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Comparison of worldwide escalator and moving walk safety standards

Part 2: Abbreviated comparison and comments

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National foreword

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TECHNICAL REPORT

ISO/TR 14799-2

Second edition
2015-12-01

Comparison of worldwide escalator and moving walk safety standards —

Part 2: Abbreviated comparison and comments

Comparaison des normes mondiales de sécurité des escaliers mécaniques et trottoirs roulants —

Partie 2: Comparaison abrégée et commentaires

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 procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: Foreword - Supplementary information

The committee responsible for this document is ISO/TC 178, *Lifts, escalators and moving walks*.

This second edition cancels and replaces the first edition (ISO/TR 14799-2:2005), which has been technically revised.

ISO/TR 14799 consists of the following parts, under the general title *Comparison of worldwide escalator and moving walk safety standards*:

— *Part 1: Rule by rule comparison*

— *Part 2: Abbreviated comparison and comments*

Annexes A and B form an integral part of this part of ISO/TR 14799.

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Introduction

At the 1995 plenary meeting of ISO/TC 178, the work on a comparison of worldwide standards which includes the American, Australian, European, Russian, and Japanese escalator and moving walk safety code was passed to ISO/TC 178 (Resolution Singapore 1995/114). In October 1995, working group 5 was officially formed to carry out the task of preparing a cross reference between the relevant sections of these standards and to analyse the differences on selected subjects. The goal at that time was to prepare a Technical Report which would provide reference information to assist national committees when reviewing and revising individual standards which may initiate a gradual convergence of the technical requirements. In 1996, the study was expanded to include the Korean safety standard.

Subsequently at the 2007 plenary meeting of ISO/TC 178, it was agreed to start the update in accordance with Resolution 190/2001. However, it was also agreed only to restrict the comparison to the American, European, and Japanese safety codes. That work was completed after six meetings in 2012.

The content of this Technical Report is based on the information provided by the WG 5 members acting in personal capacity.

This Technical Report is intended to aid standards writers in developing their safety requirements and to help standards users understand the basis for the requirements as they are applied throughout the world.

This Technical Report is not intended to replace existing safety standards which may have been updated. Conclusions are arrived at in some cases, but only where is unanimity amongst the various experts. In other cases, the reasons for the divergent views are expressed.

This Technical Report is to be read in conjunction with the various safety standards. Unless approved by the relevant standard writing organizations, the information contained in this Technical Report does not necessarily represent the opinions of these standards writing organizations (see Annex B for references).

The Technical Report was done with EN 115-1:2008 and its Amendment A1:2010 as a reference document shown as the only one in its normal sequence. All other codes are not in their normal sequence and logical order. They are structured differently to EN 115-1. The result incorrectly leaves the impression of incompleteness of these standards. These standards in their original structure inclusive of their references to other standards and requirements are however complete.

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Comparison of worldwide escalator and moving walk safety standards —

Part 2: Abbreviated comparison and comments

1 Scope

This part of ISO/TR 14799 consists of a comparison of the requirements of selected topics as covered by the following worldwide safety standards (excluding local deviations):

a) Europe (CEN) – EN 115-1, *Safety of escalators and moving walks — Part 1: Construction and installation* (Edition 2010, including Amendment 1);

b) North America - ASME A17.1/CSA B44-2010, *Safety Code for Elevators and Escalators*;

c) Japan – Safety requirements mainly comprised of Building Standard Law Enforcement Order (BSLJ-EO), Notifications of Ministry of Construction (MOC-N), and Japan Elevator Association Standard (JEAS).

It is to be noted that in addition to the above listed standards and other regulations, escalators and moving walks may be required to conform to the requirements of other standards, as appropriate. Where ISO/TC 178 was aware of these standards, they are mentioned in Annex B.

2 Acronyms, abbreviated designations, and terminology

2.1 Acronyms and abbreviated designations

The following acronyms and abbreviated designations are used by the codes compared when making reference to regulations and organizations.

