

Hazard & Risk audit report for

Macquarie Gardens

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ThyssenKrupp Elevator Australia



ThyssenKrupp

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Introduction



Risk management requirements for Building Owners and Managers have significantly changed in recent times. Across Australia, litigation and changes in regulations have placed a greater responsibility for safety and compliance on private enterprise. These changes have taken the responsibility for safety and compliance from Government agencies and now place this responsibility onto individual companies to become self regulatory.

The recent overhaul of the Australian Lift Code (AS1735 – Lifts, Escalators and Moving Walks) is to bring our standards into line with overseas standards. The requirements of the Occupational Health & Safety(Plant) Regulations have brought about significant changes to current requirements and up until now, new requirements were not applicable on a retrospective basis; however this is no longer the general rule.

The Occupational Health & Safety (Plant) Regulations now requires all owners of lifts to undertake a Hazard and Risk Assessment. This is to identify all associated hazards and to develop a Risk Management Plan, to address the identified risks. Whilst it is not possible to make all lifts comply with the latest code requirements, the Risk and Hazard approach will allow risks with existing plant to be identified and managed.

Due consideration has been given to the existing control measures installed and compliance to pass Australian Lift Standards, when assessing the risks associated with known hazards.

The Hazard and Risk Assessment has become a necessary process in developing safe environments for lift users (general public), lift maintenance / inspection personnel and any authorised persons. In providing this Hazard and Risk Assessment, we have intended to identify and assess the potential hazards associated with the existing lift plant and equipment. This is to provide direction for corrective actions to progressively and selectively improve the safety of the installation in line with current industry knowledge and practices.



