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Replacing GB/T 10058-1997

Specification for Electric Lifts

电梯技术条件

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Foreword

This Standard replaces GB/T 10058-1997 "Specification for Lifts".

Compared with GB/T 10058-1997, the main changes of this Standard are as follows:

- The scope of application was enlarged from 2.5m/s as stated in GB/T 10058-1997 to 6.0m/s;
- The contents on safety of electric lift was modified base on GB 7588-2003;
- The performance parameters of the complete machine of electric lift were comprehensively modified in accordance with GB/T 24474-2009 "Lifts (Elevators) - Measurement of Lift Ride Quality";
- The technical requirements related to "electric lift without machine room" were added;
- The calculation and measurement methods of energy consumption of electric lift were added;
- The additional requirements of the barrier-free design of electric lift were added;
- The basic requirements of anti-seismic design of electric lift were added.

In this Standard, Appendix B is normative; Appendix A is informative.

This Standard shall be under the jurisdiction of National Technical Committee on Elevators of Standardization Administration of China (SAC/TC 196).

Responsible drafting organization of this Standard: Institute of Building Mechanization of China Academy of Building Research.

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The previous editions replaced by this Standard are as follows:

- GB 10058-1988, and GB/T 10058-1997.

Specification for Electric Lifts

1 Scope

This Standard specifies the technical requirements, inspection rules, marking, packing, transportation, and storage requirements of the passenger lifts and freight lifts.

This Standard is applicable to electrically-driven traction type passenger lifts and freight lifts of which the rated speed is not larger than 6.0m/s, and those electrically-driven positive type passenger lifts and freight lifts of which the rated speed is not larger than 0.63m/s. For the electrically-driven traction type passenger lifts and freight lifts of which the rated speed is greater than 6.0m/s, it may reference to this Standard; the inapplicable part shall be determined by the manufacturer and the client through negotiation.

This Standard is not applicable to the hydraulic lifts, dumbwaiter lifts, and home lifts.

2 Normative References

The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. For dated reference, subsequent amendments (excluding corrigendum) or revisions of these publications do not apply. However, all parties who enter into an agreement according to this Standard are encouraged to study whether the latest edition of these documents is applicable. For undated references, the latest edition of the normative document referred to applies.

GB 7588-2003 "Safety Rules for the Construction and Installation of Electric Lifts" (EN 81-1:1998, EQV)

GB 8903-2005 "Steel Wire Ropes for Elevators" (ISO/FDIS 4344:2003, MOD)

GB/T 10059 "Electric Lifts - Testing Methods"

GB/T 10060 "Code for Acceptance of Lifts Installation"

GB 14048.1-2006 "Low-voltage Switchgear and Controlgear - Part 1: General Rules" (IEC 60947-1:2001, MOD)

GB/T 20645-2006 "Specific Environmental Condition-Technical Requirements of Low-voltage Apparatuses for Plateau"

GB/T 22562-2008 "Guide Rails for Lifts - T-type" (ISO 7465:2007, IDT)

GB/T 24474-2009 "Lifts (Elevators) - Measurement of Lift Ride Quality" (ISO

continue-operating (excluding the leveling and re-leveling in the unlocking zone);

- 2) The safety device for verifying the tight locking of landing doors; the electrical safety device for verifying the closed state of landing doors; emergency unlocking device and the automatic closing device of landing doors.
- f) During the closing process of the power-operated automatic door, one protective device is required to make the door re-open automatically when someone is impacted or is going to be impacted by passing the entrance.
- g) Lift-car ascending over-speed protection devices.
- h) Emergency operating device.
- i) The pulley room, car top, foundation pit, overhauling control device, lift machine, and the emergency-testing operating devices installed outside the lift-well of "electric lift without machine room" shall all be set with bi-stable red stopping devices. If there is the main switch or other stopping devices set within 1m away from the lift machine or within 1m away from the emergency-testing operating devices outside the lift-well of "electric lift without machine room", then the stopping devices may be not-installed on the lift machine or on the emergency-testing operating devices.
- j) The quantity of overhauling control devices installed shall not be larger than two.