ANSI	American National Standards Institute
ASME	American Society of Mechanical Engineers
BSLJ	The Building Standard Law of Japan
BSLJ-EO	The Building Standard Law Enforcement Order (Japan)
CEN/CENELEC	Comité Européen de Normalization (European Committee for Standardization)
CIRA	Commission Internationale pour la Réglementation des Ascenseurs et Monte-charge
CSA	Canadian Standards Association
EN	European Norm (standard)
EUIL-MO	Electrical Utilities Industry Law - Ministerial Ordinance of technical standards for electrical equipment
EXP	Explanation/Interpretation of BSLJ-EO, MOC-N (Japan)

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IEC	International Electrotechnical Commission
ISO	International Standardization Organization
JEAC	Japan Electrical Association Code
JEAS	Japan Elevator Association Standard
JIS	Japanese Industrial Standard
MOC-N	Notifications of the Ministry of Construction (Japan)
NEC	National Electrical Code (USA)
NFPA	National Fire Protection Association (USA)
OSHA	Occupational Safety and Health Administration (USA)

2.2 Terminology (list of terms used in the codes)

Table 1 shows those terms which are used differently for the same item in the standards dealt with. Definitions in the Japanese standard are based on unofficial translation, whereas the terms in European and American codes are official language.

The items in parenthesis reference the clauses where the terms are used in the various standards.

Table 1 — Differences in terminology (list of terms used in the codes)

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
Auxiliary brake (5.4.2.2)	Main drive shaft brake (6.1.5.3.2)	Main drive shaft brake
Balustrade decking (3.1.3, 5.5.2.2)	High deck balustrades (6.1.6.3.1, 6.2.3.3.7, 6.2.6.3.1)	Deck board
Balustrade exterior panelling (mod)	Exterior panel	Exterior panel
Balustrade interior panelling (mod)	Interior panel (6.1.3.3.1, 6.2.3.3.4)	Interior panel
Brake load (3.1.4)	Brake rated load (6.1.3.9.3, 6.2.3.10.3, 6.2.5.3.1, 6.2.5.3.2)	
Criss-cross (A.2.3, A.2.4)	6.1.3.3.13	Criss-cross
Safety factor (5.4.1.3.2, 5.4.3.2)	Design factor of safety (3.6.1, 3.6.4)	Safety factor
Height above the steps (A.2.1)	Head-room (8.10.4.1.1)	Height above the steps
Inclination (3.1.1)	Slope/inclination (6.2.3.1, 6.2.3.7, 6.2.3.9.1)	
Inspection cover and floor plate (5.2.4)	Access door/plate (US) (6.2.7.3.3)	
Lower inner decking (5.5.2.6)	Low-deck interior (802.3d)	
Multiplex chain (5.4.1.3.1, 5.4.2.2.1)	Multi-strand chain	
Not easy to ignite (0.5.1)	Non/limited combustible (6.1.2.1, 6.2.2.1)	
Moving walk	Moving walk	Moving (side) walk
Rated load[a]	Rated load[a] (6.2.3.10)	Rated load[a]
Rated speed[a](3.6)	Rated speed[a] (6.1.4, 6.2.4)	Rated speed[a]
Skirting (3.1.23, 5.5.3)	Skirt (panel) (6.1.3.3.6, 6.2.3.3.6)	Skirt guard (panel)

[a] Definitions vary from code to code (see Annexes); terms in European, American, and Australian code are offocial terms.

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Table 1 *(continued)*

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
Structural load	Structural rated load (6.1.3.9.1, 6.2.3.10.1)	
Supporting structure (5.2)	Truss (6.1.2, 6.1.3.7, 6.1.3.10.1, 6.2.3.11.1, 6.2.7.1.2)	Truss
Supporting structure (of the combs) (8.3.2.4, 8.3.2.6, 16.2.1.1.1)	Comb plate (6.1.6.3.13, 6.2.6.3.11, 6.2.8.3), access plate (6.1.7.3, 6.2.7.3)	Comb plate
Maximum capacity (Annex H.1)		
	Machinery rated load (6.1.3.9.2, 6.2.3.10.2)	
	Conventional/modular moving walk (6.1.3.9.2, 6.1.3.9.3, 6.1.3.10)	
	Skirt obstruction device (6.1.6.3.6)	Skirt guard switch [JEAS-406F (draft), 2.1] MOC-N (no. 1424–2000), 2(d)
	Skirtless balustrade (6.2.3.3.5)	
Horizontal movement (5.7.2.1)	Flat step (6.1.3.6.5)	(Flat step)

a Definitions vary from code to code (see Annexes); terms in European, American, and Australian code are offocial terms.

3 Basis for escalator and moving walk safety standards

3.1 Historical origin and development of standards

3.1.1 European Standard EN 115-1

3.1.1.1 Why do we have EN 115-1?

The ever increasing number of escalators put in operation in Europe after the second world war required the drawing-up of guidelines for models and safety for escalators, especially as not all European countries had their own standard or national regulation for escalators.

