TECHNICAL REPORT

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Comparison of worldwide lift safety standards —

Part 1:
Electric lifts (elevators)

AMENDMENT 1: References to Japanese standards

Comparaison des normes mondiales de sécurité des ascenseurs —

Partie 1: Ascenseurs électriques

AMENDEMENT 1: Références aux normes japonaises

Reference number
ISO/TR 11071-1:1990/Amd.1:1999(E)

Foreword

ISO (the International Organization for Standardization, is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The main task of ISO technical committees is to prepare International Standards. In exceptional circumstances a technical committee may propose the publication of a Technical Report of one of the following types:

— type 1, when the required support cannot be obtained for the publication of an International Standard, despite repeated efforts;

— type 2, when the subject is still under technical development or where for any other reason there is the future but not immediate possibility of an agreement on an International Standard;

— type 3, when a technical committee has collected data of a different kind from that which is normally published as an International Standard («state of the art», for example).

Technical Reports of types 1 and 2 are subject to review within three years of publication, to decide whether they can be transformed into International Standards. Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

Amendment 1 to ISO/TR 11071-1, which is a Technical Report of type 3, was prepared by Technical Committee ISO/TC 178, *Lifts, escalators, passenger conveyors, Working Group 4*.

ISO/TR 11071 consists of the following parts, under the general title *Comparison of worldwide lift safety standards*:

— *Part 1: 1990, Electric lifts (elevators)*

— *Part 2: 1996, Hydraulic lifts (elevators)*

NOTE It is intended that an amendment 1 to Part 2 will provide similar references to Japanese and Australian standards.

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Introduction

Technical report ISO/TR 11071-1:1990 consists of a comparison of the requirements of lifts (elevators) as covered by the following safety standards for electric lifts that were used in various countries or regions at the end of 1989:

a) CEN - European Standard EN 81: *Part 1, Lifts and service lifts* [Edition 1985 - as presented in BS 5655-1:1986 (excluding national Appendix)];

b) ASME - ASME/ANSI A17.1 *Safety code for elevators and escalators* (Edition 1987 including the A17.1a-1988 and A17.1b-1989 addenda);

c) CSA - CSA Standard CAN3-B44 *Safety code for elevators* (Edition 1985, including Supplement 1-1987);

d) USSR - USSR *Elevator design and safe operation code* (Edition NEDRA, 1971 as presented in English version NEDRA 1972);

e) CMEA - Elevator safety regulations of the Council for Mutual Economic Assistance.

The intention of the Technical Report was to provide reference information to assist national committees when reviewing and revising individual standards. This process was expected to initiate a gradual convergence of the technical requirements.

The original Technical Report did not include the safety requirements and standards used in Japan.

At the initiative of Technical Committee ISO/TC 178, experts from the Japanese Elevator Association provided ISO/TC 178 Working Group 4 with comprehensive reports on the Japanese safety standards system and with tables comparing their requirements with those in the five listed safety standards. It should be noted that since the publication of ISO/TR 11071-1, the CMEA has been put out of use and USSR [NEDRA, 1971] standard withdrawn and replaced with a new code for the Russian Federation [PUBEL:1992]. Furthermore, the ASME and CSA standards have been revised and new editions published.

By Resolution No. 1995/117; however, ISO/TC 178 asked WG 4 to review the material prepared by Japanese experts with the intention of publishing it as an amendment to ISO/TR 11071-1:1990, rather than revising and updating the whole 1990 edition.

This amendment does not replace compared safety standards from the 1990 edition. The information contained in this Technical Report does not necessarily represent the opinions of the standards-writing organizations responsible for the development of the safety standards being compared, and they should be consulted regarding interpretations of their requirements.

NOTE ISO/TR 11071-1 and this amendment do not deal with lift rated loads and suspension ropes. The subjects are, however, covered in ISO/TR 11071-2, published in 1996, in clauses 7 and 8, which include tables and analysis of corresponding requirements in CEN, ASME and CSA standards as related to both electric and hydraulic lifts (elevators).