If two overhauling control devices are installed, the interlocking system between them shall ensure that:

- 1) If only one overhauling control device is set at the "overhauling" position, then the electric lift shall be started by pressing the button on this overhauling control device;
- 2) If both of the two overhauling control devices are set at the "overhauling" position:
 - I) The operation on any one of these two overhauling control devices shall be able to make the electric lift to operate; or
 - II) The electric lift shall be able to operate only by pressing the buttons of the same function of these two overhauling control devices simultaneously.
- k) The places in lift-car and lift-well, where the workers may be stranded, shall be installed with emergency alarm devices. When the lift travel is larger than 30m or the direct dialogue between the inner part of lift-car and the emergency

3.5.2 The braking system shall have one electromechanical brake (friction-type).

- a) When the lift-car carries 125% of its rated loading capacity and moves downward at its rated speed, operating brake shall be able to make the tractor shut down. The deceleration of lift-car shall not exceed the deceleration produced by the action of safety tongs or the impacting between lift-car and buffer. All the mechanical parts of brake that participate in applying braking force to the brake pulley (or disk) shall be installed in two groups. If one group of components is out of function, there shall still have sufficient braking force to make the lift-car, that carries the rated loading capacity and descends at rated speed, to decelerate.
- b) The braked-components shall adopt direct rigid connection with traction sheave, winding drum or chain wheel in mechanical mode.

3.5.3 The lift machine shall be free from abnormal vibration or abnormal noise. The temperature rise of the coil of brake and the winding of motor stator, and the oil temperature in the reduction gearbox of lift machine shall not be larger than those specified in 4.2.3.2 of GB/T 24478-2009.

3.5.4 The divisional planes and viewing window (hole) / cover of the reduction gearbox of lift machine shall be connected tightly without oil seepage. During the normal operation of electric lift, the area of oil, per hour seeping out of the shaft extension end of reduction gearbox, shall not exceed those specified in 4.2.3.8 of GB/T 24478-2009.

3.5.5 The lift machine after assembling shall be inspected in accordance with GB/T 24478-2009.

3.6 Speed Limiter

3.6.1 The acting-speed of speed limiter that controls the safety tongs of lift-car shall not be less than 115% of the rated speed of electric lift, and shall be less than the following values:

- a) For the instantaneous safety tongs other than the non-shedding roller type ones: 0.8m/s;
- b) For the non-shedding roller type instantaneous safety tongs: 1.0m/s;
- c) For the progressive safety tongs of which the rated speed of electric lift is less than or equal to 1.0m/s: 1.5m/s;
- d) For the progressive safety tongs of which the rated speed of electric lift is larger than 1.0m/s: $1.25v + \frac{0.25}{v}$ (m/s).

3.6.2 For electric lift with rated speed larger than 1.0m/s, the acting-speed that is

safety device may act, at latest, when the speed limiter reaches its acting-speed.

3.6.10 If the speed limiter can not reset automatically after the safety tongs release, then one electrical safety device meeting those specified in 14.1.2 of GB 7588-2003 shall be equipped when the speed limiter can not reset, so as to prevent the electric lift from starting.

3.6.11 When the rope of speed limiter breaks or stretches excessively, one electrical safety device meeting those specified in 14.1.2 of GB 7588-2003 shall act to stop the lift.

3.6.12 The response time before the speed limiter acts shall be short enough; it is not allowed to reach the dangerous speed before the safety tongs act.

3.7 Safety Tongs

3.7.1 The lift-car shall be equipped with the safety tongs that are able to act when the lift descends. When reaching the acting-speed of speed limiter or even when the suspension gear cracks, the safety tongs shall be able to clamp the guide rail to make the lift-car that carries the rated loading capacity to stop and maintain in static state.

3.7.2 Application conditions of safety tongs:

3.7.2.1 The safety tongs for lift-car shall be selected in accordance with the rated speed (v) of electric lift, which means:

- a) If $v > 0.63$ m/s, the progressive safety tongs shall be adopted;
- b) If $v \leq 0.63$ m/s, the instantaneous safety tongs may be adopted.

3.7.2.2 If the lift-car is equipped with several sets of safety tongs, then they shall all be the progressive safety tongs.

3.7.2.3 If the rated speed is larger than 1.0m/s, then the safety tongs for counterweight (or balancing weight) shall also adopt the progressive safety tongs; and the instantaneous safety tongs shall be adopted for other cases.

3.7.3 The safety tongs shall not be controlled by adopting the electrical-, hydraulic- or gas-operated devices.

3.7.4 In case the lift-car carrying its rated loading capacity falls freely, the mean of deceleration of progressive safety tongs while braking shall be between $0.2g_n$ and $1.0g_n$.

3.7.5 In case the lift-car carries no-load or the loads are evenly distributed, the gradient of the floor in lift-car after the safety tongs acts shall not be larger than 5% of the normal position of floor.

