TECHNICAL REPORT

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Comparison of worldwide escalator and moving walk safety standards —

Part 1: Rule by rule comparison

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

Partie 1: Comparaison paragraphe par paragraphe

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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is entirely informative in nature and does not have to be reviewed until the data it provides are considered to be no longer valid or useful.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 14799-1 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*

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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 there 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 resultant incorrectly leaves the impression of incompleteness of these standards. These standards in their original structure inclusive of their references to other standards and requirements are however complete.

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Comparison of worldwide escalator and moving walk safety standards —

Part 1:
Rule by rule comparison

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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 (MOCN, 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 Rule by rule comparison

General

This comparison 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 address some of the same requirements as EN 115.

The principal dimensions (e.g. L_1, b_8, h_6 etc.) of EN 115 can be seen in the figures shown in Annex A.

EN 115 clause numbers in brackets serve only as a reference point. They do not exist in the published EN 115.

Where the Australian Standard requirements are given in italics, they only apply to moving walks.

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EN 115:1995 (Europe)	ASME A 17.1-1996 (USA)	AS 1735 parts 1, 5 & 6 (Australia)	Japanese Codes	PUBEE 10-77-94:1995 (Russia)	Korean Code
0 Introduction The purpose of this standard is to define safety rules for escalators and passenger conveyors in order to safeguard people and objects against risks of accidents during operation, maintenance and inspection work.	**GENERAL** This Code is one of the numerous codes and standards developed and published by The American Society of Mechanical Engineers (ASME) under the general auspices of the American National Standards Institute, Inc. ANSI). The Code is intended to serve 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 chairlifts. 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 management of structures where equipment covered in the Scope of the Code is used. Safety codes and standards are intended to enhance public health and safety. Revisions result from committee consideration of factors such as technological advances, new data, and changing environmental and industry needs. Revisions do not imply that previous editions were inadequate. It is recommended that, prior to	The objective of this Standard is to provide requirements for electric escalators (moving walks) that carry passengers. The objective of this revision is to accommodate recent changes in engineering practices and advances in technology.	—	**1. GENERAL** **1.1** The PUBEE establishes requirements for the installation, design, manufacture, assembly, modernization or refurbishment, and use of escalators.	**Generic law** Occupational Safety and Health Act, its sublevel regulations or administrative order (Notification by minister) herein after KOSHA. **Specific law** Laws relating to manufacture and management of elevator and it sublevel regulation or administrative order(Notice) herein after KEL 4482. Other related laws to elevators and escalators: - Building construction law; - Housing construction promotion act (1,2); - Construction business act; - Electric construction act.

EN 115:1995 (Europe)	ASME A 17.1-1996 (USA)	AS 1735 parts 1, 5 & 6 (Australia)	Japanese Codes	PUBEE 10-77-94:1995 (Russia)	Korean Code
	adoption, all pertinent state and local laws or ordinances be reviewed and where there is a conflict with any of the Rules of this Code an exception to such conflicting Rules be noted, quoting the section of the law which applies.				
0.1 It is necessary that all components **0.1.1** are properly dimensioned, of sound mechanical and electrical construction and made of material with adequate strength and of suitable quality and free from defects; the use of materials with asbestos is not permitted;	—	—	**BSLJ-EO** (Fundamental Principles of Structural Design) **Article 36-2** In planning the structural design of buildings, columns, beams, floors, walls, etc. shall be arranged effectively according to use, scale, and structural features of the building concerned, as well as the conditions of the land concerned, so that the said building as a whole will be of structure safe from dead load, live load, snow load, wind pressure, ground pressure and water pressure as well as earthquakes or other vibration or shock acting upon the said building. 2. Principal parts necessary for structural strength shall be arranged in balance so as to resist any horizontal forces acting upon the building concerned. 3 Principal parts of a building necessary for structural strength shall be designed to have rigidity enough to prevent distortion or vibration adversely affecting the use of the said building and toughness enough to prevent sudden destruction.	**2.8** The escalator and its components must ensure the specified strength and reliability and be safe and easy to use, inspect, maintain, repair and lubricate. **2.11** The fastening of detachable joints must preclude self-separation. **2.12** Force fits must not be used in torque-transfer components of an escalator without additional fastening with keys, bolts etc. **2.13** Escalator components shall be protected against corrosion according to their climate version as specified by GOST 9.104. **Annex 4** Materials of important welded components. Welding and quality control of the welding.	—

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0.1.2 are kept in good repair and working order. In particular, care shall be taken that the dimensions indicated are maintained despite wear; if necessary, the worn parts shall be replaced.	—	—	**BSLJ** (Maintenance) **Article 8-1** The owner, custodian or occupant of a building shall endeavor to maintain the site, structure and building equipment of the building in a state complying with legal requirements. **BSLJ (Reports, Inspection, etc.) Article 12-2** The owners of elevatory equipment and those of building equipment other than elevatory equipment (including building equipment installed in buildings of the State, a prefecture, or a city, town or village having building officals) of a building as mentioned in Article 6 paragraph 1 item (1) or any other building specified by Cabinet Order as mentioned in the preceding paragraph and designated by the special administrative agency shall, in accordance with Ministry of Construction Order, have a 1st-class licensed architect/building engineer, 2nd-class licensed architect/ building engineer or a qualified person as designated by the Ministry of Construction, periodically inspect the said building equipment, and report the inspection results to the special administrative agency.	—	**3.1.1(1)** Shall be designed in a safety structure to prevent persons or objects from being caught by, or collided with, escalators or moving walks.
0.2 Where for elucidation of the text, an example is given this shall not be considered as the only possible design. Any other solution leading to the same	—	—	—	—	—

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result is permissible if it is guaranteed that with an equivalent function the same safety level exists.					
0.3 It is not the purpose of this standard to preclude new developments of escalators and passenger conveyors. A new design shall meet at least the safety requirements of this standard.	**PREFACE APPLICATION OF RULES TO NEW TECHNOLOGY** 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.	*Equivalent statement in Part 1 of AS 1735*	—	**2.1** Escalators shall be designed, manufactured, installed, and used in accordance with the requirements of these Regulations and of building codes.	—
0.4 Certain escalators and passenger conveyors are subject to special operational conditions. For these cases some additional requirements are defined, marked in this standard with the note "For Public Service Escalators and Public Service Passenger Conveyors". Additional recommendations for that kind of escalators and passenger conveyors are given in annex D (informative).	**1.1 Equipment covered by this Code** The provisions of this Code are not intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and safety to those prescribed by this Code, provided that there is technical documentation to demonstrate the equivalency of the system, method, or device.	—	—	—	—
During the planning stage it should be specified if it will be a public service escalator or public service passenger conveyor (for criteria and definition see 3.9).	The specific requirements of this Code may be modified by the authority having jurisdiction based upon technical documentation or physical performance verification to allow alternative arrangements that will assure safety equivalent to that which would be provided by conformance to the corresponding requirements of this Code. **Definitions:** **enforcing authority** - See				

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	authority having jurisdiction. **approved** - Acceptable to the authority having jurisdiction. **authority having jurisdiction** - The organization, office, or individual responsible for approving equipment. Where compliance with this Code has been mandated by law, the "authority having jurisdiction" is the federal, state, or local department or individual so designated in the enacting legislation or administrative regulation.				
0.5 Special indications **0.5.1** Fire protection and building requirements differ from country to country and so far neither have been harmonized, either on the international level or in Europe. Therefore, this standard cannot include specific requirements for fire protection and building requirements. However, it is recommended that as far as possible, escalators and passenger conveyors are made of materials that are not easy to ignite.	**SECTION 800/900 PROTECTION OF FLOOR OPENINGS** **800.1/900.1 Protection Required** Floor openings for escalators/moving walks shall be protected against the passage of flame, heat, and/or smoke in accordance with the provisions of the building code. **SECTION 801/901 PROTECTION OF TRUSSES/SUPPORTS AND MACHINE SPACES AGAINST FIRE** **801.1/901.1 Protection Required** The sides and undersides of an escalator/moving walk truss or group of adjacent trusses in a single wellway shall be enclosed in materials defined as either noncombustible or limited-combustible by the building code or ANSI/NFPA 101[1)] . Means provided for adequate ventilation of the driving machine and control spaces when included in the truss	**4.8 SPRINKLER SYSTEMS** Where sprinkler systems are required, the machine room sprinkler head shall comply with AS 2118 and shall have a temperature rating not less than 100°C, but shall not encroach into the machine access space. Automatic, gas type fire extinguisher systems shall not be used.	**BSLJ** (Definition of Terms) **Article 2.** In this law, the meaning of the terms in the following items shall be as defined in each item concerned: (9) Non-combustible materials The materials used as construction materials, with non-combustibility (The characteristic such as no burning with the fire heat in an ordinal fire and others which are specified by Cabinet Order) which complies with the technical standards defined by Cabinet Order and is registered by the Minister of Land, Infrastructure and Transport or is approved by the Minister of Land, Infrastructure and Transport. **BSLJ-EO** (Non-combustible Materials) **Article 108-2.** Property and principles for Building materials as specified by Cabinet Order under Article	**2.4** The design of an escalator shall comply with the requirements of fire safety.	—

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	enclosure area shall be permitted. [1)] *The term "fire resistive materials" has been replaced with a specific specification to eliminate subjective interpretations by the enforcing authorities.*		2 item (9) of the law shall be satisfied following each items for 20 minutes after start of heating (excluding item(1) and (2) in the case of those used for external finish of buildings) against the heat of normal fires. (1) Materials which neither burn. (2) Materials which neither develop deformation, melting, cracking or other damaging their fire resisting properties; (3) Materials which do not generate smoke or gas hampering fire protection.		
0.5.2 If escalators or passenger conveyors have to be operated under special conditions, such as directly exposed to the weather or explosive atmosphere, or in exceptional cases serve as emergency exits, appropriate design criteria, components, materials and instructions for use shall be used that satisfy the particular conditions. In addition, it is recommended that for escalators and passenger conveyors which otherwise would be exposed to weather conditions, the customer provides a roof and enclosure.	**OUTDOOR ESCALATORS** **807.1/907.1 Weatherproofing** Escalators/moving walks shall be so constructed that exposure to the weather will not interfere with normal operation. **807.2/907.2 Precipitation** A cover, directly over the horizontal projection of the escalator/moving walk, shall be provided. The cover shall extend outward from the centerline of the handrail so that a line extended from the edge of the cover to the center line of the handrail forms an angle of not less than 15 deg. from the vertical. The sides may be open. When the escalator/moving walk is indirectly subject to snow or freezing rain, heaters shall be operated to prevent accumulation and freezing on the steps and landing plates. Drains shall be provided in the	—	**JEAS XXX (Draft) Standard for Outdoor Escalators** **2.Description** **2.1 Classification of the outdoor type and the semi-outdoor type escalator** The escalator without overhead roof or whose line connecting the roof edge and the escalator forms an angle of less than 30° to the vertical line, is classified as the outdoor type (Refer to Fig. 1) and the escalator with above angle of not less than 30° and not more than 70° is classified as the semi-outdoor type (Refer to Fig. 2). **2.2 Considerations in construction** As to the outdoor type and the semi-outdoor type escalators, the following considerations by the building side are required. It is also recommended that a roof be furnished especially in case of rainfall or snowfall	**2.13** Escalator components shall be protected against corrosion according to their climatic version as specified by GOST 9.104.	**4.3.2 (18)** The outdoors installation shall comply with the requirements as below. The foundation in the vicinity of facilities shall not be settled or collapsed. The concrete foundation shall not have cracks or damage affecting structure. There shall be no soil discharge or collapse in the vicinity of the foundation. There shall be no uneven settlement or slope, or movement, in the foundation. Anchor bolts and bases shall be free of rust or corrosion. Anchor bolts shall be firmly tightened, and an appropriate measure shall be taken to prevent bolts from being easily loosened. The structural members, such as the columns or

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	lower pit/all pits where water could collect. **807.3/907.3 Slip Resistance** Landing plates and combplates shall be designed to provide a secure foothold when wet.		where the treads are slippery and the passengers may lose their balances when getting on and off with the use of umbrellas. (1) The landings of the escalator should be installed higher than the surrounding floors so that rainwater or snow may not flow into the inside of the escalator and the drainage slope as well as the drainage should be provided. (Refer to Fig. 3) (2) An equipment for releasing water accumulated inside of the lower pit of the escalator should be furnished. Further, as drained water is mixed with oil, dust or pebbles, a proper filtering device at the external drain is required and measures to prevent any adverse flow are recommended. (Refer to Fig. 4) (3) In consideration of the use during night time etc., lighting fixtures are necessary to be equipped for the passengers to be able to see where they are stepping well. (4) At the pull-in end of the power source for the escalator, necessary protection measures are required. (5) The supervisory panel for supervision, TV camera or the like are preferable to be furnished. (6) Depending on the installation circumstances, measures by heating devices or the like are recommended to be equipped to prevent		beams, shall be free of rust, corrosion, cracks, damage or deformations. Auxiliary members and joints shall be free of rust, corrosion, cracks, damage or deformations. To prevent rainwater from infiltrating into the inside the truss, the trust shall be installed on a level higher than the bottom around the landing area. The area between the bottom and the landing site shall be inclined, and appropriate drainage holes or other drainage facilities shall be installed to drain water accumulated in the truss bottom pit. In addition, appropriate water purifying system shall be installed in case the accumulated water might be seriously contaminated by oils. Appropriate lighting system shall be installed so that passengers can easily recognize steps during night. The electric power cable inlet shall be water-proof treated in an appropriate manner. An appropriate system capable of melting snow or ice during winter shall be installed, and sufficient power supply required. **3.3.1 (2)** For the escalator installed in outdoors condition the additional test items are applied as in ?

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			freezing etc.. **2.3 Considerations on supervision** Concerning the outdoor type or the semi-outdoor type escalator, the following considerations on supervision in operation are recommendable. (1) In case of snowfall or freezing in winter, operation of the escalator should be suspended to prevent the passengers from sliding and the equipment from being damaged. (2) When operation of escalator is suspended, necessary measures should be taken not to be used as a stairway. (3) The lifetime of the equipment of the escalator which was installed under outdoor or semi-outdoor is generally shorter than that of indoor and therefore regular maintenance and inspection in accordance with the installation circumstances are indispensable. **2.4 Considerations on equipment** Concerning the outdoor type or the semi-outdoor type escalator, the following considerations are required. (1) Adequate rustproof measures for the main structures are required. (2) Necessary protection measures for the electric apparatus are required.		and ? as below. The wiring and conduits installation shall be properly ensured; The earthing and bonding shall be ensured and the earthing resistance shall comply with the value in Table 11.

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0.5.3 If, exceptionally, means of transportation, e.g. push chairs, luggage trolleys or baggage carts, shall be carried on escalators or passenger conveyors, special measures shall be agreed between the manufacturer of the escalator/ passenger conveyor, the manufacturer of the means of transportation and the customer. Within those measures, it has to be taken care that the conditions defined in 8.2.1 for the steps, pallets and the belt are observed when selecting the means of transportation. The measures to be taken are governed by very different conditions which make a standardization within the scope of EN 115 impossible.	**SCOPE** This Part applies to escalators/moving walks used to transport passengers.[2)] [2)] *The A17.1 code addresses safety for escalators as described in the Scope. It is not intended to apply to material conveyers. Carrying carts, wheelchairs, or other wheeled carriages is discouraged because of the hazards they represent to passengers and the damage they can cause to the equipment that compromise safety.*	**3.9 (Amendment no 1)** Notice. A notice similar to one of those illustrated in Fig. 3.9 shall be prominently displayed at each end of each escalator where it is visible to passengers entering the escalator. *The Australian Standard does not explicitly prohibit the carrying of trolleys, prams etc. on escalators but in the notice specified states "Passengers only".* *Generally speaking one finds the people managing the equipment (department stores, public utilities etc.) provide large signs discouraging the use of escalators for carrying prams, pushers, trolleys etc.*	**Commentary:** 1. The present situation of wheelchair escalator The time is getting ripe for repletion of social welfare and there is a great need in Japan for installation of elevatory equipment for wheelchair users at the public institutions, (stations, city halls, public halls, etc.). With regard to escalator for wheelchair, there are at present approx. 600 sets operating in Japan. Especially, there is a steady increase in a demand of escalator for wheelchair in existing stations because of a merit of installation space and transport capacity. Recently, the need of escalator for wheelchair is shifting to the one which is able to carry an electric wheelchair from the conventional manual type. In the meantime, „A guideline to development of escalator at a railway station (1991)" was issued by Ministry of Transport, and installation of escalator for wheelchair is promoted. As there is no law or regulation for wheelchair escalator , escalator manufacturers are getting approval from the Building Center of Japan (BCJ), which is an affiliate of MOC, to cope with the situation. This the figure for 1996 2. The present situation for carrying trolley, baby cart, etc. on escalators	—	—

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			There is no law or regulation regarding use of trolley or baby cart on ordinary escalators. Carrying trolley, baby cart, etc. on escalators is warned against use of them by „Caution label“ for reasons of safety and elevators are recommended in general for the purpose. **MOC-N (No.1417-2000)** **1**. The construction of escalator devised so as persons or articles not to be caught, not to be collide with obstacles prescribed by BSLJ-EO; Article 129-12 item 1 paragraph 1, shall be specified as follows (1), (2) and (3). However (1) and (2) shall not apply to the escalator providing following conditions. - 2 or more steps are kept in the same level of tread surface when the escalator carries the person sitting on wheelchair. - The rated speed in that operation does not exceed 30 m/min. - Stoppers for the wheels are furnished on the tip of that levelled tread surface. (1) The clearance between the steps and the skirt guard panel should not exceed 5 mm. (2) The clearance between the adjacent steps should not exceed 5 mm. (3) When the horizontal distance between the outer side of handrail and any obstacle which intersects and close to that outer side of		

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			handrail, e.g. the building ceiling, building beam etc. or the lower surface of the adjacent escalator is not greater than 50 cm, a wedge guard should be furnished as follows. (a) The wedge guards should be furnished at lower side of the obstacle. (b) The thickness of the wedge guard end should be equal to or greater than 6 mm with no sharp edge. The wedge guard should have construction of the length with which the wedge guard reaches at 20 cm or more, vertically lower than upper surface of the handrail. (c) The wedge guard surface should not differ in rank with the obstacle surface facing the escalator. **EXP.1.** The escalator of this notification includes moving walks and escalator for person sitting on wheelchair. Because only the person sitting on wheelchair rides on these special steps, the specification (1) and (2) shall not apply. **EXP.[Notice of designing]** 1. Escalator with steps for wheelchair (1) Only the attendant of the building manager should be allowed to handle the wheelchair and operate the escalator carrying wheelchair. (2) The effective distance between the interior panels of balustrade should be approx. 1.2 m.		

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			(3) The speed of the escalator should become zero or very slow when the person sitting on wheelchair gets on/off the escalator. (4) Operation panels should be furnished at the upper and lower landings. Emergency stop switch(es) which is effective in wheelchair carrying operation shall be furnished in intermediate section if necessary. (5) It is recommended that an interphone is furnished near the landing for requesting the wheelchair operation to the attendant of the building manager.		
0.6 Requirements related to the life of the escalators and passenger conveyors are not included in this standard as it depends on the place of installation and customers' special specifications.	—	**5.13 DESIGN LIFE** Where it is necessary to remove any step *(pallet)* to gain access to the machine or motor within the truss, the bearings, gears, and other moving parts of machinery shall have a design life not less than 50000 h based on an average loading of the escalator *(moving walk)*. **NOTE** For rolling contact bearings, the bearing manufacturer's recommendations may be used.	—	—	—
0.7 This standard has been drawn up taking into account in certain cases the imprudent act of the user. However, this standard takes into consideration proper use and not abuse.	—	—	—	—	—
0.8 An Interpretation Committee has been established to clarify, if necessary, the spirit in which the clauses of the standard have	**Requesting Interpretations.** On request, the A17 Committee will render an interpretation of any requirement of the Code.	No equivalent ***Commentary**: Even though no equivalent statement exists in the Australian standard, an*	There is no Interpretation Committee.	—	—

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been drafted and to specify the requirements appropriate to particular cases.	Interpretations can only be rendered in response to a written request sent to the Secretary of the Main Committee. The request for interpretation should be clear and unambiguous. It is further recommended that the inquirer submit his request utilizing the following format: **Subject**: Cite the applicable Rule number(s) and a concise description. **Edition**: Cite the applicable edition and supplement of the Code for which the interpretation is being requested. **Question**: Phrase the question as a request for an interpretation of a specific requirement suitable for general understanding and use, not as a request for an approval of a proprietary design or situation. The inquirer may also include any plans or drawings which are necessary to explain the question; however, they should not contain proprietary names or information. Requests which are not in this format will be rewritten in this format by the committee prior to being answered, which may inadvertently change the intent of the original request.	*interpretation mechanism is available to industry. The mechanism consists of writing to the Project Manager for committee ME/4 (Lifts, Escalators and Moving Walks) of Standards Australia who in turn will pass on a request to the chairman of the interpretation committee at the same time as circulating the interpretation committee members. The interpretation committee members subsequently provide input to the chairman who formulates a draft response for ratification by the main committee ME/4.All ratified interpretations are published and one can subscribe to an interpretation update service provided by Standards Australia.*			

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	ASME procedures provide for reconsideration of any interpretation when or if additional information which might affect an interpretation is available. Further, persons aggrieved by an interpretation may appeal to the cognizant ASME committee or subcommittee. ASME does not "approve," "certify," "rate," or "endorse" any item, construction, proprietary device, or activity.				

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1 Scope **1.1** This standard is applicable for all new escalators and passenger conveyors (pallet or belt type).	**SCOPE Equipment Covered by This Code** This Code of safety standards covers the design, construction, operation, inspection, testing, maintenance, alteration, and repair of the following equipment, its associated parts, and its hoistways, where located in or adjacent to a building or structure (except as modified by paragraph 1.2): a) hoisting and lowering mechanisms, equipped with a car or platform, which move between two or more landings. This equipment includes, but is not limited to the following (see Section 3 definitions): (1) elevators; (2) wheelchair and stairway chairlifts; b) power-driven stairways and walkways for carrying persons between landings. This equipment includes, but is not limited to the following (see Section 3 definitions): (1) escalators; (2) moving walks; c) hoisting and lowering mechanisms equipped with a car which serves two or more landings and is restricted to the carrying of material by its limited size or limited access to the car. This equipment includes, but is not limited to the following (see Section 3 definitions): (1) dumbwaiters;	**SCOPE** This Standard sets out requirements for electric escalators which carry passengers.	**BSLJ-EO** (Scope of Application) **Article 129-3.** The provisions of this Section shall apply to the elevatory equipment installed in buildings and described in each of the following items. **(2) Escalator** Not withstanding the provision of the preceding paragraph, the provisions of each said item shall not apply to the elevatory equipment described in following each item. (2) The escalators of special construction and special use form, of which structural method designated by the Minister of Land, Infrastructure and Transport : The provisions of Article 129-12 paragraph 1.	**1.2** These regulations cover: a) **tunnel escalators** - Escalators designed for installation in tunnels (galleries). b) **floor escalators** - Escalators designed for installation between floors of buildings and structures.	**1. Scope of application:** This standard is applicable to safety inspection of elevators, escalators and motor-drive dumb waiters that are fac ilities attached to a building or machine and used in transportation of passenger or freight through a certain hoistway.

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	(2) material lifts and dumbwaiters with automatic transfer devices.				
1.2 Existing escalators and passenger conveyors are not subject to this standard. It is, however, recommended that they be adapted to this standard.	**1.3 Application of Parts** (*of A17.1)* This code applies to new installations only, except Parts X, XII, and XIX which apply to both new and existing installations. **Definitions:** - **installation, new** - any installation not classified as an existing installation by definition, or an existing elevator, dumbwaiter, escalator, material lift, inclined lift, or moving walk moved to a new location subsequent to the effective date of this Code. - **installation, existing** - an installation that has been completed or is under construction prior to the effective date of this Code. - **installation placed out of service** - an installation whose power feed lines have been disconnected from the mainline disconnect switch and; (c) an escalator or moving walks whose entrances have been permanently barricaded.	*Each requirement and amendment in the SAA lift code applies after the date on which it was included.*	—	**15.2** The necessity of proper re-equipment of the existing escalators and the escalators manufactured in accordance with earlier designs in connection with the present Regulations coming into effect and the time of the re-equipment shall be specified by the owner of the escalator upon agreement with a Gosgortekhnadzor body. Should there be any inconsistency with the present regulations of the escalators manufactured before January 1, 1995 and corresponding to the Regulations for Installation and Safe Use of Escalators approved by the Gosgortekhnadzor of the USSR on December 27 1977, the approval of such escalators by respective Gosgortekhnadzor bodies shall not be required.	—
1.3 If some dimensions of this standard cannot be kept due to structural conditions in existing buildings, it has to be defined in the individual case which alternative requirements are necessary. NOTE: in addition see 0.5 and 0.6	**SECTION 2 PURPOSE AND EXCEPTIONS** The purpose of this Code is to provide for the safety of life and limb, and to promote the public welfare. The provisions of this Code are not intended to prevent the use of systems, methods, or devices of equivalent or superior quality, strength, fire resistance, effectiveness, durability, and	—	—	—	—

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	safety to those prescribed by this Code, provided that there is technical documentation to demonstrate the equivalency of the system, method, or device. The specific requirements of this Code may be modified by the authority having jurisdiction based upon technical documentation or physical performance verification to allow alternative arrangements that will assure safety equivalent to that which would be provided by conformance to the corresponding requirements of this Code.				
(1.4)	—	**4.3 LIMITATIONS ON USE** No part of the escalator *(moving walk)* truss, machine room, or machine area shall be used to gain access to ceiling spaces or other parts of the building, nor shall they be used for the housing of equipment not associated with the escalators *(moving walk)*. NOTE: Architectural lighting equipment with voltages exceeding 1000 V, for the purposes of Clause 7.11, is not considered part of the escalator *(moving walk)* installation.	—	—	—

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2 Normative references This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.	**SECTION 4 REFERENCE CODES, STANDARDS, AND SPECIFICATIONS** This Section covers the codes, standards, and specifications incorporated in this Code by reference; the specific editions which are applicable; and the Rules of this Code which reference each document [see Table 4(a)]. This Section also lists the names and addresses of the organizations from which these documents may be procured [see Table 4(b)]. Only that portion of the code, standard, or specification as specified by the Rule in this Code is applicable.	**List of Normative references in AS 1735 Parts 1,5 & 6**. *(no details here)*	**JIS** The following Standards are cited in JIS A 4302 - 1992.....	Normative references to the documents below, are given in the corresponding places of the text.	—

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3 Definitions For the purposes of this standard, the following definitions apply: **3.1 Escalator:** Power-driven installation with endless moving stairway for the conveyance of passengers in the upward or downward direction (see also 0.5.3).	**SECTION 3 DEFINITIONS** This section defines various terms used in this code. In addition, a number of other terms are defined for the standardization of nomenclature and terminology [3)] [3)] *There are many more definitions in A 17.1 than is shown here. The ones shown here correspond to the definitions in EN 115.* **escalator** - power-driven, inclined, continuous stairway used for raising or lowering passengers **- *escalator, conventional*** - an escalator on which the running gear is driven by a single drive shaft at a terminal **- *escalator, modular*** - an escalator on which the running gear along the incline is driven by one or more drive units	**Part 1 General Requirements of AS 1735 "Lift Escalator & Moving Walk Code".** **2.57 Escalator**-a power-driven, inclined, continuous stairway used for raising or lowering passengers	**BSLJ-EO; Article 129-12** **EXP. 1** The escalator means "power driven, continuous stairway or walkway for the transport of passengers.	**1. Escalator-** Lifting and transportation facility with a continuous stairway belt to carry people from one level to another.	**Definition of escalator** : a facility that transports up and down by driving steps with power.
3.2 Passenger conveyor: Power-driven installation with endless moving walkway (e.g. pallets, belt) for the conveyance of passengers either on the same or between different traffic levels (see also 0.5.3).	**moving walk** - a type of passenger-carrying device on which passengers stand or walk, and in which the passenger-carrying surface remains parallel to its direction of motion and is uninterrupted **- *moving walk, belt pallet type***-a moving walk with a series of connected and power-driven pallets to which a continuous belt treadway is fastened **- *moving walk, belt type*** - a moving walk with a power-driven continuous belt treadway **- *moving walk, edge supported***	**In Part 1 of AS 1735** **2.107 Moving Walk**-a power-driven device on which passengers may stand or walk and of which the passenger-carrying surface remains parallel to ts direction of motion and is uninterrupted. **2.107.1 Edge-supported belt type**- a moving walk with the treadway supported near its edges by a succession of rollers. **2.107.2 Roller-bed type**-a moving walk with the treadway supported throughout its width by	**BSLJ-EO; Article 129-12** **EXP. 1** The walkway (called passenger conveyor) means that the angle of inclination is equal to or less than 15 degrees, and the tread surface of pallets or belts which the height difference between pallets is equal to or less than 4 mm is horizontal or inclined.	—	**Definition of horizontal moving walk** : a facility that transports horizontally by driving pallets or belts with power, having inclination angle of mot more than 15 degrees.

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	belt type-a moving walk with the treadway supported near its edges by succession of rollers ***- moving walk, pallet type*** - a moving walk with a series of connected and power-driven pallets which together constitute the treadway ***- moving walk, roller bed type*** - a moving walk with the treadway supported throughout its width by a succession of rollers ***- moving walk, slider-bed type*** - a moving walk with the treadway sliding upon a supporting surface	a succession of rollers. **2.107.3 Sliderbed-type** -a moving walk with the treadway sliding upon a low friction supporting surface.			
3.3 Handrail: Moving part intended to serve as a handhold for the passengers.	—	**2.157.13 Handrail**-a power-driven moving rail for passengers to grip while using the escalator or moving walk.	—	77. **Handrail of escalator -** Continuous band moving along the handrail system track and designed to support hands of passengers.	—
3.4 Comb: Parts which at both landings mesh with the steps, pallets or the belt in order to facilitate the transition of passengers.	—	**2.157.9 Comb**-the pronged portion of the combplates at the landing which mesh with the step tread grooves	—	56. **Comb of escalator landing-** Part of landing designed for safe entry of passengers to the stair-way belt and safe exit therefrom.	—
3.5 Deflector device: An additional device to minimize the risk of trapping between the step and the skirting.	—	—	—	—	—
3.6 Rated speed: Speed in the direction of the moving steps, pallets or the belt, when operating the equipment under no load condition, stated by the manufacturer as that for which the escalator or passenger conveyor had been designed and at which it should operate.	**rated speed** - the speed at which the elevator, dumbwaiter, escalator, moving walk, material lift, or inclined lift is designed to operate under the following conditions: ***- elevator, dumbwaiter, or material lift*** - the speed in the up direction with rated load in the car (also see operating speed in the down direction) ***- escalator or inclined lift*** - the rate of travel of the steps or	**2.157.17 Rated speed**-the design speed for unloaded running conditions.	**BSLJ-EO (Construction of Escalators)** **Article 129-12** **1**.(5) The rated speed of the steps shall be not more than the speed per minute designated by the Minister of Land, Infrastructure and Transport according to the inclination of the escalators within the limit of not more than 50 m/min.	11. **Rated speed of escalator-** Speed of stair-way belt during operation without load in steady-state mode.	—

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	carriage, measured along the angle of inclination, with rated load on the steps or carriage. In the case of a reversible escalator, the rated speed shall be the rate of travel of the steps in the up direction, measured along the angle of inclination, with rated load on the steps. ***- moving walk*** - the rate of travel of the treadway, horizontally or at an incline, with rated load on the treadway. In the case of reversible inclined moving walks, the rated speed is the rate of travel of the treadway in the up direction, measured along the angle of inclination, with rated load on the treadway.				
3.7 Angle of inclination: Maximum angle to the horizontal in which the steps, the pallets or the belt move.	—	**2.157.1 Angle of inclination**-the angle at which a passenger travels with respect to the horizontal.	—	8. **Angle of inclination of escalator-** Angle between the inclined base and the horizontal base of escalator.	—
3.8 Theoretical capacity: Number of persons that can be carried theoretically by the escalator or passenger conveyor in 1 h. For the determination of the theoretical capacity it is assumed that on one step with an average depth of 0,4 m, and per 0,4 m visible length of a pallet or belt, there are carried: 1 person at a nominal width z_1 = 0,6 m 1,5 persons at a nominal width z_1 = 0,8 m 2 persons at a nominal width z_1 = 1,0 m. The theoretical capacity calculation is then:	**capacity -** see rated load.	There is no definition for 'Theoretical capacity' in AS 1735 Parts 5 & 6.	**BSLJ-EO; Article 129-12** **EXP.1.(4) Notice of Designing** The official transportation capacity is assumed to be a table below according to rated speed. The official transportation capacity is maximum number which is capable of transportation theoretically, In case of escalator ,the transportation number is one person/step for the S600 type, two person/step for the S1000 type. In case of moving walk ,the transportation number is one person for the S600 type, two person for the S1000 type per	10. **Carrying capacity of escalator-** The number of passengers the escalator can carry in a time unit. **Theoretical carrying capacity of escalator-** man/hr, maximum p/hr 18,000BV man/hr, maximum p/min 300BV **Actual carrying capacity of escalator-** man/hr, maximum p/hr 8.800 (2.1V)•VxB man/hr, maximum p/min 190 (2.1-V)• VxB, where B is step width in m.	—

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$c_t = v \cdot 3600 \cdot k/0,4$ where: c_t theoretical capacity (persons/h) v rated speed (m/s) k factor For the most common widths there will be k = 1 for z_1 = 0,6 m k = 1,5 for z_1 = 0,8 m k = 2 for z_1 = 1,0 m With this formula the theoretical capacity is as given in table 1: **Table 1: Theoretical capacity [persons/h]**			the 400 mm length which is equivalent to the depth dimension of escalator step. An actual number of transportation is the number of people by which the boarding rate is multiplied for the official transportation ability. Generally ,the boarding rate is about 50% on average though temporarily reaches 80% in transit system. Generally, two kinds of the escalator with step width of 600 mm (past 800 type) and 1000mm(past 1200 type) are available. They are called as S600 type and S1000 type.		
3.9 Public service escalator/passenger conveyor Escalator/passenger conveyor to which the following conditions apply: a) they are part of a public traffic system including entrance and exit points; b) they are suitable for regularly operating for approximately 140 h/week with a load reaching 100 % of the brake load (12.4.4.1 and 12.4.4.3) during periods lasting for at least 0,5 h during	*The A 17.1 is a safety code which applies equally to all escalators regardless of theit use. The loading patterns and useful life of the equipment is a commercial issue and not one of safety.*	—	—	—	—

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any time interval of 3 h.					
(3.10)	**controller** - a device or group of devices which serves to control in a predetermined manner the apparatus to which it is connected.	**2.35 Controller**-a device or group of devices comprising the principal components of the control equipment.	—	—	—
(3.11)	**driving machine -** the power unit which applies the energy necessary to raise and lower an elevator, material lift, or dumbwaiter car or to drive an escalator, an inclined lift, or a moving walk.	**2.102 Machine, Driving**-the power unit which applies the energy necessary to raise and lower a car or to drive an escalator or moving walk.	—	—	—
(3.12)	**flat steps** – the distance, expressed in step length, that the leading edge of the escalator step travels after emerging from the comb before moving vertically	—	—	—	—
(3.13)	**landing** – the stationary area at the entrance to or exit from an escalator/moving walk	—	—	—	—
(3.14)	**pallet, moving walk** - -one of a series of rigid platforms which together form an articulated treadway or the support for a continuous treadway	**2.157.16 Pallet**-one of a series of rigid platforms which together form an articulated treadway, or one of a series of rigid platforms supporting a continuous treadway.	—	—	—
(3.15)	**slope, moving walk** - the angle which the treadway makes with the horizontal	**2.157.19 Slope**-the angle which the treadway makes with the horizontal.	—	—	—
(3.16)	**travel (rise)** - the vertical distance between the bottom terminal landing and the top terminal landing of an elevator, dumbwaiter, escalator, material lift, or inclined lift.	—	—	—	—
(3.17)	**treadway, moving walk** - the passenger-carrying member of a moving walk	**2.157.20 Treadway**-the passenger carrying member of a moving walk; (a) Belt type-a moving walk with a continuous belt treadway. (b) Belt-pallet type-a moving walk	—	—	—

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		with a series of connected pallets to which a continuous belt treadway is fastened. (c) Pallet type-a moving walk with a series of connected pallets which together constitute the treadway.			
(3.18)	**width, moving walk** - the exposed width of the treadway. **802.2/902.2 Geometry** (a) the width of the escalator/moving walk shall be the width of step tread/exposed tread, to the next whole inch(see 802.5b/902.7)	**2.157.22 Width**-the width between balustrades measured at a point 700 mm above the noseline of the steps of an escalator or the treadway of a moving walk.	—	—	—
(3.19)	**rated load** ***- elevator, dumbwaiter, escalator, or inclined lift*** - the load which the equipment is designed and installed to lift at the rated speed; ***- moving walk*** - the load which the moving walk is designed and installed to move, horizontally or at an incline, at the rated speed	**2.119 Rated Load**-the load which the lift, escalator, or moving walk is designed and installed to lift or move at rated speed.	—	—	—
(3.20)	—	Further definitions which appear in AS 1735 (not in EN 115 as definitions): **2.2 Alteration**-any change in the design of or addition to the equipment, other than ordinary maintenance, repairs or replacement. **2.32 Contactor**-an electromagnetically operated switch for making or breaking a main electrical circuit, e.g. a lift motor circuit (see Clause 2.122). **2.33 Control**-the system governing the starting, stopping, direction of motion, acceleration, speed, and retardation of the	—	—	—

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		moving member. **2.50 Enclosure drip-proof**-an enclosure with openings protected so that liquid or solid particles falling on it cannot enter in an amount sufficient to interfere with satisfactory operation of the enclosed equipment, and which complies with the relevant requirements of AS 1939. **2.60 Fire-resistance Rating**- the measured time in hours or fractions thereof that the material or construction will withstand fire exposure as determined by fire resistance tests conducted in accordance with AS 1530. **2.61 Fire resistance construction**- a method of construction which prevents or retards the passage of hot gases or flame as defined by the fire resistance rating. **2.70 Installation**-a complete lift, escalator, or moving walk including its lift well, lift well enclosure, and related construction, and all machinery and equipment necessary for its operation. **2.103 Machine Room**-the enclosed space or, if self-contained, the room used to house the driving machine (of a lift, escalator, or moving walk) and any associated equipment which is required to be similarly located. It may be necessary for a machine room to have two or more levels. **2.105 May**-the word "may" implies the right to use			

