guide rail brackets are seriously deformed, show weld detachment or crack.			D	II	
6.5		La: For sliding guide shoes, lubrication of guide shoes and guide rails contact surfaces are sufficient; For roller guide shoes, no	②	4	D	III	

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	Lubrication condition of guide shoes	lubrication on the guide rails surfaces, unless special lubrication arrangement according to maunfacturer requirement.					For sliding guide shoes, to adjust and lubricate the guide shoes to fulfill the requirement. For roller guide shoes, to ensure there is no lubrication on the guide rails surfaces.
		Lc: For sliding guide shoes, guide shoes and guide rail contact surfaces are lack of lubrication; For roller guide shoes, presence of lubrication on the guide rail surfaces unless special lubrication arrangement according to maunfacturer requirement			B	II	
6.6	Cleanliness of shoe lining	La: No dust and scum.	②	4	D	III	To clean/ replace the shoe lining to fulfill the requirement.
		Lc: Oil stain and dust accumulated on the contact surfaces of guide rails and guide shoes, which affects the operation of guide shoes.			B	II	
D.7 Buffers							
7.1	Reliable fixing of buffers	La: Buffers are fixed firmly, no obvious inclination.	②	1	F	III	To fix the buffers firmly to the ground and ensure that there is no obvious inclination.
		Lc: Buffers are not fixed firmly; inclination appears.			C	I	
7.2	Oil level and leakage of hydraulic buffers	La: Oil level is above the lowest oil level line; no obvious hydraulic oil leakage.	②	1	F	III	To check/ add oil to ensure the oil level keeps above the lowest oil level line and repair oil leakage if necessary.
		Lc: Oil level too low, or obvious hydraulic oil leakage.			C	I	
7.3	Effectiveness of hydraulic buffer reset checking switches	La: Reset checking switches intact, functions effectively.	①	1	F	III	To check and test the hydraulic buffer rest check switches are fulfilling the requirement.
		Lc: Reset checking switches are broken or ineffective.			D	II	
7.4	Effectiveness of hydraulic buffer reset function	La: Buffers can reset properly.	①	1	F	III	To check and test the hydraulic buffers to ensure the reset function works properly.
		Lc: Buffers cannot reset properly.			C	I	

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7.5	Deformation and corrosion of spring buffers	La: Spring buffers have no serious corrosion or crack, no obvious permanent deformation.	②	1	F	III	To check/ replace the buffer springs to fulfill the requirement.
		Lc: Spring buffers are seriously corroded or cracked, permanent deformation or damage occurs after action.			C	I	
7.6	Aging of nonlinear buffers	La: Use within expiry date; or non-metallic materials do not show cracking, peeling, and other aging phenomenon; the buffers are intact after action.	②/③ (see note below)	1	F	III	To replace nonlinear buffers timely to fulfill the requirement.
		Lc: Use beyond expiry date; or non-metallic materials show aging phenomenon like cracking, peeling; damage after action.			C	I	
Note: ② refers to non-metallic materials have an expiry date mark and are within the expiry date; ③refers to non-metallic materials have no expiry date mark or are still in use beyond the expiry date.							
D.8 Machinery and associated equipment							
8.1	Insulation resistance of motor's stator winding	La: The cold insulation resistance larger than 5.5 MΩ, and the hot insulation resistance larger than 0.55 MΩ.	②/③ (see note 1 below)	3	F	III	To test the insulation resistance of motors' stator winding and repair if necessary to fulfill the requirement.
		Lb: The cold insulation resistance between 5.0~5.5 MΩ, and the hot insulation resistance between 0.5~0.55 MΩ.			D	II	
		Lc: The cold insulation resistance smaller than 5.0 MΩ, and the hot insulation resistance smaller than 0.5 MΩ.			B	I	
8.2	Smooth running performance of motor	La: No obvious abnormal vibration.	②	3	E	III	To check and repair if necessary to ensure the motor is running smoothly and no obviously abnormal vibration is present.
		Lb: Has abnormal vibration.			D	II	
		Lc: Has serious abnormal vibration.			B	I	
8.3	Motor bearing condition	La: No abnormal noise.	②	3	E	III	
		Lb: Have slight abnormal noise.			D	II	

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		Lc: Have comparatively large abnormal noise.			B	I	To check and repair if necessary to the motor bearings and ensure that there is no abnormal noise.
8.4	Protection of motors	La: Motor short circuit protection, overload protection and overheating protection are effective.	③	3	F	III	To check the motor short circuit protection, overload protection and overheating protection are functioning properly.
		Lc: Motor short circuit protection, overload protection or overheating protection is ineffective.			D	II	
8.5	Encoder	La: The encoder (if any) is well shielded from interference and mechanically protected.	②	3	E	III	To check and ensure that the encoder is well shielded from interference and mechanically protected.
		Lc: The encoder (if any) interference shielding devices or mechanical protection is broken.			D	II	
8.6	Gearbox casing	La: Gearbox casing is in good condition, free of visible crack.	②	1	F	III	To replace/ repair the gear box if visible crack is present.
		Lc: Gearbox casing has visible crack.			D	I	
8.7	Structural integrity of gearbox	La: Structure of the gearbox is intact.	③	2	F	III	To replace/ repair the gears if broken teeth is found. To replace the gearbox if fatigue cracks is present on the gear pairs or the spindle.
		Lb: The gear pair of the gearbox has great abrasion, and lift reversing will lead to gear pair impact.			E	II	
		Lc: The gear pair has broken teeth, defect of gear pair, the spindle has fatigue cracks, etc.			C	I	
8.8	Gearbox bearings working condition	La: No abnormal noise.	②	2	F	III	To repair/ replace the gearbox bearings if abnormal noise is generated from the gearbox. If the gear box did not replaced, additional maintenance for gear gap inspection shall be conducted
		Lb: Have slight abnormal noise.			E	II	
		Lc: Have comparatively large abnormal noise.			C	I	

