

Wide Circulation
DOC. (24447)

Indian Standard

**Electric Traction Lifts Replacement of Existing Passenger
and Goods Passenger Lifts in Existing Buildings**

विद्युत् संकर्षण लिफ्टें
मौजूदा भवनों में मौजूदा यात्री और मालवाहक लिफ्टों
की प्रतिस्थापन

Indian Standard

**ELECTRIC TRACTION LIFTS REPLACEMENT OF EXISTING PASSENGER AND
GOODS PASSENGER LIFTS IN EXISTING BUILDINGS**

FOREWORD

This Indian Standard was adopted by the Bureau of Indian Standards after the draft finalized by the Lift and Escalators Sectional committee had been approved by the Electrotechnical Division Council.

When provisions of this standard are different from those stated in IS 17900 standards, the provisions of this standard take precedence over the provisions of the IS 17900 standard.

Where one or several requirements in IS 17900 cannot be fulfilled, due to reasons, such as the constraints of the structure of the existing building, the corresponding requirements in this Indian Standard shall apply. The application of alternative measures to prevent the risk of crushing above and underneath the lift car is restricted to installations where the requirement for free space or refuge is impossible to fulfill and may be subject to prior approval by local authorities.

The main concern dealt with in this standard is the non-availability of the required top and pit clearances due to site conditions. This situation can arise either due to the existing structure not being as per the current Indian Standards or enhancement of lift specifications, for example, speed, in the replaced lift as compared to the existing lift. The adopted principle of safety is based on two levels of achievement, first by means of an electrical stopping of the lift car, then by means of a mechanical stopping of the lift car. When drafting this standard, it has been considered for reduced overhead and pit the following:

- a) Risk reduction measures that rely solely on operations in compliance with procedures are considered as not acceptable, except in a few situations in which mistake-proof solutions are not available (for example, some activities in repair and installation in which safety devices cannot be operational); and
- b) The risk reduction measures shall be automatically (without any intervention) activated, or may be manually activated, if mistake-proof-by-design, or a combination of both is used.

The composition of the Committee, responsible for the formulation of this standard is given at Annex B.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated, expressing the result of a test or analysis, shall be rounded off in accordance with IS 2: 2022 'Rules for rounding off numerical values (*revised*)'. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

1 SCOPE

1.1 This Indian Standard specifies the safety rules related to replacement of existing lifts permanently installed in existing buildings where in some circumstances due to limitations enforced by building constraints, some requirements of IS 17900 cannot be met (*see* also Foreword).

1.2 This Indian Standard addresses a number of these constraints and gives requirements for alternative solutions. It shall be read and applied in conjunction with the IS 17900 and its amendments.

1.3 This Indian Standard covers the replacement of an existing lift by a new one in existing lift well and machinery spaces.

1.4 This Indian Standard does not cover:

- a) Replacement or modifications of some parts to a lift already installed; and
- b) Applications outside of the scope of IS 17900.

2 REFERENCES

The following Indian Standards on 'Electric traction lifts' contains provisions which through reference in this text, constitute provisions of this standard.

IS NO.	TITLE
17900	Lifts for the Transport of Persons and Goods
(Part 1) : 2022	Safety Rules
(Part 2) : 2022	Design Rules, Calculations, Examination and Tests of Lifts Componc

At the time of publication, the editions indicated were valid. These standards are subject to revision, and parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent edition of the standards.

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3 TERMINOLOGY

For the purposes of this standard, the terms and definitions given in IS 17900, in addition to the following shall apply.

3.1 Authorized Person — A person authorized by appropriate authority for carrying out one or more of lift related functions, such as inspection, testing, maintenance, rescue and who may carry out the function(s) with permission from the owner of the lift.

3.2 Existing Building — Building or structure, which is authorized and whose occupation or equivalent certificate is already issued before publication of this standard.

NOTE — A building whose internal structure is completely renewed is considered as a new building.

3.3 Existing Lift — A licensed / statutory compliant lift, to carry passengers or goods or both and that is, in existence at the disposal of its owner.

3.4 Movable Stop — Movable stop is a device that limits the travel of the car to ensure sufficient refuge space in the headroom or in the pit when a person enters the car top or the pit, however allows free movement of the lift between normal terminal stops under normal operation.

NOTE — Where a person enters on the car top or in the pit, the device limits the travel of the car to ensure sufficient refuge space in the headroom or in the pit.

