TECHNICAL REPORT

ISO/TR 14799-2

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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

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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

In exceptional circumstances, 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), it may decide by a simple majority vote of its participating members to publish a Technical Report. A Technical Report is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO/TR 14799-2 was prepared by Technical Committee ISO/TC 178, *Lifts, escalators and moving walks*.

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*

Introduction

At the 1995 Plenary Meeting of ISO/TC 178, the work on a comparison of world-wide standards which includes the American, Australian, European, Russian, and Japanese escalator and moving walk safety code was passed to ISO/TC 178 WG 5 (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.

The content of this 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 must be read in conjunction with the various safety standards. Unless approved by the relevant standard writing organisations the information contained in this report does not necessarily represent the opinions of these standards writing organizations (see bibliography for references).

The Technical Report was done with the European Standard EN 115: 1995 and its amendment A1: 1998 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. 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.

Comparison of worldwide escalator and moving walk safety standards —

Part 2:
Abbreviated comparison and comments

1 Scope

This Technical Report consists of a comparison of the requirements of selected topics as covered by the following world-wide safety standards (excluding local deviations):

a) Europe (CEN) – EN 115; Safety rules for the construction and installation of escalators and passenger conveyors (Edition January 1995 and amendment A1: 1998);

b) USA - ASME A 17.1-1996; Safety Code for Elevators and Escalators

NOTE The requirements for Canada (B 44) are generally the same as for the USA. Any differences are stated in the text.

c) Australia - AS 1735 parts 5 and 6 for escalators and moving walks (Edition 1996);

d) Japan – Safety requirements mainly comprised of Building Standard Law Enforcement Order (BSLJ-EO), Notifications of Ministry of Construction (MOC-N, No. 1110-1981) and draft of Japan Elevator Association Standard (JEAS);

e) Russia – PUBEE 10-77-94, Regulations for the installation and safe use of escalators (Edition 1995);

f) Korea –The Elevator Inspection Standards, KATS 2001-414 Edition according to the Korea Elevator Law 4482, both cover the safety requirements on the escalator and moving walk.

It should 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/WG 5 was aware of these standards they are mentioned in the bibliography.

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 organisations:

— ANSI American National Standards Institute

— AS Australian Standard

— 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 Normalisation (European Committee for Standardisation)

— CIRA Commission Internationale pour la Réglementation des Ascenseurs et Monte-charge

— CSA Canadian Standards Association

- EIS — The Elevator Inspection Standard (Korea)
- EMSIS — Elevator Manufacturing, Safety and Inspection Standard under KOSHA (Korea)
- 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)
- IEC — International Electrotechnical Commission
- ISO — International Organization for Standardization
- JEAC — Japan Electrical Association Code
- JEAS — Japan Elevator Association Standard
- JIS — Japanese Industrial Standard
- KATS — Korean agency for technology and standards
- KEL — Korea Elevator Law
- KOSHA — Korean Occupational Safety and Health Act
- MINR — Ministry of Industry and Natural Resources (Korea)
- MITI — Ministry of Trade and Industry (Korea)
- MOC-N — Notifications of the Ministry of Construction (Japan)
- NEC — National Electrical Code
- NFPA — National Fire Protection Association (USA)
- OSHA — Occupational Safety and Health Administration (USA)
- PUBEE — Regulations for Installation and Safe Operation of Escalators (Russia)

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 Russian, Japanese and Korean standard are based on unofficial translation whereas the terms in European, American and Australian 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 (Europe)	A 17.1 (USA)	AS 1735 parts 5 & 6 (Australia)	Japanese Regulations	PUBEE (Russia)	Korean Code
auxiliary brake (12.3.1, 12.4.1, 12.6)	main drive shaft brake (804.3b)	brake (additional) (5.5.2)	main drive shaft brake	emergency brake (5.2.6)	
balustrade decking (5.1.5.1.4)	high deck balustrades (802.3g, 802.3h, 805.1b)		deck board	balustrade cornice	
balustrade exterior panelling (5.1.5.1.5)	exterior panel		exterior panel		
balustrade interior panelling (5.1.5.1.3)	interior panel 802.3a, 802.3d)		interior panel		
brake load (3.9b))	brake rated load (802.9c, 804.3a, 904.3b, 805.1h)	brake rated load (5.5.1 (parts 5 and 6), same as rated load)			
criss-cross (5.2.4, 7.3.1)		crossed-trusses (3.3.6)	criss-cross		
factor of safety (9.1.2, 9.2.1)	design factor of safety (802.10)	factor of safety (2.7, 3.7, 5.2)	safety factor		
height above the steps (7.3.1, 7.6)	head-room (802.12)	head-room (3.6.9)	height above the steps		height from the step (EIS 4.3.2 (10))
inclination (10)	slope/inclination (802.1, 802.9b, 802.9c)	slope (2.157.19 (part 1), 2.3)			3.3.1 (2), (4)
inspection doors and trap door (5.3)	access door/plate (US) (806.1a, 806.1b, 806.3); access (Can)	hatch cover (4.2)			
interior profile (5.1.5.1.2)	low-deck interior (802.3d)	transition (3.3.1.2, Fig. 2.2)			

Table 1 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 parts 5 & 6 (Australia)	Japanese Regulations	PUBEE (Russia)	Korean Code
multiplex chain (12.3.1)	multi-strand chain				
newel (5.1.5.1.6)	newel (802.3a, 802.6d, 805.1b, 805.1t,805.2b)	newel (2.157.15 (part 1), 3.4.5)		handrail inlet	
not easy to ignite (0.5.1)	non/limited combustible (801.1)	not combustible (3.1, 3.6)			non/limited combustible
passenger conveyor	moving walk	moving walk	moving (side) walk		moving walk
rated load[a]	rated load[a] (802.9, 802.9a, 802.9b, 802.9c, 804.3a(2), 804.3b, 805.1b	rated load[a] (2.119 (part 1), 2.6 (parts 5 and 6))	rated load[a]		rated load (4.3.1 (2) and (3))
rated speed[a] (3.6)	rated speed[a] (803, 803.1, 805.1c)	rated speed[a] (2.4)	rated speed[a]		- speed of stepping plates (3.3.1 (4)) - rated speed (EIS Inspection Report)
skirting (3.5, 5.1.5.1.1)	skirt (panel) (802.3d, 802.3e, 802.3f, 802.5d, 805.1h)	skirting (2.157.18 (part 1), 3.3.7 (part 5)	skirt guard (panel)	skirting	skirt guard (4.3.1 (11) and (12))
structural load	structural rated load (802.9a)	structural rated load (2.6.1 (part 6)			
supporting structure (5.3)	truss 801, 801.1, 802.7, 802.9a, 802.10, 806.1, 806.1b, 806.3)	truss (2.157.21 (part 1), 3.2)	truss		
supporting structure (of the combs) (8.3.2.4, 8.3.2.6, 16.2.1.1.1)	comb plate (805.1h, 805.1k, 805.1s, 805.1u, 802.4b, 802.6a, 807.3), access plate (806.1b, 806.3)	comb plate (3.5)	comb plate		

Table 1 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 parts 5 & 6 (Australia)	Japanese Regulations	PUBEE (Russia)	Korean Code
theoretical capacity (3.8)		full capacity (2.1.1)		carrying capacity	transport capacity (EIS Inspection Report)
underside enclosure (5.1.1.3)					
	machinery rated load (802.9b)	machine rated load (same as rated load in part 5), 2.6.2 (part 6)			
	conventional/modular moving walk (802.9b, 802.9c, 802.10)				
	skirt obstruction device (805.3f)	skirt pressure switch (6.16)	skirt guard switch (JEAS-406G (draft), 2.1)		
	skirtless balustrade (902.3e)				
		end plate (8.3, part 6)			
					stepping plate (generic term for step, pallet, rubber belt) (3.3.1 (2), 3.3.1 (3), 3.3.1 (4)
					- fixed type handrail (3.3.1 (3), 4.3.2 (7)) - moving type handrail (4.3.2 (4), 4.3.2 (5))
					surface of stepping plate (3.3.1 (2))

Table 1 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 parts 5 & 6 (Australia)	Japanese Regulations	PUBEE (Russia)	Korean Code
					non-reversal device and/or braking device (3.3.2 (7), 4.3.1 (4), 4.3.1 (5))
(diff. definition)	flat step (802.6e)	*(diff. definition)*	(flat step)		

[a] definitions vary from code to code (see annexes); terms in European, American and Australian code are official language

3 Basis for escalator and moving walk safety standards

3.1 Historical origin and development of standards

3.1.1 The European Standard EN 115

3.1.1.1 Why do we have EN 115?

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 7 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/TC10 “lifts“ established the group WG2 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/TC10 WG2“ 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 standard in 1976.

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

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

The following countries are CEN Members:

Austria, Belgium, Czech Republic, Denmark, Germany, Finland, France, Greece, Ireland, Italy, Luxembourg, the Netherlands, Norway, Portugal, Sweden, Switzerland, Spain and the United Kingdom.

3.1.1.2 How did we get EN 115?

The drawing up of the harmonised 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 harmonised EN 115 standard.

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

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

The harmonised 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 a compulsory standard?

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

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

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

3.1.1.6 Is EN 115 a performance or a design standard?

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

3.1.2 The American Standard A17.1

3.1.2.1 Why do we have A17.1?

A17.1 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.

3.1.2.2 How did we get A17.1?

The use of elevators and escalators began to rapidly expand in the early 1900's, as larger and taller buildings were transforming American cities into high rise population centers. 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 addenda is published annually between editions. The 16th edition is now in the process of being finalized and published.

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

The A17.1 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 a compulsory standard?

As published, A17.1 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 a technical description, a requirement or a recommendation?

A17.1 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 a performance or a design standard?

The A17.1 code is developed as a performance standard under the procedures established by the ASME. Because of 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 Australian Standards AS 1735 parts 5 and 6

3.1.3.1 Why do we have AS 1735 parts 5 and 6?

The mission statement of Standards Australia (The body writing the above mentioned standards in Australia) states the general position relative to having appropriate standards namely:

"To excel in meeting the needs of Australia's technical infrastructure for contemporary, internationally aligned Standards and related services which enhance the nation's economic efficiency, international competitiveness, and fulfil community desire for a safe and sustainable environment"

In the specific case of escalators and moving walks, the accent is on writing standards that provide for a minimum level of safety for the users of these units and for the mechanics servicing the equipment.

All state government safety relevant acts provide for public and employee safety.

The "Occupational Health and Safety Acts", through their regulations and code of practices, require escalators and moving walks comply with the provisions in AS 1735 parts 5 and 6. (In the case of Victoria the requirement is to employ "published technical standards" in the hazard control process and AS 1735 is the example shown in the code of practice tables).

AS 1735 parts 5 and 6 are the "reference tools" employed by the various state inspectorates of lifts, escalators and moving walks and they form the basis of the newly emerging self regulatory legislative frame work.

3.1.3.2 How did we get AS 1735 parts 5 and 6?

Standards Australia was founded in 1922. Its original name was the Australian Commonwealth Engineering Standards Association. It became the Standards Association of Australia in 1929 and in 1950, it was granted a Royal Charter. In 1988 its trading name was changed to Standards Australia.

The workings of the original Australian Commonwealth Engineering Standards Association was to produce hand-written minutes of all meetings in minute books.

The first reference to escalator installations can be found in a record dated 18 July 1932.

The first reference to glass is in the 1935 edition of the standard ASCA3. (ASCA 3 is the predecessor to AS 1735).

In a 1944 minute book there is a reference to A.S.A. 17.1 1937.

Standards were and are produced under the umbrella of Standards Australia and its predecessors by an open process of consultation and consensus in which all interested parties are invited to participate.

Specifically the interested parties in AS 1735 parts 5 and 6 are the lift companies, governmental institutions, consultants, architects and, through an owners association, the users.

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

The intent and purpose of AS 1735 Parts 5 and 6 is to prescribe uniform requirements for use within Australia and Australian territories that will provide for the safety of the users and mechanics of escalators and moving walks.

3.1.3.4 Are AS 1735 parts 5 and 6 compulsory?

AS 1735 parts 5 and 6 on their own have no legal standing however the standards are cited in all state government safety relevant acts.

The "Occupational Health and Safety Acts" in force in all states and territories with the exception of Victoria make AS 1735 parts 5 and 6, through their regulations and code of practices, compulsory.

(In the case of Victoria the requirement is to employ "published technical standards" in the hazard control process. AS 1735 is an example shown in the Victoria code of practice tables as one standard that may be employed as a specification for hazard control with the design and manufacture of escalators and moving walks)

3.1.3.5 Are AS 1735 parts 5 and 6 technical descriptions, requirements or recommendations?

AS 1735 parts 5 and 6 contain all of the above to form a standard for escalators and moving walks.

Technical descriptions show up in the nomenclature as well as in the clauses. The contents of the clauses are, when the standards are called up, compulsory requirements and the notes may be read as recommendations or as one example of satisfying a particular requirement.

3.1.3.6 Are AS 1735 parts 5 and 6 performance or design standards?

AS 1735 parts 5 and 6 are prescriptive design standards.

NOTE At this point in time (May 1999) a change over to adopting EN 115 as the basis for AS 1735 parts 5 & 6 is nearly complete. The amended standard AS 1735 part 5 will contain both escalators and moving walks.

Part 6 is being reserved for accelerating moving walks and will be revisited in the last quarter of the year 2000. The next version of AS 1735 part 5 will contain as a basis the content of EN 115.

The EN 115 content will be amended to reflect Australian requirements. To indicate a change or an additional requirement to EN 115, appropriate markings are being inserting alongside the EN 115 text. The substance of an amendment of an item indicated will be contained in an amendment section appended at the rear of the publication.

3.1.4 The Japanese Codes

3.1.4.1 Why do we have Japanese Codes?

3.1.4.2 How did we get Japanese Codes?

Japanese codes are comprised of the following laws and standards.

3.1.4.2.1 The Building Standard law of Japan (BSLJ)

3.1.4.2.1.1 Enactment of the law

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

3.1.4.2.1.2 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.

3.1.4.2.1.3 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 equipments, lightning conductors.

3.1.4.2.1.4 Elevatory equipment (Article 36)

Concerning elevatory equipments, technical standards which are required for safety, fire prevention, appropriate sanitation are specified by Cabinet Order.

3.1.4.2.2 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 129-11.

3.1.4.2.2.3 Structural calculation for escalators is described in Article 129-13.

3.1.4.2.3 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.1110: Case establishing construction standards for escalators of special construction

— No.1825: Case specifying persons, etc. having qualifications for periodical inspection of special buildings

3.1.4.2.4 Japanese Industrial Standard (JIS)

3.1.4.2.4.1 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.

3.1.4.2.4.2 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.

3.1.4.2.4.3 Escalators and moving walks are described in item 4.4.

3.1.4.2.5 Japan Elevator Association Standard (JEAS)

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

3.1.4.2.5.2 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.

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

3.1.4.2.6 Electrical Utilities Industry Law Ministerial Ordinance of technical standards for Electrical Equipment (EUIL-MO)

3.1.4.2.6.1 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.

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

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

3.1.4.2.7 Japan Electrical Association Code (JEAC)

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

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

3.1.4.2.7.3 The code shall to electrical apparatus both for commercial and home use. Provided it shall not stipulate anything concerning facilities of vessels, vehicles or air planes.

3.1.4.2.7.4 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.

3.1.4.3 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).

3.1.4.4 Are the Japanese Codes compulsory standards?

The Japanese codes are compulsory standards.

3.1.4.5 Are the Japanese Codes a technical description, a requirement or a recommendation?

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

3.1.4.6 Are the Japanese codes performance or design standards?

The Japanese codes are considered as performances and design standards.

3.1.5 The Russian Standard PUBEE

3.1.5.1 Why do we have the Russian Code?

The Regulations for Installation and Safe Operation of Escalators (PUBEE) of Russia set safety requirements to the design and manufacture, installation and modernisation, repairs and operation of escalators.

PUBEE is compulsory for all organisations and companies independently of forms of property.

3.1.5.2 How did we get PUBEE?

Escalators began to be widely used in the former USSR in the 1930s and the 1940, in the period of construction of the Moscow Metropolitan.

As a result, for the first time during those years there were made effective safety rules for escalators, which were periodically reviewed. The latest edition of PUBEE was released in 1995 to replace the 1977 edition of the document.

Within the whole effective period, PUBEE has been updated and its fulfilment controlled by a special technical service - the technical supervision body. This supervision body changed its official name more than once. Now it is called the Federal Mining and Industrial Supervision Body of Russia (Gosgortekhnadzor of Russia).

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

PUBEE's level is that of a standard.

3.1.5.4 Is PUBEE a compulsory standard?

PUBEE is the standard obligatory for the application during design and manufacture, installation and operation, repairs and modernisation of escalators.

PUBEE is compulsory for all organisations and companies independently of forms of property.

