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Commission Tests Report

Product Name:	Escalators
Product Type:	FT002
Applicant:	Sail Intelligent Elevator (Suzhou) Co., Ltd. .
Manufacturer:	Sail Intelligent Elevator (Suzhou) Co., Ltd. .
Test category:	Commission Test
Test date:	2018-07-20

Shanghai Jiao Tong University
Elevator Test Center

SJTUETC

Commission Test Report

No: 2018-W327

Classification	Escalators and moving walks	Equipment type	Escalators
Product name	Escalators	Product model	FT002
Product number	SA20170902	Date of manufacturing	2018-05-02
Applicant	Sail Intelligent Elevator (Suzhou) Co., Ltd.		
Registered address of applicant	No.999, Badu Lingang Development Zone(Fenglin Bay), Zhenze Town, Wujiang District, Suzhou City, Jiangsu Province, China		
Manufacturer	Sail Intelligent Elevator (Suzhou) Co., Ltd.		
Registered address of manufacturer	No.999, Badu Lingang Development Zone(Fenglin Bay), Zhenze Town, Wujiang District, Suzhou City, Jiangsu Province, China		
Location of test	In the manufacturing factory		
Status of sample	OK	Test date	2018-07-20
Test standard	EN 115-1:2017		
Test conclusion	The elevator meet the requirements.		

Experimenter: Date: 2018.10.24

Verifier: Date: 2018.10.24

Approver: Date: 2018.10.24

Approved Certificate serial number:

TS7610022-2021

Shanghai Jiao Tong University Elevator Test Center

Date of issue: 2018.10.24

I.Configuration and technical parameters of prototype (sample)

Sample Design Specifications

<table>
<tr><td colspan="3">Nominal speed</td><td colspan="2">0.5m/s</td><td>Rise</td><td>10.0m</td></tr>
<tr><td colspan="3">Main structure type</td><td colspan="2">/</td><td>Angle of Inclination</td><td>30°</td></tr>
<tr><td colspan="3">Usage sector length</td><td colspan="2">/m</td><td>Work type</td><td>Public</td></tr>
<tr><td colspan="3">Environment</td><td colspan="2">Outdoor</td><td>Step band drive mode</td><td>Chain drive</td></tr>
<tr><td colspan="3">Tread surface type</td><td colspan="2">/</td><td>Special function</td><td>/</td></tr>
<tr><td rowspan="7">Drive Main traction machine</td><td colspan="2">Name</td><td>ET160</td><td>Structure type, quantity and Arrangement</td><td>Above, Inside truss</td></tr>
<tr><td colspan="2">Reducer Type</td><td>Worm and gear</td><td>Speed reducing ratio</td><td>49：2</td></tr>
<tr><td colspan="2">Motor Name</td><td>YFD132L-6</td><td>Rated power</td><td>11×2kW</td></tr>
<tr><td colspan="2">Rated Voltage</td><td>AC380V</td><td>Rated current</td><td>25×2 A</td></tr>
<tr><td colspan="2">Rated Speed</td><td>955 r/min</td><td>Insulation class</td><td>F</td></tr>
<tr><td rowspan="3">Name of Manufacturer</td><td>Main traction machine</td><td colspan="3">Ningbo Xinda Elevator Parts Factory</td></tr>
<tr><td>Speed reducer</td><td colspan="3">Ningbo Xinda Elevator Parts Factory</td></tr>
<tr><td>Motor</td><td colspan="3">Ningbo Xinda Elevator Parts Factory</td></tr>
<tr><td rowspan="2">Additional brake</td><td colspan="2">Model</td><td>HXZD-800B/2.5-T2</td><td>Structure type and quantity</td><td>Two sets, brake arm drum brakes</td></tr>
<tr><td colspan="2">Name of Manufacturer</td><td colspan="3">Tianjin Xiqing Huaxing Motor Manufacture Co., Ltd</td></tr>
<tr><td rowspan="4">Control system</td><td colspan="2">Start mode</td><td>Start manually, then start automatically</td><td>Energy-saving operation mode</td><td>Standby low speed operation or stop</td></tr>
<tr><td colspan="2">Model of controller cabinet</td><td>SAL-VF</td><td>Name of Manufacturer</td><td>Sail Intelligent Elevator (Suzhou) Co., Ltd.</td></tr>
<tr><td colspan="2">Governor model</td><td>ME280-4030</td><td>Name of Manufacturer</td><td>Suzhou Inovance Technology Co., Ltd.</td></tr>
<tr><td colspan="2">Model of controller</td><td>H1U-1208MR-XP</td><td>Name of Manufacturer</td><td>Suzhou Inovance Technology Co., Ltd.</td></tr>
<tr><td rowspan="2">Safety device for electric</td><td colspan="2">Safety circuit model</td><td>SX-B</td><td>Function</td><td>Fault collection and display</td></tr>
<tr><td colspan="2">Name of Manufacturer</td><td colspan="3">Wujiang Yutao Electrical and Mechanical Co., Ltd.</td></tr>
</table>

s	Model of programmable electronic safety-related systems (Note: J-2)	MCTC-PES-E1	Function	Overspeed, inverted operation, additional brake action, missing steps, floor panel opening, handrail speed deviation
	SIL rating	SIL2	Name of Manufacturer	Suzhou Inovance Technology Co., Ltd.
Trass	Material model	Q235	Main chord type	Angle steel 125×80×12 (mm)
	Name of Manufacturer	Suzhou Hengsifeng Hardware Machinery Co., Ltd.	Support distance	11.72+11.76 (mm)
Drive chain	Model and specifications	16A-2	Design tensile strength	≥111.2kN
	Name of Manufacturer	Zhejiang Shenlong Chain Transmission Co., Ltd.		
Steps(pallets, belt)	Model and specifications	TL133H-1	Design tensile strength	≥225kN
	Name of Manufacturer	Suzhou Runli Escalator Complete Sets Co., Ltd.		
Handrail	Model and specifications	SDS	Design tensile strength	≥25.0kN
	Name of Manufacturer	Wujiang Kanglong Rubber & Plastic Products Co., Ltd.		
Steps(pallets, belt)	Width	1002mm	Name of materials	YL102
	Type	Integral	Anti-slip grade	unconfirmed
	Name of Manufacturer	Nantong Jiangzhong Photoelectricity Co., Ltd.		
Roller	Model and specifications of main roller	Φ80×25-6204	Name of Manufacturer	Suzhou Tongda Escalator Parts Factory
	Model and specifications of auxiliary roller	Φ80×25-6204	Name of Manufacturer	Suzhou Tongda Escalator Parts Factory
Skirt guard panel	Surface material	Common material	Surface treatment	Not determined
	Manufacturer	Zhangjiagang Tianlida Electromechanical Co., Ltd.		
Comb Supporting plate	Surface material	Stainless steel	Anti-slip grade	R11
	Name of Manufacturer	Wujiang Chuangjie Machinery Co., Ltd.		
Floor plate	Surface material	Stainless steel	Anti-slip grade	R11
	Name of Manufacturer	Wujiang Chuangjie Machinery Co., Ltd.		