3.5 Triggering Device — Device for operating a stopping gear by a mechanical linkage when the lift car passes a predetermined position in the well.

NOTE — This device is actuated when a door giving access to the lift well is opened by means of a key.

3.6 Stopping Gear — Mechanical device for stopping, and maintaining stationary the lift car in the case of unintended movement of the lift car above and/or below a predetermined position in the well to protect person(s) on the car top and/or in the pit

3.7 Pre-triggered Stopping System — System including the triggering device, the mechanical stopping gear and a mechanical linkage in between.

NOTE — Under normal operation of the lift, the system allows the free movement of the lift between normal terminal stops. Where a person enters the car top or the pit, the system ensures sufficient refuge space in the headroom or in the pit

4 SAFETY REQUIREMENTS AND/OR PROTECTIVE MEASURES

Lifts within the scope of this standard shall comply with the relevant safety requirements and/or protective measures of this clause where one or several requirements in IS 17900, and its amendments cannot be fulfilled.

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4.1 Perforate Wall of the Lift Well — The requirements of IS 17900 shall be complied with respect to the well enclosure. However, any existing well enclosure may be perforate provided that:

- a) The well enclosure with wire grill or similar construction is used, the mesh or openings shall be such that the opening between the bars shall reject the ball of 32 mm in diameter and the lift well enclosure shall be of sufficient strength to resist accidental impact by users of the staircase or adjoining floors
- b) Where the clearance between the inside of an open type lift well enclosure and any moving or movable part of the lift equipment of apparatus is less than 50 mm, the opening in the enclosure shall be further protected by netting of square mesh of aperture not greater than 12 mm and of wire not smaller than 1 mm dia.
- c) A protective imperforate rigid screen shall be provided around the landing door locking devices in order to prevent any manipulation of the locking devices by means of a rigid rod 0.30 m long.

NOTE — Preservation of historical buildings may require retention of an existing perforate enclosure.

4.2 Clearances between Car, Counterweight or Balancing Weight — The car and its associated components shall be at a distance of at least 25 mm from the counterweight or balancing weight (if there is one) and its associated components.

To avoid any impact between the car (and its associated components) and the counterweight or balancing weight (and its associated components), in case of failure of normal guidance, emergency guidance on the car and counterweight shall be provided to maintain the car and the counterweight in their horizontal position.

4.3 Pulleys in the Well — Diverter pulleys may be installed in the headroom of the well within the projection of the car top provided that:

- a) The diverter pulleys shall be protected to avoid bodily injury and to prevent the ropes leaving the pulleys, if slack;
- b) Retaining devices shall prevent diverter pulleys from falling in the event of a mechanical failure of the pulley, shaft or bearings. The devices shall be able to support the weight of the pulley and the suspended loads;
- c) Examinations and tests and maintenance operations can be carried out in complete safety from the car top, from inside the car, from a platform or from outside of the well; and
- d) Clearances in the headroom shall comply with 5.2.5.7 of IS 17900 (Part 1) or the requirements of

4.4 Reduced Top Refuge Spaces — The requirements of 5.2.5.7 of IS 17900 (Part 1) may be replaced by the following:

4.4.1 General — The lift shall be equipped with devices providing refuge spaces in the headroom (see 4.4.2) and a safety system (4.4.3) controlling the operation of the lift.

Commented [SJM3]: AS PER IS 17900 , Lift Well Shall be Totally Enclosed by Imperforated Walls, Floors and ceiling, THUS NEED TO DECIDE HOW TO DEAL WITH CASE OF LIFTS IN EXISTING BUILDING WITH PERFORATED WALLS

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4.4.2 Devices Providing Refuge Spaces in the Headroom — The devices providing safety spaces in the headroom shall be:

- a) Either movable stops; or
- b) A pre-triggered stopping system.

4.4.2.1 Movable stops — Automatically operated movable stops shall be designed to prevent damage due to any collision when they are moved between the fully retracted and extended position.

4.4.2.1.1 Arrangement — In the case of traction drive lifts, the movable stops shall be installed under the counterweight to mechanically stop the car.