3.1.5.5 Is PUBEE a technical description, a requirement or a recommendation?

Safety requirements are the main content of PUBEE.

3.1.5.6 Is PUBEE a performance or a design standard?

As far as design requirements are concerned, the latest edition of PUBEE is certainly a design standard.

3.1.6 The Korean Code

3.1.6.1 Why do we have the Korean Code?

In the middle of 1980 the total number of elevators has been increased quite fast. The number of accident has been increasing while the local market restriction was abolished in 1985, so that the necessity to control the elevators and escalators safety had been recognised.

KOSHA, Korean Occupational Safety and Health Act expanded its scope to the elevators and escalators in 1986 in order to secure the occupational safety at the work place.

KEL (Korea Elevator Law) 4482, formulated in 1991, defines its purpose in article 1 that "to improve quality of elevators (including escalators) and ensure the users' safety."

3.1.6.2 How did we get the Korean Code?

The Korean elevator market had been protected by the Korean Government from 1970 to 1985. Through out the period only few suppliers got the business license with the condition to submit technology transfer plan.

Before 1985 the necessity for an elevator code was not so high. But since the market became free and everyone could import or make elevator components or products. It was obvious that a certain elevator code had to be developed in Korea.

The KOSHA expanded the scope into the elevator safety in 1986 led by industrial safety people and developed a system. But the system did not work well.

From 1988 to 1991 the industry had campaigned to develop a special law on elevator. Eventually the efforts made successful results so that KEL 4482 was formulated in December 1991 which became the one of five laws related to industrial standardisation and quality.

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

3.1.6.4 Is the Korean Code a compulsory standard?

KEL 4482 is the law having mandatory regulations. The technical standards comprise the parts of the law.

3.1.6.5 Is the Korean Code a technical description, a requirement or a recommendation?

3.1.6.6 Is the Korean Code a performance or a design standard?

The law likely prescribes performance requirement rather than design requirement. But for the major components the law addresses the type approval and registration. The type approval standards are technical requirement specifying the detail of components so that non-compliant parts or components cannot be used in Korea.

In case of escalator inspection standard, non-compatible area between A 17.1 and EN 115 was excluded in order to avoid the trade conflict. As the results the standard has been loosely shaped excluding critical contents.

NOTE The total number of escalator installation shows 5200 units in July 1998. The accident rates are relatively lower that one fatality and 3 injuries were reported since the last 5 years. The accident rates are almost double to the elevators and the higher rates are expected in the future.

The Korean situation shows that the design standard is not preferable because it has mandatory legal system to retrospectively effective to the all escalators even some are exempted by the tenor clauses.

3.1.7 The Canadian Standard B 44

Harmonisation efforts between A 17 and B44 were being made during the time when this report was being produced.

References to B44 were made where B44 differed from A 17.1.

3.2 General - Technical basis and structure of standards

NOTE Committee's comments are shown in italics.

Table 2 — Technical basis and structure of standards

EN 115 (Europe) *	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
Foreword		Preface			
3.2-Foreword: *A 17.1 and EN 115 have the same intent of safety. Furthermore, A 17.1 serves as a reference standard for other authorities to draft regulations. The Australian standard sets out uniform requirements for escalators and moving walks. It is not a legal paper in its own right. The Japanese code is a law. The Russian standard is part of the law and applies to escalators only. The Korean code is part of a law (Health and Safety Act). Even when it is not written down in anyone of the above mentioned documents, it is always the intention to deal with safety.*					
0 Introduction					
0: safety and construction standard; safe use	construction, testing, design, alteration; operation, repair, inspection, maintenance	new equipment	described in **BSLJ-EO 129-3** for escalators	tunnel and floor escalators, not for moving walks; safe use (see 2.8)	
0.1.1: properly dimensioned	no comparable rule	-	**Article 36-2 of BSLJ-EO**, structural methods and structural calculations	ensure the specified strength and reliability **Chapter 4** Materials of important welded components, welding and quality control of the welding *in other countries regulated in special welding codes* Fastening of detachable joints must preclude self-separation.	

Table 2 (continued)

EN 115 (Europe) *	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
0.1.1: properly dimensioned (continued)				**2.12** Requirements force fits Requirements for fixed axles **2.13** Corrosion protection **Annex 4** Welding	
3.2-0.1.1 *This is a general statement. There is no A17.1 requirement compatible with this EN 115 design clause. This clause as written, is unenforceable since it does not establish any reference that defines what is "proper", "adequate", or " suitable". The A17.1 code is a performance code and does not specify design conditions in accordance with the ASME policy.*					
0.1.2: maintenance referred to work of CEN/TC 10/WG 5	part X, specific description	appendix A, prescription of maintenance, periodic inspection	**Article 12-2 of BSLJ**	**2.8** General design requirement **2.12** No force fits in torque transfer components	**3.3.1 (1)** General design requirement
3.2-0.1.2 *Maintenance, repair, and alteration requirements are in Part X of A17.1, and are of a specific nature rather than the global generality used in 0.1.2 of EN 115.* *The Australian comment is of a general nature. It shall be mentioned that the Japanese regulation requests periodic maintenance.*					
0.2/0.3: new installations shall meet at least the safety requirements	philosophic description, freedom of design	**part 1 (1.2**), no unnecessary restrictions	-	-	
3.2-0.2/0.3 *ANSI and EN 115 have the same intention. Concerning A 17.1, where present rules are not applicable or do not describe the product or system, the enforcing authority should recognize the need for exercising latitude and granting exceptions where the product or system is equivalent in quality, strength or stability, fire resistance, effectiveness, durability, and safety to that intended by the present code rules.*					
0.4: special operational conditions (see also annex D)	performance code gives no design description	-	-		
3.2-0.4 *A17.1 is a safety code. The degree of safety does not vary with different installations. Since the code is based on performance and not design, it is applied equally on all types of escalators.* ***AGREED UPON:*** *The safety does not vary with different installations. The performance may be different and different criteria may be used.*					

Table 2 (continued)

EN 115 (Europe) *	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
0.5 Special indications					
0.5.1: material not easy to ignite **Remark:** "free of PVC" is nowhere required; details to be defined by national building codes	requirements in **the 800.1, 801.1 and 900.1, 901.1** (non/or limited combustible)	**part 5/6 clause 3.2.2**, non combustible **4.8** sprinkler system	**BSLJ art. 2; BSLJ-EO Article 108-2** **MOC-N (No.1110-1981);1**	**2.4** compliance with fire safety	
3.2-0.5.1 *A 17.1 defines materials and parts of the machine that have to be protected. The Australian code has requirements for some materials to be fire-resistant. The Japanese regulation is similar to EN 115. 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 A 17.1).*					
0.5.2: special environmental conditions	**rules 807.1, 807.2, 807.3 and 907.1, 907.2, 907.3**	for slip resistance, see **part 5/6, clause 3.6.5**	**(JEAS XXX (Draft)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**2.13 and GOST 9.104**	**3.3.1 (2), 4.3.2 (18)** Outdoor installation
3.2-0.5.2 *A 17.1 requires a roof and secure foothold. EN 115 recommends a roof and requires secure foothold (5.2.2). Australia and Russia have no requirements. The Japanese regulation has corrosion aspects in mind.*					
0.5.3: misuse with trolleys	escalators and moving walks only for passenger transport	escalators and moving walks for passenger transport only (**see 3.9**)	**MOC-N (No. 1417-2000) 1, EXP. 1 and EXP. (notice of designing) 2**, for wheelchair escalator	no note	trolleys allowed (see **4.3.2 (21)**
3.2-0.5.3 *The use of escalators by other than ambulatory passengers is only permitted by EN 115. 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 A.17 may only be used by passengers.*					

Table 2 (continued)

EN 115 (Europe) *	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
0.6: no life performance requirements	no life performance requirements **Remark**: there is an industry standard for performance requirements	**5.13** Design life ≥ 50000 h for escalator and moving walks with machine inside, treadway or step band	no note	no note	
0.7: respect foreseeable misuse	no note	no note	no note	no note	
3.2-0.6/0.7 *Customer specifications and life of the equipment are all part of the design and commercial requirements and are not part of A 17.1.* *Concerning imprudent act of the user, there are no similar statements in A17.1 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* *AS 1735.5 and 6 require a design life of at least 50.000 h for escalators and moving walks with a machine inside the treadway or step band.*					
0.8: establishment of Interpretation Committee	procedures for interpretations are described	Committee exists, not mentioned in the standard	in practice there are requests	in practice there are requests, a committee exists but is not mentioned in the standard	
3.2-0.8 *The interpretation procedures are different for each code. Committees are not always mentioned in a standard, but requests exist and description of solutions are reviewed.*					
1 Scope					
1.1: standard is applicable on new installation	like EN 115 and additionally for operation, maintenance and alteration	only for new escalators and new moving walks carrying passengers	see **BSLJ-EO 129-3** for escalators and special constructions	applies to escalator design, modernisation and repair	applies to retrospective modernisation and repair
1.2: recommendation for retrospective	**A 17.3** code applies to existing installations	not retrospective	no note	similar to EN 115	
1.3: permission of alternative requirements (for e.g. existing buildings)	purpose and exception are described in Section 2	not addressed	no note	no note	

Table 2 (continued

EN 115 (Europe) *	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
3.2-1.1, 3.2-1.2, 3.2-1,3 ***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.*					
(1.4)	in process for the A 17.1 2000 edition	**4.3** Limitation on use Escalator - Building			
AGREED UPON: *Components not used directly in connection with the escalator/ moving walk are prohibited to be installed on, in or through the escalator/ moving walk.*					
2 Normative references					
2: see Bibliography 1.1	reference list exists	see Bibliography 1.3	reference list exists	see Bibliography, 1.5	

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:

— *AS 1735 is using some definitions which are self-explanatory in the rules;*

— *A 17.1 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 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
3.1: definition of escalator	conventional and modular escalator	**part 1, 2.57**	**BSLJ-EO 129-12, EXP. 1**	similar to ANSI, see **Appendix 1.01**	definition escalator
3.3-3.1 ***AGREED UPON:*** *An escalator is a power-driven, inclined, continuous stairway used for raising or lowering passengers.*					
3.2: definition of passenger conveyor	the description of moving walks includes in **Section 3** six different types	**part 1, 2.107** three types: edge supported belt type, rollerbed type, sliderbed type	**BSLJ-EO 129-12, EXP. 1**	-	definition of horizontal moving walk
3.3-3.2 ***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* *Remark: ANSI and AS 1735 definitions should be taken into account when revising EN 115*					

Table 3 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
3.3: definition of handrail	no definition	**part 1, 2.157.13**	no definition	**appendix 1, no. 76/77**	
3.3-3.3 ***AGREED UPON:*** *A handrail is a power-driven moving rail for passengers to grip while using the escalator or moving walk.*					
3.4: definition of comb	no definition	**part 1, 2.157.9**	no definition	**appendix 1, no. 56**	
3.3-3.4 ***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.*					
3.5: definition of deflector device	no definition	no definition	no definition	no definition	
3.3-3.5 *There is no need for discussion.*					
3.6: definition of rated speed means: no load condition	rated speed means full load condition	**part 1, 2.157.17** no load condition)	**(BSLJ-EO 129-12)**	operational speed (with load) rated speed (without load); see **appendix 1, nos. 12 and 13**	
3.3-3.6 ***FUNDAMENTAL DIFFERENCES:*** *Rated speed is defined differently in various standards and effects many code requirements fundamentally.* *The American and Japanese code defines 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 at the rated speed [EN 115 and AS 1735 do not define a rated load. EN 115 is using the brake-load and structural load (for the passenger weight)].* *EN 115, AS 1735 and PUBEE define the rated speed as a (design) speed in direction of the moving steps, pallets or belts for unloaded conditions.* *The reasons for the Europeans to do so was the possibility to carry out practical measurements.*					
3.7: definition of angle of inclination (for maximum see 10)	no definition, slope/inclination is used;	**part 1, 2.157.19**	no definition	definition for escalator, **appendix 1, no. 8**	
3.3-3.7 ***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.*					

Table 3 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
3.8: definition of theoretical capacity	rated load is mentioned, no definition of theoretical capacity	rated load is mentioned in **part 1, 2.119**, no definition of theoretical capacity	**BSLJ-EO; Art. 129-12, EXP. 1(4)**	carrying capacity is mentioned in **Appendix 1, no. 10**	
3.3-3.8 *Only EN 115 and PUBEE use 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 investigation shows for a step width of 1000 mm:* *- v = 0,5 m/s down max.. 4900 pers/h counted* *- v = 0,7 m/s up max. 6800 pers/h counted*					
no definition	definition controller	2.35	no definition	no definition	
no definition	definition driving machine	**2.102**	no definition	no definition	
no definition	definition flat steps	no definition	no definition	no definition	
no definition	definition landing	no definition	no definition	no definition	
no definition	definition pallet, moving walk	**2.157.16**	no definition	no definition	
no definition	definition slope, moving walk	**2.157.19**	no definition	no definition	
no definition	travel (rise)	**2.149**	no definition	no definition	
no definition	definition treadway, moving walk	**2.157.20**	no definition	no definition	
no definition	definition width	**2.157.22**	no definition	no definition	
		other definitions : **2.2** alteration; **2.32** Contactor; **2.32** control; **2.50** enclosure drip-proof; **2.60** fire resistance rating; **2.61** fire resistance construction; **2.70** installation; **2.103** machine room; **2.105** may; **2.112** passenger; **2.119** rated load;			

Table 3 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
		2.122 relay; **2.132** shall and should; **2.157.2** balustrading; **2.157.3** broken drive belt device; **2.157.4** broken drive chain device; **2.157.5** broken pallet chain device; **2.157.6** broken step chain device; **2.157.7** broken treadway belt device; **2.157.8** ceiling intersection guard; **2.157.10** comb plates; **2.157.12** governor; **2.157.14** handrail guard; **2.157.21** truss			
3.9: definition of public service escalators/passenger conveyors	no definition	no definition	no definition	for tunnel/floor escalators **see 1.2**	
3.3-3.9					
FUNDAMENTAL DIFFERENCES: *The ANSI safety code applies equally to all escalators regardless of their use.*					
The loading pattern and useful life is a commercial issue, not one of safety. In that matter EN 115 was influenced by public transport needs and it defines and recommends different requirements for heavy duty and for commercial escalators.					
AGREED UPON: *The safety codes should apply equally to all escalators regardless of their use.*					
4 Symbols for quantities					
4.0: symbols for quantities	not included, mentioned where necessary	mentioned where necessary	not mentioned in a list	see **Appendixes 2 and 3**	
3.3-4.0 *In Europe, it is common to add a list of symbols and quantities, e.g. in parenthesis.*					
Korea sees problems in using such a list because escalator regulations are a law. Other countries think that too much information gets lost and symbols should be placed close to the corresponding drawing or formula.					
Recommendation: The list of symbols and their units is very helpful in understanding the code. It should therefore be included.					

4 Selected topics

General

This comparison laid down in tables 4 to 20 is between EN 115 and the rules in A 17.1, AS 1735, PUBEE (Russia), Japanese and Korean 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.

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

NOTE 1 EN 115 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.