3.8.3 Hydraulic buffer

3.8.3.1 The possible total travel of hydraulic buffer shall be at least equal to the gravity braking distance corresponding to 115% of rated speed, namely:

$$\frac{(1.15v)^2}{2g_n} \approx 0.0674v^2 \text{ (m)}.$$

3.8.3.2 When the lift-car carrying its rated loading capacity falls freely and impacts the lift-car buffer at a speed of 115% of its rated speed, the buffer shall meet the following requirements:

- a) The mean of deceleration during the action period of buffer shall not be larger than $1g_n$;
- b) The time during which the deceleration is larger than $2.5g_n$ shall not be larger than 0.04s;
- c) The buffer shall be free from permanent deformation after it acts.

3.8.3.3 When monitoring the deceleration of electric lift at its end of travel according to the requirements stated in 12.8 of GB 7588-2003, for the calculated travel of buffer in accordance with those specified in 3.8.3.1, it may adopt the speed of lift-car (or counterweight) when having rigid contact with the buffer to replace the 115% of rated speed in the formula. However, the travel shall not be less than:

- a) If the rated speed is less than or equal to 4.0m/s, the travel shall not be less than 50% of the travel calculated in accordance with 3.8.3.1. However, in any case, the travel shall not be less than 0.42m;
- b) If the rated speed is larger than 4.0m/s, the travel shall not be less than 1/3 of the travel calculated in accordance with 3.8.3.1. However, in any case, the travel shall not be less than 0.54m.

3.8.3.4 After the buffer acts, the electric lift may operate normally only after the buffer restores to its normal stretching position; the device used for inspecting the normal resetting of buffer shall be the electrical safety device specified in 14.1.2 of GB 7588-2003.

3.9 Lift-car Ascending Over-speed Protection Device

3.9.1 Lift-car ascending over-speed protection devices include speed monitoring element and decelerating element; it shall be able to monitor the out-of-control conditions of the ascending speed of lift-car; its lower limit is 115% of the rated speed of electric lift and its upper limit is the acting-speed of the speed limiter for counterweight safety tongs as stated in 3.6.8; it shall also be able to brake the lift-car or at least reduce the speed of the lift-car down to the design scope of counterweight

Note: The height of the vertical part of toe guard shall be measured starting from the upper surface of sill of lift-car.

3.10.6 After the car door is closed, the gap between door leaves as well as the gap between the door leaf and the post, door header or sill shall be as small as possible. For passenger lifts, these moveable gaps shall not be larger than 6mm; for the freight lifts, these gaps shall not be larger than 8mm. Due to abrasion, the gap value is allowed to be as large as 10mm. Where any recess exists, the above-mentioned gaps shall be measured from the bottom of recess.

3.10.7 When the car door is at the closed position, it shall have the following mechanical strength: when a 300N force is applied vertically at any position of the door from the inner part to the outer part of lift-car and is distributed uniformly on an circular or square area of 5cm², the car door shall:

- a) Without any permanent deformation;
- b) The elastic deformation is no larger than 15mm;
- c) During the test and after the test, the safety function of the door are not affected.

When the glass size is larger than the glass door stated in 7.6.2 of GB 7588-2003, the laminated glass shall be adopted and shall be selected in accordance with Table J2 of GB 7588-2003, or shall be able to withstand the ballistic pendulum test specified in Appendix J of GB 7588-2003.

3.10.8 To avoid the shear risk of power-operated automatic sliding door in operation, the surface of the door on one side of the lift-car shall be free from any recess or projection larger than 3mm; and the edges of these recess or projecting portions shall be chamfered in the opening direction of the door.

3.10.9 The ventilation of lift-car shall meet those specified in 8.16 of GB 7588-2003.

3.10.10 The illumination of lift-car shall meet those specified in 8.17 of GB 7588-2003.

3.10.11 For the power-operated automatic horizontally sliding door, the force for preventing door closing shall not be larger than 150N. The measurement of this force shall not be carried out within 1/3 of the door closing travel.

During the closing process of car door, if the passenger is impacted or going to be impacted by the door leaf when passing through the entrance, one protective device shall act automatically to make the door open again. The action of this protective device may be eliminated in the last 50mm travel of each driving door leaf.

3.10.12 The vertically sliding door shall meet the requirements stated in 8.7.2.2 of GB 7588-2003.

- c) During the test and after the test, the safety functions of the door are not affected.

When the glass size is larger than the glass door stated in 7.6.2 of GB 7588-2003, the laminated glass shall be adopted and shall be selected in accordance with Table J2 of GB 7588-2003, or shall be able to withstand the ballistic pendulum test specified in Appendix J of GB 7588-2003.

3.11.6 The sill, guiding devices and door suspension gear shall meet those specified in 7.4 of GB 7588-2003. When the guiding device may be out of service due to abrasion, rust or fire, the emergency guiding device shall be set to make the landing door to stay at its original position.