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		discretionary power. **2.112 Passenger**-a person, other than an attendant, who is carried by a passenger lift, escalator, or moving walk. **2.122 Relay-**an electromagnetically operated switch for making or breaking a control or auxiliary circuit (see Clause 2.32) **2.132 Shall and Should**-the word "shall" is to be understood as mandatory' and the word "should" as advisory. (Commentary; Some states in Australia take the word should as if it means shall.) **2.149 Travel (Rise**)-the vertical distance between the bottom landing and the top landing of a lift, escalator, or moving walk. **2.157 DEFINITIONS RELATING TO ESCALATORS AND MOVING WALKS** **2.157.2 Balustrading**-the enclosure at either side of the moving steps of an escalator or moving treadway of a moving walk and the decking or deck board adjacent to the moving handrails. **2.157.3 Broken drive belt device**-a device to stop the machine in the event of a broken driving belt between the motor and the gearbox. **2.157.4 Broken drive chain device**-a device to stop the machine in the event of a broken drive chain. **2.157.5 Broken pallet chain device**-a device to stop the machine in the event of a broken			

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		pallet chain. **2.157.6 Broken step chain device**-a device to stop the machine in the event of a broken step chain. **2.157.7 Broken treadway belt device**-a device to stop the machine in the event of a broken treadway belt. **2.157.8 Ceiling intersection guard**-a guard provided at the intersection angle of the decking and the ceiling grooves. **2.157.10 Combplates**-the supporting plate at the landings for the combs. **2.157.12 Governor**-a device which automatically actuates safety devices which cause an escalator or a moving walk to stop, by the operation of an electric contact or contacts in the event of the speed exceeding a predetermined limit. **2.157.14 Handrail guard**-a guard for the moving handrail at the point where the handrail enters or leaves the balustrading. **2.157.21 Truss**-the supporting structure on which the various components are mounted.			
4 Symbols for quantities The units used are chosen from the International System of units (SI).	—	—	—	—	—

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5 Enclosure, surrounds, supporting structure and lighting **5.1 Enclosure of the escalator and passenger conveyor** **5.1.1 General** **5.1.1.1** All mechanically moved parts of the escalator or passenger conveyor shall be completely enclosed within imperforate panels or walls. Exempt from this are the accessible steps, the accessible pallets, the accessible belt and that part of the handrail available for the user. Apertures for ventilation are permitted.	**801.1/901.1 Protection Required** The sides and undersides of an escalator/moving walk truss or group of adjacent trusses in a single wellway shall be enclosed in materials defined as either noncombustible or limited-combustible by the building code or ANSI/NFPA 101[1)] . Means provided for adequate ventilation of the driving machine and control spaces when included in the truss enclosure area shall be permitted. *[1)] The term "fire resistive materials" has been replaced with a specific specification to eliminate subjective interpretations by the enforcing authorities.* **802.3a/902.3a Construction** (2) The balustrade shall be totally closed, except: (a) where the handrail enters the newel base (see Rule 802.4c/902.4c); (b) gaps between interior panels shall not be wider than 3/16 in. (4.8 mm). The edges shall be rounded or beveled.	**3.2 Trusses** **3.2.2 Protection** **3.2.2.1** Fire protection Where the truss is not positioned in a fire resistant tunnel or duct accessible only to authorized persons, it shall be totally clad with and fixed to a suitable non shattering material not deemed combustible when tested in accordance with AS 1530.1, to resist the spread of fire from within the truss. For the purpose of this requirement, the lower pit section shall be regarded as part of the truss, and parallel abutting trusses can be considered as one truss. **3.2.2.2** Mechanical protection A non-perforated barrier preventing contact with moving components shall be provided between abutting parallel trusses. **SECTION 4 MACHINE ROOMS, MACHINE AREAS AND PITS** **4.1 GENERAL** Every escalator shall be provided with a machine room or machine area of adequate size to permit the safe and efficient maintenance of the machinery and the equipment contained therein. A height not less than 2000 mm shall be provided at the controller and at the machine. This height may be obtained at the controller by opening of the access hatchway, covers and at the	**BSLJ - EO; Article 129 - 12** **1.(1)** As specified by the Minister of Land, Infrastructure and Transport, escalators shall be devised so as persons or articles not to be caught, and so as not to be collide with obstacles under the normal using condition.	**5.6.1** The carrying run of the stairway belt and of the handrail shall be separated from the mechanisms and steelwork of the escalator with a balustrade: a strong, rigid, smooth, and inflammable lining. **2.15** Easily accessible moving parts of the escalator (sprockets, gears, traction and driving chains, shafts with protruding bolts and keys, etc.) shall be covered with guards that ensure safety of personnel but provide easy access for inspection, lubrication, and maintenance. The guards may be detachable if necessary.	—

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		machine by means of removable panels, or steps in the case of machines located within the stepband. Machine rooms or machine areas shall be of such dimensions as will provide a clear level standing area not less than 380 mm by 600 mm, convenient to the machine and clear of any obstructions, for normal maintenance work. **4.2 ACCESS AND GUARDING** Safe, permanent, and convenient means of access and guarding shall be provided to the machine area and the top and the bottom truss extensions. Where access to the machine room, machine area, or any equipment installed therein is by means of trapdoors or hatch covers in the floor adjacent to the escalator, such openings shall be provided with suitable guardrails of adequate strength, which may be readily and conveniently erected, but which are not removable, and the trapdoor or hatch cover shall restrict access until such guarding is positioned. Any hinged section of the guardrail arranged to permit access shall open outwards and be spring-loaded to the closing position. Trapdoors and hatch covers shall be capable of being opened by a force not greater than 250 N. **4.4 ENCLOSURE** Machine rooms or machine areas shall be totally enclosed with non-perforated non-shattering materials of not less than the strength of sheet steel of 1.2 mm thickness, except that perforated			

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		material may be used for ventilation requirements. Such enclosure and the enclosure supports shall be of material not deemed combustible when tested in accordance with AS 1530.1, to reduce the spread of fire from within the machine room or machine area. The walls shall be supported and braced so as to deflect not more than 25 mm when sustaining a horizontal force of 440 N distributed over any square of 50 mm side.			
5.1.1.2 It is permissible to omit an enclosure of the mechanically moved parts if other measures (such as rooms with locked doors accessible to authorized personnel only) make a hazard to the public impossible.	—	—	—	—	—
5.1.1.3 Accumulation of materials (e.g. grease, oil, dust, paper) represents a fire risk. Therefore it should be possible to clean the underside enclosure, if any, of dirt. If such cleaning is not possible, other precautions (e.g. sprinkler-system or other fire abatement system) shall be taken to avoid the related fire hazard arising.	**1206.6 Maintenance of Escalator and Moving Walks** **1206.6a Cleaning.** The interiors of escalators, moving walks, and their components shall be periodically cleaned to prevent an accumulation of oil, grease, lint, dirt, and refuse. The frequency of the cleaning will depend on service and conditions, but an inspection to determine if cleaning is necessary shall be required at least once a year.	—	—	**2.17** The design of the escalator shall include special devices, such as housings and trays, to protect the mechanisms and electric equipment in close proximity with moving and folding steps against dust and dirt.	—
5.1.2 The enclosure shall have adequate mechanical strength and rigidity.	*(defined in building codes)*	**3.2 Trusses** **3.2.2 Protection** **3.2.2.1** Fire protection Where the truss is not positioned in a fire resistant tunnel or duct accessible only to authorized persons, it shall be totally clad with and fixed to a suitable non	—	**2.8** The escalator and its components must ensure the specified strength and reliability and be safe and easy to use, inspect, maintain, repair and lubricate. **2.11** The fastening of	—

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		shattering material not deemed combustible when tested in accordance with AS 1530.1, to resist the spread of fire from within the truss. For the purpose of this requirement, the lower pit section shall be regarded as part of the truss, and parallel abutting trusses can be considered as one truss. **3.2.2.2** Mechanical protection A non-perforated barrier preventing contact with moving components shall be provided between abutting parallel trusses. **4.4 ENCLOSURE** Machine rooms or machine areas shall be totally enclosed with non-perforated non-shattering materials of not less than the strength of sheet steel of 1.2 mm thickness, except that perforated material may be used for ventilation requirements. Such enclosure and the enclosure supports shall be of material not deemed combustible when tested in accordance with AS 1530.1, to reduce the spread of fire from within the machine room or machine area. The walls shall be supported and braced so as to deflect not more than 25 mm when sustaining a horizontal force of 440 N distributed over any square of 50 mm side.		detachable joints must preclude self-separation. **2.12** Force fits must not be used in torque-transfer components of an escalator without additional fastening with keys, bolts etc. **2.13** Escalator components shall be protected against corrosion according to theit climate version as specified by GOST 9.104. **Annex 4** Materials of important welded components. Welding and quality control of the welding.	
5.1.3 Inspection doors and trap doors **5.1.3.1** Inspection doors and trap doors shall be provided only where necessary for the	**806.3/906.3 Access to Interior** Reasonable access to the interior of the escalator shall be provided for inspection and maintenance.	—	—	**3.10 Deflection of floor slab (plate)** Elastic deformation of floor slabs including dead load and construction cover of	—

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inspection and maintenance of the equipment.				the slabs shall not exceed 1/600 of the span under the load q_{c2}. q_{c2} = 4000 N/mm². **6.3** The design of the floor escalator shall provide access to escalator components and opportunity for maintenance, assembly and dismantling through openings in the stairway belt, the balustrade and floor slabs.	
5.1.3.2 It shall be possible to open inspection doors and trap doors by means only of a key or a tool specially suited for that purpose, which shall be in the hands of authorized persons only. If rooms behind inspection or trap doors can be entered, it shall be possible to open the inspection or trap doors from the inside without a key even when locked.	Access plates requiring no more than 70 lbf (311 N) effort to open shall be provided at the top and bottom landing/ both landings for inspection and maintenance. The plates shall be made of a material which will afford a secure foothold. The use of stone, terrazzo, or concrete as a fill material is prohibited in panels within the confines of the escalator truss. Access plates at the top and bottom landings shall be securely fastened. If access doors are provided in the side of the escalator enclosure, they shall be locked and the key kept in a location accessible to authorized persons, but not to the general public. The key shall be removable only when in the locked position.	—	—	**6.7** The machine room shall have at least two entrances provided with lockable doors. **6.8** The tension device chamber shall have a trap door or a door with a ladder for a convenient and safe exit to the bottom landing of the escalator. The tension device chamber and ist entrance shall be isolated from other rooms not related to the handling and maintenance of the escalator equipment.	—
5.1.3.3 Inspection doors or trap doors which open on to adjacent escalator or passenger conveyor treadways shall be provided with safety contacts according to 14.1.2 which prevent adjacent escalators or passenger conveyors from being operated when these doors are opened.		—	—	—	—
5.1.3.4 Inspection doors and trap doors shall be imperforate and conform to the same conditions as required for the enclosure		—	—	—	—

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material (see 5.1.2).					
5.1.4 Apertures for ventilation It shall not be possible to touch any moving part through a ventilation aperture (see 5.4 of EN 294: 1992).	—	***Comment: 4.7 VENTILATION*** *Every escalator shall be effectively ventilated to dissipate the heat generated by the machinery. Any perforated ventilation panels shall be of metal, the perforations shall not pass a 13 mm diameter ball, and the panels shall be positioned so as not to allow discharge directly onto any combustible material.*	—	—	—
5.1.5 Balustrades (see figure 2) **5.1.5.1** Balustrades shall be installed on each side of the escalator or passenger conveyor. The balustrade consists of components for which the following terms are usual .	**802.3/902.3 Balustrades** Balustrades shall be installed on each side of the escalator/moving walk (see Appendix D, Fig. D3/D2.).	**2.2 WIDTH** The width of an escalator *(moving walk)* shall be taken as the width between the balustrades, measured at a point 685 mm vertically above the nose line of the steps *(treadway)* , and shall be not less than the width of the step *(treadway)*(see Figure 2.2). It shall not exceed the width of the step *(treadway)* by more than 330 mm, subject to a maximum of 165 mm on each side of the escalator *(moving walk* . However, the width between balustrades shall be not less than 600 mm nor more than 1380 mm (see Clause 3.6.2*(1)*). **3.3 BALUSTRADES** **3.3.1 Construction** **3.3.1.1 General** Solid panel balustrading shall be provided at each side of the steps. On the passenger side, the balustrading shall be smooth and substantially flush. Mouldings or other projections shall not be raised more than 6 mm nor be depressed more than 6 mm from the panel surface. Any projecting mouldings or fillets shall be bevelled.	**BSLJ - EO; Article 129 - 12** **1.(3)** Escalators shall be provided with handrails at each side of steps (the portion going up and down, on which the persons step). The upper surface of the handrails shall move in the same direction and at the same speed as the steps.	**5.6.1** The carrying run of the stairway belt and of the handrail shall be separated from the mechanisms and steelwork of the escalator with a balustrade: a strong, rigid, smooth, and inflammable lining. **2.15** Easily accessible moving parts of the escalator (sprockets, gears, traction and driving chains, shafts with protruding bolts and keys, etc.) shall be covered with guards that ensure safety of personnel but provide easy access for inspection, lubrication, and maintenance. The guards may be detachable if necessary.	—

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5.1.5.1.1 Skirting - A Portion of the enclosure adjacent to the outer edges of the steps, pallets or belt (see figure 2 and 5.1.5.6).	—	**2.157.18 Skirting**-a vertical portion of the balustrade adjacent to the outer edge of the escalator steps or moving walk treadway.	—	**74. Balustrade apron**-Lower vertical part of balustrade along the stairway belt on the level of steps and designed for adjusting the clearance between the step and balustrade.	—
5.1.5.1.2 Interior profile - B This profile connects the skirting with the balustrade interior panelling.	—	—	—	**73. Balustrade plinth**-Balustrade element over apron to which balustrade panels are attached.	—
5.1.5.1.3 Balustrade interior panelling - C Interior panels between the skirting or the interior profile and the balustrade decking underneath the handrail.	—	—	—	—	—
5.1.5.1.4 Balustrade decking - E This decking is situated underneath the handrail and forms the top cover of the balustrade panelling.	—	**2.157.11 Decking or deck board**-the portion of the balustrade outside the moving handrails which is transversely horizontal (or approximately so).	—	**72. Balustrade decking**-Balustrade element to which handrail guides and balustrade panels are attached.	—
5.1.5.1.5 Balustrade exterior panelling - D Exterior panelling which from the balustrade deckings encloses the escalator or passenger conveyor.	—	—	—	—	—
5.1.5.1.6 Newel End of the balustrade on the landings, where the handrails change their direction of movement.	—	**2.157.15 Newel**-the portion of the balustrading on the landings at the ends where the moving handrail changes its direction.	—	**78. Newel**- Device located where the handrail passes over from the carrying run to the non-carrying run.	—
5.1.5.2 The balustrades shall have no parts on which a person would normally stand. Appropriate measures shall be taken to discourage people from climbing on the outsides of the	**802.3h Anti-Slide Device.** On high deck balustrades, anti-slide devices shall be provided on decks or combination of decks when the outer edge of the deck is greater than 12 in. (305 mm) from the center line of the	**3.3.8 Side guarding** The balustrades shall have no parts on which a person would normally stand. Appropriate measures shall be taken to discourage people from climbing on the outsides of the balustrade	**JEAS -406H (Draft) Standard for surroundings and supervision of escalators** **2. Description** **2.1 Related matters with floor openings etc. surrounding**	—	—

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balustrade if there is a danger of people falling from them. Normally, climbing on the outside of the balustrade is possible only at the lower landings because at the upper landings, railings or parapets prevent access to the balustrade. Climbing on the balustrade within the area of the lower landings is prevented, for instance, by the smooth outer balustrade decking, by railings arranged parallel to the balustrade, or by additional parts arranged at right angle to the balustrade.	handrail or on adjacent escalators when the distance between the center line of the handrail is greater than 16 in. (406 mm). These devices shall consist of raised objects fastened to the decks, no closer than 4 in. (102 mm) to the handrail and spaced no greater than 6 ft. (1.83 m) apart. The height shall be no less than 3/4 in. (19 mm). There shall be no sharp corners or edges. **802.3i Deck Barricades.** A barricade to restrict access to the outer deck on low deck exterior balustrades shall be provided at the top and bottom ends of each escalator where the outer deck width exceeds 5 in. (127 mm). On parallel abutting unit, this protection shall be provided where the combined outer deck width exceeds 5 in. (127 mm). The barricade shall extend to a height which is nominally 4 in. (102 mm) below the top of the handrail. When an escalator is not located at the edge of a floor surface, the barricade shall be installed on the outer deck at a point 40 in. (1.02 m) above the floor where the bottom of the barricade intersects the outer deck. Barricades may be made of glass or plastic provided that they meet the requirements of Rule 802.3c. **902.3h Deck Barricades** (1) A barricade to prevent access to the outer deck on low deck exterior balustrades shall be provided on each moving walk when the exterior deck is greater	if there is a danger of falling. NOTE: Normally, climbing on the outside of the balustrade is possible only at the lower landings because at the upper landings, rails or parapets prevent access. Climbing on the balustrade within the area of the lower landings is prevented, for instance, by the smooth outer balustrade decking, by railings arranged parallel to the balustrade or by additional parts arranged at right angle to the balustrade.	**escalators (To be done by building side)** **2.1.6** If there is any possibility that children can easily approach the side of the escalator and go upstairs on the deck board for fun, a partition plate etc. shall be furnished halfway on the deck board to prevent them for safety measures. Furthermore, it is recommended that partition plates to prevent climbing up be furnished at two locations on one side. (Refer to Fig. 3.)		

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	than 36 in. (915 mm) above the floor in any part of its travel and the exterior deck width exceeds 5 in. (127 mm), and is sloped at 45 deg. or less from the treadway. The barricade shall extend to a height which is nominally 4 in. (102 mm) below the top of the handrail. (2) The barricades shall be located wherever the exterior deck exceeds the 36 in. (915 mm) height above the floor. (3) Barricades may be of glass or plastic, provided that they meet the requirements of Rule 902.3c. All exposed barricade attachment fastener heads shall be of the tamper-resistant type.				
5.1.5.3 With 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.	**802.3b/902.3b Strength.** Balustrades shall be designed to resist the simultaneous application of a static lateral force of 40 lbf/ft (584 N/m) and a vertical load of 50 lbf/ft (730 N/m), both applied to the top of the handrail stand.	**3.3 BALUSTRADES** **3.3.1 Construction** **3.3.1.1 General** Solid panel balustrading shall be provided at each side of the steps. On the passenger side, the balustrading shall be smooth and substantially flush. Mouldings or other projections shall not be raised more than 6 mm nor be depressed more than 6 mm from the panel surface. Any projecting mouldings or fillets shall be bevelled. Amendment no1 1997 With 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. The balustrade interior panelling shall have adequate mechanical strength and rigidity. When a force of 500 N is applied to the	—	—	—
5.1.5.4 The parts of the balustrade facing the steps, pallets or belt shall be smooth. Covers or strips not in the direction of travel shall not project more than 3 mm. They shall be sufficiently rigid and have rounded or bevelled edges. Covers or strips of such nature are not permitted at the skirting. Cover joints in the direction of travel (in particular between the skirting and the balustrade interior panelling) shall be arranged and formed in such a manner that the risk of trapping is	**802.3a/902.3a Construction** (1) The balustrade on the step/tread side shall have no areas or moldings depressed or raised more than 1/4 in. (6.4 mm) from the parent surface. Such areas or moldings shall have all boundary edges bevelled or rounded. (2) The balustrade shall be totally closed, except: (a) where the handrail enters the newel base (see Rule 802.4c/902.4c); (b) gaps between interior panels		**BSLJ-EO; Article 129-12** **1. (1)** As specified by the Minister of Land, Infrastructure and Transport, escalators shall be devised so as persons or articles not to be caught, and so as not to be collide with obstacles under the normal using condition. **MOC-N (No.1417-2000)** **EXP.1**. The escalator of this notification includes moving walks and escalator for person sitting on wheelchair …. Further the interior panel should be smooth and durable	**5.6.4** The differences between planes of balustrade elements, such as panels, strips, and moldings, must not be greater than 3 mm from the side of the stairway belt. **5.6.6** The surfaces of the aprons facing the steps shall prevent the shoes of passengers from being drawn in. No strips or moldings shall be installed on the aprons facing the stairway belt. The permissible gaps in the	—

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reduced to a minimum. Gaps between the interior panels of the balustrade shall be not wider than 4 mm. The edges shall be rounded off or bevelled. The balustrade interior panelling shall have adequate mechanical strength and rigidity. When a force of 500 N is applied to the balustrade interior panelling at any point of the panelling at right angles on an area of 25 cm^2, there shall be no gap greater than 4 mm and no permanent deformation (setting tolerances are permitted). The use of glass for the balustrade interior panelling is permitted provided it is splinter-free one-layer safety glass (tempered glass) and has sufficient mechanical strength and rigidity. The thickness of the glass shall be not less than 6 mm. **5.1.5.5** Protrusions and indentations shall not present sharp edges.	shall not be wider than 3/16 in. (4.8 mm). The edges shall be rounded or bevelled. (3) The width between the balustrade interior panels in the direction of travel shall not be changed. **802.3c/902.3c Use of Glass or Plastic.** Glass or plastic, if used in balustrades, shall conform to the requirements of ANSI Z97.1 or 16 CFR Part 1201, except that there shall be no requirement for the panels to be transparent. Plastic bonded to basic supporting panels is not required to conform to the requirements of ANSI Z97.1.	balustrade interior panelling at any point of the panelling at right angles on an area of 25 cm2 , there shall be no gap greater than 4 mm and no permanent deformation (settling tolerances are permitted). **3.3.1.2** Angle and width of transition piece The angle between the horizontal and any transverse section of any transition piece, between the balustrade adjacent to the steps and the upper part of the balustrading, shall be not less than 25 degrees (see Figure 2.2). NOTE: In designs prior to 1969, this angle was permitted to be not less than 20 degrees. Where this angle is not more than 45 degrees, the horizontal width of the transition piece shall be not more than 120 mm. Where this angle is more than 45 degrees, the horizontal width of the transition piece shall be not more than 165 mm. Any horizontal part of the transition adjacent to the balustrade internally, shall not be more than 30 mm wide. **3.3.2** Change in width between balustrades The width between the balustrades in the direction of travel shall not be changed abruptly, and by not more than 8% of the greatest width. Where changes of width are provided, the angle of change in the balustrading to the line of travel shall be not more than 15 degrees. **3.3.3** Use of glazing in	construction without rugged portion as much as possible and it should be installed so as not to catch hands or fingers of the passengers.	joints of panels and aprons of the balustrade shall not exceed 4 mm. **5.6.5** Apron joints should not have differences in height more than 0.5 mm and their displacement relative to each other should be impossible (except the area of the temperature joint).
—	—	—	—	—	—

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		balustrades (Amendment no 1 1997) Glazing panel materials, when used in escalator balustrades, shall be in accordance with table 3.3.3.(see table 3.3.3 at end of document) and comply with the following: (a) AS 2208 Safety glazing materials for use in buildings (Human impact considerations); (b) AS 1701 SAA Loading Code part 1 with regard to "Live Loads"(Section 4); (c) The exposed surface of the glazing panels shall not be lower than the step nosing or step tread surface; (d) Exposed edges of glazing panels shall be substantially flush and either rounded, smooth or bevelled and the gap between panels shall be no greater than 4 mm; otherwise, plastics, joining strips, mouldings, or their equivalent, complying with Clause 3.3.1.1 shall be provided **3.2.3** Lighting of trusses and pits. Where exterior access is provided to trusses and pits, suitable lighting controlled by a switch adjacent to the entrance shall be provided. **3.2.4** Lighting at inspection panels. Where an inspection panel is provided for machinery spaces which contain unguarded moving parts, suitable lighting controlled by a switch adjacent to the opening shall be provided. AS 1170.1 "Loading Code" (b) All other handrails, balustrades, and the like,			

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		including parapets and railings to all roofs, shall be designed to resist a static load of 0,75 kN/m acting inward, outward or downward, or the appropriate wind load, whichever produces the most adverse effects. NOTE: On railings or balustrades which may be called upon to restrain crowds or people under panic conditions, a load up to 3 kN/m run may be encountered.			
5.1.5.6 The skirting shall be vertical. The vertical distance h_2 between top edge of skirting or bottom edge of projecting cover joints or the rigid part of deflector devices (for definition see 3.5) where installed and the tread surface of the steps, pallets or belt shall be not less than 25 mm (see figure 2).	**802.3f/902.3f Skirt Panels** (1)/(2) The height of the skirt above the tread nose line/top of the tread shall be at least 1 in. (25 mm) measured vertically.	—	—	74. **Balustrade apron** - Lower vertical part of balustrade along the stairway belt on the level of steps and designed for adjusting the clearance between the step and balustrade.	**3.3.1(6)** The skirt guard shall satisfy the following standards. The skirt guard shall be vertical. The vertical height between the tread and the top of the skirt guard (To the bottom of the cover in case there is a cover, or to the bottom of the auxiliary device if an auxiliary safety device is installed.) shall be 25mm or higher. The skirt guard shall be positively fixed and level.
5.1.5.6.1 The skirting shall be extremely rigid, plane, and butt-jointed. However, special arrangements instead of butt-jointing will possibly be necessary for long passenger conveyors at the points where they pass over building expansion joints.	**802.3f/902.3f Skirt Panels** (2)/(3) Skirt panel shall not deflect more than 1/16 in. (1.6 mm) under a force of 150 lbf (667 N).[4)] [4)] *A17.1 is equivalent to EN 115. A deflection of 4mm would require 1667 N.*	—	—	**5.6.5** Apron joints should not have differences in height more than 0.5 mm and their displacement relative to each other should be impossible (except the area of the temperature joint).	The deflection of the skirt guard shall not exceed 4mm in any part when a force of 1500N(153kgf) is applied at right angle to an area of 25?, and shall not carry permanent strain after the test. However, if this test cannot be conducted at the acceptance inspection at site due to the characteristics of the elevator design structure, such requirements may be verified by checking design documents or test reports
5.1.5.6.2 The skirting defined in 5.1.5.6 shall yield not more than 4 mm under a single force of 1500 N acting at the most unfavourable point at right angles to the	—	**3.3.7.1 Stiffness** The skirting shall be capable of sustaining a force of 1500 N at right angles to the surface, distributed over an area of 2500 mm^2 at any position	—	**3.12** Elastic deflection of the balustrade apron under a load of 1500 N imposed at right angle to the surface over an area of 0.0025 m^2	

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surface over an area of 25 cm^2. No permanent deformation shall result from this.		without deflecting more than 4 mm or permanently deforming.		between supports shall not exceed 4 mm. There shall be no residual deformation.	issued by authorized testing institutions. The skirt guard shall be made of materials featuring low friction coefficient or the surface treated materials.
5.1.5.6.3 On escalators, the possibility of trapping between skirting and steps shall be reduced. For this purpose, the following three conditions shall be fulfilled: - sufficient rigidity of the skirting according to 5.1.5.6.2; - clearances to be in accordance with 11.2.1; - reduction of coefficient of friction by the use of suitable materials or suitable type of lining for the skirting.	**802.3f Skirt Panels** (3) The exposed surfaces of the skirt panels adjacent to the steps shall be smooth and made from a low friction material or treated with a friction reducing material.[5)] **902.3f Skirt Panels** (4) The exposed surfaces of the skirt panels adjacent to the steps shall be smooth. [5)] *See **Rule 802.3e** for clearances. A17.1 does not prohibit yellow side markings but inquiry 94-73 held deflector devices as violating **Rules 802.3a(1)** and **802.3f(3).***	**3.3.7 Skirting** **3.3.7.1 Stiffness** The skirting shall be capable of sustaining a force of 1500 N at right angles to the surface, distributed over an area of 2500 mm2 at any position without deflecting more than 4 mm or permanently deforming. **3.3.7.2 Friction** In order to reduce the danger of objects being pulled into any gap between the steps and the skirting panels, the frictional properties of the exposed surfaces of the skirting panels shall be kept to a minimum by appropriate design.	**MOC-N (No.1417-2000);** **1.** The construction of escalator devised so as persons or articles not to be caught, not to be collide with obstacles prescribed by **BSLJ-EO; Article 129-12 item 1 paragraph 1**, shall be specified as follows (1), (2) and (3). However (1) and (2) shall not apply to the escalator providing following conditions. - 2 or more steps are kept in the same level of tread surface when the escalator carries the person sitting on wheelchair. - *The rated speed in that operation does not exceed 30 m/min.* - Stoppers for the wheels are furnished on the tip of that leveled tread surface. (1) The clearance between the steps and the skirt guard panel should not exceed 5 mm. **EXP.1.(1)** The horizontal clearance between the steps and the skirt guard panel (at one side) should not exceed 5 mm in the condition that no force is acting on the skirt guard panel when the escalator stands still. For the moving walks in which the skirt guard panel is placed above the steps, the vertical clearance between the tread surface and	**3.12** Elastic deflection of the balustrade apron under a load of 1500 N imposed at right angle to the surface over an area of 0.0025 m^2 between supports shall not exceed 4 mm. **5.6.6** The surfaces of the aprons facing the steps shall prevent the shoes of passengers from being drawn in. No strips or moldings shall be installed on the aprons facing the stairway belt. The permissible gaps in the joints of panels and aprons of the balustrade shall not exceed 4 mm.	—

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			lower portion of the skirt guard panel should not exceed 5 mm when the escalator stands still. **JEAS -406H (Draft)** **2. Description** **2.2 Related matters on supervision of the escalators** (Matters to be cared by superintendents) **2.2.3** It is recommended that high molecular lubricant be regularly applied to the skirt-guards (as well as flat type step risers) to make flexible footwear such as rubber shoes, hands, feet etc. difficult to be pulled in between the side of the steps and the skirt-guards.		
5.1.5.6.3 .In addition, suitable deflector devices or yellow markings may be provided on the sides of the step tread surface.	—	**3.6.10 Step demarcation** **3.6.10.1** Adjacent to the balustrades one or both of the following means shall be provided to highlight the safety limits of the step tread to each of the balustrades: **(a)** Demarcation line (see Figure 3.6.10.1(a)) which shall be (i) parallel to the balustrade skirts; (ii) not more than 50 mm from the adjacent balustrade skirt; (iii) not less than 30 mm wide; and (iv) bright yellow coloured. **(b)** Deflector guard (see Figure 3.6.10.1(b)) which shall comply with the following requirements: (i) The rubbing or contact portion shall be manufactured from materials of such flexibility and hardness as to inhibit abrasion during contact at operating speed	**JIS A 4302-1992, 4.4.2 Inspection to be carried out on upper and lower landings and on steps** (13) The safety marks (10) on steps shall be clear. Note (10) :The colour of safety mark is yellow or red. **JEAS -406H (Draft)** **2. Description** **2.2 Related matters on supervision of the escalators** (Matters to be cared by superintendents) **2.2.4** Since more passengers use the escalator and the demarcation line on the steps wear more, timely repair is advisable. **JEAS-406G (Draft)** **2. Description** **2.5** On the tread of every step there shall be a yellow	**5.3.1** The tread of a step shall have projections and recesses along the axis of the escalator. The cover of a step shall end in a projection near the balustrade. Two extreme projections and their preceding recesses on both sides shall have bright distinctive colour.	**4.3.2(16)** The safety mark shall clearly be indicated in yellow or red on the steps.

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		(ii) The design shall encourage deflection away from the skirting panel; (iii) The top of such deflector shall not be higher than the top of the vertical portion of the decking and skirting panel transitions; (iv) Transitions, tapered towards the skirting panels, shall be provided at the terminals of each deflector unit; (v) A minimum clearance of 25 mm shall be provided between the underside of any deflector device and the top of any step cleat, throughout the inclined portion of travel; (vi) A minimum clearance of 50 mm shall be provided between the underside of any deflector device and the top of any step cleat at the true horizontal portion of travel; (vii) Deflector devices shall have a minimum projection of 25 mm and a maximum of 50 mm from the vertical face of skirting panel; (viii) The terminal part of any deflector device shall end prior to reaching the combplate and not less than 50 mm nor more than 150 mm from the root of the combplate teeth; (ix) The positioning of a deflector device shall not inhibit the operation of any combplate lighting system.	demarcation line which is 20 mm wide or more on three sides (on the fringes of both sides and the riser side of the adjacent step) or four sides (on all the fringes of the tread).		
—	**805.7 Step Demarcation Lights.** Green step demarcation lights located below the step shall be located at both landings in an area not to exceed 16 in. (406 mm) from combplate. There shall be a minimum of two fluorescent	**3.6.10 Step demarcation** **3.6.10.2 Between adjacent steps** One or both of the following means of demarcation shall be provided, to highlight the gaps between adjacent steps: **(a)** A line on the tread, (see	—	—	—

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	lamp fixtures at each landing. The lamps shall be activated whenever the escalator is in operation.	Figure 3.6.10.2(a)) adjacent to the projecting edge of each step, which shall be (i) not less than 25 mm wide; and (ii) bright yellow coloured. **(b)** Two green fluorescent tubes, at least, shall be provided within the step-band at each end of each escalator to highlight the gaps between adjacent steps (see Figure 3.6.10.2(b)). The fluorescent tubes shall be activated whenever the escalator is operating normally.			
5.1.5.7 The interior profile and the balustrade interior panelling shall have an angle of inclination γ of at least 25° to the horizontal (see figure 2).	**802.3d/902.3d Interior Low Deck.** The interior low deck, where provided, shall conform to the following.[6)] (1) The width from the vertical face of the interior panel to the vertical plane of the skirt panel shall not exceed 6 in. (152 mm).	**3.3.1.2 Angle and width of transition piece** The angle between the horizontal and any transverse section of any transition piece, between the balustrade adjacent to the tread way between the balustrade adjacent	—	Inclination angle of balustrade plinth, degrees, minimum γ = 25	—
5.1.5.7.1 This requirement does not apply to the horizontal part of the interior profile that directly joins the balustrade interior panelling (see b_4 in figure 2). This horizontal part b_4 up to the balustrade interior panelling shall be less than 30 mm.	(2) The profile of the deck perpendicular to the line of travel shall be at least 20 deg. but not greater than 30 deg; (3) A horizontal section may be provided immediately adjacent to the interior panel. It shall be not greater 1 1/4 in. (32 mm).	to the treadway and the upper part of the balustrading, shall be not less than 25° (see Figure 2.2). *NOTE: In designs prior to 1969, this angle was permitted to be not less than 20 degrees.*	—	**Appendix 3** Horizontal part of balustrade plinth, mm, maximum l_5 = 30	—
5.1.5.7.2 The width b_8, measured horizontally, of each interior profile inclined at an angle of less than 45° to the horizontal shall be less than 0,12 m (see figure 2).	[6)] *This Rule addresses the same elements as EN 115, but has somewhat different dimensions*	Where this angle is not more than 45°, the horizontal width of the transition piece shall be not more than 120 mm. Where this angle is more than 45°, the horizontal width of the transition piece shall be not more than 165 mm. Any horizontal part of the transition adjacent to the balustrade internally shall not be more than 30 mm wide.	—	Distance from apron to balustrade shield, mm, maximum l_3 = 120	—

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5.1.5.8 The horizontal distance (measured at right angles to the direction of travel) between the balustrade interior panelling at lower points shall be equal to or less than the horizontal distance measured at points higher up. The maximum distance between the balustrade interior panelling at any point shall be smaller than the distance between handrails. EXCEPTION: Handrails centralized with balustrade interior panelling.	—	—	**BSLJ-EO; Article 129-12 1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and centre of the handrail at the said side of the steps shall be not more than 25 cm. **BSLJ-EO; Article 129-12 EXP.1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and centre of the handrail at the said side of the steps shall be not more than 25 cm(i.e. distance between handrails is no more than 1.6 m) The width of the steps for moving walk with inclination less than 4 degree is less than 1.6 m and distance from side edge of step to center of handrail is not more than 0.25 m (i.e. distance between handrails is not more than 2.1 m) **(MOC-N(No.1413-2000)2-2.)** Generally, two kinds of the escalator with step width of 600 mm (past 800 type) and 1000 mm(past 1200 type) are available. They are called as S600 type and S1000 type.	**5.6.3** Interior planes of the balustrade may be vertical or expanding upward.	—
5.1.5.9 The newel including the handrails shall project beyond the root of the comb teeth by at least 0,6 m in longitudinal direction (see l_4 and l_1 in figure 1 and detail X).	—	—	—	—	—

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(see also 7.2)					
5.2 Surrounds of the escalator and passenger conveyor **5.2.1** At the landings of the escalator and passenger conveyor a sufficient unrestricted area shall be available to accommodate passengers. The width of the unrestricted area shall at least correspond to the distance between the handrail centerlines (see b, in figure 2). The depth shall be at least 2,50 m measured from the end of the balustrade. It is permissible to reduce it to 2,00 m if the width of the unrestricted area is increased to at least double the distance between the handrail centerlines. Attention is drawn to the fact that this free area has to be considered as part of the whole traffic function and, thus, needs sometimes to be increased.	**802.6d/902.8d Safety Zone.** The entry and exit zone shall be kept clear of all obstacles. The width of the zone shall be not less than the width between the center lines of the handrails plus 8 in (203 mm). The length of the zone, measured from the end of the newel, shall be no less than twice the distance between the center lines of the handrails. These dimensions are absolute minimums and every consideration should be given to traffic patterns. **802.6c/902.8c Adjacent Floor Surfaces.** The adjacent floor surfaces at each landing shall be continuous with the top of the landing plate with no abrupt change in elevation of more than 1/4 in. (6.4 mm).	**2.1 ACCESS** **2.1.1 Exit landing area** The extent of each landing shall be substantially level and of a material that will afford a secure foothold. It shall provide sufficient space so as to avoid congestion and allow for the free flow of passengers when the escalator *(moving walk)* is operating at full capacity. However, this area shall be not less than that shown in Figure 2.1.1. Where it is proposed to install escalators *(moving walks)* in series, egress from intermediate platforms shall be provided or the special interlocking of each escalator *(moving walk)* control is required. **NOTE** For transport terminals, shopping areas and similar, consideration should be given to more extensive clear landing areas.	—	**6.15** An area with a width no smaller than the distance between the outer edges of the handrails and at least 4.5 m deep shall be provided from protruding equipment, such as barriers or cabins, before the entrance to the escalator.	**3.3.1 (7)** The platform area shall satisfy the following standards. The platform width shall be greater than the distance between the handrail center lines. The platform length shall be 2.5 m or longer in the direction of moving when measured from the edge of the railing; provided however, if the platform width is greater than the double the distance between the handrail center lines, the platform length may be 2.0 m or more.
In the case of successive escalators and passenger conveyors without intermediate exits, they shall have the same theoretical capacity (see 14.2.2.4.1.j)).	—	**2.1.2 Width of passageways** Passageways used for exit from or access to an escalator *(moving walk)* shall have a combined width not less than the width of the escalator, *(moving walk)* subject to a minimum of 600 mm.	—	**6.16** Should several groups of escalators be installed successively without intermediate exits, these shall all have the same theoretical capacity and an area shall be provided between them as specified in Section 6.15.	—
5.2.2 The landing area of escalators and passenger conveyors shall have a surface that provides a secure foothold for a minimum distance of 0,85 m measured from the root of the comb teeth (see L_1 in figure 1 and detail X). Exempt from this are	**806.3/906.3 Access to Interior** Reasonable access to the interior of the escalator shall be provided for inspection and maintenance. Access plates requiring no more than 70 lbf (311 N) of effort to open shall be provided at both landings. the plates shall be made	**NOTE** Building regulations may require a wider access.	—	**5.4.1** Landings with inclined combs shall be provided for safe entry on and exit from the stairway belt. The surface of the landings shall be channelled.	—

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the combs mentioned in 8.3.	of a material which will afford a secure foothold. The use of stone, terrazo, or concrete as a fill material is prohibited within the confines of the moving walk truss. Access plates at the top and bottom landings shall be securely fastened. If access doors are provided in the side of the escalator enclosure, they shall be locked and the key kept in a location accessible to authorized persons but not to the general public. The key shall be removable only when in the locked position.				
5.2.3 The clear height above the steps of the escalator or pallets or belt of the passenger conveyor at all points shall be not less than 2,30 m (see h_4 in figure 1).	**802.12/902.16 Headroom** The minimum headroom shall be 7 ft (2.13 m) measured vertically from the step noseline, landing plates, and landings.	**3.6.9 Headroom above steps *(treadway)*** Headroom clear of all obstructions of not less than 2100 mm, measured from the step nosings *(vertically above the treadway surface),* shall be provided above the escalator *(treadway surface)* for its full width and height.	**JIS A 4302-1992** **4.4.2 Inspection to be carried out un upper and lower landings and on steps** (8) Where dangerous pillars, beams, etc. are located within 0.5 m horizontally from the handrails or 2.1 m above the steps, suitable guards shall be provided. **JEAS -406H (Draft)** **2. Description** 2.1.3 On the walls etc. adjacent to the escalator, partially protruding obstacles (advertisements, lighting fixtures, piping, partition columns, projected walls, etc.) shall not be furnished within a range of 2100 mm vertically from the nose line of the steps and 500 mm horizontally from the outer face of the handrails. (Refer to Fig. 3)	**Appendix 3** Vertical distance between step tread level and ceiling or protruding parts of structure, minimum h_1 = 2300 mm	**4.3.1.(10)** Appropriate protection device shall be installed in case dangerous column or bearm is located within 0.5 m horizontally from the handrails or within 2.1 m vertically from the steps.