4.4.2.1.2 Buffering of movable stops — In the case of traction drive lifts, the movable stops shall be fitted with buffers complying with **5.8** of IS 17900 (Part 1)

4.4.2.2 pre-triggered stopping system —

4.4.2.2.1 The pre-triggered stopping system shall include a triggering device with its actuation means for tripping a mechanical stopping gear by a linkage when the car reaches a fixed tripping point in the up direction.

4.4.2.2.2 The triggering device shall be easily accessible so that examinations and maintenance operations can be carried out in complete safety from the pit, or from the car top or from outside of the well.

4.4.2.2.3 The pre-triggered stopping system shall comply with the following —

- a) The stopping gear shall be fixed on the car and act on the guide rails of the car.
- b) The stopping gear shall be tripped by a mechanical triggering device using a mechanical linkage for the tripping operation.
- c) The stopping gear shall be kept tripped by the triggering device and the linkage, when the car is at any position above the tripping point; In case of a release of the stopping gear due to dynamic effects or rescue operations, it shall be re-engaged when the car moves again in up direction above the tripping point keeping the required refuge space.
- d) The stopping gear shall be operated positively:
 - 1) Where springs are used, they shall act by compression; or
 - 2) Where a rope is used, the safety factor of the rope shall be 8 to the tensile force produced in the rope when tripped.
- e) The force required to activate the stopping gear shall be at least the greater of the following two values:
 - 1) Twice the engagement force of the stopping gear taking into consideration the tolerances due to friction; or
 - 2) 300 N.

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- f) The stopping gear shall operate an electric safety device if it is engaged.
- g) When the stopping gear has been tripped, its release shall require the intervention of a competent person.
- h) After the release, the stopping gear shall be in a condition to operate.
- j) The pre-triggered device shall be protected against the accidental insertion of objects, dirt and corrosion.
- k) The pre-triggered stopping system shall be able to stop the car and keep it stopped from any speed between zero and the tripping speed of the ascending car over-speed protections means;
- m) The maximum retardation by the stopping gear shall not exceed $1 g_n$ in the worst case. The worst case should consider load in car (no load / full load), failure of lift machine, brake status (engaged / not engaged), tolerances on components which may increase or decrease braking force, variation in friction coefficient, wear of components, etc. The maximum worst-case braking distance shall be used to decide location of the triggering source. The minimum worst-case braking distance shall be used to calculate the maximum retardation values.
- n) When the stopping gear operates, the floor of the car with or without the load uniformly distributed shall not incline more than 5 percent from its normal position; and
- p) The pre-triggered stopping system including triggering device, linkages, and stopping gear shall be verified in a laboratory with a test stand / lift test tower with masses on both sides of a traction sheave and detachable inertia masses. Measurements with reference to time shall be made of acceleration, speed, braking distance, retardation. Sufficient number of, but not less than six, observations shall be made. From average retardation, the average braking force shall be calculated.

4.4.2.3 Clearances — When the buffering parts of the movable stops are fully compressed or when the car is stopped by the pre-triggered stopping system, the following conditions shall be satisfied:

- a) The free vertical distance between the level of the highest area of at least 0.12 sq. m with lesser dimension of at least 0.25 m, on the car top (areas on parts such as guide shoes or rollers, rope attachments, barricade, etc. excluded) and the level of the lowest part of the ceiling of the lift well (including beams and components located under the ceiling above the clear area) situated in the projection of the car, expressed in meters, shall be the height of the relevant refuge space(s) according to 5.2.5.7.1 of IS 17900 (Part 1) $+0.035 v^2$ (here v is the speed/velocity of the lift)
- b) The vertical clearance between any equipment mounted on top of the car and the nearest overhead obstruction shall be at least $0.50 m + 0.035 v^2$ (here v is the speed/velocity of the lift)

4.4.2.4 Operation — The movable stops or the triggering device shall be operated:

- a) Automatically at the latest when the safety system (*see 4.4.3*) has been activated; or
- b) Manually.

4.4.2.4.1 In the case of power failure —

- a) The automatic movable stops or the automatic triggering device shall be activated and maintained in the active position at least up to the power restoration; and

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- b) For manually operated movable stops or for manually operated triggering devices, a mechanical safety device shall maintain the car stationary. This device shall be activated and maintained in the active position at least up to the power restoration.

4.4.2.4.2 In case of manual operation of moveable stops or automatic triggering device, the mechanical safety device according to **4.4.2.4.1 (b)** shall be operated by the safety system (*see 4.4.3*), in order to prevent any movement of the car in the up direction if the movable stops or the triggering device is not in the active position.