3.11.7 The protection requirements in relation to the movement of power-operated land doors shall meet those specified in 7.5.2 of GB 7588-2003.

3.11.8 Before the lift-car moves, the landing doors shall be locked at their close-positions effectively; and the lift-car shall be started only when the meshing of locking element is not less than 7mm. The locking of landing doors shall be verified by an electrical safety device that meets the requirements stated in 14.1.2 of GB 7588-2003.

3.11.9 In type test, the door lock assembly shall be able to withstand a force acting in the door opening direction at the height of door lock; the value of this force shall not be less than the following specified values; and the door lock assembly shall be free from permanent deformation.

- a) 1,000N for sliding door;
- b) 3,000N above the lock pin for hinged door.

3.11.10 The door lock assembly shall be able to withstand 1×10^6 times of full cycle operations ($\pm 1\%$); its actuation shall be smooth without impact; and the frequency shall be 60 times per minute ($\pm 10\%$).

3.11.11 Except for the cases stated in 7.7.2.2 of GB 7588-2003, if one landing door is opened (or any one leaf among several leaves is opened), under the normal operating conditions, the electric lift shall fail to start or shall continue operating.

3.11.12 When the electric lift operates normally, unless the lift-car stops or arrives at the station in the unlocking area of one landing door, this landing door (or any leaf among several leaves of the landing door) shall not be opened.

3.11.13 Under the condition that the lift-car door drives the landing door, when the lift-car is beyond the unlocking area, for example, the landing door is opened due to any reason, then there shall have a kind of device (heavy block or spring) to be able to ensure the automatic closing this landing door.

3.11.14 If the lift-car never obtains operating instructions during the regular service of electric lift, then the power-operated automatic door shall be closed after a certain necessary time.

3.11.15 If the building demands the landing door of electric lift having fireproof performance, then this landing door shall be tested in accordance with GA 109.

3.12 Suspension device

3.12.1 The characteristics of suspension steel wire ropes shall meet the relevant provisions on electric lift steel wire rope, as stated in GB 8903.

3.12.2 The quantity of steel wire ropes shall be no less than two, and each steel wire rope shall be independent.

3.12.3 The nominal diameter of steel wire rope shall not be less than 8mm. The ratio between the pitch diameter of traction sheave or pulley and the nominal diameter of steel wire rope shall not be less than 40.

3.12.4 The safety factor of steel wire rope shall meet those specified in 9.2.2 of GB 7588-2003.

3.12.5 The mechanical strength of the junction (rope hitch) between the steel wire ropes and the terminating devices shall be able to withstand at least 80% of the minimum breaking load of steel wire rope.

3.12.6 The traction of steel wire rope shall meet the following three conditions:

- a) Under the condition that the lift-car is loaded till 125% of the rated loading capacity specified in 8.2.1 or 8.2.2 of GB 7588-2003, the lift-car shall keep at leveling state without slipping;
- b) It shall be ensured that, in any emergency braking state, whether the lift-car is at no-load or full-load state, its deceleration value shall not exceed the deceleration value when buffer is acting (including travel-reducing buffer);
- c) When the counterweight is pressed on buffer and the tractor rotates in the ascending direction of electric lift, the no-load lift-car shall not be lifted.

The design method may refer to Appendix M of GB 7588-2003.

3.13 Counterweight and Balancing Weight

The counterweight and balancing weight shall meet those specified in 8.18 of GB 7588-2003.

3.14 Guide Rail

Guide rail shall meet those specified in 10.1 and 10.2 of GB 7588-2003; T-shaped

respectively operate for 1,000 times (no less than 8h per day) under the conditions of no-load and rated loading capacity according to the hourly starting times and duty cycle specified in product design; the electric lift shall operate stably, brake reliably, and operate continuously without trouble.

4 Reliability

4.1 Reliability of Complete Machine

The reliability test of the complete machine requires that the failure (fault) times, among 60,000 times of starting, braking and operating, shall not exceed five times. The maintenance down-time of failure (fault) every time shall not exceed 1h. The shutdown caused by the reasons of electric lift or the abnormal operation not meeting the performance requirements of complete machine as specified in this Standard are all be regarded as failure (fault).

4.2 Reliability of Control Cabinet

The reliability test of control cabinet requires that the failure (fault) times of control cabinet, among the 60,000 times of starting, braking and operating of the electric lift that is started and controlled by this control cabinet, shall not exceed two times. The shutdown caused by the reasons of control cabinet or the abnormal operation not meeting the relevant performance requirements specified in this Standard are all be regarded as failure (fault). The performance items of complete machine that are related to the control cabinet include:

- a) Starting acceleration and braking deceleration;
- b) Maximum acceleration and deceleration as well as A95 acceleration and deceleration;
- c) Leveling accuracy.