Comparison of worldwide lift safety standards —

Part 1:
Electric lifts (elevators)

AMENDMENT 1: References to Japanese standards

This amendment illustrates Japanese lift safety requirements in relation to the requirements of all standards covered in the original Technical Report, ISO/TR 11071-1:1990.

This amendment consists of the following:

a) reproduction of the original 1990 tables, with the addition of the Japanese requirements in new columns in tables 3.3.2.3, 3.9.2 and 3.10.2 of clause 3;

b) additions to the previous annex A, reproducing the original 1990 tables but incorporating a new column «JAPAN»;

c) addition of a new annex D containing information on the Japanese safety standards system with regard to lifts.

These tables may therefore be inserted to replace the original tables in ISO/TR 11071-1:1990.

This amendment does not constitute a general review of ISO/TR 11071-1:1990.

Table 3.3.2.3: Comparison of Components' Ratings (Percentage of Rated Load)

Component	CEN	ASME	CSA	USSR	CMEA	JAPAN
Rope traction	Dynamic: 125 % (9-Notes)	Dynamic: 125 % (208.2)	Dynamic: 125 % (3.10.2.2)	Dynamic: 110 % (7.3.10)	Dynamic: 110 % (3.3)	Dynamic: 125 % (passenger) 120 % (freight) [BSLJ-EO-129.9(6)]
				Static: 200 % (7.3.9b)	Static: 200 % (3.3)	Static: 125 % (passenger) 120 % (freight) [BSLJ-EO-129.9(6)]
Mechanical brake alone from rated speed	125 % (12.4.2.1)	* (208.8)	125 % (3.10.8.2)	110 % (7.3.10)	110 % (4.4.4)	125 % (passenger) 120 % (freight) [BSLJ-EO-129.9(6)]
Safety gear**	100 % (9.8.1.1)	125 % (205.3)	125 % (3.7.4.1)	110 % (7.3.10)	Not available	100 % [JIS A4302-4.2.1(6)]

* Holding capacity for 125 %. There are no requirements in ASME for deceleration from any speed at any load.

** CEN and USSR safety gear is tested in free-fall, ASME and CSA in overspeed with 100 % rated load.

Table 3.9.2: Assumption 7 as applied in current standards

Assumption	CEN	ASME	CSA	USSR	CMEA	JAPAN
Static force						
Landing Doors	300 N (7.2.3)	1110 N [110.11e(7)]	2500 N (2.11.10.4.7)	No spec.	No spec.	No spec.
Car Enclosure	300 N (8.3.2.1)	334 N (204.1c)	330 N (3.6.1.3)	No spec.	No spec.	No spec.
Impact	No spec.	No spec.	5000 N (2.11.10.5)	No spec.	No spec.	No spec.
Force distribution	No spec.	No spec.	No spec.	No spec.	No spec.	No spec.

Table 3.10.2: Assumption 8 as applied in current standards

Assumption	CEN	ASME	CSA	USSR	CMEA	JAPAN
Average retardation*						
Safety gear	1 g (9.8.4)	1 g (205.8b)	1 g (3.7.9.2)	1 g (4.9.1)	Not available	1 g (JIS A 4302)
Buffers	1 g (10.4.3.3)	1 g (201.4b)	1 g (3.3.5.2)	No spec.	Not available	1 g [BSLJ-EO-129.9(9)]
Maximum retardation						
Safety gear	No spec.	No spec.	No spec.	2,5 g 0,04 s (4.7.5)	2,5 g 0,04 s (3.3)	No spec.
Buffers duration	2,5 g 0,04 s (10.4.3.3)	2,5 g 0,04 s (201.4b)	2,5 g 0,04 s (3.3.5.2)	2,5 g 0,04 s (4.0.1)	No spec.	2,5 g 0,04 s [BSLJ-EO-129.9(9)]

* Average retardation levels exceeding 1g can occur with a lightly loaded car during safety or buffer application.