II. Inspection and test of the prototype (sample)

No.	Item No.	Test item	Test result	Conclusion
1	5.11.1.2	5.11.1.2 Limits of application 5.11.1.2.3 The electromagnetic compatibility shall comply with the requirements of EN12015:2014 and EN12016:2013.	Not applicable	/
2	5.11.1.3	5.11.1.3 Protection against direct contact For protection against direct contact the requirements of EN 60204-1:2006, 6.2 shall apply.	Pass	OK
3	5.11.1.4	5.11.1.4 Insulation resistance tests For resistance of the insulation between conductors and between conductors and the earth, EN 60204-1:2006, 18.3 shall apply.	Insulation resistance ⩾ 100MΩ	OK
4	5.11.1.5	5.11.1.5 Voltage limit for control and safety circuits For control and safety circuits, the 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.	AC110V	OK
5	5.11.1.6	5.11.1.6 Conductor for neutral and earth-continuity Conductor for neutral and earth-continuity shall be in accordance with EN 60204-1:2006, Clause 8.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
6	5.11.2.1	5.11.2.1 Contactors and relay contactors 5.11.2.1.1 To stop the driving machine (see 5.12.3.5) the main contactors shall belong to the following categories as defined in EN 60947-4-1:2010. a) AC-3 for contactors of alternating current motors; b) DC-3 for contactors of direct current machines. 5.11.2.1.2 Relay contactors (see 5.12.3.5) shall belong to the following categories as defined in EN 60947-5-1: a) AC-15 for contactors in alternating current control circuits; b) DC-13 for contactors in direct current control circuits 5.11.2.1.3 For the main contactors (see 5.11.2.1.1), it is permissible to assume, in the measures taken to comply with 5.12.1.2.2, that: - if one of the main contacts (normally open) is closed, all the normally closed mirror contacts (EN 60947-4-1, Annex F) are open; 5.11.2.1.4 For the relay contactors (see 5.11.2.1.2) and safety relays (see EN 50205), i.e. relays with forcibly guided (mechanically linked) contacts, it is permissible to assume, in the measures taken to comply with 5.12.1.2.2, that: a) if one of the normally closed contacts is closed, all the normally open contacts are open (EN 60947-5-1); b) if one of the normally open contacts is closed, all the normally closed contacts are open (EN 60947-5-1). Note : Auxiliary contacts used as separate block added to a main contactor or relay contactor are permitted only when fulfilling the requirements of EN 60947–5-1.	Pass	OK
7	5.11.2.2	5.11.2.2 Components of failsafe circuits 5.11.2.2.1 When devices according to 5.11.2.1.2 are used as relays in a failsafe circuit, the assumptions of 5.11.2.1.3 also apply. 5.11.2.2.2 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 partial attraction of the armature is permitted to be	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		disregarded (see 5.12.1.2.2 f). 5.11.2.2.3 Devices connected after safety devices shall meet the requirements of 5.12.2.6.1.3 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 5.11.2.1.		
8	5.11.3	5.11.3 Main switches 5.11.3.1 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, to 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 inspection and maintenance (see 5.8.3). 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. 5.11.3.2 The main switches as defined in 5.11.3.1 shall be capable of being locked or otherwise secured in the "isolated" position, with the use of a padlock or equivalent, to ensure no inadvertent operation by others (see EN 60204-1:2006, 5.3.3). The control mechanism of the main switch shall be easily and rapidly accessible after opening of the doors or trap doors. 5.11.3.3 Main switches shall be capable of interrupting the highest current involved in normal operating conditions of the escalator or moving walk. They shall comply with the requirements of EN 60204-1:2006, Clause 5. 5.11.3.4 Where the main switches of several escalators or moving walks are positioned together it shall be possible to easily identify to which escalator or moving walk they refer.	Pass	OK
9*	5.11.4.1	5.11.4.1 Conductors and cables Conductors and cables shall be selected according to	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		EN 60204-1:2006, Clause 12.		
10*	5.11.4.2	5.11.4.2 Cross-sectional area of conductors To ensure adequate mechanical strength the cross-sectional area of conductors shall not be less than as shown in EN 60204-1:2006, Table 5.	0.75mm^2	OK
11*	5.11.4.3	5.11.4.3 Wiring practices 5.11.4.3.1 The general requirements of EN 60204-1:2006, 13.1.1, 13.1.2 and 13.1.3, apply. 5.11.4.3.2 Conductors and cables shall be installed in conduits or trunkings or equivalent mechanical protection. Double insulated conductors and cables can be installed without conduits or trunkings if they are located as to avoid accidental damage, e.g. by moving parts. 5.11.4.3.3 The requirement 5.11.4.3.2 needs not apply to: a) conductors or cables not connected to safety devices provided that: 1) they are not subject to a rated output of more than 100 VA, and; 2) they are part of SELV or PELV circuits; b) The wiring of operating or distribution devices in cabinets or on panels between: 1) different pieces of electric equipment, or 2) these pieces of equipment and the connection terminals. 5.11.4.3.4 If connections, connection terminals and connectors are not located in protective enclosure, their IP2X (EN 60529:1991) protection shall be maintained when connected and disconnected and they shall be properly fixed to prevent unintended disconnection. 5.11.4.3.5 If, after opening of the main switch or switches of an escalator/moving walk, some connection terminals remain live and if the voltage exceeds 25 VAC or 60 VDC, a permanent warning label according to EN 60204-1:2006, Clause 16, shall be appropriately placed in proximity to the main switch or switches and a corresponding statement shall be included in the maintenance	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		manual. Furthermore, for circuits connected to such live terminals, the requirements of labelling, separation or identification by colour shall be fulfilled as given in EN 60204-1:2006, 5.3.5. 5.11.4.3.6 Connection terminals whose accidental interconnection could lead to a dangerous malfunction of the escalator/moving walk shall be clearly separated unless their method of construction obviates this risk. 5.11.4.3.7 In order to ensure continuity of mechanical protection, the protective sheathing of conductors and cables shall fully enter the casings of switches and appliances, or shall terminate in a suitably constructed gland. However, if there is a risk of mechanical damage due to movement of parts or sharp edges of the frame itself, the conductors connected to the safety device shall be protected mechanically.		
12*	5.11.4.4	5.11.4.4 Connectors Plug socket combinations shall comply with the requirements of EN 60204-1:2006, 13.4.5 except c), d) and i). Connectors and devices of the plug-in type placed in the circuits of electrical safety devices shall be so	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		designed that it shall not be possible to insert them in a position which leads to a dangerous situation.		
13	5.12.1.2	5.12.1.2 Protection against electric faults 5.12.1.2.1 Any single fault listed in 5.12.1.2.2 in the electric equipment of an escalator or moving walk, if it cannot be excluded under conditions described in 5.12.1.2.3 and/or Annex B, shall not, on its own, be the cause of a dangerous situation of the escalator or moving walk. 5.12.1.2.2 The following faults shall be 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 electric component such as resistor, capacitor, transistor, lamp; f) non-attraction or incomplete attraction of the moving armature of a contactor or relay; g) non-separation of the moving armature of a contactor or relay; h) non-opening of a contact; i) non-closing of a contact; j) phase reversal. 5.12.1.2.3 The non-opening of a contact need not be considered in the case of safety switches conforming to 5.12.2.6.1.	Pass	OK
14	5.12.1.3	5.12.1.3 Protection of motors 5.12.1.3.1 Motors directly connected to the mains shall be protected against short-circuiting. 5.12.1.3.2 Motors directly connected to the mains shall be protected against overload by means of automatic circuit breakers with manual reset which shall cut off the supply to the motor in all live conductors (see EN 60947-4-1:20109).	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		5.12.1.3.3 When the detection of overload operates on the basis of temperature increase in the windings of the motor, the protection device is permitted to close its contact automatically after sufficient cooling down has taken place. However, it shall only be possible to restart the escalator or moving walk under the conditions of 5.12.3.2. 5.12.1.3.4 The provisions of 5.12.1.3.2 and 5.12.1.3.3 apply to each winding if the motor has windings supplied by different circuits. 5.12.1.3.5 When the escalator or moving walk driving motors are supplied by DC generators driven by motors, the generator driving motors shall also be protected against overload.		
15	5.12.1.4	5.12.1.4 Protection of safety devices The fault to earth of a circuit in which there is a safety device shall cause the immediate stopping of the driving machine.	Pass	OK
16	5.12.1.5	5.12.1.5 Protection against electrostatic loading Means to discharge electrostatic loading shall be provided (e.g. anti-static-brushes).	Pass	OK
17*	5.12.2.2	5.12.2.2 Function of safety devices The safety devices listed in Table 8 shall initiate a stop and prevent restarting according to 5.12.3.9. They shall consist of: a) either one or more safety switches satisfying 5.12.2.6.1, and/or b) failsafe circuits satisfying 5.12.2.6.2 considering failure exclusion of electronic components according to Annex B, and/or c) safety related electrical, electronic and programmable electronic devices (E/E/PE) in accordance with 5.12.2.6.3.	Pass	OK
18	5.12.2.3	5.12.2.3 Monitoring of safety devices No electric equipment shall be connected in parallel with a safety device with the exception of: a) safety devices in case of inspection control (5.12.3.13); b) connections to different points of the safety circuit for information about the status of safety devices; the devices used for that purpose shall fulfil	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		the requirements of Annex B.		
19	5.12.2.4	5.12.2.4 Power supply for safety devices 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 safety devices due to the effects of switching. In particular, voltage peaks arising from the operation of the escalator or moving walk or other equipment on the network shall not create inadmissible disturbances in electronic components (noise, immunity) in compliance with EN 12015:2014 and EN 12016:2013.	Pass	OK
20	5.12.2.5	5.12.2.5 Actuation of safety devices The components actuating the safety devices shall be selected and assembled so that they are able to function properly even under the mechanical stresses resulting from its continuous operation. Fixing elements for safety devices shall ensure the operation of the function by mechanical or geometric arrangements. In the case of redundancy type failsafe circuit, it shall be ensured by mechanical or geometric arrangements of the detecting elements that a mechanical fault cannot cause unnoticed loss of redundancy. Detecting elements of failsafe circuits shall fulfill the requirements of D.4.2 and D.4.3 if its malfunction is not detected.	Pass	OK
21	5.12.2.6.1	5.12.2.6.1 Safety switches 5.12.2.6.1.1 The operation of a safety switch shall be by positive mechanical separation of the contacts. This positive mechanical separation shall even occur if the contacts are welded together. Positive mechanical separation is achieved, when all contacts 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	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		short-circuit resulting from a faulty component. 5.12.2.6.1.2 The safety switch 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 switches shall belong to the following categories as defined in EN 60947-5-1:200411),: 11) This standard is currently impacted by the amendment EN 60947-5-1:2004/A1:2009. a) AC-15 for safety switches in alternating current circuits; b) DC-13 for safety switches in direct current circuits. 5.12.2.6.1.3 If the protective enclosure is not at least of type IP 4X the air gaps shall be at least 3 mm and creep distances at least 4 mm. After separation the distance for contacts shall be at least 4 mm. 5.12.2.6.1.4 In the case of multiple breaks, the individual distances for breaking contacts shall be at least 2 mm after separation. 5.12.2.6.1.5 Debris from the conductive material shall not lead to short-circuiting of contacts.		
22	5.12.2.6.2	5.12.2.6.2 Failsafe circuits 5.12.2.6.2.1 Anyone of the faults envisaged in 5.12.1.2 shall not be on its own the cause of a dangerous situation. 5.12.2.6.2.2 Furthermore, the following conditions apply for the faults envisaged in 5.12.1.2.2: If one fault combined with a second fault can lead to a dangerous situation, the escalator or moving walk 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 moving walk has been stopped by the sequence mentioned, is not considered. If the malfunction of the component which has	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		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 moving walk is restarted according to 5.12.3.2. The MTBF (mean time between failures) of the failsafe 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 moving walk is restarted according to 5.12.3.2 at least once and, thus, is subject to a change of state. 5.12.2.6.2.3 If two faults combined with a third fault can lead to a dangerous situation, the escalator or moving walk 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 moving walk 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 moving walk is restarted according to 5.12.3.2.		