4.4.2.5 *Electrical monitoring* — The movable stops or the triggering device shall be provided with electric safety devices that monitor:

- a) The fully extended (active) position; and
- b) The fully retracted (inactive) position.

4.4.3 *Safety System* —

4.4.3.1 *An electric safety device shall* —

- a) Activate a safety system that deactivates normal operation.
- b) Be operated when any door giving access to the car top is opened by means of a key.
- c) Be a bi-stable switch.
- d) Be reset together with the resetting of the safety system (*see 4.4.3.2*).
- e) For lifts with manual landing doors, a second switch shall prevent any movement of the car if any door giving access to the car top is open. This switch shall not be accessible without using a tool; and
- f) The improvement of the refuge space is possible due to the arrangement of the mechanical devices providing safety spaces and does not require an alteration of the existing building.

4.4.3.2 The resetting of the safety system and the return of the lift to normal operation shall only be made by operation of an electrical reset device.

4.4.3.2.1 *The resetting shall be effective only when* —

- a) The lift is not in inspection operation.
- b) The stopping devices in the pit and on the car top are not in the STOP position;
- c) Any door giving access to the car top is closed and locked; and
- d) The devices providing the safety spaces are in the inactive position (*see 4.4.2*).

4.4.3.2.2 *A power failure shall not reset the safety system* —

4.4.3.3 *The electrical reset device shall be* —

- a) Lockable with the use of a padlock or equivalent, to ensure no inadvertent operation,
- b) Placed outside of the well and accessible to authorized persons only (maintenance, inspection and rescue); and

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- c) Monitored by an electric safety device which prevents normal operation when the reset device remains activated.

4.4.3.4 An additional final limit switch shall interrupt movements of the 'car under inspection' operation in up direction before the buffering parts of the movable stops are hit or before the triggering device is tripping the stopping gear. The car shall be stopped before the stopping gear is tripped.

This switch shall allow the movement of the car only in the down direction. In the position the car has stopped, examinations and test and maintenance operations for all components, which are located in the headroom shall be able to be carried out in complete safety from the car top or from outside of the well.

4.4.3.5 Normal operation of the lift shall only be possible if the movable stops or the triggering device are in the inactive position and the safety system is not activated.

4.4.3.6 When the safety system has been activated, inspection operation shall only be possible if the movable stops or the triggering device are in the active position.

4.4.3.7 When the safety system has been activated and the movable stops or the triggering device are not in the active position, electrical emergency operation shall only be possible in down direction.

4.4.4 *Visible and/or Audible Information* — On opening, by means of a key, of any door giving access to the car top (see 4.4.3.1), a signal visible and/or audible from the landing shall inform about the positions (active and not active) of.

- a) The movable stops; or
- b) The triggering device.

If both ends of the travel are protected by the movable stop(s) and/or by pre-triggered stopping system(s), this information shall allow noticing whether it is from top or bottom end of the well.

The audible signal may be switched off after 60 seconds provided that the movable stops or the triggering device are in the active position. (See also 7.2.1.)

4.4.5 *Protection for Group of Lifts* — When the well contains several lifts, the partition wall in the pit / shaft according to 5.2.5.2 of IS 17900 (Part 1) shall extend to full depth & height of the shaft, thus preventing access to the lift(s) having reduced top clearances.

4.5 Car Top Barricade — The requirements of 5.2.5.7 of IS 17900 (Part 1) are completed as follows:

4.5.1 Where the requirements of 5.2.5.7 of IS 17900 (Part 1) cannot be fulfilled, an easily and safely extendable barricade for the full periphery of the car top shall be permanently installed on the car top (See also 7.2.2)