NOTE: 1g = 9,81 m/s².

After Annex A, page 23, of the original report: Insert the following explanatory text below the existing notes and Legend, and insert the replacement tables.

(1) Column «JAPAN» is added based on the requirements in the following laws and standards.

BSLJ	Building Standard Law of Japan
BSLJ-EO.....	Building Standard Law Enforcement Order Explanation of technical standard for elevators and escalators
JIS.....	Japanese Industrial Standard
JEAS.....	Japan Elevator Association Standard
GUIDELINE.....	Guideline for design and construction of elevators, escalators and play facilities
ELEC	Technical standard concerning electric installation

(2) In other columns, the bracketed numbers cross-reference rules in individual standards CEN, ASME etc (see Introduction).

(3) The following abbreviations and symbols are used in the tables.

Notation	Meaning
No Spec	There is no rule covering the specific subject
N/A	The question is not applicable to the specific standard for various reasons
-	Same as «No spec» or «N/A»
?	The requirement in the standard is not clear, or the data were not available at the time of publication of the report
>	Greater than
<	Less than
≤	Up to (less or equal)

The following lift safety requirements are not covered in the tables, but specific Japanese requirements exist.

(a) Earthquake requirements

A seismic sensor is required to be set up in the machine room to control the operation of elevators. When an earthquake occurs, the car should be stopped at the nearest floor. Item 129 Article 7 of the Building Standard Law Enforcement Order provides that the following should be considered according to structural earthquake-proof standards:

— the stress and deflection in the equipment and the material of each elevator part caused by earthquakes should be within the allowable stress of the material and fixed tolerances of the equipment (e.g. strength of guide rail and rail bracket);

— elevator equipment should be securely fixed so as to not, be moved, fall down, or be damaged by earthquakes (e.g., derailment-restraint of counterweight and earthquake-proof fixings of machine room equipment);

— traction sheaves should be so constructed as to keep ropes in place in the case of earthquakes (e.g., provision of deep-grooved sheaves and installation of retaining guards for ropes);

— travelling cables should be guarded from damage by projections in hoistway during the earthquake.

(b) Fire emergency elevators

Fire emergency elevators are required to be installed in buildings exceeding 31 m in height, according to Item 2 of Article 34 of the Building Standards Law of Japan.

Regulations prescribe the details for fire emergency elevators, such as necessary units, location in the building, structure of hoistway, machine room, elevator hall, and the operation.