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5.2.4 Where building obstacles can cause injuries, appropriate preventive measures shall be taken (see 7.3.1).

In particular, at floor intersections and on criss-cross escalators or passenger conveyors, a vertical obstruction of not less than 0,30 m in height, not presenting any sharp cutting edges shall be placed above the balustrade decking, e.g. as an imperforate triangle (see h_5 in figure 1). It is not necessary to comply with these requirements when the distance b_9 between the centerline of the handrail and any obstacle is equal to or greater than 0,50 m (see figure 2).

802.3g/902.3g Guard at ceiling Intersection

(1) On high deck balustrades, a solid guard shall be provided in the intersection of the angle of the outside balustrade deck and the ceiling or soffit, under the following conditions:

(a) where the clearance between the outside edge of the deck and the ceiling or soffit is 12 in. (305 mm) or less; or
(b) where the projected intersection of the outside deck and the ceiling or soffit is 24 in. (610 mm) or less from the center line of the handrail.

(2) On low deck balustrades, a solid guard shall be provided to protect the intersection formed by the top of the handrail and the plain of the ceiling or soffit where the centerline of the handrail is 14 in. (356 mm) or less from the ceiling or soffit.

(3) The vertical edge of the guard shall be a minimum of 8 in. (203 mm) in length.

(4) The escalator/moving walk side of the vertical face of the guard shall be flush with the face of the wellway.

(5) The exposed edge of the guard shall be rounded and have a minimum width of 1/4 in. (6.4 mm).

(6) Guards may be of glass or plastic, provided they meet the requirements of Rule 802.3c/902.3c.

Also **see Appendix D, Figs. D4 and D5**.

3.3.6 Guards at ceiling intersection Where the distances and clearances between the ceiling, beams, or crossed escalator *(moving walk)* trusses and the outside edge of the handrail and balustrade do not comply with the limitations shown in Figure 3.3.6(A), a solid guard shall be provided in the intersecting angle, i.e. if the intersection of distances A and B falls within the unshaded area of the figure, then a guard is required.

The guard shall have a height of not less than that shown in Figure 3.3.6(B) and shall be approximately vertical at its leading edge. A curved guard may be used, provided that the diameter of the circle is not less than 2D (see Figure 3.3.6(B)) and the curve is tangential to the vertical line and convex to the crossing point of the ceiling or escalator *(moving walk)*.

The lower edge of the intersecting guard shall be continuous and attached to or returned to the decking at a level below the handrail, or shall be extended and attached to a portion of the balustrade or a fixture below the level of the decking so that this combination will provide a smooth vertical surface for a distance not less than 450 mm below the handrail (see Figure 3.3.6(C) and Clause 3.4.6.).

3.4.1 Note 2

The range of height of the handrail is nominated on the basis of its suitability for persons

MOC-N (No.1417-2000)

1. The construction of escalator devised so as persons or articles not to be caught, not to be collide with obstacles prescribed by **BSLJ-EO; Article 129-12 item 1 paragraph 1**, shall be specified as follows (1), (2) and (3).

(3) When the horizontal distance between the outer side of handrail and any obstacle which intersects and close to that outer side of handrail, e.g. the building ceiling, building beam etc. or the lower surface of the adjacent escalator is not greater than 50 cm, a wedge guard should be furnished as follows.

(a) The wedge guards should be furnished at lower side of the obstacle.

(b) The thickness of the wedge guard end should be equal to or greater than 6 mm with no sharp edge. The wedge guard should have construction of the length with which the wedge guard reaches at 20 cm or more, vertically lower than upper surface of the handrail.

(c) The wedge guard surface should not differ in rank with the obstacle surface facing the escalator.

EXP.1.(3)

(Paragraph 1) …. The wedge guard should be furnished stationary.

(Paragraph 2) …. If the wedge guard could not be fixed on the obstacle because of its

6.18 If the distance from the centreline of the handrail of a floor escalator to an opening in the cover or to the centreline of the handrail of an adjacent escalator (when they run in opposite directions) is less than 500 mm, a protective shield shall be provided in the area where the handrail intersects with the cover or the lower edge of the adjacent escalator. The baffler edge of the shield shall be smooth, rounded and have a vertical height of at least 300 mm.

4.3.2 (14) The following measures shall be taken to prevent part of the human body, such as the head, from being caught by the triangle part created between the building ceiling or sides intersecting with the balustrade.

As shown in Figure 1, the clearance shall be closed up to the point the vertical distance of the triangle gap is 30 cm in order to prevent the triangle from being formed. The area shall be finished with elastic materials (such as sponge) to prevent bodily injury even when collided with the step's advancing speed. However, this provision shall not apply in case the building ceiling or side is away from the outer edge of the hand rail for more than 50 cm, or if the intersecting angle exceeds 45°.

To warn the people of the danger of colliding with the triangle part, a mobile safety shield made of injury-free materials shall be installed at a place approximately 25~35 cm from the front side. However, in case the ceiling or the side of the building is 50 cm or more away from the external edge of the handrail, or if the crossing angle is greater than 60°, this provision shall not apply.

The corners and the edges of the materials used to

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		riding on the escalator. In open spaces, building designers may have to provide additional protection along the side of the escalator.	construction, the wedge guard might be suspended firmly from the ceiling or beam etc. and its lower side might be fixed to the escalator with chain etc. without big difference in rank with the obstacle surface facing the escalator. (Paragraph 3) …. If the stationary wedge guard could not reach vertically lower than upper surface of the handrail, lower end of the wedge guard might be put on the balustrade decking. (Paragraph 4) Vertical surface of the stationary wedge guard facing the escalator is specified not to differ in rank with the obstacle surface facing the escalator. However it may project at the dimension about a thickness of the wedge guard board or its metal fitting. *(Paragraph 5) The wedge guard is not required when the obstacle is vertical pillar etc. with no sharp edge.* **EXP.[Notice of designing]** **2. Wedge guard** (1) The stationary wedge guard is effective for preventing the passenger's head from being caught, and its height over the handrail should not be less than 30 cm. (2) The front end of the stationary wedge guard may be a cylinder of 50 mm or more in diameter. (3) It is recommended that a movable wedge guard is furnished in front of the		cover the triangle part, safety shield and the ceilings of buildings that are likely to collide with the people shall be rounded with no sharp parts left.

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			stationary wedge guard to warn the passenger leaning over the handrail of approaching the stationary wedge guard. **JEAS-406H (Draft)** **2. Description** **2.1 Related matters with floor openings etc. surrounding escalators (To be done by building side)** **2.1.1** The edge of the lower surface of the building ceiling etc. which intersects the escalator shall not protrude inward from the finished surface of the exterior panel of the escalator. **2.1.2** When the building ceiling and the building beam etc. intersecting the escalator or the lower surface edge of the exterior panel of the adjacent escalator is close to the outer surface end of the handrail within 500 mm horizontally, a wedge guard consisting of a movable guard plate and a stationary guard plate shall be used there to warn the passengers of approaching a dangerous spot and to prevent the passengers from being caught. The building structures where wedge guards are equipped shall have enough strength. The materials and details of fixing the movable guard plate and the stationary guard plate are described as follows (Refer to Fig. 1 and Fig. 2.). (1) The movable guard plate should be of the suspended		

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—	—	—	type and the stationary guard plate to be of the stationary type, respectively. (2) The front end of the movable guard plate should be located at a distance of 1,000 mm (700 mm in case of intersecting at 60°) or more from the intersecting point and the rear end at a distance of about 450 mm (275 mm in case of intersecting at 60°). The clearance between the upper end of the movable guard plate and fixing surface should be about 100 mm and free length of the suspending chains etc. should be 75 mm or more. (3) The front end of the stationary guard plate should be located at a distance of about 350 mm (175 mm in case of intersecting at 60°) from the intersecting point and the rear end at around the intersecting point. **2.1.3** On the walls etc. adjacent to the escalator, partially protruding obstacles (advertisements, lighting fixtures, piping, partition columns, projected walls, etc.) shall not be furnished within a range of 2,100 mm vertically from the nose line of the steps and 500 mm horizontally from the outer face of the handrails (Refer to Fig. 3). **JEAS -406H (Draft)** **2. Description** **2.1 Related matters with floor openings etc. surrounding**	—	—

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			escalators (To be done by building side) **2.1.4** When there is some clearance or space between the escalator and the opening of the building floor, fences for prevention of falling down and barriers for prevention of obstacles falling shall be furnished. At a place facing the entrance or the exit of the escalator, a partition plate shall be furnished to prevent the children from coming in by mistake (Refer to Fig. 4). **2.1.5** When there is some clearance or space of 200 mm or more between the two adjacent escalators or between the escalator and the opening of the building floor etc., safety nets etc. which do not allow the ball of 50 mm in diameter pass through shall be furnished at every other floor to catch the falling personal belongings of the passengers etc. for preventing injury due to the falling articles. Frameworks of the safety nets etc. shall be made of steel or the like and shall be fixed firmly.		
5.3 Supporting structure of the escalator or passenger conveyor The supporting structure shall be designed in a way that it can support the dead weight of the escalator or passenger conveyor plus a passenger weight of 5 000 N/m^2 [load carrying area = nominal width z_1 (see figure 2) of	**802.9/902.10 Rated Load** [8] [8] *Rated loads are expressed in terms that apply to both linear and curved escalators.* **802.9a/902.10a Structural.** For the purpose of structural design, the rated load shall be considered to be not less than: *(Customary Units)* Structural rated load (lb) =	**2.6 RATED LOAD *(LOAD RATING FOR CONSTANT SPEED MOVING WALKS)*** The rated load shall be calculated from the following equation: Rated load (kilograms) = 0.27 WA where W = the width between the balustrades (see Clause 2.2), in millimeters;	**BSLJ-EO; Article 129-12** **2**. With respect to the escalators installed in the building, the provisions of Article 129-4 (except paragraph 3 item (5)) and Article 129-5 paragraph 1 shall apply mutatis mutandis. In this case, the terms shown in the middle column corresponding	**3.4** The design and verification of the strength of escalator elements and of deflection of the steelwork for a non-operating escalator must take into account the loads listed in Appendix 4. **Max. static load qc_1**- Strength - Metalwork, floor	—

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the escalator or passenger conveyor x distance between supports l_1 (see figure 1)]. An impact factor shall not be added to the passenger load.	4.6 (*W* +8)*A/8,33 (W)A* *(SI Units)* Structural rated load (kg) = 0.27 (*W* +203)*A/ 0,49 (W)A* where *A* = length of the horizontal projection of the entire truss measured along its centerline, ft. (m) [9] [9] *The length "A" is the horizontal projection of the entire truss in order to cover a cantilevered truss that extends beyond the support.* *W* = width of the escalator/moving walk, in. (mm) (see Rule 802.2/902.2a and 902.7)	A = the horizontal distance between the upper and lower combplate teeth, in meters. ***(2.6.1 Structural** For the purpose of structural design, the load rating shall be considered to be not less than 4.75 kPa, applied to the exposed area of the treadway.* ***2.6.2 Machinery** For the purpose of brake, treadway and power transmission calculations, the load rating shall be considered to be not less than the following:* *(a) For systems with an overall length up to 50 m 3.58 kPa;* *(b) For systems with an overall length greater than 50 m 3.58 kPa* *decreasing uniformly to not less than 1.47 kPa at a rate of 0.039 kPa/m provided that* *(i) a monitoring system continually checking the load is provided;* *(ii) speed is ramped down to a stop when the rated load is exceeded, and requires manual restarting;* *(iii) in (ii) above, the deceleration does not exceed 1 m/s2; and* *(iv) the brake and system friction is sufficient to prevent movement of the walkway under a load rating of 3.58 kPa.)* **2.7 FACTOR OF SAFETY** The factor of safety based on the static loads for trusses and structural members, including tracks, shall be not less than 2.5, based on yield strength. *(The factors of safety based on the static loads shall be not less*	to the provisions shown in the left column of the following table shall read the terms shown in the right column of the table. **[see Table B.1 in the annex of this comparison]** **3.** Carrying load for the escalators shall equal or exceed the values calculated by the following formula: P=2600 A where: P: The carrying load for the escalator, in Newtons A: The horizontal projected area of the steps of the escalators, in square meters **BSLJ-EO;** **Application of Article 129-4** **1.** The construction of principal structural parts to suspend or to support the steps of the escalator (hereinafter refer to as principal supporting parts in this Article) shall comply with any of the provisions described in the following items. (1) The steps and the principal supporting parts at installation and during use shall be constructed as the structural method designated by the Minister of Land, Infrastructure and Transport considering the abrasion and the fatigued destruction, as conforming to the following provisions. a. Any damage by the shock during the normal operation	slabs, landings and guides: 5000 N/m² **Static load qc_2**- Deflection - Metalwork, floor slabs, landings: 4000 N/mm² **3.11 Deflection of track system** Elastic deflection of guide runners under the load q_{me} shall not be greater than 1/1000 of the span, additional forces from traction chains being taken into account for design of curved guides. q_{me}= 2000 x (2,1-V)B n/mm² where V operational speed B stairway belt step tread width	

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		than the following: *(a) For trusses and all structural members, including tracks, based on yield strength 2.5* *(b) For belt treadways (including the splice) with slider bed support or safety decking (see Clause 3.6.7.4) 5;* *(c) For belt treadways (including the splice) without slider bed support or safety decking (see Clause 3.6.7.4) 10* *(d) For belt-pallet and pallet-type treadways 10.)*	and when the safety device is actuated shall not occur to the parts other than the parts liable to the abrasion or the fatigued destruction by the ascent and descent of the steps b. Any damage which causes fall down of the step under the normal use by the shock during the normal operation and when the safety device is actuated shall not occur to the parts liable to the abrasion or the fatigued destruction by the ascent and descent of the steps. (2) With respect to the escalators suspended by the chain, other escalators designated by the Minister of Land, Infrastructure and Transport, it shall be confirmed that the structures of the steps and principal supporting parts comply with a and b of the preceding items by the strength verification method for the escalators with taking account of the abrasion or the fatigued destruction under the normal using condition. (3) It shall be approved by the Minister of Land, Infrastructure and Transport that the structures of steps and principal supporting parts at installation and during use comply with the provisions of a and b of the item (1). **2**. “The strength verification method for the escalators” is the method to verify the strength of the steps and principal supporting parts of the		

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			escalators at installation and during use in accordance with the following provisions. (1) The force acting on the principal supporting parts and the step slabs (herein after refer to as the principal supporting parts etc. in this Article) shall be calculated in accordance with the load stipulated in the following Article. (2) The intensity of stress occurred on the section of the principal supporting parts etc. during normal operation and when the safety device is actuated in the preceding item shall be calculated by the formula described in the following table. [**see Table B.2 in the annex of this comparison**] In this table G1, G2 and P indicate following force and X1 and X2 indicate following values respectively. G1: forces occurred by the fixed load of the parts except the ascending and descending parts out of the fixed load stipulated in item 1 of following article. G2: forces occurred by the fixed load of the ascending and descending parts out of the fixed load stipulated in item 1 of following article. P: forces occurred by the movable load stipulated in item		

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			3 of article 129-12 X1: the value established by the Minister of Land, Infrastructure and Transport with taking account of the acceleration occurred on the ascending and descending parts in the normal operating condition. X2: the value established by the Minister of Land, Infrastructure and Transport with taking account of the acceleration occurred on the ascending and descending parts when the safety device is actuated. (3) It shall be confirmed that intensity of stress calculated in accordance with the provisions of preceding item under the normal operation and when the safety device is actuated does not exceed the allowable intensity of stress, which is obtained to divide the breaking strength of the materials used for the principal supporting parts etc. by the safety factor. (The value at installation and during use, specified by the Minister of Land, Infrastructure and Transport with taking account of the strength deterioration of the materials used for the said parts caused by abrasion or the fatigued destruction.) (4) With respect to the parts furnished in accordance with follow ing paragraph item 2, which are capable to support or suspend the steps individually, it shall be confirmed that the		

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			intensity of stress of each parts calculated in accordance with item 1 and item 2 on the assumption that one of them is missing does not exceed the critical allowable intensity of stress of the materials used for said parts obtained to divide the breaking strength of the materials by critical safety factor (the value at installation and during use specified by the Minister of Land, Infrastructure and Transport individually, with taking account of the strength deterioration of the materials by abrasion or the fatigued destruction so as not to occur the such damages that cause fall down of the steps). **3.** In addition to the provisions of the preceding 2 items, the structural of the steps and principal supporting parts etc. of the escalators shall be conform to the following standards. (1) With respect to the parts liable to corrosion or deterioration out of the steps and principal supporting parts etc. of the escalators, the materials, which are hard to corrosion or deterioration, shall be used, or effective rust prevention or the countermeasures against corrosion shall be adopted (2) The parts liable to abrasion and fatigued destruction out of the steps and principal supporting components etc. of the escalators shall be consist of more than 2 parts, and each		

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			of them shall be capable to support or suspend the steps independently. (3) The joint sections of the pin connection shall be constructed so that they are not out of gear as the result of earthquakes or any of the vibrations. (4) With respect to the escalators suspended by the chains with using the sprockets, the chains shall not come off from sprockets as result of earthquakes or any other vibrations. **BSLJ-EO;** **Application of Article 129-5** The fixed load on each part consisting the escalators shall be calculated according to the conditions of the said escalators. **MOC-N (No.1418-2000)** **1.** In the Art.129- 12 item 2 of the Building Standard Law Enforcement Order, the escalators object to the strength verification method for the escalators applied Art.129-4 item 2 mutatis mutandis shall be the ones of which steps are suspended by chains or similar equipment and the step tread made of belt suspended by chains or similar equipment. **2.** The escalator strength verification method shall be conform to the following each item. (1) In the Art.129-12 item2, X1 and X2 stipulated in Art.129-4 item 2 applied mutatis		

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			mutandis shall be 1.0 and 1.5 respectively. (2) In the Art.129-12 item 2, the safety factor of step, frame and truss or beam stipulated in Art.129-4 item 2 paragraph 3 of the Building Standard Law Enforcement Order applied mutatis mutandis shall be not less than the value described in the following table. b. Truss or beam [**see Table B.3 in the annex of this comparison**]		
—	**902.9 Supporting Structure** **902.9a Supports** Supports shall conform to the following: (1) *Slider Bed.* The carrying portion of the treadway shall be supported for its entire width and length except where it passes from a support to a pulley. The surface of the slider bed shall be reasonably smooth. It shall be so constructed that it will not support combustion. (2) *Roller Bed.* Where the treadway is supported on a series of rollers, the combination of roller spacing, belt tension, and belt stiffness shall be such that the deflection of the treadway surface, midway between rollers, shall not exceed the quantity 0.094 in. (0.239 mm) plus 0.004 times the center to center distance of rollers in in. (mm) when measured as follows. (a) The treadway surface shall be loaded midway between rollers with a 25 lb (11.3 kg) weight	**3.1 SUPPORTS** Supports for escalators *(moving walks)* shall be of steel, reinforced concrete, or other material not deemed combustible when tested in accordance with AS 1530.1, and shall be designed for not less than the sum of the following static loads: (a) The mass of the complete escalator *(moving walk),* including cladding; (b) The rated load calculated in accordance with Clause 2.6 *(on the basis of 3,58 kPa of the exposed treadway).* NOTE: Thirty-five percent of the sum of (a) and (b), above, should be considered as the rolling load in making allowances for vibration where necessitated by the form of the supporting structure.	—	—	—

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	concentrated on a cylindrical foot piece 2 in. (51 mm) long by 1 in. (25 mm) in diameter placed with its long axis across the belt. Deflection of this foot piece from its unloaded position shall not exceed the figure obtained above. (b) The rollers shall be concentric and true running within commercially acceptable tolerances. (3) *Edge Supported Belt* When the treadway belt is transversely rigid and is supported by rollers along its edges, the following requirement shall apply: (a) With the belt tensioned through the take-up system, the permissible slope of a straight line from the top of a treadway rib adjacent to the centerline of the treadway to the top of a treadway rib adjacent to the balustrade, in a plane perpendicular to the path of the treadway, shall not exceed 3% when the treadway is loaded with a 150 lb (68 kg) weight on a 6 in. (152 mm) by 10 in. (254 mm) plate located on the centerline of the treadway with the 10 in. (254 mm) dimension in the direction of treadway travel. (b) In order to support the treadway in case of localized overload, supports shall be supplied at intervals, not exceeding 6 ft (18.3 m) along the center line of the treadway. The supports shall be located at a level not more than 2 in. (51 mm) below the underside of the treadway when it is loaded under test conditions required by Rule				

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	902.9a(3)(a).				
Based on passenger weight, the maximum calculated or measured deflection shall not exceed 1/750 of the distance between supports l_1.	—	**3.2 TRUSSES** **3.2.1 Construction** Trusses shall be of steel or other equivalent material, and shall be designed to safely sustain the steps and running gear in operation. In the event of failure of the track system *(treadway),* the trusses shall retain the running gear in their guides. Where tightening devices are operated by means of tension fittings, provision shall be made to retain these fittings in the trusses if they should be released. A truss shall not support load from any portion of the building or adjacent equipment which is not part of the escalator *(moving walk).*	—	**3.9** Elastic deflection of the steelwork under the load qc_2 shall not exceed 1/1000 of the distance between supports of the steelwork span structure for tunnel escalators and 1/750 for floor escalators.	—
For public service escalators and public service passenger conveyors: Based on passenger load, the maximum calculated or measured deflection shall not exceed 1/1000 of the distance between supports l_1.	—	—	—	—	—

Comparison of loads between EN 115 and A 17.1

A 17.1 recognizes that fewer passengers can be placed on a moving escalator than can be accommodated on a stationary one. Therefore two different rated loads are defined, one for the structural support, and one for the machinery that moves the passengers.

The rated load is expressed differently in the two codes, but the table below shows the comparison in the same format, N/m of length. This is required since the width factor for the load carrying area in A 17.1 is the step width plus a constant.

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5.4 Lighting **5.4.1** The escalator or passenger conveyor and its surrounds shall be sufficiently and adequately illuminated, especially in the vicinity of the combs.	**806.2/906.2 Lighting of Escalator/ Treadway** Landing floor plates and all exposed step treads/treadways shall be illuminated with a lighting intensity of not less than 5 footcandles (54 lux).	**3.6.8 Lighting of step treads** Step treads shall be substantially uniformly illuminated throughout their run. The illumination on the tread surface shall be not less than 75 lx.	—	**2.18** Exterior parts of the escalator, the machine room, the tension station, and passages of tunnel escalators shall be illuminated as specified by sanitary regulations.	—
5.4.2 It is permissible to arrange the lighting in the surrounding space or at the installation itself. The intensity of illumination at the landings including the combs, shall be related to the intensity of illumination of the general lighting in the area. On indoor escalators or passenger conveyors the intensity of illumination shall be not less than 50 lx at the landings; on outdoor escalators or passenger conveyors it shall be not less than 15 lx at the landings, measured at floor level.	The illumination of these surfaces shall be of uniform intensity and not contrast materially with that of the surrounding area.	NOTE: It is desirable that the illumination of the surrounding area does not contrast materially with that of the escalator (see AS 1680). Inbuilt ornamental lighting of balustrades (see Clause 7.11) is not considered to be part of the lighting of step treads. ***(3.6.8 Lighting of treadways*** *Treadways shall be substantially uniformly illuminated throughout their run. The illumination on the treadway surface shall be not less than 75 lx whilst the unit is running and no substantial contrast shall exist at any point over the length of the unit, including the entry and exit areas as defined by Clause 2.1.1.)*	—	**5.4.5** Illumination of the landings shall be at least 50 lx.	**4.3.2 (18)**? Appropriate lighting system shall be installed so that passengers can easily recognize steps during night on outdoor escalators or passenger conveyors.
5.5 Transportation Completely assembled escalators/passenger conveyors or components of escalators/passenger conveyors which cannot be handled by hand shall	*(A 17.1 does not address this issue)*	—	—	—	—

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a) either be equipped with fittings for movement by a lifting device or transportation means; b) or be designed in a way that such fittings can be attached (e.g. threaded holes); c) or be shaped in a way that the lifting device or transportation means can be attached easily.					

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6 Machinery Spaces **6.1 General** Driving and return stations, machinery spaces inside the truss, as well as separate machinery spaces, shall be not accessible to unauthorized persons. These rooms shall be used only for accommodating the equipment necessary for the operation of the escalator or passenger conveyor. Fire alarm systems, equipment for direct fire abatement and sprinkler heads, provided they are sufficiently protected against incidental damage, are permitted in these rooms. Lift driving equipment is also permitted in these rooms. NOTE: See clause 16 for instruction for use covering maintenance requirements and inspection activities.	*(There is no specific rule that addresses these issues, however Rule 806.3/906.3 has some related requirements requiring access plates to be securely fastened, and side access doors to be locked.)*	**SECTION 4 MACHINE ROOMS, MACHINE AREAS AND PITS** **4.1 GENERAL** Every escalator *(moving walk)* shall be provided with a machine room or machine area of adequate size to permit the safe and efficient maintenance of the machinery and the equipment contained therein. A height not less than 2000 mm shall be provided at the controller and at the machine. This height may be obtained at the controller by opening of the access hatchway, covers and at the machine by means of removable panels, or steps *(pallets)* in the case of machines located within the stepband *(pallet bands)*. Machine rooms or machine areas shall be of such dimensions as will provide a clear level standing area not less than 380 mm by 600 mm, convenient to the machine and clear of any obstructions, for normal maintenance work. **4.3 LIMITATIONS ON USE** No part of the escalator *(moving walk)* truss, machine room, or machine area shall be used to gain access to ceiling spaces or other parts of the building, nor shall they be used for the housing of equipment not associated with the escalators *(moving walk)*. NOTE: Architectural lighting equipment with voltages exceeding 1000 V, for the purposes of Clause 7.11, is not	—	—	—

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		considered part of the escalator *(moving walk)* installation. **4.4 ENCLOSURE** Machine rooms or machine areas shall be totally enclosed with non-perforated non-shattering materials of not less than the strength of sheet steel of 1.2 mm thickness, except that perforated material may be used for ventilation requirements. Such enclosure and the enclosure supports shall be of material not deemed combustible when tested in accordance with AS 1530.1, to reduce the spread of fire from within the machine room or machine area. The walls shall be supported and braced so as to deflect not more than 25 mm when sustaining a horizontal force of 440 N distributed over any square of 50 mm side.			
6.2 Accessibility **6.2.1** Ways and access routes to machinery spaces shall be easy and safe. The clear height of the access shall be at least 1,80 m.	(A17.1 does not address this issue. Words like “easy and safe” should be avoided in a code rule. They are subjective and provide no frame of reference to design or inspect to.)	**4.2 ACCESS AND GUARDING** Safe, permanent, and convenient means of access and guarding shall be provided to the machine area and the top and the bottom truss extensions. Where access to the machine room, machine area, or any equipment installed therein is by means of trapdoors or hatch covers in the floor adjacent to the escalator *(moving walk),* such openings shall be provided with suitable guardrails of adequate strength, which may be readily and conveniently erected, but which are not removable, and the trapdoor or hatch cover shall restrict access until such guarding is positioned. Any hinged section of the	—	**2.16** Safe access shall be provided to the mechanisms, protection devices, and electric equipment that require maintenance. When necessary, platforms, detachable guards, ladders, and attachments shall be provided for the purpose. **6.3** The design of the floor escalator shall provide access to escalator components and opportunity for maintenance, assembly and dismantling through openings in the stairway belt, the balustrade and	—

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		guardrail arranged to permit access shall open outwards and be spring-loaded to the closing position. Trapdoors and hatch covers shall be capable of being opened by a force not greater than 250 N.		floor slabs. **6.4** The width of the aisle between foundations or projections of the tunnel escalator's drive and the walls of the machine room and the end wall of the tension device chamber shall be established as required for assembly and dismantling of equipment but no less than 900 mm. For escalators with a lifting height of less than 15 m, the aisle width in the machine room may be reduced on one side to 750 mm for three escalators and to 600 mm for two escalators (in refurbishment).	
6.2.2 It is preferable that authorized personnel obtain access to inspection doors and trap doors, separate machinery spaces, separate driving and return stations by means of stairs only. Where stairs are difficult to install, it is permitted to use ladders that satisfy the following conditions: a) they shall be not liable to slip or to turn over; b) they shall, when in position of use, form an angle of 65° to 75° to the horizontal, unless they are fixed and their height is less than 1,50 m; c) on vertical ladders up to a maximum height of 1,5 m, the distance between the rungs and the wall behind shall be at least 0,15 m; d) they shall be exclusively used for this purpose and be kept	—		—	**6.9** The machine room shall have an entry ladder. The ladder shall have free landings equal to the ladder width but at least 900 mm at the beginning and at the end. The inclination angle of the ladder shall not exceed 45 deg. The ladder shall have hand railings and flat horizontal steps no more than 200 mm thick. where metal ladders are used, the metal steps shall be made of fluted steel sheets. **6.10** The tension device chamber shall have, if necessary, an entry ladder which may be inclined or vertical. The inclined ladder (with an inclination angle of 75 degrees or less to	—

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always available in the vicinity; the necessary provisions shall be made for that purpose; e) at the upper part of the ladder there shall be one or more handhold(s) within easy reach; f) when the ladders are not fastened, fixed attachment points shall be provided.				horizontal) shall be provided with hand railings and shall have steps at least 120 mm wide of fluted steel sheets. Vertical ladders (or ladders inclined at more than 75 deg to horizontal) shall be at least 600 mm wide and shall have steps spaced not more than 300 mm. The spacing shall be maintained over the entire height of the ladder. The steps of the vertical ladder shall be separated from walls and other structural components by at least 150 mm. If the height of a ladder exceeds 5 m, arched guard rungs shall be installed starting from a height of 3 m.	
6.3 Construction and equipment of machinery spaces, driving and return stations **6.3.1. General** **6.3.1.1** In machinery spaces and return stations, space with a sufficiently large standing area shall be kept free from fixed parts of any kind. The size of the standing area shall be at least 0,30 m² and the smaller side shall be at least 0,50 m long.	—	**4.1 GENERAL** Every escalator *(moving walk)* shall be provided with a machine room or machine area of adequate size to permit the safe and efficient maintenance of the machinery and the equipment contained therein. A height not less than 2000 mm shall be provided at the controller and at the machine. This height may be obtained at the controller by opening of the access hatchway covers and at the machine by means of removable panels, or steps *(pallets)* in the case of machines located within the stepband *(pallet bands)*. Machine rooms or machine areas shall be of such dimensions as	**JEAS-406G (Draft)** **2. Description** **2.6** The upper and lower machine rooms where the driving machine and the like are located shall have space for maintenance and inspection.	—	—

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		will provide a clear level standing area not less than 380 mm by 600 mm, convenient to the machine and clear of any obstructions, for normal maintenance work. **4.10 PIT ACCESS** Escalator *(moving walk)* pits shall have a clear standing space not less than 380 mm by 600 mm between any fixed obstruction and the path traversed by the steps *(treadway)*. This standing space may be reduced where suitable alternative access is provided.			
6.3.1.2 Where the main drive or brake is arranged between the passenger side of the step, pallet or belt and the return line, a suitable sensibly horizontal standing area in the working zone of not less than 0,12 m² shall be provided. The minimum dimension shall be not less than 0,30 m. This part is permitted to be fixed or removable. In the latter case, it shall always be available in the vicinity. Necessary provisions shall be made for this purpose.	—	—	—	—	—
6.3.1.3 The size of separate machinery spaces, separate driving and return stations, and the space in front of fixed control panels shall be sufficient to permit easy and safe access for maintenance personnel to all the equipment, especially to the electrical connections. In particular there shall be provided: a) a free space above an area of	**Rules from 1996 Edition ANSI/NFPA 70:** **620-5 Working Clearances.** Working space shall be provided about controllers, disconnecting means, and other electrical equipment. The minimum working space shall not be less than specified in Section 110-16(a). Where conditions of maintenance and supervision ensure that only qualified persons will examine,	**4.1 GENERAL** Every escalator *(moving walk)* shall be provided with a machine room or machine area of adequate size to permit the safe and efficient maintenance of the machinery and the equipment contained therein. A height not less than 2000 mm shall be provided at the controller and at the machine. This height may be obtained at the controller	—	—	—

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the full width of the control panels or cabinets (but not less than 0,50 m) and 0,80 m in depth to give access to the equipment they support or contain; b) a free space above an area of at least 0,50 m x 0,60 m for maintenance and inspection of moving parts at points where this is necessary; c) access routes, having a width of at least 0,50 m, to these free spaces. SPECIFIC CASE: It is permitted to reduce the width of 0,50 m to 0,40 m in areas where there are no moving parts.	adjust, service, and maintain the equipment, the clearance requirements of Section 110-16(a) shall be waived as permitted in (a) through (d) below. **(a) Flexible Connections to Equipment.** Electrical equipment in (1) through (4) below is provided with flexible leads to all external connections: (1) Controllers and disconnecting means for dumbwaiters, escalators, moving walks, wheelchair lifts, and stairway chair lifts installed int he same space with the driving machine.	by opening of the access hatchway covers and at the machine by means of removable panels, or steps *(pallets)* in the case of machines located within the stepband *(pallet bands)*. Machine rooms or machine areas shall be of such dimensions as will provide a clear level standing area not less than 380 mm by 600 mm, convenient to the machine and clear of any obstructions, for normal maintenance work. **4.10 PIT ACCESS** Escalator *(moving walk)* pits shall have a clear standing space not less than 380 mm by 600 mm between any fixed obstruction and the path traversed by the steps *(treadway)*. This standing space may be reduced where suitable alternative access is provided.			
6.3.1.4 In separate machinery spaces, and separate driving and return stations, and in front of fixed control panels, the clear height shall under no circumstances be less than 2,0 m.	**(b) Guards.** Live parts of the electrical equipment are suitably guarded, isolated, or insulated, and the equipment can be examined, adjusted, serviced, or maintained while energized without removal of this protection. (FPN): See definition for "Exposed" in Article 100. **(c) Examination, Adjusting, and Servicing.** Electrical equipment is not required to be examined, adjusted, serviced, or maintained while energized. **(d) Low Voltage.** Uninsulated parts are at a voltage no greater than 30 volts RMS, 42 volts peak, or 60 volts dc. **620-4. Live Parts Enclosed.** All live parts of electric apparatus in the hoistways, at the landings, or in or on the cars of elevators and dumbwaiters, or in the wellways or the landings of escalators or		—	**6.5** The heights of the machine room and of the tension device chamber from the floor to the ceiling beams or overhead rails of lifting equipment shall be at least 2400 mm for the machine room and at least 2000 mm for the tension device chamber.	—

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	moving walks, or in the runways and machinery spaces of wheelchair lifts and stairway chair lifts shall be enclosed to protect against accidental contact. (FPN): See Section 110-17 for guarding of live parts (600 volts, nominal, or less).				
6.3.2 Lighting Electric lighting installation in separate machinery spaces, or separate driving and return stations, shall be permanent and fixed. Electric lighting installation in driving and return stations and machine rooms inside the truss shall be by means of a portable lamp permanently available in one of these places. One or more socket outlets shall be provided in each of these places. The electric lighting installation and the socket outlets shall be independent of the power supply to the machine being fed either by a separate cable or a branch cable which is connected before the main switch of the escalator or passenger conveyor (see 13.4.1 and 13.6).	**806.1/906.1 Lighting of Machine Room and Truss Interior** **806.1a/906.1a Remote Machine Room.** Permanent electric lighting and a duplex receptacle rated at not less than 15 A, 120 V shall be provided in every remote machine room. The illumination shall be not less than 10 footcandles (108 lux) at the floor level. The lighting control switch shall be located within easy reach of the access to such rooms. Where practicable, the light control switch shall be located on the lock jamb side of the access door. **806.1b/906.1b Truss Interior.** A duplex receptacle rated at not less than 15 A, 120 V, accessibly located, shall be provided under the access plates (Rule 806.3/906.3) at the top and bottom landings/both landings and in any machine areas located in the incline/within the moving walk.	**3.2.2 Lighting of trusses and pits.** Where exterior access is provided to trusses and pits, suitable lighting controlled by a switch adjacent to the entrance shall be provided. **3.2.4 Lighting at inspection panels.** Where an inspection panel is provided for machinery spaces which contain unguarded moving parts, suitable lighting controlled by a switch adjacent to the opening shall be provided. **4.5 LIGHTING** Permanent lighting shall be provided to adequately illuminate every machine room, machine area, or truss extension. The illumination may be provided from the general exterior illumination. In addition, bulkhead-type light fittings shall be provided in the top and bottom truss extension. Locations of all lighting switches shall be such that they may be operated without the operator having to pass over or reach over any part of the machinery.	—	**6.19** The machine room, escalator tunnel, and the tension device chamber of tunnel escalators, as well as the top and bottom parts of floor escalators shall have sockets to provide power to portable inspection lamps from the 42 V mains. Sockets shall be spaced no more than 20 m along the escalator tunnel. Electric power supply points shall be provided to connect portable electrical equipment such as welding machines and power tools in the machine room and in the tension device chamber.	—
6.3.3 Stop switch It shall be possible to switch off the escalator and passenger conveyor in the driving and return station. Escalators and passenger conveyors with the driving unit	**805.3e/905.3e Stop Switch in Machinery Spaces.** A stop switch, conforming to the requirements of Rule 210.2(e), shall be provided in each machinery space and other spaces where means of access	**6.4 STOP SWITCH AT TRUSS AND PIT INSPECTION PANELS** A stop switch shall be provided in the truss adjacent to panels which give access to unguarded moving parts. This switch, when opened, shall	—	—	—

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arranged between the passenger side of the step, pallet or belt and the return line, or outside the return stations, shall have additional stop switches in the area of the driving unit. The operation of these stop switches shall cause the disconnection of the power supply from the driving machine and allow the operational brake to become effective to stop the escalator or passenger conveyor. The stop switches shall: a) be of a manually opened and closed type; b) have the switching positions marked unambiguously and permanently; c) be safety contacts satisfying 14.1.2.2. SPECIFIC CASE: A stop switch need not be provided in a machinery space if a main switch according to 13.4 is located therein.	to the interior space is provided (see Rule 806.3/906.3), except for the machinery space where the main line disconnect switch is located. This switch, when opened, shall cause electric power to be removed from the escalator driving machine motor and brake. **Requirements of Rule 210.2(e):** Emergency stop switches shall (1) be of the manually opened and closed type; (2) have red operating handles or buttons; (3) be conspicuously and permanently marked "STOP" and shall indicate the stop and run positions; (4) be positively opened mechanically and their opening shall not be solely dependent on springs.	cause electric power to be removed from the escalator driving machine motor and brake. The stop switch shall comply with Clause 29.14(a), (b) and (c) of AS 1735.2. NOTE: For the purposes of this Clause, a circuit-breaker or main switch fixed in the machine room is considered a stop switch in this space. **Clause 29.14 (a), (b) and (c) of AS 1735 Part 2:** "**29.14 Stop switch general**. Stop switches shall comply with the following: (a) They shall be of the manually opened closed type; (b) They shall be capable of being positively opened mechanically and not dependant on springs. Commercial switches shall comply with AS 3133; (c) They shall be conspicuously and permanently marked "stop" and both the stop position and the run position shall be clearly marked."			