So in the early 1960s, specialists/experts from seven European countries joined together and founded the “Commission Internationale pour la Réglementation des Ascenseurs et Monte-charge (CIRA)”. The CIRA draft for escalators was produced in June 1972 containing safety guidelines for escalators to protect persons and objects against possible accidents and injury.

The Technical Committee CEN/TC 10 “lifts” and established a working group in June 1974 with the request to prepare a draft European Standard for escalators and moving walks.

The convenorship of this work group was initially given to a member of the German delegation. In December 1974, the German convenor distributed a first proposal for the construction and installation of escalators founded on the CIRA guidelines, which after careful examination through the CEN/TC 10, was submitted to all member countries of the CEN for consideration in June 1977.

It should be noted that the EC Committee BTS2 gave the CEN a mandate for drawing up this part of ISO/TR 14799 in 1976.

Finally, following a second and a third draft, the final edition of EN 115 was prepared and accepted by CEN on 3rd January 1995 (firstly amended January 1998).

Considering that EN 115:1995 had given rise to requests for interpretation and this standard did not fully comply with EN 414 (today CEN Guide 414 “Safety of machinery — Rules for the drafting and

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presentation of safety standards"), CEN/TC 10 asked its Working Group 2 to revise EN 115:1995. This task was completed by CEN/TC 10 in 2007 when the final draft of EN 115-1 was available. An Amendment 1 was published in 2010.

According to the Internal Regulations of CEN/ CENELEC, the CEN members are bound to give this EN 115-1 the status of a National Standard without any national deviations.

The following countries are CEN Members:

Austria, Belgium, Bulgaria, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, and the United Kingdom.

3.1.1.2 How did we get EN 115-1?

The drawing up of the harmonized European Standard removed the technical trade restraints on the escalators and moving walks within the CEN countries listed above. The safety level of the CIRA Directives Edition June 1972 and the existing national regulations or standards of the CEN Member States essentially became reference documents which illustrate how the new standard was derived.

Therefore, all CEN members are bound to follow the CEN/CENELEC requirements and all national standards for escalators and moving walks are superseded by the harmonized EN 115-1 standard.

3.1.1.3 What is the code (law, standard, requirement)?

The purpose of EN 115 is to define minimum safety requirements in order to reduce the possibility of accidents on escalators and moving walks.

The harmonized standard is essentially a method of demonstrating compliance with the essential safety requirements of the machinery directive which is embodied in the laws of each country member of CEN/CENELEC and therefore, demonstrates compliance with the laws of the member states.

3.1.1.4 Is EN 115-1 a compulsory standard?

Some exceptions are possible (such as sections 0.3 and 1.3).

3.1.1.5 Is EN 115-1 a technical description, a requirement, or a recommendation?

Compliance with EN 115-1 is one way to satisfy the requirements of the European Machinery Directive.

3.1.1.6 Is EN 115-1 a performance or a design standard?

EN 115-1 has to be considered as a minimum requirement for safe operation of escalators and moving walks.

3.1.2 North American Standard A17.1/B44

3.1.2.1 Why do we have A17.1/B44?

A17.1/B44 is intended to enhance public health and safety. It serves as the basis for state, municipal, and other jurisdictional authorities in drafting regulations governing the installation, testing, inspection, maintenance, alteration, and repair of elevators, dumbwaiters, escalators, moving walks, material lifts with automatic transfer devices, wheelchair lifts, and stairway chair lifts. It is also intended as a standard reference of safety requirements for the guidance of architects, engineers, insurance companies, manufacturers, and contractors, and as a standard of safety practices for owners and managements of structures where equipment covered in the scope of the code is used.

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3.1.2.2 How did we get A17.1/B44?

The use of elevators and escalators began to rapidly expand in the early 1900s as larger and taller buildings were transforming American cities into high rise population centres. With the growth of the elevator industry came a proliferation of new manufacturers and maintenance organizations that lacked the knowledge and background of the industry developers. They often, because of this lack of experience, failed to understand or enforce safe practices in the work they performed.

It became apparent that in order for these cities, with their high-rise buildings to remain viable, the public had to have unwavering faith in the safety of the elevators that made these buildings usable. A safety code developed by experts in the field of vertical transportation would help develop this public confidence.