Table A1A: Spaces and Clearances - Part 1 of 5

	REQUIREMENTS	CEN	ASME	JAPAN			CSA	USSR	CMEA
1.	Top car clearances for traction elevators (With counterweight on fully compressed buffers in all except JAPAN columns)	(5.7.1) **(see Note 1)**	(107.1e & k) **(see Note 1)**	**BSLJ-EO 129-6(5) and JIS A 4302 4.1.4**			(2.8.5) (see Note 1)	(4.1.7)	1937-79 (2)
1.1	Guided travel of car.....min.	0,1 m + 0,035 v^2	See 200.8	**Top car clearance (TCC) in this column means car frame to overhead floor or beam distances when car is level with top landing**			See 3.2.8	See 4.3.4	?
1.2	Free height above a specific area of the car roof.....min.	1 m + 0,035 v^2	1,07 m + possible car jump				No spec.	0,75 m	0.75m (2.22)
1.3	Well roof to car crosshead.....min.	0,3 m + 0,035 v^2	0,60 m + 0,035 v^2	**Rated speed (unit: m/s)**		**TCC (m)**	0,60 m + 0,035 v^2	0,2 m + 0,06 v^2 or 0,5 m v = rated speed 0,5 if oil buffers	No spec
1.4	Well roof to equipment on car top (except 1.5)..... min.	same as 1.3	0,15 m + 0,035 v^2		≤ 0,75	1,2	0,15 m + 0,035 v^2	0,2 m + 0,06 v^2	?
				> 0,75	≤ 1,0	1,4			
1.5	Well roof to guide shoes, rope attachments, door header of vert. sliding doors.....min.	0,1 m+0,035 v^2	> 0 + 0,035 v^2	> 1,0	≤ 1,5	1,6	> 0 + 0,035 v^2	same as 1.3	No spec
				> 1,5	≤ 2,0	1,8			
	Note 1: 0,035 v^2 represents 1/2 gravity stop distance with 115% rated speed. This may be reduced:			> 2,0	≤ 2,5	2,0			
				> 2,5	≤ 3,0	2,3			
	a) If slow down control is used, 0,035 v^2 may be:	multiplied by 1/2 if v ≤ 4m/s 1/3 if v > 4m/s min. 0,25 m	replaced by 1/2 buffer stroke (107.1e (4)b)	> 3,0	≤ 3,5	2,7	v replaced by reduced stroke buffer speed	No spec	No spec
				> 3,5	≤ 4,0	3,3			
				> 4,0		4,0			
	b) If comp. rope tie-down, 0,035 v^2 may be reduced	see 5.7.1.4 min. 0,2 m	See 107.1e (4)b mn. 0,0 m				see 2.8.5(d) min. 0,0 m	No spec	No spec
2.	Top counterweight clearance (with car on compressed buffers)	(5.7.1.2)	(107.1h)	No spec			(2.8.8)	(4.1.7)	—
2.1	Guided travel of counterweight.....min.	same as 1.1	same as 1.1	No spec			same as 1.1	same as 1.1	No spec
2.2	Well roof to counterweight.....min.	No spec	same as 1.4	No spec			same as 1.4	same as 1.3	No spec
3.	Refuge space on car top	(5.7.1.1(d))	(107.1k)				(2.8.11)	(4.1.7.2)	—
3.1	Minimum area.....	Rect. block	0,419 m^2	No spec			(1,07x0,76)m^2	No spec	No spec
3.2	Minimum height.....	(0,5x0,6x0,8) m	same as 1.2	No spec			same as line 1.3	same as 1.2	No spec

Table A1A: Spaces and Clearances - Part 2 of 5

	REQUIREMENTS	CEN	ASME	JAPAN							CSA	USSR	CMEA
4.	Bottom runby	N/A	(107.1b & d)	JIS A 4302 4.2.4		IF SPRING BUFFER				IF OIL BUFFER	(2.8.2 & 2.8.4)	(4.1.13)	—
4.1	Minimum car & CW runby......min.	No spec	0 to 0,3 m depends on type of buffer & motor control	m/s		V ≤ 0,125	< V ≤ 0,25	< V ≤ 0,5	0,5 > V		0 if spring return oil buffers (3.3.5) 0,15 m otherwise	No spec	No spec
				MIN	AC	75 mm	150 mm	225 mm	300 mm	No spec			
4.2	Maximum car runby...........max.	No spec	610 mm		DC	150					600 mm	200 mm	No spec
4.3	Maximum CW runby...........max.	No spec	914 mm	MAX	CAR	600					900 mm	200 mm	No spec
					CWT	900							
5.	Pit clearances	(5.7.3.3)	(107.1a)	JIS A 4302 4.2.4							(2.8.1)	(4.1.10)	1933-79 (2.21)
	(with car on fully compressed buffers **in CEN and ASME columns)**			**For rated speed: (m/s)**		**Pit Depth (m)**							
					≤ 0,75	1,2							
5.1	Pit floor and the lowest portion of car structure (except 5.2)..................min.	0,5 m	0,6 m	> 0,75	≤ 1,0	1,4					0,6 m	0,75 m	0,5 m
				> 1,0	≤ 1,5	1,6							
				> 1,5	≤ 2,0	1,8							
5.2	Pit floor to guide shoes, roller, safety gear blocks, toe guards, car door .....min.	0,1 m	> 0	> 2,0	≤ 2,5	2,0					> 0	No	0,1 m
				> 2,5	≤ 3,0	2,3							
5.3				> 3,0	≤ 3,5	2,7							
	Sufficient space for a rectangular block	(0,5x0,6x 1,0) m	No spec	> 3,5	≤ 4,0	3,3					No spec.	No spec.	No spec.
				> 4,0		4,0							