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							in half-year basis (變速器齒輪咬合隙縫檢查).
8.9	Degree of oil leakage of gearbox	La: Light, no oil leakage and no diffusion.	②	3	F	III	To repair the oil seals/ gaskets of gearbox to fulfill the requirement.
		Lb: Medium, large area of oil leakage, no continuous oil dropping condition.			D	II	
		Lc: Serious, very large area of oil leakage, significant continuing oil leakage exists.			B	I	
8.10	Gearbox oil quality	La: Adequate oil, clear oil, no impurities, no deterioration.	②	4	E	III	To replace the gearbox oil timely to fulfill the requirement.
		Lc: Small amount of impurities exists in the gearbox oil.			C	II	
8.11	Operation state of the gearbox	La: The vibration amplitude is less than 4.6 mm/s.	②/③ (see note 1 below)	3	F	III	To recondition / repair the gearbox to ensure the vibration amplitude is within the required limit.
		Lb: The vibration amplitude is larger than 4.6 mm/s and less than 11.2 mm/s.			D	II	
		Lc: The vibration amplitude is larger than 11.2 mm/s.			B	I	
8.12	Couplings metal fatigue	La: Coupling retainer, pin and other components are intact, metal parts without cracks, deformation and obvious abrasion.	③	2	F	III	To check and replace if necessary the coupling metals to fulfill the requirement.
		Lc: Visible cracks, deformation or abrasion marks are found in the coupling metal parts.			B	I	
8.13	Couplings connection	La: No vibration, shock or noise while couplings are in operation.	②	2	F	III	To check and repair if necessary to ensure the couplings connection are working properly.
		Lc: Obvious vibration, shock and noise occur while couplings are in operation.			D	II	
8.14	Coupling appearance	La: The non-metallic element of elastic coupling does not show excessive abrasion, cracking, serious deformation and aging.	②	2	F	III	To check and replace if necessary to ensure the elastic coupling is working properly.
		Lc: The non-metallic element of elastic coupling shows excessive abrasion, cracking, serious deformation and aging.			B	I	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
8.15	Abrasion condition of rope grooves of traction sheaves and diverter pulleys	La: Rope grooves do not show obvious abrasion.	②	1	F	III	To check the condition of rope grooves of traction sheaves/ guide sheaves and replace the sheaves if necessary.
		Lb: Ropes grooves have comparatively large abrasion and powder, but no change in the profile of rope' grooves.			E	II	
		Lc: Rope groove profile changed due to abrasion.			B	I	
8.16	Structural integrity of traction sheaves and diverter pulleys	La: No visible crack defect in the traction sheave's structure.	②	1	F	III	To check the condition of rope grooves of traction sheaves/ guide sheaves and replace the sheaves if necessary.
		Lb: Corrosion and slight defect is found on the traction sheave.			E	II	
		Lc: Cracks or large defects are found on the traction sheaves.			B	I	
8.17	Traction sheave running stability	La: Traction sheave operates smoothly, no shaking.	②	3	F	III	To check the traction sheaves are operating smoothly and repair/ replace the traction sheaves if necessary.
		Lb: Traction sheave shakes slightly while in operation.			D	II	
		Lc: Traction sheave shakes significantly while in operation and cannot be repaired.			B	I	
8.18	Traction wheel bearing	La: No abnormal noise.	②	2	F	III	To check the traction wheel bearings are operating smoothly and repair/ replace the bearings if necessary.
		Lb: Have slight abnormal noise.			E	II	
		Lc: Have comparatively large abnormal noise.			C	I	
8.19	Brakes performances	La: Good braking performances, can reliably stop the descending car with 125% of rated load.	②/③ (see note 2 below)	1	F	III	To repair/ re-adjust the brake system to fulfill the requirement.
		Lc: Cannot reliably stop the descending car with 125% of rated load.			C	I	
8.20	Brake types	La: Mechanical parts of the brake are in two groups.	②	1	F	III	To install double brake system.
		Lc: Mechanical parts of the brake are in a single group.			C	I	
8.21	Brakes operating condition	La: Smooth action; maintenance of non-disassembly brakes are conducted by way of disassembly according to the requirements	①/③ (see	1	F	III	To check the brake operating condition and ensure proper