4.5.2 *The extendable barricade shall meet the following requirements* —

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- a) The design of the barricade shall provide enough strength and fixings to resist a force of 1000 N applied horizontally at right angles to any point at the top of the balustrade, it shall resist without elastic deformation greater than 50 mm and shall allow the barricade to remain in the unfolded or extended position. The fully extended height of the barricade shall be minimum 0.7 m where the free distance in the horizontal plane beyond the outer edge of the handrail of the barricade is between 0.3 m and 0.5 m; and minimum 1.1 m if that distance is greater than 0.5 m. [The provision of barricade on car top is optional, if the free distance is less than 0.3 m.]
- b) The barricade shall be designed in such a way that it can be totally unfolded / folded or extended retracted while standing on a safe area.
- c) If the standing area is on the car top, it shall be:
 - 1) Clear area for standing of at least 0.12 m², in which the lesser dimension is at least 0.25m.
 - 2) Clearly indicated and visible from the landing.
 - 3) Placed at a distance from the edge of the car top not less than 0.50 m, where the risk of falling exists.
- d) Electric safety devices shall prevent the movement of the car if:
 - 1) In normal operation, the barricade is not fully retracted.
 - 2) In inspection operation, the barricade is not fully extended.
- e) For emergency electrical operation, a direction dependent switch shall prevent upward emergency operations in the zone where the barricade if not folded or retracted, can collide with the ceiling of the well.

NOTE — This direction dependent switch for the barricade can be achieved with the additional final limit switch according to 4.4.3.4.

4.6 Reduced Bottom Clearances — The requirements of 5.2.5.8 of IS 17900 (Part 1) may be replaced by the following.

4.6.1 General — The lift shall be equipped with devices providing refuge spaces in the pit (*see 4.6.2*) and a safety system (*see 4.6.3*) controlling the operation of the lift.

4.6.2 Devices Providing Safety Spaces in the Pit — The devices providing safety spaces in the pit shall be:

- a) Either movable stops, or
- b) A pre-triggered stopping system.

4.6.2.1 Movable stops — Movable stops shall comply with the following

- a) The movable stops shall be installed in the pit to mechanically stop the car.
- b) The movable stops shall be fitted with buffers complying with 5.8 of IS 17900; and
- c) Automatically operated movable stops shall be designed to prevent damage due to any collision when they are moved between the fully retracted and extended position.

4.6.2.2 pre-triggered stopping system —

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4.6.2.2.1 The pre-triggered stopping system shall include a triggering device with its actuation means for tripping the mechanical stopping gear by a linkage when the car reaches a fixed tripping point in the down direction.

4.6.2.2.2 The triggering device shall be easily accessible so that examinations and maintenance operations can be carried out in complete safety from the pit, or from the car top or from outside of the well.

4.6.2.2.3 *The pre-triggered stopping system shall comply with the following —*

- a) The stopping gear shall be fixed on the car and act on the guide rails of the car;
- b) The stopping gear shall be tripped by a mechanical triggering device using a mechanical linkage for the tripping operation;
- c) The stopping gear shall be kept tripped by the triggering device and the linkage, when the car is at any position below the tripping point;
In case of a release of the stopping gear due to dynamic effects or rescue operations, it shall be re-engaged when the car moves again in down direction below the tripping point keeping the required refuge space.
- d) The stopping gear shall be operated positively:
 - 1) Where springs are used, they shall act by compression; or
 - 2) Where a rope is used, the safety factor of the rope shall be 8 to the tensile force produced in the rope, when tripped.
- e) The force required to activate the stopping gear shall be at least the greater of the following two values:
 - 1) twice the engagement force of the stopping gear taking into consideration the tolerances due to friction; or
 - 2) 300 N.
- f) The stopping gear shall operate an electric safety device, if it is engaged;
- g) When the stopping gear has been tripped, its release shall require the intervention of a competent person;
- h) After the release, the stopping gear shall be in a condition to operate;
- j) The pre trigger device shall be protected against the accidental insertion of objects, dirt and by corrosion;
- k) The pre-triggered stopping system shall be able to stop the car and keep it stopped from any speed between zero and the tripping speed of the safety gear;
- m) The maximum retardation by the stopping gear shall not create retardation higher than the one created by the safety gear;
- n) When the stopping gear operates, the floor of the car with or without the load uniformly distributed shall not incline more than 5 percent from its normal position; and

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p) The pre-triggered stopping system including triggering device, linkages, and stopping gear shall be verified in a laboratory with a test stand / lift test tower with masses on both sides of a traction sheave and detachable inertia masses. Measurements with reference to time shall be made of acceleration, speed, braking distance, retardation. Sufficient number of, but not less than six, observations shall be made. From average retardation the average braking force shall be calculated.

4.6.2.3 Clearances — When the car rests on the fully compressed buffers of the movable stops or when the car is stopped by the pre-triggered stopping system, **5.2.5.8** of IS 17900 (Part 1) shall be satisfied.