Table A1A: Spaces and Clearances - Continuation of Part 2 of 5

	REQUIREMENTS	CEN	ASME	JAPAN	CSA	USSR	CMEA
6.	Well to entrance-side-car clearances						
6.1	Car without car doors.....	(11.3 & 5.4.4)	(204.4a) NOT PERMITTED	Not permitted	(3.6.4.1) Not permitted	(4.5.5) Not permitted	1933-79
6.1.1	Car sill to inner well face.....max.	20 mm	—	—	—	—	25 mm (2.5)
6.1.2	Car entrance header to inner face (if car entrance height less than 2.5m).....min. .....max.	70 mm 120 mm	— —	— —	— —	— —	No spec No spec
6.1.3	Projection permitted – if not bevelled.....max.	2 mm	—	—	—	—	5 mm (2.4)
6.1.4	Projection permitted – if bevelled.....max.	5 mm	—	—	—	—	No spec

Table A1A: Spaces and clearances - Part 3 of 5

	REQUIREMENTS	CEN	ASME	JAPAN	CSA	USSR	CMEA
6.	<u>Well to entrance-side-car clearances</u>						
6.2	<u>Car with car doors</u>	(5.4.3 & 11.2)	(110.10/108.1e&d)	BSLJ-EO 129-6.(4)	(2.11.9.1/2.9.4 & 2.9.5)	(4.1.14 & table 1)	1933-79
6.2.1	Car sill to landing sill..................................min. max.	No spec 35 mm	13 mm (19*) 38 mm *Corner car guides	No spec 40 mm BSLJ-EO 129-6.(4)	13 mm (20*) 32 mm *corner car guides	15 mm 50 mm	25 mm (2.9) 45 mm (2.5)
6.2.2 a)	Car sill to inner well face limited to...max.	150 mm	127 mm	125 mm	125 mm	125...swing 200...1-slide 250...2-slide	No spec
b)	except for vertical sliding doors to ....max.	200 mm	190 mm	No spec	190 mm	250 mm	No spec
c)	except if car door lock provided ....max.	Not limited	No spec	No spec	Not limited	No spec	No spec
d)	specific cases...max.	20 mm through height max. 500 mm	No spec	No spec	No spec	No spec	No spec
6.2.3	Car door panel to landing door panel ....max.	120 mm (11.2.3)	140 mm (204.4e)	No spec	140 mm (3.6.4.3)	No spec	120 mm 1933-79 (29)
	– swinging landing door + car gate ....max.	No spec	102 mm	—	100 mm	No spec	120 mm
	– swinging landing door on freight elevator..max.	No spec	Not spec'd max. but permitted	—	165 mm	No spec	No spec

