TECHNICAL REPORT

ISO/TR 11071-2

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AMENDMENT 1
1999-08-01

Comparison of worldwide lift safety standards —

Part 2:
Hydraulic lifts (elevators)

AMENDMENT 1: Reference to Japanese and Australian standards

Comparaison des normes mondiales de sécurité des ascenseurs —
Partie 2: Ascenseurs hydrauliques
AMENDEMENT 1: Référence aux normes japonaises et australiennes

Reference number
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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 Technical Reports of type 3 do not necessarily have to be reviewed until the data they provide are considered to be no longer valid or useful.

ISO/TR 11071-2, including this Amendment A, which is a Technical Report of type 3, was prepared by Technical Committee ISO/TC 178, *Lifts, escalators, passenger conveyors.*

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

- Part 1: 1990, Electric lifts (elevators)

- Amendment A: 1997 to Part 1: 1990, Electric lifts (elevators), References to Japanese standards

- Amendment B: [in preparation] to Part 1:1990, Electric lifts (elevators), References to Australian Standards.

- Part 2: 1997, Hydraulic lifts (elevators)

- Amendment A: 1998 to Part 2: 1997, Hydraulic lifts (elevators), References to Japanese and Australian standards.

Introduction

Technical Report ISO/TR 11071-2:1996 consisted of a comparison of the requirements of selected topics as covered by the following worldwide safety standards for hydraulic lifts (excluding regional or national deviations):

a) CEN European Standard EN81: Part 2, Lifts and Service Lifts [Edition 1987 as presented in BS5655: Part 2:1988 (excluding national Appendix)]

b) ASME ASME A17.1 Safety Code for Elevators and Escalators (Edition 1993)

c) CSA CSA Standard CAN/CSA-B44 Safety Code for Elevators (Edition 1994)

The intent of the Technical Report ISO/TR 11071-2 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 Technical Report ISO/TR 11071-2 did not include the safety requirements and standards used in Japan and Australia.

At the initiative of the ISO Technical Committee 178 experts from the Japanese Elevator Association and Standards Australia provided the ISO/TC 178 Working Group 4 with tables comparing their requirements with those in the three listed safety standards. Please note that since the publication of ISO/TR 11071-2, the ASME and CSA Standards have been revised and new editions/amendments published, which are not included in this amendment.

With Resolution 1996/129 the ISO/TC 178 asked the Working Group 4 to review the material prepared by Japanese and Australian experts and proceed with the publication of Amendment 1 to the ISO/TR 11071-2:1996, rather than to revise and update the whole 1996 edition of the technical report.

This Amendment, as was the case with Technical Report ISO/TR 11071-2, does not intend to replace therein compared safety standards. The information contained in this Amendment 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.

Comparison of worldwide lift safety standards —
Part 2:
Hydraulic lifts (elevators)
AMENDMENT 1: Reference to Japanese and Australian standards

1 Scope

The sole purpose of this amendment is to illustrate in the form of tabulations, the requirements specified in the Japanese and Australian standards applicable to lifts in relation to the requirements of standards covered in the Technical Report ISO/TR 11071-2:1996.

This Amendment does not constitute the general review of the ISO/TR 11071-2:1996.

The hydraulic lifts related requirements of the following standards are illustrated in this Amendment (see Annex B).

a) under heading "Australia":

- SA

b) under heading "Japan":

EUIL-MO	Electrical Utilities Industry Law Ministerial Ordinance of Technical Standards for Electrical Equipment
BSLJ-EO	Building Standard Law Enforcement Order Explanation of technical standard for elevators and escalators
NTF	Notification of the Ministry of Construction
JIS	Japanese Industrial Standard
JEAS	Japan Elevator Association Standard
JEC	Japanese Electrotechnical Committee
EAMCL	Electrical Appliance and Material Control Law
JEM	Standard of the Japanese Electrical Manufacturers Association
JEAC	Japan Electrical Association Code

Note: *For information on Japanese safety standards system applicable to lifts refer to Annex D of Amendment 1:1999 to ISO/TR 11071-1:1990, Comparison of worldwide lift and safety standards — Part 1: Electric lifts.*

2 References and Terminology

For references, terminology, abbreviations, symbols and nomenclature refer to the Technical Report ISO/TR 11071-2:1996. Additional references are in the scope.

The following notations are used in the tabulations:

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 was not available at the time

of publication of the report.
> Greater than
< Less than
≤ Up to (less or equal)

Rules on which entries in the tabulations for specific requirements are based are indicated in the brackets, either next to the entry or above a group of entries. To find a specific requirement one has to refer to the applicable CEN, ASME, or CSA standard listed in the introduction of this Amendment or to the Australian and Japanese standards listed in the scope of this Amendment.