4.1 Enclosure, inspection doors

Table 4 — Enclosure, inspection doors

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.1 General					
5.1.1.1: complete enclosure	see **801.1 and 802.3a (2)**	same intention in **3.2.2.2 and 4.4**	**BSLJ-EO; Art. 129-12,. 1(1)**	see **2.15 and 5.6.1/2**	
4.1-5.1.1.1 ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 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. The Australian code requires material which is deemed not combustible.* *Australia considers only the fire inside the machine and Japan requires non-combustibility, too. It does not only require non-combustible material, but explains in 0.5 what it means.* ***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.*					
5.1.1.2: omission of enclosure	no content	**3.2.2.2**	no note	no comment	
4.1-5.1.1.2 *The omission of enclosure is only mentioned in EN 115. The protection in case of fire should be in accordance to the agreed upon point to 4.1-5.1.1.1.*					

Table 4 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.1.3: cleaning of underside enclosure	like EN 115 and cleaning periods are defined **1206.6a**	no comment	no comment	similar (**see 2.17**)	
4.1-5.1.1.3 *The term "underside enclosure" is wrong in EN 115 and shall be replaced by "underside" as a structural part of the truss.*					
5.1.2: strength and rigidity of enclosure	not mentioned, defined in building code	**4.4 /3.2**	no comment	**2.8** General design requirement **2.11** Fastening of detachable points **2.12** No force fits in torque transfer components **2.13** Corrosion protection **Annex 4** Welding	
4.1-5.1.2: *Adequate mechanical strength and rigidity needs detailed definition and performance criteria.* ***RECOMMENDATION:*** *To adopt the Australian specification (see AS 1735, 4.4; 440 N horizontal force applied on 50 mm by 50 mm with max. deflection of 25 mm).*					
5.1.3 Inspection doors and trap doors					
5.1.3.1 inspection/trap doors for inspection and maintenance	reasonable access to interior is required similarly **(806.3 / 906.3)**	**4.2** deals with access and guarding of the machine room	no requirement	**3.10** Deflection of floor slab *(plate)* ≤ 1/600 **6.3**	
4.1-5.1.3.1 *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.*					

Table 4 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.3.2 closing/opening requirements for inspection/trap doors	same intention in 806.3 / 906.3	no requirement	no requirement	**see 6.7 and 6.8** for tunnel escalators	
4.1-5.1.3.2 *(see also 6.2)* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 and EN 115 require to lock the access door with a key. In A 17.1 the key shall be removed only when in the locked position. EN 115 requires to open the access door from the inside even when the door is locked.* *A 17.1 is related to access doors in escalator/moving walk trusses; EN 115 is related to external machine rooms and access plates for trusses. EN 115 requires the use of a tool or a key for trap doors like floor plates on escalator machine rooms.*					
5.1.3.3 Inspection doors with safety contact	not required	not defined	not defined	not defined	not defined
5.1.3.4 Inspection door, material same as for enclosure	**806.3 / 906.3**	*same as for enclosure 3.2.2.1*	not defined	not defined	not defined
4.1-5.1.3.3, 4.2-5.1.3.4 *(defined in 6.2 Accessibility)*					
5.1.4 Apertures for ventilation					
5.1.4 Apertures for ventilation	**801.1**	**4.7** ventilation	no requirement	no requirement	no requirement
4.1-5.1.4 ***AGREED UPON:*** *Escalators/ moving walks should be effectively ventilated to dissipate the heat generated. Apertures should not enable contact with moving parts.*					

4.2 Balustrade

Table 5 — Balustrade

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5 Balustrade					
5.1.5.1 Balustrades on each side	see **802.3 / 902.3**	see **3.3.1.1** *same* **2.2** Width of escalator; nominal width	**BSLJ-EO Art. 129-12 1.(3)** *same*	**5.6.1** Definition and general requirements of balustrades	**3.2.C** *same*
4.2-5.1.5.1 ***AGREED UPON:*** *The balustrade provides the passenger's safety by providing stability, protects the passenger from moving parts of the escalator and supports the handrail.*					
5.1.5.1.1 Definition **skirting** see Fig.2	Skirt panel see **Appendix D,** **Fig.D3; A17.1 Section 3** not defined for moving walks	Skirting **Fig.2.2; Part 1 2.157.18**	Skirt guard panel **BSLJ-EO fig. 1-36 and 1-37**	**Appendix 1 term 74** Skirting	not defined
4.2-5.1.5.1.1 ***AGREED UPON (see AS 1735, 2.157.18):*** *The skirting is a vertical part of the balustrade interfacing with the outer edge of the escalator steps and moving walk treadway.*					
5.1.5.1.2 Definition **interior profile** see fig.2	Low-deck interior see **Appendix D, fig. D3; A17.1 Section 3**	Transition **Fig.2.2**	not defined	**Appendix 1 term 73** Interior profile	not defined
4.2-5.1.5.1.2 ***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.*					
5.1.5.1.3 Definition **balustrade interior panelling** see fig.2	Interior panel see see **appendix D, fig.D3; A17.1 Section 3**	not defined	Interior panel **BSLJ-EO fig. 1-36 and 1-37**	not defined	not defined
4.2-5.1.5.1.3 ***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.*					

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5.1.4 Definition **balustrade decking** see fig.2	High deck interior, high deck exterior, low deck exterior see **appendix D, fig.D3; A17.1 Section 3**	**2.157.11**	Deck board **BSLJ-EO fig. 1-37**	**Appendix term72** balustrade decking	not defined
4.2-5.1.5.1.4 *The A 17.1 definitions for high deck exterior/interior and low deck exterior are more precisely than the one for balustrade decking in EN 115.* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 prevents any change in width. AS 1735 allows a gradual change to a maximum of 8%.* ***AGREED UPON:*** *Deck (interior/exterior) is the transverse members of the balustrade. A low deck is located immediately above the skirting. A high deck meets with the handrail support profile.*					
5.1.5.1.5 Definition **balustrade exterior panelling** see fig.2	Exterior panel see **Appendix D, fig.D3; A17.1 Section 3**	not defined	Exterior panel **BSLJ-EO fig. 1-36**	not defined	not defined
4.2-5.1.5.1.5 ***AGREED UPON:*** *The exterior panel is a panel enclosing the exterior sides of the escalator or moving walk.*					
5.1.5.1.6 Definition **Newel**	Newel, see **Appendix D, fig.D3; A17.1 Section 3**	Newel, see **Fig.2.1.1** *same*	not defined	**Term 78 App.1** Newel	not defined
4.2-5.1.5.1.6 ***AGREED UPON:*** *The newel is the end of the balustrade.* ***RECOMMENDATION:*** *All definitions of EN 115, clause 5.1.5.1 should be placed in the chapter „Definition“.*					

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5.2 Prevention of climbing on balustrades	**802.3i / 902.3h** deck barricades, **802.3h** Anti-slide device, *special requirements*	Side guarding, **3.3.8** (AS 1735.5- 1996)	**(JEAS 406H (Draft)** **2.1.6)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	no requirement	no requirement
4.2-5.1.5.2 *(see figure 2): The general intention is to prevent climbing and sliding by appropriate devices. These devices should be precisely defined as for example done in A 17.1 in future editions of escalator safety codes.* ***AGREED UPON:*** *Deck barricade is a barricade to discourage climbing on the lower exterior outer deck. An anti-slide-device is a device to discourage sliding on the high exterior decks.*					
5.1.5.3 Force on handrail, vertical force of 900N per 0.5 m (no deformation)	**802.3b / 902.3b** vertical load 730 N/m, lateral load 584 N/m; simultaneously *different*	**Amendment 1 1997** *same* **AS 1170.1(b)** loading code	no requirement	**Appendix 4**	no requirement
4.2-5.1.5.3 *A 17.1 requires to consider forces over the whole length of the balustrade. These typical forces are created when people are leaning against balustrades (handrails) and act simultaneously in the vertical and horizontal directions.* *EN 115 takes into account only a single vertical force as does the Australian code.* ***AGREED UPON:*** *Balustrades should be designed to resist the simultaneous (vertical plus horizontal) application of a static lateral force of 585 N/m and a vertical load of 730 N/m, both applied to the top of the handrail stand (agreed for A 17.1 only in seismic zones 1 and 2, zone 3 and 4 require higher values).* *Further it is agreed when applying a vertical force of 900 N distributed over the surface of the handrail for a length of 0,5 m there shall be no permanent deformation, no breakage or displacement of any balustrade parts.*					
5.1.5.4 Balustrade construction, mouldings, cover joints etc	**802.3a** *similar* **902.3a**	**3.3.1.1** *similar* Change in width between balustrades **3.3.2**	**MOC-N (No. 1417-2000), EXP.(1)** *similar; no specific dimensions*	**5.6.4** *same*, **5.6.6** *same*, **5.6.5** *additional*	no requirement
4.2-5.1.5.4 *EN 115, AS 1735 and PUBEE limit the gaps between panels to 4 mm. A 17.1 limits the gap between panels to 4,8 mm.*					

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5.4 Force applied on the balustrade interior panelling 500N over 25 cm^2 =>Gap ≤ 4mm no deformation	no requirement	**Amendment 1**; 1997 *same*	no requirement	**5.6.6** Gap requirement	no requirement
4.2-5.1.5.4 ***FUNDAMENTAL DIFFERENCES:*** *EN 115 and AS 1735 give limits to permanent deformation and permissible gap £ 4 mm for a defined load. The PUBEE code limits the gap to 4 mm. A 17.1, JIS and Korea have no load and deformation requirement.* ***AGREED UPON:*** *Balustrades should be parallel to the travel path.*					
5.1.5.4 Glass balustrade, one-layer safety glass t ≥ 6mm	**802.3c** / **902.3c** ANSI Z97.1 or 16CFR Part 1201	**3.3.3** AS 2208 t ≥ 6mm	no requirement	no requirement	no requirement
4.2-5.1.5.4 *Terminology problems are raised when discussing the use of glass for balustrades. For example, safety glass means (and is used as) laminated glass in the A 17.1. with reference to nationals glass standards (the use of polycarbonate is also permitted). AS 1735 permits both tempered and laminated glass; also poly carbonate is accepted. EN 115 requires for glass balustrades with self supporting panels tempered glass only.* *The Russian, Japanese and Korean codes contain no requirements on glass balustrades. The minimum thickness of glass panels are determined by real load conditions, safety factors and vandalism conditions .All calculations are based on technical data provided by the glass manufacturers.* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 and AS 1735 define a possible change in width between the balustrades. All other codes have no definition for that subject.*					
5.1.5.5 Sharp edges	**802.3a** / **902.3a**	**3.3.3(d)** *same*	no requirement	no requirement	no requirement
4.2-5.1.5.5 *No discussion*					
5.1.5.6 Skirting h_2 ≥ 25 mm	**802.3f(1)** h_2 ≥ 25 mm **902.3f(2)**	no dimension	no dimension	no requirement	**3.3.1 (6)** skirting h_2 ≥ 25 mm
4.2-5.1.5.6 ***Comment:*** *To define the height of skirting A 17.1 is using the nose-line (path of the traces by the nose of the step as it moves around the escalator) as reference line. EN 115 is using the tread surface of steps, pallets and belt as a reference. The meaning of each code is exactly the same. AS 1735 has no requirement for skirting height.*					

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5.6.1 Rigidity of skirting	**802.3f(2)** **902.3f(3)**	**3.3.7.1**	no requirement	**5.6.5** *different (will be deleted)*	no requirement
4.2-5.1.5.6.1 ***Fundamental differences:*** *PUBEE (5.6.5) requires skirting joints with differences in height not more than 0,5 mm.*					
5.1.5.6.2 Force applied to skirting 1500 N over 25 cm^2 =>Deflection .≤4 mm	**802.3f(2) / 902.3f(3)** 667N Defl .≤ 1.6mm *nearly the same* *depends on how the force applies*	1500 N over 2500 mm^2 =>Defl .≤ 4mm **3.3.7.1** *same*	no requirement	**3.12** 1500 N over 0.0025 m^2 =>Defl. ≤ 4mm *same*	**3.3.1 (6)** Force applied to skirting 1500 N over 25 cm^2=> Defl. ≤ 4 mm
4.2-5.1.5.6.2 *(see 5.1.5.4)* *Comment: A 17.1 is equivalent to EN 115. A deflection of 4 mm would require 1667 N.*					
5.1.5.6.3 Skirting requirements	**802.3f(3) / 902.3f(4)**	**3.3.7.2** Friction *nearly the same*	**MOC-N (No.1417-2000); 1 EXP. (1)** Friction demarcation line **JIS A4302 4.4.2 (13)** **(JEAS 406G (Draft);406H (Draft); 2.1 and 2.2.3; 2.5)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**5.6.6** *general requirements*	**4.3.2(16)** *same intention* add. yellow or red stripes **3.3.1(6)** friction

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
		3.6.10.1 Step demarcation adjacent to the balustrades a) Requirements demarcation lines b) Requirements deflector guards	**JIS A 4302-1992** **4.4.2 (13)** Requirements demarcation lines	**5.3.1** step demarcation adjacent to the balustrades	Step demarcation adjacent to the balustrade
	(Step demarcation lights **805.1k** for escalators)	**3.6.10.2** step demarcation between adjacent steps a) Line on the tread b)Two green fluorescent tubes			Step demarcation between adjacent steps
4.2-5.1.5.6.3 ***Comment:*** *A 17.1 excludes the use of deflector devices (B 44 requires yellow demarcations on steps). AS 1735 has a mandatory requirement for either deflector devices on the skirting or yellow demarcation lines on the steps. EN 115 permits yellow lines and deflector devices. Japan does not require deflector devices but yellow or red lines as demarcation on steps (JIS A4302/4.2.13). PUBEE does not require deflector devices but step demarcations in 5.3.1.*					
5.1.5.7 Interior panel $\gamma \geq 25°$ see fig.2	$20° \leq \gamma \leq 30°$ Interior Low Deck **802.3d (2)** **902.3d (2)**	$\gamma \geq 25°$ **3.3.1.2**	no dimension	**Appendix 3** $\gamma \geq 25°$	no requirement
5.1.5.7.1 $b_4 \leq 30$mm see Fig.2	$b_4 \leq 32$mm **802.3d (3)** **902.3d (3)**	$b_4 \leq 30$mm **3.3.1.2** *(AS 1735.5-1996)*	no dimension	$b_4 \leq 30$mm Appendix 3	no requirement
4.2-5.1.5.7 /5.1.5.7.1 : *Japan and Korea have no requirement on the angle (g) of the interior lower deck. A 17.1 requires between 20° and 30°, the Russian, Australian and European codes require at least 25°.* ***RECOMMENDATION:*** *g should be explained for interior lower deck and for interior panel in EN 115 (next revision).*					

Table 5 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.1.5.7.2 $b_3 \leq 0.12$ m if $\gamma \leq 45°$ see Fig.2	$b_3 \leq 152$ mm **802.3d (1)** **902.3d (1)**	$b_3 \leq 120$ mm, if $\gamma \leq 45°$ $b_3 \leq 165$ mm, if $\gamma > 45°$ **3.3.1.2**	no requirement	$b_3 \leq 120$ mm **Appendix 3**	no requirement
4.2-5.1.5.7.2 ***RECOMMENDATION FOR EN 115:*** *The horizontal width of the interior lower deck should not exceed 0,12 m (see b_3 in figure 2).* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 requires a maximum of 0,152 m. EN 115 and PUBEE require a maximum of 0,12 m. For g higher than 45° AS 1735 requires a maximum of 0,165 m and for g not more than 45° a maximum of 0,12 m.* ***AGREED UPON (Definition):*** *The angle g of the interior lower deck or the interior panel is the angle the lower interior deck (interior panel) makes to the horizontal in a normal view of the inclined.*					
5.1.5.8 Balustrades with centred handrails	no requirement	no requirement	no requirement	**5.6.3** no restriction *general requirement*	no requirement
			(**BSLJ-EO; Art.129-12 1.(4) and EXP 1.(4);** *see rule by rule comparison*		
4.2-5.1.5.8 ***FUNDAMENTAL DIFFERENCES:*** *The Russian code includes requirements in accordance to escalators/ moving walks with centred handrails and not centred handrails. The other codes do not have such requirements.*					
5.1.5.9 Newel $l_2 \geq 0.6$ m see Fig.1 (for EN115, 7.2 too)	no requirement	no requirement	no requirement	no requirement	no requirement
4.2-5.1.5.9 *(see 4.6-7.2/4.6-7.5.2) Continuation of the handrail beyond the comb*					

4.3 Surrounds

Table 6 — Surrounds

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.2 Surrounds of the escalator and passenger conveyor					
5.2.1 Unrestricted area requirements	Safety zone requirements **802.6d / 902.8d**	Exit landing area **2.1.1** **Fig.2.1.1** **2.1.2** *special requirements*	no requirement	**6.15 / 6.16** *more restrictive to tunnel escalators*	**3.3.1(7)** Unrestricted area requirements
	Adjacent floor surfaces; no abrupt change in elevation of more than 6.4 mm **802.6c/ 902.8c**				
4.3-5.2.1 *For requirement on surrounds of the escalator A 17.1 and EN 115 requirements have the same intention.* ***FUNDAMENTAL DIFFERENCES:*** *Whereas all codes recognise a minimum safety zone the requirements laid down are different. AS 1735 requires only half of the European size, PUBEE reflects to tunnel escalators. Additionally, EN 115 and PUBEE require the same theoretical capacity for series arrangements of escalators and moving walks* ***Comment****: .The heading should be changed to escalator/moving walk interface requirements*					
5.2.2 Landing area, secure foothold min 0.85 m	**806.3/ 906.3** 2. paragraph 2./3.sentence	**2.1.1**	no requirement	**5.4.1** *general requirements*	no requirement
4.3-5.2.2 ***Fundamental differences:*** *The choice of materials used in A 17.1 is restricted and access plates shall be securely fastened. A17.1, AS 1735, PUBEE and EN 115 require a plate surface with secure foothold.* ***Recommendation****: Restrictions for the cover material of access plates (e.g. concrete, stone, terrazo and rubber) should be defined in the next revision of all codes.*					

Table 6 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.2.3 Minimum headroom $h_4 \geq 2,.30$ m see fig.1	$h_4 \geq 2.13$ m **802.12/ 902.16**	$h_4 \geq 2100$ mm **3.6.9**	$h_4 \geq 2,1$ m **JIS A 4302 4.4.2 (8) 1992** **(JEAS-406H (Draft) 2.1.3)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**Appendix 3** $h_4 \geq 2.30$ m	**4.3.2 (10)** $h_4 \geq 2.1$ m
4.3-5.2.3 ***AGREED UPON:*** *The minimum headroom shall be measured vertically from the step nose-line, landing plates and landings.*					
5.2.4 Requirements for guards at ceiling intersection see h_5 fig.1	**802.3g** see appendix D, figs D4,D5 *more requirements* **902.3g**	**3.3.6** fig 3.3.6 (A),(B),(C) *more requirements* **3.4.1 Note 2** Additional protection along the side of the escalator is allowed	**MOC-N (No.1417-2000) 1 (3), EXP.1 (3) and EXP. (notice of designing) 2** *nearly the same* *exact dimensions (JEAS-406H Draft)(fig.1 and)* NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.*2*	**6.18** *nearly the same*	**4.3.2 (14)** see fig 1. for more requirements