Hazard and Risk methodology

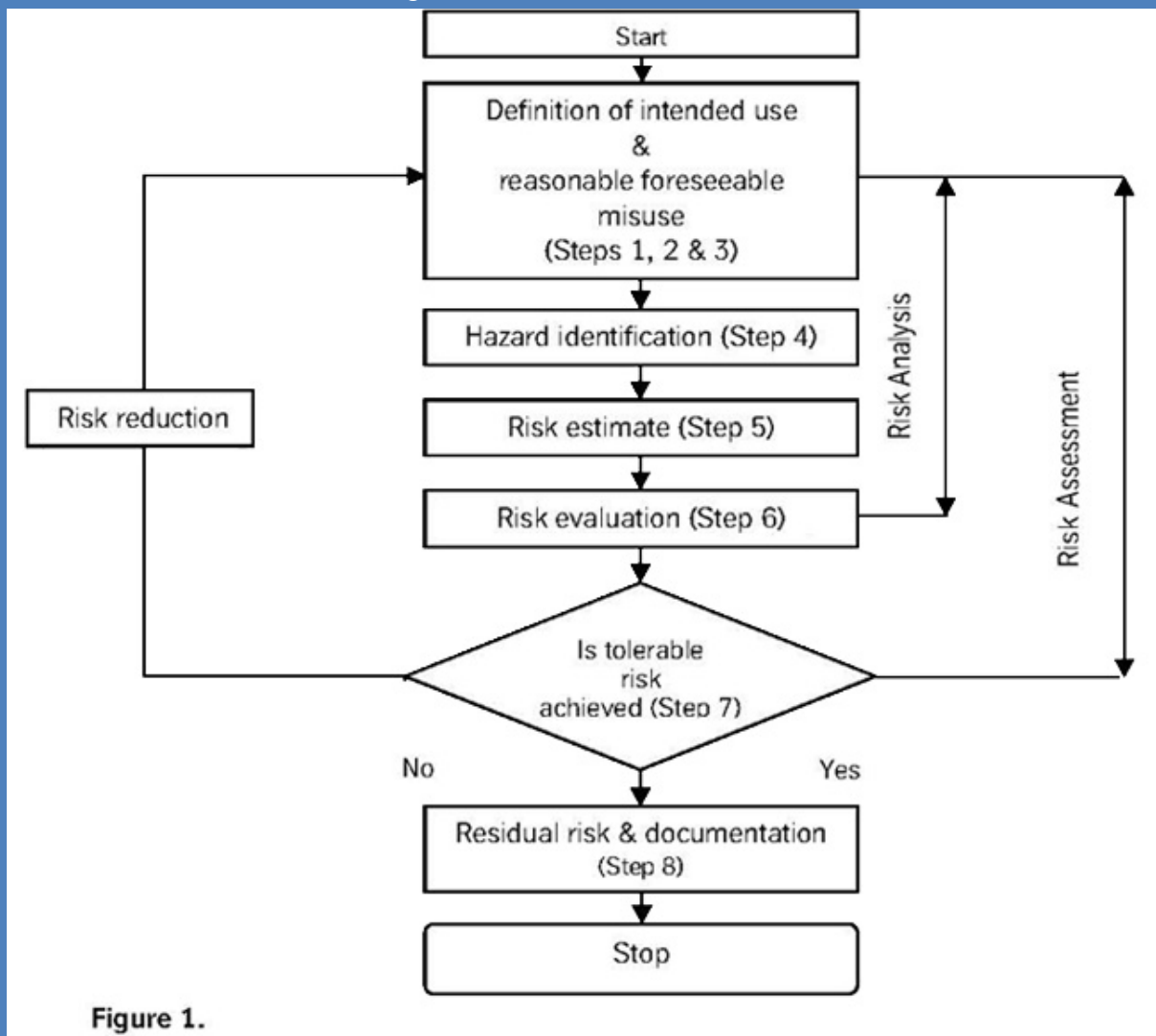


ThyssenKrupp Elevator Risk Assessment process enables a systematic study of hazards and their corresponding causes and effects. In this report, risk assessment is applied to the lift equipment, access and location.

The identification of hazards are followed up with an assessment of their severity and frequency. A measure of risk is associated with each individual hazard.

Through the use of this repetitive process, each hazard and effect is evaluated and either eliminated or, controlled by means of appropriated protective measures that reduce the corresponding risk to a tolerable level.

The step-by-step process is shown in Figure 1.



Risk analysis process



Step 1: Reasons for the risk analysis

The risk analysis process is used for the following purposes:

- 1: Review and assessment of the efficiency of safety requirements.
- 2: The design of safety-related components in instances where safety standards do not exist or are not applicable.
- 3: Verification that the risk associated with plant and equipment is tolerable.

Step 2: The risk analysis team

The risk analysis team consists of a leader and other members with extensive lift industry experience and working knowledge of the product or process being analysed.

Step 3: Define the products, processes and application to be analysed

The following should be considered:

- 1: Products/Processes
- 2: Codes, standards and government requirements
- 3: Electrical, mechanical and hydraulic equipment
- 4: Hardware and software
- 5: Operating procedures
- 6: Performance parameters (environment, duty cycle, load limits)
- 7: Aspects
- 8: Design
- 9: Manufacturing
- 10: Transport
- 11: Installation
- 12: Type of use
- 13: Maintenance
- 14: Dismantling and disposal
- 15: Modernisation
- 16: Training
- 17: Applications
- 18: Transport of passengers
- 19: Transport of goods



Step 4: Hazard Identification

An on-site audit is carried out to identify any hazardous situation by defining the hazards, cause and effect. A systematic approach for the identification of hazardous situations yields a list of necessary words for risk analysis, assessment, and identification of risk reduction measures.

In order to assist in this process, a form for tabulating the results was designed and a generic list of ("Thought provoking key words") used when identifying potentially hazardous conditions.

The list below of key words allows the identification of hazards that may arise or be present throughout the life cycle of the product, system or process.

- Crush
- Shear
- Electrocute
- Slip
- Noise
- Fall
- Entrap
- Trip

The Hazard Identification process includes the following:

- Hazards inherent to the system and process.
- Hazards resulting from system or equipment malfunction.
- Hazards resulting from outside influences of the environment.
- Hazards resulting from operating procedures and use.
- Hazards resulting from the life cycle of the equipment.

Step 5: Risk assessment

The cause and effect of each hazard is assessed in terms of probability of occurrence of the hazard and the severity of its effect(s). The combination of severity and frequency quantifies the risk associated with the hazard. Figure 2 is a schematic representation of risk assessment.

Annex “A” sets out the risk assessment scale that defines the categories of hazard severity and their level of frequency.



Note1: The severity is assessed by considering the effect on life, property and environment

Note 2: (a) The assessment of the frequency of a hazard takes into account
(b) The frequency of harmful events
(c) The frequency and duration of the exposure of the hazard
(d) The human and technical possibilities of avoiding or limiting the harm

• Figure2: Schematic representation of risk assessment

Step 6: Risk evaluation

The risk assessment results are evaluated in terms of residual risk and tolerable risk.

Table 1 in Annexe “B” is used to make this determination. If the risk is not tolerable, further risk reduction measures are required and the following procedure is used:

- Eliminate the hazard, if possible.
- If the identified hazard cannot be eliminated, take the necessary measures to reduce the risk so that it becomes tolerable. These measures include redesigning equipment, altering procedures, adding protective devices guarding the equipment, etc.
- Inform the users of the system/process of the residual risks. These measures include information, training, adding warning signs, personal protection equipment, etc.