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4.6.2.4 Operation — The movable stops or the triggering device shall be operated

- a) Automatically at the latest when the safety system (*see 4.6.3*) has been activated; or
- b) Manually.

4.6.2.4.1 In the case of power failure —

- a) The automatic movable stops or the automatic triggering device shall be activated and maintained in the active position at least up to the power restoration; and
- b) For manually operated movable stops or for manually operated triggering devices, a mechanical safety device shall maintain the car stationary. This device shall be activated and maintained in the active position at least up to the power restoration.

4.6.2.4.2 In the case of manual operation, the mechanical safety device according to **4.6.2.4.1 b)** shall be operated by the safety system (*see 4.6.3*), in order to prevent any movement of the car in the down direction, if the movable stops or the triggering device is not in the active position.

4.6.2.5 Electrical monitoring — The movable stops or the triggering device shall be provided with electric safety devices that monitor:

- a) The fully extended (active) position; and
- b) The fully retracted (inactive) position.

4.6.3 Safety System

4.6.3.1 An electric safety device shall —

- a) Activate a safety system that deactivates normal operation;
- b) Be operated when any door giving access to the pit is opened by means of a key;
- c) Be a bi-stable switch; and
- d) Be reset together with the resetting of the safety system (*see 4.6.3.2*).

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For lifts with manual landing doors, a second switch shall prevent any movement of the car, if any door giving access to the pit is open. This switch shall not be accessible without using a tool.

Any door/trap door whose sill is having a distance less than 2.5 m from the pit floor, is considered as access door to the pit.

4.6.3.2 The resetting of the safety system and the return of the lift to normal operation shall only be made by operation of an electrical reset device.

4.6.3.2.1 *The resetting shall be effective only when —*

- a) The lift is not in inspection operation;
- b) The stopping devices in the pit and on the car top are not in the STOP position;
- c) Any door/trap door giving access to the well are closed and locked; and
- d) The devices providing the safety spaces are in the inactive position (*see 4.6.2*).

4.6.3.2.2 *A power failure shall not reset the safety system.*

4.6.3.3 *The electrical reset device shall be —*

- a) Lockable with the use of a padlock or equivalent, to ensure no inadvertent operation;
- b) Placed outside of the well and accessible to authorized persons only (maintenance, inspection and rescue); and
- c) Monitored by an electric safety device which prevents normal operation when the reset device remains activated.

4.6.3.4 An additional final limit switch shall interrupt movements of the ‘car under inspection’ operation in down direction before the buffering parts of the movable stops are hit or before the triggering device is tripping the stopping gear. This switch shall allow the movement of the car in the up direction.

In the position the car has stopped, examinations and tests and maintenance operations for all components which are located in the lower part of the car shall be able to be carried out in complete safety from the pit or from outside of the well.

4.6.3.5 Normal operation of the lift shall only be possible, if the movable stops or the triggering device are in the inactive position and the safety system is not activated.

4.6.3.6 When the safety system has been activated, inspection operation shall only be possible if the movable stops of the triggering device are in the active position.

4.6.3.7 When the safety system has been activated and the movable stops or the triggering device are not in the active position, electrical emergency operation shall only be possible in upwards direction.

4.6.4 *Visible and/or Audible Information* — On opening, by means of a key, of any door giving access to the pit (*see 4.6.3.1*), a signal visible and/or audible from the landing shall inform about the positions (active and not active) of:

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- a) The movable stops; or
- b) The triggering device.

If both ends of the travel are protected by movable stop(s) and/or by pre-triggered stopping system(s), this information shall allow noticing, whether it is from top or bottom end of the well.

The audible signal may be switched off after 60 s provided that the movable stops or the triggering device are in the active position. (See also 7.2.3.)

4.6.5 Partition in the Pit/Shaft — When the well contains several lifts, the partition wall in the pit / shaft according to 5.2.5.5.2 of IS 17900 (Part 1) shall be provided to full depth and height of the shaft.