Table 6 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
			(JEAS-406H (Draft)) **2.1.4; 2.1.5** Floor openings etc. NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.		
4.3-5.2.4 ***Fundamental differences:*** *A 17.1, AS 1735, JIS and Korea are using a specific description of the solid guard. EN 115 and PUBEE require a general protection of the intersections.* ***Comment:*** *The required distances are different, but the intent is the same for each code.*					

4.4 Supporting structure (truss), lighting, transportation

Table 7 — Supporting structure (truss), lighting, transportation

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
5.3 Supporting structure of the escalator or passenger conveyor					
5.3 Supporting structure loads 5000 N/m ^{2} Deflection: l_1/750 l_1/1000 public service escalators *Live Load:* *1000 mm width: 5000 N/m* *800 mm width: 400 0N/m* *600 mm width: 3000 N/m* *(Safety factor acc. to DIN 18800)*	**802.9** Structural and machinery rated load *different* Structural (kg)= 0.27(W+203)A Machinery (kg)= 0.21(W+203)B_1 *Structural:* *1000 mm: 3185 N/m* *800 mm: 2656 N/m* *600 mm: 2126 N/m* *Machinery:* *1000 mm: 2477 N/m* *800 mm: 2066 N/m* *600 mm: 1656 N/m* *Safety factor acc. to 802.10*	**2.6, 2.7** Rated load *different* Rated load (kg)= 0.27 WA Safety factor S = 2.5 against yield strength *1000 mm: 3140 N/m* *800 mm: 2610 N/m* *600 mm: 2080 N/m*	**BSLJ-EO Art 129-12 (3)** Rated load *different* P = 2600A [N] *1000 mm: 2006 N/m* *(800 mm: 2080 N/m)* *600 mm: 1560 N/m* **MOC N (No. 1418-2000)** Safety factor at normal operation is 3 against breaking point. Safety factor when safety device is actuated is 2 against breaking point	**3.4, 3.9** *a little bit different for public transport* q_{c1} =5000 N/m ^{2} Strength q_{c2} =4000 N/m ^{2} Deflection Deflection: 1/1000 for tunnel escalators 1/750 for floor escalators **3.11** 1/1000 for track systems	270 kg/m ^{2} no deflection requirements
5.3 For moving walks → see above	**902.10** Structural and machinery rated load *different* Structural (kg)= 0.49 (W)A Machinery (kg)= 0.37 (W)C_1 Safety factor acc.to 902.12 **902.9** Supporting structure	**Part 6 2.6** **2.6.1** 4.75kPa rated load **2.6.2** Machinery rated load **2.7** Safety factors	see above 270 kg/m ^{2} **MOC-N (No.1110-1981); 3 EXP 2)** Safety factors		

Table 7 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
	902.9 Supporting structure	Requirements and loads for supports **3.1**			
		Truss construction, special requirements **3.2.1**			
4.4-5.3 *(see figure 3)* ***FUNDAMENTAL DIFFERENCES:*** *- live load is clearly defined in EN 115, A 17.1, AS 1735 and PUBEE;* *- a specific deflection of the truss (supporting structure) is required by EN 115 and PUBEE;* *- the term 'dead-weight (load)' of the escalator is mentioned in EN 115, AS 1735 and JIS;* *- the machinery load, used for the calculation of the driving machine and the power transmission components, is clearly defined in A 17.1 and the Korean code; AS 1735, EN 115 and JIS are using the live load for the calculation of the power transmission components; Russia uses a different formula for machinery load;* *- safety factors are given in the AS 1735, A 17.1, JIS and Korean code; the other codes are developing a safety factor by the use of other values.*					
5.4 Lighting					
5.4 Lighting min 50 lux	**806.2/906.2** min 54 lux *nearly the same*	**3.6.8** Lighting of step treads min 75 lux *different*	no requirement	**2.18, 5.4.5** min 50 lux *nearly the same*	**4.3.2 (18)** required for outdoor escalators or moving walks
4.4-5.4: *A 17.1, EN 115, AS 1735 and PUBEE require lighting on escalator surrounds and landings.* ***FUNDAMENTAL DIFFERENCES:*** *EN 115 explains requirements for indoor and outdoor escalators.*					
5.5 Transportation					
5.5 Transportation	no requirement	no requirement	no requirement	no requirement	no requirement
4.4-5.5 ***Comment:*** *Only EN 115 defines rules for transportation. This is a legal requirement coming from the European Machinery Directive.*					

4.5 Machinery space

Table 8 — Machinery space

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
6.1 General					
6.1 Machinery Spaces general requirements	**[806.1(a),(b)]**	**4.1, 4.3 and 4.4**	no requirement	no requirement	no requirement
4.5-6.1 *EN 115, A 17.1 and AS 1735 are defining specific requirements for inside truss and separate outside escalator machinery spaces (separate machine rooms).* ***Comment:*** *EN 115 allows the installation of lift driving equipment in separate machinery spaces (separate machine rooms). AS 1735 requires a headroom space at the machine.*					
6.2 Accessibility					
6.2.1 Access routes height 1.8m	**[806.3]**	**4.2** *different* **4.1** 2000mm at controller and machine *different*	no requirement	**2.16, 6.3, 6.4**	no requirement
4.5-6.2.1 *(see also 5.1.3)* ***FUNDAMENTAL DIFFERENCES:*** *- AS 1735 requires a guarding around the machine area which is not removable and part of the escalator/moving walk;* *- the headroom for access route is required in EN 115;* *- a maximum force for opening the access plates is required by A 17.1 and AS 1735.* ***AGREED UPON:*** *The maximum force limitations for lifting of covers should comply with manual handling (ergonomic) standards (USA-OSHA gives 55 pounds; Note: A 17.1 limits it to 70 pounds).*					
6.2.2 Access to separate machinery spaces; Requirements for stairs and ladders	no requirement	no requirement	no requirement	**6.9, 6.10** *different detailed requirements*	no requirement
4.5-6.2.2 ***Fundamental differences:*** *EN 115 and PUBEE define the access with stairs, ladders and foothold.*					

Table 8 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
6.3 Construction and equipment of machinery spaces and driving and return stations					
6.3 Construction and equipment of machinery spaces, driving and return stations **6.3.1.1** machinery spaces 0.3m^2 but smaller side min 0.5m	no requirement	**4.1** machinery spaces not less than 380 mm by 600 mm **4.10** Pit access not less than 380mm by 600 mm **4.3; 4.4**	**(JEAS 406G (Draft) 2.6)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	no requirement	no requirement
4.5-6.3 *EN 115 and AS 1735 define the standing area and the headroom for the machinery space.* ***4.5-6.3.1.1*** *EN 115, A 17.1 and AS 1735 are defining specific requirements for inside truss and separate outside escalator machinery spaces (separate machine rooms).* ***Comment:*** *EN 115 allows the installation of lift driving equipment in separate machinery spaces (separate machine rooms). AS 1735 requires a headroom space at the machine.*					
6.3.1.2 Main drive within step band 0.12m^2, smaller side 0.3m	no requirement	no requirement	no requirement	no requirement	no requirement
4.5-6.3.1.2 ***FUNDAMENTAL DIFFERENCES:*** *- AS 1735 requires a special device to hold the step-band or the tread-band for maintenance purposes;* *- EN 115 requires a horizontal standing area in the working zone.*					
6.3.1.3 Requirements separate machinery spaces	*for information only* No special requirements for separate machinery spaces, same as for machinery room Rules from 1996 Edition **ANSI/NFPA 70** **620-5; 620-4**	No special requirements for separate machinery spaces, same as for machinery room **4.1; 4.10**	no requirement	no requirement	no requirement, but included in the elevator code

Table 8 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.5-6.3.1.3					
Comment: *Only EN 115 describes a separate machine room (machinery space). A 17.1 describes it in a reference document as shown above.*					
6.3.1.4 Height of separate machinery spaces ≤ 2.0 m	references ANSI/NFPA 70	see remark **rule 6.2.1/6.3.1.3**	no requirement	**6.5** ≤ 2400 mm machine room ≤ 2000 mm tension device chamber *nearly the same*	no requirement
4.5-6.3.1.4					
Fundamental differences: *EN 115 describes the headroom in separate machine rooms, in front of control panels and in driving/return stations explicitly.*					
6.3.2 Requirements lighting machine rooms	**806.1a/ 906.1a** Lighting remote machine room **806.1b/ 906.1b** truss interior *more special requirements*	**3.2.3** Lighting of truss and pits **3.2.4** Lighting at inspection panel **4.5** *nearly the same* **4.6** outlets *same*	no requirement	**6.19** sockets 42 V *different*	no requirement
4.5-6.3.2					
FUNDAMENTAL DIFFERENCES:					
- EN 115 and A 17.1 require lighting for the remote machine room and power supply in the truss interior.					
- AS 1735 requires permanently installed lighting for machinery spaces and remote stations. Permanently installed lighting is also required at truss inspection panels.					
- Russia requires lighting for the landings, the interior truss, the general environment of the installation and the machine room. Lighting points all over the escalator are also required.					
- EN 115 asks for a lighting power supply independent of the power supply of the machine.					
AGREED UPON: *Socket outlets shall be provided in truss extensions. Power points (socket outlet, duplex receptacle, general purpose outlet, socket) need to be defined.*					

Table 8 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
6.3.3 Requirements stop switch in driving and return stations	**805.1g, 905.1g, 210.2e** *nearly the same*	**6.4** Stop switch at truss and pit inspection panels Clause 29.14(a),(b) and (c) of AS1735 Part2 *nearly the same*	no requirement	no requirement	no requirement
4.5-6.3.3 *EN 115, A 17.1 and AS 1735 include the same intent and description of stop switches and operational use.* ***AGREED UPON:*** *This is a fundamental requirement for all codes.*					

4.6 Handrail

Table 9 — Handrail

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
7.1 General					
7.1 Handrail moving in the same direction; speed tolerance 0%-2% of the speed of the steps	**802.4a/ 902.4a** same direction, „substantially same speed“ curved escalator handrails	**3.4.1** same direction, substantially same speed	**BSLJ-EO Art.129-12 1.(3)** same direction, same speed	**5.7.1, 5.7.2** *same*	**4.3.2 (4)** same speed, same direction, no tolerance
4.6-7.1 ***Fundamental differences:*** *- EN 115 defines the handrail speed with a tolerance of -0 +2 %;* *- PUBEE permits ± 2 % for the handrail speed;* *- A 17.1, AS 1735, JIS and Korea require substantially the same speed:* *- A 17.1 defines handrail speed requirements for curved escalators;* ***AGREED UPON: „Substantially“ is not a detailed requirement. Fixed speed values including a tolerance should be defined.***					
7.2 Continuation of the handrail beyond the comb					
7.2 Dimension $l_3 \geq 0.3$ m (Definition of comb!)	Extension beyond comb plates $l_3 \geq 305$ mm **802.4b/902.4b** B44 $l_3 \geq 300$ mm	$l_3 \geq 300$ mm **3.4.2**	**MOC-N (No. 1417-2000); EXP. 2 (Notice for design)** dimension $l_3 \geq 0,3$ m	$l_3 \geq 300$mm **Appendix 3**	no requirement

Table 9 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.6-7.2 ***AGREED UPON:*** *The dimensions for the continuation of the handrail beyond the comb plate should be defined in all codes.* ***FUNDAMENTAL DIFFERENCES:*** *- A 17.1 requires the extension of handrail beyond the comb plates (l_3);* *- AS 1735 requires the extension of handrail beyond the comb plates (l_3) and the distance from the end of the newel to the handrail entry point into the balustrade (l_4).* *EN 115 establishes the distance of the end of the newel* *- to the combline (l_2);* *- to the balustrade entry of the handrail (l_4).* *The extension of the handrail beyond the combline is also required (l_3).*					
7.3 Profile and position					
7.3.1 Distance handrail to handrail profile guide $b_6 \leq 8$ mm	no requirement **B44** $b_6 \leq 10$ mm	no requirement	no requirement	no requirement	no requirement
7.3.1 Distance outer edge of handrail and walls $b_{10} \geq 80$ mm to adjacent escalators $b_{10} \geq 120$ mm	$b_{10} \geq 102$ mm **802.2b/ 902.2c** additional vertical dimension	$b_{10} \geq 75$ mm **3.4.6**	**(Draft JEAS-406H Point 2.1.3** $b_{10} \geq 500$ mm) *limited by the outside of the exterior panel* NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	$b_{10} \geq 80$ mm **Appendix 3** $b_{10} \geq 150$ mm to adjacent escalators	no requirement

Table 9 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.6-7.3.1					
FUNDAMENTAL DIFFERENCES:					
- Japan requires that partially protruding objects shall not be allowed within a range of 2.100 mm from the nose line of the steps and 500 mm horizontally from the outer face of the handrails.					
- A 17.1 (802.2b and 902.2c) gives a minimum vertical distance (25 mm) between deck and handrail. The purpose is the ability to grasp.					
- EN 115 asks to reduce the possibility of pinching or trapping of fingers and hands by an appropriate vertical distance between deck and handrail.					
AGREED UPON: *Every code has to provide for unrestricted access to the handrail to avoid pinching or trapping hands or fingers.*					
7.3.2 Width of handrail 70 mm ≤ b_2 ≤ 100 mm see fig.2	no requirement	70 mm ≤ b_2 ≤ 100 mm **3.4.1**	no requirement	70 mm ≤ b_2 ≤ 100 mm **Appendix 3**	no requirement
4.6-7.3.2					
Fundamental differences: *There are fundamental differences in dimensional requirements for handrails. EN 115, AS 1735 and PUBEE are defining the width. A17.1, B44, JIS and Korea have no specific requirements.*					
7.3.3 Dimension b_5 ≤ 50 mm	no requirement	b_5 ≤ 55 where handrail is 70 wide b_5 ≤ 40 where handrail is 100 wide measured to centre line **fig.2** *not separately identified in the text*	no requirement	b_5 ≤ 50 mm **Appendix 3**	no requirement
4.6-7.3.3 *Only EN 115, AS 1735 and PUBEE have requirements. No recommendations are given by the other codes.*					
7.4 Distance between the handrail centrelines					
7.4 Distance between handrail centerlines **figure 2** (b_1 - z_2) ≤ 0.45 m	**802.2 (b) /902.2(c)** (b_1-z_1)/2 ≤ 241 mm	(b_1-z_2)/2 ≤ 255 mm (max b_1 ≤ 1560 mm) **fig.2** *not separately identified in the text*	**BSLJ-EO Art. 129-12; 1 (4) and EXP. 1.(4)** b_1 - z_1 ≤ 0,50 m (b_1-z_1)/2 ≤ 25 cm	b_1 - z_1 ≤ 400 mm **Appendix 3**	no requirement

Table 9 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.6-7.4 *The relationship between the centrelines of the handrail and step width is defined in all codes with the exception of Korea. There, only a distance between handrails is required.*					
7.5 Protection at the point of entry into the balustrade					
7.5.1 Dimension 0.1m ≤ h_3 ≤ 0.25m **fig. 1 and 2**	no requirement	90 mm ≤ h_3 ≤ 200 mm **3.4.5**	no requirement	no requirement	no requirement
4.6-7.5.1 *B 44 requires a clearance (225 mm maximum) for moving walks only.* *To avoid entrapping only EN 115 and AS 1735 require a clearance from the floor for the handrail entry* ***Recommendation****: Dimensions should be specified in all codes.*					
7.5.2 l_4 ≥ 0.3 m	no requirement	l_4 ≥ 250 mm **3.4.3**	no requirement	l_4 ≧ 300 mm **Appendix 3**	no requirement
4.6-7.5.2 *(see 4.6-7.2 above)*					
7.5.3 Handrail entry guard required *(14.2.2.4.1 k safety switch)*	**802.4c** *same* **902.4c** *(805.1t; 905.1q)*	**6.12** *same*	**MOC-N (No.14214-2000); 1 (2)** **(JEAS-406G (Draft))** *same* NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**Appendix 3** b_5 ≤ 5 mm *different*	**4.3.2(6)** *same*
4.6-7.5.3 ***AGREED UPON: A handrail entry guard should be required in all escalator/moving walk standards.***					