No.	Item No.	Test item	Test result	Conclusion
		The MTBF (mean time between failures) of the failsafe 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 moving walk is restarted according to 5.12.3.2 at least once and, thus, is subject to a change of state. 5.12.2.6.2.4 A combination of more than three faults can be disregarded if: a) the failsafe circuit is built up of at least two channels, and their equal status is monitored by a control circuit. The control circuit shall be checked prior to a restart of the escalator or moving walk according to 5.12.3.2 (see also Annex C), or b) the failsafe circuit is built-up of at least three channels, and 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 5.12.2.6.2.3. For the implementation 5.11.2.2 shall be applied. 5.12.2.6.2.5 Drafting and assessing failsafe circuits shall be as shown in Figure C.1. 5.12.2.6.3 Safety related electrical, electronic and programmable electronic devices (E/E/PE) Safety related electrical, electronic and programmable electronic devices (E/E/PE) shall be designed in accordance with the requirements of EN 62061:200512), If a E/E/PE and a non-safety related system share the same hardware, the requirements for E/E/PE shall be met.		
23	5.12.2.7.2	5.12.2.7.2 Detection of excessive speed A device shall be provided to detect excessive speed before the speed exceeds a value of 1.2 times the nominal speed. It is permissible to disregard this requirement if the design prevents excessive speed.	Pass	OK
24	5.12.2.7.3	5.12.2.7.3 Detection of unintentional reversal of the direction of travel A device shall be provided for escalators and	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		inclined ($\alpha \geq 6°$) moving walks to detect immediately the unintentional reversal of direction of travel.		
25	5.12.2.7.4	5.12.2.7.4 Detection of non-lifting of the auxiliary brake A device shall be provided to detect the non-lifting of the auxiliary brake after starting the escalator/moving walk (see 5.4.2.2).	Pass	OK
26	5.12.2.7.5	5.12.2.7.5 Detection of breakage or undue elongation of parts immediately driving the steps,pallets or the belt A device shall be provided to detect the breakage or undue elongation of parts immediately driving the steps, pallets or the belt, e.g. chains or racks.	Pass	OK
27	5.12.2.7.6	5.12.2.7.6 Detection of movement of tensioning device A device shall be provided to detect an unintended extension or reduction of the distance between the driving and tensioning devices of more than 20 mm (see 5.4.3.3 and 5.4.4.2).	Pass	OK
28	5.12.2.7.7	5.12.2.7.7 Detection of entrapment at comb A device shall be provided to detect objects being trapped which are not dealt with by the means described in 5.7.3.2.5.	Pass	OK
29	5.12.2.7.8	5.12.2.7.8 Detection of the stopping of a succeeding escalator or moving walk or detection of structural measures blocking the exit of the escalator or moving walk Stopping of a succeeding escalator or moving walk where an intermediate exit does not exist (see A.2.6) or the exit of the escalator or moving walk by structural measures is blocked (e.g. shutters, fire protection gates). See A.2.5 for additional stop device for emergency situation and definition of the exit area.	Not applicable	/
30	5.12.2.7.9	5.12.2.7.9 Detection of entrapment at hand rail entry A device shall be provided to detect foreign bodies being trapped in the handrail entry (see 5.6.4.3).	Pass	OK
31	5.12.2.7.10	5.12.2.7.10 Detection of sagging step or pallet If any part of the step or pallet is sagging so that meshing of the combs is no longer ensured a safety	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		device shall be provided. This safety device shall be arranged before each transition curve 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 5.4.2.1.3.2 and 5.4.2.1.3.4). The safety device may be applied at any point of the step or pallet (see 5.7.2.5). This does not apply to belt moving walks.		
32	5.12.2.7.11	5.12.2.7.11 Detection of missing step or pallet A missing step/pallet shall be detected and the escalator/moving walk stopped before the gap (resulting from the missing step/pallet) emerges from the comb. This shall be ensured by a safety device or function provided at each driving and return station in the return run of the steps/pallets. The installation of the detection means for this device is not permitted in the straight part between the transition curves as this is not part of driving or return station.	Pass	OK
33	5.12.2.7.12	5.12.2.7.12 Detection of non-lifting of the operational brake A device shall be provided to detect the non-lifting of the operational brake after starting the escalator/moving walk (see 5.4.2.1).	Pass	OK
34	5.12.2.7.13	5.12.2.7.13 Detection of speed deviation of the hand rail A handrail speed monitoring device shall be provided and shall initiate the stopping of the escalator or moving walk in the event of a hand rail speed deviation of more than + 15 %/-15 % to the step/pallet speed within a time frame of 5 s to 15 s (see 5.6.1). It is permissible to disregard the requirement of + 15 % if the design prevents this situation condition.	Pass	OK
35	5.12.2.7.14	5.12.2.7.14 Detection of opened inspection cover A device shall be provided to detect opened inspection cover (see 5.2.4).	Pass	OK
36	5.12.2.7.15	5.12.2.7.15 Detection of the actuation of the stop device for emergency situations A device shall be provided to detect the actuation of a stop device for emergency	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
37	5.12.2.7.16	5.12.2.7.16 Detection of installed hand winding device A device shall be provided to detect the installation of a removable hand winding device (see 5.4.1.4).	Pass	OK
38	5.12.2.7.17	5.12.2.7.17 Detection of the maintenance and repair stop device There shall be a stop device in the driving and return station. Escalators and moving walks with the driving unit arranged between the user side of the step, pallet or belt and the return line, or outside the return stations, shall have additional stop devices in the area of the driving unit. The stop devices shall be functionally in accordance with EN ISO 13850:2015. The position of the actuator of the stop device shall be marked clearly and permanently or the status of the safety contact shall be displayed clearly on the safety device. SPECIFIC CASE: A stop device need not be provided in a machinery space if a main switch according to 5.11.3 is located therein.	Not applicable	/
39	5.12.2.7.18	5.12.2.7.18 Detection of the actuation of the stop device on the inspection control device A device shall be provided to detect the actuation of the stop device on the inspection control device. The stop device shall: a) be operated manually; b) have the switching positions marked clearly and permanently;	Pass	OK
40*	5.12.2.7.19	5.12.2.7.19 Detection of the absence/presence of a removable barrier intended to prevent access of shopping trolleys and baggage carts If the escalator/moving walk is required to operate in both directions and has facility for removable barriers in unrestricted area the absence/presence of these barriers shall be detected to prevent wrong positioning of the barrier resulting in operation towards the barrier (see also A.4). A device shall be provided to detect the removal of the barrier when the escalator/moving walk is running and the absence/presence of a removable barrier intended to prevent access of shopping	Not applicable	/

