PROVISIONS AND PROCEDURES - A SAFE COMBINATION.

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1. ABSTRACT.

Standards and legislation for lifts are predictably intended to safeguard, by intrinsic means any person(s) making proper use of such machines.

Only wilful misuse of a lift, inadequate maintenance or drastic component failure will endanger a lift passenger.

Persons working on lifts will usually take a lift out of normal use, and will then rely for their protection upon the passenger safeguards and other safeguards specially provided to achieve safe working conditions.

This paper will consider some of the safety provisions at modern lift installations, and will exemplify the need for provisions to be included in appropriate safe working procedures.

2. INTRODUCTION.

2.1 Current European Standards for lifts (EN81: Parts 1and 2) include users and servicing/inspection personnel amongst persons to be safeguarded against the risks of accidents associated with the operation of lifts.

2.2 Interestingly, the Standards take into account 'that the users have to be safeguarded against their own negligence and unwitting carelessness.'
(No mention of such safeguarding for servicing/inspection personnel.)

2.3 The extent of intrinsic safety provided at modern passenger lifts makes it unlikely that the safety of any passenger will be endangered whilst making proper use of a lift.

2.4 It is often claimed that a modern lift provides the safest known means of passenger transportation, and accidents suffered by passengers are relatively rare. Whilst these facts may be true, it is also clear that the risks to those persons working upon lifts are disproportionately greater.

2.5 Much of the time spent working on lifts by servicing/inspection personnel is spent within the well of a lift and outside the lift car, i.e. in the space in which the car and counterweight, if there is one, travel. This paper will concentrate upon persons working within lift wells.

2.6 Passengers also travel within lift wells, but, unlike servicing/inspection personnel, they are contained within completely-enclosed cars when moving within the wells of modern lifts.

2.7 Intrinsic devices provided for passenger (user) safety are also

available for the protection of those who work on lifts. Occasionally, however, such persons may consider it necessary to circumvent such safeguards temporarily in order to carry out particular types of work, e.g. fault-finding, installation, testing, etc.

2.8 Special provisions do exist at modern lifts which are intended to enhance the safety of persons working within lift wells. However, such safeguards usually require to be brought into use via some positive action - either proactive or reactive - by those persons whom they are intended to protect.

2.9 Therefore, it is presumed that the achievement of an adequate degree of safety for persons working on lifts relies upon a combination of two factors:-

(a) safety provisions, which may or may not be intrinsically or automatically effective, and,

(b) safety procedures, intended to ensure that the safety provisions are effectively brought into use when required.

2.10 This presumption was recognised within the United Kingdom (UK) some years ago when British Standard (BS)7255:1989, entitled 'BS Code of practice for safe working on lifts,' was published.

2.11 BS 7255 recognises that the effectiveness of defined safe working procedures will be enhanced substantially if use is made of safety provisions which exist at lifts made and installed in accordance with current British Standards. (often identical with European Standards.)

2.12 It would be foolhardy to presume that improvements need not be made to the requirements of BS 5655 (EN 81) regarding provisions or to the requirements of BS 7255 regarding procedures.

2.13 In the ensuing paper some examples of BS and EN provisions and procedures for safe working within lift wells of new lifts are highlighted, and, when considered apposite, comments are included.

2.14 It should be emphasised that the selected examples are far from being exhaustive.

3. WORKING WITHIN WELL - GENERAL.

3.1 PROVISIONS.

3.1.1 A main switch capable of breaking the electrical supply to the lift on all the live conductors shall be provided within the machine room. BS and EN Standards specify requirements for main switches (and alternative devices), and it is recommended that a main switch lock-out facility should be provided.

3.1.2 Access into the well is usually achieved by opening a landing door with the lift car situated at some convenient distance away from its normal position at the landing. An emergency release key is used to unlock the landing door in this situation and the type of key now in common use within Europe is specified in EN 81.

3.1.3 Permanent electric lighting shall be provided in the well, allowing the well to be adequately illuminated even when all doors are closed and/or the main switch (see 3.1.1) is in the 'off' position. The means of switching on the lighting should be clearly identifiable,and should be capable of being reached safely, within the machine room and/or the pit.

3.1.4 Safety signs should be provided to enable other persons to be informed that a lift(s) is out of service.

3.2 PROCEDURES.

3.2.1 Before any landing door is opened for working access into a well it should be decided if the work to be undertaken will require the electrical supply to the lift to be maintained. If not, and wherever possible, the main switch should be locked in the 'off' position and an appropriate safety sign should be positioned at the point of such isolation.

3.2.2 A safe means of access into the well and egress from the well should be clearly established and should be readily available at the work areas, e.g. the pit.

3.2.3 The permanent well lighting should be switched on before access into the well is attempted,and where necessary, any temporary lighting facility should be checked.

