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**Inspection standard of elevator, escalator
and dumbwaiter**

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Foreword

This translation has been made based on the original Japanese Industrial Standard revised by the Minister of Land, Infrastructure and Transport through deliberations at the Japanese Industrial Standards Committee as the result of proposal for revision of Japanese Industrial Standard submitted by Japan Building Equipment and Elevator Center Foundation (BEEC) with the draft being attached, based on the provision of Article 12 Clause 1 of the Industrial Standardization Law applicable to the case of revision by the provision of Article 14.

Consequently JIS A 4302:1992 is replaced with this Standard.

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Inspection standard of elevator, escalator and dumbwaiter

1 Scope This Japanese Industrial Standard specifies the inspection items, inspection apparatus, methods of inspection and criteria for the inspection for safety of elevators (including step lift and inclined stairway chairlift), escalators (including moving sidewalks), and dumbwaiters installed in buildings, structures and so on.

2 Normative references The following standards contain provisions which, through reference in this text, constitute provisions of this Standard. The most recent editions of the standards (including amendments) indicated below shall be applied.

- JIS B 7507 *Vernier, dial and digital callipers*
- JIS B 7510 *Precision levels*
- JIS B 7512 *Steel tape measures*
- JIS B 7516 *Metal rules*
- JIS B 7522 *Textile tape measures*
- JIS B 8360 *Wire reinforced rubber hose assemblies for hydraulic use*
- JIS B 8364 *Textile reinforced rubber hose assemblies for hydraulic use*
- JIS C 1102-2 *Direct acting indicating analogue electrical measuring instruments and their accessories Part 2 : Special requirements for ammeters and voltmeters*
- JIS C 1302 *Insulation resistance testers*
- JIS G 3525 *Wire ropes*
- JIS G 3546 *Wire ropes with profile wires*

3 Inspection items

3.1 Completion inspection In the completion inspection, compliances with every item given in the design documents, and also all the items provided in clause 5 shall be inspected.

3.2 Periodic inspection In the periodic inspection for maintenance and care, inspection is made for all the items provided in clause 5 except for the loading test and for the ascending and descending speeds.

4 Inspection apparatus

4.1 For insulation resistance measurement the 500 V 100 M Ω insulation resistance tester specified in **JIS C 1302** shall be used. For the circuit including electronics such as semiconductor, electrolytic capacitor, electronic tube and so on, the insulation resistance tester suitable for the measuring circuit shall be used.

4.2 In loading test, the ammeter, voltmeter and speedometer specified below shall be used.

- a) The ammeter and voltmeter shall have the accuracy of Class 2.5 or finer specified in **JIS C 1102-2** or digital type meter of equivalent precision.
- b) The speedometer shall be the instantaneous tachometer or electronic speed display equipment.

NOTE : Electronic speed display equipment includes encoder type, acceleration inverter type, pulse counter type and so on, installed on the elevator.

4.3 In other inspections, the tape measure, bench rule, vernier calliper and precision level specified below shall be used.

- a) The vernier callipers shall be as specified in **JIS B 7507**.
- b) The precision level shall be as specified in **JIS B 7510**.
- c) The tape measures shall be as specified in **JIS B 7512** or **JIS B 7522**.
- d) The metal rules shall be as specified in **JIS B 7516**.

5 Methods of inspection and criteria for the inspection

5.1 Rope type elevator (excluding elevator without machinery room)

5.1.1 Inspection to be carried out in machinery room

a) Construction and equipment of machinery room

- 1) The drive unit and control board shall be, as a rule, located not less than 50 cm apart from pillars and walls, except where there is no obstacle to maintenance and care.
- 2) The hoisting ropes, speed governor rope, steel tape of floor selector, and so on shall not be in contact with the parts of the machinery room floor where they are passing through.
- 3) No unnecessary equipment shall be installed or placed in the machinery room.
- 4) Facilities shall be made so that the lighting and ventilation is suitable for care and inspection, and the room temperature is as a rule maintained at 40 °C or lower.
- 5) The door of entrance shall be locked and the function of locking mechanism shall be good.