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		of the operation manual; disassembly-free brakes are used within their service life;	note 3 below)				maintenance are carried out timely.
		Lc: Abnormal action; or maintenance of non-disassembly brakes are not conducted by way of disassembly according to the requirements of the operation manual; or disassembly-free brakes are used in excess of their service life.			D	Ⅱ/Ⅰ	
8.22	Brake friction pair working condition	La: When the brakes are closed, the braking surfaces fit evenly, and is clear when the brakes open.	②	1	F	Ⅲ	To repair/ re-adjust the braking system to fulfill the requirement.
		Lc: When the brakes are closed, the braking surfaces are not uniform, and the braking surfaces touch when the brakes open.			E	Ⅱ	
8.23	Synchronization of two brake shoes	La: Synchronization is good.	②	1	F	Ⅲ	To repair/ re-adjust the braking system to fulfill the requirement.
		Lb: Slightly out of synchronization.			E	Ⅱ	
		Lc: Seriously out of synchronization.			B	Ⅰ	
8.24	The surfaces of brake drum and brake shoe linings	La: The surfaces of brake drum and brake shoe linings are clean and free of scratches.	②/③ (see note 1 below)	1	F	Ⅲ	To clean/ repair the surfaces of brake wheel and brake shoe linings to fulfill the requirement.
		Lb: Small number of scratches or high temperature burnt particles exist, no oil stains.			E	Ⅱ	
		Lc: Large number of high temperature burnt particles, oil stains, etc.			B	Ⅰ	
8.25	Brake shoes abrasion condition	La: Abrasion of brake shoes is small and even.	②	1	F	Ⅲ	To replace the brake linings if necessary to fulfill the requirement.
		Lc: Defect or abrasion of brake shoes reach the discard conditions specified by the manufacturer.			B	Ⅰ	
8.26		La: Insulation resistance is larger than 0.55 MΩ.		1	F	Ⅲ	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
	Insulation resistance of brake electro-magnetic coil connector	Lb: Insulation resistance is between 0.5~0.55 MΩ.	②/③ (see note 1 below)		E	II	To check/ test the insulation resistance of the brake coil and carry out necessary repair/ replace works to fulfill the requirement.
		Lc: Insulation resistance is smaller than 0.5 MΩ.			B	I	
8.27	Temperature rise of the coils	La: Temperature rise of Class B insulated coil is less than 70 K; Temperature rise of Class F insulated coil is less than 95 K.	②/③ (see note 1 below)	2	F	III	To check/ test the temperature rises of the brake coil and carry out necessary repair/ replace works to fulfill the requirement.
		Lb: Temperature rise of Class B insulated coil is between 70~80 K; Temperature rise of Class F insulated coil is between 95~105 K.			E	II	
		Lc: Temperature rise of Class B insulated coil is larger than 80 K; Temperature rise of Class F insulated coil is larger than 105 K.			C	I	
8.28	Self-monitoring of brake action or braking force	La: Brakes have action and self-monitoring function of braking force; and the monitoring function is effective.	①/②/③(see note 4 below)	2	F	III	To install brake monitoring switches and ensure they are functioning properly.
		Lc: No brake action or self-monitoring of braking force, or the monitoring function is ineffective.			D	II	
8.29	Emergency rescue operation devices	La: The emergency rescue operation devices are complete and intact; the electrical safety devices for checking the state of the hand winding wheels are effective.	②	2	F	III	To check/ test the emergency rescue operation devices and carry out necessary repair works to ensure that they are functioning properly.
		Lc: The emergency rescue operation devices are incomplete or ineffective; the electrical safety devices for checking the state of the hand winding wheels are ineffective.			D	II	
8.30	Signage of Emergency rescue devices	La: The instructions of emergency rescue procedures are clearly displayed, and the signs such as hand winding direction and levelling signs are clearly displayed.	②	2	F	III	To provide clearly visible instructions and signs of emergency rescue procedures.

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		Lc: The instructions of emergency rescue procedures are missing or not clearly displayed, and the signs such as hand winding direction and levelling signs not provided or not clearly displayed.			D	II	
8.31	Manual brake release devices	La: No serious corrosion, deformation or crack in the brake release wrench; no serious corrosion, stuck or fracture in the brake release steel wire ropes.	②	2	F	III	To repair/ recondition the manual brake release devices and ensure that they can perform their intended function.
		Lc: Serious corrosion, deformation or crack occur in the brake release wrench; serious corrosion, stuck or fracture occur in the brake release steel wire ropes.			D	II	
8.32	Manual brake release device structure	La: Each group of brake parts release device is separately arranged; or when multiple groups of brake components share a set of release device, manual release lever will not rotate with magnetic field changes.	②	1	F	III	To repair/ recondition the manual brake release devices and ensure that they can perform their intended function.
		Lc: Multiple groups of brake parts share one set of release device, and the manual release lever may rotate with magnetic field changes.			D	I	
8.33	Position check of the detachable hand winding wheels	La: For detachable hand winding wheels, an electrical safety device is provided to check their position, and the electrical safety device functions normally and effectively.	②	2	F	III	To install an electrical safety device for detachable hand winding wheels.
		Lc: For detachable hand winding wheels, no electrical safety device provided for checking their position, or the electrical safety device functions is ineffective.			D	II	
8.34	Manual winding devices	La: No serious corrosion, deformation, crack or defect on the hand winding wheels , no crack in the welding part; effective meshing of the gear pair; no crack or broken tooth in the gear.	②	2	F	III	To repair/ recondition the manual winding devices and ensure that