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7 Handrail (see figures 1 and 2) **7.1 General** On the top of each balustrade there shall be provided a handrail moving in the same direction and at a speed tolerance of 0 % to 2 % of the speed of the steps, pallets or belt.	**802.4/902.4 Handrails** **802.4a/902.4a Type Required.** Each balustrade shall be provided with a handrail moving in the same direction and at substantially the same speed as the steps/treadway. In the case of curved escalators, this shall be substantially the same angular velocity.	**3.4 HANDRAILS** **3.4.1** Type and finish Each balustrade shall be provided with a handrail having an overall width of not less than 70 mm nor more than 100 mm, moving in the same direction and substantially at the same speed as the treadway and at a height not less than 900 mm nor more than 1100 mm measured vertically from the treadway. Handrails shall afford a smooth even surface, and shall be continuous without open joints. **NOTES**: **1** The smooth even surface should be maintained at all times, by the use of a suitable slippery polish. **2** The range of height of the handrail is nominated on the basis of its suitability for persons riding on the moving walk. In open spaces, building designers may have to provide additional protection along the side of the moving walk. Where handrails are mounted on top of structural glass balustrades without mullions, the handrail mounting shall be structurally continuous and the failure of any one glass panel shall not allow the handrail to become dislodged from its guides.	**BSLJ-EO; Article 129-12** **1.(3)** Escalators shall be provided with handrails at each side of steps (the portion going up and down, on which the persons step). The upper surface of the handrails shall move in the same direction and at the same speed as the steps. **MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph (3) The escalator of which speed varies in halfway of travel It shall be conform to the construction specified as follows. (g) It shall be that the escalator is provided with the handrails which are conform to the provision of (1) or (2) in the followings. (1) It shall be that the upper portion of the handrails move connecting with the step in same direction and same speed as the step on which person who grasps the handrail get.	**5.7.1** Moving handrails shall be provided on the balustrade on both sides of the escalator. **5.7.2** The speed of the handrails shall not differ from that of the steps by more than 2 percent.	**4.3.2(4)** The mobile handrails shall go up and down at the same speed and in the same direction with those of the steps.

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			(2) It shall be that the pass shift period for gripping the next handrails is more than 2 seconds (except fixed handrails with almost same height as the moving handrails and length within 15 cm.), and the difference of running distance between step and handrails from the end point of the preceding handrails to the start point of the next handrails is less than 40 cm for the escalator of which handrail construction to combined with plural handrails of different speed as the construction not easy to be caught by furnishing the fixed handrails between the handrails of different speed.		
7.2 Continuation of the handrail beyond the comb The horizontal portion of the handrail shall continue longitudinally at the landings for a distance l_3 (see figure 1) of at least 0,30 m past the root of the comb teeth (see L_1 in figure 1 and detail X). In the case of inclined passenger conveyors without a horizontal section at the landings, the continuation of the handrail parallel to the angle of inclination is permitted.	**802.4b Extension Beyond Combplates.** Each moving handrail shall extend at normal handrail height not less than 12 in. (305 mm) beyond the line of points of the comb plate teeth at the upper and lower landings.[7)] [7)] *This dimension is more meaningful than that given in Clause 5.1.5.9, since it relates to the handrail available to the boarding or exiting passengers.* **902.4b Extension Beyond Combplates.** The moving handrail at both the entrance and exit landings shall extend at normal height not less than 12 in. (305 mm) beyond the end of the exposed treadway. The point at which the moving handrail enters or leaves an enclosure shall be not more than 10 in. (254 mm) above the floor line.	**3.4.2 Extension beyond combplate.** Each moving handrail shall extend at normal handrail height not less than 300 mm beyond the line of the points of the combplate teeth at the upper and lower landings.	**MOC-N (No.1417-2000)** **EXP. 2.** **[Notice for Designing]** (2) The horizontal distance of the handrail from the comb to the edge of handrail return section (newel) shall not be less than 0.3 m as a guide range in order that passengers may be guided properly (to secure stable position) between the floor cover and the step.	**Appendix 3** Distance between comb crossing line (from D point) to the end of handrail horizontal section (bending line): minimum l_h=300 mm.	—

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7.3 Profile and position **7.3.1** The handrail profiles and their guides on the balustrades shall be formed or enclosed in such a way that the possibility of pinching or trapping of fingers or hands is reduced. The distance between the handrail profile and guide or cover profiles shall under no circumstances be wider than 8 mm (see b_6' and b_6" in figure 2, detail W). To prevent collision the horizontal distance b_{10} (see figure 2) between the outer edge of the handrail and walls or other obstacles shall under no circumstances be less than 80 mm. This distance shall be maintained to a height of at least 2,10 m above the steps of the escalator and above the pallets or the belt of the passenger conveyor. This height is permitted to be smaller if by appropriate measures the risk of injury is avoided. For escalators arranged adjacent to one another either parallel or criss-cross, the distance between the edges of the handrails shall be not less than 120 mm.	**802.2/902.2 Geometry** (b)/(c) The handrail shall be a minimum of 4 in. (102 mm) horizontally and 1 in. (25 mm) vertically away from adjacent surfaces, except that rounded fillets or beveled sides of the handrail stand are permited. The center line of the handrail shall be not more than 9 1/2 in. (241 mm), measured horizontally, from the vertical plane through the edge of the exposed step/treadway (see Rule 802.5b for step width requirements, and Appendix D, Fig. D1/D2.).	**3.4.6 Handrail clearances.** A clearance of approximately 75 mm shall be provided between the outside edge of the escalator handrail and any fixed railing or guard which is provided to protect floor openings. Such fixed railings shall not rise above the balustrade decking level within this 75 mm clearance distance. **NOTE:** The guarding of floor openings in the vicinity of escalators should be referred to the Statutory Authority. Where walls, partitions, or fixtures are erected within 600 mm of, and are above, the handrail and are not flush on the escalator side for the full length of the escalators, they shall comply with the clearances required in Fig. 3.3.6(A) as for ceiling intersections. Where apertures are provided in such walls, partitions, or fixtures, and the apertures are within 2000 mm of the escalator step nosing, the vertical height of such apertures shall be not less than the minimum height given in Fig. 3.3.6(B) as for ceiling guards. A clearance not less than 75 mm shall be provided between the outside edge of the escalator handrail and any other object.	**JEAS -406H (Draft)** **2. Description** **2.1 Related matters with floor openings etc. surrounding escalators** (to be done by building side) **2.1.1** The edge of the lower surface of the building ceiling etc. which intersects the escalator shall not protrude inward from the finished surface of the exterior panel of the escalator.	**Appendix 3** Distance between handrail side and obstacle (wall, tunnel lining, etc.): minimum l_8= 80 mm. Distance between handrail sides of adjacent escalators: minimum l_9=150 mm.	—
7.3.2 The width b2 of the handrail shall be between 70 mm and 100 mm (see figure 2, detail W).	—	**3.4 HANDRAILS** **3.4.1 Type and finish** Each balustrade shall be provided with a handrail having an overall width of not less than 70 mm nor more than 100 mm, moving in the same direction and substantially at the same speed as the	—	**Appendix 3** Width of handrail for newly designed escalators: l_7= 70-100 mm.	—

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		treadway and at a height not less than 900 mm nor more than 1100 mm measured vertically from the treadway.			
7.3.3 The distance b5 between the handrail and the edge of the balustrade shall not exceed 50 mm (see figure 2).	—	**Figure 2:** ≤ 55 mm for 70 mm handrail width and ≤ 40 mm for 100 mm handrail width, measured to centre line	—	**Appendix 3** Distance between handrail and edge of balustrade cornice: maximum l_1 = 50 mm.	—
7.4 Distance between the handrail centerlines The distance b1 between the centerline of the handrails shall not exceed the distance between the skirting by more than 0,45 m (see b1 and z2 in figure 2).	**802.2/902.2 Geometry** (b)/(c) The handrail shall be a minimum of 4 in. (102 mm) horizontally and 1 in. (25 mm) vertically away from adjacent surfaces, except that rounded fillets or bevelled sides of the handrail stand are permitted. The centre line of the handrail shall be not more than 9 1/2 in. (241 mm), measured horizontally, from the vertical plane through the edge of the exposed step/treadway (see Rule 802.5b for step width requirements, and Appendix D, Fig. D1/D2.).	**3.4.4 Distance between handrails** The horizontal distance between the center-lines of the two handrails, measured on any inclined section of the escalator / moving walk, shall be not more than 1560 mm, subject to this distance not exceeding the width between the balustrades by more than 90 mm on any side of the escalator / moving walk (see Clause 2.2). (**Figure 2:** b_1-z_2 ≤ 255 mm; not mentioned in text)	**BSLJ-EO; Article 129-12** **1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and centre of the handrail at the said side of the steps shall be not more than 25 cm. **BSLJ-EO; Article 129-12** **EXP 1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and center of the handrail at the said side of the steps shall be not more than 25 cm(i.e. distance between handrails is no more than 1.6 m) The width of the steps for moving walk with inclination less than 4 degree is less than 1.6 m and distance from side edge of step to centre of handrail is not more than 0.25 m (i.e. distance between handrails is not more than 2.1 m)**(MOC-N(No.1413-2000)2-2.)**	**Appendix 3** Distance by axles of handrails: maximum l_2 = B+400, where B is step width in mm.	—
7.5 Protection at the point of entry into the balustrade **7.5.1** The lowest point of entry of	—	**3.4.5 Guards** The handrails shall enter into or depart from the newels substantially horizontally,	—	—	—

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the handrail into the newel shall be at a distance h3 from the floor which shall be not less than 0,10 m and not exceed 0,25 m (see figures 1 and 2).		so that no part of the handrail is less than 90 mm nor more than 200 mm vertically above the floor level. Guards which are not conducive to drawing materials into the space between the guard and the handrail shall be provided at these points. The newel, directly above the point where the handrail enters its guard, shall be not less than 25 mm wider (on each side) than the handrail, or an auxiliary guard shall be provided.			
7.5.2 The horizontal distance l4 between the furthest point reached by the handrail and the point of entry into the newel shall be at least 0,30 m (see figure 1).	—	**3.4.3 Distance from newel to handrail point** A distance of not less than 250 mm, measured horizontally, shall be provided between the face of the handrail at the end of the newel and the point where the handrail enters the balustrade guard	—	**Appendix 3** Horizontal distance from handrail inlet to extreme point of handrail surface: minimum l_6 =300 mm.	—
7.5.3 At the point of entry of the handrail into the newel a guard shall be installed to prevent the pinching of fingers and hands. A switch according to 14.2.2.4.1.k) shall be provided.	**802.4c/902.4c Guards.** Hand or finger guards shall be provided at a point where the handrail enters the balustrade. **805.3m/905.3j Handrail Entry Device.** A handrail entry device shall be provided at each newel. It shall operate in the handrail entry direction only, shall be of the manually reset type, and shall cause the escalator/moving walk to stop by removing power from the driving machine motor and brake. It shall operate in either of twoways: (1) if an object becomes caught between the handrail and the handrail guard; or (2) if an object approaches the area between the handrail and	**3.4 5** If auxiliary guards are provided, they shall be designed to deflect hands away from the point of handrail entry. **6.12 HANDRAIL ENTRY DEVICES** The opening in the balustrade for entry of the handrail shall be provided with a protective device which will cause interruption of power to the moving walk machine motor and brake should any part of a person's body or clothing be carried into this area by contact with the handrail.	**MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15	**Appendix 3** Clearance between handrail and edge of opening in handrail inlet: maximum b_5 =5 mm.	**4.3.2.(6)** Holes through which the handrail passes shall have appropriate protection device, and switch of which shall operate positively.

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	handrail guard.		degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not more than 15 degree) is less than 4mm) (e)The person or the articles are caught in the inlet of the handrail. **JEAS-406G (Draft)** **2. Description** **2.2** Switches shall be incorporated in the guards which are fixed at the inlets of the handrails and shall have functions to stop the escalator if an article is forced into the guards.		
7.6 Height above the steps, pallets and the belt The vertical distance h1 between the handrail and step nose or pallet surface or belt surface shall be not less than 0,90 m and not exceed 1,10 m (see figures 1 and 2).	*(A17.1 does not address this issue, but it is currently on the agenda to be discussed and possibly be addressed in a new rule for escalators.)* **902.2 Geometry** (b) The height of the balustrade shall not be less than 30 in. (762 mm) nor more than 42 in. (1067 mm) from the treadway to the top of handrail, measured perpendicular to the treadway surface.	**3.4.1 Type and finish** Each balustrade shall be provided with a handrail having an overall width of not less than 70 mm nor more than 100 mm, moving in the same direction and substantially at the same speed as the treadway and at a height not less than 900 mm nor more than 1100 mm measured vertically from the treadway. Handrails shall afford a smooth even surface, and shall be continuous without open joints.	—	**Appendix 3** Vertical distance between step tread surface and handrail surface in the escalator inclined part: h_8= 800-1100 mm.	—
7.7 Guiding The handrail shall be guided and tensioned in such a way that it will not leave its guides during normal use.	—	**3.4.1 Type and finish** *(in part)* Where handrails are mounted on top of structural glass balustrades without mullions, the handrail mounting shall be structurally continuous and the failure of any one glass panel shall not allow the handrail to become dislodged from its guides.	—	—	—

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7.8 For public service escalators and public service passenger conveyors **Control device for handrail breakage** If the handrail is not certified by its manufacturer for a breaking load of at least 25 kN a device shall cause the escalator or passenger conveyor to stop if the handrail breaks (see 14.2.2.4.1.m)).	**805.4/905.4 Handrail-Speed Monitoring Device.** A handrail speed monitoring device shall be provided which will cause the immediate activation of the alarm required by Rule 805.1b/905.1b, whenever the speed of either handrail deviates from the step/treadway speed by 15% or more. The device shall cause electric power to be removed from the driving machine motor and brake if the speed deviation of 15% or more is continuous for more than 2 sec. The device shall be of the manually reset type.	**6.17 HANDRAIL SPEED MONITORING DEVICE** Handrail speed monitoring device shall be provided and shall stop the moving walk in the event of a broken handrail or a handrail which has stopped for more than 15 s while the escalator / treadway is in motion	—	**Appendix 3** **5.8.1** The escalator shall be provided with interlocking devices that should cut off electric motors to stop the stairway belt when the handrail is broken.	
(7.9)	**(B 44 (8.3.4.1)) Type Required** Each balustrade shall be provided with a handrail moving in the same direction and at substantially the same speed as the steps. The speed of the handrail shall not change when a retarding force of 450 N is applied in the down direction.	—	**JIS A 4302-1992;** **4.4.2 Inspection to be carried out un upper and lower landings and on steps** (5) During downward operation, the handrail shall not be stopped by a human power of about 15 kgf (150N) pulling horizontally at the upper landing.	—	**4.3.2(5)** The mobile handrail shall not stop during descent even when it is pulled horizontally with the pulling strength of about 15 kgf(147N) from the upper landing.

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8 Steps, pallets, belt and combs ***(see 0.5.1)***	**802.5a/902.5e Material and type** (1) Step frames, treads, and risers, excluding their attachments or inserts, shall be metal, except that magnesium alloys shall not be used; or the materials, in their end use configuration, shall have a flame spread index of 0 to 50 based on the tests conducted in accordance with the requirements of ASTM E84, UL 273, or NFPA 255. (2) Nonmetallic attachments and inserts (ex cluding wheels) shall be classified 94 HB or better in accordance with ANSI/UL 94.	**3.6.1 Material** Step frames and treads shall be of material not deemed combustible when tested in accordance with AS 1530.1.	—	—	—
8.1 Dimensions (see figure 3) **8.1.1** The step height x1 shall not exceed 0,24 m. If escalators are permitted to be used as emergency exit when out of service, the step height shall not exceed 0,21 m.	**802.5b Dimensions of Steps.** The depth of any step tread in the direction of travel shall be not less than 15 3/4 in. (400 mm), and the rise between treads shall be not more than 8 1/2 in. (216 mm). The width of a step tread shall be not less than 22 in. (559 mm) nor more than 40 in. (1016 mm) (see Appendix D, Fig. D1) **902.7 Width.** The width of a moving walk (Rule 902.2(a)) shall not be less than 22 in. (559 mm). The maximum width shall depend both on the maximum slope at the point on the treadway, and on the treadway	**3.6 Steps** **3.6.2 Dimensions** The depth (i.e. in the horizontal direction of travel) of step treads shall be not less than 400 mm. The rise between adjacent treads on the incline shall not exceed 215 mm. The width (i.e. normal to the direction of travel) of step treads shall be not less than 400 mm nor more than 1050 mm.	—	**Appendix 3** Vertical distance between tread levels of two adjacent steps for 35 degrees inclination angle of guides: maximum h = 240 mm (only for floor escalators).	**3.3.1(5)** The length of the steps of the escalator, in the direction of moving, shall be 400 mm or more, and the width, 560 mm or more but not exceeding 1,020 mm; and the difference of height between the steps shall be 215 mm or less. However, if the escalator inclination exceeds 30°, the difference of height between the steps may be 240 mm or less. The length of the steps of the moving walk, in the direction of moving, is not limited, however, the width of the step shall be 560 mm or more but not exceeding 1.020 mm.
8.1.2 The step depth y1 shall be not less than 0,38 m.	speed. The width shall not exceed the value shown in Table 902.7..	***(3.6 Treadways*** ***3.6.1 Treadway width*** *The*	**MOC-N (No.1413-2000)** **2.** The escalators of the special	Step depth: minimum L=380 mm	However, wider steps may be installed for moving walk with inclination not

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		width of the expo- sed treadway shall be not less than 400 mm nor more than 1050 mm, and shall not vary more than ±3.5 mm).	construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph (1) The escalator of which inclination exceeding 30 degree. *In addition to conforming to the provisions stipulated in the Art.129-12 item 1 paragraph 1, 3 and 4, it shall be conform to the construction specified as follows.* (d) It shall be that the depth of the step is more than 35 cm.		exceeding 6°.
8.1.3 For escalators and passenger conveyors the nominal width z1 shall be not less than 0,58 m and not exceed 1,10 m. For passenger conveyors with an angle of inclination up to 6° larger widths are permitted.			**BSLJ-EO; Article 129-12** **1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and centre of the handrail at the said side of the steps shall be not more than 25 cm. **BSLJ-EO; Article 129-12** **EXP 1.(4)** The width of the steps shall be not more than 1.1 m and the horizontal distance between the side edge of the steps and cenrer of the handrail at the said side of the steps shall be not more than 25 cm (i.e. distance between handrails is no more than 1.6 m) The width of the steps for moving walk with inclination	**Appendix 3** Stairway belt step tread width: B=1000+/- 10 mm (tunnel escalators); B= maximum 1100 mm and minimum 580 mm (floor escalators).	

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			less than 4 degree is less than 1.6 m and distance from side edge of step to center of handrail is not more than 0.25 m (i.e. distance between handrails is not more than 2.1 m)**(MOC-N(No.1413-2000)2-2.)** **MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph. (2) The escalator of which step tread width exceeding 1.1 m. *In addition to conforming to the provisions stipulated in the Art.129-12 item 1 paragraph 1, 3 and 4, it shall be conform to the construction specified as follows.* *(c) It shall be that the width of the step is less than 1.6 m and the horizontal distance between the said edge of the step and center of the handrail of the said side of the step is less than 25 cm.* *(3) The escalator of which speed varies in halfway of travel.* f) Width of a step shall be equal to or less than 1.6 m. Horizontal displacement between the side of a step and the center of an upper surface		

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8.2 Construction of the steps, pallets and the belt (see figure 1, detail X and figure 3) 8.2.1 The steps, pallets and the belt shall match the operational conditions. They shall be able to support continuously an equally distributed load corresponding to 6000 N/m2 without such deformation that would prejudice the proper functioning of the escalator or passenger conveyor. To establish the dimensions of the belt, an area of effective width x 1,0 m length shall be taken as a basis for this specific load (in addition the requirements of 8.2.4.6.1 shall be complied with).	**802.9d Step** The step shall be designed to support a load of 300 lb (136 kg) on a 6 in. (152 mm) by 10 in. (254 mm) plate placed on any part of the step with the 10 in. (254 mm) dimension in the direction of step travel.[11)] *[11)] see Rule 802.10 (Design Factors of Safety) for additional design factors.* **902.11 Pallet.** The pallet shall be designed to support a load of 300 lb (136 kg) for each 4.5 ft^2 (0.42 m^2) of area, or part thereof. The load shall be applied on a 6 in. (152 mm) by 10 in. (254 mm) plate, placed on any part of the pallet with the 10 in. (254 mm) dimension in the direction of travel. If more than one load is required, they shall be located no closer than 36 in. (914 mm) from each other.	***3.6.3 Loading*** Each step shall be designed to support a minimum force distribution of 3.5 kPa over the whole tread surface. ***2.6 LOAD RATING FOR CONSTANT SPEED MOVING WALKS*** ***2.6.1 Structural*** *For the purpose of structural design, the load rating shall be considered to be not less than 4.75 kPa, applied to the exposed area of the treadway.* ***3.6.7 Treadway supports*** ***3.6.7.1 Slider bed*** *The exposed portion of the treadway shall be supported for its entire width and length by the slider bed, except that a space not more than 50 mm may be permitted between the periphery of any roller or pulley and the slider bed. Longitudinal members of a slider bed may be spaced apart not more than 25 mm.* *Based on the design load, the slider bed shall not deflect more than 5 mm.* *The surface of the slider bed shall be reasonably smooth. It shall be constructed so that it will not support combustion.* ***3.6.7.2 Roller bed*** *Where the treadway is supported by rollers, the combination of roller spacing, belt tension, and rigidity of the belt shall be such that the gaps between the treadway and the lower edge of the balustrade are not more than 5.5 mm, when the*	of handrail on the same side of the said step shall be equal to or less than 25 cm. (same text as in the row related to EN 115, 5.3, applies also for step and frame in **MOC-N (No. 1418-2000, 2a)**	**Appendix 4** Steps shall withstand the static load of 4000 N/ m^2. Safety factor minimum 5.	—

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		treadway surface is loaded with a 45 kg mass placed on a 50 mm diameter plate and the centre of the plate being placed 200 mm from the vertical inside of the balustrade and midway between the rollers. *Either the belt shall have a factor of safety of not less than 10 (see Clause 2.7), or a safety decking complying with Clause 3.6.7.4 shall be provided.* ***3.6.7.4 Safety decking*** *Where required under Clauses 3.6.7.2 and 3.6.7.3, a safety decking consisting of sheets of material not deemed combustible when tested in accordance with AS 1530.1, which may have perforations not larger than 25 cm^2, shall be provided. Such decking shall be rigidly fixed at a distance not more than 150 mm below the belt and shall cover the area of exposed belt or treadway, except that a space not more than 50 mm may be permitted between any roller or pulley and the safety decking. The decking shall be capable of withstanding a load of 365 kgf/m^2 without deflecting more than 25 mm.* ***3.6.7.5 Guiding of belt, belt-pallet or pallet*** *Belts, belt-pallets and pallets of inclined (sloped) type moving walks shall be prevented from being displaced from the guiding system in the event of a breakage of a belt or pallet connection within the exposed area of the belt, belt-pallet, or pallet where it is capable of carrying passengers.* *Means shall be provided to*			

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		prevent a displacement of the treadway when measured perpendicular to the passenger surface of the treadway of more than 3.5 mm, in the event of any breaking of a pallet connection.			
8.2.2 The steps and pallets shall satisfy the following tests and requirements: **8.2.2.1** Static test **8.2.2.1.1** Steps The step shall be tested for deflection with a single force of 3 000 N (including weight of the plate) applied perpendicular to the tread surface on a steel plate 0,20 m x 0,30 m in size and at least 25 mm thick, in the center of the tread surface. The edge of the plate being 0,20 m long shall be arranged parallel to the front edge of the step, the edge of the plate being 0,30 m long at right angles to the front edge of the step. During this test, the deflection measured at the tread surface shall be not more than 4 mm. There shall be no permanent deformation (setting tolerances are permitted). The step shall be tested as a whole together with rollers (not rotating), axles or stub shafts (if existing) in a horizontal position (horizontal support) and at the maximum inclination (inclined support) for which the step is to be applied. For all inclinations smaller than the maximum inclination permitted, a new test is not required. A test of the installed	—	—	—	The strength of each fabricated or repaired step shall be verified on the rig under a static load as follows: The step shall not have residual deformations (deviations from dimensions established by the drawing) after the test.	**8. Inspection of elevator main safety component** **Step 7** The step shall be tested for deflection with a single force of 300kgf (including weight of the plate) applied perpendicular to the tread surface on a steel plate 0,20 m x 0,30 m in size , in the centre of the tread surface. deflection ≤ 4 mm by ECTAS

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step, i.e. together with the guide rails and the supporting structure of the escalator, is also not necessary.					
8.2.2.1.2 Pallets The pallet shall be tested for deflection with a single force which, for a pallet area of 1 m^2, shall be 7 500 N (including weight of the plate). The force shall be applied perpendicular to the tread surface on a steel plate 0,30 m x 0,45 m in size and at least 25 mm thick, in the center of the tread surface, and the edge of the plate being 0,45 m long shall be arranged parallel to the lateral edge of the pallet. For pallets with smaller or larger areas, the force and the loading area shall be changed proportionally, whereby for the loading area the ratio of edge length shall be 1: 1,5; however, the force shall be not below 3 000 N (including weight of the plate), the size of the plate be not smaller than 0,20 m x 0,30 m and its thickness be not less than 25 mm. During this test the deflection measured at the tread surface shall be not more than 4 mm. There shall be no permanent deformation (setting tolerances are permitted). The pallet shall be tested as a whole together with rollers (not rotating), axles or stub shafts (if existing) in a horizontal position. A test of the installed pallet, i.e. together with the guide rails and	—	—	—	—	**8. Inspection of elevator main safety component** **Step 7. Load of steps** The step shall be tested for deflection with a single force of 300 kgf (including weight of the plate) applied perpendicular to the tread surface on a steel plate 0,20 m x 0,30 m in size , in the center of the tread surface. deflection ≤ 4 mm

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the supporting structure of the passenger conveyor, is not required.					
8.2.2.2 Dynamic test **8.2.2.2.1** Steps The step shall be tested at the maximum inclination (inclined support) for which the step is to be applied, together with rollers (not rotating), axles or stub shafts (if existing). It shall be subjected to a load pulsating between 500 N and 3 000 N at a frequency between approximately 5 Hz and 20 Hz for at least 5 x 10^6 cycles whereby an undisturbed harmonic force flow shall be achieved. The load shall be applied perpendicular to the tread surface on a steel plate 0,20 m x 0,30 m in size and at least 25 mm thick, arranged as specified in 8.2.2.1.1, in the center of the tread surface. After the test the step shall show neither fracture nor permanent deformation greater than 4 mm, measured at the tread surface. If rollers are damaged during the test, it is permissible to replace them.	**802.5e/902.5d Step/Pallet Fatigue Tests.** Each step/ pallet width shall be subjected to the step fatigue test as described in Rule 1105.1. **SECTION 1105; ENGINEERING TEST OF ESCALATOR STEPS AND MOVING WALK PALLETS** **1105.1 Step Fatigue Test** (a) The test shall be made at either the manufacturer's facility or at a testing laboratory. The results of the test shall be certified by a registered professional engineer. (b) Escalator steps shall be mounted in an arrangement that duplicates the conditions on the escalator incline and their attachment to the step chain. Moving walk pallets shall be mounted in an arrangement that duplicates the condition of a horizontal moving walk and their attachment to the pallet chain. (c) The steps or pallet shall be subjected to a load varying from 100 lbf (455 N) to 650 lbf (2955 N) at a frequency of 10 Hz ±5 for 5,000,000 cycles. An undisturbed harmonic force flow shall be achieved. (d) The load shall be applied normal to the tread surface to a plate 1 in. (25 mm) thick, 7 7/8 in. (200 mm) wide, and 11 7/8 in. (300 mm) long, located at the center of the step or pallet with the 11 7/8 in. (300 mm) dimension in the direction of step travel.	—	—	**3.8** At least two steps in each experimental batch of newly made steps shall undergo dynamic tests as specified by procedures of the organization that designs escalators. The dynamic test procedure shall take into account maximum forces that occur at upper curved segments of the stairway belt. The step shall not have residual deformations (deviations from dimensions established by the drawing) after the test.	≤ 0,215 m $y_1 \leq 0,4$ m z_1 0,56 m to 1,02 m; by ECTAS non-destructive test is required
8.2.2.2.2 Pallets	(e) The step or pallet shall have no	—	—	—	—

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The pallet, irrespective of its size, shall be tested in a horizontal position together with rollers (not rotating), axles or stub shafts (if existing). It shall be subjected to a load pulsating between 500 N and 3 000 N at a frequency between approximately 5 Hz and 20 Hz for at least 5 x 10^6 cycles whereby an undisturbed harmonic force flow shall be achieved. The load shall be applied perpendicular to the tread surface on a steel plate 0,20 m x 0,30 m in size and at least 25 mm thick, in the center of the tread surface. After the test, the pallet shall show neither fracture nor permanent deformation greater than 4 mm, measured at the tread surface. If rollers are damaged during the test, it is permissible to replace them.	fractures or permanent tread surface deflection exceeding 5/32 in. (4 mm) following the completion of the test. The deflection of 5/32 in. (4 mm) does not include any set or wear in the supporting wheels (f) This test is to be performed on each step or pallet width.				
8.2.3 Step treads and pallets (see figure 1, detail X) **8.2.3.1** The surface of the step treads and pallets shall have grooves in the direction of movement with which the teeth of the combs mesh. The step treads of the escalator shall be sensibly horizontal in the usable area of the escalator.	**802.5a Material and type** (3) Step treads shall be horizontal and shall afford a secure foothold. **902.5e Material and type** (3) Pallet treads shall afford a secure foothold	**3.6.6.1 Treads** The tread surface of each step shall be slotted the full width of the step, parallel to the horizontal direction of travel. Each slot shall be not more than 7.5 mm wide nor less than 9.5 mm deep, and the distance from center to center of adjoining slots shall be not more than 10 mm. (See Clause 3.5.2 for wear on combplates.) ***(3.6.2 Treadway surface*** ***3.6.2.1 Grooved surfaces*** *The treadway surface of belts and belt pallets shall be grooved in a direction parallel to its direction of travel for the purpose of meshing*	**JEAS-406G (Draft)** **2. Description** **2.5** On the tread of every step there shall be a yellow demarcation line which is 20 mm wide or more on three sides (on the fringes of both sides and the riser side of the adjacent step) or four sides (on all the fringes of the tread).	**5.3.1** The tread of a step shall have projections and recesses along the axis of the escalator. The cover of a step shall end in a projection near the balustrade. Two extreme projections and their proceeding recesses on both sides shall have bright distinctive colour.	—

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		with combplates at the landings. Each groove shall be not more than 7 mm wide at the treadway surface nor less than 4.5 mm deep, and the distance from the centre to centre of adjoining grooves shall be not more than 13 mm. The sides of grooves may slope for mould or draft purposes and may be filleted at the bottom. Additionally, the exposed surface of the moving walk treadway shall be designed to provide a secure foothold. This treadway surface is to be used in conjunction with combplate in accordance with Clause 3.5. For pallet-type treadways, each groove shall be not more than 7.5 mm wide nor			
8.2.3.2 The width b_7 of the grooves shall be at least 5 mm and not exceed 7 mm.	**802.5d/902.5a Slotting of Step Treads/ Treadway.** The tread/treadway surface of each step/pallet shall be slotted in a direction parallel to the travel of the steps. Each slot shall be not more than 1/4 in. (6.3 mm) wide and not less than 3/8 in. (9.5 mm) deep; and the distance from	*less than9.5 mm deep, and the distance from centre to centre of adjoining grooves shall be not more than 10 mm. (See Clause 3.5.2.1 for wear on combplates.)*	—	**Appendix 3** Step tread depression width :l_{11} =5-7 mm	**8. Inspection of elevator main safety component** **Step 4.3 (1)** The width of the grooves shall be not exceed 7 mm.
8.2.3.3 The depth h_7 of the grooves shall be not less than 10 mm.	center to center of adjoining slots shall be not more than 3/8 in. (9.5 mm). *(Escalator)*: Slots shall be so located on the step tread surface as to form a cleat on each side of the step tread adjacent to the skirt panel.			**Appendix 3** Height of projection of tread not less than h_5=10 mm	**8. Inspection of elevator main safety component** **Step 4.3 (1)** 10 mm or more for escalator, 5 mm or more for moving walk
8.2.3.4 The web width b_8 shall be at least 2,5 mm and not exceed 5 mm.	*(Moving walk):* Sides of the slots may slope for mold draft purposes and may be filleted at the bottom. Slots shall be so located on each side of the pallet to form a cleat adjacent to the skirt panel.	***3.6.2.2 Non-grooved surface*** *Non-grooved surfaces shall provide a secure foothold.)* Additional requirement in Part 5: **3.6.5 Tread surface** The surface of steps shall be horizontal at all visible positions of the escalator and shall provide a secure foothold		**Appendix 3** Step tread protrusion width: l_{10} =2.5-5 mm	**8. Inspection of elevator main safety component** **Step 4.3 (2)** $b_7 + b_8 \leq 10$ mm for escalator $b_7 + b_8 \leq 13$ mm for moving walk
8.2.3.5 The step treads and step risers or pallets shall not finish with a groove at their side edges.	**902.5b Intermeshing Pallets.** Alternate cleats on adjacent pallets shall intermesh so that there is no continuous transverse gap between adjacent pallets.	—	—	**5.3.1** The cover of a step shall end in a projection near the balustrade.	—
8.2.3.6 The edge between the surface of the step tread and the	—	—	—	—	—

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riser shall have any sharpness relieved.					
(8.2.3.7)	**902.5c Alignment of Pallet Tread Surfaces.** Adjacent ends of pallets shall not vary in elevation more than 1/16 in. (1.6 mm).	**3.6.6.2 Alignment** Adjacent ends of pallets shall not vary in elevation more than 1,6 mm.	—	—	—
8.2.4 Belts (see figure 1, detail X) **8.2.4.1** The belts shall have grooves in the direction of movement with which the teeth of the comb mesh.	**Rule 902.6 Belt Type Treadway** Belt type treadways shall conform to the following: **902.6a Splices.** Splicing of the treadway belt shall be made in such a manner as to result in a continuous unbroken treadway surface of the same characteristics as the balance of the belt. **902.6b Slotting of Treadway.** The treadway surface shall be slotted in a direction parallel to its travel for purposes of meshing with combplates at the landings. Each slot shall not be more than 1/4 in. (6.3 mm) wide at the treadway surface and not less than 3/16 in. (4.8 mm) deep, and the distance from center to center of adjoining slots shall be not more than 1/2 in. (13 mm). Sides of slots may slope for mold draft purposes and may be filleted at the bottom. Slots shall be so located on each side of the belt to form a cleat adjacent to the skirt panel.	**3.6.2 Treadway surface** **3.6.2.1 Grooved surfaces** The treadway surface of belts and belt pallets shall be grooved in a direction parallel to its direction of travel for the purpose of meshing with combplates at the landings. Each groove shall be not more than 7 mm wide at the treadway surface nor less than 4.5 mm deep, and the distance from the centre to centre of adjoining grooves shall be not more than 13 mm. The sides of grooves may slope for mould or draft purposes and may be filleted at the bottom. Additionally, the exposed surface of the moving walk treadway shall be designed to provide a secure foothold. This treadway surface is to be used in conjunction with combplate in accordance with Clause 3.5. For pallet-type treadways, each groove shall be not more than 7.5 mm wide nor less than 9.5 mm deep, and the distance from centre to centre of adjoining grooves shall be not more than 10 mm. (See Clause 3.5.2.1 for wear on combplates.) **3.6.2.2 Non-grooved surface** Non-grooved surfaces shall provide a secure foothold.	—	—	Flat belt conveyor having no groove allowed. **4.3.2 (13)** In case rubber belt type moving walk does not have slip prevention groove on the loading surface, the equipment shall comply with the following additional requirements as below: Stop switch detecting the rubber belt failure shall be ensured the positive operation; Splice joint of the rubber belt does not have partial crack and shall be free from damage; Splice joint of the rubber belt shall not split, having smooth surface and shall be free from defect; The side edges of the rubber belt shall not split or be wear resistant; The inside of the rubber belt and supporting structure, the friction reducing method shall be prepared; Operating condition of the rubber belt shall be smooth and free from knocking or irregular contact to the frame; The guide rollers preventing sway of the rubber belt shall