4.3 Loading Conditions of Reliability Test

During the duration of reliability tests of complete machine and control cabinet, the lift-car shall ascend at its rated speed for no less than 15,000 times by carrying its rated loading capacity.

5 Inspection Rules

The test methods for electric lift shall be carried out in accordance with those specified in GB/T 10059.

The inspection on electric lift includes exit-factory inspection as well as and type test before putting into service.

5.1 Exit-factory Inspection

The exit-factory inspection of electric lift shall be carried out in accordance with those specified in the manufacturer's product standard.

5.2 Inspection Before Putting into Service

The inspection on electric lift before putting into service shall be carried out in accordance with 3.19, Appendix D of GB 7588-2003 and those specified in GB 50310 and GB/T 10060.

5.3 Type Test

5.3.1 The type test shall be carried out under any one of the following circumstances:

- a) When new products are launched into production or the old products are transferred the plant;
- b) When the structure, main configuration, or technical parameters etc. are changed, after the product is formally launched into production;
- c) When reinstating the production after the production is halted for over two years;
- d) When the exit-factory inspection result is significantly different from the previous type test result;
- e) When it is required by the laws and regulations of the State.

5.3.2 For the type test of electric lift, the type test of the complete machine and the type tests of main components and safety components shall be carried out in accordance with those specified in Chapter 3 and Chapter 4. In which, the type test of door lock assembly, safety tongs, speed limiters, lift-car ascending over-speed protection devices, buffers, and safety circuits containing electronic elements shall be carried out in accordance with those specified in Appendix F of GB 7588-2003.

6 Marking, Packing, Transportation, Storage and Technical Archives

6.1 Marking

6.1.1 The electric lift shall be installed with product label at obvious position in the lift-car. And the label shall indicate in Chinese as follows:

- a) The rated loading capacity of electric lift (kg) and the passenger limit of

Where:

P_1 — the coefficient related to balance coefficient;

$P_1=1.0$ (When the balance coefficient is 50%)

$P_1=0.8$ (When the balance coefficient is 40%)

$P_0=(0.5 \times \text{rated loading capacity} \times \text{rated speed} \times g_n)/(1000 \times n_s \times n_g \times n_m)$

n_s — the suspension efficiency, of which the default is $n_s=0.85$;

n_g — the transmission efficiency;

$n_g=0.75$ (For worm and gear driving system)

$n_g=1.0$ (For driving system without gear)

n_m — the motor efficiency;

$n_m=0.76$ (For AC voltage-speed-regulated driving system)

$n_m=0.85$ (For VVVF driving system)

g_n — the normal acceleration of gravity, which is 9.81 m/s^2 ;

V — the rated speed, expressed in meters per second (m/s);

E_{standby} — the total standby energy consumption of one year, expressed in kilowatt-hours per year ($\text{kW} \cdot \text{h/year}$).

A.2 Measurement of Energy Consumption

All the measurements of energy consumption shall be ensured with a accuracy of $\pm 5\%$.

A.2.1 Energy consumption of main power supply — operating

- a) The energy meter is connected to the access points of all phases of main power supply;
- b) The voltage of main power supply shall be measured and recorded;
- c) The energy meter shall be installed to measure the active energy;
- d) If impossible, the electric lift shall be set at the mode of automatic circulating operation between two end stations;
- e) The lift-car shall be operated to the end station at bottom storey;

- f) The energy consumption (expressed in kw·h) shall be calculated with the measured electric energy.

A.2.4 Energy consumption of auxiliary equipment — operating

- a) The energy meter shall be connected to the access points of the power supply of auxiliary equipment;
- b) The voltage of main power supply shall be measured and recorded;
- c) The energy meter shall be installed to measure the active energy;
- d) If impossible, the electric lift shall be set at the mode of automatic circulating operation between two end stations;
- e) The lift-car shall be operated to the end station at bottom storey;
- f) The measurement shall be started;
- g) The circulating-measurements between end stations shall be started (one cycle refers to that the electric lift ascends from the end station at the bottom storey to the end station at the top storey, then returns to the end station at bottom storey);
- h) The measurement shall be continued for at least ten cycles;
- i) The value of active energy shall be measured and recorded;
- j) The cycle times shall be recorded;
- k) The total energy consumption shall be divided by the cycle times to obtain a mean value, and this mean value shall be recorded.

Electrical schematic diagram, electrical wiring diagram, and the code descriptions.

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