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		Lc: Serious corrosion, deformation, crack or defect on the hand winding wheels; cracks occur in the welded part; meshing gear pair cracks or have broken teeth.			D	II	they can perform their intended function.
8.35	Emergency power device	La: The emergency power supply battery is intact and in normal output voltage.	①/③ (see note 5 below)	2	F	III	To check/test the emergency power device and carry out necessary repair/ replacement works to fulfill the requirement.
		Lc: Battery fluid leakage occurs; output voltage is significantly lower than the normal working voltage after charging.			D	II / I	
Note 1: ② means that the project is included in the maintenance inspection project; ③ means that the project is not included in the maintenance inspection project. **Note 2:** ② refers to there is brake test in the last five years; ③ refers to there is no brake test in the last five years. **Note 3:** ② refers to the movement monitoring is normal; ③ refers to movement monitoring is not effective. **Note 4:** ① refers to the movement monitoring cannot be cancelled; ② refers to the movement monitoring can be cancelled; ③ refers to no braking validation method. **Note 5:** ① refers to there is automatic electricity power monitoring; ③ refers to there is no automatic electricity power monitoring.							
D.9 Electrical installations							
9.1	Main loop supply voltage	La: The fluctuation value of the main loop supply voltage relative to the rated voltage does not exceed ±7%.	①/③ (see note 1 below)	4	D	III	To check/ test the main loop supply voltage is fulfilling the requirement.
		Lc: The fluctuation value of the main loop supply voltage relative to the rated voltage exceed ±7%.			A	II	
9.2	Main switches	La: Main switches can cut off the power supply reliably during the operation of the lift.	②	1	F	III	To check/ test the main switches and carry out necessary repairing / replacement works to fulfill the requirement.
		Lc: Main switches cannot cut off the power supply reliably during the operation of the lift.			C	I	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
9.3	Earthing condition	La: All earthing cables and earthing terminal are properly connected.	②/③ (see note 2 below)	1	F	III	To check/ test the earthing condition and carry out necessary repairing / replacement works to fulfill the requirement.
		Lc: Earthing cables exist broken or loosen condition or earthing terminal loosen.			E	II	
9.4	Travelling cables	La: The travelling cables do not appear serious deformation or distortion, sheath does not open.	②	4	D	III	To check condition of travelling cables and carry out necessary repairing / replacement works to fulfill the requirement.
		Lc: The travelling cables seriously deformed or distorted, or sheath crack causing the core exposed.			A	II	
9.5	Insulated shell	La: Live parts with non-safety voltage (such as safety switch, frequency converter, etc.) insulation shell is intact.	②	1	F	III	To check the insulation shell of live parts with non-safety voltage are intact and carry out necessary repairing / replacement works to fulfill the requirement.
		Lc: Live parts with non-safety voltage (such as safety switch, frequency converter, etc.) insulation shell is badly damaged.			D	I	
9.6	Electric safety chain grounding protection device	La: Electric safety chain grounding protection device function is normal.	②	1	F	III	To check/ test the electric safety chain grounding protection device and carry out necessary repairing / replacement works to fulfill the requirement.
		Lc: Electric safety chain grounding protection device function lose efficacy.			E	II	
Note 1: ① refers to there is automatic monitoring; ③ refers to there is no automatic monitoring. **Note 2:** ② refers to there is automatic monitoring; ③ refers to there is no automatic monitoring.							
D.10 Electronic control system							
10.1	Frequency inverter	La: Frequency inverter intact, no abnormal.	②	3	E	III	To check the frequency converter is intact and function properly and carry out repairing/ replacement
		Lc: One of the following situations occurs in frequency inverter:			D	II	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		1) The copper skin of main circuit board of input and output is broken; 2) The capacitor of DC bus bulges, leaks, or burns out obviously; 3) Severe overheat deformation, arc oxidation or corrosion of input or output terminals and copper bars of brake units and brake resistors.					works if necessary to fulfill the requirement.
10.2	Phase protection function	La: Phase protection is functioning effectively.	②	3	E	III	To check/ test the phase sequence protection device is function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Phase protection is ineffective.			D	II	
10.3	Contactors	La: Contactor is intact, function normal.	②	3	E	III	To check/ test the contactors are function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: One of the following situations occurs: 1) Casing broken; 2) When the coil circuit is opened or closed, the contactors cannot close or disconnect correctly and reliably; 3) Contactors serious abrasion or corrosion; 4) Electromagnetic noise is very loud and cannot be reduced.			D	II	
10.4	Control cabinets	La: Control cabinets are intact, function normal.	③	3	F	III	To check control cabinet is intact and carry out repairing/ reconditioning works if necessary to fulfill the requirement.
		Lc: One of the following situations occurs: 1) Control cabinets body is seriously corroded, deformed and damaged, resulting in the components in the cabinet cannot be fixed and functioning properly; 2) Electrical elements inside the control cabinet are ineffective hindering operation of the lift. Cannot be replaced with			D	II	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		components of the same specifications, or cannot work properly even after replacement of components.					
10.5	Sensors and detection switches	La: Sensors and detection switches are intact, function normal.	①/③ (see note 1 below)	3	F	III	To check/ test the sensors and detection switches are function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: One of the following situations occurs in sensors or detection switches: 1) Abnormal output signal, causing malfunction or mis-operation; 2) Casing seriously broken or deformed.			D	III/ II	
10.6	Levelling accuracy	La: Levelling accuracy of every floors not larger than 10 mm.	②	3	E	III	To check the levelling accuracy of each landing is within the required range and carry out repairing works if necessary to fulfill the requirement.
		Lc: Levelling accuracy of some floors larger than 10 mm.			D	II	
10.7	Floor control system functions	La: All devices are normal.	①/② (see note 2 below)	3	E	III	To test and floor control system is function properly and carry out repairing works if necessary to fulfill the requirement.
		Lc: Some floors display are abnormal or cannot answer the calls.			D	III/ II	
10.8	Safety switches	La: Safety switches intact, function normal.	②	1	F	III	To check/ test the safety switches are function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lb: Contracts seriously corroded, affect normal operation; or contacts are seriously burnt out or contact is poor.			D	II	
		Lc: Structural failure of drive safety switches; or the mechanical device that triggers safety switches are ineffective.			D	I	
10.9	Overload protection device functions	La: The overload shall be detected at the latest when the rated load is exceeded by almost 10 %, and alert sensitively activated if	②/③ (see	1	F	III	To check/ test the overload device is function properly and carry out