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					be robust and ensure the positive operation; The edge of rubber belt and the guide rollers shall be fully enclosed by protective cover and shall not be exposed outside.
8.2.4.2 The width b_7 of the grooves shall be at least 4,5 mm and not exceed 7 mm, and shall be measured at the tread surface of the belt.			—	—	—
8.2.4.3 The depth h_7 of the grooves shall be not less than 5 mm.			—	—	—
8.2.4.4 The web width b_8 shall be at least 4,5 mm and not exceed 8 mm and shall be measured at the tread surface of the belt.			—	—	—
8.2.4.5 The belt shall not finish with a groove at the side edge of the belt. Splicing of the treadway belt shall be such as to provide a continuous unbroken treadway surface.		**3.6.3 Splicing of belts.** Splicing of the treadway on belt and belt-pallet types shall be made so as to result in a continuous unbroken treadway surface of the same characteristics as the remainder of the belt.	—	—	—
8.2.4.6 Belt passenger conveyors with edge supported belt	**902.9a Supports.** Supports shall conform to the following: (2) *Roller Bed*. Where the treadway is supported on a series of rollers, the combination of roller spacing, belt tension, and belt stiffness shall be such that the deflection of the treadway surface, midway between rollers, shall not exceed the quantity 0.094 in. (0.239 mm) plus 0.004 times the center to center distance of rollers in in. (mm) when measured as follows: (a) The treadway surface shall be loaded midway between rollers	**3.6.7.3 Edge-supported belt** Where the treadway belt is transversely rigid and is supported by rollers along its edge, the following requirements shall apply: **(a)** With the belt fully tensioned, while a load of 68 kgf shall be applied centrally between the edge supports by means of a metal plate 150 mm by 250 mm by 20 mm thick placed with its longitudinal axis along the length of the belt, the deflection at the centre shall be not more than 0.01 times the distance between	—	—	—
8.2.4.6.1 Where the treadway belt is transversely rigid and is supported by rollers along its edges only, the following requirements shall apply:			—	—	—
8.2.4.6.1.1 With the belt tensioned to suit operational conditions, a single force of 750 N (including weight of the plate)			—	—	—

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shall be applied on a steel plate 0,15 m x 0,25 m x 0,02 m in size. The plate shall be placed centrally between the edge supporting rollers in such a way that its longitudinal axis is parallel to the longitudinal axis of the belt. The deflection at the center shall not exceed 0,01 z3 where z3 is the transverse distance between the supporting rollers (see z3 in figure 5). **8.2.4.6.1.2** Additional treadway supports shall be provided at intervals not exceeding 2 m along the centerline of the treadway. These supports shall be located at a level not more than 50 mm below the underside of the treadway when it is loaded under the conditions required by 8.2.4.6.1.1.	with a 25 lb (11.3 kg) weight concentrated on a cylindrical foot piece 2 in. (51 mm) long by 1 in. (25 mm) in diameter placed with its long axis across the belt. Deflection of this foot piece from its unloaded position shall not exceed the figure obtained above. (b) The rollers shall be concentric and true running within commercially acceptable tolerances (3) *Edge Supported Belt* When the treadway belt is transversely rigid and is supported by rollers along its edges, the following requirement shall apply: (a) With the belt tensioned through the take-up system, the permissible slope of a straight line from the top of a treadway rib adjacent to the centerline of the treadway to the top of a treadway rib adjacent to the balustrade, in a plane perpendicular to the path of the treadway, shall not exceed 3% when the treadway is loaded with a 150 lb (68 kg) weight on a 6 in. (152 mm) by 10 in. (254 mm) plate located on the centerline of the treadway with the 10 in. (254 mm) dimension in the direction of treadway travel. (b) In order to support the treadway in case of localized overload, supports shall be supplied at intervals, not exceeding 6 ft (18.3 m) along the center line of the treadway. The supports shall be located at a level not more than 2 in. (51 mm) below the underside of the treadway when it is loaded under test conditions required by Rule	the edge supports. **(b)** In order to support the treadway in the event of localised overloading, supports shall be provided at intervals not more than 2000 mm along the centre-line of the treadway. The supports shall be located not more than 50 mm below the underside of the treadway, while supporting the test load specified by (a) above. **3.6.7.4 Safety decking** Where required under Clauses 3.6.7.2 and 3.6.7.3, a safety decking consisting of sheets of material not deemed combustible when tested in accordance with AS 1530.1, which may have perforations not larger than 25 cm^2, shall be provided. Such decking shall be rigidly fixed at a distance not more than 150 mm below the belt and shall cover the area of exposed belt or treadway, except that a space not more than 50 mm may be permitted between any roller or pulley and the safety decking. The decking shall be capable of withstanding a load of 365 kgf/m^2 without deflecting more than 25 mm.	—	—	—

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	902.9a(3)(a).				
(8.2.4.6.1.3)	—	**3.6.7.3 Edge-supported belt** **(c)** Either the belt shall have a factor of safety not less than 10 (see Clause 2.7), or a safety decking complying with Clause 3.6.7.4 shall be provided.	—	—	—
8.2.5 Step risers The step risers shall be sufficiently rigid and breakage-resistant. The step risers shall be appropriately cleated and the surface ot the cleating shall be smooth. The ends of the step tread shall mesh with the cleating of the next step riser.	**802.5c Cleated Step Risers.** The step riser shall be provided with vertical cleats which shall mesh with slots on the adjacent step tread wherever the steps are exposed.	**3.6.6.2 Risers** The step riser shall be provided with vertical ribs, which shall mesh with slots on the adjacent step tread as the steps make the transition from incline to horizontal	—	**5.3.2** The riser may have vertical projections and recesses which should match those of the step tread to form a labyrinth.	**8. Inspection of elevator main safety component** **Step 4.2** The step riser shall be provided with vertical ribs, which shall mesh with slots on the adjacent step tread as the steps make the transition from incline to horizontal.
8.3 Combs **8.3.1 General** Combs shall be fitted at both landings to facilitate the transition of passengers.	**802.6/902.8 Entrance and Egress Ends** **802.6a/902.8a Combplates.** (1) There shall be a combplate, to which the combs shall be fastened, at the entrance and at the exit of every escalator/moving walk.	**3.5 COMBPLATES** **3.5.1 Location** Combplates shall be provided at each end of every escalator. ***(3.5 END-PLATE*** ***3.5.1 Location*** *An end-plate shall be provided at any end of a moving walk which can be used as an exit end. When a ribbed belt or pallet-type treadway is used, this end-plate shall consist of a combplate in accordance with Clause 3.5.2.1, or when flat belts are used, shall be a non-toothed plate or plates in accordance with Clause 3.5.2.2.)*	**JIS A 4302-1992;** **4.4.2 Inspection to be carried out un upper and lower landings and on steps** (7) The engagement between the grooves on the steps and the combplate teeth on the upper and lower landings shall be adequate enough, and there is no risk of easy jamming of things.	**5.4.1** Landings with inclined combs shall be provided for safe entry on and exit from the stairway belt. The surface of the landings shall be channelled.	—
8.3.2 Construction **8.3.2.1** The teeth of the combs shall mesh with the grooves of the steps, pallets or belt (see 11.3 and 11.4). The width of the comb teeth shall be not less than 2,5 mm, measured at the tread surface.	**802.6/902.8 Entrance and Egress Ends** **802.6a/902.8a Combplates.** (2) The comb teeth shall be meshed with and set into the slots in the tread surfaces so that the points of the teeth are always below the upper surface of the	**3.5.2 Design** **3.5.2.1 Combplate design** Combplates shall comply with the following requirements: (c) Combplate teeth shall mesh with and be set into the grooves in the treadway surface, so that the points of the teeth are always	—	**5.4.4** The projections of the step tread shall pass through teeth of the comb without touching their sides.	—

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	treads	below the upper surface of the treads *(treadway grooves).* (d) Combplate penetration shall not diminish by more than 50% through wear, but in no case shall the distance between the bottom of the step *(pallet)* groove and the lower edge of the comb be more than 6 mm. (f) The distance between the underside of the combplate teeth and the bottom of the step-tread slots and the distance between the roots of the combplate teeth and the top of the step treads shall be not less than 2.5 mm nor more than 4 mm (see Figure 3.5.2). NOTE: These distances are intended to apply to equipment when new. *((e) Where grooved metal-surfaced treads are used, combplate teeth shall be of non-ductile material and be designed to break when or before' the end of one tooth has deflected to the point of touching the next straight tooth.* *(f) Where pliable belts are used for treadways, the combplate may be of other suitable materials*.) (g) At no time shall the thickness of the teeth be reduced by wear to less than 1.25 mm.			
8.3.2.2 The ends of the combs shall be rounded off and so shaped as to minimize the risk of trapping between combs and steps, pallets or belt. The radius of the teeth end shall be not greater than 2 mm.	—	—	—	—	—

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8.3.2.3 The teeth of the comb shall have a form and inclination so that the feet of passengers, leaving the escalator or passenger conveyor, will not stub against them. The design angle ß shown in figure 1, detail X shall not exceed 40°.	—	—	—	**Appendix 3** Inclination angle of landing comb teeth: maximum β=40 degrees	—
8.3.2.4 The combs or their supporting structure shall be readjustable, to ensure correct meshing. The combs shall be easily replaceable.	**802.6a/902.8a Combplates.** (3) Combplates shall be adjustable vertically. Sections forming the comb teeth shall be readily replaceable.	**3.5.2.1 Combplate design** Combplates shall comply with the following requirements: (a) Sections forming combplate teeth shall be readily replaceable. (b) Combplates shall be adjustable vertically.	—	**5.4.4** The landing shall have a device to guide correctly the step tread relative to the teeth of the comb. **5.4.2** The combs of the landings shall be replaceable.	—
8.3.2.5 On escalators and pallet passenger conveyors the combs shall be rigid and have such a design that upon trapping of foreign bodies either their teeth deflect and remain in mesh with the grooves of the steps or pallets, or they break. On belt passenger conveyors the combs shall be rigid. Upon trapping of foreign bodies the belt webs are permitted to deflect, however, the comb teeth shall remain in mesh with the grooves.	—	**3.5.2.1 Combplate design** Combplates shall comply with the following requirements: (e) Combplate teeth shall be of non ductile material and be designed to break when, or before, the end of one tooth has deflected to the point of touching the next straight tooth.	—	—	—
8.3.2.6 In the case of objects being trapped which are not dealt with by the means described in 8.3.2.5 and that give rise to risk of damaging the steps, pallets, belt or comb supporting structure, the escalator or passenger conveyor shall be stopped (see 14.2.2.4.1.i)).	—	**6.13 COMBPLATE SWITCHES** A combplate switch shall be provided for the combplate at each end of escalators (moving walks) to cause interruption of power to the machine motor and brake. The escalator (moving walk) shall stop in the event of a force exceeding 1000 N being at any point along the combplate and in the direction of travel of the combplate.	—	**5.4.3** The landing shall be designed so that the escalator should stop when a foreign object gets into it.	**4.3.2 (19)** The stop switch which automatically stops the movement of the tread when an object is caught at a spot where the tread and the comb are engaged with each other shall be installed firmly and shall operate satisfactorily.
(8.3.2.7)	**802.6a/902.8a**	—	—	—	—

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	(4) The comb section, combplate, and landing plate assemblies shall not make contact with the step treads/pallet or belt treadway surfaces with a weight of 350 lb (159 kg) applied to any area 7 7/8 in (200 mm) by 11 7/8 in (300 mm) centered on the plates with the 11 7/8 in (300 mm) dimension parallel to the direction of travel.				
(8.3.2.8)	**802.6b/902.8b Distinction Between Comb and Step.** There shall be a visual contrast between the comb and step/tread, achieved by color, pattern, or texture.	—	—	—	—
(8.3.2.9)	**802.6c/902.8c Adjacent Floor Surfaces.** The adjacent floor surfaces at each landing shall be continuous with the top of the landing plate with no abrupt change in elevation of more than 1/4 in. (6.4 mm).	—	—	—	—
(8.3.2.10)	—	**3.5.2.2 Belt entry points for flat belts** The entry point for moving belts at any exit shall be designed and fitted with an end-plate assembly to reject the entry of foreign objects as far as practicable, and shall comply with the following requirements: (a) The belt adjacent to the end-plate shall return about a diameter not greater than 100 mm. (b) The top of the end-plate assembly shall be between 3 mm and 20 mm below the exposed surface of the treadway. **3.5.5 Clearance for flat-belt-type treadways** The gap between the belt surface and the end-plate assembly shall not	—	—	—

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		exceed 2mm. The operation of the guard on the end-plate protection shall not expose a gap exceeding 15 mm.m.			
(8.3.2.11)	—	**3.5.3 Clearance for belt-and belt-pallet-type treadways.** The combplate teeth shall engage the grooves of the belt for a depth not less than 60% of the grooved depth, and the clearance between the underside of the combplate teeth and the bottom of the belt grooves, and between the top of the treadway and the roots of the combplate teeth, shall be not more than 5 mm) **3.5.4** The distance between the underside of the combplate teeth and the bottom of the pallet slots and the distance between the roots of the combplate teeth and the top of the pallet treads shall be not less than 2.5 mm nor more than 4 mm (see Figure 3.5.4). NOTE: These distances are intended to apply to equipment when new.	—	—	—

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9 Drive for steps, pallets or belt **9.1 Chain drive for the steps and pallets** **9.1.1** The steps of escalators shall be driven by at least two steel link chains of which at least one shall be located on each side of the step. The pallets of passenger conveyors are permitted to be driven by only one steel link chain if the parallel movement of the pallets in the usable area is ensured by other mechanical measures.	**802.11/902.13 Chains** The use of chains with cast iron links shall not be permitted.	**3.7 STEP CHAINS** Steps shall be driven by two roller chains. The factor of safety based on static loads for these chains shall be not less than 10, based on the breaking strength. Chains constructed of a material that would require periodical heat treatment shall not be used.	**BSLJ-EO; Article 129-12** **2.** With respect to the escalators installed in the building, the provisions of Article 129-4 (except paragraph 3 item (5)) and Article 129-5 paragraph 1 shall apply mutatis mutandis. In this case, the terms shown in the middle column corresponding to the provisions shown in the left column of the following table shall read the terms shown in the right column of the table. [**see Table B.1 in the annex of this comparison**] **3.** Carrying load for the escalators shall equal or exceed the values calculated by the following formula: P=2600 A where; P: The carrying load for the escalator, in Newtons A: The horizontal projected area of the steps of the escalators, in square meters **BSLJ-EO;** **Application of Article 129-4** **1.** The construction of principal structural parts to suspend or to support the steps of the escalator (hereinafter refer to as principal supporting parts in this Article) shall comply with any of the provisions described	—	—

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			in the following items. (1) The steps and the principal supporting parts at installation and during use shall be constructed as the structural method designated by the Minister of Land, Infrastructure and Transport considering the abrasion and the fatigued destruction, as conforming to the following provisions. a. Any damage by the shock during the normal operation and when the safety device is actuated shall not occur to the parts other than the parts liable to the abrasion or the fatigued destruction by the ascent and descent of the steps b. Any damage which causes fall down of the step under the normal use by the shock during the normal operation and when the safety device is actuated shall not occur to the parts liable to the abrasion or the fatigued destruction by the ascent and descent of the steps. (2) With respect to the escalators suspended by the chain, other escalators designated by the Minister of Land, Infrastructure and Transport, it shall be confirmed that the structures of the steps and principal supporting parts comply with a and b of the preceding items by the strength verification method for the escalators with taking account of the abrasion or the fatigued destruction under the normal using condition.		

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			(3) It shall be approved by the Minister of Land, Infrastructure and Transport that the structures of steps and principal supporting parts at installation and during use comply with the provisions of a and b of the item (1). **2.** "The strength verification method for the escalators" is the method to verify the strength of the steps and principal supporting parts of the escalators at installation and during use in accordance with the following provisions. (1) The force acting on the principal supporting parts and the step slabs (herein after refer to as the principal supporting parts etc. in this Article) shall be calculated in accordance with the load stipulated in the following Article. (2) The intensity of stress occurred on the section of the principal supporting parts etc. during normal operation and when the safety device is actuated in the preceding item shall be calculated by the formula described in the following table. [**see Table B.2 in the annex of this comparison**] In this table G1, G2 and P indicate following force and X1 and X2 indicate following values respectively G1: forces occurred by the		

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			fixed load of the parts except the ascending and descending parts out of the fixed load stipulated in item 1 of following article G2: forces occurred by the fixed load of the ascending and descending parts out of the fixed load stipulated in item 1 of following article P: forces occurred by the movable load stipulated in item 3 of article 129-12 X1: the value established by the Minister of Land, Infrastructure and Transport with taking account of the acceleration occurred on the ascending and descending parts in the normal operating condition. X2: the value established by the Minister of Land, Infrastructure and Transport with taking account of the acceleration occurred on the ascending and descending parts when the safety device is actuated. (3) It shall be confirmed that intensity of stress calculated in accordance with the provisions of preceding item under the normal operation and when the safety device is actuated does not exceed the allowable intensity of stress, which is obtained to divide the breaking strength of the materials used for the principal supporting parts etc. by the safety factor. (the value at installation and during use, specified by the Minister of Land, Infrastructure		

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			and Transport with taking account of the strength deterioration of the materials used for the said parts caused by abrasion or the fatigued destruction.) (4) With respect to the parts furnished in accordance with following paragraph item 2, which are capable to support or suspend the steps individually, it shall be confirmed that the intensity of stress of each parts calculated in accordance with item 1 and item 2 on the assumption that one of them is missing does not exceed the critical allowable intensity of stress of the materials used for said parts obtained to divide the breaking strength of the materials by critical safety factor (the value at installation and during use specified by the Minister of Land, Infrastructure and Transport individually, with taking account of the strength deterioration of the materials by abrasion or the fatigued destruction so as not to occur the such damages that cause fall down of the steps). **3**. In addition to the provisions of the preceding 2 items, the structural of the steps and principal supporting parts etc. of the escalators shall be conform to the following standards. (1) With respect to the parts liable to corrosion or deterioration out of the steps and principal supporting parts etc. of the escalators, the		

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			materials, which are hard to corrosion or deterioration, shall be used, or effective rust prevention or the countermeasures against corrosion shall be adopted (2) The parts liable to abrasion and fatigued destruction out of the steps and principal supporting components etc. of the escalators shall be consist of more than 2 parts, and each of them shall be capable to support or suspend the steps independently. (3) The joint sections of the pin connection shall be constructed so that they are not out of gear as the result of earthquakes or any of the vibrations. (4) With respect to the escalators suspended by the chains with using the sprockets, the chains shall not come off from sprockets as result of earthquakes or any other vibrations. **BSLJ-EO;** **Application of Article 129-5** The fixed load on each part consisting the escalators shall be calculated according to the conditions of the said escalators. **MOC-N (No.1418-2000)** **1.** In the Art.129- 12 item 2 of the Building Standard Law Enforcement Order, the escalators object to the strength verification method for the escalators applied Art.129-4 item 2 mutatis mutandis shall		

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			be the ones of which steps are suspended by chains or similar equipment and the step tread made of belt suspended by chains or similar equipment. **2.** The escalator strength verification method shall be conform to the following each item. (1) In the Art.129-12 item2, X1 and X2 stipulated in Art.129-4 item 2 applied mutatis mutandis shall be 1.0 and 1.5 respectively. (3) The safety factor of the chain and other similar equipment and hitch part of the chain or belt for the escalators shall be not less than the value described in the following table. [**see Table B.4 in the annex of this comparison**] (4) In the Art.129-12 item 2 of the Building Standard Law Enforcement Order, the critical safety factor stipulated in the Art.129-4 item 2 paragraph 4 applied mutatis mutandis(restricted to that the step is not supported by the other equipment not liable to abrasion or fatigued destruction) shall be not less than the value described in the following table. [**see Table B.5 in the annex of this comparison**]		

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9.1.2 The factor of safety of each chain shall be at least 5. This factor is determined as the ratio between the breaking strength of the chain and the static force to which the chain is subjected when the escalator or passenger conveyor carries the passenger weight according to 5.3 together with the tension force of the tensioning device. When more than one chain is used it is assumed that the load is equally distributed over the chains.	**802.10/902.12 Design Factors of Safety** Factors of safety are based on either single driving machine design or modular driving machine design. The factors of safety shall be at least the following. (a) Trusses and all supporting structures, including tracks, shall conform to the AISC Specifications for Design, Fabrication, and Erection of Structural Steel for Buildings, based on the maximum static load calculated per Rule 802.9a/902.10a. (b) For driving machine parts based on not less than the loads calculated per Rule 802.9b/902.10b: (1) where made of steel or bronze, 8; (2) where made of cast iron or other materials, 10. (c) For power transmission members, 10, based on not less than the loads calculated per Rule 802.9b/902.10b. (d) For steps/pallets, 5, based on not less than the loads designated in Rule 802.9d/902.11.		**same text as for 9.1/9.1.1**	**3.6** Safety factors shall be at least seven (7) for traction and driving chains and at least five (5) for steps and handrails. **3.5** Safety factors shall be defined in the strength design as a ratio of the breaking load to the maximum force caused by loads corresponding to those in Appendix 4 in the element under consideration. **3.7 Breaking test requirements for chains** The actual safety margin of a traction chain must be determined on a test rig. For this purpose, at least two similar sections /lengths) of a chain must be selected out of a maximum two hundred (200) chain lengths and loaded to failure. They should meet the specifications of 3.6 Sections at least 600 mm long of the selected chain lengths may be loaded to failure separately. The tests of chains shall be performed with step axles inserted in the holes of hollow rollers. It is permissible not to load chains to failure if the test load exceeds the breaking load by 5 percent. Each chain length shall be checked in a test rig under a load equal to twice the maximum design tension loading under operation.	—

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				The chain length should not have residual deformations or pressing-out of chain parts after the test.	
9.1.3 The chains shall be tensioned continuously and automatically. Tension springs as tensioning device are not permitted. When weights are used for tensioning they shall be safely caught should their suspension break.	**802.7 Trusses or girders** The truss or girder shall be designed to safely sustain the steps and running gear in operation. In the event of failure of the track system, it shall retain the running gear in its guides. Where tightening devices are operated by means of tension weights, provision shall be made to retain these weights in the truss if they should be released.	—	—	**5.3.3** A tensioning device shall be provided to ensure constant tension of the stairway belt.	—
9.2 Drum drive for the belt **9.2.1** The factor of safety of the belt including splicing shall be at least 5. This factor is determined as the ratio between the breaking strength of the belt and the static force to which the belt is subjected when the passenger conveyor carries the passenger weight according to 5.3 together with the tension force of the tensioning device.	**902.12 Design Factors of Safety** Factors of safety are based on either single driving machine design or modular driving machine design. The factors of safety shall be at least the following. (e) For belts, 5, based on not less than the loads designated in Rule 902.10b.	**2.6.2 Machinery** For the purpose of brake, treadway and power transmission calculations, the load rating shall be considered to be not less than the following: (a) For systems with an overall length up to 50 m 3.58 kPa (b) For systems with an overall length greater than 50 m 3.58 kPa decreasing uniformly to not less than 1.47 kPa at a rate of 0.039 kPa/m provided that (i) a monitoring system continually checking the load is provided; (ii) speed is ramped down to a stop when the rated load is exceeded, and requires manual restarting; (iii) in (ii) above, the deceleration does not exceed 1 m/s2; and (iv) the brake and system friction is sufficient to prevent movement of the walkway under a load rating of 3.58 kPa.	—	—	Safety factor 7 by article 60, KOSHA

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		2.7 FACTORS OF SAFETY The factors of safety based on the static loads shall be not less than the following: (a) For trusses and all structural members, including tracks, based on yield strength 2.5. (b) For belt treadways (including the splice) with slider bed support or safety decking (see Clause 3.6.7.4) 5. (c) For belt treadways (including the splice) without slider bed support or safety decking (see Clause 3.6.7.4) 10. (d) For belt-pallet and pallet-type treadways 10.			
9.2.2 The belt shall be driven by drums and be tensioned continuously and automatically. Tension springs as tensioning device are not permitted. When weights are used for tensioning they shall be safely caught should their suspension break.		**3.6.7.5 Guiding of belt, belt-pallet or pallet** Belts, belt-pallets and pallets of inclined (sloped) type moving walks shall be prevented from being displaced from the guiding system in the event of a breakage of a belt or pallet connection within the exposed area of the belt, belt-pallet, or pallet where it is capable of carrying passengers. Means shall be provided to prevent a displacement of the treadway when measured perpendicular to the passenger surface of the treadway of more than 3.5 mm, in the event of any breaking of a pallet connection.	—	—	—
9.3 Other methods of driving steps, pallets or belt Other methods of driving are permitted if safety and operation are at least equal to those required in 9.1 and 9.2.	*(This EN 115 Clause refers to specific designs, which A17.1 does not address in accordance to ASME procedures.)*	—	—	—	—

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(9.4)	—	**5.16 LUBRICATION** Where routine lubrication is required, it shall be possible without removing the steps.	—	—	—

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EN 115:1995 (Europe)	ASME A 17.1-1996 (USA)	AS 1735 parts 1, 5 & 6 (Australia)	Japanese Codes	PUBEE 10-77-94:1995 (Russia)	Korean Code
10 Angle of inclination of the escalator and passenger conveyor and guiding of the steps, pallets and belt **10.1 Angle of inclination and position of the steps** **10.1.1** The angle of inclination α of the escalator shall not exceed 30°, but for rises not exceeding 6 m and a rated speed not exceeding 0,50 m/s the angle of inclination is permitted to be increased up to 35° (see α in figure 1). The angle of inclination of passenger conveyors shall not exceed 12°. *(see also 10.1.5)*	**802.1 Angle of Inclination** The angle of inclination shall not exceed 30 deg. from the horizontal by design, but at-the-site may exceed this maximum by 1 deg. due to field conditions. The angle shall be measured at the centerline of the steps **902.1 Angle of Inclination** The angle of inclination from the horizontal shall not exceed 3 deg. within 3 ft (914 mm) of the entrance and exits and shall not exceed 12 deg. at any point.	**2.3 SLOPE** The slope of the direction of travel of the steps *(treadway),* at every point of travel, shall be not more than 30 *(12)*° from the *horizontal (see Clause 2.4 for interdependence of treadway speed and treadway slope).*	**BSLJ-EO; Article 129-12** **1.**(2) The inclination shall be 30° or less. **BSLJ-EO; Article 129-12, EXP.1.(2)** The inclination (slope) of the escalator shall be 30° or less. However, the inclination of 35° or less is permitted for the escalator as provided to MOC-N (No.1413-2000) 2-1. The inclination of 15° or less is permitted for the moving walks as provided to MOC-N (No.1417-2000)2. **MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph (1) The escalator of which inclination exceeding 30 degree. In addition to conforming to the provisions stipulated in the Art.129-12 item 1 paragraph 1, 3 and 4, it shall be conform to the construction specified as follows. (a) It shall be that the inclination is less than 35 degrees. (2) The escalator of which step	Escalator inclination angle: maximum α=35° (floor escalators) and 30° (tunnel escalators)	**33.1 (2)** The inclination of escalator shall be not more than 30° and moving walk shall be not more than 12°, respectively. However, if the height of the escalator riser is less than 6 m, inclination may be 35°or less; and if the stepping surface of the moving walks is of rubber products or non-slipper structure, the inclination may be 15° or less.

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			tread width exceeding 1.1m. In addition to conforming to the provisions stipulated in the Art.129-12 item 1 paragraph 1, 3 and 4, it shall be conform to the construction specified as follows. (a) It shall be that the inclination is less than 4 degree. (3) The escalator of which speed varies in halfway of travel It shall be conform to the construction specified as follows. (e) Slope of the escalator shall be equal to or less than 4 degrees at the position where the speed of step varies, and shall be equal to or less than 8 degrees at the position other than the part mentioned above		
10.1.2 The step treads shall be sensibly horizontal in the usable area of the escalator.	**802.5a Material and type** (3) Step treads shall be horizontal and shall afford a secure foothold.	**3.6.5 Tread surface** The surface of steps shall be horizontal at all visible positions of the escalator and shall provide a secure foothold	—	**5.5.2** The tread of the steps shall maintain horizontal position along the whole path of the steps from one landing to another. The slope of the steps shall not exceed 1:100.	**3.3.1 (8)** The length between the horizontal moving section when the difference of height between treads is 4 mm or less shall be 0.8 m or more; provided however, if the rated speed is greater than 30 m/min or if the riser height exceeds 6m, the length shall be 1.2 m or more.
10.1.3 At the landings, the steps of the escalator shall be guided in such a way that the front edges of the steps leaving the comb and the rear edges of the steps entering the comb are moving horizontally for a length of at least 0,80 m measured from point L_4 (see figure 1 and detail X).	**802.6e Flat Steps.** There shall be a minimum of 2 and a maximum of 4 flat steps at the entrance and exit of every escalator. **902.9 Supporting Structure** **902.9a Supports.** Supports shall conform to the following:	**3.6.7 Horizontal step movement at ends of escalators** The steps at the ends of the escalators shall travel substantially horizontally, measured from the combplate, for a distance not less than the minimum shown in Table 3.6.7 and Figure 3.6.7, relevant to the	—	The stairway steps shall have horizontal sections before landings with a minimum length - with height of transporting passengers, maximum 6 m and nominal speed not more than 0.5 m/s: 800 mm; - with height of transporting	—

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A vertical difference in level between two consecutive steps of 4 mm maximum is permitted. At rated speeds above 0,50 m/s or rises above 6 m this length shall be at least 1,20 m, measured from point L_1 (see figure 1 and detail X). NOTE: Additional recommendations to 10.1.3 for public service escalators are given in annex D (informative). **D.1** to 10.1.3: At rated speeds above 0,65 m/s, it is recommended for public service escalators to guide the steps of the escalator at the landings in such a way that the front edges of the steps leaving the comb and the rear edges of the steps entering the comb are moving horizontally for a length of at least 1,60 m, measured from point L_1 (see figure 1 and detail X).	(4) *Pallet Type*. Pallet wheel tracks shall be so designed and located as to prevent more than 1/8 in. (3.2 mm) vertical displacement of the treadway should the pallet connection means break.	escalator rated speed. At the instant when the leading edge of any step leaving, or the trailing edge of any step approaching the combplate reaches this horizontal travel, the vertical height between adjacent step treads within this area shall be not more than 3 mm. **NOTE:** See Clause 6.2 for automatic start and speed change of escalators. **Table 3.6.7: Horizontal Step Movement**		passengers over 6 m and nominal speed over 0.5 m/s (but maximum more than 0.75 m/s for tunnel escalators): 1200 mm; - with height of transporting passengers over 6 m and nominal speed over 0.65 m/s: 1200 mm (floor escalators) and 1600 mm (tunnel escalators). The difference in heights of two adjacent steps on a horizontal section shall not be more than 4 mm.	
10.1.4 For escalators, the radius of curvature in the upper transition from incline to horizontal shall be - at least 1,00 m for rated speeds $v \leq 0,5$ m/s - at least 1,50 m for rated speeds $v > 0,5$ m/s The radius of curvature in the lower transition from incline to horizontal of the escalator shall be at least 1,00 m irrespective of the rated speed. NOTE: Additional recommendations to 10.1.4 for public service escalators are given in annex D (informative). **D.2** to 10.1.4: At rated speeds above 0,65 m/s, it is	—	—	—	—	**3.3.1 (9)** The radius of curvature of the changing section at the top of the ascending escalator shall be 1.0 m or more in case the rated speed is 30 m/min or less, or 1.5 m or more in case the rated speed exceeds 30 m/min. On the other hand, the radius of curvature of the changing section at the bottom of the descending escalator shall be 1.0 m or more irrespective of the rated speed.

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recommended for public service escalators to increase the minimum radius of curvature in the upper transition from incline to horizontal of the escalator to 2,60 m and in the lower transition from incline to horizontal of the escalator to 2,00 m.					
10.1.5 For belt passenger conveyors, the radius of curvature in the transition from incline to horizontal shall be at least 0,40 m. For pallet passenger conveyors, it is not necessary to determine the radius of curvature because on account of the maximum permissible distance between two consecutive pallets (see 11.1) it will always be sufficiently large.	—	—	—	—	**3.3.1 (9)** For a belt type horizontal moving walk, the radius of curvature of the changing section shall be 0.4 m or more. However, no radius of curvature shall be prescribed in the case of pallet types as the radius of curvature of the changing section always becomes large if the clearance between adjacent treads satisfy the prescribed value.
10.1.6 At the upper landings of passenger conveyors with an inclination of more than 6°, the pallets or belt shall move for a length of at least 0,40 m at a maximum angle of 6° before entering or leaving the comb. Analogous to 10.1.3, for pallet passenger conveyors the movement is specified as follows: The front edge of the pallet leaving the comb and the rear edge of the pallet entering the comb shall move without changing the degree of angle over at least 0,40 m.	**902.1 Angle of Inclination** The angle of inclination from the horizontal shall not exceed 3 deg. within 3 ft (914 mm) of the entrance and exits and shall not exceed 12 deg. at any point.	**2.4 RATED SPEED** The rated speed of a treadway shall not exceed 0.9 m/s and shall depend on the maximum treadway slope both at the points of entrance or exit and at any other point on the treadway. The rated speed of the exposed treadway surface shall be not more than the lesser of the speeds shown on Curves A and B in Figure 2.4 as follows: (a) For treadways with uniform slope: Curve B. (b) For entrances and exits: Curve A. (c) Maximum slope of treadways of varying slope: Curve B. In the application of this Clause, a moving walk shall not be considered as having a reduced slope at the entrance and exit,	—	—	—

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		unless both such reduced slopes continue for not less than 400 mm from the combplate to the measurable starting point of transition.*(See fig. 2.4 at end of document)*			
10.2 Guiding of steps, pallets and belt **10.2.1** Provisions shall be made to limit the displacement of the steps or pallets out of their guiding system should a driving device (according to clause 9) become defective, and to prevent the belt from leaving its guideway should the belt break. This requirement applies only to the usable area of the escalator or passenger conveyor.	**802.8 Step Wheel Tracks** Step wheel tracks shall be designed so as to prevent displacement of the steps and running gear if a step chain breaks.	**3.8 STEP WHEEL TRACKS** Step wheel tracks shall prevent displacement of the steps and running gear in the event of a step chain breaking. **3.6.7.4 Safety decking** Where required under Clauses 3.6.7.2 and 3.6.7.3, a safety decking consisting of sheets of material not deemed combustible when tested in accordance with AS 1530.1, which may have perforations not larger than 25 cm2, shall be provided. Such decking shall be rigidly fixed at a distance not more than 150 mm below the belt and shall cover the area of exposed belt or treadway, except that a space not more than 50 mm may be permitted between any roller or pulley and the safety decking. The decking shall be capable of withstanding a load of 365 kgf/m^2 without deflecting more than 25 mm. **3.6.7.5 Guiding of belt, belt-pallet or pallet** Belts, belt-pallets and pallets of inclined (sloped) type moving walks shall be prevented from being displaced from the guiding system in the event of a breakage of a belt or pallet connection within the exposed area of the belt, belt-pallet, or pallet where it is capable of carrying passengers. Means shall be provided to	—	**2.9** Should the stairway belt disjoin, the design of the escalator must secure the geometric shape of the carrying run of the belt.	—

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		prevent a displacement of the treadway when measured perpendicular to the passenger surface of the treadway of more than 3.5 mm, in the event of any breaking of a pallet connection.			
(10.2.1.1)	**(B 44 (8.3.5.1.3))** A step tread shall be horizontal, provide secure footing, and be so installed that a person standing on its nose shall not cause it to tip upward by more than 6 mm at any point.	—	—	—	—
10.2.2 *(see also 11.3 and 11.4)* Provisions shall be made in the area of the combs to ensure the correct meshing of the comb teeth with the grooves of the tread surface. The belt shall be supported in this area in a suitable manner, e.g. by drums, rollers, sliding plates.	**802.6/902.8 Entrance and Egress Ends** **802.6a/902.8a Combplates.** (2) The comb teeth shall be meshed with and set into the slots in the tread surfaces so that the points of the teeth are always below the upper surface of the treads. (3) Combplates shall be adjustable vertically. Sections forming the comb teeth shall be readily replaceable. (4) The comb section, combplate, and landing plate assemblies shall not make contact with the step treads/pallet or belt treadway surfaces with a weight of 350 lb (159 kg) applied to any area 7 7/8 in (200 mm) by 11 7/8 in (300 mm) centered on the plates with the 11 7/8 in (300 mm) dimension parallel to the direction of travel.	—	—	**5.4.4** The landing shall have a device to guide correctly the step tread relative to the teeth of the comb. The projections of the step tread shall pass through teeth of the comb without touching their sides.	—

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11 Clearance between steps or pallets and between steps, pallets or belt and skirting **11.1 Clearance between steps or pallets** The clearance between two consecutive steps (see also 8.2.5) or pallets in any usable position measured at the tread surface shall not exceed 6 mm (see figure 1, details Y, Z and figure 4 except detail V). In the area of the transition curves of passenger conveyors with meshed front edges and rear edges of the pallets, this clearance is permitted to be increased to 8 mm (see figure 4, detail V).	**Rule 802.5c Cleated Step Risers** [12)] The step riser shall be provided with vertical cleats which shall mesh with slots on the adjacent step tread wherever the steps are exposed. [12)]*step to step clearances were dropped in A17.1, when cleated risers were required. Their meshing eliminated the need for such a requirement.*	**3.6.4 Clearances between steps.** Clearances in the horizontal direction of travel between adjacent steps shall be not more than 5 mm. ***3.6.6.1 Clearance between pallets*** *The clearances between pallets shall be not more than 5 mm.*	**MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph (3) The escalator of which speed varies in halfway of travel It shall be conform to the construction specified as follows. (b) It shall be that the clearance between the side edge of the step and skirt guard panel is not more than 5 mm.	**Appendix 3** Clearance between steps, by manufacture: maximum b_2 = 6 mm. The same in operation: maximum b_2 =10 mm.	**4.3.2 (11)** The gap between the treads shall be within the range of 2 - 5 mm throughout the entire length of the treadway. In addition, the gap between the skirtguard and the tread shall be 4mm or less at one side throughout the entire length of the treadway, and shall be 7mm or less when both sides are combined.
11.2 Clearance between steps, pallets or belt and skirting **11.2.1** Where the skirting of escalators or passenger conveyors is placed beside the steps and pallets or the belt the horizontal clearance shall not exceed 4 mm at either side, and 7 mm for the sum of clearances measured at both sides at two directly opposite points.	**802.3e Clearance Between Skirt and Step.** The clearance on each side of the steps between the step tread and the adjacent skirt panel shall be not more than 3/16 in. (4.8 mm). **902.3f Skirt Panels.** Where skirt panels are provided: the clearance between each side of the treadway and the adjacent skirt panel shall be not more than 1/4 in. (6.4 mm). **(B 44 (8.3.3.3)) Clearance Between Balustrade and Steps.** The clearance on either side of the steps between the steps and the adjacent skirt guard shall be not	**3.3.4 Clearances between balustrades and steps** The clearances between the steps and adjacent skirting shall be not more than 4 mm, and the sum of the clearances on both sides shall be not more than 7 mm. ***3.3.4 Treadway clearances*** *Where the edges of the treadway pass underneath the balustrade skirting, the clearances between the top* surface of the treadway and the underside of the balustrade shall be not more than 3.5 mm, measured at the roller supports. *Where the top surface of the*	(c) It shall be that the clearance between the adjacent steps is not more than 5mm. **MOC-N (No.1417-2000)** **1.** The construction of escalator devised so as persons or articles not to be caught, not to be collide with obstacles prescribed by **BSLJ-EO; Article 129-12 item 1 paragraph 1**, shall be specified as follows (1), (2) and (3). However (1) and (2) shall not apply to the escalator providing following conditions. - 2 or more steps are kept in the same level of tread surface	**Appendix 3** Clearance between step and balustrade apron, at installation: maximum b_3 = 6 mm on one side, total = 10 mm. The same in operation: maximum b_3= 10 mm on one side, total =16 mm.	