Step 7: Provisional assessment

If after the risk evaluation the hazard is still not tolerable, the process is repeated starting with step 4.

Step 8: Documentation and evaluation

The result of the risk analysis process is documented and contains, as a minimum:

- A definition of the system/process that was analysed
- The hazardous situations, risk assessment and risk evaluation
- The reference data used and sources of the data
- The proposed risk reduction measures and residual risks
- The risk profiles indicating the risks before and after the assessment.

Annexe A: Assessment Scale



Category of Severity:

Category of Severity	Definition
1 - Catastrophic	Death, System loss, or sever environment damage
2 - Critical	Severe injury, Sever occupational illness, major system or environment damage
3 - Marginal	Minor injury, Minor occupational illness, Minor system to environment damage
4 - Negligible	Will not result in injury, occupational illness, system or environment damage
Note: The definition of categories of severity reflects the generic task being analysed for e.g. Use the fire fighting elevators ; Use of elevators by persons with physical disabilities	

Level of Frequency:

Level of Frequency	Definition
A - Frequent	Likely to occur often
B - Probable	Will occur several times in the life cycle of the system
C - Occasional	Will occur at least once in the life cycle of the system
D - Remote	Unlikely, but may possibly occur in the life cycle of the system
E - Improbable	So unlikely that it can be assumed occurrence will not be experienced
F - Impossible	The hazard incident cannot occur unless caused by a deliberate act

Annex B - Risk Profile



Risk Assessment

Frequency	Severity			
	1 - Catastrophic	2 - Critical	3 - Marginal	4 - Negligible
A - Frequent	1A	2A	3A	4A
B - Probable	1B	2B	3B	4B
C - Occasional	1C	2C	3C	4C
D - Remote	1D	2D	3D	4D
E - Improbable	1E	2E	3E	4E
F - Impossible	1F	2F	3F	4F

Unacceptable - 1A, 2A, 3A, 1B, 2B, 1C	Corrective action required to eliminate the risks
Undesirable - 1D, 2C, 3B	Corrective action required to mitigate the risks
Acceptable with review - 1E, 2D, 2E, 3C, 3D, 4A, 4B	Review required to determine whether any action is necessary
Acceptable without review - 1F, 2F, 3E, 3F, 3D, 4C, 4D	No actions required

Bibliography



AS:1735	Australian Standards - Lifts, Escalators and Moving Walks
ISO/TS:14798	Lifts, Escalators and Passenger Conveyors, Risk Analysis Methodology
EN:81-80	Existing lifts - Rules for the improvement of safety of existing passenger and goods passenger lifts
EN:81-1	European Code for Electric Lifts
EN:81-2	European Code for Hydraulic Lifts
	Code of Practice for Plant
	Occupational Health and Safety (Plant) regulation
	AEA National Code of Practice for Existing Lifts & Escalators

Evaluation of Macquarie Gardens

Lifts: 1-4



S is the severity & hazard effect

I: Catastrophic
II: Critical
III: Marginal
IV: Negligible

F is the frequency & hazard cause level

A: Frequent
B: Probable
C: Occasional
D: Remote
E: Improbable
F: Impossible



Priority Level


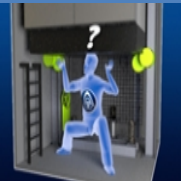


H – High
M – Medium
L – Low


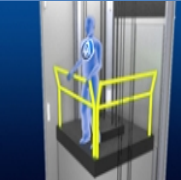

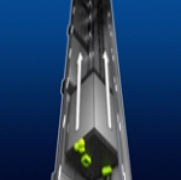
Hazard and Risk assessment audit report





Lift: 1-4





Item No.	Hazard	Harmful event	Incident	Assessment Actual		Priority Level	Corrective Action (Risk reduction measure)	Photograph
				S	F			
2	Disabled access features provided	Disabled persons gaining access to building levels	Unable to access lift controls and communication restricted travel, claustrophobia.	IV	B	Low	Upgrade to disabled requirements. Item Note: No compliant handrails. No compliant buttons/height or type. 2 compliant panels required due to car size. No voice annunciation installed.	
11	Unsafe pit access and egress	Falling when entering or leaving the pit	Serious injuries	II	B	High	Provide safe access and egress to lift pit	