Table 9 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
7.6 Height above the steps, pallets and the belt					
7.6 Height above steps 0.9 m ≤ h_1 ≤ 1.1 m **fig.1 and 2**	until now no requirement *in preparation* **902.2b** 762 mm ≤ h_1 ≤ 1067 mm	900 mm ≤ h_1 ≤ 1100 mm **(AS 1735.5 - 1996) 3.4.1**	no requirement	**Appendix 3** 800mm ≤ h_1 ≤ 1100 mm	no requirement
4.6-7.6 *EN 115, AS 1735 and PUBEE (B44, too) require similar dimensioned heights. A 17.1 does so only for moving walks (at the moment).* ***AGREED UPON:*** *The intent of a balustrade is to carry the moving handrail and to facilitate the safe use of escalators/moving walks.* *The balustrade including the handrail is not considered to be a barrier as requested by building codes. .*					
7.7 Guiding					
7.7 Handrail guiding	no requirement	**3.4.1**	no requirement	no requirement	no requirement
4.6-7.7 *AS 1735 has a special requirement relative to the balustrade glass breakage and handrail guiding.* *EN 115 requires a guided and tensioned handrail system. No specific requirements are in the other codes.*					
7.8 For public service escalators and public service passenger conveyors					
7.8 Control device for handrail breakage No device if F ≥ 25 kN Control device if F ≤ 25 kN	**805.1q** *different* **905.1m** Handrail speed monitoring device required	**6.17** *different* Handrail speed monitoring device	**(JEAS-406G (Draft))** **2.3** Handrail speed monitoring device NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**5.8.1** *different* Handrail breaking switch	no requirement

Table 9 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.6-7.8 ***Fundamental differences:*** *Korea requires a specific breaking load in general. EN 115 specifies for public service use a minimum breaking load for the handrail or a broken handrail device as an alternative.* *A 17.1, B44, AS 1735 and Japan require a handrail speed monitoring device to detect a broken, slow speed or stopped handrail.* *AS 1735 requires a device which detects a handrail which has stopped for more than 15 seconds whilst the steps are in motion.* *PUBEE requires a broken handrail device.*					
(7.9)	**B44/ 8.3.4.1** retarding force for handrail-drive of 450 N		**JIS A 4302-1992; 4.4.2 (5)** Retarding force of 150 N		**4.3.2 (5)** Retarding force of 147 N (15kgf)
(4.6-7.9) *B44 and Japan require for escalators a retarding force applied to the handrail in down-running direction. The speed should not be changed (escalators).*					

4.7 Steps and pallets

Table 10 — Steps and pallets

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
8 Step, pallets, belts and combs					
8 Step, pallets, belts and combs	**802.5a/ 902.5e** Material and type	**3.6.1 Material**			
4.7-8 *A 17.1, AS 1735 and Korea are the only codes which prescribe the flame resistance performance of the step material.*					
8.1 Dimensions					
8.1.1 Step height $x_1 \leq 0.24$ m $x_1 \leq 0.21$m (emerg. exit) **fig.3**	$x_1 \leq 216$ mm **802.5b**	$x_1 \leq 215$ mm **3.6.2**	no requirement	**Appendix 3** 35°: $x_1 \leq 240$ mm floor esc. 30°: $x_1 \leq 205$ mm floor and tunnel escalators	**3.3.1(5)** $x_1 \leq 0.215$ m $x_1 \leq 0.24$m if $\alpha > 30$
4.7-8.1.1 ***FUNDAMENTAL DIFFERENCES:*** *EN 115 defines a step height for escalators which are permitted to be used as emergency staircases.*					
8.1.2 Step depth $y_1 \geq 0.38$ m **fig.3**	$y_1 \geq 40$ mm **802.5b**	$y_1 \geq 400$ mm **3.6.2**	**MOC-N (No. 1413-2000); 2 (1)** step depth $y_1 \geq 0{,}38$ m	$y_1 \geq 380$mm **Appendix 3**	**3.3.1 (5)** $y_1 \geq 0.4$ m
4.7-8.1.2 *No comment necessary*					
8.1.3 Step width/ pallet width **fig.3** 0.58 m $\leq z_1 \leq$ 1.1 m	559 mm $\leq z_1 \leq$ 1016 mm **802.5b** Moving walks 559 mm $\leq z_1 \leq$ maximum see table **902.7** **902.7**	400 mm $\leq z_1 \leq$ 1050 mm **3.6.2** **Part 6 3.6.1** treadway width + tolerances	**BSLJ-EO; Art. 129-12; 1 (4) and Exp. 1 (4);** **MOC-N (No. 1413-2000; 2 (2) and 2(3)** $1{,}1 \leq z_1 \leq 1{,}6$ m For moving walks of which speed varies in halfway of travel: $1{,}1 \leq z_1 \leq 1{,}6$ m	580 mm $\leq z_1 \leq$ 1100 mm floor escalators $z_1 = 1000$ mm ± 10 mm tunnel escalators **App. 3**	**3.3.1 (5)** 0.56 m $\leq z_1 \leq$ 1.02 m; wider pallets may be installed if $\alpha \leq 6°$

Table 10 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.7-8.1.3 *No comment necessary*					
8.2 Construction of the steps, pallets and belt					
8.2.1 Load (steps, pallets, belt) 6000 N/m^2	136 kg on 152 mm x 254 mm **802.9d** Safety factor S = 5 (against ultimate tensile strength) **802.10** *different* **902.11** 136 kg for each 0.42 m^2 **902.9** Supporting structure	At least 3500 N/m^2 over whole tread surface **3.6.3** *different* **Part 6 2.6.1** 4.75 kPa **3.6.7** Treadway supports	**BSLJ-EO Art 129-12 (3)** Rated load *different* P = 2600A [N] **MOC N (No. 1418-2000)** Safety factor at normal operation is 3 against breaking point. Safety factor when safety device is actuated is 2 against breaking point	**Appendix 4** 4000 N/m^2 safety factor S ≥ 5 *different*	
4.7-8.2.1 *EN 115, AS 1735 and Korea require an equally distributed step load for the design. Korea requires also non-destructive testing for steps or representative samples.* *A17.1 requires a unique step load with a defined load area on different locations on the tread surface. In addition a safety factor against the ultimate tensile strength of the step material is required.* *Russia requires a distributed step load and in addition a safety factor against the ultimate tensile strength of the step material.* *JIS has no specific requirements.*					
8.2.2 Tests **8.2.2.1.1** Steps, Static tests 3000 N on plate 0.2 m x 0.3 m deflection ≤ 4mm	no requirement	no requirement	no requirement	**3.8** Step width Load 1000 mm 3200 N 800 mm 2400 N 600 mm 1600 N	**8 step 7** 300 kgf deflection ≤ 4 mm

Table 10 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.7-8.2.2.1.1					
FUNDAMENTAL DIFFERENCES: *A static step assembly test is required in EN 115, PUBEE and the Korean code. EN 115 and Korea define maximum deflection limits. A17.1, AS 1735 and JIS do not require a static test on steps.*					
A non-destructive test is required in Russia for welded assembled steps.					
8.2.2.1.2 Pallets, static tests 7500 N on plate 0.3 m x 0.45 m deflection ≤ 4 mm *(if not possible, other requirements)*	no requirement for tests requirement for steps and paletts -> design load	no requirement	no requirement	no requirement	same requirements as for steps
4.7-8.2.2.1.2 *A 17.1 has no static load test requirement for steps and pallets. A specific static design load for steps/pallets is a requirement.*					
8.2.2.2 Dynamic test steps/ pallets Load 500N – 3000 N Frequency 5 - 20 Hz Cycles > 5 x 10^6 x 0.3 m Deformation ≤ 4mm	**802.5e/902.5d/ 1105.1** *nearly the same* Load 455 N – 2965 N Frequency 10 Hz ± 5 Cycles > 5 x 10^6 Area 0.2 m x 0.3 m Deformation ≤ 4 mm	no requirement	no requirement	**3.8** Test procedure of the manufacturer *vague, different*	no requirement
4.7-8.2.2.2 *A17.1 and EN 115 define a specific dynamic test for escalator steps/pallets.*					
8.2.3 Step treads and pallets					
8.2.3.1 General requirement step treads	**802.5a (3)** *same requirements* **902.5e (3)**	**3.6.6.1 / 3.6.5** *same* **Part 6 3.6.2**	*no requirements for steps* **(JEAS-406G (Draft) 2.5)** step tread with three side demarcation	**5.3.1** bright distinctive colour on both sides	no requirements

Table 10 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
			NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	*same*	
4.7-8.2.3.1 **Comment on demarcation lines:** *Plastic inserts (raised or flat) are not required in all codes. If they are used, they have to be of limited flammability (A 17.1).*					
8.2.3.2 Width of grooves b_7 5 mm ≤ b_7 ≤ 7 mm	**802.5d** $b_7 \leq 6.3$ mm **902.5a** $b_7 \leq 6.4$ mm	**3.6.6.1** $b_7 \leq 7.5$ mm **Part 6 3.6.2.1**		**Appendix 3** 5mm ≤ b_7 ≤ 7 mm	**8 step 4.3 (1)** $b_7 \leq 7$ mm
4.7-8.2.3.2 *No comment.*					
8.2.3.3 Depth of grooves $h_7 \geq 10$ mm	**802.5d** $h_7 \geq 9.5$ mm **902.5a** $h_7 \geq 9.5$ mm	**3.6.6.1** $h_7 \geq 9.5$ mm **Part 6 3.6.2.1**		**Appendix 3** $h_7 \geq 10$ mm	**8 step 4.3 (1)** $h_7 \geq 10$ mm escalators $h_7 \geq 5$ mm mov. walks
4.7-8.2.3.3 *No comment.*					
8.2.3.4 Web width 2.5 mm ≤ b_8 ≤ 5 mm	**802.5d** $b_7 + b_8 \leq 9.5$ mm pitch of cleats *pitch is relevant* **902.5a**	**3.6.6.1** $b_7 + b_8 \leq 10$ mm **Part 6 3.6.2.1**		**Appendix 3** 2.5 mm ≤ b_8 ≤ 5 mm	**8 step 4.3 (2)** $b_7 + b_8 \leq 10$ mm escalator $b_7 + b_8 \leq 13$ mm moving walks
4.7-8.2.3.4 *No comment.*					
8.2.3.5 Edge-cleat	**802.5d** *same* **902.5a** **902.5b** Intermeshing pallets	no requirement	no requirement	**5.3.1** *same*	no requirement
4.7-8.2.3.5 *(see 4.3-5.1.5.6.3)*					

Table 10 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
8.2.3.6 front edge sharpness relieved	no requirement	no requirement	no requirement	no requirement	no requirement
4.7-8.2.3.6 *No comment*					
(8.2.3.7)	**902.5c** Alignment of pallet tread surfaces	**Part 6 3.6.6.2**			
(4.7-8.2.3.7) ***AGREED UPON:*** *All codes should have the alignment of pallets specified*					
8.2.5 Step risers					
8.2.5 Requirements step riser	**802.5c** *nearly same intention*	**3.3.6.2** *same intention*	no requirement	**5.3.2** *same intention but not so detailed*	**8 step 4.2** Requirements step riser (except moving walk etc.)
4.8-8.2.5 *No comment*					

4.8 Belts

Table 11 — Belts

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
8.2.4 Belts					
8.2.4 Belts **8.2.4.1** Grooves in direction of movement required	**902.6 b** *same*	**3.6.2.1/ 3.6.2.2 Part 6** *different, non grooved surfaces are allowed*	no requirements	no requirements	**4.3.2 (13)** non grooved surfaces are allowed
4.8-8.2.4.1 ***FUNDAMENTAL DIFFERENCES:*** *AS 1735 and the Korean code permit non-grooved surfaces for moving walk belts. EN 115 and A 17.1 require grooves in belts in the direction of movement.*					
8.2.4.2 Width of grooves b_7 4.5 mm ≤ b_7 ≤ 7 mm	**902.6b** $b_7 \leq 6.3$ mm	**3.6.2.1 Part 6** $b_7 \leq 7.0$ mm	no requirements	no requirements	no requirements
4.8-8.2.4.2 *A 17.1, EN 115 and AS 1735 define the pitch and the width of the groove at the tread surface of the belt. All other codes have no requirements.*					
8.2.4.3 Depth of grooves $h_7 \geq 5$ mm	**902.6b** $h_7 \geq 4.8$ mm	**3.6.2.1 Part 6** $h_7 \geq 4.5$ mm	no requirements	no requirements	no requirements
8.2.4.4 Web width 4.5 mm ≤ b_8 ≤ 8 mm	**902.6b** $b_7 + b_8 \leq 13$ mm *pitch is relevant*	**3.6.2.1 Part 6** $b_7 + b_8 \leq 13$ mm	no requirements	no requirements	no requirements
8.2.4.5 Finished with edge cleats, requirement for splicing of the treadway belt	**902.6a** Splices **902.6b** Slots *same*	no requirement for splices same requirements **Part 6 3.6.3**	no requirements	no requirements	no requirements
8.2.4.6 Requirements edge-supported belt	requirements see (5.3) **902.9a(3)**	**3.6.7.3 Part 6**	no requirements	no requirements	

Table 11 (continued)

8.2.4.6.1.1 Belt 750N on plate 0.15 m x 0.25 m x 0.02 m deflection between the edge supporting rollers ≤ 0.01 z_1 **Fig.5**	requirements see (5.3) **902.9a.(2),(3)**	**3.6.7.3 a** *same, but force 68kgf*	no requirements	no requirements	no requirements
8.2.4.6.1.2 additional treadway supports along the centerline every ≤ 2 m	requirements (see 5.3) **902.9a (3)(b)** ≤ 1.83 m	**3.6.7.2 b Part 6** *same* **3.6.7.3 b Part 6**	no requirements	no requirements	no requirements
		3.6.7.3 b Belt_safety factor ≥ 10 Belt safety factor < 10 -> safety decking required			
4.8-8.2.4.6 ***Fundamental differences:*** *AS 1735 requires a safety factor of at least 10 for the belt. If the safety factor is less than 10, a safety decking is required. Safety decking means sheets of material rigidly fixed at a distance not more than 150 mm below the belt.*					

4.9 Combs and comb-plate

Table 12 — Combs and comb-plate

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
8.3.1 General					
8.3 Combs **8.3.1** General	**802.6a (1)** *same* **902.8a (1)**	**3.5.1** *same* **Part 6 3.5.1** *additional end plates for non grooved belts*	**JIS A4302 4.4.2 (7)** *same*	**5.4.1** *same*	
4.9-8.3.1 ***FUNDAMENTAL DIFFERENCES:*** *AS 1735 requires additional end plates for non-grooved belts.*					
8.3.2 Construction					
8.3.2.1 Mesh in of combs width of comb teeth ≥ 2.5 mm	**802.6a (2)** *same but no width of comb teeth* **902.8a (2)**	**3.5.2.1(c)** *same but no width of comb teeth* **3.5.2.1(g)** thickness ≥ 1.25 mm *AS 1735.5 (1996)*	**JIS A4302 4.4.2 (7)** *same but no width of comb teeth*	**5.4.4** *same intention, but no width*	no dimension
8.3.2.2 Radius of teeth end ≤ 2 mm	no requirement	no requirement	no requirement	no requirement	no requirement
8.3.2.3 Design angle of comb β ≤ 40°	no requirement	no requirement	no requirement	**Appendix 3** β ≤ 40°	no requirement
4.9-8.3.1, 8.3.2.1, 8.3.2.2, 8.3.2.3 ***AGREED UPON:*** *All standards describe the meshing of combs with the tread surface of steps, pallets and belts.* ***Comment:*** *A17.1 and AS 1735 require the points of the teeth always below the upper surface of the tread. The intent of EN 115 is exactly the same.* *EN 115 also describes the width, the radius of the teeth and the design angle of the combs.*					
8.3.2.4 Adjustment and replacement of combs	**802.6a (3)** *same* **902.8a (3)**	**3.5.2.1(a),(b) Part 6** *same*	no requirement	**5.4.4 / 5.4.2** *same*	no requirement

Table 12 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.9-8.3.2.4 ***AGREED UPON:*** *A comb/comb plate should be adjustable and the combs should be readily replaceable.*					
8.3.2.5 Rigidity of comb teeth	no requirement	**3.5.2.1(e) Part 6**_*different*	no requirement	no requirement	no requirement
4.9-8.3.2.5 ***FUNDAMENTAL DIFFERENCE:*** *AS 1735 requires a lateral rigidity of the comb tooth. Breakage shall occur when or before the end of one tooth has deflected to the point of touching the next straight tooth.* ***AGREED UPON****: The comb teeth should break before the step/pallet tread breaks.*					
8.3.2.6 Objects in area of combs, stopping escalator	no requirement	**6.13** Comb plate switch required	no requirement	**5.4.3** *same intention, but not so detailed*	**4.3.2 (19)** comb plate switch required
4.9-8.3.2.6 *EN 115, AS 1735, Russia and Korea have the same intention when they require a stop switch in case of objects trapped in step grooves. A 17.1 has no specific requirement.* ***FUNDAMENTAL DIFFERENCE:*** *AS 1735 defines a specific force and the direction of the force to operate the switch.*					
(8.3.2.7)	Load for comb section, comb plate and landing plate assemblies **802.6a (4)/ 902.8 a (4)**				
(4.9-8.3.2.7) ***FUNDAMENTAL DIFFERENCE:*** *A 17.1 requirements limit the deflection of the comb plate between combs and steps.*					
(8.3.2.8)	Visual distinction between comb and step **802.6b/ 902.8b**				
(4.9-8.3.2.8) ***FUNDAMENTAL DIFFERENCE:*** *A 17.1 requires a visual distinction between combs and steps.*					