- 6) The corridors, staircase, and so on leading to the machinery room shall be so arranged as to give no obstruction to maintenance and care.
 - 7) The machinery room of emergency elevator shall be partitioned off from other space than the elevator shaft for emergency use for fire protection.
- b) **Incoming panel, main switch, control board, conduit tube and wiring**
- 1) The incoming panel and main switch shall be, as a rule, located near the machinery room entrance so that they can be safely and easily operated.
 - 2) The control board and other control equipment shall be installed firmly, and shall be provided with measures to prevent displacement and tumbling due to vibration of earthquake and so on.
 - 3) The operation of each equipment on board shall be in good condition.
 - 4) The insulation resistance of each circuit shall satisfy the requirements of table 1. The insulation resistance shall be capable of being inspected on each circuit divisible by switches or overcurrent breakers.
 - 5) The earthing wire shall be connected to the earth certainly.
 - 6) An emergency elevator shall be provided with a stand-by power source.
 - 7) An emergency elevator in emergency service shall not be affected by other elevators.

Table 1 Insulation resistance of each circuit

Unit : MΩ

Purpose of circuit	Service voltage of circuit	Insulation resistance
Motor main circuit	Up to and including 300 V	0.2 min.
	Over 300 V	0.4 min.
Control circuit	Up to and including 150 V	0.1 min.
Signal circuit	Over 150 V up to and including 300 V	0.2 min.
Lighting circuit		

NOTE : The insulation resistance of motor main circuit system shall be inspected with every switch or every overcurrent breaker on the control board in "off" position.

The insulation resistance of control circuit shall be inspected with every door switch closed and the switch or overcurrent breaker in "off" position.

c) **The drive unit and brake**

- 1) The drive unit shall be installed firmly, and shall be provided with measures to prevent displacement and tumbling due to vibration of earthquake and so on.
- 2) The driving unit shall work in good condition and shall be free from abnormal generation of heat, vibration and abnormal sound.
- 3) The brake shall be installed firmly, and capable of decelerating and stopping

the car safely when the power is cut off.

- 4) The sheaves shall be free from cracks and shall not permit noticeable slip between the sheave and the hoisting ropes in case of normal operation. Where the hoisting machine is equipped with reduction gearing, the thickness of each tooth of gears shall not be less than 7/8 of the original.
- 5) The sheaves, deflector sheaves or winding drums shall be provided with measures to prevent the running out of hoisting ropes due to vibration of earthquake and so on.
- 6) When the car has no rescue gate, it shall be possible to move the car to the ground floor level or to any position where rescue is possible by means not dependent on common electric power given in either of the following 6.1) or 6.2) so that the passengers in the car can be rescued safely.
 - 6.1) Using the building's auxiliary power or the exclusive battery as a power supply, rotate the drive unit or loosen the brake intermittently by manual operation of controller or operation of maintenance console, and make the car ascend or descend utilizing the unbalance of car and counterweight.
 - 6.2) Loosen the brake manually, rotate the sheaves by operation of the crank and so on or loosen the brake intermittently, and make the car ascend or descend utilizing the unbalance of car and counterweight.
- d) **Loading test**
 - 1) The loading test shall be carried out under the following three conditions. In each case the speed and current shall be measured under rated voltage and rated frequency, and shall satisfy the provisions of table 2.
 - 1.1) No load
 - 1.2) Loaded with 100 % of rated load
 - 1.3) Loaded with 110 % of rated load

Table 2 Speed and current

Item	When with no load, and loaded with 110 % of rated load	Loaded with 100 % of rated load
Speed	Not more than 125 % of the speed given in design documents.	Ascending speed shall be not less than 90 % and not more than 105 % of the speed given in design documents.
Current	Not more than 120 % of the rated current value of the motor.	Not more than 110 % of the rated current value of the motor.

- 2) When 1.25 times of rated car load (1.5 times for the elevator on which a folk lift and so on boars when it is at stop, except for passenger elevators or bed elevators) is loaded, the position of the car shall not move more than 7.5 cm. When the position of the car moves 7.5 cm and over, the floor level calibration apparatus shall be provided which is capable of meeting the position within 7.5 cm

with the floor landing surface as a standard level.

e) **Speed governor**

- 1) The speed governor shall be installed firmly, and shall be provided with measures to prevent displacement and tumbling due to vibration of earthquake and so on.
- 2) The working speed of governor shall be measured with a tachometer and shall satisfy the provisions of table 3. In this procedure, if it is impossible to get an overspeed by directly running the car, the measurement may be made by driving the speed governor independently of the car to give the same effect as when the speed of car increases extraordinarily.