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4.7 Apron — The requirements of 5.4.5 of IS 17900 (Part 1) may be replaced by the following:

4.7.1 General — Each car sill shall be fitted with an extendable apron, which shall satisfy the following:

- a) Fixed part and movable part(s) of the apron shall cover the full width of the clear landing entrance, which it faces;
- b) The vertical section of the lowest movable part shall be extended downwards by a chamfer whose angle with the horizontal plane shall be not less than 60°. The projection of this chamfer on the horizontal plane shall be not less than 20 mm;
- c) The extended apron shall have a mechanical strength such that when a force of 300 N, being evenly distributed over an area of 5 cm² in round or square section, is applied at right angles to the apron at any point from outside to inside of the well, it shall resist:
 - 1) Without any permanent deformation;
 - 2) Without any horizontal deformation greater than 35 mm;
- d) The height of the fixed vertical part shall be at least equal to the unlocking zone extending above the landing sill level; and
- e) The height of the vertical portion of the extended apron shall be at least 0.75 m. (See also 7.2.4.)

4.7.2 Specific Requirements — One of the following means shall be provided:

- a) An apron retracted under normal operation, manually extendable when needed and fulfilling the following conditions:
 - 1) If the apron is not in the retracted position, normal operation of the lift shall be deactivated by means of an electric safety device;
 - 2) The car door shall be equipped with a locking device in conformity with 5.3.9.2 of IS 17900 (Part 1)
 - 3) A mechanical device reachable from the rescue landing shall be provided for unlocking the car door;
 - 4) The apron shall be unlocked by means of the emergency unlocking key operated at the apron;

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- 5) Putting back the car apron into the retracted position shall be possible manually only from the lowest landing, the pit floor or the car top, by appropriate means; and
- 6) A direction dependent switch shall prevent downwards inspection and emergency operations in the zone where the car apron, if not retracted, can collide with the pit floor.

NOTE — This direction dependent switch for the apron can be achieved with the additional final limit switch according to 4.4.3.4.

- b) Or an apron retracted under normal operation, automatically extended on opening any landing door with the emergency unlocking key, and fulfilling the following conditions:

- 1) If the apron is not in the retracted position, normal operation of the lift shall be deactivated by means of an electric safety device;
- 2) The car door shall be equipped with a locking device in conformity with 5.3.9.2 of IS 17900 (Part 1)
- 3) A mechanical device reachable from the rescue landing shall be provided for unlocking the car door;
- 4) In the case of loss (interruption or isolation) of power supply, the car apron shall move automatically into the extended position;
- 5) Putting back the car apron in to the retracted position shall be possible:
 - i) Either automatically, provided the landing doors are closed and locked, or
 - ii) Manually, only from the lowest landing, the pit floor or the car top, by appropriate means.
- 6) A direction dependent switch shall prevent downwards inspection and emergency operations in the zone where the car apron, if not retracted, can collide with the pit floor.

NOTE — This direction dependent switch for the apron can be achieved with the additional final limit switch according to 4.6.3.4.

- c) Or an apron extended under normal operation, retracted when the car is reaching its lowest position, and fulfilling the following condition:

- 1) Normal operation shall be deactivated by electric safety devices if, the apron is not in the extended position when the car is not in a zone, which extends from the position of the car resting on its fully compressed buffers to a position of not more than 1 m above the lowest landing sill.

4.8 Height of Machine Room — The requirements of 5.2.6.3.2 of IS 17900 (Part 1) for the height of the machine room may be replaced by the following:

When the clear height at working areas is less than 1980 mm, warnings for example, using yellow and black stripes according to Fig. 1 below and/or an adequate warning sign shall be appropriately placed and soft materials shall be provided under the ceiling above those areas.



FIG. 1

The clear height of the machine room, measured up to the lower surface of soft materials on the ceiling, shall not be less than 1.80 m for working areas.

4.9 Height of Machine Room Doors — Access doors shall have a minimum width of 0.60 m and a minimum height of 1.70 m. They shall not open towards the inside of the room.

When the height is less than 1.80 m, suitable warnings, for example, using yellow and black stripes according to Fig. 1 and/or an adequate warning sign shall be appropriately placed on both sides of the door.

4.10 Height of Pulley Rooms — The following requirements are added to: 5.2.6 Of IS 17900 (Part 1)

- a) If there are control panels and cabinets in the pulley room and when the clear height at the working areas is less than 1980 mm, warnings for example, using yellow and black stripes as shown in Fig 1 and/or an adequate warning sign shall be appropriately placed and soft materials shall be provided under the ceiling above those areas.
- b) The clear height of the pulley room, measured up to the lower surface of soft materials on the ceiling if required, shall not be less than 1.80 m for working areas.