Table 12 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
(8.3.2.9)	Adjacent floor surfaces; no abrupt change in elevation of more than 6.4 mm **802.6c/ 902.8c**				
(4.9-8.3.2.9) ***FUNDAMENTAL DIFFERENCE:*** *A 17.1 restricts the adjacent building floor levels in accordance to the landing plate levels.*					
(8.3.2.10)		**Part 6 3.5.2.2/ 3.5.5** entry and clearance requirements for flat belts			
(4.9-8.3.2.10) ***FUNDAMENTAL DIFFERENCE:*** *AS 1735.6 contains requirements for the belt entry points and requires clearances for flat belts.*					
(8.3.2.11)		**Part 6 3.5.3 /3.5.4** clearance for belt type and pallet type treadways			
(4.9-8.3.2.11) ***FUNDAMENTAL DIFFERENCE:*** *AS 1735.6 requires clearances for belt-and belt-pallet-type treadways.*					

4.10 Drives

Table 13 — Drives

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
9.1 Chain drive for the steps and pallets					
9.1 Chain drive for steps and pallets **9.1.1** Principle of steel step chains	**802.11/ 902.13** no cast iron	**3.7** *similar*	no requirement	no requirement	no requirements
4.10-9.1.1 *EN 115, AS 1735 and Korea require at least two steel step chains. A 17.1 excludes cast iron for step chains. Russia and Japan have no requirement.*					
9.1.2 Safety factor S ≥ 5 Static load	**802.10 (c)** S ≥ 10 machinery rated load **902.12 (c)**	**3.7** S ≥ 10 static load (breaking strength) minimum number of chains 2	**MOC-N (No. 1418-2000)** Safety factor at normal operation: - 7 (at installation) against breaking point – 4 (during use) against breaking point. Safety factor when safety device is actuated: - 2,5 (at installation) against breaking point – 2,5 (during use) against breaking point rated load + weight + pretension	**3.6 / 3.5** S ≥ 7 for traction and driving chains S ≥ 5 for steps and handrails **3.7** Breaking test requirements for chains	

Table 13 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.10-9.1.2 ***FUNDAMENTAL DIFFERENCES:*** *- EN 115 requires a static load (5000 N/m²) and a safety factor of 5.* *- A 17.1 requires a machinery load (2535 N/m², 2805 N/m² depending on width of the step) and a safety factor of 10 for power transmission members.* *- AS 1735 requires a static load - depending on the width of the step and the rise - with a safety factor of 10.* *- Korea and JIS require a static load (2700 N/m²) and a safety factor of 10.* *- Russia requires a maximum operational load - depending on width of the steps and speed (1000 mm, 0.5 m/s: 3200 N/m²) - with a safety factor of 7.*					
9.1.3 Tensioning of step chain	no requirement **802.7** for counter weight tensioning	no requirement	no requirement	**5.3.3** *only general* **5.5.1**	
4.10-9.1.3 *EN 115 requires a tensioning device for the step chain system; tension springs are prohibited. Russia requires a tensioning device.* ***FUNDAMENTAL DIFFERENCE:*** *AS 1735, JIS and Korea have no specific requirement. A 17.1 has no requirement for an automatic tensioning device.*					
9.2 Drum drive for the belt					
9.2.1 drum drive for belt safety factor incl. splicing ≥ 5	**902.12 (e)** safety factor ≥ 5 different load **902.10b**	**Part 6 2.6.2** load rating **2.7** *different safety factors* belt safety ≥ 5; without safety decking ≥ 10 **3.6.7.5**	**MOC-N (No. 1418-2000)** Safety factor at normal operation: - 7 (at installation) against breaking point – 4 (during use) against breaking point. Safety factor when safety device is actuated: - 4 (at installation) against breaking point – 2,5 (during use) against breaking point rated load + weight + pretension		

Table 13 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.10-9.2.1 ***FUNDAMENTAL DIFFERENCES:*** *Only AS 1735 deals with a safety deck and a slider bed.*					
9.2.2 Tensioning of belt					
4.10-9.2.2 *EN 115 requires a tensioning device for b elts; tension springs are prohibited.* ***FUNDAMENTAL DIFFERENCES:*** *A.17.1, JIS, Russia and Korea have no specific requirement.* ***AGREED UPON:*** *Belts shall be tensioned continuously and automatically.*					
9.3 Other methods of driving steps, pallets or belts					
9.3 Alternative methods of driving steps	no requirements (not usual in ASME procedures) **902.15** V-Belt Drives	no requirement	no requirement	no requirement	no requirement
4.10-9.3 ***AGREED UPON****: step chain tensioning devices are not used in modular escalators and some moving walk types. A safety code should not restrict the design of a step chain driving system.*					
(9.4) Lubrication		**5.16** Routine lubrication			
(4.10-9.4) ***AGREED UPON:*** *Where routine lubrication is required, it should be possible without removing steps or pallets.*					

4.11 Angle of inclination and guiding of the steps, pallets and belt

Table 14 — Angle of inclination and guiding of the steps, pallets and belt

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
10.1 Angle of inclination and position of the steps					
10.1.1 Angle of inclination $\alpha \leq 30° \alpha \leq 35°$, if rise ≤ 6 m and $v \leq 0.5$ m/s Moving walks: $\alpha \leq 12°$ (Ref. 10.1.5)	**802.1** $\alpha \leq 30°$ **902.1** $\alpha \leq 12°$ moving walks upper and lower landing $\alpha \leq 3°$ within 900 mm	**2.3** $\alpha \leq 30°$ escalator $\alpha \leq 12°$ moving walks	**BSLJ-EO Art.129-12 1.(2)** $\alpha \leq 30°$ **BSLJ-EO; Art. 12942 EXP. 1 (2)** $\alpha \leq 35°$, if rise ≤ 6 m and $v \leq 0{,}5$ m/s and $y_1 \geq 35$ cm and minimum 2 flat steps **(MOC-N (No.1413-2000) 2-1).** Moving walks: $\alpha \leq 15°$ **(MOC-N (No.1417-2000) 2).** **MOC-N(No.1413-2000);2** (1) $\alpha \leq 35°$, if rise ≤ 6 m and $v \leq 0.5$ m/s (2) Moving walks: $\alpha \leq 4°$ if step width $1{,}1 < z_1 \leq 1{,}6$ m (3) Moving walks of which speed varies in halfway of travel:	**Appendix 3** $\alpha \leq 35°$ floor escalators $\alpha \leq 30°$ tunnel escalators	**3.3.1 (2)** $\alpha \leq 35°$ if rise $\leq 6°$ $\alpha \leq 30°$ *same as EN with speed limitations* Moving walks: pallet: $\alpha \leq 12°$ belt: $\alpha \leq 15°$

Table 14 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
			$\alpha \leq 4°$ at the position where the speed of step varies $\alpha \leq 8°$ at other points.		
4.11-10.1.1: ***- Escalators:*** *All codes except PUBEE, EN 115 and Korea specify an angle of inclination less or equal to 30°. PUBEE, EN 115 and Korea permit an angle up to 35° under special conditions (EN 115 / Korea: rise max. 6 m, speed max. 0,5 m/s).* ***- Moving walks:*** ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 does not permit the incline of the entrance or exit of moving walks to exceed an angle of 3° within 900 mm. AS 1735.6 requires transitions in upper and lower landings depending on the speed of the moving walk.* ***Historical background:*** *EN 115 permits inclined moving walks in order to support the use of trolleys (see 3.2-0.5.3).*					
10.1.2 Step tread horizontally	**802.5a (3)** *same*	**3.6.5** *same, additional secure foothold*	no requirement	**5.5.2** *nearly the same* but slope 1 : 100	no requirement
4.11-10.1.2 ***AGREED UPON: All steps treads should remain sensibly horizontal in the usable area.***					
10.1.3 Horizontal step movement 0.8 m with max 4 mm difference in level if v > 0.5 m/s or rise > 6.0 m => 1.2 m	**802.6e** Minimum 2 flat steps Maximum 4 flat steps without difference in level **902.9 (a)(4)**	**3.6.7 / fig. 3.6.7** Horizontal step movement depends on escalator speed; max 3mm difference in level 0.45 m/s: 400 mm 0.65 m/s: 530 mm 0.75 m/s: 1200 mm *different*	no requirement	**5.5.2 / Appendix 3** *same as EN* additional if v>0.50 m/s and rise >6.0 m => 1200 mm for tunnel escalator if v= 0.5 m/s and H ≤ 6 m => EN 115	**3.3.1 (8)**Horizontal step movement 0.8 m with max 4 mm difference in level; if v > 0.50 m/s or rise > 6.0 m then 1.2 m

Table 14 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.11-10.1.3 ***AGREED UPON:*** *Horizontal step movement ('flat step'): A distance 400 mm beyond the comb shall be flat at all times. Where the rated speed is in excess of 0,5 m/s or the rise is in excess of 6 m, this distance shall be 800 mm.* ***FUNDAMENTAL DIFFERENCES:*** *- EN 115 / AS 1735 and PUBEE allow a tolerance in vertical height between two consecutive steps* *- EN 115 and PUBEE require to enlarge horizontal sections for rises above 6 m and speeds above 0,5 m/s.* *- AS 1735 requires to enlarge the horizontal section depending on the speed of the escalator* *- Japanese and Korean codes have no specific requirement.*					
10.1.4 Radius of curvature upper landing: if v ≤ 0.5m/s=> r ≥ 1 m if v>0.5 => r ≥ 1.5 m lower landing: r ≥ 1 m	no requirement	no requirement	no requirement	no requirement	**3.3.1 (9)** Radius of curvature upper landing: if v ≤ 30 m/min => r ≥ 1m; if v > 30 m/min => r ≥ 1.5 m lower landing: r ≥ 1 m
4.11-10.1.4 ***Fundamental differences:*** *EN 115 defines a track radius for both the upper and lower transition from incline to horizontal. The reason behind is the (ergonomic, comfort) horizontal acceleration of the passenger. Japan and A 17.1 have no specific requirement. PUBEE defines the vertical distance of the consecutive step after horizontal section.*					
10.1.5 Radius of curvature for belt moving walks r ≥ 0.4 m					**3.3.1 (9)** Radius of curvature for belt moving walks r ≥ 0.4 m

Table 14 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.11.10.1.5 *No comment.*					
10.1.6 For moving walks >6° Upper landing: ≥ 0.4 m at max. angle of 6° before entering or leaving the comb	**902.1** $\alpha \leq 3°$ within 900 mm of the entrance and exits	**Part 6** **2.4** reduced slopes for not less than 400 mm from the comb plate speed dependant see **fig.2.4**			

Table 14 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.11-10.1.6 ***Fundamental differences:*** *A 17.1 does not permit the incline of the entrance or exit of moving walks to exceed an angle of 3° within 900 mm. AS 1735.6 requires transitions in upper and lower landings depending on the speed of the moving walk. EN 115 requires a transition in the upper landing.*					
10.2 Guiding of steps, pallets and belt					
10.2.1 Guiding of steps if step chain breaks	**802.8** *nearly the same*	**3.8** step wheel track *nearly the same* **Part 6 3.6.7.5** *Special requirements for guiding of belts* *Ref. 8.2.4.6.1.2.*	no requirement	**2.9** *nearly the same*	no requirement
(10.2.1.1)	**B44: 8.3.5.1.3** additional requirement				
(4.11-10.2.1.1) ***FUNDAMENTAL DIFFERENCES :*** *A limitation of displacement of steps in the guiding system is required by EN 115 in the useable area.* *A 17.1, AS 1735, PUBEE and B 44 define that the displacement of steps shall be controlled throughout the system.* *B 44 defines tolerances to limit the vertical movement of steps.*					
10.2.2 Guiding of steps in the area of combs see 11.3 / 11.4	**802.6a (2),(3),(4)** **902.8 (a)(2)**	no requirement	no requirement	**5.4.4** *same intention*	no requirement
4.11-10.2.2 *see comments 4.11-11.3 and 4.11-11.4* ***AGREED UPON:*** *The intent of the device is the same for EN 115, AS 1735 and A 17.1.* ***Comment:*** *A 17.1 requires the sections forming the comb teeth be readily replaceable.*					

4.12 Clearances between steps or pallets and between steps, pallets or belt and skirting

Table 15 — Clearances between steps or pallets and between steps, pallets or belt and skirting

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
11.1 Clearance between steps or pallets					
11.1 Clearance between steps or pallets ≤ 6mm **fig.1 and fig.4** Transition curves of moving walks max.8 mm	**802.5c** but no numerical dimension *different* **B44:** 6 mm on horizontal run	**3.6.4** ≤ 5 mm *AS 1735.5 (1996)* **Part 6 3.6.6.1** ≤ 5 mm	**MOC-N (No.1413-2000); 2** **(3)** Moving walks of which speed varies in halfway of travel: ≤ 5 mm **MOC-N (No.1417-2000) 1 (2) and EXP.1 (2)** ≤ 5 mm **JIS A4302-1992; 4.4.2** about 2 mm -5 mm *general requirement*	**Appendix 3** ≤ 6 mm in operation ≤ 10 mm	**4.3.2 (11)** 2-5 mm *general requirem.*
4.12-11.1:*EN 115, AS 1735, JIS, PUBEE, Korea and B 44 require in detail clearances between steps.* *PUBEE requires different figures for new escalators and those already in operation. A 17.1 require no specific dimensions but the meshing of adjacent steps.* ***AGREED UPON: The clearance between steps or pallets. when measured on the horizontal. should be 6 mm maximum.***					
11.2 Clearance between steps, pallets or belt and skirting					
11.2.1 Clearance between steps and skirting ≤ 4 mm at either side, but max 7 mm for sum	**802.3e** ≤ 4.8 mm at either side **B44:** ≤ 5mm at either side, but max 6 mm for sum **902.3f** ≤ 6.4 mm	**3.3.4** ≤ 4mm at either side, but max 7mm for sum *AS 1735.5 (1996)* **Part 6 3.3.4**	**MOC-N (1417-2000),1 (1) and EXP. 1 (1))** ≤ 5 mm **JIS A4302-1992; 4.4.2** about 2 mm -5 mm at either side	**Appendix 3** ≤ 6 mm at either side but 10 mm for sum in operation: ≤ 10 mm at either side but 16 mm for sum	**4.3.2 (11)** one side : ≤ 4 mm both side : ≤ 7 mm

Table 15 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.12-11.2.1 ***FUNDAMENTAL DIFFERENCES**: EN 115 / AS 1735 and Russia require a maximum distance at each side and a maximum for the sum of both sides. A 17.1, JIS and Korea require a maximum distance at each side. Russia requires different figures for both new escalators and those already in operation.*					
11.2.2 Skirting above tread surface (moving walks) clearance between tread surface and underside of the skirting ≤ 4 mm	**902.3e** ≤ 6.4 mm	**3.3.4** ≤ 3.5 mm	**MOC-N (1417-2000), EXP. 1 (1))** ≤ 5 mm	no requirement	no requirement
4.12-11.2.2 ***AGREED UPON:** The definition and requirement of clearance between steps, pallets, belts and skirting is necessary. The real value shall be determined by a risk analysis.* *NOTE: Without step formation there is a different risk to be considered* ***FUNDAMENTAL DIFFERENCE:** EN 115 does not permit oscillating motion of pallets/ belts in lateral direction if this causes a gap..*					
11.3 Mesh depth of the combs into the grooves of the step or pallet tread					
11.3 Mesh depth of combs (step or pallet) $h_8 \geq 6$ mm ; $h_6 \leq 4$ mm **fig.1 detail X**	**802.6a (2),(4)** comb teeth below upper surface of treads *different* **902.8a (2)**	**3.5.2 (d),(f) / fig.3.5.2** 4 mm ≥ h_7 - h_8 ≥ 2.5 mm 4 mm ≥ h_6 ≥ 2.5 mm wear tolerance ≤ 6 mm *(d) different* **Part 6 3.5.4** 4 mm ≥ h_7 - h_8 ≥ 2.5 mm	no requirement	**Appendix 3** 8mm ≥ h_7 -h_8 ≥ 2 mm	**4.3.2 (8)** Mesh depth of combs (step or pallet) $h_8 \geq 6$ mm; $h_6 \leq 4$ mm
4.12-11.3 ***FUNDAMENTAL DIFFERENCE:** A 17.1 has a performance requirement for the mesh depth of combs. AS 1735/EN 115/JIS and Russia are using design requirements. The intend is totally in line with the A 17.1 requirement. AS 1735 defines a distance between the bottom of the cleat groove and comb tooth ($h_7 – h_8$). In addition, it gives a tolerance for the wear of combs.*					