In 1915, ASME assembled a committee of engineers who were knowledgeable about elevators and charged them with developing a set of standards for elevator manufacturers, architects, consulting engineers, insurance inspectors, and building owners. The committee recognized the harmful influence of wear, rough usage, and atmospheric conditions under which elevator apparatus must operate, particularly on door locks, interlocks, and electrical contacts.

This effort resulted in the first edition of the A17.1 code being developed in 1921. New editions are periodically published which in recent years has been every third year. An addendum is published annually between editions.

As a result of a joint effort by the CSA B44 Technical Committee on the Elevator Safety Code and the ASME A17 Committee on Elevators and Escalators, harmonization of the provisions of CSA B44 and ASME A17.1 was completed and published as ASME A17.1/CSA B44 in 2007. The 2nd edition of ASME A17.1/CSA B44 was published as ASME A17.1-2010/CSA B44-10 in 2010.

3.1.2.3 What is the code (law, standard, requirement)?

The A17.1/B44 Safety Code for Elevators and Escalators is a voluntary reference standard that is used by people and organizations involved in the industry. Developed by a consensus of experts in the industry, it is used to guide them in maintaining a high level of safety in their respective functions.

After it is developed by the ASME under the auspices and consensus procedures established by ANSI, it becomes an American National Standard.

3.1.2.4 Is A17.1/B44 a compulsory standard?

As published, A17.1/B44 is a voluntary standard. It is used by authorities having jurisdiction as a basis for the code they enforce and becomes law when the governing legislative body over their jurisdiction adopts it.

3.1.2.5 Is A17.1/B44 a technical description, a requirement, or a recommendation?

A17.1/B44 presents most of its requirements as mandatory when following the standard. However, some rules may be in the form of a permissive recommendation.

3.1.2.6 Is A17.1/B44 a performance or a design standard?

The A17.1/B44 code is developed as a performance standard under the procedures established by the ASME and the CSA. Due to the unique nature of the industry, some rules are of a design nature, but efforts are continually underway to replace them with performance language.

3.1.3 The Japanese codes

3.1.3.1 Why do we have Japanese codes?

The Japanese codes are established to protect life, health, and property of the nation, and thereby, to contribute to promoting public welfare.

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3.1.3.2 How did we get Japanese codes?

Japanese codes are comprised of the following laws and standards.

3.1.3.2.1 The Building Standard Law of Japan (BSLJ)

3.1.3.2.1.1 Enactment of the law

This law was enacted in May 1950 and has been revised several times.

3.1.3.2.1.2 Purpose of this law

The purpose of the law is to safeguard the life, health, and property of people by providing minimum standards concerning the site, construction, equipment and use of buildings, and thereby, to contribute to the furtherance of the public welfare.

3.1.3.2.1.3 Equipment of buildings

Equipment of buildings are electricity, gas, water supply, drain, ventilation, heating, air-conditioning, fire extinguishing, smoke removal, or equipment of dirt disposal, chimneys, elevatory equipment, and lightning conductors.

3.1.3.2.1.4 Elevatory equipment (article 36)

Concerning elevatory equipments, technical standards which are required for safety, fire prevention, and appropriate sanitation are specified by cabinet order.

3.1.3.2.2 The Building Standard Law Enforcement Order (BSLJ-EO)

3.1.4.2.2.1 This order was established in November 1950 and has been revised several times.

3.1.4.2.2.2 Construction of escalators is described in Article 129-12.

3.1.4.2.2.3 Structural calculation for escalators is described in Article 129-12.

3.1.3.2.3 Notifications of the Ministry of Construction (MOC-N)

The notifications describe an indistinct part of BSLJ and BSLJ-EO.

The following notifications relate to the escalators and moving walks:

— no.1413: Requirements for over 30° inclination escalator, over 1,1 m step/pallet width and accelerate moving walk;

— no.1417: Requirements for clearance between step and skirt panel, vertical deflector, and nominal speed;

— no.1418: Requirement for structural calculation;

— no.1424: Requirements for fault detection and stopping distance.

3.1.3.2.4 Japanese Industrial Standard (JIS)

3.1.3.2.4.1 This standard was established by Ministry of International Trade and Industry in 1949. JIS A 4302 (inspection standard of elevator, escalator, and dumbwaiter) has been published in 1964 as the first edition and revised several times.

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3.1.3.2.4.2 This standard stipulates inspection items, inspection apparatus method, and standard of judgement in order to inspect the safety concerning traction type elevator, escalator, moving walk, and electrical dumbwaiter installed in building, structure, etc.