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	more than 5 mm and the sum of the clearances on both sides shall be not more than 6 mm.	*treadway is above the bottom of the balustrade skirting, the clearances between the treadway and adjacent skirting shall be not more than 4 mm, and the sum of the clearances on both sides shall be not more than 7 mm.*	when the escalator carries the person sitting on wheelchair. - The rated speed in that operation does not exceed 30 m/min. - Stoppers for the wheels are furnished on the tip of that levelled tread surface.		
11.2.2 Where the skirting of passenger conveyors finishes above the pallets or the belt, the clearance shall not exceed 4 mm measured vertically from the tread surface. Oscillating motion of the pallets or the belt in lateral direction shall not cause a gap between the sides of the pallets or the belt and the vertical projection of the skirting.	**902.3e Skirtless Balustrade.** On moving walks where the balustrade covers the edge of the treadway: (1) the clearance between the top surface of the treadway and the underside of the balustrade shall not exceed 1/4 in. (6.4 mm).		(1) The clearance between the steps and the skirt guard panel should not exceed 5 mm. (2) The clearance between the adjacent steps should not exceed 5 mm. **EXP.1.(1)** The horizontal clearance between the steps and the skirt guard panel (at one side) should not exceed 5 mm in the condition that no force is acting on the skirt guard panel when the escalator stands still. For the moving walks in which the skirt guard panel is placed above the steps, the vertical clearance between the tread surface and lower portion of the skirt guard panel should not exceed 5 mm when the escalator stands still. **EXP.1.(2)** For the escalator in which gaps appear between adjacent steps, the clearance between adjacent steps should not exceed 5 mm. **JIS A 4302-1992; 4.4.2 Inspection to be carried out on upper and lower landings and on steps** (9) The clearance between adjoining steps and that between skirt guard and steps shall be within the range of 2 to 5 mm over the whole length of escalator.	—	—

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11.3 Mesh depth of the combs into the grooves of the step or pallet tread **11.3.1** The mesh depth h_8 of the combs into the grooves of the tread (see figure 1, detail X) shall be at least 6 mm.	**802.6/902.8 Entrance and Egress Ends** **802.6a/902.8a Combplates.** (2) The comb teeth shall be meshed with and set into the slots in the tread surfaces so that the points of the teeth are always below the upper surface of the treads.	**3.5 COMBPLATES** **3.5.2 Design** Combplates shall comply with the following requirements: **(c)** Combplate teeth shall mesh with and be set into the slots in the tread surface, so that the points of the teeth are always below the upper surface of the treads. **(d)** Combplate penetration shall not diminish by more than 50% through wear, but in no case shall the distance between the bottom of the step groove and the lower edge of the comb be more than 6 mm. **(f)** The distance between the underside of the combplate teeth and the bottom of the step-tread slots and the distance between the roots of the combplate teeth and the top of the step treads shall be not less than 2.5 mm nor more than 4 mm (see Figure 3.5.2). NOTE These distances are intended to apply to equipment when new. **(g)** At no time shall the thickness of the teeth be reduced by wear to less than 1.25 mm. ***(3.5.4 Clearances for pallet-type treadways** The distance between the underside of the combplate teeth and the bottom of the pallet slots and the distance between the roots of the combplate teeth and the top of the pallet treads shall be not less than 2.5 mm nor more than 4 mm (see Figure 3.5.4).*	—	**Appendix 3** height of protection of tread (h_5) < 10 mm; clearance between lower edge of landing comb tooth and bottom of step tread recession 2mm ≤ b_1 ≤ 8 mm.	**4.3.2 (8)** To avoid an object from being caught at the platform, the degree of the engagement between the tread and the comb shall be 6 mm or more(or 4 mm or more in the case of a belt type). The gap at the spot of engagement shall be 4 mm or less.
11.3.2 The clearance h_6 (see figure 1, detail X) shall not exceed 4 mm.	**802.6/902.8 Entrance and Egress Ends** **802.6a/902.8a Combplates.** (4) The comb section, combplate, and landing plate assemblies shall not make contact with the step treads/pallet or belt treadway surfaces with a weight of 350 lb (159 kg) applied to any area 7 7/8 in (200 mm) by 11 7/8 in (300 mm) centered on the plates with the 11 7/8 in (300 mm) dimension parallel to the direction of travel.		—	—	

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		NOTE: These distances are intended to apply to equipment when new.)			
11.4 Mesh depth of the combs into the grooves of the belt **11.4.1** The mesh depth h_8 of the combs into the grooves of the belt (see figure 1, detail X) shall be at least 4 mm. **11.4.2** The clearance h_6 (see figure 1, detail X) shall not exceed 4 mm.	**902.8a Combplates.** (2) The comb teeth shall be meshed with and set into the slots in the tread surfaces so that the points of the teeth are always below the upper surface of the treads.	***(3.5.3 Clearance for belt-and belt-pallet-type treadways*** *The combplate teeth shall engage the grooves of the belt for a depth not less than 60% of the grooved depth, and the clearance between the underside of the combplate teeth and the bottom of the belt grooves, and between the top of the treadway and the roots of the combplate teeth, shall be not more than 5 mm.* ***3.5.5 Clearance for flat-belt-type treadways*** *The gap between the belt surface and the end-plate assembly shall not exceed 2mm. The operation of the guard on the end-plate protection shall not expose a gap exceeding 15 mm.)*	—	—	**4.3.2 (8)** To avoid an object from being caught at the platform, the degree of the engagement between the tread and the comb shall be 6mm or more(or 4 mm or more in the case of a belt type). The gap at the spot of engagement shall be 4 mm or less.

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12 Driving machine **12.1 General** Each escalator and each passenger conveyor shall be driven by at least one machine of its own.	**804.2/904.2 Driving Motor** An electric motor shall not drive more than one escalator/moving walk driving machine. A driving machine shall not operate more than one escalator/moving walk.	**5.4 DRIVING MOTOR** Each escalator *(moving walk or section of a moving walk complex)* shall be driven by its own electric motor.	—	—	—
12.2 Speed **12.2.1** The rated speed of the escalator shall not exceed: - 0,75 m/s for an escalator with an angle of inclination α up to 30°; - 0,50 m/s for an escalator with an angle of inclination α of more than 30° up to 35°.	**803.1 Limits of Speed** The rated speed shall be not more than 125 ft/min (0.64 m/s), measured along the centreline of the steps in the direction of travel.	**2.4 RATED SPEED** The rated speed of an escalator shall be not more than 0.75 m/s.	**BSLJ-EO (Construction of Escalators)** **Article 129-12** **1.**(5) The rated speed of the steps shall be not more than the speed per minute designated by the Minister of Land, Infrastructure and Transport according to the inclination of the escalators within the limit of not more than 50m/min. **MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph (1) The escalator of which inclination exceeding 30 degree. In addition to conforming to the provisions stipulated in the Art.129-12 item 1 paragraph 1, 3 and 4, it shall be conform to the construction specified as follows.	**Appendix 2** - operational speed: maximum v= 0.75 m/s; - repair speed: maximum v_r =0.04 m/s.	**3.3.1 (4)** The speed of the escalator steps shall be 30m/min or less. However, if the inclination of the escalator is 30° or less, and the total height of the riser 6 m or less, or if the number of the horizontally moving steps is more than 3, the speed may be set to 40 m/min or less. The speed of the moving walk steps shall be 50 m/min or less for those the inclination of which is not more than 8°, and shall be 40 m/min or less, for those whose inclination exceeds 8°.

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			(b) It shall be that the rated speed of the step is less than 30m/min. **EXP. 2.(1)** Rated speed is stipulated corresponding to inclination [**see Table B.6 in the annex of this comparison**] **MOC-N (No.1417-2000) EXP. 2.(1) & (2)** Rated speed is stipulated corresponding to inclination. [**see Table B.7 in the annex of this comparison**]		
12.2.2 The rated speed of passenger conveyors shall not exceed 0,75 m/s. **12.2.2.1** Contrary to 12.2.2, passenger conveyors are permitted to have a maximum rated speed of 0,90 m/s provided the width of the pallets or the belt does not exceed 1,10 m, and contrary to 10.1.6 at the landings, the pallets or the belt move horizontally for a length of at least 1,60 m before entering the combs.	**903.1 Speed** The maximum speed of a treadway shall depend on the maximum slope at any point on the treadway. The speed shall not exceed the value determined by Table 903.1. **Table 903.1 – Treadway Speed** max. treadway slope / max. speed (ft/min) 0 to 8 degrees / 180 above 8 to 12 degrees / 140	**2.4 RATED SPEED** The rated speed of a treadway shall not exceed 0.9 m/s and shall depend on the maximum treadway slope both at the points of entrance or exit and at any other point on the treadway. The rated speed of the exposed treadway surface shall be not more than the lesser of the speeds shown on Curves A and B in Figure 2.4 as follows: (a) For treadways with uniform slope: Curve B. (b) For entrances and exits: Curve A. (c) Maximum slope of treadways of varying slope: Curve B. In the application of this Clause, a moving walk shall not be considered as having a reduced slope at the entrance and exit, unless both such reduced slopes continue for not less than 400	**MOC-N (No.1417-2000) EXP. 2.(1) &(2)** Rated speed is stipulated corresponding to inclination. [**see Table B.8 in the annex of this comparison**]	—	

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		mm from the combplate to the measurable starting point of transition.			
12.2.2.2 12.2.2 and 12.2.2.1 do not apply to passenger conveyors with acceleration paths or passenger conveyor systems with direct transition to passenger conveyors travelling at different speeds.	—	**SECTION 8 ACCELERATING MOVING WALK** **8.3 SPEEDS** The entry and exit speeds shall not exceed 0.9 m/s at 1.0 m from the end plate. The highest speed shall not exceed 2.25 m/s. In addition, and in order to limit bunching at the exit end, the ratio of the highest speed to the speed of the last section immediately before the exit, shall not exceed 2.5. Where the slope at any point exceeds 3°, the speed at that point shall not exceed the speeds derived from Figure 8.3.	**MOC-N (No.1413-2000)** **2.** The escalators of the special construction or the special use form to which the provisions described in the Art.129-3 item 3 paragraph 2 are not applied, shall be conform to the construction method specified in each paragraph come under the kind of the escalators described in following each paragraph. (3) The escalator of which speed varies in halfway of travel It shall be conform to the construction specified as follows. (h) It shall be that the speed of the step at the riding entrance and leaving exit is less than 50m/min. **EXP. 2.(3)** Maximum speed of moving walk which is accelerated at intermediate section is not stipulated but speed at entrance and exit is stipulated up to 50m /min.	—	—
12.2.3 At rated frequency and at rated voltage, the speed measured under no load in the direction of movement of the steps and pallets or the belt is permitted to deviate from the rated speed by a maximum of ± 5 %.	—	**2.5 MEASURED SPEED** The actual speed measured on the inclined section of the escalator *(treadway of the moving walk),* in an unloaded condition, shall not exceed the rated speed by more than 5%.	—	**Appendix 2** ± 5%	**4.3.1 (4)** ≤ 125% rated speed under no-load condition
12.3 Link between operational brake and step, pallet or belt drive according to clause 9	**804.1/904.1 Connection between Driving Machine and Main Drive Shaft**	**5.3 CONNECTION BETWEEN DRIVING MACHINE AND MAIN DRIVING SHAFT**	—	—	—

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12.3.1 For the link between the operational brake and the step, pallet or belt drive, preferably non-friction driving elements should be used such as shafts, gear wheels, multiplex chains, two or more single chains. Where friction elements are used such as trapezoidal belts (flat belts are not permitted) an auxiliary brake in accordance with 12.6 shall be used.	The driving machine shall be connected to the main drive shaft by toothed gearing, a mechanical coupling, or a chain. **804.3/904.3 Brakes** **804.3a/904.3a Escalator/Moving Walk Driving-Machine Brake** (5) Where means other than a continuous shaft, mechanical coupling, or toothed gearing is used to connect the motor to a gear reducer, the escalator/moving walk driving-machine brake shall be located on the gear reducer or main drive shaft. **805.3j/905.3h Disconnected Motor Safety Device.** If the drive motor is attached to a gear reducer by means other than a continuous shaft, mechanical coupling, or toothed gearing, a device shall be provided that will cause the application of the escalator/moving walk brake (Rule 804.3a), if the motor becomes disconnected from the gear reducer. The device shall be of the manually reset type.	The driving machine shall be connected to the main driving shaft by toothed gearing, a coupling, or a chain. **6.9 BROKEN INPUT DRIVE-CHAIN OR V- BELT DEVICE** Where the motor is connected to the driving machine by V-belts or chains, a device of the manually reset type shall be provided which will interrupt the supply to the motor and brake if the driving means breaks.			
(12.3.1.1)	**902.14 Chain Drives** Chain drives shall be of the type covered by ANSI B29.1 and ANSI/SAE SP-68. When operating at the machinery rated load, the load imposed on such chains shall not exceed the horsepower rating as established by these standards. The loading shall be considered to be uniform and the service to be 24 hr per day	—	—	—	—

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(12.3.1.2)	**902.15 V-Belt Drives** The load imposed on V-Belt drives, when operating at the machinery rated load, shall not exceed the horsepower rating as established by ANSI/RMA IP-20. The loading shall be considered to be uniform and the service to be 24 hr per day.	—	—	—	—
12.3.2 All driving elements shall be sufficiently dimensioned. In accordance with 9.1.2 and 9.2.1 the factor of safety for chains, belts and trapezoidal belts shall be at least 5 whereby in the case of trapezoidal belts at least 3 belts shall be applied.	**802.10/902.12 Design Factors of Safety** Factors of safety are based on either single driving machine design or modular driving machine design. The factors of safety shall be at least the following. (b) For driving machine parts based on not less than the loads calculated per Rule 802.9b/902.10b: (1) where made of steel or bronze, 8; (2) where made of cast iron or other materials, 10. (c) For power transmission members, 10, based on not less than the loads calculated per Rule 802.9b/902.10b.	**5.2 FACTORS OF SAFETY** The factors of safety based on the static loads shall be not less than the following: (a) For driving machine parts (i) for steel, based on yield strength, where elongation is not less than 14% in a gauge length of 50 mm: 4; (ii) for steel, based on yield strength, where elongation is less than 14% in a gauge length of 50 mm: 5; (iii) for other ductile metals, based on yield strength (i.e. those with an elongation of not less than 14% in a gauge length of 50 mm): 5; (iv) for grey cast iron in compression, based on tensile strength: 10; (v) for grey cast iron in tension or bending, based on tensile strength: 12; (vi) for shaft design, due account shall be taken of the stress raising factor K as applied to various designs of shafts in AS 1403. (b) For chains and chain wheels used for transmission of power, based on breaking strength: 10.	Refer to 9.1	**3.6** Safety factors shall be at least seven (7) for traction and driving chains and at least five (5) for steps and handrails.	—
12.4 Braking system	**804.3/904.3 Brakes**	**5.5 BRAKE**	—	**5.2.1** The escalator shall be equipped by a braking	3.3.2 (6) EIS, KEL

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12.4.1 Escalators and passenger conveyors shall have a braking system by means of which they can be brought to rest with a largely uniform deceleration and maintained stationary (operational braking); see also 14.1.2.1.6 and 14.1.2.4. There shall be no intentional delay in the application of the braking system.	**804.3a/904.3a Escalator/Moving Walk Driving-Machine Brake** (1) Each escalator/moving walk driving machine shall be provided with an electrically released and mechanically or magnetically applied brake. If the brake is magnetically applied, a ceramic permanent magnet shall be used. There shall be no intentional time delay designed into the application of the brake. (4) The brake shall be provided with a nameplate which indicates the range of brake torques in ft-lb which complies with Rules 804.3a/904.3a and 805.1h. The torque shall be designated "BREAKAWAY" or "DYNAMIC" based on the method used when measuring the torque. The location where the torque is to be measured shall be clearly stated, e.g., "MOTOR SHAFT," "MACHINE INPUT SHAFT," "MAIN DRIVE SHAFT". (5) Where means other than a continuous shaft, mechanical coupling, or toothed gearing is used to connect the motor to a gear reducer, the escalator/moving walk driving-machine brake shall be located on the gear reducer or main drive shaft.	**5.5.1 Provision** Each escalator shall be provided with an electrically released and mechanically applied brake, capable of progressively stopping the escalator with rated load by mechanical means. This brake shall be capable of release without the need for removal of any step. Where a chain or belt is used to connect the motor to the driving machine, the brake shall operate automatically should this driving means fail. **5.5.3 Brake deceleration rate** Electrically released brakes shall stop the escalator, automatically upon failure of power or when any of the safety devices operates, at an average deceleration rate of not more than 1.25 m/s² ***(5.5 BRAKE*** ***5.5.1 Provision*** *Each moving walk shall be provided with a mechanically-applied brake, capable of progressively stopping and holding the treadway with any load up to the rated load.* *Brakes are not required on moving walks which are on a slope of 4° or less, provided the treadway will not run in the down direction by gravity under any load condition with the power*			system to be composed of two or more service brakes and at least one emergency brake, the latter to be installed on the main shaft. Deceleration of escalator stairway belt irrespective of passenger load, maximum: a) braking with service brakes:a_{Tp} - moving downwards: 0.6 m/sq.s; - moving upward 1.0 m/sq.s. b) braking with emergency brakes a_{Ta} - with increasing moment 2.0 m/sq.s; - with constant moment 1.0 m/sq.s.: **3.12** The service brake shall provide at least double braking torque margin when stopping stairway with a maximum passenger load.	
12.4.1.1 The braking system shall operate automatically: a) in the event of loss of the voltage supply; b) in the event of loss of the	**804.3/904.3 Brakes** **804.3a/904.3a Escalator/Moving Walk Driving-Machine Brake** (2) The brake shall be applied	*supply interrupted, and where the deceleration is between 0.2 and 2.0 m/s². The brake shall be located either on the driving machine or on the main drive shaft. The brake shall be capable*	**BSLJ-EO; Article 129-12** **4**. Escalators shall be provided with the emergency stopping devices and devices to stop the ascending or the descending	**5.2.3** The service brake(s) shall be engaged any time the main drive or the auxiliary drive is disengaged and when the control circuit is de-energized and shall	**3.3.2 (6)** A device which automatically prevents motor from running due to inertia after power has been shut off

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voltage supply to the control circuits.	automatically if the electrical power supply is interrupted. The brake shall be capable of stopping the down running escalator/down or horizontal running moving walk with any load up to the brake rated load (Rule 802.9c(1)(b) or (2)(b)/902.10c(1)(b) or (2)(b)). The brake shall hold the stopped escalator/moving walk with any load up to the brake rated load (Rule 802.9c(1)(a) or (2)(a)//902.10c(1)(a) or (2)(a).	*of release without the need for removal of any treadway. Where a chain or belt is used to connect the motor to the driving machine, the brake shall operate automatically should this driving means fail.* ***5.5.3 Brake deceleration*** *Brakes, other than emergency brakes, shall stop the moving walk, automatically upon failure of power or when any of the safety devicesoperate, at an average deceleration of not more than 1.25 m/s²).*	steps at the entrances and exits of the escalators. **5.** The constructions of the preceding emergency stopping devices shall be the construction methods specified by the Minister of Land, Infrastructure and Transport so as to have performance which operate automatically and enable to stop the steps safely with the deceleration in operating direction of not more than 1.25 m/sec^2 when power supply fail, break down of driving devices, person or articles are caught, and in case of that persons are liable to be injured or articles are damaged, or the construction methods approved by the Minister of Land, Infrastructure and Transport.	meet the requirement of 3.13 herein. **3.13** The service break shall provide at least double braking torque margin when stopping the stairway belt with a maximum passenger load of q_{me}. **3.14** When two or more brakes are provided, each of the brakes shall have a braking torque margin of at least 1,1 for stopping the stairway under the maximum load.	
12.4.1.2 Operational braking is permitted to be effected by an electro-mechanical brake or by other means. Where no electro-mechanical operational brake is used, an auxiliary brake in accordance with 12.6 shall be provided.	***Commentary:*** *(The escalator Driving-Machine Brake must be electrically released and mechanically or magnetically applied. There is no other method permitted.* *There is no "Auxiliary Brake" in A17.1. The "Main Drive Shaft Brake" is used for only one reason, when required, and not to supplement the Driving-Machine Brake.) (see Rule 804.3b).*		**MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows.	**5.2.2** The service brake(s) of normally closed type shall be installed on the entry shaft of the gearbox. **5.2.1** The escalator shall be equipped by a braking system to be composed of two or more service brakes and at least one emergency brake, the latter to be installed on the main shaft.	—
12.4.2 Electro-mechanical brake The normal lifting of the electro-mechanical brake shall be by a continuous flow of electric current. The braking operation shall be effective immediately after the electric brake circuit is opened. The brake force shall be	**804.3/904.3 Brakes** **804.3a/904.3a Escalator/Moving Walk Driving-Machine Brake** (3) Driving-machine brakes shall stop the down running escalator/down or horizontal moving walk at a rate no greater than 3 ft/sec² (0.91 m/s^2).	**5.5 BRAKE** **5.5.1 Provision** Each escalator shall be provided with an electrically released and mechanically applied brake, capable of progressively stopping the escalator with rated load by mechanical means. This brake shall be located either on the driving machine or on the main	**1**. The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the	**5.2.2** The service brake(s) of normally closed type shall be installed on the entry shaft of the gear box.	—

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generated by guided compression spring(s) or by weight(s). Self-excitation of the brake releasing device shall be impossible. The interruption of the electricity supply shall be effected by at least two independent electrical devices. They can be those which break the supply to the machine. If after the stop of the escalator or passenger conveyor one of these electrical devices has not opened, re-starting shall be impossible.	*There is a revision in A17.1 that will be in the next edition of the code, that addresses the issues in the last paragraph of EN 115 Clause 12.4.2*	drive shaft. The brake shall be capable of release without the need for removal of any step. Where a chain or belt is used to connect the motor to the driving machine, the brake shall operate automatically should this driving means fail. ***(5.5 BRAKE*** ***5.5.1 Provision*** *Each moving walk shall be provided with a mechanically-applied brake, capable of progressively stopping and holding the treadway with any load up to the rated load.* *Brakes are not required on moving walks which are on a slope of 4° or less, provided the treadway will not run in the down direction by gravity under any load condition with the power supply interrupted, and where the deceleration is between 0.2 and 2.0 m/s².* *The brake shall be located either on the driving machine or on the main drive shaft. The brake shall be capable of release without the need for removal of any treadway. Where a chain or belt is used to connect the motor to the driving machine, the brake shall operate automatically should this driving means fail.* **7.7 FAULT PROTECTION** **7.7.1 Single failure.** 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 permit the escalator to start or run.	Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e) (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not more than 15 degree) is less than 4mm) (a) The extraordinary extension of the step chains. (b) The power is cut off. (c) The door covering the opening surrounding the escalator is closing. (d)The person or the articles are caught between a side of the step and the skirt guard panels near the riding entrance and leaving exit. (e)The person or the articles are caught in the inlet of the handrail.		

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12.4.3 Brakes that can be released by hand shall require continuous application of manual pressure to keep them open.	—	—	—	—	—
12.4.4 Brake load and stopping distances for operational brake **12.4.4.1** Determination of brake load for escalators Per step and at a nominal width z_1 of up to 0,6 m 60 kg more than 0,6 m up to 0,8 m 90 kg more than 0,8 m up to 1,1 m 120 kg shall be applied. The number of steps to be considered is determined by "rise divided by maximal visible height of the step riser" (see x_1 in figure 3). For the purpose of a test, the total brake load is permitted to be distributed over two-thirds of the number of steps thus obtained.	**802.9c Brake** *(1)* For the purpose of brake calculations, the rated load for all single driving machines shall be considered to be not less than: *(a) With Escalator Stopped (Customary Units):* Brake rated load (lb) = 4.6 (W +8)B_1 *(SI Units):* Brake rated load (kg) = 0.27 (W +203)B_1 *(b) With Escalator Running (Customary Units:)* Brake rated load (lb) = 3.5 (W +8)B_1 *(SI Units:):* Brake rated load (kg) = 0.21 (W +203)B_1 *(2)* The rated load per module for two or more modular driving machines shall be considered to be not less than: *(a) With Escalator Stopped (Customary Units):* Brake rated load (lb) = 4.6 (W +8)B_2 *(SI Units):* Brake rated load (kg) = 0.27 (W +203)B_2 *(b) With Escalator Running (Customary Units):* Brake rated load (lb) = 3.5 (W +8)B_2 *(SI Units):* Brake rated load (kg) = 0.21 (W +203)B_2	**2.6 RATED LOAD.** The rated load shall be calculated from the following equation: Rated load (kilograms) = 0,27 WA where W = the width between the balustrades (see Clause 2.2), in millimetres A = the horizontal distance between the upper and lower combplate teeth, in metres **5.5.3 Brake deceleration rate** Electrically released brakes shall stop the escalator, automatically upon failure of power or when any of the safety devices operates, at an average deceleration rate of not more than 1.25 m/s^2.	—	**Appendix 4** Design type (parameter): Strength, traction starting and braking characteristics Designed component: Escalator elements (brakes, etc.) q_{me} (max. operational load) = 2000 x (2.1 - V)B [N/m^2] where B is step width in m, and V is operational speed in m/s.	—

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	where B_1 = cot Ø X total rise, ft (m) B_2 = cot Ø X rise per module, ft (m) Ø = the angle of inclination (see Rule 802.1) *W* = width of the escalator, in. (mm) (see Rule 802.2)				
12.4.4.2 Stopping distances of the escalator The stopping distances for unloaded and downward moving loaded escalators (see 12.4.4.1) shall be between the following values: Rated speed Stopping distance between 0,50 m/s min. 0,20 m and max. 1,00 m 0,65 m/s min. 0,30 m and max. 1,30 m 0,75 m/s min. 0,35 m and max. 1,50 m For intermediate speeds the stopping distances are to be interpolated. The stopping distances shall be measured from the time the electric stopping device is actuated.	**804.3a Escalator Driving-Machine Brake** (3) Driving-machine brakes shall stop the down running escalator at a rate no greater than 3 ft/sec² (0.91 m/s²). *Stopping requirements in A17.1 are not expressed in specific distances. The escalator can not exceed a deceleration of 3 ft/sec² (0.91 m/s²) when stopping in the down direction. For an escalator running at 100 ft/min (0.5 m/s), the maximum deceleration would provide a distance of .463ft (.14 m). There would be an additional factor added to the this distance that is the distance traveled from the initiation of the stop until the brake applies the stopping torque. This will vary with each escalator design.* The maximum stopping distance is defined in **Rule 805.3f**	**5.5.3 Brake deceleration rate** Electrically released brakes shall stop the escalator, automatically upon failure of power or when any of the safety devices operates, at an average deceleration rate of not more than 1.25 m/s².	**JIS A 4302-1992; 4.4.1 Inspection to be carried out in the machinery room** (3) The brake of driving machine shall operate properly, and its braking force shall be capable of stopping the ascending steps without load within 0.1 to 0.6 m inclusive. **BSLJ-EO; Article 129-12** **5.** The constructions of the preceding emergency stopping devices shall be the construction methods specified by the Minister of Land, Infrastructure and Transport so as to have performance which operate automatically and enable to stop the steps safely with the deceleration in operating direction of not more than 1.25 m/sec² when power supply fail, break down of driving devices, person or	—	**4.3.1(3)** The braking system shall be installed in firm condition, with its operating condition satisfactory. In addition, as to its strength, the stopping distance when steps rise shall be greater than 0.1 m but less than 0.6 m, without applying load capacity.

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			articles are caught, and in case of that persons are liable to be injured or articles are damaged, or the construction methods approved by the Minister of Land, Infrastructure and Transport. **MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows. 1. The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (3)When any situations described in preceding (a) to (e) are detected, the stopping distance of the escalators with no load condition shall be not less than the value obtained by the following formula and not exceeding 0.6m for the escalator with inclination of 15 degree and more or the escalator with the difference in level between each adjacent steps is exceeding 4mm. $S = v^2/9000$ Where, S and V indicate the following values; S: stopping distance of the step(unit m) V: rated speed of the escalator (unit m/min.)		

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12.4.4.3 Determination of the brake load for designing the brake for passenger conveyors Per 0,4 m length and at a nominal width z_1 of the pallets or the belt of up to 0,6 m 50 kg more than 0,6 m up to 0,8 m 75 kg more than 0,8 m up to 1,1 m 100 kg shall be applied. In the case where passenger conveyors with an angle of inclination of up to 6° have larger nominal widths than 1,1 m, another 25 kg per 0,4 m length shall be applied for each additional 0,3 m width. To determine the brake load for passenger conveyors which in their length overcome several inclinations (differences in level), only those horizontal and inclined sections which taken together give the most unfavourable load, shall be considered.	**902.10c Brake** (1) For the purpose of brake calculations, the rated load for all single driving machines shall be considered to be not less than: (a) With Moving Walk Stopped (Customary Units) Brake rated load (lb) = 8.33 (W)C_1 (SI Units) Brake rated load (kg) = 0.49 (W)C_1 (b) With Moving Walk Running (Customary Units) Brake rated load (lb) = 6.25 (W)C_1 (SI Units) Brake rated load (kg) = 0.37 (W)C_1 (2) The rated load per module for two or more modular driving machines shall be considered to be not less than: (a) With Moving Walk Stopped (Customary Units) Brake rated load (lb) = 8.33 (W)C_2 (SI Units) Brake rated load (kg) = 0.49 (W)C_2 (b) With Moving Walk Running (Customary Units) Brake rated load (lb) = 6.25 (W)C_2 (SI Units) Brake rated load (kg) = 0.37 (W)C_2 where C_1 = length of exposed	**2.6 LOAD RATING** **2.6.2 Machinery.** For the purpose of brake, treadway, and power transmission calculations, the load rating shall be considered to be not less than 365 kg/m² of exposed treadway. **5.5.3 Brake deceleration** Brakes, other than emergency brakes, shall stop the moving walk, automatically upon failure of power or when any of the safety devices operate, at an average deceleration of not more than 1.25 m/s².	—	—	—

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	treadway, ft (m) C_2 = length of exposed treadway per module, ft (m) W = width of moving walk, in. (mm) (see Rules 902.2(a) and 902.7)				
12.4.4.4 Stopping distances for passenger conveyors The stopping distances for unloaded and horizontally or downward moving loaded passenger conveyors (see 12.4.4.3) shall be between the following values: Rated speed — Stopping distance between 0,50 m/s — min. 0,20 m and max. 1,00 m 0,65 m/s — min. 0,30 m and max. 1,30 m 0,75 m/s — min. 0,35 m and max. 1,50 m 0,90 m/s — min. 0,40 m and max. 1,70 m For intermediate speeds the stopping distances are to be interpolated. The stopping distances shall be measured from the time the electric stopping device is actuated. For passenger conveyors a brake test under no load will be sufficient. For loaded passenger conveyors, the manufacturer shall prove the stopping distances by calculation (see 16.2.1.1.1.c)).	**904.3a Moving Walk Driving-Machine Brake** (3) Driving-machine brakes shall stop the down or horizontal moving walk at a rate no greater than 3 ft/sec² (0.91 m/s²).	**5.5.3 Brake deceleration** Brakes, other than emergency brakes, shall stop the moving walk, automatically upon failure of power or when any of the safety devices operate, at an average deceleration of not more than 1.25 m/s².	**JIS A 4302-1992; 4.4.1 Inspection to be carried out in the machinery room** (3) The brake of driving machine shall operate properly, and its braking force shall be capable of stopping the ascending steps without load within 0.1 to 0.6 m inclusive. **BSLJ-EO; Article 129-12** **5.** The constructions of the preceding emergency stopping devices shall be the construction methods specified by the Minister of Land, Infrastructure and Transport so as to have performance which operate automatically and enable to stop the steps safely with the deceleration in operating direction of not more than 1.25 m/sec^2 when power supply fail, break down of driving devices, person or articles are caught, and in case of that persons are liable to be injured or articles are damaged, or the construction methods approved by the Minister of Land, Infrastructure and Transport. **MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338),	—	**4.3.1(3)** The braking system shall be installed in firm condition, with its operating condition satisfactory. In addition, as to its strength, the stopping distance when steps rise shall be greater than 0.1 m but less than 0.6 m, without applying load capacity

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			construction method of breaking devices for the escalator is specified as follows. **1**. The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (3)When any situations described in preceding (a) to (e) are detected, the stopping distance of the escalators with no load condition shall be not less than the value obtained by the following formula and not exceeding 0.6m for the escalator with inclination of 15 degree and more or the escalator with the difference in level between each adjacent steps is exceeding 4mm. $S = v^2/9000$ Where, S and V indicate the following values; S: stopping distance of the step(unit m) V: rated speed of the escalator (unit m/min.)		
12.5 Protection against risks of overspeed and unintentional reversal of the direction of travel **12.5.1** Escalators and passenger conveyors shall be equipped in such a way that they stop automatically before the speed exceeds a value of 1,2 times the rated speed (see 14.2.2.4.1.e)). Where speed control devices are used for this purpose they shall have switched off the escalator or passenger conveyor before the	**805.3b/905.3b Speed Governor.** A speed governor shall be provided, except as specified in Rule 805.3b(3)/905.3b(3). (1) The operation of the governor shall cause the interruption of power to the driving machine should the speed of the steps exceed a predetermined value, which shall be not more than 40% above the rated speed. All variable frequency drive motor controls require an overspeed	**6.5 SPEED GOVERNOR** A speed governor shall be provided, the operation of which will cause the power to the driving machine and the brake to be interrupted, should the speed exceed the rated speed by more than 30%. However, a speed governor may be omitted if the slip of the alternating current cage rotor motor does not exceed 5% and the motor is directly connected to the driving machine. The	—	**5.2.6** The emergency brake shall stop an escalator going downward when the speed of the step band belt exceeds the operational speed by at least 30 percent or when the band changes direction on its own accord, or when a service brake fails.	—

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speed exceeds a value of 1,2 times the rated speed. It is permissible to disregard this requirement in the case of a.c. motors with a non-friction connection with the drive for the steps, pallets or the belt and with a slip not exceeding 10 % if thereby overspeed is prevented.	governor. (2) The device shall be of the manually reset type. (3) The speed governor is not required where an alternating-current, squirrel cage induction motor is used and the motor is directly connected to the driving machine. **NOTE** (Rule 805.3b): The governor may be omitted in such case even though a chain is used to connect the sprocket on the driving machine to the sprocket on the main drive shaft as permitted by Rule 804.1. **905.3b Speed Governor.** A speed governor shall be provided, except as specified in Rule 905.3b(3). (1) The operation of the governor shall cause the electric power to be removed from the driving machine motor and brake should the speed of the treadway exceed a predetermined value, which shall not be more than 40% above the rated speed. (2) The device shall be of the manually reset type. (3) The speed governor is not required where an alternating-current, squirrel cage induction motor is used, and the motor is directly connected to the driving machine. **NOTE** (Rule 905.3b): The governor shall be permitted to be omitted in such case even though a chain is used to connect the sprocket on the driving machine to the sprocket on the main drive shaft as permitted by Rule 904.1.	governor may in this case be omitted, even though a chain is used to connect the driving machine to the main drive shaft. NOTE: Where a machine is connected to the main drive shaft by a chain, Clause 5.5.2 applies.			

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12.5.2 Escalators and inclined passenger conveyors shall be equipped in such a way that they stop automatically by the time the steps and pallets or the belt change from the pre-set direction of travel (see 14.2.2.4.1.e)).	**805.3h/905.3g Reversal Stop Device.** Means shall be provided to cause the opening of the power circuit to the escalator driving-machine motor and brake in case of accidental reversal of travel while the escalator/ an inclined moving walk is operating in the ascending direction. The device shall be of the manually reset type.	**6.14 REVERSAL STOP DEVICE** Means shall be provided to cause the interruption of power to the escalator machine motor and brake in the event of accidental reversal of travel while the escalator is ascending.	—		In upward motion, unintentional downward motion shall be stopped by breaking power switch and reversal motion shall be prevented by a safety device. (**Art. 64 (1) 5 EMSIS, KOSHA**)
12.6 Auxiliary brake for the non-friction part of the driving system for steps and pallets or the belt **12.6.1** Escalators and inclined passenger conveyors shall be equipped with auxiliary brake(s) acting immediately on the non-friction part of the driving system for the steps, pallets or the belt (one single chain is not considered to be a non-friction part), if a) the coupling of the operational brake (see 12.4) and the driving wheels of the steps, pallets or the belt is not accomplished by shafts, gear wheels, mulitplex chains, two or more single chains; or b) the operational brake is not an electro-mechanical brake according to 12.4.2; or c) the rise exceeds 6 m. NOTE: Additional recommendations to 12.6.1 for public service escalators and public service passenger conveyors are given in annex D (informative).	**804.3b Main Drive Shaft Brake.** If the escalator driving-machine brake is separated from the main drive shaft by a chain used to connect the driving machine to the main drive shaft, a mechanically or magnetically applied brake capable of stopping a down running escalator with brake rated load (Rule 802.9c) shall be provided on the main drive shaft. If the brake is magnetically applied, a ceramic permanent magnet shall be used. The brake shall stop the down running escalator at a rate no greater than 3 ft/sec^2 (0.91 m/s^2) at any load up to and including brake rated load [Rule 802.9c(1)(b) or (2)(b)]. **904.3b Main Drive Shaft Brake.** If the moving walk driving machine brake is connected to the main drive shaft by a chain and the moving walk, with the drive chain disconnected, is capable of running under gravity with any load up to and including rated load (Rule 902.10b), a mechanically or magnetically applied brake capable of stopping a down running moving walk with brake rated load (Rule 902.10c) shall be	**5.5.2 Chain drive** Where a chain is used to connect a driving machine to the main drive shaft, a brake shall be provided on the main drive which will operate automatically should the chain fail. The brake shall be capable of sustaining the fully loaded escalator *(moving walk)* and shall provide a gradual stop for loaded conditions. This brake is not required to be of the electrically released type where an electrically released brake is provided on the driving machine. NOTE: With an empty escalator *(moving walk),* the emergency brake could give an abrupt stop.	**MOC-N (No.1424-2000)** **EXP.2.** The escalator shall be provided with the following safety devices and shall be stopped depend on detecting the operation of these safety devices. (a) The step chain safety device which stop the escalator rapidly and surely when the step chain stretches extremely or breaks. Although not stipulated in this regulation, for the escalator which uses the chain (called as the main drive chain) to transmit the driving force from the driving machine to the step chain sprocket, it is required to furnish the escalator with the mechanical brake to prevent the step from descending and the safety switch to stop the driving motor when the main drive chain brakes. In this case, it needs rapidly to stop, the stopping distance of the escalators is allowed to over the value obtained by the formula described in item (3).	**5.2.5** In addition to the service brake(s), the escalator shall be provided with an automatic emergency brake to be installed on the main drive shaft.	

