1. Purpose

The purpose of this guideline is to provide advice regarding the issues relating to the use of lifts for evacuation. It also serves as a document for operational crews to utilise in order to become aware of the issues that may affect their standard operational procedures.

2. Scope

This document will detail the MFB’s opinion regarding the use of lifts for evacuation and fire fighter access and to outline the considerations required to be adequately addressed when an alternative solution incorporates lifts into an emergency management strategy. The guideline considers the design, construction, commissioning, maintenance and management of lift systems for the full life cycle of a building.

Reference should be made to Guideline GL-07, Single Fire Isolated Stair in High Rise Buildings, if the use of lifts for evacuation is to be designed in conjunction with a single exit.

3. Background

Although the MFB is supportive of designs which provide equitable evacuation opportunities for all occupants, the use of lifts in a fire emergency prior to fire services arrival on scene is one concept that not only goes against the “norm”, as illustrated by the deemed-to-satisfy requirement for signage warning against the use of lifts in the event of fire, but also requires careful consideration, proving and demonstration to ensure that failure modes are identified and adequately addressed. It is also the opinion of the MFB that the use of lifts for evacuation should only be considered within fully sprinklered buildings, with trained and equipped warden/emergency management structure in place.

Furthermore, the MFB understands the benefits associated with the use of lifts for evacuation, but considers lifts as an additional means of escape to fire isolated stairwells.

Investigations by MFB, through AFAC have identified a number of issues associated with the uncertainty associated with lift function during fire and other emergencies and have built upon the issues documented within the previous combined Guideline GL-07 Version 4, 9 August 2005.
4. Lift System Considerations

It is imperative that prior to the development of any project aiming to incorporate the use of lifts into the life safety system of a building, that the limitation of lift systems and their associated control equipment must be understood and addressed. Liaison between the Lift Industry and AFAC has revealed the functions that can and cannot typically be performed by a lift. Such functions, as provided by the lift industry, and are outlined below, should be addressed through consultation with the lift designer and manufacturer as part of the analysis of any alternative solution incorporating the use of lifts.

Typical functions lift systems can perform:

(a) Carry their rated loads at contract speed
(b) Run from bottom to top floor in a prescribed time
(c) Communicate with the outside for assistance
(d) Provide emergency lighting in car in the event of power failure
(e) Bypass a floor if fully loaded
(f) Know when to open or close doors
(g) Protect door opening to stop doors closing on person
(h) Facilitate special fire services control provided the keys are available
(i) Switch to emergency power if it is available
(j) Detect earthquake of a magnitude that could cause harm
(k) Bypass security systems when on fire service control
(l) Provide information as to its location in the lift shaft

Typical function lift cannot perform:

(a) Run when overloaded
(b) Run when any door is open or has a faulty contact/lock
(c) Run if doors are distorted by fire
(d) Run if water is in the pit above a certain level
(e) Run if safety gear has operated
(f) Run if there is insufficient power available
(g) Run if door damage effects locks
(h) Run if the machine room temperature is excessive
(i) Run if the lift is under repair
(j) Decide who should use the lift

Based on the above, it is the MFB’s opinion that lifts cannot be relied upon for evacuation and fire fighter access until these issues are specifically dealt with and resolved and until established performance criteria can be identified and confirmed to be achievable in the “as-built” state. In addition, emergency evacuation procedures and design solution should be proven throughout the life of the building. This may involve conducting evacuation drills which become a requirement on the occupancy permit as an essential maintenance item.

5. General Considerations

Where lifts are proposed for the general evacuation of occupants, theoretically, this provides a means of egress for all occupants, including those who may be disabled or mobility impaired. Nevertheless, there has been no official Industry/Regulatory approved method for designing such systems.

The fire service is not an expert in the design of such systems, however based on conferences and studies dealing with the use of lifts for evacuation conducted to date, a range of deficiencies in current designs have been highlighted. It is the expectation of the MFB that designers not only address concerns during desk-top design but also through robust practical demonstration and ongoing through purpose developed maintenance regime. These concerns relate to the following:
5.1 Number and dimensions of fire-isolated exits should not be reduced as part of a design proposing to incorporate the use of lifts into an emergency management strategy and these exits be encouraged for use as the primary evacuation route for ambulant occupants.

5.2 Use of lifts for evacuation should only be considered within fully sprinklered buildings, with trained and equipped warden/emergency management structure is in place.