NOTE Moving walk is treated therein as escalator of special construction.

3.1.3.2.4.3 Escalators and moving walks are described in 4.4.

3.1.3.2.5 Japan Elevator Association Standard (JEAS)

3.1.3.2.5.1 This standard was established in June 1974 and has been revised several times.

3.1.3.2.5.2 The purpose of this standard is to stipulate the universal standard for elevator and escalator industry unifying the correct application and method of laws, JIS, etc. and thereby, to facilitate to the negotiation with the competent authorities.

3.1.3.2.5.3 It is recommended that some of the content stipulated be enacted as law or incorporated into JIS.

3.1.3.2.6 Electrical Utilities Industry Law Ministerial Ordinance of Technical Standards for Electrical Equipment (EUIL-MO)

3.1.3.2.6.1 The standard was established in July 1965 as the Ministerial Ordinance of the Ministry of International Trade and Industry and shall be revised if deemed necessary.

3.1.3.2.6.2 The purpose of the standard is to safeguard the applicable electrical apparatus.

3.1.3.2.6.3 This stipulates the facility standard where enclosed electrical apparatus both for commercial and home use.

3.1.3.2.7 Japan Electrical Association Code (JEAC)

3.1.3.2.7.1 This code was established in November 1963 and shall be revised if deemed necessary.

3.1.3.2.7.2 The purpose of this code is to safeguard the applicable electrical apparatus and contribute to the convenient electricity use.

3.1.3.2.7.3 The code applies to electrical apparatus both for commercial and home use; it does not stipulate anything concerning facilities of vessels, vehicles, or airplanes.

3.1.3.2.7.4 The code stipulates the technical matters subjected to follow so that no humans or animals may be exposed to any hazard by electrical apparatus or products.

3.1.3.3 What is the code (law, standard, requirement)?

The codes consist of four kinds of laws (BSLJ, BSLJ-EO, MOC-N, and EUIL-MO) and three kinds of standards (JIS, JEAS, and JEAC).

3.1.3.4 Are the Japanese codes compulsory standards?

The Japanese codes are compulsory standards.

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3.1.3.5 Are the Japanese codes a technical description, a requirement, or a recommendation?

The Japanese codes are technical descriptions, requirements, and recommendations.

3.1.3.6 Are the Japanese codes performance or design standards?

The Japanese codes are considered as performances and design standards.

3.2 General — Technical basis and structure of standards

NOTE Committee's comments are shown in italics.

Table 2 — Technical basis and structure of standard

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
5.9: Material not easy to ignite **Remark:** "Free of PVC" is nowhere required; details to be defined by national building codes	Requirements in **6.1.1,1 6.1.2.1 and 6.2.1.1, 6.2.2.1** (non/or limited combustible) **6.1.3.5.1 (a) and (b)/6.2.3.5.5 (a) and (b)** Material, type, and fire rating	**BSLJ; Art. 34** **MOC-N (No. 1418–2000), 2(2)(a) and 2(2)(b)**
5.9: *A17.1/B44 Defines materials and parts of the machine that have to be protected. The Japanese regulation is similar to EN 115–1. The intention of all regulations is more or less the same. They refer to specific tests and the specification for material shall be defined.* ***AGREED UPON:*** *Automatic fire extinguisher systems should not be used. Furthermore, any sprinkler head should not reduce maintenance space (no comment of A17.1/B44).*		
5.10 Transportation	No requirement	No requirement
5.10 ***Comment:*** *Only EN 115–1 5 defines rules for transportation. This is a legal requirement coming from the European Machinery Directive.*		
Introduction (11): Special environmental conditions	**Rules 6.1.8.1, 6.1.8.2, 6.1.8.3 and 6.2.8.1, 6.2.8.2, 6.2.8.3**	**JEAS-520** Installation for outdoor condition
Introduction (11) *A17.1/B44 requires a roof and secure foothold. The Japanese regulation has corrosion aspects in mind.*		
No note	No life performance requirements **Remark:** There is an industry standard for performance requirements	No note
1 Scope		
1.1 (1): Standard is applicable on new installation	Like EN 115–1 and additionally for operation, maintenance and alteration	**BSLJ** ; Art. **3, 2** for escalators and special constructions
1.2: Seismic activity not covered	No note	**MOC-N (No.541–2009)**
1.3: Recommendation for retrospective	**A17.3** Code applies to existing installations	**BSLJ; Art. 3, 3(3)**
Clause 1: ***AGREED UPON:*** *The design and operation of new escalators (moving walk) is covered as well as maintenance. Existing installations, installation procedures, code deviations, testing, inspection, repair, and alteration vary in different codes and are not part of the agreed upon points.*		
1.1 (2) Respect reasonably foreseeable misuse	No note	No note