No.	Item No.	Test item	Test result	Conclusion
		trolleys and baggage carts and shall permit starting away from the inserted barrier. See A.2.5 for additional stop device for emergency situation and definition of the exit area.		
41*	5.12.2.8	5.12.2.8 Function of failure lock When a failure is locked, starting shall be prevented for the electric control devices and functions mentioned in Table 8 and Table 9. NOTE: Failure lock prevents from starting. Manual reset releases the failure lock. Safety devices (see Table 8 and Table 9), protective devices (see Table 6) and control devices (see Table 10) shall be provided with a failure lock where mentioned. Making available according Table 10, item A, shall be possible only after manual reset of the failure lock. It is not permitted to carry out a manual reset of the failure lock remotely. The manual reset of the failure lock shall be performed only by an authorized person. Before manual reset of the failure lock, the root cause for stopping shall be investigated, the stopping device shall be checked and corrective action shall be taken if necessary. The failure lock shall remain active in case of: a) even another following event of Table 6, Table 8 or Table 9 occurs; b) the reinstatement of the power supply or c) the change to or the return from inspection control. In inspection control it is permissible to enable/disable the safety devices according Table 8 and Table 9.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
42	5.12.3.2	5.12.3.2 Making available for use and starting – manually operated Making available for use and starting of the escalator/moving walk shall only be possible without users and be effected by one or more switches available to authorized persons only (e.g. key-operated switches, switches with detachable lever, switches under lockable protective caps, remote start devices) and be reachable from an area outside the comb intersection line. Such switches shall not function concurrently as main switches described in 5.11.3. The person who operates the switch shall be able to verify the step/pallet band is free of users and objects by visual or other means before making this operation. The direction of travel shall be distinctly recognizable from the indication on the switch. The starting switch(es) shall be located within reach of the stop device according to 5.12.3.8. For remote starting devices the requirements above shall apply. NOTE See 7.4.1 d) for manual starting; 5.12.3.3.2 On escalators/moving walks which start automatically by the entering of a user, the direction of travel shall be predetermined, clearly visible to the user and marked distinctly on the escalator/moving walk (see 7.2.2). In such cases where escalators or moving walks which start automatically by the entering 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 5.12.3.3.1. The moving time shall be not less than 10 s. 5.12.3.3.3 Following control requirements for users waiting on any of the landings apply ——for the moving step/pallet band; or —— in case the step/pallet band is stopped according to 5.12.3.7; 5.12.3.3.3.1 Requirement where the step/pallet band is moving	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		Means shall be provided to detect any user on the landing. It shall provide a signal to the control system to keep the escalator/moving walk moving until the last user has left the landing or entered the moving step/pallet band. For stopping the requirements of 5.12.3.7 apply. 5.12.3.3.3.2 Requirements where the step/pallet band is stopped according to 5.12.3.7: When a user is about to enter the step/pallet band, detecting means shall be provided not more than 0,3 m before the comb intersection line providing control signal to the control system causing a) the termination of the automatic operation (5.12.3.3) and making the escalator/moving walk unavailable. Starting shall only apply according to 5.12.3.2;		
		or b) the reactivation for automatic start according to 5.12.3.12; or c) to initiate the start of the step band/pallet band with an acceleration of not more than 0,3 m/s2		
43	5.12.3.4	**5.12.3.4 Automatic operation - Starting in 2-Direction-Mode** 5.12.3.4.1 Automatic operation shall only be possible after 5.12.3.2 applied. Escalators which start automatically by detecting the entering of a user shall move with at least 0,2 times the nominal speed when the user reaches the comb intersection line and then accelerate less than 0,5 m/s2. The means for detecting the entering of a user shall take into account an average walking speed for a walking person of 1 m/s. Constructional measures may be necessary to prevent circumvention of the detecting means. For the implementation of starting automatically (5.12.1.2 applies), the consequence of failures of the detection means actuating the automatic start at the entries (e.g. no or partly no detection of users) shall be prevented.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		2-Direction-Mode is not permitted on moving walks. NOTE 1 The intention of above requirements is to detect a user is entering the landings. Depending on the location of the detecting means the area to be regarded for detection may extend the landings (e.g. provision of traffic columns) or is smaller than the landings. NOTE 2 For escalators a traffic flow analysis has to be undertaken by the owner to establish this functionality can accommodate passenger volumes in both directions. 5.12.3.4.2 On escalators which can start automatically in either direction (2-Direction-Mode) by the entering of a user, the operating mode shall be clearly visible to the user and marked distinctly on the escalator (see also 7.2.2). They shall start in the direction determined by the user entering first. When the escalator was started by a user from either direction, the indicator opposite from the initiated starting side		