Table 15 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
11.4 Mesh depth of the combs into the grooves of the belt					
11.4 Mesh depth of combs (belt) $h_8 \geq 4$ mm ; $h_6 \leq 4$ mm **fig.1 detail X**	no requirement **902.8a (2)**	**Part 6 3.5.3** $h_8 \geq$ 0.6 * grooved depth $h_6 \leq 5$ mm $h_7 - h_8 \leq 5$ mm **3.5.5** flat belt ≤ 2mm clearance above treadway	no requirement	no requirement	**4.3.2 (8)** Mesh depth of combs(belt) (belt: $h_8 \geq 4$mm)
4.12-11.4 ***FUNDAMENTAL DIFFERENCE:*** *AS 1735.6 defines and specifies requirements for the positioning and clearances of end plates relative to flat belts.*					

4.13 Driving machine and breaking system

Table 16 — Driving machine and breaking system

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.1 General					
12.1 At least one machine per escalator	**804.2/ 904.2** *same*	**5.4** *same*	no requirement	no requirement	no requirement
4.13-12.1 ***AGREED UPON:*** *A driving machine shall not operate more than one escalator or moving walk.*					
12.2 Speed					
12.2.1 Speed of escalators v ≤ 0.75 m/s up to 30° v ≤ 0.5 m/s (30° up to 35°)	**803.1** v ≤ 0.64 m/s	**2.4** v ≤ 0.75 m/s	**BSLJ-EO Art. 129-12 1.(5) and** **MOC-N (No.1417-2000); EXP. 2.(1) &(2) and** **MOC-N (No.1413-2000); EXP. 2.(1)** v ≤ 45 m/min (0,75 m/s) up to 30°) v ≤ 30 m/min (0,5 m/s) 30°up to 35°)	**Appendix 2** v ≤ 0.75 m/s operational speed v ≤ 0.04 m/s repair speed *different*	**3.3.1 (4)** Escalator : v ≤ 30 m/min; v ≤ 40 m/min if α ≤ 30° rise ≤ 6m the number of the horizontally steps ≥ 3
4.13-12.2.1 *The limitation of the speeds are different* ***FUNDAMENTAL DIFFERENCE:****. In EN 115 and the Korean Code the maximum speed is related to the angle of inclination. Russia is the only one defining a repair speed.*					
12.2.2 v ≤ 0.75 m/s (speed of moving walks)	**903.1** 0° - 8° : v ≤ 180 ft/min (0.914 m/s) 8° - 12° : v ≤ 140 ft/min (0.711 m/s)	**2.4** v ≤ 0.9 m/s and **Fig. 2.4 ; Curve A and B** exception: if reduced slope at entrance and exit for ≥ 400mm	**MOC-N /No.1417-20001); EXP 2 (1) and (2)** ≤ 8° : v ≤ 50 m/min (0,833m/s) > 8° : v ≤ 45 m/min (0,75 m/s)	obsolete	**3.3.1 (4)** α > 8° , v ≤ 40 m/min α ≤ 8° , v ≤ 50 m/min

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Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.2.2.1 exception: v ≤ 0.9 m/s, if pallet width ≤ 1.1 m and horizontal pallet movement ≥1.6 m		**Part 6 2.4; Fig 2.4**			
4.13-12.2.2.1 *All codes define a correlation between speed, treadway width and angle of inclination of moving walks.*					
12.2.2.2 For accelerating moving walks not defined	no requirement	**8.3** For accelerating moving walks special requirements	**MOC-N (No. 1413-2000); 2 (3)** Moving walks of which speed varies in halfway of travel v ≤ 50 m/min (0.833 m/s) at entrance and exit	obsolete	no requirement
4.13-12.2.2.2 *The interim standard AS 1735.6 (8.3) contains several requirements related to the speed of accelerating moving walks.* ***AGREED UPON*** *for both 4.10-12.2.2.1 and 4.10-12.2.2.2:* *There is a correlation between speed and the safe use of an escalator/moving walk. The higher the speed the higher the incidence of falls. It is also a known fact that carrying capacity does not increase commensurate with increases in speed.*					
12.2.3 Deviation of speed ± 5% no load condition	no requirement	**2.5** +5%	no requirement	**Appendix 2** ± 5% no load condition	**4.3.1 (4)** no load; v = 125% or less than rated speed
4.13-12.2.3 ***FUNDAMENTAL DIFFERENCE:*** *A 17.1 and Japan have no requirement. The tolerance is not used in A 17.1 because of the requirement "not to exceed the maximum rated speed (0,64 m/s)". A 17.1 means that the maximum rated speed is absolutely limited with this value (0,64 m/s) under full load.* *EN 115 and Russia mention tolerances of ± 5 %, that means for EN 115 a maximum nominal speed of 0,75 m/s ± 5 % under no load condition.* *Korean permits a tolerance of + 25 % under no load condition; AS 1735 permits + 5 % under no load condition.*					

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.3 Link between operational brake and step, pallet or belt drive according to clause 9					
12.3.1 Possibilities of connection between operational brake and main drive Auxiliary brake required if friction drive elements	**804.1** *same, but without driving belts* **904.1** **804.3a(5)** **904.3a(5)** **805.3j/ 905.3h** Disconnected motor safety device	**5.3** Connection between driving machine and main drive nearly the same, but „driving “machine“ instead of operational brake“ Chains or belt drive => auxiliary brake **6.9** Broken input drive chain or V-belt device	no requirement	no requirement	no requirement
4.13-12.3.1 ***Fundamental differences:*** *EN 115 permits a friction drive between operational brake and the step/pallet or belt drive with an additional auxiliary brake. A 17.1/ AS 1735 do not allow a friction drive between operational brake and the step/pallet or belt drive.* *A main drive shaft brake (A 17.1)/ auxiliary brake (EN 115)/ additional brake (AS 1735) is not required in EN 115 for multiplex chains and more than one independent chain drive.* *A 17.1/ AS 1735 require a brake on the main drive shaft for all escalators with a chain between machine and main drive.* ***Agreed upon:*** *If a friction connection is used between the motor and the gear, a disconnected motor safety device is required.*					
(12.3.1.1)	**902.14**				
(12.3.1.2)	**902.15**				
12.3.2 Safety factor of driving elements	**802.10** **902.12** Design factors of safety	**5.2** driving machine parts depends on material; chain and chain wheels S = 10 *different*	**MOC-N (No. 1418-2000)** Safety factor at normal operation: - 7 (at installation) against breaking point – 4 (during use) against breaking point.	**3.6** S ≥ 7 for traction and driving chains S ≥ 5 for steps and handrail	

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
			Safety factor when safety device is actuated: - 2,5 (at installation) against breaking point – 2,5 (during use) against breaking point		no comment

4.13-12.3.2

FUNDAMENTAL DIFFERENCES:

- EN 115 uses a passenger load of 5000 N/m^2 and a safety factor of 5 for driving elements;

- in combination with the formula used for machinery rated load, A 17.1 requires a safety factor of 10 for power transmission members and of 8 respectively 10 depending on the material used;

- AS 1735 uses a formula with rated load for the design of driving machine parts depending on the material; for chains and chain wheels a safety factor of 10 is required;

- Japan requires a safety factor of 10 under live load condition;

- Russia requires a safety factor of at least 7 for traction and driving parts.

AGREED UPON: *When employing the same criteria for the basis of the load rating, the safety factors for the machine and transmission elements are practically the same from code to code.*

Rated load in N/m of length			
Step width	**600 mm**	**800 mm**	**1000 mm**
1.1.1.1.1 EN 115	3000 N/m	4000 N/m	5000 N/m
A 17.1 (Structural)	2202 N/m	2753 N/m	3304 N/m
A 17.1 (Machinery)	1675 N/m	2095 N/m	2514 N/m

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.4 Braking system					
12.4.1 General requirements	**804.3a** Brake **904.3a**	**5.5.1** Brake progressively stopping by mechanical means *different* **Part 6 5.5.1/ 5.5.3**	Braking s ystem **BSLJ-EO Art 129-12 4, 5**	Braking system **5.2.1** deceleration defined *different* **3.12** double braking torque margin with max. passenger load **3.14** Margin of braking torque	**3.3.2.(6)** Brake
4.13-12.4 ***FUNDAMENTAL DIFFERENCES:*** *EN 115, the Japanese, Russian and Korean codes describe the braking system. A 17.1 and AS 1735 contain more detailed brake requirements.*					
12.4.1.1 Automatically operation (brake); loss of supply or loss of control voltage	**804.3a(2), 904.3a(2)** for brake the same different for braking system	**5.5.3** failure of power or safety device operation *similar*	**MOC-N (No. 1424-2000); 1 (1) and (2)**	**5.2.3 /3.13** *only a little bit different*	**3.3.2 (6)** Automatically operation ; loss of supply
4.13-12.4.1.1: *EN 115, A 17.1, AS 1735 and Japan address the loss of power and the function of the safety devices.*					
12.4.1.2 Type of operational brake	**804.3a** electrically released and mechanically or magnetically applied *different , no alternative*	**5.5.1** electrically released and mechanically applied *different , no alternative*	**MOC-N (No. 1424-2000); 1 (1) and (2)**	**5.2.2/5.2.1** service brake on entry shaft *different*	
4.13-12.4.1.2 ***FUNDAMENTAL DIFFERENCES:*** *- EN 115 permits types of brake other than electromechanical;* *- A 17.1 requires an electrically released brake mechanically or magnetically (permanent magnet) applied. The main drive shaft brake cannot be used to supplement the driving machine brake;* *- AS 1735, Japan and Korea require an electrically released brake mechanically applied;* *- the Russian code requires two service brakes and an emergency brake.* ***AGREED UPON:*** *The actuation of any safety device shall result in the stopping of the escalator/ moving walk.*					

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.4.2 Electro-mechanical brake					
12.4.2 Function of electro-mechanical brake	**804.3a(1), 804.3a(2), 904.3a(1) and (2)**	**5.5.1 / 7.7.1** single failure *different in detail*	**BSLJ-EO Art.129-11 2.(1)** **MOC-N (No.1110-1981) 2.** **BSLJ-EO; Art. 129-12, 5**	**5.2.2** *not such specific requirements*	no comment
4.13-12.4.2 ***FUNDAMENTAL DIFFERENCES:*** *- AS 1735, Japan and Korea do not address the immediate operation of the brake after the electric circuit is open (EN 115, A 17.1);* *- A 17.1 does not address the requirement for two independent electrical devices needing to release to permit the escalator to re-start (A 17.1 intends to address this in the 2000 edition).*					
12.4.3 Brakes released by hand	no requirement	not mentioned	no requirement	no requirement	no requirement
4.13-12.4.3 ***Agreed upon:*** *Brakes which can be released by hand shall require a continuous manual pressure to keep them open.*					
12.4.4 Brake load and stopping distances for operational brake					
12.4.4.1 Brake load per step (escalators) Width up to 0,6 m 60 kg >0.6m up to 0,8 m 90 kg >0.8m up to 1,1 m 120 kg	**802.9c** With escalator stopped ***Annex** → Tabulation of brake load Brake rated load (kg)= $0,27(W+203)B_1$ With escalator running Brake rated load (kg) = $0,21(W+203)B_1$ *different*	**2.6** Rated load = 0,27WA *different*	not mentioned	**Annex 4** Brake rated load 2000 x (2,1-V) x B	no requirement

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.13-12.4.4.1 ***FUNDAMENTAL DIFFERENCES:*** *EN 115 defines brake load per step, A 17.1 defines dynamic and static loads, AS 1735 defines a rated load. Japan and Korea have no specific brake load requirement.* **Escalator brake loads EN 115/ A 17.1 in kg** **Step width** / **600 mm** / **800 mm** / **1000 mm** **1.1.1.1.2 EN 115** / 295 x H / 443 x H / 591 x H **A 17.1 Static Load** / 376 x H / 469 x H / 563 x H **A 17.1 Dynamic Load** / 292 x H / 365 x H / 438 x H H means rise in m					
12.4.4.2 Stopping distances (escalators) (unloaded and downward moving loaded escalators) v = 0,5 m/s => min 0,2m and max 1,0 m v = 0,65 m/s => min 0,3m and max 1,3 m v = 0,75 m/s => min 0,35 m and max 1,5 m	**804.3a (3)** max deceleration 0,91 m/s^2 stopping in down direction *different*	**5.5.3** Brake deceleration of not more than 1,25 m/s^2 (average) *different*	**JIS A4302 4.4.1(3)** 0,1m – 0,6m ≤ 0,5 m/s **BSLJ-EO; Art. 129-12 5** deceleration rate ≤ 1,25 m/s^2 **MOC-N (No. 1424-2000); 1 (3)**	no requirement	**4.3.1(3)** 0,1m – 0,6 m
4.13-12.4.4.2 ***FUNDAMENTAL DIFFERENCES:*** *- A 17.1 and AS 1735 require a limit of the deceleration value for the braking action;* *- EN 115 requires a stopping distance related to the speed.* ***AGREED UPON:*** *The deceleration profile to stop an escalator/moving walk without causing people to fall needs to be defined.* ***FUNDAMENTAL DIFFERENCES:*** *Japan and Korea require a stopping distance for the unloaded escalator in upwards direction.*					

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Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.4.4.3 Brake load (moving walks) Width up to 0,6m 50 kg >0,6m up to 0,8m 75 kg >0,8m up to 1,1m 100 kg greater width: 25 kg per 0,4 m length for each additional 0,3 m width	**902.10c** With moving walk stopped Brake rated load (kg)= 0,49(W)C_1 With moving walk running Brake rated load (kg) = 0,37(W)C_1 *different*	**2.6** Rated load = 0,27WA *different*	no requirement	no requirement	no requirement
12.4.4.4 Stopping distances (moving walks) (unloaded and horizontally or downward moving loaded moving walks) v = 0,5 m/s => min 0,2m and max 1,0 m v = 0,65 m/s => min 0,3m and max 1,3 m v = 0,75 m/s => min 0,35 m and max 1,5 m v = 0,9 m/s => min 0,40 m and max 1,7m	**904.3a (3)** max deceleration 0,91 m/s^2 stopping in horizontal or down direction *different*	**5.5.3** Brake deceleration of not more than 1,25 m/s^2 *different*	0,1m – 0,6 m ≤ 0,5 m/s **BSLJ-EO;** **Art. 129-125** deceleration rate ≤ 1,25 m/s^2 **MOC-N** **(No 1424 2000); 1 (3)**	no requirement	**4.3.1(3)** 0,1 m – 0,6 m
4.13-12.4.4.3/4 *- AS 1735 requires no brake for moving walks with an inclination £ 4°, providing the drive is self-sustaining and a pre-determined deceleration rate between 0,2 and 2m/s² pertains;* *- Japan addresses no requirement for the braking distance or deceleration of moving walks;* *- A 17.1 and AS 1735 (> 4°) require a brake load and a maximum deceleration rate;* *- EN 115 requires a brake load and a stopping distance related to the speed of the moving walk.*					

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.5 Protection against risk of over speed and unintentional reversal of the direction of travel					
12.5.1 Over speed; stop before 1,2 times of rated speed not required for AC-motors with non friction connections and slip not exceeding 10%	**805.1c** stop before 1,4 times of rated speed / speed governor **905.1c** stop before 1,2 times of rated speed / speed governor	**6.5** stop before 1,3 times of rated speed; not required for AC-motors with < 5% slip (direct couplings or chains)	no requirement	**5.2.6** stop before 1,3 times of rated speed	no requirement
4.13-12.5.1 ***FUNDAMENTAL DIFFERENCES:*** *There is no requirement for over speed protection in the Japanese and Korean codes.* ***AGREED UPON:*** *Escalators and moving walks employing AC-induction motors with limited slip and not employing a frequency converter do not require an over speed governor.*					
12.5.2 Reversal of travel Automatically stop	**805.1j/ 905.1i** automatically stop *same*	**6.14** Interruption of power to motor and brake if direction reversed whilst travelling in up direction *same*	no requirement	**5.2.6** Reversal of travel – automatically stop	
4.13-12.5.2 ***FUNDAMENTAL DIFFERENCES:*** *The Japanese code has no specific requirement due to reversal of travel of the step/pallet band.* ***AGREED UPON:*** *The reversal of travel shall be prevented by a safety device.*					
12.6 Auxiliary brake for the non-friction part of the driving system for steps and pallets or belts					
12.6.1 Auxiliary brake >6m required and two other items	**804.3b** required if driving machine brake is separated from main drive shaft by a chain *different* **904.3b** like above	**5.5.2** required if driving machine brake is separated from main drive shaft by a chain *different*	**MOC-N (No. 1424-2000) EXP. 2** not directly required if driving machine brake is separated from main drive shaft by a chain *different*	**5.2.5** emergency brake is always required *different*	
4.13-12.6.1 *A 17.1, AS 1735, Japan, Russia and Korea require a main drive shaft brake when a chain is used to connect the main drive shaft to the machine. EN 115 does not require an additional brake to the machine brake for a rise up to 6 m and the use of multiplex chains or gears.*					