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Table 2 *(continued)*

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
1.1 (2) *Customer specifications and life of the equipment are all part of the design and commercial requirements and are not part of A17.1/B44.* *Concerning imprudent act of the user, there are no similar statements in A17.1/B44 since this is the responsibility of the designer. It should be noted that there is a legal responsibility in the USA and in the European Union's Directives for the designer to compensate for reasonable foreseeable abuse in the design of the equipment.*		
Annex I: Misuse with trolleys	Escalators and moving walks only for passenger transport	**MOC-N (No. 1417–2000) 1, EXP. 1 and EXP. (notice of designing) 2**, for wheelchair escalator
Annex I *The use of escalators by other than ambulatory passengers is only permitted by EN 115–1. Such use is only permitted under special circumstances and modifications as agreed between the manufacturer of the escalator and the transportation means and the owner of the escalator. Moving walks as stipulated in the A17.1/B44 may only be used by passengers.*		
(1.4)	**6.1.3.14, 6.2.3.17** Components not in connection with escalator/ moving walk not permitted in them	-
2 Normative references		
2: See Annex B.1	See Annex B.2	See Annex B.4

3.3 Definitions

NOTE Committee's comments are shown in italics.

AGREED UPON: *Instead of "passenger conveyor" the term "moving walk" shall be used.*

***FUNDAMENTAL DIFFERENCES*:**

— *A17.1/B44 uses definitions to clarify unique terminology used within the code/rules.*

AGREED UPON: *Definitions have to clarify specific escalator/moving walk terminology without introducing extra requirements. If rules are self-explanatory as to the meaning of their headings, additional definitions are not required.*

Table 3 — Definitions

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
3.1.1: Definition of angle of inclination (for maximum, see 10)	No definition, slope/inclination is used	MOC-N (No. 1413–2000), EXP.2(1)
3.1.1 ***AGREED UPON:*** *The angle of inclination is the angle made between the line the passenger travels between transitions and the horizontal measured along the centre line of the steps.*		
3.1.3 Definition **balustrade decking** (see Figure 3).	High deck interior, high deck exterior, low deck exterior See A**ppendix I, Fig.I-3**	**BSLJ-EO Figure 129–5, 129–7 and 129–8** Deck board
3.1.3 *The A17.1/B44 definitions for high deck exterior/interior and low deck exterior are more precisely than the one for balustrade decking in EN 115–1.* ***FUNDAMENTAL DIFFERENCES:*** *A17.1/B44 prevents any change in width.*		
3.1.5: Definition of comb	Section 1.3, definition of comb	No definition
3.1.5 ***AGREED UPON:*** *A comb is a pronged section at each landing that meshes with the grooves in the passenger carrying surface. A comb plate is a platform at each landing to which the combs are attached.*		
3.1.8: Definition of escalator	Conventional and modular escalator	**BSLJ-EO 129–3, EXP. 1(2)**