Table 3 Working speed of governor

Item	Machines with rated speed ⁽¹⁾ not more than 45 m/min	Machines with rated speed ⁽¹⁾ more than 45 m/min
Overspeed switch	To open at not more than 63 m/min.	To open at not more than 1.3 times the rated speed ⁽¹⁾ .
Catch	To work as soon as or after the overspeed switch has opened and before the falling speed exceeds 68 m/min.	To work after the overspeed switch has opened and before the falling speed exceeds 1.4 times the rated speed ⁽¹⁾ .

Note ⁽¹⁾ The rated speed is the speed as given in the design documents, being the maximum speed per minute when ascending with a load equal to 100 % of the rated load.

NOTE : In the case where an emergency stop function is provided for the counterweight and actuated by a speed governor, the working speed of the counterweight governor shall be faster than that of car speed governor and shall be actuated at 1.1 times and less speed.

f) **Working condition of emergency stop** Inspections shall be carried out in accordance with 1) or 2) below.

The emergency stop for counterweight shall be inspected in the same way, except for car being interpreted as counterweight and vice versa.

- 1) For a device whose safety has been proved in advance by factory tests or else, the inspection shall be carried out in accordance with 1.1) and 1.2) below at a speed as low as possible.
 - 1.1) The inspection shall be carried out in accordance with 1.1.1) or 1.1.2) below. For the type which is not provided with a speed governor the inspection shall be carried out in accordance with 1.1.3), and for the type not provided with a counterweight, its shall be carried out in accordance with 1.1.4).
 - 1.1.1) Under no load conditions (the weight of the working people not considered), stop the car by actuating the catch of speed governor while the car is descending. Then operate the hoisting machine to lower the car. If the car does not move upon revolution of the sheave, the emergency stop is confirmed to

be working.

- 1.1.2) With 100 % load on the car, stop the car by actuating the catch of speed governor while the car is descending. If the car does not move upon releasing the brake, the emergency stop is confirmed to be working.
- 1.1.3) Under no load conditions (the weight of the working people not considered), and fix the car and hoist the counterweight. Loosen the hoisting rope at the car side. If the car does not move upon release of car fixing, the emergency stop is confirmed to be working because of loosening of hoisting rope.
- 1.1.4) Under no load conditions (the weight of the working people not considered), fix the car and operate the drive unit for the car to descend. Loosen the hoisting rope at the car side. If the car does not move upon release of car fixing, the emergency stop is confirmed to be working because of loosening of hoisting rope.

NOTE : As for 1.1.3) and 1.1.4), it shall be confirmed in the completion inspection that the emergency stop works firmly regardless of the stop position of the car.

- 1.2) The inspection shall be carried out in accordance with 1.2.1) and 1.2.2) below with the emergency stop in working condition.
 - 1.2.1) The mechanical device and the speed governor rope shall be free from any damage.
 - 1.2.2) The emergency stop shall work equally on both sides. The levelness of car floor, when measured with a level, shall not exceed 1/30 anywhere.
- 2) For devices other than described in 1), load 100 % of the rated load, and the inspection shall be carried out in accordance with 1.2) of 1) case and 2.1) and 2.2) below.
 - 2.1) While the car is descending, speed up gradually until the catch actuate speed, let the speed governor catch actuate, and stop the car. Then operate the hoisting machine to lower the car. If the car does not move upon revolution of the sheave, the emergency stop is confirmed to be working. Or if the car does not move upon releasing the brake, the emergency stop is confirmed to be working.
 - 2.2) **Deceleration at the emergency stop in working condition** Mean deceleration under the actuation of emergency stop of gradually working type, obtained from the four marks on the guide rail surface, shall be confirmed to be no more than 9.8 m/s^2 . Measure the stopping distance from the marks, and the mean value shall fall within the maximum and minimum stop range of figure 1-1 or figure 1-2. The maximum stopping distance shall be calculated by formula (1), and the minimum by formula (2). However, for the slip allowable type equipment such as clamp type emergency stop equipment the slip length shall be considered at the confirmation.