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D.3 to 12.6.1: It is recommended for public service escalators and public service passenger conveyors to install auxiliary brakes also for rises below 6 m.	provided on the main drive shaft or specially attached braking surface attached directly to the treadway. If the brake is magnetically applied, a ceramic permanent magnet shall be used. The brake shall stop the down running moving walk at a rate no greater than 3 ft/sec^2 (0.91 m/s^2) with any load up to brake rated load [Rule 902.10c(1)(b) or (2)(b)].				
12.6.2 The auxiliary brake shall be dimensioned in such a way that escalators and passenger conveyors travelling with brake load downward are brought to rest by effective retardation and maintained stationary.		*see 5.5.2 above*	—	**5.2.7** The braking distance of the emergency brake with the escalator unloaded shall be established by designers. **5.2.8** When a service brake fails or when the drive and the main shaft disengage, the emergency brake should stop the step band under a maximum live load with a deceleration of no more than that indicated in Appendix 2.	—
12.6.3 Auxiliary brakes shall be of the mechanical (friction) type.		—	—	—	—
12.6.4 The auxiliary brake shall become effective in either of the following conditions: a) before the speed exceeds a value of 1,4 times the rated speed; b) by the time the steps and pallets or the belt change from the present direction of motion. Its operation shall positively open the control circuit. It is not necessary that this device is operated electrically such as is the operational brake mentioned in 12.4.2.		*see 5.5.2 above*	—	**5.2.6** The emergency brake shall stop an escalator going downward when the speed of the step band belt exceeds the operational speed by at least 30 percent or when the band changes direction on its own accord, or when a service brake fails.	—
12.6.5 Auxiliary brakes are permitted to operate together with the operational brake when in case of power failure or of an	***Commentary:*** *(The Main Drive Shaft Brake[13]) is only applied when the Main Drive-Chain brakes, and is only required when*	*see 5.5.2 above*	—	—	—

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interruption of a safety circuit the stopping distances according to 12.4.4.2 and 12.4.4.4 are kept; otherwise a simultaneous operation of the two brakes is only permitted under the conditions of 12.6.4.	*a chain is used to connect the main drive shaft to the machine.)* [13] *see Rule 804.3b904.3b*				
12.6.6 Upon operation of the auxiliary brake it is not necessary to keep the stopping distances defined for the operational brake (see 12.4.4).	***Commentary:*** *(The stopping requirements for the Main Drive Shaft Brake, are under review.* ***Rule 804.3b904.3b*** *requires this brake to stop the escalator/moving walk at a rate no greater than 3 ft/sec².)*	**5.5.2 Chain drive** ... NOTE: With an empty escalator *(moving walk)* the emergency brake could give an abrupt stop.	—	—	—
12.7 Hand winding device If a hand winding device is provided it shall be easily accessible and safe to operate (see 15.1.3). If the hand winding device is placed outside machinery spaces, driving and return stations it shall not be accessible to unauthorized persons. Crank handles or perforate hand wheels are not permitted.	—	**5.14 EMERGENCY OPERATION** Emergency operation shall be provided and shall be located in such a position that it is not necessary to remove any part of a step in order to obtain movement. Hand-winding facilities shall be provided in all cases. In addition, a power-operated system, as specified in Appendix B, may also be provided.	—	—	—
12.8 Stopping the machine and checking its stopped position Stopping the escalator or passenger conveyor by means of the electrical safety devices according to 14.1.2 shall be effected as follows: The supply shall be interrupted by two independent contactors, the contacts of which shall be in series in the supply circuit. If, when the escalator or passenger conveyor is stopped, one of the main contacts of one of the contactors has not opened, restarting shall be impossible.	*A17.1 does not currently address this issue, but changes in the next edition will.*	**7.7 FAULT PROTECTION** **7.7.1 Single failure** 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 permit the escalator *(moving walk)* to start or run. **7.7.2 Capacitors** Capacitors shall not be installed in any escalator *(moving walk installation)* where their operation or failure may cause an unsafe operation.	—	—	—

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12.9 Protection in driving stations and/or return stations According to clause 4 of EN 292-2: 1991, effective protection shall be provided for rotating parts if they are accessible and dangerous, in particular for a) keys and screws in shafts; b) tapes, chains, belts; c) gears, gear wheels, sprockets; d) projecting motor shafts; e) speed governors not enclosed; f) step and pallet reversal in driving stations and/or return stations if these must be entered for maintenance purposes. SPECIFIC CASES: Handwheels, brake drums and similar smooth round parts. Such parts shall be painted yellow at least in part.	***Commentary:*** *(A17.1 does not address this issue. These issues are covered under OSHA requirements.)* **(B 44 (8.3.5.7.1))** Where access is provided to a machinery enclosure, a fixed guard shall be provided to prevent accidental contact with the moving steps by a person servicing equipment from within the enclosure. The guard shall be made of material which will reject a 13 mm diameter ball and shall extend the full width of the step treads. **(B 44 (8.3.5.7.2))** A guard is not required where the only equipment normally serviced from within the enclosure is within the step band.	**3.2.2.2 Mechanical protection** A non-perforated barrier preventing contact with moving components shall be provided between abutting parallel trusses.	—	**2.15** Easily accessible moving parts of the escalator (sprockets, gears, traction and driving chains, shafts with protruding bolts and keys, etc.) shall be covered with guards that ensure safety of personnel but provide easy access for inspection, lubrication, and maintenance. The guards may be detachable if necessary.	—

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13 Electrical installations and appliances **13.1 General** The electrical installation of escalators or passenger conveyors shall be so designed and manufactured as to ensure protection against hazards arising from the electrical equipment or which may be caused by external influences on it, provided the equipment is used in applications for which it was made and is adequately maintained. Therefore, the electrical equipment shall a) comply with the requirements stated in the CENELEC harmonized standards; b) where no harmonized standards as referred to in a) exist, comply with the requirements of the International Electrotechnical Commission (IEC) and which are stated in the CENELEC harmonized documents; c) where no documents as referred to in a) and b) exist, comply with the requirements of the national rules of the producer's country comparable to those of the country where it is installed; d) where no documents as referred to in a) to c) exist, comply with the requirements of the national rules of the country where it is installed.	**806.4/906.4 Electrical Equipment and Wiring** (a) All electrical equipment and wiring shall conform to ANSI/NFPA 70. (b) Electrical equipment shall be certified to the requirements of CSA B44.1/ASME A17.5. **ASME A17.5 Elevator and Escalator Electrical Equipment.** This Code contains requirements for obtaining, labeling, and listing of drive machine controllers, logic controllers, and operating devices for starting, stopping, regulating, controlling, or protecting electric motors, generators, and all other electrical equipment, for elevators, escalators, moving walks, dumbwaiters, wheelchair lifts, and stairway lifts.	**SECTION 7 ELECTRICAL INSTALLATIONS** **7.1 WIRING** Wiring, including supply mains, shall comply with AS 3000.	—	**2.2** An escalator's electric equipment mounting, power supply and grounding shall comply with the Regulations for Mounting of Electric Installations and, for tunnel escalators, also with the design specifications of underground railways. **2.3** The electric equipment of escalators shall be operated in accordance with the Regulations for the Technical Operation of Consumer Electric Installations and Safety Regulations for Operation of Consumer Electric Installations.	—
13.1.1 Limits of application	—	—	—	—	—

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13.1.1.1 The requirements of this standard relating to the installation and to the constituent components of the electrical equipment apply: a) to the main switch of the power circuit of the escalator or passenger conveyor and dependent circuits; b) to the switch for the lighting circuit of the escalator or passenger conveyor and dependent circuits. The escalator or passenger conveyor shall be considered as a whole, in the same way as a machine with its incorporated apparatus.					
13.1.1.2 The electricity supply to the input terminals of the switches referred to in 13.1.1.1 and the electricity supply to the lighting of the machinery spaces, driving and return stations are not laid down by this standard.	—	—	—	—	—
13.1.2 In separate machinery spaces and separate driving and return stations (according to 6.3.1.3) protection against direct contact by means of enclosures providing a degree of protection of at least IP 2 X is necessary.	—	**7.12 CONTROLLERS** Controller enclosures shall comply with Clause 26.14 of AS 1735.2.	—	—	—
—	—	A movable controller unit shall be able to be moved by a direct force not more than 150 N. Means shall be provided so that when the movable controller is removed from its normal position in the machine area and placed in the upright position, it is stable.	—	—	—
13.1.3 The resistance of the insulation between conductors	—	—	**JIS A 4302-1992 Inspection standard of elevator,**	—	**4.3.1.(1) EIS, KEL4482** **1) Power line:**

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and between conductors and earth shall be greater than 1000 Ω/V with a minimum of a) 500 000 Ω for power circuits and electrical safety device circuits; b) 250 000 Ω for other circuits (controls, lighting, signalling, etc.).			**escalator and dumbwaiter** **4.4.1** Inspection to be carried out in machinery room (1) The insulation resistance shall satisfy the provisions of Table 10, as applicable to the respective purpose of circuit below. However, the insulation resistance may be inspected on each circuit which can be separated by switches or overcurrent circuit breakers.		0.2 Mega Ohm for 300 V or below 0.4 Mega Ohm for 300 V above. **2) Signal wires:** 0.1 Mega Ohm for 150 V or below 0.2 Mega Ohm for 150 V above
13.1.4 For control and safety circuits, the mean value in direct current or the r.m.s. value in alternating current between conductors or between conductors and earth shall not exceed 250 V.	—	**7.4 MAXIMUM PERMISSIBLE VOLTAGE** The voltage of circuits in locations other than those specified in Clause 7.5 and 7.11 shall be not more than 600 V. **7.5 CONTROL CIRCUIT VOLTAGES** The voltage of control circuits shall be not more than 250 V and one side of such circuits shall be at earth potential; however, for other than safety circuits, higher voltages may be used for frequencies of 25 Hz to 60 Hz alternating current or for direct current if the current in the system cannot, under normal, conditions, exceed 8 mA for alternating current or 30 mA for direct current.	**Remarks:** 1. The insulation resistance shall be calculated in accordance with remarks to 4.2.1(2). 2. The service voltage of the circuit for the instantaneous-start fluorescent lamp (so-called slim-line lamp) used for lighting the sides of escalator, etc. shall be the primary (low voltage side) voltage.	—	—
13.1.5 The neutral conductor and the earth-continuity conductor shall be in accordance with CENELEC HD 384.	**J. Grounding** **NFPA 620-84. Escalators, Moving Walks, Wheelchair Lifts, and Stairway Chair Lifts.** Escalators, moving walks, wheelchair lifts, and stairway chair lifts shall comply with Article 250.	**7.9 EARTHING** Earthing of main current devices and control current devices shall comply with Clauses 27.1 and 27.2 respectively of AS 1735.2.	**EUIL-MO-1997; 13, 18** **JEAC 8001-1995; 140-3, 140-15**	—	—
13.2 Contactors, relay contactors, components of electrical safety circuits	—	—	**JIS C 8325-1983;** AC electromagnetic switches	—	—

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13.2.1 Contactors and relay contactors					
13.2.1.1 To stop the machine (see 14.1.2.4) the main contactors shall belong to the following categories as defined in EN 60947-4-1: 1992: a) AC-3 for contactors of alternating current motors; b) DC-3 for contactors of direct current machines.					
13.2.1.2 Relay contactors (see 14.1.2.4) shall belong to the following categories as defined in EN 60947-5-1: 1991: a) AC-15 for contactors in alternating current control circuits; b) DC-13 for contactors in direct current control circuits.	—	—	—	—	—
13.2.1.3 For both, the main contactors (see 13.2.1.1) and the relay contactors (see 13.2.1.2) it is permissible to assume in the measures taken to comply with 14.1.1.1, that: a) if one of the break contacts (normally closed) is closed, all the make contacts are open; b) if one of the make contacts (normally open) is closed, all the break contacts are open.	—	—	—	—	—
13.2.2 Components of electrical safety circuits	—	—	—	—	—
13.2.2.1 When devices according to 13.2.1.2 are used as relays in a safety circuit, the assumptions of 13.2.1.3 also apply.					
13.2.2.2 If the relays used, are such that the break and make contacts are never closed simultaneously for any position of the armature, the possibility of	—	—	—	—	—

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partial attraction of the armature shall not be taken into account (see 14.1.1.1 f)).					
13.2.2.3 Devices connected after electrical safety devices shall meet the requirements of 14.1.2.2.2 with regard to the creep distances and air gaps (not with regard to the separation distances). This requirement does not apply to the devices mentioned in 13.2.1.1, 13.2.1.2 and 13.2.1.3.	—	—	**JIS C 8325-1983;** AC electromagnetic switches	—	—
13.3 Protection of motors **13.3.1** Motors directly connected to the mains shall be protected against short-circuiting.	—	**7.2 CIRCUIT BREAKER OR MAIN SWITCH** Each escalator machine *(moving walk)* shall be provided with a single overcurrent circuit breaker or a main switch and fuse, which will simultaneously open or close all active conductors controlled by it. The circuit breaker may have a time-lag device, but shall not be provided with an undervoltage release. **7.3 POSITION OF CIRCUIT BREAKER OR MAIN SWITCH** The circuit breaker or main switch	**EUIL-MO-1997** **[Facilities of overload protection device of motor] (Ministerial Ordinance Article 65)** **Article 169** For a motor equipped indoors in the event of an over-current, a device which automatically obstructs an over-current that may cause a motor to burn or an alarm device shall be provided. The article, however, shall not be applicable to any of the following cases.	—	—
13.3.2 Motors directly connected to the mains shall be protected against overload by means of automatic circuit breakers with manual reset (except as provided for in 13.3.3) which shall cut off the supply to the motor in all live conductors (see EN 60947-4-1).	—	shall be mounted near the controller. Where the controller is not located in the top truss extension, there shall also be a control current stop switch in this area. The stop switch shall be located so that it may be operated without the operator having to pass over or reach over any part of the machinery. Where a walk in machine room is provided, the circuit breaker or main switch shall be located in an accessible position, convenient and adjacent to the entrance.	1. A case of the motor equipped where the person in charge can always watch the motor during operation 2. A case of the motor that has no risk to carry an over-current which may cause the motor to burn because of the motor structures or nature of a motor load 3. A case of a single-phase motor where a rated current of the over-current breaker furnished on the line of the	—	—

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		The main current isolators shall be of a lock or padlock type.	power source is not exceeding 15 A (20 A for a molded-type circuit breaker).		
13.3.3 When the detection of overload operates on the basis of temperature increase in the windings of the motor, the circuit breaker is permitted to close automatically after sufficient cooling down has taken place, however, it shall only be possible to re-start the escalator or passenger conveyor under the conditions of 14.2.1.	—		**JEAC 8001-1995** **Rule 305-5 Facilities for overload protection device of motors and the like** **1**. An overload protection device for a motor, such as a fuse, a molded-case circuit-breaker, a thermal relay, an induction type relay, a static type relay or the similar device for motor protection which is effective in preventing the motor from burning, or an overload alarming device shall be provided. The article, however, shall not be applicable to any of the following cases (EUIL-MO 184).	—	—
13.3.4 The provisions of 13.3.2 and 13.3.3 apply to each winding if the motor has windings supplied by different circuits.	—		1) The motor itself has an effective preventive device against overload burning. 2) Even in case of a start failure, there is no risk of burning the motor due to a high impedance of a motor winding. **Note** : An a. c. motor not exceeding 35 W or so generally corresponds to the above. 3) The person in charge always operates the motor like a general machine tool, a hoist or the like. 4) There is no risk of overloading the motor because of a nature of a load. 5) A single-phase motor is supplied from the branched circuits of 15 A (20 A for a	—	—

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			molded-case circuit-breaker). 6) An output of the motor is not exceeding 0.2 kW.		
13.3.5 When the escalator or passenger conveyor driving motors are supplied by d.c. generators driven by motors, the generator driving motors shall also be protected against overload.	—		**Note 1** : A fuse for the motor, which corresponds with the rated output or the rated current of the motor, shall be used. **Note 2** : A fuse for the motor shall be provided at every pole as a general rule but the fuse for the branched over-current breaker shown in Table 3-3 may be used for the grounding side. **Note 3** : The overload protection device for the motor shall be located as closely as possible to the motor. **2**. For a motor, which may fail to function or be damaged remarkably due to a phase failure of the power source, a protection device (an alarm device acceptable if no hitch) against the phase failure shall be provided for prevention of burning caused by the phase failure as a rule.	—	—
13.4 Main switches **13.4.1** In the vicinity of the machine or in the return stations or in the vicinity of the control devices there shall be a main switch capable of breaking the supply to the motor, the brake releasing device and to the control circuit in the live conductors. This switch shall not cut the supply to the socket outlets or to the lighting circuits necessary for	—	**7.2 CIRCUIT BREAKER OR MAIN SWITCH** Each escalator machine *(moving walk)* shall be provided with a single overcurrent circuit breaker or a main switch and fuse, which will simultaneously open or close all active conductors controlled by it. The circuit breaker may have a time-lag device, but shall not be provided with an undervoltage release. **7.3 POSITION OF CIRCUIT**	**JIS A 4302-1992 Inspection standard of elevator, escalator and dumbwaiter** **4.2.1** Inspection to be carried out in machinery room **(2)** Incoming panel, main switch, control board, conduit tube and wiring (a) The incoming panel and main switch shall as a rule be located near the machinery room entrance and shall be capable of being safely and	—	—

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inspection and maintenance. When separate supplies are provided for auxiliary equipment such as heating, balustrade lighting and comb lighting it shall be possible to switch them off independently. The corresponding switches shall be located close to the main switch and be marked unambiguously.		**BREAKER OR MAIN SWITCH** The circuit breaker or main switch shall be mounted near the controller. Where the controller is not located in the top truss extension, there shall also be a control current stop switch in this area. The stop switch shall be located so that it may be operated without the operator having to pass over or reach over any part of the machinery. Where a walk in machine room is provided, the circuit breaker or main switch shall be located in an accessible position, convenient and adjacent to the entrance. The main current isolators shall be of a lock or padlock type.	easily operated. (b) The control board and other control equipment shall be installed firmly, and provided with measures to prevent displacement and tumbling due to vibration of earthquake, etc. (c) The operation of contact points of every switch on the board shall be good.		
13.4.2 The main switches as defined in 13.4.1 shall be capable of being locked or otherwise scured in the "isolated" position, with the use of a padlock or equivalent, to ensure no inadvertent operation by others (see 5.2 of prEN 1037: 1994). The control mechanism of the main switch shall be easily and rapidly accessible after opening of the doors or trap doors.	—		(d) The insulation resistance of each circuit shall satisfy the requirements of Table 1. The insulation resistance shall be capable of being inspected on each circuit divisible by switches or overcurrent breakers.	—	—
13.4.3 Main switches shall be capable of interrupting the highest current involved in normal operating conditions of the escalator or passenger conveyor. They shall have a breaking capacity corresponding to category AC-3 as defined in EN 60947-4-1: 1992.	—			—	—
13.4.4 When main switches for several escalators or passenger conveyors are arranged in one machinery space it shall be possible to identify easily to which escalator or passenger conveyor they refer.	—	**4.9 NUMBERING** Escalators *(moving walks)* shall be conspicuously numbered both on the circuit- breaker and on the starting station at each end.		—	—
13.5 Electrical wiring **13.5.1** Cables shall be selected from those standardized by CENELEC and of a quality at	—	**SECTION 7 ELECTRICAL INSTALLATIONS** **7.1 WIRING** Wiring, including supply mains, shall comply with	**JIS A 4302-1992 Inspection standard of elevator, escalator and dumbwaiter** **4.4.1** Inspection to be carried	—	Equivalent to Korean Regulation on Electric Installation and wirings. But detail requirements are

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least equivalent to that defined by CENELEC HD 21 and HD 22.		AS 3000 and the following: (a) Wiring shall be suitably insulated and enclosed in any of the following enclosures: (i) Screwed rigid steel conduit or piping in accordance with AS 2052; (ii) Metal cable troughing complying with Clause 28.2 of AS 1735.2; (iii) Flexible non-metallic conduit complying with AS 2053 may be used to connect the ends of conduits to equipment, where any of the following apply: (A) To allow adjustment of equipment. (B) To provide sound isolation. (C) To make difficult connections The length of flexible conduit shall be the minimum necessary for the purpose, and shall not be placed in any position where it could be mechanically damaged. (iv) Circular cross-section rigid PVC conduit in accordance with AS 2053	out in machinery room **(1)** The insulation resistance shall satisfy the provisions of Table 10, as applicable to the respective purpose of circuit below. However, the insulation resistance may be inspected on each circuit which can be separated by switches or over-current circuit breakers. **Remarks:** **1.** The insulation resistance shall be calculated in accordance with remarks to 4.2.1 (2). **2.** The service voltage of the circuit for the instantaneous-start fluorescent lamp (so- slim-line lamp) used for lighting the sides of escalator, etc. shall be the primary (low voltage side) voltage. **JIS C 3301-1987** Rubber insulated flexible cords **JIS C 3306-1987** Polyvinyl chloride insulated flexible cords **JIS C 3307-1993** V polyvinyl chloride insulated wires **JIS C 3316-1993** Polyvinyl chloride insulated wires for electrical apparatus		different.
13.5.1.1 Conductors such as those in conformity with CENELEC HD 21.3 S2, part 2 (HO7V-U and HO7V-R), part 3 (HO7V-K), part 4 (HO5V-U) and part 5 (HO5V-K) are permitted only in conduits, ducting, or similar fittings ensuring equivalent protection. When deviating from CENELEC HD 21.3 S2, the nominal cross-sectional area of the conductors shall be not less than 0,75 mm^2. NOTE: These requirements replace those in the guide to use appearing in Annex 1 of CENELEC HD 21.1 S2.	—			—	—
13.5.1.2 Rigid cables, such as those in conformity with part 2 of CENELEC HD 21.4 S2, are permitted only in visible mountings fixed to the walls, or in conduits, ducting or similar fittings.	—			—	—
13.5.1.3 Ordinary flexible cables, such as those in conformity with part 3 (HO5RR-F) of CENELEC HD 22.4 S2 and part 5 (HO5VV-F) of CENELEC HD 21.5 S2 are permitted only in conduits, ducting or similar fittings ensuring equivalent protection. Flexible cables with a thick sheath such as those in	—	**Table 7.1: Maximum fixing ventres for straight runs of rigid 'PVC' conduit**	**JIS C 3317-1987** 600V grade heat-resistant polyvinyl chloride insulated wires **JIS C 3327-1993** 600V rubber insulated flexible cables **JIS C 3342-1993** 600V polyvinyl chloride insulated and sheathed cables **JIS C 3401-1992** Control	—	—

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conformity with part 5 of CENELEC HD 22.4 S2 are permitted to be installed rigidly in the conditions defined in 13.5.1.2 and for connection to a movable appliance or if they are subject to vibrations. **13.5.1.4** The requirements of 13.5.1.1, 13.5.1.2 and 13.5.1.3 need not apply to the wiring of control or distribution devices in control cabinets or on control panels a) either between different pieces of electrical equipment; b) or between these pieces of equipment and the connection terminals. In these instances the requirements in 7.8 of EN 60439-1: 1994 apply.	—	On straight runs of rigid PVC conduit, expansion fittings shall be provided at intervals not more than 8 m. Where rigid PVC conduit is used along inclined sections of a truss in a position where it is unlikely to be disturbed, the maximum permitted distance between fixing centres may be increased in accordance with Table 7.1. Rigid PVC conduit shall not be used where it would be subjected to direct sunlight. (v) Rigid PVC cable troughing complying with the following requirements: (A) Not subject to sunlight. (B) Provided with clip-on lid. (C) Minimum wall thickness of 1.5 mm with a cross-sectional area up to 50 cm², or minimum wall thickness of 2 mm with a cross-sectional area greater than 50 cm². (b) MIMS cable shall be in accordance with AS 3187. (c) Armored cable shall be in accordance with either AS 3116 or AS 3147. (d) Where connecting a portable control panel or portable operating station, flexible cable shall be in accordance with AS 1979, AS 3116, AS 3147, or AS	cables **JIS C 3408-1987** Travelling cables for elevators **JIS C 3652-1987** Installation methods of power flat conductor cables **EUIL-MO-1997** **[Facilities of low voltage indoor wiring for elevators, dumbwaiters and the like]** **(Ministerial Ordinance Article 57)** **Article 200** For low voltage indoor wiring, low voltage travelling cables and low voltage indoor wiring that directly connects the above which are installed in hoistways of elevators, dumbwaiters and the like and whose working voltage is not exceeding 300 V, the cables for elevators corresponding to the following may be used : 1. Their structures shall conform to the requirements of the item 4 „Materials, structures and processing methods“ of the Japanese Industrial Standard JIS C 3408 (1993) „Travelling cables for elevators“. 2. Their finished products shall conform to the requirements of the item 3 „Characteristics“, when they are tested by the item 6 „Testing methods“ of the Japanese Industrial Standard JIS C 3408 (1993) „Travelling cables for elevators“. **EUIL-MO-1997**	—	—

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		3191, with a minimum length suitable for the purpose. (e) Wiring of illuminated balustrades shall be in accordance with Clause 7.11. (f) Extra-low voltage wiring shall be suitably enclosed where mechanical protection is necessary.	**[Works for indoor discharge lamps (part 2)] (Ministerial Ordinance Article 10, 11, 56 and 57)** **Article 207** 10 When electrical wiring of lighting circuits (applicable to only wiring installed in an		
13.5.2 Cross-sectional area of conductors The nominal cross-sectional area of the conductors of electrical safety circuits shall be not less than 0,75 mm^2.	—	AS 3000	in an enclosure where possible for an inspection) installed in a dry place within escalators is enclosed in soft vinyl tubes, the wiring shall conform to the following: a) Fluorescent lamp electrical wires shall be used for electrical wires and every wire	—	—
13.5.3 Method of installation **13.5.3.1** The electrical installation shall be provided with the indications necessary to make it easy to understand.	—	AS 3000	shall be installed in an independent soft vinyl tube. (Related to Ministerial Ordinance Article 57) b) Soft vinyl tubes shall conform to the requirements of the item 6 „Testing“ of the	—	—
13.5.3.2 Connections, connection terminals and connectors except those defined in 13.1.2 shall be located in control cabinets, control boxes or on panels provided for this purpose.	—	—	Japanese Industrial Standard JIS C 2415 (1994) „Extruded tubes for electrical insulation“. c) Any joint of electrical wires except the joints with lead wires of the ballasts or those of the lamp sockets for discharge lamps shall not be made. d) Metal structures which may touch electrical wires shall be grounded by the Class D grounding (related to Ministerial Ordinance Article 10 and Article 11).	—	—
13.5.3.3 If, after the opening of the main switch or switches of the escalator or passenger conveyor, some connection terminals	—	—	**JEAS-A407 Standard for interlocking suspension of escalators with fireproof shutters**	—	—

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remain live, they shall be clearly separated from terminals which are not live; if the voltage exceeds 50 V, they shall be suitably marked.			**2. Description** **2.2 Contacts for interlocking (Refer to Fig. 2 and Fig. 3.)** A contact for interlocking to be		
13.5.3.4 In order to ensure continuity of mechanical protection, the protective enclosures of cables shall enter the casings of switches and appliances, or shall have proper glands at their ends.	—	AS 3000	provided at the shutter shall be „b“ contact (contact to be opened before the closing shutter comes down to a height of 1. 8 m above floor level) of DC 125V 0.2A (AC 250V 1A) in rating and number of contacts	—	—
13.5.3.5 If the same conduit or cable contains conductors the circuits of which have different voltages, all cables shall have the insulation specified for the highest voltage.	—	—	shall be same as number of escalators necessary to be interlocked. **JEAC 8001-1995** **Rule 220-8 Wiring of lighting circuits in escalators** All electrical wiring (applicable to only wiring installed in an enclosure where it is possible for an inspection) of lighting circuits in escalators which are installed in a dry place shall conform to the following : (EUIL-MO 222) 1) Fluorescent lamp electrical wires shall be used for electrical wires and every wire shall be installed in an independent soft vinyl pipe.	—	—
13.5.4 Connectors Connectors and devices of the plug-in type which are placed in safety circuits and which can be extracted without the use of a tool, shall be designed in such a way that it is impossible to re-insert them incorrectly.	—	—	**Note** : Concerning the soft vinyl pipe, the pipes conforming to the requirements of JIS C 2410 (P.V.C. tubing for electrical insulation) shall be used. 2) Any joint of electrical wires except the joints with lead wires of the ballast or those of the lamp-sockets for discharge lamps shall not be made.	—	—

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			3) Metal structures which may touch electrical wires shall be grounded by the Class 3 grounding. **JEAC 8001-1995** **Rule 310-13 Elevators and dumbwaiters** All electrical wiring installed in elevators and dumbwaiters shall conform to the following : (EUIL-MO 215) 6) Sizes of electrical wires and travelling cables installed in hoistways and travelling body shall conform to the sizes listed in Table 3-17. **Table 3-17: Sizes of electrical wires and traveling cables for elevators and the like** **Reference 1**: Conductors with		

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			a size not less than 0.75 mm² may be used only for short runs connecting terminating piping boxes to mechanical apparatus for the wires with the mark of *. **Reference 2**: Solid wires with a diameter not less than 0.8 mm and less than 1.6 mm or stranded wires with a cross section not less than 0.75 mm² and less than 2 mm² with the mark of ** may be used only for control or signal circuits, when a device breaking an over-current and disconnecting it automatically from the electrical circuits in the event of an over-current. **Reference 3**: Concerning conductor sizes of travelling cables, three kinds of 0.75 mm², 1.4 mm² and 2.0 mm² are prescribed by the Japanese Industrial Standard JIS C 3408 „Travelling cables for elevators". 9) An over-current breaker shall be provided for a branched circuit (e.g., circuits for a micro motor, a cam motor, a door motor, lamps within hoistways or the like, control circuits or the similar circuits). Provided, for the circuits such as magnetic brake circuits where an over-current breaker is not recommendable to be provided, the above may be excluded. **Note** : Concerning installation of an over-current breaker, see Rule 150-9 „Rated current of an over-current breaker for		

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			protection of electrical wires". 10) For electrical wires connecting to resistors or the like whose temperature rise is not less than 60 degrees C, electrical wires of heat resistance property shall be used. Provided, insulated wires may be used, if a covering of a portion having excessive temperature rise is removed and the portion is covered by an insulator of heat resistance property, or the portion is treated by inserting miniature porcelain bushings or the like. **JEAC 8001-1995** **Rule 310-14 Escalators** All electrical wiring installed in escalators shall conform to the following : 1) All electrical wiring in escalators shall be installed by metallic conduit wiring, synthetic resin tube wiring, metal raceway wiring or cable wiring (excluding lead-covered cables of rubber insulation) except the cases corresponding to the following : a) A case where the wiring for short runs connecting the junction box to every mechanical apparatus is installed by flexible metal conduit tube wiring. Provided, RB electrical wires (those of rubber insulation) shall not be used where electrical wires could be possibly damaged by oil. b) A case where wiring is		

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			installed by using chloroprene or vinyl armor sheathed cables for short runs connecting the junction box to every mechanical apparatus where electrical wires are not feared to be possibly damaged mechanically. 2) All electrical wiring shall be securely fastened to stationary structures so as not to be damaged by a possible contact to a movable structure. 3) Sizes of electrical wires for wiring shall conform to the requirements of the item 6) of Rule 310-13 „Elevators and dumbwaiters“. 4) An over-current breaker shall be provided for circuits branched from the main motor circuits according to the requirements of the item 9) of Rule 310-13 „Elevators and dumbwaiters“.		
13.6 Socket outlets **13.6.1** The supply to the socket outlets shall be independent of the supply to the machine and it shall be possible to break the supply of all phases by means of a separate switch.	—	**4.6 GENERAL PURPOSE OUTLETS IN TRUSS EXTENSION** (Part 5) A general purpose outlet shall be conveniently and accessibly located in the top and bottom truss extension.	—	—	—
13.6.2 Socket outlets shall be a) either of type 2 P+T (2 poles + earth conductor), 250 V, directly supplied by the mains; b) or of a type that is supplied at a safety extra low voltage in accordance with CENELEC HD 384.4.41 S1, sub-clause 411.	—	—	—	**6.19** The machine room, escalator tunnel, and the tension device chamber of tunnel escalators, as well as the top and bottom parts of floor escalators shall have sockets to provide power to portable inspection lamps from the 12 V mains.	—

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13.7 Connecting terminals Connection terminals, accidental interconnection of which could lead to a dangerous malfunction of the escalator or passenger conveyor shall be clearly separated.	–	–	–	–	–

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14 Protection against electrical faults - controls **14.1 Protection against electrical faults** **14.1.1 General** Any one of the faults envisaged in 14.1.1.1 in the electrical equipment of the escalator or passenger conveyor if t cannot be exluded under conditions described in 14.1.1.2 and/or appendix A (normative) shall not on its own be the cause of a dangerous malfunction of the escalator or passenger conveyor.	*These items contained in **EN 115 Clause 14**, except as specifically noted, are not addressed in **A17.1, Part VIII.** Some of them will be a part of the next edition of the code and some are currently covered in the National Electrical Code, ANSI/NFPA 70.* **805.10/905.9 Control and Operating Circuits** The design and installation of the control an operating circuits shall conform to the following requirements: (a) The failure of any single magnetically operated switch, contactor, or relay to release in the intended manner, or the failure of any solid state device to operate as intended, or the occurrence of a single accidental ground or combination of accidental grounds, shall not: (1) permit the escalator/ moving walk to start; (2) render ineffective any electrical protective device required by Rule 805.3/ 905.3 or the handrail-speed monitoring device required by Rule 805.4/ 905.4, or the missing step/ pallet device required by Rule 805.5/ 905.5. NOTE ((Rule 805.10(a)(2))/ ((Rule 905.9(a)(2)): Requirements only apply to the safety circuits in which the electrical protective devices are used.	**7.7 FAULT PROTECTION** **7.1.1 Single failure** 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 permit the escalator *(moving walk)* to start or run.	—	—	—
14.1.1.1 Faults envisaged a) absence of voltage; b) voltage drop; c) loss of continuity of a conductor; d) fault to earth of a circuit; e) short circuit or open circuit, change of value or function in an electrical component such as resistor, capacitor, transistor, lamp; g) non-separation of the moving armature of a contactor or relay; f) non-attraction or incomplete attraction of the moving armature of a contactor or relay; h) non-opening of a contact; i) non-closing of a contact.		—	—	—	—
14.1.1.2 The non-opening of a	(b) Escalators/ Moving walks with	—	—	—	—

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contact need not be considered in the case of safety contacts conforming to 14.1.2.2.	driving-machine motors employing static control shall conform to the following:				
14.1.1.3 The fault to earth of a circuit in which there is an electrical safety device shall cause the immediate stopping of the driving machine. The return to service shall not be possible except by an authorized person.	(1) Two devices shall be provided to remove power from the driving-machine motor. At least one device shall be an electromechanical contactor. (a) The contactor shall be arranged to open each time the escalator/ moving walk stops.	—	**EUIL-MO-1997; 13, 18**	—	—
14.1.2 Electrical safety devices **14.1.2.1** General requirements **14.1.2.1.1** The operation of an electrical safety device for any of the events 14.2.2.4.1 b) to m) shall prevent the driving machine from starting or cause the immediate stopping of the driving machine according to 14.1.2.4. The electrical safety devices shall consist of: a) either one or more safety contacts satisfying 14.1.2.2 directly disconnecting the supply to the contactors or their relay contactors; b) or safety circuits satisfying 14.1.2.3 consisting of: 1) either one or more safety contacts satisfying 14.1.2.2 not directly disconnecting the supply to the contactors or their relay contactors; 2) or contacts not satisfying the requirements of 14.1.2.2; 3) or other components in accordance with the requirements of annex A (normative).	(b) The contactor shall cause the removal of power from the driving-machine brake or main drive shaft brake in accordance with Rules 804.3b/904.3b and 805.3d/ 905.3d. (2) An additional contactor shall be provided to also open the driving machine brake circuit. This contactor is not required to have contacts in the driving-machine motor circuit. (3) The electrical protective devices required by Rule 805.3/ 905.3 shall control the solid state device and both contactors. (4) After each stop of the escalator, the escalator shall not respond to a signal to start unless both contactors ((Rule 805.10(b)/1) and (2))/ ((Rule 905.9(b)/1) and (2)) are in the energized position.	**SECTION 6 OPERATING AND SAFETY DEVICES** **6.1 GENERAL** Operating and safety devices shall be provided in accordance with the requirements of this Section. Such devices shall be readily accessible.	—	—	—
14.1.2.1.2 No electrical equipment shall be connected in parallel to electrical safety devices.		—	—	—	—

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14.1.2.1.3 The effects of internal or external inductance or capacitance shall not cause failures of electrical safety circuits.	**805.11/ 905.10 Installation of Capacitors or Other Devices to Make Electrical Protective Devices Inoperative** The installation of capacitors, or other devices, the operation or failure of which will cause an unsafe operation of the escalator/ moving walk, is prohibited. No permanent device shall be installed, except as provided for this Code, which will make any required electrical protective device inoperative (also see Rule 805.3d).	**7.7.2 Capacitors** Capacitors shall not be installed in any escalator *(moving walk)* installation where their operation or failure may cause an unsafe operation.	—	—	—
14.1.2.1.4 An output signal emanating from an electrical safety circuit shall not be altered by an extraneous signal emanating from another electrical device placed further down the same circuit, which would cause a dangerous condition to result.		—	—	—	—
14.1.2.1.5 In safety circuits comprising two or more parallel channels, all information other than that required for the functioning of the safety circuit shall be taken from one channel only.		—	—	—	—
14.1.2.1.6 Circuits which record or delay calls shall not, even in event of fault, prevent or intentionally delay the stopping of the driving machine through the functioning of an electrical safety device.		—	—	—	—
14.1.2.1.7 The construction and arrangement of the internal power supply units shall be such as to prevent the appearance of false signals at the outputs of electrical safety devices due to the effects of switching. In particular, voltage peaks arising from the operation of the escalator or passenger conveyor or other equipment on the network shall not create inadmissible disturbances in electronic components (noise immunity).		—	—	—	—