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.6.2 Deceleration (auxiliary brake) Escalators are brought to rest by effective retardation	**804.3b** ≤ 0,91 m/s^2 **904.3b**	**5.5.2** gradual stop for loaded conditions with an empty escalator the emergency brake could give an abrupt stop	no requirement	**5.2.7** braking distance defined by designer **5.2.8 / Appendix 2** ≤ 2 m/s^2 with increasing moment ≤ 1 m/s^2 with constant moment	no requirement
4.13-12.6.2 *(see 12.4.4.2)**: EN 115 requires effective retardation, AS 1735 a gradual stop and Korea asks for quantification of a safe stop.*** ***AGREED UPON**: Safe stopping shall be defined precisely: The deceleration needs clarification.*					
12.6.3 mechanical (friction) type	**804.3b/ 904.3b** mechanical or magnetically applied *different*	**5.5.2** does not have to be the electrically released type *different*	no requirement	no requirement	no requirement
4.13-12.6.3 ***FUNDAMENTAL DIFFERENCES:** A 17.1 permits ceramic permanent magnet brake application..*					
12.6.4 Conditions for application of the auxiliary brake - ≥ 1,4 times of rated speed - reversal of travel	**804.3b/ 904.3b** breakage of main drive chain *different*	**5.5.2** breakage of main drive chain *different*	no requirement	**5.2.6** - ≥ 1,3 times the rated speed - reversal of travel	
4.13-12.6.4 ***FUNDAMENTAL DIFFERENCES:** Both EN 115 and Russia require either an overspeed or a reversal of travel condition to apply the auxiliary brake.*					
12.6.5 Operation of auxiliary brake together with operational brake	**804.3b/ 904.3b** *not allowed*	no requirement	no requirement	no requirement	no requirement

Table 16 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
12.6.6 Stopping distances of auxiliary brake (12.4.4)	**804.3b/ 904.3b** max. deceleration	**5.5.2** *note: unit may stop abruptly*	no requirement		no requirement
4.13-12.6.5/6 ***AGREED UPON:*** *Auxiliary brake/main drive shaft brak e and the machine brake should not simultaneously decelerate the escalator/moving walk step/ pallet band.*					
12.7 Hand winding device					
12.7 Information about hand winding device	no requirement	**5.14** hand winding facilities required in all cases *mandatory*	no requirement	no requirement	no requirement
4.13-12.7 ***FUNDAMENTAL DIFFERENCES:*** *An emergency operation facility is mandatory required in AS 1735. EN 115 gives some information if a hand winding device is provided.*					
12.8 Stopping the machine and checking its stopped position					
12.8 Manner of stopping the machine and checking its stopped condition	requirements in revision	**7.7.1** different; Intent is the same "one fault shall not prevent the unit from stopping“	no requirement	no requirement	no requirement
4.13-12.8 *A 17.1 has similar requirements like EN 115. Further revisions are in process for the 2000 edition of A 17.1.* ***AGREED UPON:*** *There should be a redundancy in the safety circuit of the escalator/ moving walk drive. The integrity should be checked before the escalator/moving walk is permitted to start.*					
12.9 Protection in driving stations and/ or return stations					
12.9 Requirements for protection in driving and return stations	no requirements in A17.1, but see **OSHA** **B44 -** Requirements	**3.2.2.2** barrier between abutting parallel trusses *not comparable*	no requirement	**2.15** same	no requirement
4.13-12.9 ***AGREED UPON:*** *Effective protection shall be provided for all moving parts accessible when the escalator/ moving walk is running.* ***Comment:*** *This issue is addressed by other codes and laws as well (see A 17.1, AS 1735) depending on the legal situation.*					

4.14 Electrical devices

NOTE Electrical items generally used throughout industry, e. g. contactors and wiring material, are not compared. Special escalator and moving walk requirements for such electrical items will be explained.

Table 17 — Electrical devices

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
13.1 General					
Clause 13 Electric Reference CENELEC *not compared!*	*not compared!* **Reference NFPA70; CSA B44.1/ ASME A 17.5** **for Canada see CSA 22.1**	*not compared!* **Reference AS 3000**	*not compared!* **Reference JEAC 8001-1995; JIS A 4302-1992**	*not compared!*	
4.14-13.1 ***AGREED UPON:*** *The electric installation of escalators and moving walks shall be so designed and manufactured as to ensure protection against hazards arising from the electrical equipment.* *(The index shall make the following references: EN 115 (CENELEC), A 17.1 (NFPA 70; CSA B44/ ASME A 17.5), AS 1735 (AS 3000), Korea (MITI No. 411-70 (1993.9.3)), Japan (JEAC 8001-1995/JIS A 4302-1992).)* ***4.14-13.1.1.1*** *Scope and limits of applications of the electrical equipment are defined in EN 115. The escalator or moving walk shall be considered as a whole.* *AS 1735 is not specifically mentioning this scope. A 17.1 (NEC) defines the scope based on how the electrical equipment is listed and labelled. A 17.5 defines how the equipment is tested and labelled.* ***4.14-13.1.1.2*** ***AGREED UPON:*** *For each escalator and moving walk an input voltage limitation has to be defined.* *4.14-13.1.2 A 17.1 deals with that item in NFPA 70, Rule 620-71. AS 1735 refers to clause 26.14 of AS 1735.2.* ***AGREED UPON:*** *A protection against direct contact is required.* ***4.14-13.1.3*** ***AGREED UPON:*** *The insulation for conductors should be resistant against electrical shock.* *A 17.1 and NFPA 70 address fire retardation as well.* ***4.14-13.1.4*** *The intent of EN 115 and NFPA 70, Rule 620.3 is the same for control and safety circuits. Compared with the before mentioned, AS 1735 has the same requirements for safety circuits but it is different for control circuits. Japan, Russia and Korea have no requirements.*					

Table 17 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.14-13.1.5					
AGREED UPON *The intent of the earthing requirements is the same for all codes including their references.*					
4.14-13.2 *(Contactors)**: The comparison of standard electrical equipment for escalators and elevators (lifts) is part of the ISO/TC 178/WG 8 tasks.*					
There are specific requirements for escalators/ moving walks related to the categories of the main contactors in EN 115 (for inching purposes).					
4.14-13.3 *(Protection of motors)*					
AGREED UPON: *Motors for escalators and moving walks should be equipped with an overload protection and short circuit protection.*					
4.14-13.3.1 *The USA National Electrical Code, NFPA 70, Rule 620-61 (c) and (d) requires in addition motor feeder and motor branch circuit short circuit and ground fault protection. Rule 620-62 requires selective co-ordination of the over-current devices in the disconnecting means with any other supply side over-current devices.*					
4.14-13.3.2 *AS 1735, EN 115, Japan and NFPA 70 require overload protection.*					
4.14-13.3.3/4 *The reset cycle of an overload device and the re-start of an escalator after such an event is only defined in EN 115.*					
4.14-13.3.5 *The requirements for generator driving motors are addressed in EN 115 and AS 3000.*					
4.14-13.4 *For EN 115, A 17 (NFPA 70), AS 1735, Japan and Korea the intent of the various switches related requirements is the same.*					
FUNDAMENTAL DIFFERENCES: *Japan recommends a location in the vicinity of the controller. EN 115 (see 6.3.1.3) requires location in the vicinity of the controller or return stations or the machine. A 17.1 requires in addition minimum space and fuse disconnection of the main switch. A 17 (NFPA 70) and AS 1735 (no limitation on qualified persons for AS 1735) require ready accessibility to qualified persons and installation in the vicinity of the controller. Korea requires location in the machine room.*					
AGREED UPON: *Ready accessibility to qualified persons and installation in the vicinity of the controller is required.*					
4.14-13.5.1					
AGREED UPON: *The wiring should be suitably insulated and provided with protection where it may be subject to mechanical damage. The intent of the various wiring requirement is for all codes incl. reference standards the same.*					
4.14-13.5.2 *Korea has no specific requirement.*					
AGREED UPON: *The intent to define a minimum for the cross-sectional area of conductors is for all codes incl. reference standards the same.*					
4.14-13.5.3 *EN 115, A 17-NFPA 70 and AS 1735 cover various requirements for the methods of installation and cable insulation.*					
Japan and Korea address these requirements in their reference standards.					
4.14-13.5.4 *(Connectors): EN 115 describes requirements for the design of plug-in type connectors in safety circuits. A 17.5, AS 1735, Japan and Korea have no specific connector design requirement.*					

Table 17 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.14-13.6 *(Socket outlet): Japan and Korea have no requirement.* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1, Rules 806.1 and 906.1 (NEC 620-85), requires limited voltage, limited current and ground fault interruption. AS 1735 requires a switch-off by disconnection of the active phases; the supply to the sockets may originate from the line side of the main switch (circuit breaker).* ***AGREED UPON:*** *A socket outlet (receptacle) should be conveniently and accessibly located in the return stations and any machinery space within the incline. Such socket outlet (receptacle) should be equipped with ground fault protection in accordance with the escalator/ moving walk and the general electrical codes.* ***4.14-13.7*** *no comment*					

4.15 Protection against electrical faults – controls

Table 18 — Protection against electrical faults – controls

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
14.1 General					
Clause 14.1 Reference CENELEC *not compared!*	*not compared!* **Reference NFPA70; A 17.5**	*not compared!* **Reference AS 3000**	*not compared!* **Reference JEAC 8001-1995; JIS A 4302-1992**	*not compared!*	
4.15-14.1 *"Protection against electrical fault" is covered by definition of several electrical faults in A 17.1, AS 1735, Japanese and Korean standards.* *EN 115 covers the subject matter in greater detail.* *Further investigations and analyses will be done by ISO/TC 178/WG 8 (Comparison of electrical standard equipment for elevators/ escalators).* ***AGREED UPON:*** *- The failure of any single magnetically operated switch, contactor or relay to release in the intended manner or the occurrence of a single earth fault shall not be the cause of a dangerous malfunction of the escalator or moving walk.* *- Capacitors shall not be installed in any escalator/ moving walk installation where their operation or failure may cause an unsafe operation.*					
14.2 Controls **14.2.1 Starting and making available for use the escalator or passenger conveyor**					
14.2.1 Starting switch -one or more switches -authorised persons only -step/ treadway within sight *special requirements*	**805.2a/ 905.2a** -key switch to be in run position before escalator restart - key operated, spring return type -specific labelling sequence -steps/ treadway within sight -automatic starting prohibited	**6.2.1** -at each end of escalator/moving walk -key operated, spring off type -steps /treadway within sight - labelling	**(JEAS - 406 G 2.4** - operating panels near upper and lower landing - key operated, spring return type with an alarm) NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**5.9.2** - operating panels at upper and lower landing - steps within sight -start with passengers -> warning signal	

Table 18 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.15-14.2.1 *(Starting):* ***FUNDAMENTAL DIFFERENCES:*** *A 17.1 prohibits automatic starting and change of speed during operation. The switch for starting must be spring returned type to the "run" position, and must be a cylinder type with a five-pin disk combination. Japan requires a key operated switch with an alarm. Russia defines rules for starting with passengers on the step/ treadway.* ***AGREED UPON:*** *- Starting should be done by an authorised person with a key switch. The step /treadway has to be within the sight of this person.* *- The direction of travel shall be recognisable from the indication of the switch.* *NOTE: In most cases key switches clockwise is up and counter clockwise is down.* *A stop button shall be within reach from the starting key switch location.*					
14.2.1.1 Automatic starting by light rays and contact mats	**805.2c / 905.2c** automatic starting prohibited	**6.2.2** automatic starting and automatic speed change *special requirements*	**(JEAS 410 B 2.)** Automatic starting *special requirements* NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	**5.9.3** Automatic starting *special requirements*	no requirement
14.2.1.2 by automatic starting -> direction of travel clearly visible start in predetermined direction	**805.2c / 905.2c** *prohibited*	**6.2.2.3** restriction of access	**(JEAS 410 B 2.3)** Prevention against entering from exit side NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.	no requirement	no requirement

Table 18 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.15-14.2.1.1/2					
FUNDAMENTAL DIFFERENCES: *Automatic starting is prohibited in A 17.1. AS 1735 states an assumed passenger speed for approaching the comb plate and requires measures for the automatic speed change, safety circuit operation and remote operation. EN 115 requires movement of the escalator/ moving walk before a person reaches the comb intersection line.*					
Japan permits automatic start and requires the speed to be at least 50% of the rated speed before passengers are getting on the step/ treadway.					
14.2.2 Stopping					
14.2.2 stopping by interrupting current	**805.12/ 905.11** completion or maintenance of a circuit not permitted to stop the machine		**BSLJ-EO Article 129-12, 4**		
4.15-14.2.2					
AGREED UPON: *The completion or maintenance of an electrical circuit should not be used to stop an escalator/ moving walk.*					
14.2.2.1 manual stopping in view of the steps	**805.3a (1)/ 905.3a (1)** emergency stop	**6.11** operation under fire conditions	**BSLJ-EO Article 129-12, 4** emergency stop		
4.15-14.2.2.1					
AGREED UPON: *Except for emergency stopping, the manual stopping operation must be done without passengers travelling on the escalator/ moving walk.*					
14.2.2.2 stopping in automatic operating mode	automatic operation not permitted by Rule 805.2c/ 905.2c	same intent EN 115	**(JEAS 410B (Draft) 2.3)** NOTE: JEAS attached in parenthesis are draft and mentioned as reference data. These are intended to be replaced later.		
4.15-14.2.2.2					
For EN 115, AS 1735 and Japan the intent is like in 14.2.2.1, i.e. stopping after all passengers have left the escalator /moving walk.					

Table 18 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
14.2.2.3 / 14.2.2.3.1 Emergency stop devices (not automatically operated) - at or near the landings -distances between additional stop buttons : 15 m on escalators; 40 m on moving walks	**805.3a /905.3a** *more special detailed requirements (type, location, marking, buzzer etc.)*	**6.3** emergency stop buttons	**BSLJ-EO Article 129-12 4**	**5.8.2**	**4.3.2 (20)** -at or near the landings -distances between additional stop buttons 15 m on escalators; 40 m on moving walks -additional emergency stop button switches shall be installed in the middle of the hoistway (rise > 12 m (E/S) or the length > 40 m (M/W))
4.15-14.2.2.3 / 14.2.2.3.1 ***FUNDAMENTAL DIFFERENCE:*** *A 17.1 requires an alarmed cover over the stop device to discourage its misuse.* *AS 1735 and Japan require a cover over the stop device to discourage its misuse.* *EN 115 doesn't require a cover, but one may be fitted.* *A 17.1 requires the sound of 80 dB of a warning signal when the cover is moved.* *A 17.1 requires the stop device be located at the landings of the escalator/ moving walks on the units right-hand side balustrade when approaching the unit.* ***AGREED UPON:*** *A red emergency stop button/ stop device should be visibly located at both landings of the escalator/ moving walk.*					
14.2.2.3.2 Emergency stop devices shall be safety contact according to 14.1.2.2	*not adressed in A17.1, but some parts are in* ***ANSI/NFPA 70***	Not defined	Not mentioned		
4.15-14.2.2.3.2 ***AGREED UPON:*** *The function of the emergency button should have the same purpose as a safety contact*					

Table 18 (continued)

EN 115 (Europe)	A 17.1 (USA)	AS 1735 (Australia)	Japanese Codes	PUBEE (Russia)	Korean Code
4.15-14.2.2.4.1 a) to d) ***AGREED UPON*** *to the principle requirements of these rules.*					
14.2.2.4 Emergency stopping, automatically operated **14.2.2.4.1** **a)** absence of voltage **b)** fault to earth of a circuit **c)** overload acc. 13.3.2 **d)** overload acc. 13.3.3	*addressed in National Electrical Code ANSI/NFPA 70* **A17.1: –805.10a; 805.12;** **905.9a; 905.11** **NEC-620 – 61 b/c/d**	**6.6** reverse phase protection **7.2** circuit breaker or main switch		**5.8.1** Interlocking devices	
4.15-14.2.2.4.1 a) to d) ***AGREED UPON*** *to the principle requirements of these rules.*					
14.2.2.4.1 stop automatically **e)** - overspeed; 20% above rated speed - reversal of direction of travel Exception: AC-motors ≤ 10% slip	**805.3b** speed governor /manual reset 40% above rated speed **905.3b** 20 % above rated speed **805.3h/ 905.3g** reversal stop device / manual reset - Variable frequency motor - Alternating-current squirrel cage induction motors	**6.5** speed governor 30% above rated speed **6.14** Reversal stop device AC- Motors ≤ 5% slip			