$$S_{\max} = \frac{(V/60)^2}{2\alpha_{\min} \cdot g} \text{ (m)} \dots\dots\dots (1)$$

$$S_{\min} = \frac{(V/60)^2}{2\alpha_{\max} \cdot g} \text{ (m)} \dots\dots\dots (2)$$

Where, $S_{\max}$: Maximum stopping distance (m),
 $S_{\min}$: Minimum stopping distance (m),
 V : Working speed of governor (m/min),
 g : Gravitational acceleration (9.8 m/s²),
 $\alpha_{\min}$: Equivalent deceleration at $S_{\max}$ [0.2 (G)],
 $\alpha_{\max}$: Equivalent deceleration at $S_{\min}$ [1.0 (G)].

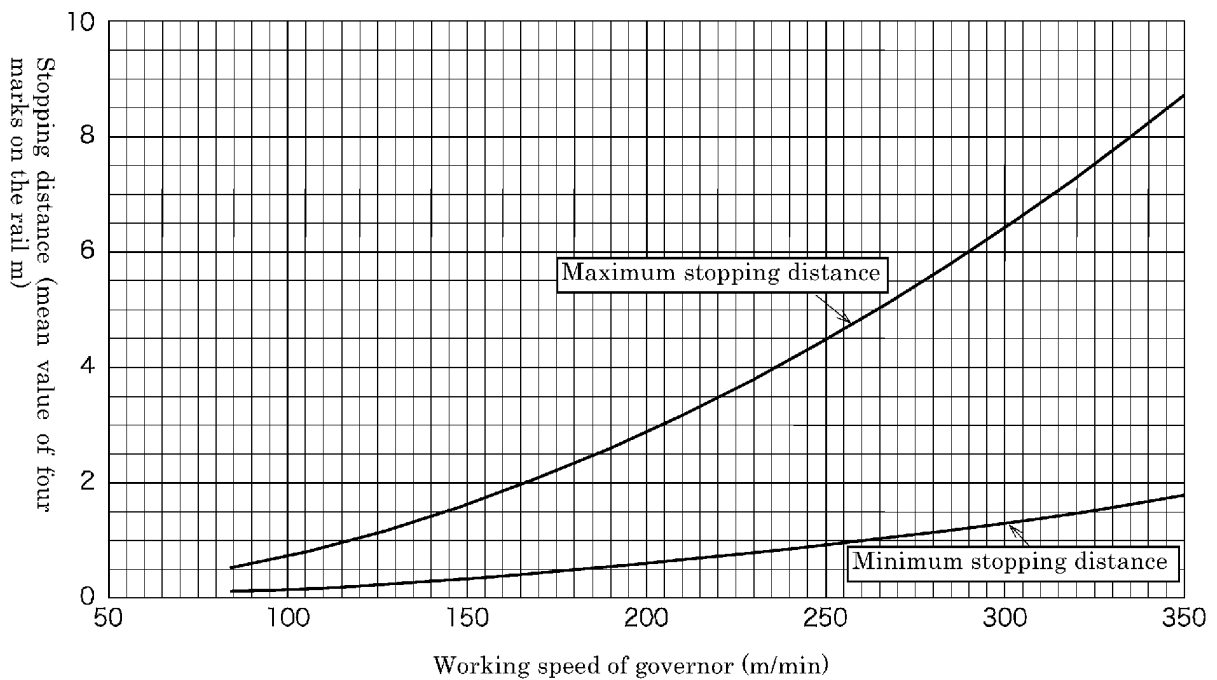


Figure 1-1 Stopping distance of gradually working type emergency stop (Case 1)