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		overloading continues; alert sensitively cancels if overloading disappears; function reliable.	note 3 below)				repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Alert not activated when the rated load is exceeded by 110%, function unreliable.			D	I	
10.10	Landing door and car door bridging device	La: Landing door and car door bridging device is intact and effectively.	②	1	F	III	To check/ test the landing door and car door bridging devices are function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Landing door and car door bridging device is ineffective.			E	II	
10.11	Door closed detection function	La: Door closed detection functions effectively.	②	1	F	III	To check/ test the door close detection device is function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Level C: Door closed detection functions are ineffective.			E	II	
10.12	Car final limit switches	La: Car final limit switches are intact and effectively.	①/③ (see note 1 below)	1	F	III	To check/ test the car final limit switches are function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Car final limit switches are damaged or ineffective.			B	I	
10.13	Motor running time limiter	La: Motor running time limiter functions normally and effectively.	②	1	F	III	To check/ test the motor running time limiter is function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Motor running time limiter functions are ineffective or did not equip with a motor running time limiter.			D	I	
10.14	Automatic rescue operation device	La: Automatic rescue operation device functions normally and effectively.	②	2	F	III	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
		Lc: Automatic rescue operation device functions are ineffective or did not set an automatic rescue operation device.			D	II	To install an automatic rescue operation device and ensure that it is functioning properly.
Note 1: ① refers to there is automatic monitoring; ③ refers to there is no automatic monitoring. **Note 2:** ① refers to there is automatic monitoring; ② refers to there is no automatic monitoring. **Note 3:** ① refers to there is a load test in the last five years; ③ refers to there is no load test in the last five years.							
D.11 Other requirements in Hong Kong							
11.1	Rope retainers in lift machine room	La: Rope retainer(s) for preventing the ropes from leaving the grooves of pulleys is provided.	②	2	F	III	To install rope retainer(s) to prevent the ropes form leaving the grooves of pulleys.
		Lc: Rope retainer(s) for preventing the ropes from leaving the grooves of pulleys is not provided.			D	II	
11.2	CCTV system	La: CCTV camera is provided in the lift car and is connected to the building management office and the machine room.	②	2	F	III	To connect the CCTV system to building management office and lift machine room.
		Lc: CCTV camera is not provided in the lift car or is not connected to the building management office and the machine room.			D	II	
11.3	Fire extinguisher in machine room	La: Fire extinguisher is provided in machine room.	②	2	F	III	To provide suitable fire extinguisher in lift machine room.
		Lc: Fire extinguisher is not provided in machine room.			D	II	
11.4	Emergency trap door in lift car	La: Emergency trap door complying with design code clause 5.4.6 requirement is provided.	②	2	F	III	To check/ test the emergency trap door in lift car is function properly and carry out repairing/ replacement works if necessary to fulfill the requirement.
		Lc: Emergency trap door complying with design code clause 5.4.6 requirement is not provided.			D	II	

Item NO.	Assessment Item	Classification Index	Reference Value of Risk Evaluation				Possible Recommendations as Improvement
			Detectivity	Severity	Probability Level	Risk Categories	
11.5	Emergency unlocking device for landing doors	La: Emergency unlocking device for each of the landing doors is provided and functioning properly.	②	2	F	III	To install/ modify emergency unlocking device for each of the landing door and ensure they are functioning properly.
		Lc: Emergency unlocking device for each of the landing doors is not provided or not functioning properly.			D	II	
11.6	Inspection control station at lift pit	La: Inspection control station at lift pit is provided and functioning properly.	②	2	F	III	To install inspection control station at lift pit and ensure it is functioning properly.
		Lc: Inspection control station at lift pit is not provided or not functioning properly.			D	II	
11.7	Barrier free access requirement for lift	La: The lift is designed in accordance with the design requirement stipulated in Chapter 4 Division 19 of Design Manual: Barrier Free Access published by Building Department.	②	2	F	III	To provide necessary Barrier Free Access features in accordance with design requirements.
		Lc: The lift cannot fulfill the design requirement stipulated in Chapter 4 Division 19 of Design Manual: Barrier Free Access published by Building Department.			D	II	
11.8	Three point bearings design of machine shaft	La: Three point bearing design of mechanical shaft and the shaft shall be checked by NDT to ensure its safety last three years or follow manufacturer's recommendation frequency.	③	2	F	III	Short Term: Arrange NDT checking asap. Regular Measures: Arrange NDT checking once per three years. Long Term: Carry out modification and eliminate the risk of three point bearing design
		Lc: Three point bearing design of mechanical shaft and the shaft shall NOT be checked by NDT to ensure its safety last three years or follow manufacturer's recommendation frequency.	③	2	D	II	