No.	Item No.	Test item	Test result	Conclusion
		shall automatically indicate "no entry" (see 7.2.1.2.3). 5.12.3.4.3 Following control requirements for users waiting on any of the landings apply: ——for the moving step/pallet band; or —— in case the step/pallet band is stopped according to 5.12.3.7. 5.12.3.4.3.1 Requirement where the step/pallet band is moving Means shall be provided to detect any user on the landing. It shall provide a signal to the control system to keep the escalator/moving walk moving until the last user has left the landing or entered the moving step/pallet band. For stopping the requirements of 5.12.3.7 apply. 5.12.3.4.3.2 Requirements where the step/pallet band is stopped according to 5.12.3.7: When a user is about to enter the step/pallet band, detecting means shall be provided not more than 0,3 m before the comb intersection line providing control signal to the control system causing a) the termination of the automatic operation (5.12.3.3) and making the escalator/moving walk unavailable. Starting shall only apply according to 5.12.3.2;or b) the reactivation for automatic start according to 5.12.3.12; or c) the start of the step/pallet band with an acceleration of not more than 0,3 m/ s2.		
44	5.12.3.5	5.12.3.5 Stopping the escalator or moving walk 5.12.3.5.1 General Stopping is regarded as the initiation of a braking sequence caused by protective, safety and control devices and functions. The stopping shall operate automatically: a) in the event of loss of the voltage supply; b) in the event of loss of the voltage supply to the control circuits. NOTE The interruption of a safety circuit is not considered as loss of voltage supply. The supply to the motor(s) shall be interrupted by at	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		least two independent contactors, the contacts of which shall be in series in the supply circuit of the motor(s). If, when the escalator or moving walk is stopped, one of the main contacts of one of the contactors has not opened,		
		restarting shall be prevented. The interruption of the electricity supply to the operational brake shall be effected by at least two independent electric devices. They can be those which break the supply to the motor(s). If after the stop of the escalator or moving walk one of these electric devices has not opened, restarting shall be prevented.		
45	5.12.3.5.2	5.12.3.5.2 Initiation of the braking sequence of the operational brake 5.12.3.5.2.1 There shall be no intentional delay in the application of the operational braking system. If the control system starts a braking sequence immediately to bring the escalator/moving walk to a stop, this is not considered as an intentional delay. 5.12.3.5.2.2. Where electrical braking according to 5.4.2.1.1.2 is provided the interruption of the electricity supply of the electro-mechanical brake shall occur no later than 1 s after the specified electrical braking time is achieved after the initiation of the electrical braking sequence. The total time for the defined electrical braking sequence until the actuation of the electro-mechanical brake shall not exceed 4 s. In case of the events 5.12.2.7.2, 5.12.2.7.3 and 5.12.2.9.2 the electrical braking sequence shall be terminated and the electro-mechanical brake shall be applied immediately.	Pass	OK
46	5.12.3.5.3	5.12.3.5.3 Initiation of the braking sequence by the auxiliary brake Auxiliary brakes shall become effective in either of the following conditions: a) before the speed exceeds a value of 1,4 times the nominal speed; b) by the time the steps and pallets or the belt change	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		from the present direction of motion. （See 5.4.2.2.5）.		
47	5.12.3.6	5.12.3.6 Stopping and making unavailable by operator - manually operated Before stopping, the person shall have means of ensuring that nobody is using the escalator or moving walk, before making this operation. For remote stopping devices the same requirements apply.	Pass	OK
48	5.12.3.7	5.12.3.7 Stopping - automatically operated It is permitted to design the control in such a way that the escalator or moving walk is stopped automatically after a sufficient time (at least the anticipated user transfer time plus 10 s) after the user has actuated a detection means described in 5.12.3.2.	Pass	OK
49*	5.12.3.8	5.12.3.8 Stopping by stop device for emergency situations, manually operated 5.12.3.8.1 Stop device for emergency situations shall be provided to stop the escalator or moving walks in the event of an emergency according to 5.12.2.7.15 when the actuator of the stop device has been activated. The actuator of the stop device shall be placed in conspicuous and easily reachable positions at least at or near each landing of the escalator or moving walk	Pass	OK
		(see 7.2.1.2.2 for optical design). At the landings, the stop switches shall be reachable from an area outside the step/pallet band. If the stop switch is located below half the balustrade height h1, in addition an indicator according to Figure 12 shall be placed on the inner side of the balustrade with the following characteristics: — a minimum diameter of 80 mm; — coloured red; – marked with “STOP” in white letters; - located above half the balustrade height h1; — an arrow - which also may be located below half the balustrade height h1.- pointing from the sign towards the stop device.		

No.	Item No.	Test item	Test result	Conclusion
		The distances between stop devices for emergency situations shall not exceed: – 30 m on escalators; — 40 m on moving walks. If necessary, additional stop switches shall be provided to maintain the distance. For moving walks intended to transport shopping trolleys and baggage carts, see I.2. Stop devices for emergency situations shall be safety devices according to 5.12.2.6.1.		
50	5.12.3.10	5.12.3.10 Preventing from starting when permitted stopping distance exceeded Means shall be provided to prevent activation when the maximum allowable stopping distance (5.4.2.1.3.2 and 5.4.2.1.3.4) is exceeded by more than 20%. Failure lock function according to 5.12.2.8 shall be provided	Pass	OK
51	5.12.3.11	5.12.3.11 Intended reversal of direction of travel An intended reversal of the direction of travel shall be possible only if the escalator or moving walk stands still and 5.12.3.2 applies.	Pass	OK
52	5.12.3.12	5.12.3.12 Reactivation for automatic restart Where stopping is effected by a stop switch for emergency situation according to 5.12.3.8, reactivation of the escalator or moving walk for automatic restart without the switches mentioned in 5.12.3.2 is permitted under the following conditions: a) The steps, pallets or the belt shall be supervised between the comb intersection lines and additional 0,30 m beyond each comb so that reactivation for automatic restart is effected only	Not applicable	/
		when there is no person or object within this zone. The device shall be able to detect an opaque upright standing cylinder with a diameter of 0,30 m and a height of 0,30 m at any place within this zone; b) The escalator or moving walk shall start by the entering of a user according to 5.12.3.3 and 5.12.3.4. Starting shall be effected only if, for a period of at		

No.	Item No.	Test item	Test result	Conclusion
		least 10 s, the control device has not detected any persons or objects within the defined zone; c) The reactivation control initiated by the control device for automatic restart shall be a safety device according to 5.12.2. Self-controlling transmitter elements are permitted in single-channel design.		
53*	5.12.3.13	5.12.3.13 Inspection control 5.12.3.13.1 Escalators or moving walks shall be equipped with inspection controls to permit operation during maintenance or repair or inspection by means of portable and manually operated control devices. At least one portable control device shall be provided for each escalator or moving walk. This device shall require at least continuous simultaneous actuation by the use of both hands, one hand on the direction-control-device and the other hand on the RUN-control-device, in order to activate and to maintain any operation of the escalator/moving walk. 5.12.3.13.2 For this purpose, one inspection outlet for the connection of the flexible cable of the portable manually operated control device shall be provided at least at each landing, e.g. in the driving station and the return station in the truss. The length of the cable shall be at least 3,00 m. Inspection outlets shall be located in such a way that any point of the escalator or moving walk can be reached with the cable. 5.12.3.13.3 The operating elements of this inspection control device shall be protected against accidental operation. . The escalator or moving walk is permitted to run only as long as the operating elements are switched on by permanent application of manual pressure. The direction of travel shall be distinctly recognizable from the indication on the switch. Each inspection control device shall have a stop device according to 5.12.2.7.18. When the inspection control device is plugged in, the operation of the stop switch shall cause the	Meet the requirements	Conformity