5 TESTS BEFORE PUTTING THE LIFT INTO SERVICE

In addition to the tests listed in 6.3 of IS 17900 (Part 1), the following tests shall be carried out:

- a) For Top Clearances:
 - 1) Movable stops and pre-triggering safety system shall be dynamically tested with the empty car and at rated speed. For traction drive lifts, the brake shall be kept open.
After the test, it shall be ascertained that no deterioration that could adversely affect the normal use of the lift has occurred. Visual check is considered to be sufficient;
 - 2) Test certificate review for the stroke of the buffers of the movable stop(s); and

3) Check of the braking distance, in the case of pre-triggering safety system.

b) For Bottom Clearances:

1) Movable stops and pre-triggering safety system shall be dynamically tested with the car loaded with rated load and at rated speed. For traction drive lifts, the brake shall be kept open.

After the test, it shall be ascertained that no deterioration that could adversely affect the normal use of the lift has occurred. Visual check is considered to be sufficient;

2) Test certificate review for the stroke of the buffers of the movable stop(s); and
3) Check of the braking distance, in the case of pre-triggering safety system.

6 TECHNICAL NOTE

In the general arrangement drawing, in case of reduced pit and/or headroom, information about protective measures taken shall be included.

7 INFORMATION FOR USE

7.1 Instructions — The instruction manual shall include explanations on the functioning, use and maintenance of the provisions of this standard (for example, safety system, movable stops, pre-triggered stopping system, extendable barricade, extendable apron, etc.).

For pre-triggered stopping system, the nominal, minimum and maximum braking distances shall be stated in the GAD (General Arrangement Drawing) and in the instruction manual of the lift. Information shall be given on how to proceed if the braking distance of a site test is outside of this range.

7.2 Notices and Warnings — All labels, notices, markings and operating instructions shall be indelible, legible and readily understandable (if necessary, aided by signs or symbols). They shall be untearable, of durable material, placed in a visible position, and written in English and the local language where the lift is installed (or, if necessary, in several languages).

The minimum height of the characters used for the notices shall be:

a) For machinery spaces, emergency operation devices and for resetting device location:

- 1) 10 mm for capital letters and numbers; or
- 2) 7 mm for small letters.

b) For pit and car top locations:

- 1) 17 mm for capital letters and numbers; or
- 2) 12 mm for small letters.

7.2.1 Reduced Top Clearances — A notice bearing the following inscription: “**Danger – Reduced top clearances – Respect instructions**” shall be affixed:

- a) In machinery spaces at the emergency operation devices;
- b) On or at the device for resetting the lift; and
- c) On the car top.

This notice may be accompanied by the warning sign given as Fig. 2:



FIG. 2

7.2.2 Extendable Barricade — A warning shall be affixed on the car top in order to inform about the need of extending the barricade before any work is performed on the car top.

7.2.3 Reduced Bottom Clearances — A notice bearing the following inscription: “**Danger – Reduced bottom clearances – Respect instructions**” shall be affixed:

- a) In machinery spaces at the emergency operation devices;
- b) On or at the device for resetting the lift; and
- c) In the pit.

This notice may be accompanied by the warning sign given as Fig. 3:



FIG. 3

7.2.4 Extendable Car Apron — A notice clearly visible from the landing when the doors are opened shall be affixed on or near the mechanical device required in **4.7.2 (a)(3)** and **4.7.2 (b)(3)** or on the fixed part of the apron, warning:

"Apron shall be fully extended before rescuing persons"

This notice may be accompanied by the warning sign given as Fig. 4:



FIG. 4

ANNEX A

PERIODICAL EXAMINATIONS AND TESTS, EXAMINATIONS AND TESTS AFTER AN IMPORTANT MODIFICATION OR AFTER AN ACCIDENT

A-1 PERIODICAL EXAMINATIONS AND TESTS

These periodical tests should not, through their repetition, cause excessive wear or impose stresses likely to reduce the safety of the lift. This is the case, in particular, of the test on components, such as the safety gear, the buffers and the movable stop(s). If tests on these components are made, they shall be carried out with empty car and at a reduced speed.

A-2 EXAMINATIONS AND TESTS AFTER AN IMPORTANT MODIFICATION OR AFTER AN ACCIDENT

- a) The movable stops;
- b) The pre-triggered stopping system;
- c) The extendable car top barricade; and
- d) The extendable apron.