Annex E

Template of risk assessment report

Risk Assessment Report of Lift

Employer:

EMSD Lift location ID:

Lift No.:

Address:

Lift Manufacturer:

Maintenance Contractor:

Assessment Organization:

Assessment Date:

Endorsement of Assessor	Acknowledgement of Responsible Person of Lifts
Name:_____	
RA No.:_____	Name:_____
Date: _____	Date: _____
Tel: _____	Tel: _____

DISCLAIMER

Parties, such as Responsible Person, building owners, building occupiers, facility managers, maintenance agents and related trade operators, can make reference or consider to adopt the contents in this report to suit their operational need.

NOTICES

1. This report is formulated based on "*Guideline for the Implementation of Risk Assessment for Existing Traction Lifts In Hong Kong*."
2. This report shall be printed out by computer; or filled in with pen. The handwriting shall be clear and tidy.
3. This report is invalid if it was not endorsed by Assessor.
4. If there are any objections or other views about the assessment and/or recommendations, the party concerned shall submit written opinions to the assessment organisation within 15 calendar days after receiving this report.
5. The recommendations and suggestions given in this report are only valid for the current condition of the assessed lift. In case of any change in the lift and its environment after assessment, the related items and conclusions in this assessment report may no longer applicable.
6. In any case, if the results or data in this report need to be referred, the original meaning should be maintained, and it is not allowed

to add, modify, falsify or cover up the facts.

7. This report shall have three (3) official copies, one copy shall be kept by the assessment organization and two copies for the employer / Responsible Person.

1. Executive Summary

<table>
<tr><td>Employer</td><td colspan="3"></td></tr>
<tr><td>EMSD lift location ID</td><td></td><td>Lift No.</td><td></td></tr>
<tr><td>Address</td><td colspan="3"></td></tr>
<tr><td>Maintenance contractor</td><td colspan="3"></td></tr>
<tr><td>Manufacturer/Brand</td><td></td><td>Lift Model/Control</td><td></td></tr>
<tr><td>Type of Landing Door</td><td></td><td>Type of Car Door</td><td></td></tr>
<tr><td>Rated Load (kg)</td><td></td><td>Rated Speed (m/s)</td><td></td></tr>
<tr><td>Floors Served</td><td></td><td>Lift Type</td><td></td></tr>
<tr><td>Nos. and Dia. of Suspension Ropes (mm)</td><td></td><td>Roping Ratio</td><td></td></tr>
<tr><td rowspan="2">Summary of Assessment Findings</td><td>Operation and Maintenance Performance</td><td colspan="2">After assessment, the operation and maintenance of lift has the following findings and recommendations:
Individual items:
(1) XXXX;
(2) XXXX;
(3) XXXX.

Overall performance and recommendations:
XXXXX</td></tr>
<tr><td>Installation and associated building works</td><td colspan="2">After assessment, the lift installation and associated building works has the following findings and recommendations:
Individual items:
(1) XXXX;
(2) XXXX;
(3) XXXX.

Overall performance and recommendations:
XXXXX</td></tr>
<tr><td>Conclusion and necessary</td><td colspan="3">Ad hoc maintenance, repairing, re-conditioning, remedial actions have to be carried out shortly:
(a) XX
(b) XX</td></tr>
</table>

<table>
<tr><td rowspan="3">follow up actions</td><td colspan="5">Regular enhanced maintenance works have to be carried out:
(a) Special Maintenance (Twice a year)
(b)</td></tr>
<tr><td colspan="5">Energy saving performance
(a)</td></tr>
<tr><td colspan="5">Long term recommendations for modernisation/replacement
(a)</td></tr>
<tr><td>Remarks</td><td colspan="5"></td></tr>
<tr><td>Assessment Date and Time</td><td colspan="5">/ /</td></tr>
<tr><td>Name of Risk Assessor and signature</td><td colspan="3">(Registration no. of risk assessment:)</td><td>Name and sign by Responsible Person</td><td></td></tr>
<tr><td>Edited by</td><td></td><td>Date</td><td>/ /</td><td colspan="2" rowspan="3">(Inspection seal of the assessment organization)
/ /</td></tr>
<tr><td>Reviewed by</td><td></td><td>Date</td><td>/ /</td></tr>
<tr><td>Authorized by:</td><td></td><td>Date</td><td>/ /</td></tr>
</table>