No.	Item No.	Test item	Test result	Conclusion
		disconnection of the power supply from the driving machine and the operational brake shall be activated. 5.12.3.13.4 When in inspection control, the inspection control device shall be the only means for starting the escalator or moving walk. All other starting devices shall be rendered inoperative. All inspection outlets shall be arranged in such a way that when more than one inspection control device is connected, they all become inoperative for the starting of the escalator/moving walks (see Table 8 and Table 9 for safety devices remaining active in inspection control).		
54*	5.2.1	5.2.1Supporting structure (truss) and enclosure-General 5.2.1.1 All mechanically moving parts of the escalator or moving walk 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 (see also 5.2.1.5). 5.2.1.2 Any gaps or openings are restricted to 4 mm where there is a risk of contact with moving parts. The exterior panels shall withstand a force of 250 N at any point at right angles on a round or square area of 2 500 mm2 without breakage. The fixing shall be designed in that way to carry at least twice the dead load of the enclosure. 5.2.1.3 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. 5.2.1.4 Accumulation of materials (e.g. grease, oil, dust, paper) represents a fire risk. Therefore it shall be possible to clean the inner part of the escalator/moving walk. 5.2.1.5 Ventilation apertures shall be built or	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		arranged in such a way to comply with EN ISO 13857:2006, Table 5. However it shall not be possible to pass a straight rigid rod 10 mm in diameter through the enclosure and to touch any moving part through a ventilation aperture. 5.2.1.6 Any exterior panels which are designed to be opened (e.g. for cleaning purposes) shall be provided with a safety device according to 5.12.2.7.14.		
55	5.2.2	5.2.2 Angle of inclination The angle of inclination α of the escalator shall not exceed 30°, but for rises h13 not exceeding 6 m and a nominal speed not exceeding 0,50 m/s the angle of inclination is permitted to be increased up to 35° (see α in Figure 5). The angle of inclination of moving walks shall not exceed 12°.	30°	OK
56	5.2.3	5.2.3 Access to the interior Machinery spaces inside the truss shall only be accessible to authorized persons (e.g. by key, access control).	Pass	OK
57*	5.2.4	5.2.4 Inspection covers Inspection covers shall be provided with a safety device according to 5.12.2.7.14. It shall only be possible to open inspection covers by a key or a tool suited for that purpose. Parts of the balustrade (e.g. deckings, panels) which are required to be removed for maintenance purposes shall not be considered to be inspection covers. If the inspection cover consists of more than one part, one safety device shall be provided on the one to be opened first. For the consecutive ones either removal shall be prevented, e.g. by mechanical interlocking, overlapping or each single part shall be provided with a safety device. If rooms behind inspection covers can be entered, it shall be possible to open them from the inside without a key or a tool even when locked. Inspection covers shall be imperforate. Inspection covers shall conform to the same conditions as	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		required for the location (e.g. the balustrade, the cladding, the floor plate) where they are installed. NOTE Floor plates can have the functionality of an inspection cover. In this case the same conditions for inspection covers apply.		
58*	5.2.5	5.2.5 Structural design The supporting structure shall be designed in a way that it can support the dead weight of the escalator or moving walk plus a structural rated load of 5 000 N/m2. It shall be calculated in accordance with EN 1993-1-1. NOTE Load carrying area = (nominal width z1 (see Figure 6) of the escalator or moving walk) x (distance l1 between the supports) (see Figure 5). Based on the structural rated load, the maximum calculated or measured deflection shall not exceed 1/750 of the distance l1 between the supports. Based on the structural rated load for the comb plate and floor plate the maximum deflection shall not exceed 4 mm and the meshing of the combs shall be ensured.	1/1069	OK
59	5.3.1	5.3.1Steps, pallets, belt-General In the user carrying area of the escalator, the step treads shall be horizontal with a tolerance of ± 1° in the direction of travel. NOTE 1 The maximum permissible height between two consecutive steps at the landings is defined in 5.3.4 and 5.7.2.1. Tread surfaces for escalators and moving walks shall provide a secure foothold.	Pass	OK
60	5.3.2.1	5.3.2.1 Dimensions-General For escalators and moving walks the nominal width z1 shall be not less than 0.58 m and not exceed 1.10 m. For moving walks with an angle of inclination up to 6° widths up to 1.65 m are permitted.	Pass	OK
61	5.3.2.2	5.3.2.2 Step treads and pallets (see Figure 5, detail X and Figure 8)	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		5.3.2.2.1 The step height x1 shall not exceed 0.24 m. 5.3.2.2.2 The step depth y1 shall be not less than 0,38 m. 5.3.2.2.3 The surface of the step treads and pallets shall have grooves in the direction of movement with which the teeth of the combs mesh. 5.3.2.2.4 The step risers shall be cleated and the surface of the cleat shall be smooth. The ends of the step tread shall mesh with the cleating of the next step riser. 5.3.2.2.5 The width b7 of the grooves shall be at least 5 mm and not exceed 7 mm. 5.3.2.2.6 The depth h7 of the grooves shall be not less than 10 mm. 5.3.2.2.7 The web width b8 shall be at least 2,5 mm and not exceed 5 mm. 5.3.2.2.8 The step treads and step risers or pallets shall not finish with a groove at their side edges. 5.3.2.2.9 The edge between the surface of the step tread and the riser shall have any sharpness relieved.		
62	5.3.4	5.3.4 Guiding of steps, pallets and belt The lateral displacement of the steps or pallets out of their guiding system shall not exceed 4 mm at either side and 7 mm for the sum of clearances measured at both sides and the vertical displacement shall not exceed 4 mm for steps and pallets and 6 mm for belts. This requirement applies only to the usable area of the steps, pallets or belt. Treadway supports for belts shall be provided at intervals not exceeding 2 m along the centre line 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 5.3.3.2.4.	Pass	OK
63	5.3.5	5.3.5 Clearance between steps or pallets The clearance between two consecutive steps or pallets in any usable position measured at the tread surface shall not exceed 6 mm (see Figure 5, details Y, Z, Figure 9, detail S and Figure 10, detail U). For steps the measurement shall be carried out as the	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		dimensions of the gaps are indicated in Figure 2. For pallets the measurements shall be done according to Figures 7 and 8. Demarcation (e.g. groove in the step tread) shall be provided to highlight at the landings the rear edge of the steps. In the area of the transition curves of moving walks with meshed front edges and rear edges of the pallets, this clearance is permitted to be increased to 8 mm (see Figure 8, detail V).		
64	5.3.6	5.3.6 Missing step or pallet device The operation of the escalator/moving walk is only permitted with a complete step/pallet band. Missing step/pallet shall be detected by a safety device or function in accordance with 5.12.2.7.11.	Pass	OK
65	5.4.1.1	5.4.1.1 Driving machine-Genaral A drive unit shall not operate more than one escalator or moving walk.	Pass	OK
66*	5.4.1.2	5.4.1.2 Speed 5.4.1.2.1 The speed of an unloaded steps, pallets or belt shall not deviate by more than ± 5 % from the nominal speed at nominal frequency and nominal voltage. 5.4.1.2.2 The nominal 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°. 5.4.1.2.3 The nominal speed of moving walks shall be not higher than 0,75 m/s. Deviating from the above a nominal speed up to 0,90 m/s is permitted provided the width of the pallets or the belt does not exceed 1,10 m, and at the landings, the pallets or the belt move horizontally for a length of at least 1,60 m before entering the combs. The before mentioned requirements do not apply to moving walks with acceleration paths or moving walk systems with direct transition to moving walks travelling at different speeds.	Deviation -3.04%	OK