In addition, tabulations make references to the following standards:

- ANSI/INFPA 70, National Electrical Code (USA)
- CSA C22.1, Canadian Electrical Code
- CSA B44.1/ASME A17.5, Standard for Elevator and Escalator Electrical Equipment
- CENELEC/IEC Standards
- AS 3000 Wiring Rules (Australia)
- AS 1979 Travelling Cables (Australia)

3 Basic assumptions

Amended tables of Section 3 of TR 11071-2.

TABLE 3.8.2
ASSUMPTION 6 (HORIZONTAL FORCES EXERTED BY A PERSON) AS APPLIED IN CURRENT STANDARDS

Assumptions	CEN	ASME	CSA	SA	Japan
1.0 **Static force**					
1.1 Landing doors	300 N (7.2.3)	5004 N [110.11e(7)]	2500 N (2.11.10.4.7)	1.2 kN (12.4.1 & 12.16.1)	No spec
1.2 Car enclosure	300 N (8.3.2.1)	334 N (204.1c)	330 N (3.6.1.3)	330 N (23.18)	No spec
2.0 **Impact**	No spec.	5004 N (110.11h)	5000 N (2.11.10.5)	No spec.	No spec
3.0 **Force distribution**	No spec.	No spec.	No spec.	No spec.	No spec

TABLE 3.9.2
ASSUMPTION 7 (RETARDATION) AS APPLIED IN CURRENT STANDARDS

Assumption	CEN	ASME	CSA	SA **	Japan
Maximum Average Retardation*					
•Progressive Safety Gear	1 g (9.8.4)	1 g (205.8b)	1 g (3.7.9.2)	2,295 g	1 g (JIS A4302)
•Progressive Clamping Device	1 g (9.9.4)	N/A	N/A	N/A	N/A
•Oil Buffers	1 g (10.4.3.2)	1 g (3.3.5.2)	1 g (3.3.5.2)	0,769 g	1 g [BSL-J-EO-129.9(9)]
•Rupture valve	1 g (12.5.5.1)	No spec.	No spec.	No spec.	N/A
•Plunger stops	1 g (12.2.3)	No spec.	No spec.	1 g (7.2.6)	No spec.
•Emergency speed limit	No spec.	1 g [305.2b(2)]	1 g (4.21.2.2.b)	No spec	No spec.
•Emergency car stops	No spec.	No. spec.	No spec.	No spec	No spec.
Maximum retardation					
•Safety gear	No spec.	No spec.	No spec.	No spec	No spec.
•Buffers *(if t = Duration)*	> 2,5 g (10.4.3.2) t ≤ 0,04 s	> 2,5 g (201.4b) t ≤ 0,04 s	> 2,5 g (3.3.5.2) t ≤ 0,04 s	>2,5 g (9.1.5.3) t ≤ 0,04 s	>2,5 g t≤0,04 s [BSLJ-EO-129.9(9)]

**Maximum average retardation levels exceeding 1 g can occur with a lightly loaded lift during safety or buffer application.*
***Indirect lifts only*

Note: 1 g = 9,81 m/s^2
Approach to design safety for hydraulic components.
Amended tables of Section 4 of TR 11071-2.

4 Approach to design safety for hydraulic components

Amended tables of Section 4 of TR 11071-2.

Table 4.2.1.4: ILLUSTRATIVE EXAMPLES OF WALL THICKNESS FOR 4 MATERIALS

					Wall Thickness (mm)			
Source Country	**Material**	**UTS MPa**	**0,2% PS MPa**	**Elong. %**	**CEN**	**ASME and CSA**	**SA**	**Japan**
U.S.A.	ASTM A53-88a Grade A	330	205	>20	5,5	3,7	5,5	2.7
U.S.A.	ASTM A53-88a Grade B	415	240	>20	4,8	3,1	4,8	2.2
Finland	DIN 17100	510	353	22	3,6	2,2	3,6	1.8
Russia	35 GOST 1050	520	≥310	20	4,0	2,4	4,0	1.7

5 Driving machines and jacks (plungers and cylinders)

Amended tables of Section 5 of TR 11071-2.