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Table 3 *(continued)*

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
3.1.8 ***AGREED UPON:*** *An escalator is a power-driven, inclined, continuous stairway used for raising or lowering passengers.*		
3.1.9 Definition **exterior panel** (see Figure 3)	Exterior panel See **Appendix I, Fig.I-3**	Exterior panel **BSLJ-EO Figure 129–5, 129–7 and 129–8**
3.1.9 ***AGREED UPON:*** *The exterior panel is a panel enclosing the exterior sides of the escalator or moving walk.*		
3.1.11: Definition of handrail	No definition	No definition
3.1.11 ***AGREED UPON:*** *A handrail is a power-driven moving rail for passengers to grip while using the escalator or moving walk.*		
3.1.12 Definition **interior panel** (see Figure 3)	Interior panel (see **Appendix I, Fig. I-3 for escalators only**)	**BSLJ-EO Figure 129–5, 129–7 and 129–8** Interior panel
3.1.12 ***AGREED UPON:*** *The interior panel is a panel located between the skirting or lower interior decking and the handrail support profile or upper inner decking.*		
3.1.13 a Definition lower inner decking (see Figure 3)	Low-deck interior (see **Nonmandatory Appendix I, Fig. I-1**)	BSLJ-EO Figure 129–5, 129–7 and 129–8
3.1.13 a ***AGREED UPON:*** *Lower inner decking is a profile that connects the skirting with balustrade interior panel when they do not meet at a common point.*		
3.1.16: Definition of maximum capacity	Rated load is mentioned, no definition of maximum capacity	**BSLJ-EO; Art. 129–12, EXP. 1(4)**
3.1.16 *Only EN 115–1 uses the term "theoretical capacity". This theoretical value will never be reached (the real limit is 6,800 persons/h) and depends on the behaviour of the user.* ***AGREED UPON:*** *Real load conditions have to be defined. Definitions like theoretical capacity are not related to general safety codes.* *NOTE: the results of EN 115–1 investigation shows for a step width of 1 000 mm:* *- v = 0,7 m/s up max. 6 800 pers/h counted*		
3.1.17: Definition of moving walk	The description of moving walks includes in **Section 1.3** six different types	**BSLJ-EO 129–3, EXP. 1(2)**
3.1.17 ***AGREED UPON:*** *A moving walk is a power-driven installation for the conveyance of passengers in which the passenger-carrying surface remains parallel to its direction of motion and is uninterrupted*		

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3.1.18 Definition **newel**	Newel (see **Appendix I, Fig. I-3**)	Not defined
3.1.18 ***AGREED UPON:*** *The newel is the end of the balustrade. EN 115–1.*		
3.1.19: Definition of nominal speed means: no load condition	Rated speed means full load condition	**MSLJ-EO, 129–12 1(5)** No condition for load in upward direction
3.1.19 ***FUNDAMENTAL DIFFERENCES:*** *Rated speed is defined differently in various standards and effects many code requirements fundamentally.* *The North American and Japanese code define the rated speed as the speed at which the escalator can lift the rated load. Rated load is the load that the escalator is designed to lift.* *The reasons for the Europeans to do so was the possibility to carry out practical measurements.*		
3.1.25 Definition **skirting** See Figure 3	Skirt panel (see **Appendix I, Fig. I-3, I-8**) Not defined for moving walks	Skirt guard panel **BSLJ-EO Figure 129–5, 129–7 and 129–8**
3.1.25 ***AGREED UPON:*** *The skirting is a vertical part of the balustrade interfacing with the outer edge of the escalator steps and moving walk treadway.*		
3.1.26: Definition of skirt deflector	No definition	No definition
3.1.26 *There is no need for discussion.*		
(3.31) No definition	Definition controller	No definition
(3.32) No definition	Definition driving machine	No definition
(3.33) No definition	Definition flat steps	No definition
(3.34) No definition	Definition landing	No definition
(3.35) No definition	Definition pallet, moving walk	No definition
(3.36) No definition	Definition slope, moving walk	No definition
(3.37) No definition	Travel (rise)	No definition
(3.38) No definition	Definition treadway, moving walk	No definition
(3.39) No definition	Definition width escalator/moving walk	No definition

4 Selected topics

4.1 General

This comparison laid down in Tables 4 to 15 is between EN 115-1 and the rules in A17.1/B44 and the Japanese code. There are other standards (see listed in Scope) in the countries concerned that have requirements not shown in the escalator/moving walk standards compared, but are addressing some requirements in EN 115-1.

Significant hazards, hazardous situations, and events identified for escalators and moving walks and which require action to eliminate or reduce the risk are covered by this comparison. In addition, for relevant but not significant hazards which are not dealt with by these standards to be compared, the principles of ISO 12100 apply.

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When symbols are used to compare principal dimensions (e.g. L_1, b_8, h_6, etc.), always those of EN 115-1, Figures 2, 3, 5, and 8 (see Annex A) are used independent of the designation in other standards.

NOTE 1 EN 115–1 clause numbers in brackets serve only as a reference point. They do not exist in the real EN 115.

NOTE 2 Committee's comments are shown in italics.