No.	Item No.	Test item	Test result	Conclusion
67	5.4.1.3	5.4.1.3 Link between operational brake and step, pallet or belt drive 5.4.1.3.1 For the link between the operational brake and the step, pallet or belt drive, preferably nonfriction 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 5.4.2.2 shall be used.	Pass	OK
		5.4.1.3.2 The design of all driving elements shall be of nominal infinite fatigue life. Safety factors of all driving elements shall be at least 5 for static calculations. In the case of trapezoidal belts, at least 3 belts shall be applied. This safety factor is determined as the ratio between the breaking force of the driving element and the static force to which the driving element is subjected when the escalator or inclined moving walk carries the structural rated load according to 5.2.5 together with the tension force of the tensioning device. For horizontal moving walks the dynamic forces according to 5.4.2.1.3.3 respectfully 5.4.2.1.3.4 together with the tension force of the tensioning device shall be used to determine the safety factor. Note : Driving elements are the parts which are moving and hence dynamically loaded, e.g. shaft, gear wheels, multiplex chains. The fixation of these parts in the truss has to be done according to the specific requirements of these components (e.g. Eurocode for the truss, welding and screws according to the relevant standards).		
68	5.4.1.4	5.4.1.4 Hand winding device If a hand winding device is provided it shall be easily accessible and safe to operate (see 7.2.1.3 and 7.4.1 g) for instructions). If the hand winding device is removable a safety device or function according to 5.12.2.7.16 shall be provided. Crank handles or perforate hand wheels are not permitted.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
69*	5.4.2.1.1	5.4.2.1.1 Operational brake-general Escalators and moving walks shall have an operational braking system by which they: a) can be brought to rest with an uniform deceleration; b) can be maintained stationary. See also 5.12.3.5 5.4.2.1.1.1 Operational braking by electro-mechanical brake For operational braking by electro-mechanical brake the requirements of 5.4.2.1.2 apply. 5.4.2.1.1.2 Operational braking by electrical braking For electrical braking (e.g. electrical braking with inverter) the requirements according 5.4.2.1.1 a) shall be fulfilled. An electro-mechanical brake according to 5.4.2.1.2 is required and also to be initiated under the conditions of 5.12.3.5.2.	Pass	OK
		5.4.2.1.1.3 Operational braking by other means Where the operational brake is effected by other means an auxiliary brake in accordance with 5.4.2.2 shall be provided. 5.4.2.1.1.4 Brakes that can be released by hand shall require continuous application of manual pressure to keep them open.		
70	5.4.2.1.2	5.4.2.1.2 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 generated by guided compression spring(s). Electrically generated selfexcitation of the brake releasing device shall be impossible.	Pass	OK
71	5.4.2.1.3	5.4.2.1.3 Brake load and stopping distances for operational brake 5.4.2.1.3.1 Determination of the brake load for escalators Table 2 shall be applied for the determination of the brake load for escalators. Table 2 Determination of the brake load for	Pass	OK

<table>
<tr><th>No.</th><th>Item No.</th><th>Test item</th><th>Test result</th><th>Conclusion</th></tr>
<tr><td></td><td></td><td>escalators
<table>
<tr><td>Nominal width z1</td><td>Brake load per step</td></tr>
<tr><td>z1≤0,60 m</td><td>60 kg</td></tr>
<tr><td>0,60 m< z1≤0,80 m</td><td>90 kg</td></tr>
<tr><td>0,80 m< z1≤1,10 m</td><td>120 kg</td></tr>
</table>
The number of steps to be considered is determined by “rise h13 divided by maximum visible height of the step riser” (see x1 in Figure 8).
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.</td><td></td><td></td></tr>
<tr><td></td><td></td><td>5.4.2.1.3.2 Stopping distances for the escalator
The stopping distances for unloaded upwards, unloaded downwards and loaded downward moving escalators (see 5.4.2.1.3.1) shall be as given in Table 3.
Table 3: Stopping distances for the escalator
<table>
<tr><td>Nominal speed v</td><td>Stopping distance between</td></tr>
<tr><td>0. 50 m/s</td><td>0. 20 m~1.00 m</td></tr>
<tr><td>0. 65 m/s</td><td>0. 30 m~1.30 m</td></tr>
<tr><td>0. 75 m/s</td><td>0. 40 m ~1.50 m</td></tr>
</table>
For intermediate nominal speeds the stopping distances shall be interpolated.
The stopping distances shall be measured from the time the electric stopping device is actuated.
The deceleration, measured on a downward moving escalator, in the direction of travel shall not exceed 1 m/s2 during the operation of the braking system.
For measuring purposes, the raw deceleration signal

shall be band-limited using a 4,0 Hz low-pass two-pole Butterworth filter.
It is recommended to achieve the shortest possible stopping distance within the given deceleration

limit.</td><td></td><td></td></tr>
</table>

<table>
<tr><th>No.</th><th>Item No.</th><th>Test item</th><th>Test result</th><th>Conclusion</th></tr>
<tr><td>72</td><td>5.4.2.1.3</td><td>5.4.2.1.3.3 Determination of the brake load for moving walks
Table 4 shall be applied for the determination of the brake load for moving walks.
Table 4 Determination of the brake load for moving walks
<table><tr><td>Nominal width z1</td><td>Brake load per 0,4 m length</td></tr><tr><td>z1≤0,60 m</td><td>50 kg</td></tr><tr><td>0.60 m<z1≤0.80 m</td><td>75 kg</td></tr><tr><td>0.80 m<z1≤1.10 m</td><td>100 kg</td></tr><tr><td>1.10 m<z1≤1.40m</td><td>125 kg</td></tr><tr><td>1.40 m<z1≤1.65m</td><td>150 kg</td></tr></table>To determine the brake load for moving walks which in their length overcome several inclinations (differences in level), only the downward moving sections shall be considered.
5.4.2.1.3.4 Stopping distances for moving walks
The stopping distances for unloaded upwards, unloaded downwards and loaded downward moving inclined moving walks (see 5.4.2.1.3.3) shall be as given in Table 5. This applies also for unloaded and loaded horizontal moving walks in both directions.</td><td>Not applicable</td><td>/</td></tr>
<tr><td></td><td></td><td>Table 5 — Stopping distances for moving walks
<table><tr><td>Nominal speed v</td><td>Stopping distance between</td></tr><tr><td>0.50 m/s</td><td>0.20 m~1.00 m</td></tr><tr><td>0.65 m/s</td><td>0.30 m~1.30 m</td></tr><tr><td>0.75 m/s</td><td>0.40 m~1.50 m</td></tr><tr><td>0.90 m/s</td><td>0.55 m~1.70 m</td></tr></table>For intermediate nominal speeds the stopping distances shall be interpolated.
The stopping distances shall be measured from the time the electric stopping device is actuated.</td><td></td><td></td></tr>
</table>

No.	Item No.	Test item	Test result	Conclusion
		The deceleration, measured on a downward moving or horizontal moving walk, in the direction of travel shall not exceed 1 m/s2 during the operation of the braking system. For measuring purposes, the raw deceleration signal shall be band-limited using a 4,0 Hz low-pass two-pole Butterworth filter. It is recommended to achieve the shortest possible stopping distance within the given deceleration limit. For moving walks a brake test under no load will be sufficient. For loaded moving walks, the manufacturer shall prove the stopping distances by calculation (see 6.2 c)).		
73*	5.4.2.2	5.4.2.2 Auxiliary brake 5.4.2.2.1 Escalators and inclined moving walks shall be equipped with auxiliary brake(s) if: a) the connection between the operational brake (see 5.4.2.1) and the driving sprockets of the steps/pallets or the drum of the belt is not accomplished by shafts, gear wheels, multiplex chains, or more than one single chain, or b) the operational brake has not an electro-mechanical brake according to 5.4.2.1.2, or c) the rise h13 exceeds 6 m (see also H.2). The connection between the auxiliary brake and the driving sprockets of the steps/ pallets or the drum of the belt shall be accomplished by shafts, gear wheels, multiplex chains or more than one single chain. It is not permissible for the connection to comprise friction drives, i.e. clutches.	Pass	OK
		5.4.2.2.2 The auxiliary braking system shall be dimensioned in such a way that escalators and moving walks travelling with brake load downward are brought to rest by effective retardation and maintained stationary.		