Table 5.1.2

COMPARISON OF REQUIREMENTS FOR INDIRECT ACTING LIFTS

Requirement	**CEN**	**ASME (303.1b)**	**CSA**	**SA**	**Japan**
Driving machine (jack) to be vertical	No spec	Yes	No spec.	No spec.	No spec.
Minimum number of ropes per jack	2(9.1.3)	2	2(4.23.1.2)	2	2
Maximum roping ratio	No spec.	1:2	1:2(4.18.1)	No spec.	No spec.
Moving element of ram to be guided	Yes(12.2.2.4)	No spec.	No spec.	No spec.	No spec.
Slack rope device required	Yes(9.4.1b)	Yes	No spec.	Yes	Yes
Safety factor for - ropes	12(9.2.2)	6,65—11,9(212.3)	6,65—11,9 (3.14.3)	10	10
- chains	10(9.2.5)	not permitted	Not permitted	Not permitted	10
Maximum rated speed	No limit*	No limit	No limit	1 m/s	No limit

**EN81/2 specifies requirements for lifts with rated speed up to 1,0 m/s only. For lifts with higher rated speeds, additional measures have to be taken which are not specified in the Standard.*

6 Valves, piping and fittings

Amended tables of Section 6 of TR 11071-2.

Table 6.1.1 (Part 1 of 2)
PIPES AND FITTINGS – COMPARISON OF REQUIREMENTS

Requirement	CEN	ASME	CSA	SA	Japan
(1) Pipes in general (a) suited to used fluid	(12.3.1) Yes	(303.1) Flexible hose only (303.3c)	(4.19.1) [4.19.1.4.1(c)]	(7.4.1) No	(NTF-1675-'82) No Spec.
(b) installed as to avoid stress	Yes	Yes (303.2c)	Yes (4.19.1.3)	Yes (7.4.1.3)	Yes
(c) protected against damage	Yes	No spec.	No spec.	Yes (7.4.1.3)	Yes
(d) accessible for inspection	Yes	Grooved pipe fittings only	No spec.	Yes only (7.4.2.2)	Yes (JEAS-B205)
(e) if through floor or walls, then protected and capable of being dismantled for inspection	Yes	No spec	No spec.	No	Yes (JEAS-B205)
(f) grooved pipe fittings, additional	No spec.	303.3b	No spec.	No	No Spec.
(1) installed per manuf. spec.		Yes			
(2) will not permit separation if sealing fails		Yes			
(3) devices for (2) removable with special tools, not with quick release levers or toggles		Yes			
(g) Buried piping below ground to be protected from corrosion (see 5.1.6.2 of this report)	Not permitted (12.3.1.2)	Yes (303.5)	No spec.	No	No Spec.
(h) Threading of pipes permitted	No spec.	Only schedule 40 and greater (303.2b)	As ASME (4.19.3.2.3)	Yes (7.4.3)	No Spec.
(i) Specific requirements for welding	No spec.	Yes (303.6)	Yes (4.19.4)	No spec.	No Spec.

Table 6.1.1 (Part 2 of 2)
PIPES AND FITTINGS – COMPARISON OF REQUIREMENTS

Requirement	CEN	ASME	CSA	SA	Japan
(2) Rigid pipe and fittings	(12.3.2)	(303.2, 1302.4)	(4.19.3, 4.19.3.2)	(7.4.2)	(NTF-1675-'82)
(a) between cylinder and non-return or down valve	Yes	supply piping	pressure piping	Figure 7.5.5	
(1) design pressure	3,3 x full load pressure			Table 7.4(5)	
(2) design formula (per section 4.1.4 of this report)	Formula (2) *+1,0 or 0,5 mm			Table 7.4	
(b) between rupture and non-return or down valve	Calculated with additional FOS=1,3 if used to synchronize telescopic jacks with 2 or more stages			Table 7.4(5)	
(c) between cylinder and rupture valve	Calculated with cylinder pressure			Table 7.2	
(3) Flexible hoses and fittings, if between cylinder and non-return or down valve	(12.3.3)	(303.3c)	(4.19.1.4)	(7.2.3.2)	(JEAS-708) (JIS-B8360)
(a) factor of safety	8 (flexible hose only)	10	10	Table 7.4	10
(b) pressure required to withstand in test	5 x full load pressure	5 x working pressure	5 x working pressure		4x working pressure
(c) hoses marked with:					
(1) trade mark	Yes	No spec.	Yes	No	Yes
(2) test pressure	Yes	Yes	Yes		No Spec.
(3) date of test	Yes	Yes	Yes		No Spec.
(4) replacement date	No specification	Yes, no longer than 6 yrs	No specification		No Spec.
(d) bending	Per manufacturer's instructions	Per SAE standard	Per SAE standard	Yes (7.4.3.1)	Yes
(e) installation in hoistway through walls	Yes (12.3.1.2)	Not permitted	Not permitted	Yes (7.4.3.2)	Not permitted
(f) fittings of non-reusable type only	No spec.	Yes (303.3c(2)	Yes	(7.4.3.1) AS 8791	No Spec.