Item No.	Hazard	Harmful event	Incident	Assessment Actual		Priority Level	Corrective Action (Risk reduction measure)	Photograph
				S	F			
12	No or inadequate stopping devices in the pit or in the pulley room	Uncontrolled movements.	Contact with moving parts, shearing or crushing	II	B	High	Provide stop switch adjacent to each machine/ pulley. Item Note: No 'mushroom type' stop switches installed in the lift pits.	
14	Insufficient safety spaces in headroom and pit	The car is overrunning the upmost or lowest floor with person on the car roof or in the pit	Person is crushed, serious injuries or death	I	C	High	Provide marked safe standing area in pit if found. If no area is suitable provide signage to notify maintenance personal	
17	No alarm system in pit and on car roof	Persons trapped or injured in pit or on car roof	Rescue and treatment	III	B	Medium	Install emergency communication to lift pits and car tops.	
25	Unlocking devices not fitted to intermediate landing doors.	Delay in passenger release if trapped in car	Panic, claustrophobia.	I	C	High	Fit unlocking device for authorised persons to intermediate floor doors.	

Item No.	Hazard	Harmful event	Incident	Assessment Actual		Priority Level	Corrective Action (Risk reduction measure)	Photograph
				S	F			
37	No or inadequate detectors on power operated doors	Person is passing the doors when door starts closing	Person is hit or jammed by the door, serious injury	II	B	High	Provide full height electronic door detection to car doors Item Note: Consider installation of 3D door detection device	
41	No or inadequate balustrade on car	Maintenance person trips or stumbles and falls into space between car and wall	Falling down the well, serious injury or death	I	C	High	Fit car top guard rails	
43	No or insufficient ventilation in car	Breakdown of lift, persons trapped	Suffocation, heat, exhaustion, panic	II	C	Medium	Supply vents or exhaust fan to car Item Note: No exhaust fan is installed.	
47	No protection means against over speed in up direction	Over speed in up direction due to failure of traction sheave shaft, brake failure, failure of electrical system, etc.	Person in car is crushed when car hit the roof of well. Maintenance person is crushed on car roof	II	C	High	Fit protection device that operate on ropes or traction system in case of upward runaway.	

Item No.	Hazard	Harmful event	Incident	Assessment Actual		Priority Level	Corrective Action (Risk reduction measure)	Photograph
				S	F			
51	No or inadequate slack rope switch for governor rope	Over speed of car, governor doesn't trip safety gear due to slack governor rope	Persons in car crushed, serious injury or death	II	C	High	Fit safety contact to governor idler sheave in pit to operate if governor rope brakes or becomes slack.	
53	No or inadequate buffers	Car or counterweight is hitting the buffers due to failure in the mechanical or electrical system	User in car or maintenance person on car roof crushed, serious injury	I	C	High	Fit safety switch to car and counterweight buffers in pits to monitor correct positioning	
58	No or inadequate braking system, two separate shoes, control of, etc	Uncontrolled movement at landing with doors open	Person is sheared between landing and car door.	II	B	High	Fit rope brake for double acting brake.	
65	No lockable main switch	A person switches lift on when another person is working on the lift	Maintenance person is sheared or crushed, injury to user	I	C	High	Supply lock-off devices to main switches	

Item No.	Hazard	Harmful event	Incident	Assessment Actual		Priority Level	Corrective Action (Risk reduction measure)	Photograph
				S	F			
71	Missing notices, markings and operating instructions	Users overload the car, persons get into hazardous areas	Serious or fatal injuries	I	C	High	Provide correct notices, markings and operating instructions.	
85	No or inadequate emergency lighting on car roof*	Maintenance person is trapped on car roof due to loss of power supply	Falling down the well, serious injury or death	I	C	High	Supply and fit emergency lighting to car top	

Summary of identified hazards on

Macquarie Gardens

Lifts: 1-4



Item No	Lift Number	Hazard	Priority
H2	1-4	If required, provide disabled access (DA) features as per BCA Amendment No10	Low
H11	1-4	Safe access and egress from pit	High
H12	1-4	Stopping device in pit and pulley room	High
H14	1-4	Headroom and pit clearances	High
H17	1-4	If required fit alarm device in well (car roof & pit)	Medium
H25	1-4	Mechanics door unlocking devices	High
H37	1-4	Car door detectors	High
H41	1-4	Protection against falling from car roof whenever fall space is greater than 300 mm	High
H43	1-4	Sufficient car ventilation	Medium
H47	1-4	Ascending car over speed protection	High
H51	1-4	Safety contact in governor tensioning device	High
H53	1-4	Adequate buffers	High
H58	1-4	Double electro-mechanical brake	High
H65	1-4	Main switch lockable	High
H71	1-4	Information on safe use & maintenance of lift – Danger warnings	High
H85	1-4	No or inadequate emergency lighting on car roof (TKEA Recommendation*)	High

**Special Notes on
Macquarie Gardens
Lift: 1-4**



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