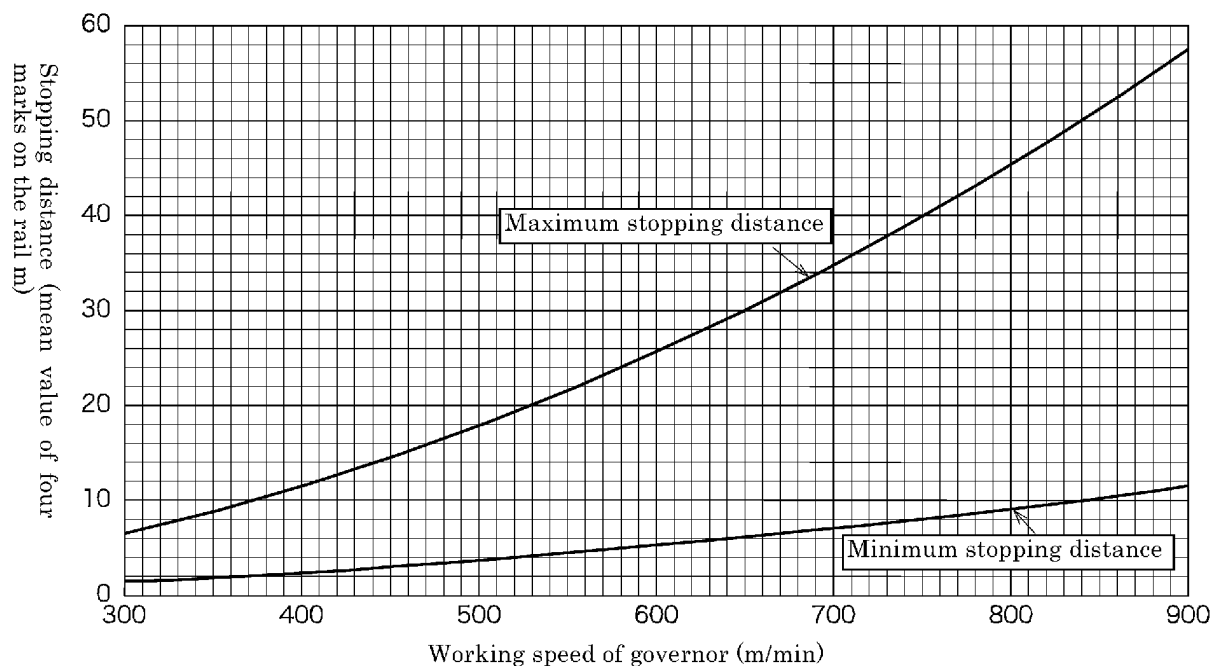


Figure 1-2 Stopping distance of gradually working type emergency stop (Case 2)

- g) When a weighing device is fitted on the machine chamber, the inspection shall be carried out in accordance with 5.1.4 t).

5.1.2 Inspection to be carried out in car

- The horizontal distance between the gateway floor sill and the car floor sill shall not exceed 4 cm. For passenger elevators and bed elevators, the horizontal distance between the car floor sill and the shaft wall shall not exceed 12.5 cm.
- Signs showing the purpose, rated load and passenger capacity shall be located where it can easily be read and their contents shall be proper.
- The function of door switch of car shall be good.
- The control device shall be installed firmly and shall work well. In particular, the operating handle or lever shall return automatically to the stop-operation position, and the function of stop switch in the car shall be good.
- The function of communication device to outside shall be good.
- For passenger elevators and bed elevators, power failure lamp, which luminous intensity of 1 lx or over at the floor level in the case of power failure, shall be installed and shall work well.
- When the floor level compensating device is installed, it shall be confirmed that the compensation works within 7.5 cm and the floor leveling is normal. Further, when the car floor fluctuates beyond the floor re-leveling zone, the car shall be confirmed to stop.
- When the car is about to run beyond the door zone in the condition that the door

is open, the device to stop the car automatically shall work certainly.

- i) In emergency elevators, the function of telephone for calling the central control room shall be good.
- j) As for emergency elevators, the function of the emergency equipment [emergency operation lamp, primary firefighting switch ⁽²⁾ and secondary firefighting switch ⁽³⁾] shall be good.

Notes ⁽²⁾ The primary firefighting switch is a switch which, in an emergency, changes over to the operation for exclusive firefighting purpose.

⁽³⁾ The secondary firefighting switch is a switch that “makes it possible to operate the car up or down with the car door being kept open” by killing the function to stop the car when any of the doors on the car or on the hoist way is open.