4.2 Enclosure, inspection doors

Table 4 — Supporting structure (truss) and enclosure

EN 115–1 (Europe)	A17.1/B44 (North America)	Japanese Codes
5.2.1.1: Complete enclosure	See **6.1.2.1/6.2.2.1 and 6.1.3.3.1 (b)/6.2.3.3.1 (b)** **New Rule:** **6.1.3.6.6/6.2.3.8.5 floor opening protection adjacent to escalator**	
5.2.1.1 ***FUNDAMENTAL DIFFERENCES:*** *A17.1/B44 requires that sides and undersides of a truss shall be enclosed with materials defined as either non combustible or limited combustible to protect both the escalator or the environment.* ***AGREED UPON:*** *The truss sides and undersides should be covered with material that will contain combustion within the truss. These materials are determined by individual building or fire codes in each country.*		
5.2.1.2: Strength and rigidity of enclosure	Not mentioned, defined in building code	No comment
5.2.1.2: *Adequate mechanical strength and rigidity needs detailed definition and performance criteria.*		
5.2.1.3: Omission of enclosure	No content	No note
5.2.1.3 *The omission of enclosure is only mentioned in EN 115–1. The protection in case of fire should be in accordance to the agreed upon point to 5.2.1.1.*		
5.2.1.4: Cleaning of underside enclosure	**8.6.8.13/8.6.9.11** like EN 115 and cleaning periods are defined	No comment
5.2.1.5 Apertures for ventilation	**6.1.2.1/6.2.2.1**	No requirement
5.2.1.5 ***AGREED UPON:*** *Escalators/moving walks should be effectively ventilated to dissipate the heat generated. Apertures should not enable contact with moving parts.*		

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5.2.1.6 Requirement for safety device	**6.1.7.3.3/6.2.7.3.3** is close to that requirement	No requirement
5.2.2 Angle of inclination $\alpha \leq 30°$ $\alpha \leq 35°$, if rise ≤6 m and $v \leq 0{,}5$ m/s Moving walks: $\alpha \leq 12°$	**6.1.3.1** $\alpha \leq 30°$ **6.2.3.1** $\alpha \leq 12°$ moving walks and upper and lower landing $\alpha \leq 3°$ within 900 mm	**BSLJ-EO Art.129–12 1.(2)** $\alpha \leq 30°$ Moving walks: $\alpha \leq 15°$ **BSLJ-EO; Art. 129–12 EXP. 1 (2)** **(1)(a)** $\alpha \leq 35°$, if rise ≤6 m and $v \leq 0{,}5$ m/s and $y_1 \geq 35$ cm and minimum two flat steps [MOC-N (No.1413–2000) 2–1] **(2)(a)** $\alpha \leq 4°$ if step width $1{,}1 < z_1 \leq 1{,}6$ m **(3)(e)** The escalator of which speed varies in halfway of travel It shall conform to the construction specified as follows. (e) Slope of the escalator shall be equal to or less than 4° at the position where the speed of step varies and shall be equal to or less than 8° at the position other than the part mentioned above.
5.2.2: ***- Escalators:*** *A17.1/B44 specifies an angle of inclination less or equal to 30°. EN 115–1 and Japan permit an angle up to 35° under special conditions (EN 115–1 and Japan: Rise max. 6 m, speed max. 0,5 m/s).* ***- Moving walks:*** ***Historical background:*** *EN 115–1 permits inclined moving walks in order to support the use of trolleys (see Annex I.2).*		
5.2.3 Machinery spaces Requirements on authorization	**8.1.3** Authorized personnel	No requirement
5.2.3 *EN 115–1and A17.1/B44 are defining specific requirements for accessing inside truss and separate outside escalator machinery spaces (separate machine rooms).*		
5.2.4 (1) Inspection/trap doors for inspection and maintenance requirement for safety switch	Reasonable access to interior is required similarly **6.1.7.3/6.2.7.3** additional requirement for mechanical retention of covers	No requirement
5.2.4 (1) *Inspection and trapdoors (see Figure 1 for explanation) are part of the enclosure. The general access to the interior is treated in 6.2 and it is required for maintenance and inspection.* ***RECOMMENDATION****: Stop switches should be located in these areas which when activated prevent the operation of the escalator or moving walk.*		
5.2.4 (2), (3) closing/opening requirements for inspection/trap doors	Same intention in 6.1.7.3.2/6.2.7.3.2 and **6.1.7.3.3/6.2.7.3.3**	No requirement
5.2.4 (2),(3) *(see also Annex A.3)* ***FUNDAMENTAL DIFFERENCES:*** *A17.1/B44 and EN 115–1 require to lock the access door with a key. In A17.1/B44 the key shall be removed only when in the locked position. EN 115–1 requires to open the access door from the inside even when the door is locked.*		

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