3.3 COMMENTARY.

3.3.1 BS 7255 contains much more advice of a general - though important - nature, and emphasis is placed upon the need for a 'site safety assessment' to be undertaken before work is undertaken for the first time.

3.3.2 The BS also makes recommendations concerning training of personnel, well-being of persons working alone, etc.

4. WORKING WITHIN WELL - ON CAR TOP.

4.1 PROVISIONS.

4.1.1 Equipment on the roof of the lift car shall include a readily accessible control station and a stopping device. If the stopping device associated with the control station is greater than 1 metre from the entry point for access from a landing then an additional, suitably-located stopping device is required.

4.1.2 Among the requirements for the control station is an 'inspection operation switch' which shall be bi-stable and protected against involuntary operation.

4.1.3 Engagement of the inspection operation switch shall ensure that:-
-the lift car cannot be moved by the normal controls (including the operation of any automatic doors), by emergency electrical

operation (e.g. gearless car lifts), or by a docking operation;

-another operation of the inspection operation switch is necessary for the lift to be returned to normal service;

-constant pressure on a push-button is required to move the car;

-the car speed shall not exceed 0.63 m./s.;

-the limits of normal car travel shall not be exceeded;

-the operation of the lift shall remain dependent upon the safety devices.

4.1.4 The roof of the car shall be capable of supporting two persons, with a minimum clear area for standing, and shall be provided with means for installing a balustrade, if required.

4.1.5 Protection against being trapped between ropes and pulleys (where fitted) shall be provided for persons on the car roof.

4.1.6 Minimum clearances between car roof (including guide lengths, beams, etc.) and the roof of the well are specified, with some variations.

4.1.7 However, for all lifts, the Standards require that 'there shall be above the car sufficient space to accommodate a rectangular block not less than 0.5m x 0.6m x 0.8m resting on one of its faces.'

4.2 PROCEDURES.

4.2.1 The correct functioning of the stopping device should be ascertained before access is gained to the car roof, and correct operation of the control station should be checked before beginning work within the well.

4.2.2 The number of persons permitted to travel on the roof of a car at any one time should be kept to a minimum (see 4.1.4), and persons should not travel on top of an ascending car unless it is essential to do so.

4.2.3 The procedures adopted for moving a car are of prime importance, and all persons working on a car roof shall be aware of when and how the car is to be moved. It is essential that one person be in sole control of the starting and stopping of such movement.

4.3 COMMENTARY.

4.3.1 Electrical isolation of the normal controls of the lift is essential before entry into the lift well is effected, and, if the work to be undertaken does not require the electrical power supply to be maintained the main switch should be locked in the 'off' position and an appropriate safety sign should be positioned at the point of isolation. Keeping car/or landing doors open in order to interrupt the normal control circuit shall not be used instead of the car top stopping device, and it should be remembered that landing doors often have a self-closing facility.

4.3.2 The siting of the control station warrants careful consideration, bearing in mind that car tops differ in size, layout, etc. A central location for the station is often preferable, particularly for large lift cars, and such a location usually means that the person operating the controls is sited away from the roof edges.

4.3.3 If the supporting panel for the control station is mounted vertically, e.g. on the crosshead beam, it might make it more difficult for the control buttons/switches to be identified and/or reached from all parts of the roof. Conversely, if the control station is mounted in the horizontal plane it might make it easier for the controls to be actuated inadvertently, particularly if prudent shrouding of control buttons is not effected.

4.3.4 It is usually safer for persons on car tops when movement of the car takes place in the downward - rather than upward - direction.

4.3.5 If the car roof is designed to support the weight of two persons (see 4.1.4) then safe working procedures should preclude access by more than two persons unless additional precautions are arranged.

4.3.6 It should be noted that the 'refuge' space of 0.5m x 0.6m x 0.8m (see 4.1.7) might not accommodate two persons in an emergency situation.

4.3.7 BS 2655, which preceded BS 5655/EN 81 required that whenever a car top control station was being used a terminal stop switch associated with the control station would stop a car ascending to within 1.8m of the top of the well.

4.3.8 Current Standards offer no definite advice regarding how and when a car top balustrade should be provided.

4.3.9 BS 7255 states:-
'Where a person could fall into the space between the edge of the car top and the well enclosure, suitable precautions should be taken which may include:-

(a) a vertical screen;

(b) a horizontal extension of the car top;

(c) other suitable means, e.g. an improved safe system of work.

As the fitting of guard rails around the top of the car might, under certain circumstances, introduce particular hazards, it should be considered only if the precautions listed in items (a) to (c) are not appropriate.'

(Author's note:- Currently, EN 81 requires an effective screen (partition) to be provided throughout the full height of a well if the horizontal distance between the edges of a car roof and a moving part (of a car or counterweight) of an adjacent lift is less than 0.3m.)