2. Operation and Maintenance Performance

2.1 Summary of Assessment Results

NO.	Items	Max. Points (150 Points)	Assessment Results
A1.1	Installed double brake system	8 Points	
A1.2	Installed unintended car movement protection device	8 Points	
A1.3	Installed ascending car overspeed protection device	8 Points	
A1.4	Installed car door mechanical lock and safety edge	8 Points	
A1.5	Installed intercom and CCTV system	6 Points	
A1.6	Installed obstruction switch to protect suspension ropes	6 Points	
A1.7	Installed automatic rescue device or post-voltage-dip-operation means or automatic rescue device with equivalent functions	6 Points	
A1.8	Installed remote monitoring device	Extra 10 Points	
B1.1	Average duration of service suspension due to failure (hours per month in the past 24 months in average)	25 Points	
B1.2	Average arrival time for failure related to passenger entrapment (minutes per time in the past 24 months in average)	15 Points	
B1.3	Average arrival time for failure unrelated to passenger entrapment (hours per time in the past 24 months)	10 Points	
C1.1	Ensure compliance of lift maintenance and examination with legal requirements	7 points	
C1.2	Frequently conduct inspections to oversee the condition of the lift	7 points	
C1.3	Properly manage the contractors' work	5 points	
C1.4	Verify the records in the log book	5 points	
C1.5	Hold regular meetings with contractors	2 points	
C1.6	Appoint a professional lift consultant, a registered lift engineer or an in-house engineer employed by the property management company to examine the work of lift contractors	4 points	
C1.7	Ensure the cleanliness of the lift machine room, shaft and pit	5 points	
C1.8	Immediately assist trapped lift passengers	5 points	
C1.9	Properly handle users' complaints	5 points	
C1.10	The comfort of lift passengers and quality of physical environment of the lift car (including ventilation system, cleanliness, lighting, etc.)	5 points	
		Total points:	

2.2 Individual Recommendations

NO.	Items	Details Recommendations

3. Installation and Associated Building Works

3.1 Summary of Assessment Results

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
1. Lift well, machine rooms and pulley rooms			
1.1	Exclusive use of the well, machine and pulley rooms		
1.2	Lighting and power sockets		
1.3	Metal brackets or hooks installation		
1.4	Pit ladder		
1.5	Temperature control and ventilation		
1.6	Access to well, machine rooms and pulley rooms		
1.7	Access doors, emergency doors, trap doors and inspection doors		
1.8	Condition of access doors, emergency doors, trap doors & inspection doors		
1.9	Warning notice of machine rooms and pulley rooms		
1.10	The gap between car door and the wall of well		
1.11	Protection of space accessible to people at the bottom of the pit		
1.12	Well enclosed and protection		
1.13	The guardrails of machine rooms with different floor levels		
1.14	Covers of recesses on machine room floor		
1.15	Openings on machine room floor		
1.16	Noise of machine rooms		
1.17	Protection of rotation components		
1.18	Devices for emergency and test operations while the machine is in the well		
2. Landing door and car door			
2.1	Gap between door panels of landing door and car door		
2.2	The horizontal distance between the car sill and the landing door sills		
2.3	Corrosion of landing doors and car doors		

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
2.4	Mechanical strength of landing doors and car doors		
2.5	Operation stability of landing doors and car doors		
2.6	Operation noise of landing doors and car doors		
2.7	Door drive performances		
2.8	The engagement depth of the door gibs and sills		
2.9	Landing door sills		
2.10	Door sliders abrasion and fixed		
2.11	Sill support channels		
2.12	Automatic closing device for landing door		
2.13	The engagement depth of locking element of landing door and car door locking devices		
2.14	Electric safety devices for verification of closing and locking of landing doors and car doors		
2.15	Door safety edge for automatic doors		
2.16	Force to open the car doors in unlocking zone		
2.17	Car door restrictor mechanism		
3. Car and counterweight			
3.1	Emergency alarm device		
3.2	Car closed circuit television		
3.3	Car lighting		
3.4	Car roof balustrade		
3.5	Car roof inspection device		
3.6	Corrosion of car sling		
3.7	Deformation of car sling		
3.8	Fastening of connection parts of car sling and aging of buffer rubber at bottom of car		
3.9	Corrosion of car body		
3.10	Deformation of the car walls, car roof and the bottom of the car		
3.11	Car ceiling fixing		
3.12	Car apron		
3.13	Balance factor		
3.14	Condition of counterweight sling		

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
3.15	Corrosion of counterweight sling		
3.16	Counterweight block		
3.17	Counterweight protection screen in the pit		
3.18	Counterweight guide shoes		
4. Suspension means and compensation means			
4.1	Steel wire ropes abrasion		
4.2	Steel wire ropes deformation or damage		
4.3	Steel wire ropes corrosion		
4.4	Steel wire ropes broken wires condition		
4.5	Damage of the coating of ropes (belts)		
4.6	Reduction in the diameter or thickness of the coating of ropes (belts)		
4.7	Fastening of rope termination device		
4.8	Corrosion condition of rope termination device		
4.9	Whether the springs of the rope termination deformed and cracked		
4.10	The support of the rope terminations		
4.11	Diverter pulleys and its supporting device		
4.12	Compensating chains (ropes)		
4.13	Compensating chains (ropes) guide device		
5. Essential Safety Devices			
5.1	Safety gears operation reliability		
5.2	Safety gears braking capacity and deceleration		
5.3	Agility of safety gears		
5.4	Levelness of car after safety gears activation		
5.5	Consistency of gap between safety gear wedges and guide rail working surfaces		
5.6	Reliability of overspeed governor action		
5.7	Lubrication of overspeed governor rotating parts		
5.8	Overspeed governor protection guards		
5.9	Abrasion of overspeed governor steel wire ropes		
5.10	Tensioning device of overspeed governor		
5.11	Presence of ascending car overspeed protection		