5.1.3 Inspection carried out on car top

- a) The dimensions related to the well bucket type elevator car top clearance (TC_1) shall not be less than the values given in table 4 or the following calculated values; in the case of machine having hydraulic buffer, value (H) obtained according to equation (3), for other cases, value (H) obtained according to formula (4), in the case of drum type elevator, value (H) obtained according to formula (5). The relationship between the top clearance and the machine top clearance is shown in figure 2.

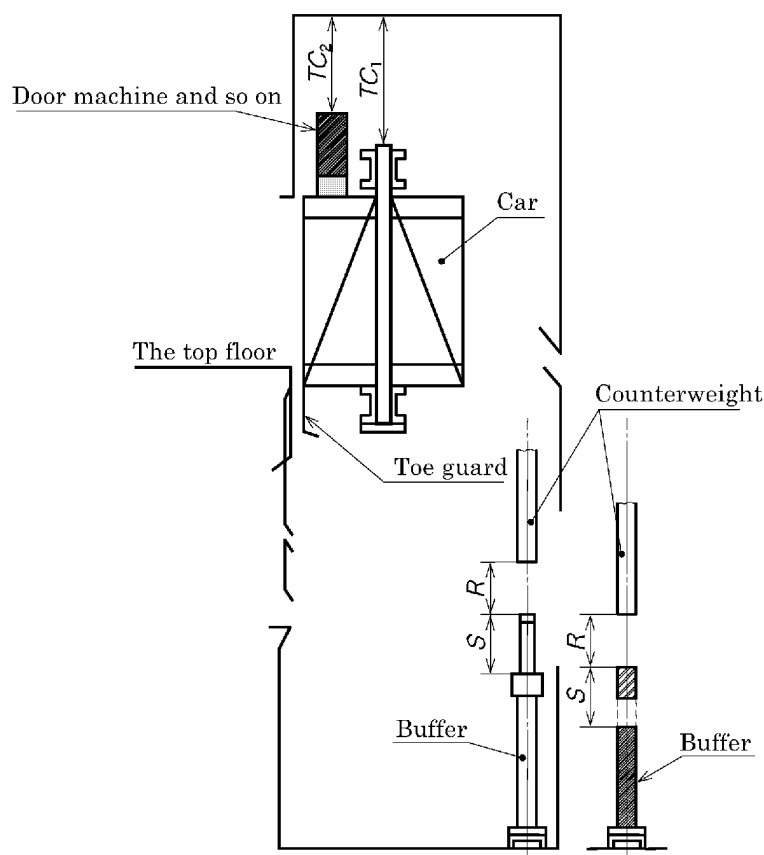


Figure 2 Relationship between the top clearance and the machine top clearance

$$H = S + R + \frac{V^2}{1\,068} + C \text{ (cm)} \dots\dots\dots (3)$$

$$H = S + R + \frac{V^2}{720} + C \text{ (cm)} \dots\dots\dots (4)$$

Where, TC_1 : Vertical distance between the top of car frame and the bottom of hoistway beam or the top of hoistway (top clearance),

TC_2 : Vertical distance between the maximum projection of the car and the bottom of hoistway beam or the top of hoistway (machine top clearance),

S : Buffer stroke of counterweight side or the thickness of buffer (cm),

R : Vertical distance of the clearance between the counterweight and the buffer of the counterweight side or the material of buffer in the case the car stops at the top floor (cm),

V : Rated speed of the car (m/min),

C : 2.5 cm, in the case of operating the car on the car with top safety distance of minimum 1.2 m secured and with the limit switch which automatically stops the rise of the car over the safety distance installed, or in the case of not operating on the car. For other cases than this, 60 cm.

$$H = K + L + C \text{ (cm)} \dots\dots\dots (5)$$

Where, K : Vertical distance from the stop position of the car at the top floor to the position where the spiral switch works (cm),

L : Buffer stroke or the thickness of buffer when the buffer or the buffer material is installed on the car or the hoistway top (cm),

C : 2.5 cm, in the case of operating the car on the car with top safety distance of minimum 1.2 m secured and with the limit switch which automatically stops the rise of the car over the safety distance installed, or in the case of not operating on the car. For other cases than this, 60 cm.