*Formula (2) in TR 11071-2.

Table 6.1.2 (Part 1 of 3)
VALVES – COMPARISON OF REQUIREMENTS

Requirement	CEN	ASME	CSA	SA	Japan
(1) Shutoff valve	[12.5.1]	[303.4a]	[4.19.2.4]		No spec.
(a) where required	Every lift	Where cylinder is not exposed to inspection	Every lift	Not required	
(b) location	Between cylinder & non-return valve; in machine room	In supply line to cylinder; in machine room	Between pump and jack; next to pump		
(c) manually operated	No spec.	Yes	Yes		
(2) Non-return (check) valve	[12.5.2]	[303.4c]	[4.19.2.2]	[7.5.3]	Yes [5(2)]
(a) location	Between pump & shut-off valve	No spec.	No spec.	No spec.	No spec.
(b) capable of holding rated load when:					
(1) pressure drops below min. oper. pressure; or	Yes	Yes	No spec.	Yes	No spec.
(2) pump stops	No spec.	Yes	Yes	Yes	Yes
(c) activated by pressure from jack and at least one guided compression spring and/or gravity	Yes	No spec.	No spec.	No spec.	No spec.
(3) Pressure (pump) relief valve	[12.5.3]	[303.4b]	[4.19.2]	[7.5.2.1]	Yes [5(1)]
(a) location	Between pump & non-return valve	Between pump & check valve	As ASME	between pump and check valve	between pump and check valve
(b) valve cannot be shutoff from hydraulic system	No spec.	Yes	Yes	Yes (7.5.2.2)	Yes
(c) fluid to be returned to tank	Yes	No spec.	No spec.	Yes	No spec.
(d) Setting	—	Pre set to open at pressure ≤ 125% WP	As ASME	125% (7.5.3)	Pre-set to open at P ≤125% WP
(e) requirements for operation (Note: see 2.3 in this report for relationship between FLP and WP)	Adjusted to limit pressure to 140% FLP or up to 170% FLP (if high internal losses), but in that case, all hydraulic equip. including jack and buckling to be calculated at 170/140 x FLP	Of a size to limit pressure 20% above that in (d), or maximum of 150% WP	As ASME	No spec. 125% and full load working pressure	Max of 150% WP
(f) sealing	No spec.	If adjustable, must be sealed	Must be sealed	Yes if not on pump in tank	No spec.
(g) exceptions for centrifugal pump	No spec.	Yes	Yes	Yes	No spec.

(Continued)

Table 6.1.2 (Part 2 of 3)
VALVES – COMPARISON OF REQUIREMENTS

Requirement	CEN	ASME	CSA	SA	Japan
(4) Direction valves	[12.5.4]	[306.9]	[4.22.9]	[7.5.8]	No spec.
(a) hold open electrically	Yes	Yes	Yes	Yes	No spec.
(b) down direction valve activation	By pressure from jack and at least one guided compression spring per valve	See (d)	As ASME	Yes by at least on guided compression spring	No spec.
(c) up direction valve activation	Special requirements if only one contactor used to interrupt power to motor, in that case the by-pass valve must be used	See (d)	As ASME	No spec.	No spec.
(d) springs activating electrically operated valves	See (b)	Must be of compression type	As ASME	No spec.	No spec.
(5) Rupture valve	[12.5.5	[410.6] (seismic	[4.19.1.4.1]	[7.5.5]	No spec.
(a) To be used as one of the methods of protection against excessive speed	Yes, per 9.5 of CEN	risk zone 2 or higher only)	Yes, only if flexible hoses used	Yes for all lifts	No spec.
(b) Requirements for stopping car	Rated speed + 0,3 m/s with ≤ g	No spec.	No spec.	Close to allow car to sink at min. 0,02 m/s max. 0,05 m/s	No spec.
(c) Accessible for inspection and adjustment	Yes	No spec.	No spec.	No spec	No spec.
(d) be integral to cylinder, or directly or close to cylinder	Yes	Yes	Yes	Yes	No spec.
(e) Special requirements for lifts with several jacks	If jacks oper. in parallel, only one required; otherwise, must be interconnected	No spec.	No spec.	Yes	No spec.