5.3 Provision of sufficient number of lifts provided for simultaneous evacuation of occupants and use by the fire service with at least one lift dedicated for fire fighter use. Upon general fire alarm the dedicated fire fighter lift is to descend to the ground floor and thereafter shall only be operated by fire service personnel via key.

5.4 Lift keys for the fire service control are to be provided at the relevant fire station(s) and at a security/emergency services liaison point, FIP, or Fire Control Room (FCR).

5.5 It is envisaged that all lifts will be provided with fire services control as well as recall facilities. The lifts, once under fire service control would be operated from within the lift car. Lift annunciation panels should be provided at ground floor adjunct to the lift landing doors and at the FIP/FCR.

5.6 Reliable means of communication within the lifts to the FCR/FIP (telephone system, hardwired, fire rated cabling, etc)

5.7 Emergency management and evacuation plans be developed in consultation with the fire service and take into consideration the impact of human behaviour upon the assumed evacuation strategy.

5.8 It is expected that during the development of the evacuation philosophy, the fire service will be further consulted and advised of the finalised procedures so that operational staff can be advised.

5.9 Appropriate signage and educational programs for all occupants be provided in lift /stair lobby areas describing the evacuation philosophy.

5.10 Procedures/systems need to be put in place in the case of a fire that is located in areas (lifts shaft, lifts and lift motor rooms, smoke lobbies) which may preclude the lifts being used for evacuation purposes. In addition lift controls and programming should not allow lifts to go to smoke/fire affected smoke lobbies.

5.11 Lifts designed to incorporate protection from possible equipment overheating and the products of fire.

5.12 Appropriate visual indication provided on each floor so that wardens/fire service personnel are provided with the relevant information relating to the status of each lift.

5.13 Consideration to locating lift shafts and fire isolated stairs within a protected smoke/fire lobby providing a safe haven sufficiently sized to accommodate occupants waiting to be evacuated. The use of lifts for vertical transportation will form only a part of the whole evacuation philosophy.

5.14 Sequence of lifts upon fire alarm shall be developed in consultation with the fire service. A potential lift sequence may, upon alarm, facilitate immediate recall of all lift cars to the safe discharge level, (normally ground floor) for occupants in-travel to disembark. Empty lifts would travel to the floor of fire origin, (only if a call is registered on the fire floor landing call button) and subsequent lifts to the floors above. Meanwhile, a dedicated fire service lift will descend to the ground floor for use by the fire service.

5.15 The lift system, including all mechanisms such as lift shaft, lift car and control equipment, shall be designed appropriately and incorporated into the buildings design to minimise the impact of smoke, heat, air pressure, leakage, lift piston effects and human behaviour on lift operation. Integration of lifts with sprinkler and smoke detector activation and other life safety systems shall be an integral component of the system design.
5.16 All evacuation methods/systems utilised shall be supported by a reliable power supply. It is also required that back up power supplies are also provided.

5.17 Lift control programs should be developed in consultation with the fire service with consideration given to providing logical sequences under both automatic and manually generated alarms.

5.18 The implementation of an automatic sequential evacuation process is to be considered and the unnecessary evacuation of unaffected floors should be discouraged within the design, unless automatically instigated. Manual control is to also be provided.

5.19 The level of lift safety, reliability and availability, including breakdown, maintenance and associated down time, must be considered in fire and other emergency scenarios.

5.20 Protection against water ingress to lift shafts and drainage for both lobbies and lift shaft pit are essential for continued operation of lifts.

5.21 Management of the lift system in a residential building without the facilitation of wardens is considered unreliable and therefore not recommended.

5.22 Programmed and reoccurring training and familiarisation exercises for those who are expected to use the lifts in a fire situation (including occupants, the fire service, etc) must be provided for the life of the building.

5.22 All lift security features must be overridden when the lift car is in Fire Service mode.

6. Documentation

The overall fire safety design must provide an acceptable level of occupant life safety as well as fire fighter life safety.

For the purpose of Fire Service review, the following must be provided, in writing, from the Practitioner:

- Reason for the use of lifts for evacuation.
- Redundancies proposed in the design.
- Comment against this guideline and relevant discussion points.

It should be noted that a supporting decision made for one building does not automatically infer that the same decision will be made for another. Each building shall be reviewed on its own merits, with all justification documented.

Note: This is a controlled document and may only be modified by authorised personnel after review by the MFESB Community Safety Advisory Group.