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14.1.2.2 Safety contacts **14.1.2.2.1** The operation of a safety contact shall be by positive mechanical separation of the circuit breaking devices. This positive mechanical separation shall even occur if the contacts are welded together. Positive mechanical separation is achieved when all the contact breaking elements are brought to their open position in such a way that for a significant part of the travel there are no resilient elements (e.g. springs) between the moving contacts and the part of the actuator to which the actuating force is applied. The design shall be such as to minimize the risk of a short-circuit resulting from a faulty component.	The items contained in **EN 115 Clause 14.1.2.2,** are not addressed in **A17.1, Part VIII.** Some of them will be a part of the next edition of the code and some are currently covered in the National Electrical Code, ANSI/NFPA 70.	—	—	—	—
14.1.2.2.2 The safety contacts shall be provided for a rated insulation voltage of 250 V if the enclosure provides a degree of protection of at least IP 4X (in accordance with EN 60529: 1991), or 500 V if the degree of protection of the enclosure is less than IP 4X. Safety contacts shall belong to the following categories as defined in EN 60947-5-1: 1991: a) AC-15 for safety contacts in alternating current circuits; b) DC-13 for safety contacts in direct current circuits.		—	—	—	—
14.1.2.2.3 If the protective enclosure is not at least of type IP 4X the air gaps shall be at least 3		—	—	—	—

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mm and creep distances at least 4 mm. The distances for breaking contacts shall be at least 4 mm after separation.					
14.1.2.2.4 In the case of multiple breaks, the individual distances for breaking contacts shall be at least 2 mm after separation.		—	—	—	—
14.1.2.2.5 Debris from the conductive material shall not lead to short-circuiting of contacts.		—	—	—	—
14.1.2.3 Safety circuits		—	—	—	—
14.1.2.3.1 Anyone of the faults envisaged in 14.1.1. shall not on its own be the cause of a dangerous situation.					
14.1.2.3.2 Furthermore, the following conditions apply for the faults envisaged in 14.1.1: If one fault combined with a second fault can lead to a dangerous situation, the escalator or passenger conveyor shall be stopped by the time the next operating sequence takes place in which the faulty element should participate. The possibility of the second fault leading to a dangerous situation before the escalator or passenger conveyor has been stopped by the sequence mentioned, is not considered. If the malfunction of the component which has caused the first fault cannot be detected by a change of state, appropriate measures shall ensure that the fault is detected and movement prevented at the latest when the escalator or passenger conveyor		—	—	—	—

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is re-started according to 14.2.4. The MTBF (Mean Time between Failures) of the safety circuit shall be at least 2,5 years. This time was determined under the assumption that within a period of three months each escalator or each passenger conveyor is re-started according to 14.2.4 at least one time and, thus, is subject to a change of state.					
14.1.2.3.3 If two faults combined with a third fault can lead to a dangerous situation, the escalator or passenger conveyor shall be stopped by the time the next operating sequence takes place in which one of the faulty elements should participate. The possibility of the third fault leading to a dangerous situation before the escalator or passenger conveyor has been stopped by the sequence mentioned, is not considered. If the malfunction of the components which have caused the two faults cannot be detected by a change of state, appropriate measures shall ensure that the faults are detected and movement is prevented at the latest when the escalator or passenger conveyor is re-started according to 14.2.4. The MTBF (Mean Time between Failures) of the safety circuit shall be at least 2,5 years. This time was determined under the assumption that within a period of three months each escalator or each passenger conveyor is re-started according to 14.2.4 at	–	–	–	–	–

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least one time and, thus, is subject to a change of state. **14.1.2.3.4** A combination of more than three faults can be disregarded if a) the safety circuit is built-up of at least two channels, their equal status is monitored by a control circuit. The control circuit shall be checked prior to a re-start of the escalator or passenger conveyor according to 14.2.4 (see also Annex B (normative)); or b) the safety circuit is built-up of at least three channels, their equal status is monitored by a control circuit. If the requirements of a) or b) are not fulfilled, it is not permitted to interrupt the failure analysis but it shall be continued analogous to 14.1.2.3.3. **14.1.2.4** Operation of electrical safety devices When operated, an electrical safety device shall prevent the setting in motion of the driving machine or immediately initiate its stopping. The operational brake shall be applied. Electrical safety devices shall act directly on the equipment controlling the supply to the driving machine. If, because of the power to be transmitted, relay contactors are used to control the driving machine, these shall be considered as equipment directly controlling the supply to the driving machine for starting and		—	—	—	—
			BSLJ-EO; Article 129-12 **4.** Escalators shall be provided with the emergency stopping devices and devices to stop the ascending or the descending steps at the entrances and exits of the escalators. **5.** The constructions of the preceding emergency stopping devices shall be the construction methods specified by the Minister of Land, Infrastructure and Transport so as to have performance which operate automatically and enable to stop the steps safely with the deceleration in operating direction of not more than 1.25m/sec2 when power supply fail, break down of	**5.8.1** The escalator shall be provided with interlocking devices that should cut off electric motors to stop the stairway belt.	3.3.2 Safety devices The following safety devices shall be installed. (1) A device which, when the step chain is cut, automatically stops the rising of steps. (2) A device which automatically stops the rising of steps when the fire protective shutter installed in the vicinity of the landing begins to close. (3) A device which is capable of stopping the rising of steps at landing. (4) A device which, when persons or objects are caught between the side of

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stopping.			driving devices, person or articles are caught, and in case of that persons are liable to be injured or articles are damaged, or the construction methods approved by the Minister of Land, Infrastructure and Transport. **MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not more than 15 degree) is less		steps and the skirt guard, automatically stops the rising of steps before the affected persons or objects reach the comb plate. One or more of these devices shall be installed on top, bottom, left and right side of the moving path, respectively; however, such devices are not required in the case of a moving walk. (5) A device which, when persons or objects are caught by the handrail inlet, automatically stops the rising of steps. (6) A device which automatically prevents motor from running due to inertia after power has been shut off. (7) A device which shuts off power and prevents reverse running when drive chain is cut, or a device which stops operation, and acts as a brake, when the car is ascending abnormally or runs backwards. However, such devices are not required in the case of a moving walk. (8) A device which prevents persons or objects from being caught between the steps and comb plate from the upper or lower landing of escalators. (9) Devices, fixed to both sides of the top and bottom of the hoistway, detects operation with the steps in lifted condition and stops

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			than 4 mm) (a) The extraordinary extension of the step chains. (b) The power is cut off. (c) The door covering the opening surrounding the escalator is closing. (d)The person or the articles are caught between a side of the step and the skirt guard panels near the riding entrance and leaving exit. (e)The person or the articles are caught in the inlet of the handrail.		the rising of the steps. However, such devices are not required in the case of a moving walk. (10) A device which automatically stops the movement of the tread when an object is caught at a spot where the tread and the comb are engaged with each other.
14.1.2.5 Control of electrical safety devices The components controlling the electrical safety devices shall be selected and assembled so that they are able to function properly even under the mechanical stresses resulting from continuous operation. In the case of redundancy type safety circuits, it shall be ensured by mechanical or geometric arrangements of the transmitter elements that a mechanical fault cannot cause unnoticed loss of redundancy. Transmitter elements of safety circuits shall withstand the requirements of: A.6.1 of prEN 60068-2-6: 1994: Endurance by sweeping: Table C.2: - 20 sweep cycles in each axis - at amplitude 0.35 mm or 5 g_n - and in the frequency range 10 Hz to 55 Hz		—	—	—	—

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and also of 4.1 of EN 60068-2-27: 1993: Acceleration and duration of pulse: Table 1: the combination of - peak acceleration 294 m/s^2 or 30 g_n - corresponding duration of pulse 11 ms, and - corresponding velocity change 2,1 m/s half sine NOTE: Where shock absorbers are used for the transmitter elements, they shall be considered as part of the transmitter elements.					
14.2 Controls **14.2.1 Starting and making available for use the escalator or passenger conveyor** Starting of the escalator or passenger conveyor (or making it available for use when starting is automatic by a user passing a certain point) shall be effected by one or more switches available to authorized persons only (e.g. key-operated switches, switches with detachable lever, lockable protective caps for switches). Such switches shall not function concurrently as main switches described in 13.4. The person who operates the switch shall either be able to see the entire escalator or entire passenger conveyor or shall have means of ensuring that nobody is using the escalator or passenger conveyor before making this operation. The direction of travel shall be distinctly recognizable from the indication on the switch.	**SECTION 805 OPERATING AND SAFETY DEVICES** **Rule 805.1/905.1 General** Operating and safety devices conforming to the requirements of this Section shall be provided. When more than one driving machine per escalator/moving walk is utilized, actuation of devices covered by this Section shall simultaneously control all driving machines. **805.2/905.2 Starting switches** Escalators/ moving walks shall be provided with starting switches conforming to the following: (a) Location and design. The switches shall be: (1) located so that the escalator steps are/ exposed treadway is within sight; (2) of the continuous-pressure spring-return type, and shall be operated by a cylinder-type lock having not less than a five-pin or five-disk combination; (3) clearly and permanently	**6.2 NORMAL OPERATION** **6.2.1 Starting switch** **6.2.1.1 Provision** A starting switch shall be provided at each end of each escalator *(moving walk*). **6.2.1.2 Type** Starting switches shall be of the key-operated, spring off type. **6.2.1.3 Location** Starting switches shall be located in a readily accessible position where the operator, while using the key to operate the starting switch, can observe any person at any position on the escalator *(moving walk)* (see also Clause 6.3(b)). **6.2.1.4 Labeling** Each starting switch shall be clearly labeled with the direction of travel.	**JEAS-406G (Draft)** **2. Description** **2.4** Operating panels shall be located near the upper and lower landings and shall have the following items. (2) A key-operated switch with an alarm, a spring return type key-operated start switch, and the like should be incorporated in the operating panel.	**5.9.2** Control panels accessible only for operating personnel shall be installed at the top landing and at the bottom landing to start and stop the loaded escalator. Escalators may have remote control panels both at the escalator area or beyond it. An escalator with passengers on the belt may be started from a remote control panel only if it is possible to watch the passengers on the escalator or there is a two-way communication with the personnel near the escalator, a warning being given to passengers when the escalator is about to be started.	—

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	marked "DOWN", "RUN" and "UP", in that order, with the key removable only in the "RUN" (spring return) position. The switch(es) shall be rotated clockwise to go from the "DOWN" to "RUN" to "UP" position. (b) Operating requirements. The operation of the switches shall initiate movement of the escalator/ moving walk. The escalator/ moving walk shall not start (restart) unless the starting switches were first in the "RUN" position. (c) Automatic Starting. Automatic starting by any means is prohibited.				
14.2.1.1 Escalators or passenger conveyors which start automatically by the passing of a user shall start to move before the person walking reaches the comb intersection line. This is, for instance, accomplished by: a) lightrays if they are arranged at least 1,30 m before the comb intersection line (see L_2 in figure 1, detail X); b) contact mats if the outer edge of the contact mat is arranged at least 1,80 m before the comb intersection line. The length of the contact mat in the direction of travel shall be at least 0,85 m. Contact mats reacting to weight shall respond before the load reaches 150 N, applied to a surface of 25 cm² at any point. Constructional measures shall discourage circumvention of the	*This is prohibited by **Rule 805.2c/905.2c,** shown above.*	**6.2.2 Automatic operation** **6.2.2.1 General** Where provided, automatic control shall comply with Clauses 6.2.2.2 to 6.2.2.8. **6.2.2.2 Changeover switches** Where automatic starting or speed change is provided, key type changeover switches shall be provided at each end of the escalator *(moving walk)* for maintenance purposes. Such changeover switches shall be required to be set to the automatic position before automatic starting can become effective. **6.2.2.4 Passenger speed** The passenger speed used in Clauses 6.2.2.5, 6.2.2.6, and 6.2.2.7, to calculate the time taken for a passenger to actuate the speed switch and move to the combplate, shall be not less than 0.9 m/s.	**JEAS-410B (Draft)** **2. Description** **2.1 The detecting point of the detection device** The detecting point shall be placed at a point where the escalator starts moving and can reach to a stable speed prior to passengers getting on. It shall be located at a distance of 1.0 m or more from the turning end of the handrail or 1.7 m or more from the edge of the combs and shall be located at both the landing entrance and the exit (An example of the photo-electric device is shown in Fig. 1). **2.2 Automatic operation** (1) When the stopped escalator detects passengers approaching at the entrance, it shall automatically start running and continue operation	—	—

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control elements.		**6.2.2.5 Starting** Where a light ray, a floor pad switch, or another device detects the approach of a passenger and starts an escalator *(moving walk),* the steps shall have commenced to move before the passenger has arrived at the combplate. **6.2.2.7 Automatic speed change** Where a light ray, a floor pad switch or another device detects the approach of a passenger and increases the speed of an escalator *(moving walk)*, the steps *(treadway)* shall have commenced to increase speed before the passenger has arrived at the combplate. Any dual speed escalator *(moving walk)* starting from rest shall have commenced to change speed before a passenger reaches the combplate. Escalators *(moving walks)* may be arranged to slow down automatically, provided that not less than 120% of the time required by the last person passing the initiating device to complete the journey has elapsed. **6.2.2.8 Safety circuit operation** Automatic starting shall not be effective after the operation of any safety switch or device (including any emergency stop button and the key switch for the power emergency operation) until such time as the switch or starting circuit has been manually reset by the use of a key. **6.2.3 Remote operation** Where provided, remote operation shall comply with Clauses 6.2.1.2 to	until the last passenger reaches the exit. (2) The running direction for the automatic operation shall be restricted to either upward or downward movement by the key operation. **2.4 Indications, instructions and notices** (1) At the entrance it should be indicated that passengers are allowed to get on (An example is shown in Fig. 2.). (2) At the exit it should be indicated that passengers are not allowed to get on (An example is shown in Fig. 3). (3) The indications should be located at a place where the approaching passengers can see them easily. (4) At both the entrance and the exit, fences or the like should be installed between the detection device location and the entrance or the exit to guide the passengers. (5) It is preferable to perform the public announcements on warning or guidance that it is in the automatic operation. (6) It is advisable that the monitoring devices such as TV camera be mounted		

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		6.2.1.4. An emergency stop button shall be provided to the remote station and shall comply with Clause 6.3.			
14.2.1.2 On escalators or passenger conveyors which start automatically by the passing of a user, the direction of travel shall be predetermined, clearly visible and marked distinctly (see 15.2). In such cases where escalators or passenger conveyors which start automatically by the passing of a user can be entered in the direction opposite its predetermined direction of travel, they shall start in the predetermined direction and conform to the requirements of 14.2.1.1. The running time shall be not less than 10 s.	*This is prohibited by **Rule 805.2c/905.2c,** shown above.*	**6.2.2.3 Restriction of access** Turnstile gates or other means shall be provided to prevent access to the escalator *(moving walk)* in the direction reverse to that set for automatic starting.	**2.3 Prevention against the entering from the exit side** When the stopped escalator detects passengers approaching at the exit, it shall give them a warning, begin running in the predetermined direction by the key operation for a fixed time and show them that the escalator is not serviceable to prevent them from entering in the wrong direction.	—	—
14.2.2 Stopping All stopping devices shall act by interrupting current and not by the completion of a circuit of a relay.	**805.12/905.11 Completion or Maintenance of Circuit** The completion or maintenance of an electric circuit shall not be used to stop the escalator when the emergency stop switch is opened or when any of the electrical protective devices operate. These requirements do not apply to dynamic braking or speed control switches (Rules 805.3b/905.3b, 805.3h/905.3g, and 805.4/905.4).	—	**BSLJ-EO; Article 129-12** **4.** Escalators shall be provided with the emergency stopping devices and devices to stop the ascending or the descending steps at the entrances and exits of the escalators.	—	—
14.2.2.1 Stopping, not automatically operated Before stopping, the person who operates the switch shall have means of ensuring that nobody is using the escalator or passenger conveyor, before making this operation.	**Rule 805.3a/905.3a Emergency Stop Buttons**) (1) A red stop button shall be visibly located at the top and bottom landing on the right side facing the escalator/every entrance to and exit from a moving walk on the right side facing the walk. The operation of either of these buttons shall stop	**6.11 OPERATION UNDER FIRE CONDITIONS** **6.11.1 Application** The operation described in Clause 6.11.2 is recommended for the use of firemen and other authorized personnel. **6.11.2 Stopping operation** The procedure for stopping escalators *(moving walks)* in the event of fire		—	—

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	the escalator/walk. It shall not be possible to start the escalator/walk by these buttons. Remote stop buttons are prohibited. The buttons shall be covered with a transparent cover which can be readily lifted or pushed aside. When the cover is moved, an audible warning signal shall be activated. The signal shall have a sound intensity of 80 dBA minimum at the button location.	in a building shall be by means of activating the escalator *(moving walk)* emergency stop buttons (see Clause 6.3) individually. Stopping shall not be initiated either manually by remote manual switching or automatically by heat sensing devices or smoke sensing devices.			
14.2.2.2 Stopping, automatically operated It is permitted to design the control in such a way that the escalator or passenger conveyor is stopped automatically after a sufficient time (at least the anticipated passenger transfer time plus 10 s) after the passenger has actuated a control element described in 14.2.1.1.	*This type of operation is prohibited in A17.1, see* ***Rule 805.3a/905.3a***	**6.2.2.6 Stopping** Escalators *(moving walks)* may be arranged to stop automatically, provided that not less than 120% of the time required by the last person passing the initiating device to complete the journey has elapsed.	**JEAS-410B (Draft)** **2. Description** **2.2 Automatic operation** (1) When the stopped escalator detects passengers approaching at the entrance, it shall automatically start running and continue operation until the last passenger reaches the exit.	—	—
14.2.2.3 Emergency stopping, not automatically operated **14.2.2.3.1** Emergency stop devices shall be placed in conspicuous and easily accessible positions at or near to the landings of the escalator or passenger conveyor (see 15.1.2.2). For escalators with rises above 12 m, additional emergency stop devices shall be provided. For passenger conveyors with a length of the treadway of more than 40 m, additional emergency stop devices shall be provided. The distances to and between the additional emergency stop devices shall not exceed	**805.3a/905.3a Emergency Stop Buttons** (1) A red stop button shall be visibly located at the top and bottom landing on the right side facing the escalator/every entrance to and exit from a moving walk on the right side facing the walk. The operation of either of these buttons shall stop the escalator/walk. It shall not be possible to start the escalator/walk by these buttons. Remote stop buttons are prohibited. The buttons shall be covered with a transparent cover which can be readily lifted or pushed aside. When the cover is moved, an audible warning signal	**6.3 EMERGENCY STOP BUTTONS** Emergency stop buttons or other types of manually operated switches shall be provided and shall comply with the following requirements: (a) They shall be distinctly marked and have red buttons or handles. (b) They shall be mounted on a common plate with the starting switch and shall be accessible and protected against accidental operation (see Clause 6.2.1.1). (c) Stop buttons shall be provided with a cover, which can be readily lifted or pushed aside. (d) The operation of either of	**BSLJ-EO; Article 129-12** **4.** Escalators shall be provided with the emergency stopping devices and devices to stop the ascending or the descending steps at the entrances and exits of the escalators.	**5.8.2** Non-biased switches shall be installed at the top and the bottom of the escalator on both sides for emergency stopping and they shall bear the inscription "STOP".	**3.3.2 (3)** A device which is capable of stopping the rising of steps at landing. **4.3.2 (20)** The emergency stop button switch used in an emergency shall satisfy the following standards. The emergency stop button switch shall be installed in an easily seen place at the upper and lower platforms so that they can readily be operated in an emergency. Furthermore, for escalators with the height of the riser exceeding 12 m, or for horizontal moving walks with the length exceeding 40 m, additional emergency

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- 15 m on escalators; - 40 m on passenger conveyors.	shall be activated. The signal shall have a sound intensity of 80 dBA minimum at the button location. (2) The cover shall be marked "EMERGENCY STOP"; "MOVE COVER" or equivalent legend (e.g., "LIFT COVER," "SLIDE COVER," etc.); and "PUSH BUTTON". "EMERGENCY STOP" shall be in letters not less than 1/2 in. (13 mm) high. Other required wording shall be in letters not less than 3/16 in. (4.8 mm) high. The cover shall be self resetting. (3) The stop button shall be located as follows. (a) On high deck balustrades, it shall be located on the curved newel deck in the upper quadrant with the center line of the button at a 45 deg. angle from the horizontal. (b) On low deck balustrades, it shall be located below the handrail height. The center line of the button shall be located on a radial line 45 deg. above the horizontal such that no part of the button assembly is within 1 1/2 in. (38 mm) of the bottom of the handrail and the button is no more than 3 1/2 in. (89 mm) from the bottom of the handrail.	these buttons or switches shall interrupt the electric power to the driving machine and brake. (e) It shall not be possible to start the driving machine by these buttons or switches. Where provided, additional stop buttons shall comply with Items (a), (d) and (e) above.			stop button switches shall be installed in the middle of the treadway. The interval between the additionally installed emergency stop button switches shall not exceed 15 m in the case of escalators, or 40 m in the case of horizontal moving walks. The color of the emergency stop button switch shall be red, and the button or the area adjacent to the button shall be marked with a word "Stop". The emergency stop button switch shall be protected by a cover to prevent erroneous manipulation resulting from fault or prank. The cover shall be installed in such a way that it can easily be opened in an emergency.
14.2.2.3.2 The emergency stop devices shall be safety contacts according to 14.1.2.2.	—	—	—	—	—
14.2.2.4 Emergency stopping, automatically operated **14.2.2.4.1** The escalator or	**805.10/905.9 Control and Operating Circuits** The design and installation of the control an	**6.6 REVERSE PHASE PROTECTION** Every escalator *(moving walk)*	—	**5.8.1**. The escalator shall be provided with interlocking devices that should cut off	—

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passenger conveyor shall stop automatically in case of: a) absence of control voltage; b) fault to earth of a circuit (according to 14.1.1.3); c) overload (according to 13.3.2); d) overload (according to 13.3.3);	operating circuits shall conform to the following requirements: (a) The failure of any single magnetically operated switch, contactor, or relay to release in the intended manner, or the failure of any solid state device to operate as intended, or the occurrence of a single accidental ground or combination of accidental grounds, shall not: (1) permit the escalator/ moving walk to start; (2) render ineffective any electrical protective device required by Rule 805.3/ 905.3 or the handrail-speed monitoring device required by Rule 805.4/ 905.4, or the missing step/ pallet device required by Rule 805.5/ 905.5. NOTE ((Rule 805.10(a)(2))/ ((Rule 905.9(a)(2)): Requirements only apply to the safety circuits in which the electrical protective devices are used. **805.12/905.11 Completion or Maintenance of Circuit** The completion or maintenance of an electric circuit shall not be used to stop the escalator when the emergency stop switch is opened or when any of the electrical protective devices operate. These requirements do not apply to dynamic braking or speed control switches (Rules 805.3b/905.3b, 805.3h/905.3g, and 805.4/905.4).	operated by a polyphase alternating current motor shall be provided with a device which will either prevent starting of the motor if there is a failure of any phase, or prevent continuation of running of the motor if the phase rotation is in the wrong direction. **7.2 CIRCUIT BREAKER OR MAIN SWITCH** Each escalator machine *(moving walk)* shall be provided with a single overcurrent circuit breaker or a main switch and fuse, which will simultaneously open or close all active conductors controlled by it. The circuit breaker may have a time-lag device, but shall not be provided with an undervoltage release.		electric motors to stop the stairway belt when - the handrail is broken, excessively stretched, or when it stops; - one or two sprockets of the tension carriage moves toward the tension device or back by more than 30 mm; - the nut of the emergency brake is unscrewed or its screw comes out (when the load-stop type is used); - the service brake(s) or the emergency brake(s) is (are) engaged; - the free travel of the armature of the electric magnet of the service brake is less than required by regulations; - a landing rises; - a stopping device is engaged anywhere in the aisle between escalators or behind balustrade panels, or when a stop switch is turned on; - a step rises or drops before landings; - the handrail comes off the guides on the lower curved section; - floor slabs are lifted or removed (for floor escalators). In this case a device shall be provided to start the escalator from the auxiliary drive for repairs; - power supply to an escalator in operation is switched off with the cut-off switch; - the driving chain is broken or is excessively stretched.	

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e) operation of the control devices at overspeed and unintentional reversal of the direction of travel (according to 12.5);	**805.3b Speed Governor.** A speed governor shall be provided, except as specified in Rule 805.3b(3). (1) The operation of the governor shall cause the interruption of power to the driving machine should the speed of the steps exceed a predetermined value, which shall be not more than 40% above the rated speed. All variable frequency drive motor controls require an overspeed governor. (2) The device shall be of the manually reset type. (3) The speed governor is not required where an alternating-current squirrel cage induction motor is used and the motor is directly connected to the driving machine. **NOTE** (Rule 805.3b): The governor may be omitted in such case even though a chain is used to connect the sprocket on the driving machine to the sprocket on the main drive shaft as permitted by Rule 804.1. **905.3b Speed Governor.** A speed governor shall be provided, except as specified in Rule 905.3b(3). (1) The operation of the governor shall cause the electric power to be removed from the driving machine motor and brake should the speed of the treadway exceed a predetermined value, which shall not be more than 40% above the rated speed. (2) The device shall be of the manually reset type.	**6.5 SPEED GOVERNOR** A speed governor shall be provided, the operation of which will cause the power to the driving machine and the brake to be interrupted, should the speed exceed the rated speed by more than 30%. However, a speed governor may be omitted if the slip of the alternating current cage rotor motor does not exceed 5% and the motor is directly connected to the driving machine. The governor may in this case be omitted, even though a chain is used to connect the driving machine to the main drive shaft. NOTE: Where a machine is connected to the main drive shaft by a chain, Clause 5.5.2 applies. **6.14 REVERSAL STOP DEVICE** Means shall be provided to cause the interruption of power to the escalator machine motor and brake in the event of accidental reversal of travel while the escalator is ascending.	—	—	—

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	(3) The speed governor is not required where an alternating-current, squirrel cage induction motor is used, and the motor is directly connected to the driving machine. **NOTE** (Rule 905.3b): The governor shall be permitted to be omitted in such case even though a chain is used to connect the sprocket on the driving machine to the sprocket on the main drive shaft as permitted by Rule 904.1. **805.3h/905.3g Reversal Stop Device.** Means shall be provided to cause the opening of the power circuit to the escalator driving-machine motor and brake in case of accidental reversal of travel while the escalator/ an inclined moving walk is operating in the ascending direction. The device shall be of the manually reset type.				
f) operation of the auxiliary brake (according to 12.6.4);	**805.3d/905.3d Broken Drive-Chain Device.** When the driving machine is connected to the main drive shaft by a chain, a device shall be provided which will cause the application of the brake on the main drive shaft and also stop the drive machine if the drive chain parts. The device shall be of the manually reset type.	**6.8 BROKEN DRIVE CHAIN DEVICE** Where the driving machine is connected to the main drive shaft by chains, a device of the manually reset type shall be provided which will disconnect the machine and the electromechanical brake from the supply if the chain breaks.	—	—	—
g) breakage or undue elongation of parts immediately driving the steps, pallets or the belt, e.g. chains or racks;	**805.3c Broken Step-Chain Device.** (1) A broken step-chain device shall be provided that will cause the interruption of power to the driving machine: (a) if a step chain breaks, and; (b) where no automatic chain	**6.7 BROKEN STEP CHAIN DEVICE** A broken step chain device of the manually reset type shall be provided, which will cause the interruption of power to the driving machine and brake if a stepchain breaks and, where no automatic chain tension device is	**MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the	—	**3.3.2 (1)** A device which, when the step chain is cut, automatically stops the rising of the steps. **3.3.2 (2)** A device which shuts off power and prevents reverse running when drive chain is cut, or a

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	tension device is provided, if excessive sag occurs in either step chain. (2) the device shall be of the manually reset type. **905.3c Broken Treadway Device.** A broken treadway device shall be provided that shall cause the electric power to be removed from the driving machine motor and brake if the connecting means between pallets or the belt breaks. The device shall be of the manually reset type.	provided, if excessive sag occurs in either stepchain. ***6.7 BROKEN TREADWAY DEVICE*** ***6.7.1 Belt type*** *A broken treadway device of the manually reset type shall be provided, which will cause interruption of power to the driving machine and brake if the treadway belt becomes unduly slack or breaks.* ***6.7.2 Pallet and belt-pallet type*** *A broken treadway device of the manually reset type shall be provided, which will cause interruption of the power to the driving machine and brake if the connecting means between pallets break or if undue slackness occurs in the treadway system).*	escalator is specified as follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not more than 15 degree) is less than 4mm) (a) The extraordinary extension of the step chains.		device which stops operation, and acts as a brake, when the car is ascending abnormally or runs backwards. However, such devices are not required in the case of a moving walk.
h) (unintended) reduction of the distance between the driving and return devices;	*The item in* ***EN 115 Clause 14.2.2.4.1 h*** *is not addressed by A17.1. It is unclear what is intended by this requirement.*	—	—	**5.8.1** The escalator shall be provided with interlocking devices that should cut off electric motors to stop the stairway belt.	—
i) foreign bodies being trapped at the point where the steps, pallets or the belt enter the comb (according to 8.3.2.6);	—	**6.13 COMBPLATE SWITCHES** A combplate switch shall be provided for the combplate at each end of escalators *(moving walks)* to cause interruption of power to the machine motor and brake. The escalator *(moving walks)* shall stop in the event of a	—	—	**3.3.2 (10)** A device which automatically stops the movement of the tread when an object is caught at a spot where the tread and the comb are engaged with each other.

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		force exceeding 1000 N being at any point along the combplate and in the direction of travel of the combplate. *(6.14 FLAT BELT ENTRY PROTECTION A flat belt entry protection switch shall be provided for the end-plate assembly and shall be arranged to stop the machine and belt if a foreign object is drawn into the gap between the belt and the guard, before the guard moves more than 5 mm.* *Any device dependent on a displacement force shall operate at not more than 200 N.)*			
j) stopping of a succeeding escalator or passenger conveyor where an intermediate exit does not exist (see 5.2.1);	**805.6/905.6 Tandem Operation.** Tandem operation escalators shall be electrically interlocked where traffic flow is such that bunching will occur if the escalator carrying passengers away from the intermediate landing stops. The electrical interlocks shall stop the escalator carrying passengers into the common intermediate landing if the escalator carrying passengers away from the landing stops. These escalators shall also be electrically interlocked to assure that they run in the same direction.	**SECTION 6 OPERATING AND SAFETY DEVICES** **6.1 GENERAL** Operating and safety devices shall be provided in accordance with the requirements of this Section. Such devices shall be readily accessible. NOTE: Where it is proposed to install escalators *(moving walks)* in series, egress from intermediate platforms should be provided or else special interlocking of each escalator *(moving walk)* control is required.	—	**5.8.1** The escalator shall be provided with interlocking devices that should cut off electric motors to stop the stairway belt.	—
k) operation of the handrail entry guard (see 7.5.3);	**805.3m/905.3j Handrail Entry Device.** A handrail entry device shall be provided at each newel. It shall operate in the handrail entry direction only, shall be of the manually reset type, and shall cause the escalator/moving walk to stop by removing power from the driving machine motor and	**6.12 HANDRAIL ENTRY DEVICES** The opening in the balustrade for entry of the handrail shall be provided with a protective device which will cause interruption of power to the escalator *(moving walk)* machine motor and brake should any part of a person's	**MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as	—	**3.3.2 (5)** A device which, when persons or objects are caught by the handrail inlet, automatically stops the rising of steps.

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	brake. It shall operate in either of twoways: (1) if an object becomes caught between the handrail and the handrail guard; or (2) if an object approaches the area between the handrail and handrail guard.	body or clothing be carried into this area by contact with the handrail.	follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not more than 15 degree) is less than 4mm). (e)The person or the articles are caught in the inlet of the handrail.		
l) any part of the step or pallet is sagging so that meshing of the combs is no longer ensured at the point at which the steps or pallets enter the landing (see 8.3.1). Switching off shall be operated at a sufficient distance before the comb intersection line to ensure that the step or pallet which has sagged does not reach the comb intersection line (see stopping distances defined in 12.4.4.2 and 12.4.4.4). The	**805.3k Step Level Device.** Step level devices shall be located at the top and bottom of the escalator. These devices shall detect downward displacement of $^{1}/_{8}$ in. (3.2 mm) or greater at the riser end at either side of the step. When activated, the device shall cause the escalator to stop prior to the step entering the combplate. Devices shall be of the manually reset type. **905.3i Pallet Level Device.**	**6.15 STEP *(PALLET)* SAG DEVICES** Step *(Pallet)* sag devices of the manually reset type shall be provided at the upper and lower ends of escalators *(moving walks),* which shall cause interruption of power to the machine motor and brake and cause the escalator *(moving walk)* to stop in the event of a step lowering more than 5 mm. The distance between the step *(pallet)* sag devices and the	—	—	—

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control device can be applied at any point of the steps or pallets. Paragraph l) does not apply for belt passenger conveyors (see 10.2.2);	Moving walks equipped with pallets with trail wheels shall be provided with pallet level devices located at the tope and bottom of the moving walk. These devices shall detect downward displacement of 1/8 in. (3.2 mm) or greater at the trailing edge of the pallet at either side of the pallet. When activated, the device shall cause the moving walk to stop prior to the pallet entering the combplate. Devices shall be of the manually reset type.	combs shall be not less than the stopping distance required by Clause 5.5.3.			
m) for public service escalators and public service passenger conveyors: operation of the device mentioned in 7.8 caused by a broken handrail	**805.4/905.4 Handrail-Speed Monitoring Device.** A handrail speed monitoring device shall be provided which will cause the immediate activation of the alarm required by Rule 805.3a(2)/905.3a(2), whenever the speed of either handrail deviates from the step/treadway speed by 15% or more. The device shall cause electric power to be removed from the driving machine motor and brake if the speed deviation of 15% or more is continuous for more than 2 sec. The device shall be of the manually reset type.	**6.17 HANDRAIL SPEED MONITORING DEVICE** A handrail speed-monitoring device shall be provided and shall stop the escalator in the event of a broken handrail or a handrail, which has stopped for more than 15 s while the escalator is in motion.	—	—	—
(n)			**JEAS-406G (Draft)** **2. Description** 2.3 If both or either of the handrails stop during operation, a detection device shall be provided to automatically stop the escalator immediately. Although this device is provided to detect the halt of the handrail, such a device that detects extraordinarily low speed	—	—

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			conditions of the handrail is also acceptable.		
(o)	**805.3f Skirt Obstruction Device.** Means shall be provided to cause the electric power to be removed from the escalator driving machine motor and brake, if an object becomes caught between the step and the skirt as the step approaches the upper or lower comb-plate. The device shall be located so that the escalator will stop before that object reaches the comb-plate with any load up to full brake rated load with escalator running (Rules 802.9c(1)(b) and 802.9c(2)(b).	**6.16 SKIRT PRESSURE SWITCHES** Means shall be provided to cause interruption of power to the machine motor and the brake should an object become wedged between any step and any skirt panel as the step approaches the upper and lower combplates. The activation force shall not exceed 1500 N when applied at right angles to the skirt over an area of 2500 mm^2.	**JEAS-406G (Draft)** **2. Description** **2.1** Switches shall be located at the skirt-guards near the landings and shall have functions to stop the escalator if an article is tightly caught between the side of the step and the skirt-guard. **MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in	—	**4.3.2 (12)** The skirt guard switch shall be in satisfactory operating condition, except in the case of horizontal moving walk.

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			the direction of movement of the higher level step is not more than 15 degree) is less than 4mm) (d)The person or the articles are caught between a side of the step and the skirt guard panels near the riding entrance and leaving exit.		
(p)	**805.3g/905.3f Rolling Shutter Device.** Rolling shutters, if used, shall be provided with a device which will be activated as the shutters begin to close to cause the opening of the power circuit to the escalator/moving walk driving machine –motor and brake.	**6.10 INTERLOCKING OF EXIT DOORS** Any shutters and any doors shall not be installed over and shall not be able to close off the steps *(treadway)* of the immediate exit area of an escalator *(moving walk)* (see Clause 2.1.1), unless they are electrically interlocked in a control circuit to prevent the escalator *(moving walk)* from operating, except when the shutter or door is fully open.	**MOC-N (No.1424-2000)** Based on the stipulation of the Art.129-12 item 5 of the Building Standard Law Enforcement Order (1950-Cabinet Order No.338), construction method of breaking devices for the escalator is specified as follows. **1.** The construction method of the braking devices for the escalator shall be conform to each paragraph describe in below. (1) It shall be that the braking devices are used for the escalators conforming to the standard described in Art.129-12 paragraphs 3 to 5 of the Building Standard Law Enforcement Order (2) It shall be that the escalators are provided with devices to detect the situations described following (a) to (e). (except (d) for the escalator of which inclination is less than 15 degree and a difference in level between each adjacent steps (except the difference in level that the angle at the nose in the direction of movement of the higher level step is not	—	**3.3.2 (2)** A device which automatically stops the rising of steps when the fire protective shutter installed in the vicinity of the landing begins to close.

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			more than 15 degree) is less than 4mm) (c) The door covering the opening surrounding the escalator is closing. **JEAS-A407** **2. Description** **2.1 Escalator required for interlocking suspension (Refer to Fig. 1.)** If a shutter facing with a landing of the escalator is located within 2 m from the turning end of the handrails, the escalator is required to suspend operation interlocking with the shutter which starts closing. Furthermore, if the other shutters including the above shutter form an area and start closing at the same time, the escalator may be interlocked with any one of them. **2.2 Contacts for interlocking (Refer to Fig. 2 and Fig. 3.)** A contact for interlocking to be provided at the shutter shall be „b“ contact (contact to be opened before the closing shutter comes down to a height of 1. 8 m above floor level) of DC 125V 0.2A (AC 250V 1A) in rating and number of contacts shall be same as number of escalators necessary to be interlocked. **2.3 Piping and wiring (Refer to Fig. 2 and Fig. 3.)** Lead-in piping and wiring from a contact for interlocking with the shutter to the escalator machine room shall not be		

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			passed through inside of the escalator truss but shall be separately installed for every escalator necessary to be interlocked. **3. Related matters** The shutter facing the landing of the escalator shall be located 1.2 m or more from the turning end of the handrails.		
(q)	**805.3i Step Upthrust Device.** Means shall be provided to cause the opening of the power circuit to the escalator driving-machine motor and brake, should a step be displaced against the upthrust track at the lower curve in the passenger-carrying line of the track system.	—	—	—	—
(r)	**805.3n/905.3k Comb-Step/Pallet Impact Devices.** Devices shall be provided which will cause the opening of the power circuit to the escalator/moving walk driving machine motor and brake if either: (1) A horizontal force in the direction of travel is applied exceeding 112 lbf (500 N) at either side, or exceeding 225 lbf (1000 N) at the center of the front edge of the combplate; or (2) A resultant vertical force in upward direction is applied exceeding 150 lbf (668 N) at the center of the front of the combplate. These devices shall be of the manual reset type.	—	—	—	—
(s)	**805.3p Step Lateral**	*6.16 BELT TRACKING*	—	—	—

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