Table A1A: Spaces and clearances - Part 4 of 5

	REQUIREMENTS	CEN	ASME	JAPAN	CSA	USSR	CMEA
7.	Other horizontal well clearances	(11.4 & 5.6.2)	(108.1a, b, c)		(2.9.1/2/3)	(table 1)	1933-79 (2.9)
7.1	Car to well enclosure.....min.	No spec	19 mm	No spec	20 mm	25 mm (50*) *if wire mesh well	25 mm (50*) *if wire mesh well
	(except sides covered in 6) max.	No spec	No spec	No spec	No spec	(250–650) mm	No spec
7.2	Car to counterweight.....min.	50 mm	25 mm	No spec	25 mm	50 mm	50 mm
	max.	No spec	No spec	No spec	No spec	250 mm	No spec
7.3	Counterweight to well enclosure.....min.	No spec	19 mm	No spec	20 mm	25 mm (50*) *if wire mesh well	25 mm (50*) *if wire mesh well
7.4	Counterweight to CWT guard.....min.	No spec	19 mm	No spec	20 mm	No spec	No spec
7.5	Car to CWT guard.....min.	No spec	No spec	No spec	13 mm	No spec	10 mm
7.6	Car to car in multiple wells.....min.	300 mm (without partition)	51 mm	No spec	150 mm	No spec	No spec
8.	Clearances in machine room(MR) & machinery spaces(MS)	(6.3.2/6.4.2.2)	(101.4/100.3f/ 101.3d)	BSLJ-EO 129-8.1	(2.3.4/2.3.7/ 2.2.3.6/2.3.3.5)	(6.1.5/6.1.6)	1933-79
8.1	Clearances around panel or cabinet		ANSI/NFPA 70: 620–70 & 110–16 (102.1 & 210.4)		C.22.1:38–44 (2.4.1 & 3.12.4.1)	—	
8.1.1	In front						
a)	Depth.....min.	0,7 m	0,9 m (0–150V) 1,1 m (151–600V)	0,5 m	0,75 m	0,75 m	
b)	Width.....min.	0,5 m (Note 1)	0,762 m	No spec	No spec	0,5 m	
8.1.2	At rear if openable.....min.	No spec	same as front	same as front	0,6 m	0,5 m	
8.2	Clearance near parts requiring maintenance & inspection						
a)	Clearance.....min.	(0,.5 x 0,6) m	same as 8.1	0,5 m	0,45 m (2.3.7)	0,5 m	0,5 m (3.2)
b)	Accessway to those areas.....min.	0,.5 m	110–16(c)	0,5 m	0,45 m	0,5 m	0,5 m (3.2)
c)	Accessway if no moving parts.....min.	0,4 m	110–16(c)	0,5 m	0,45 m	0,5 m	0,5 m (3.2)

Table A1A: Spaces and Clearances - Part 5 of 5

	REQUIREMENTS	CEN	ASME	JAPAN	CSA	USSR	CMEA
8.3	Clear headroom in MR & MS........................min. Exceptions:	1,8 m	2,13 m	BSLJ-EO 129-8.(2) 2,0 m	2,13 m	2,2 m	1,8 m (3.2)
a)	Space for sheaves only.................................min.	1,5 m	1,07 m	BSLJ-EO 129-8.(2) 1,5 m	1,07 m	0,8 m	?
b)	Space for governor & selector......................min.	1,5 m	1,37 m	BSLJ-EO 129-8.(2) 1,5 m	1,37 m	No spec	?
8.4	Clear vertical distance above rotating parts..min.	0,3 m	No spec	No spec	No spec	No spec	No spec
8.5	If difference in MR floor levels exceeds this height, stairs or ladders and guard rails must be provided	0,5 m (6.3.2.4)	0,38 m (100.3f)	0,23 m BSLJ-EO 129-8.(5)	0,4 m (2.2.3.6)	0,.35 m (6.1.9)	0,35 m (3.6)
8.6	Machine room door – width............................min. – height...........................min.	0,6 m 1,8 m	0,76 m 1,83 m	0,7 m 1,8 m BSLJ-EO 129-8.(4)	0,75 m 2,03 m	No spec No spec	No spec No spec
8.7	Machine room access trap door..................min.	0,8 ´ 0,8 m (6.3.3.2)	Prohibited	Prohibited	Prohibited (2.3.3.2c)	Prohibited (6.1.11)	No spec
8.8	Pulley room access trap door........................min.	same as 8.7	(762 x 762) mm (101.3d(a))	No spec	(750 x 750) mm (2.3.3.5.1b)	No spec	No spec

Note 1: Respecting CEN entry in line 8.1.1(b): The width of the clearances in front of the panel or cabinet must be the full width of the panel or the cabinet or 0.5m, whichever is greater.