4.3.10 BS 7255 implies that the guardrail/balustrade would be intended to

protect against the risk of a person falling from the car roof, whilst suggesting that additional hazards, e.g. trapping, might be created.

4.3.11 The current revision of EN 81 at present requires the car roof to be provided 'with a balustrade when the free space in a horizontal plane beyond the outer edge of a car roof exceeds 0.5m.' The revision includes requirements for balustrade dimensions, location, etc., and it is interesting to note that the height of the balustrade may vary between 0.7m minimum (fully-enclosed lift well) and 1.1m minimum (partially-enclosed lift well.)

4.3.12 The Standards and Code of Practice make no direct references to the use of safety harnesses to protect against falling, but such devices might qualify as 'other suitable means.' (see 4.3.9 (c).)

4.3.13 Whilst there is a long-standing reluctance by those working on lift car tops to make use of safety-belts/harnesses, failure to make use of such devices when alternative means of protection are not available might be construed to be 'wilful negligence'-------.

5. WORKING WITHIN WELL - BELOW CAR.

5.1 PROVISIONS.

5.1.1 Equipment within the lift pit shall include a switch, accessible on opening the door to the pit, to stop the lift and keep it stopped. The switch shall be installed such that there is no risk of mistaking its 'Stop' position.

5.1.2 Minimum clearances between the lowermost portions of the car and/or ram and the bottom of the pit (including the highest parts fixed in the pit) are specified.

5.1.3 However, for all lifts the Standards require that when the car rests on its fully compressed buffers 'there shall be in the pit sufficient space to accommodate a rectangular block not less than 0.5m x 0.6m x 1.0m resting on one of its faces.'

5.1.4 If there is no other access to the pit other than a landing door a permanent means of access shall be provided inside the well, easily accessible from the selected landing door, to permit safe descent by persons to the pit floor.

5.2 PROCEDURES.

5.2.1 If access to the pit is to be gained from the lowermost landing then the required stop switch within the well should be located approximately 1.3m above the landing sill and no more than 1.0m measured horizontally from the landing sill. This will enable the switch to be operated from the landing before access to the pit is gained.

If any other door is provided for direct access to the pit the door should be effectively interlocked to prevent lift movement whilst the door is open and a pit stop switch should be provided so as to be within safe reach from

the door opening. (threshold)

5.2.2 It should be noted that the 'refuge' space provided within the pit is slightly greater than that provided above the car, i.e. the longest side of the 'rectangular block' is increased from 0.8m to 1.0m.

The number of persons permitted to enter the pit at any one time should be kept to a minimum.

5.2.3 If the lowermost landing is to be used for access to the pit and permanent means of access is not possible, suitable portable means should be provided in the form of a ladder which can be restrained in position when placed in the pit. This ladder should be stored and locked in a position as close as is practicable to the pit.

5.3 COMMENTARY.

5.3.1 The commonest means of gaining access into a lift pit is via the lowermost landing door. Many persons prefer to have this landing door slightly open whilst working in the pit. In such circumstances, careful consideration should be given to the method of preventing full closure of the door, and to the means provided for preventing unauthorised access by other persons into the lift well.

5.3.2 The need to maintain the electrical supply to a lift when work is taking place beneath a lift car (in the pit) is often less than when work is being undertaken elsewhere within a lift well. (see 4.3.1) Movement of the car when persons are within a lift pit should be prevented unless absolutely necessary, and only then in accordance with a specific safe working procedure.

5.3.3 Mechanical restraint devices to prevent unintentional descent of a lift car may be employed in the pit area, and such devices, e.g. pit props, are often used at hydraulic lifts.

6. CONCLUDING COMMENTS.

6.1 An adequate degree of safety for persons working on lifts will only be achieved via a combination of safety provisions and safety procedures.

6.2 Persons engaged to work on lifts should be selected and trained to recognise and understand the hazards associated with working on lifts, and to appreciate the need to make proper use of safety provisions, particularly when such provisions have to be brought into use when required.

6.3 It should also be appreciated by those persons working on lifts that their work might endanger others, and due consideration of this possibility should be included in the initial site safety assessment and preparation of safe working procedures.

6.4 Newly-enacted and emerging European Union (EU) Directives will mean that minimum design and manufacturing requirements for lifts will be

mandatory throughout the EU. The aims of such Directives are to remove barriers to trade and they will effectively result in lift 'PROVISIONS' being standardised at lifts installed in EU countries.

6.5 Other Directives are specifically intended to ensure that an acceptable degree of safety for workers is achieved, and, predictably, safe working 'PROCEDURES' are important requirements of such Directives.

6.6 An assessment of the hazards and risks to which those persons working on a lift may be subjected is now an essential part of the required safety assessment for that lift installation.

6.7 The philosophy of combining 'provisions and procedures' should assist greatly in satisfying the mandatory requirements of the relevant EU Directives, and it should ensure that adequate safe working procedures are developed.

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