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
	means		
5.12	Reliability of ascending car overspeed protection means		
5.13	Presence of unintended car movement protection means		
5.14	Reliability of unintended car movement protection means		
5.15	Abrasion of brake linings		
5.16	'Star sealing (motor)' protection function (if any)		
6. Guide rail			
6.1	Damage of guide rails		
6.2	Alignment and distortion of guide rails		
6.3	Cleanliness of guide rails' working surfaces		
6.4	Fasteners on guide rails		
6.5	Lubrication condition of guide shoes		
6.6	Cleanliness of shoe lining		
7. Buffers			
7.1	Reliable fixing of buffers		
7.2	Oil level and leakage of hydraulic buffers		
7.3	Effectiveness of hydraulic buffer reset checking switches		
7.4	Effectiveness of hydraulic buffer reset function		
7.5	Deformation and corrosion of spring buffers		
7.6	Aging of nonlinear buffers		
8. Lift machinery and associated equipment			
8.1	Insulation resistance of motor's stator winding		
8.2	Smooth running performance of motor		
8.3	Motor bearing condition		
8.4	Protection of motors		
8.5	Encoder		
8.6	Gearbox casing		
8.7	Structural integrity of gearbox		

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
8.8	Gearbox bearings working condition		
8.9	Degree of oil leakage of gearbox		
8.10	Gearbox oil quality		
8.11	Operation state of the gearbox		
8.12	Couplings metal fatigue		
8.13	Couplings connection		
8.14	Coupling appearance		
8.15	Abrasion condition of rope grooves of traction sheaves and diverter pulleys		
8.16	Structural integrity of traction sheaves and diverter pulleys		
8.17	Traction sheave running stability		
8.18	Traction wheel bearing		
8.19	Brakes performances		
8.20	Brake types		
8.21	Brakes operating condition		
8.22	Brake friction pair working condition		
8.23	Synchronization of two brake shoes		
8.24	The surfaces of brake drum and brake shoe linings		
8.25	Brake shoes abrasion condition		
8.26	Insulation resistance of brake electromagnetic coil connector		
8.27	Temperature rise of the coils		
8.28	Self-monitoring of brake action or braking force		
8.29	Emergency rescue operation devices		
8.30	Emergency rescue devices signs		
8.31	Manual brake release devices		
8.32	Manual brake release device structure		
8.33	Position check of the detachable hand winding wheels		
8.34	Manual winding devices		
8.35	Emergency power device		

Item No.	Assessment Items	Assessment Result	
		Risk Cat./ NA	La/Lb/Lc (comments)
9. Electrical Installations			
9.1	Main supply voltage		
9.2	Main switches		
9.3	Earthing condition		
9.4	Travelling cables		
9.5	Insulated shell		
9.6	Electric safety circuit earthing protection device		
10. Electronic control system			
10.1	Frequency inverter		
10.2	Phase protection function		
10.3	Contactors		
10.4	Control cabinets		
10.5	Sensors and detection switches		
10.6	Levelling accuracy		
10.7	Floor control system functions		
10.8	Safety switches		
10.9	Overload protection device functions		
10.10	Landing door and car door bridging device		
10.11	Door closed detection function		
10.12	Car final limit switches		
10.13	Motor running time limiter		
10.14	Automatic rescue operation device		
11. Other requirements in Hong Kong			
11.1	Rope retainers in lift machine room		
11.2	CCTV system		
11.3	Fire extinguisher in machine room		
11.4	Emergency trap door in lift car		
11.5	Emergency unlocking device for landing doors		
11.6	Inspection control station at lift pit		
11.7	Barrier free access requirement for Lift		
11.8	Three point bearings design of machine shaft		

3.2 Individual findings with photos and recommendations

Item No.	Items with Photos	Details Recommendations

3.3 Overall Safety Standard of the Lift Installation

Total number of risk items assessed [A]	
- Number of identified category I risk [B]	
- Number of identified category II risk [C]	
- Number of identified category III risk [E]	
- Number of items scored "※" [F]	
Number of risk items have identified categories [G = A - F]	
Total assigned value of risk category I [H = B x 0]	
Total assigned value of risk category II [I = C x -1]	
Total assigned value of risk category III [J = E x 1]	
Overall ranking: D = [(H+I+J) / G]	
Is there any identified category I risk marked as ※	
Ranking of overall safety standards and recommendation	

4 Conclusion of the risk assessment (if any)

4.1 Short term measures

4.2 Regular enhanced maintenance works in special maintenance

4.3 Long term suggestions for modernisation and replacement

Appendices of risk assessment report (if any):

Appendix A – Declaration of interest of Risk Assessor
Appendix B – On-site finding record sheet with site photo