No.	Item No.	Test item	Test result	Conclusion
		The deceleration of 1 m/s2 downward shall not be exceeded under all operating conditions. For measuring purposes, the raw deceleration signal shall be band-limited using a 4,0Hz low-pass two-pole Butterworth filter. Upon operation of auxiliary brakes it is not necessary to keep the stopping distances defined for the operational brake (see 5.4.2.1.3). 5.4.2.2.3 Auxiliary brakes shall be of the mechanical (friction) type. 5.4.2.2.4 Auxiliary brakes shall stop according to 5.12.3.5.3. The activation of the auxiliary brake shall be detected by electrical safety device or function according to 5.12.2.7.4. 5.4.2.2.5 Auxiliary brake(s) are permitted to operate together with the operational brake when in case of power failure or of an interruption of a safety circuit the stopping conditions according to 5.4.2.1.3.2 and 5.4.2.1.3.4 are kept; otherwise a simultaneous operation of the auxiliary and the operational braking system is only permitted under the conditions of 5.4.2.2.4.		
74	5.4.2.3	5.4.2.3 Protection against risks of excessive speed and unintentional reversal of the direction of travel A safety device or function according to 5.12.2.7.2 and 5.12.2.7.3 shall be provided.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
75	5.4.3	5.4.3 Steps and pallets drive 5.4.3.1 The steps of escalators shall be driven by at least two chains of which at least one shall be located on each side of the step. The pallets of moving walks are permitted to be driven by only one chain if the parallel movement of the pallets in the usable area is ensured by other mechanical measures. A safety device or function according to 5.12.2.7.5 shall be provided to detect breakage or undue elongation of the step/pallet chains. 5.4.3.2 The step/pallet chain design shall be of nominal infinite fatigue life. The safety factor against breaking of each chain shall be at least 5 (see 5.4.1.3.2) with respect to structural steel according to EN 10025-1:2004 in combination with EN 10025-2:2004, EN 10025-3:2004, EN 10025-4:2004, EN 10025-5:2004 and EN 10025-6:2004+A1:2009 and with respect to quenched and tempered steel according to EN 10083-1:2006 in combination with EN 10083-2:2006 and EN 10083-3:2006. The chain shall be subject to a tensile test. When more than one chain is used it is assumed that the load is equally distributed over the chains. 5.4.3.3 The chains shall be tensioned continuously. A safety device or function according to 5.12.2.7.6 shall be provided to detect movement of the tensioning device. Springs working in tension are not permitted for the tensioning device. When weights are used for tensioning they shall be safely retained should their suspension break.	Pass	OK
76	5.5.1	5.5.1Balustrade-general Balustrades shall be installed on each side of the escalator or moving walk.	Pass	OK

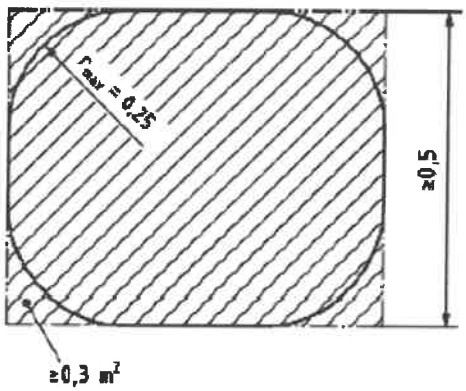
No.	Item No.	Test item	Test result	Conclusion
77	5.5.2	5.5.2 Dimensions of balustrade 5.5.2.1 In the inclined section the vertical height h1 from step nose or pallet surface or belt surface to top of the handrail shall be not less than 0,90 m and not exceed 1,10 m (see Figures 5 and 6). 5.5.2.2 The balustrades 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 balustrade if there is a danger of people falling from them To ensure this, on escalators and moving walks devices (see 1 in Figure 7) shall be provided on the lower outer decking at a point (1 000 ± 50) mm above the floor level (see h9 in Figure 7) where the bottom of the device intersects with the balustrade decking and shall extend to a length l5 of at least 1 000 mm parallel with the balustrade decking where no stepping is possible. The device shall extend to at least a height in line with the top of the handrail not conflicting with the requirements of b10 and b12. Where escalators or moving walks are located adjacent to walls, devices (see 2 in Figure 7) to restrict access to the balustrade decking shall be provided at the top and bottom ends of these walls when the lower outer decking width b13 exceeds 125 mm. On adjacent parallel arrangements, this protection shall be provided when the combined balustrade decking width b14 exceeds 125 mm.	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		. The device shall extend to the height h10. All exposed fastener heads for the devices shall be of the vandal resistant type. Where handrail level balustrade decking are provided between escalators/inclined moving walks and adjacent walls, anti-slide devices (see 3 in Figure 5) shall be provided on the balustrade decking when the distance b15 between the structure of the building (wall) and the centreline of the handrail is greater than 300 mm. These devices shall consist of objects fastened to the balustrade decking, no closer than 100 mm to the handrail (see b17) and spaced no greater than 1 800 mm apart. The height h11 shall be not less than 20 mm. The devices shall have no sharp corners or edges. The above mentioned also applies to adjacent escalators/inclined moving walks when the distance b16 between the centrelines of the handrails is greater than 400 mm.		
78	5.5.4	5.5.4 Newel 5.5.4.1 The newel including the handrails shall project horizontally beyond the comb intersection line by at least 0,60 m in longitudinal direction (see L2 and l2 in Figure 3 and detail X). 5.5.4.2 The horizontal portion of the handrail shall continue longitudinally at the landings for a distance l3 (see Figure 3) of at least 0,30 m past the comb intersection line (see L2 in Figure 3 and detail X). In the case of inclined moving walks without a horizontal section at the landings, the continuation of the handrail parallel to the angle of inclination is permitted.	Pass	OK
79	5.5.5	5.5.5 Clearance between steps, pallets or belt and skirting 5.5.5.1 Where the skirting of escalators or moving walks 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	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		clearances measured at both sides at two directly opposite points. 5.5.5.2 Where the skirting of moving walks finishes above the pallets or the belt, the clearance shall not exceed 4 mm measured vertically from the tread surface. 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.		
80	5.6.1	5.6.1Handrail system-general On the top of each balustrade there shall be provided a handrail moving in the same direction and at a speed with a tolerance of – 0 % to + 2 % relative to the speed of the steps, pallets or belt under normal operating conditions.	Pass	OK
81	5.6.2	5.6.2 Profile and position 5.6.2.1 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 handrail shall be a minimum of 80 mm horizontally (b10) and 25 mm vertically (b12) away from adjacent surfaces. The reduction of this area is permitted as long as b18 is not less than 8 mm as shown in detail W of Figure 6 (Point A on the handrail profile – Point B vertically minimum 25 mm below the lower edge of the handrail and horizontally maximum to the outer edge of the handrail). No point of the balustrade shall be above the direct line from A to B. The distance between the handrail profile and guide or cover profiles shall under no circumstances be wider than 8 mm (see b6' and b6" in Figure 6, detail W). 5.6.2.2 The width b2 of the handrail shall be between 70 mm and 100 mm (see Figure 6, detail W). 5.6.2.3 The distance b5 between the handrail and the edge of the balustrade shall not exceed 50 mm (see Figure 6).	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
82	5.6.3	5.6.3 Distance between the handrail centre lines The distance b1 between the centre line of the handrails shall not exceed the distance between the skirting by more than 0,45 m (see b1 and z2 in Figure 6).	Pass	OK
83	5.6.4	5.6.4 Handrail entry 5.6.4.1 The lowest point of entry of the handrail into the newel shall be at a distance h3 from the finished floor level which shall be not less than 0,10 m and not exceed 0,25 m (see Figures 5 and 6). 5.6.4.2 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 3). If l4 is greater than (l2 - l3 + 50 mm) the handrail shall enter into the balustrade at an angle α of at least 20° measured to the horizontal. 5.6.4.3 At the point of entry of the handrail into the newel a guard shall be installed to protect against pinching of fingers and hands. A safety device or function according to 5.12.2.7.9 shall be provided.	Pass	OK
84	5.6.5	5.6.5 Guiding The handrail shall be guided and tensioned in such a way that it will not leave its guides during normal use.	Pass	OK
85	5.7.1	5.7.1 Landings Surface properties The landing area of escalators and moving walks (i.e. comb plate and floor plate) 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 L1 in Figure 5 and detail X).	Pass	OK
86	5.7.2	5.7.2 Configuration of steps, pallets and belts 5.7.2.1 At the upper and lower landing, 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 L1 (see Figure 5 and detail X). At nominal speeds above 0,50 m/s and not	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		more than 0,65 m/s or rises h13 above 6 m this length shall be at least 1,20 m, measured from point L1 (see Figure 5 and detail X). At nominal speeds above 0,65 m/s this length shall be at least 1,60 m measured from point L1(see Figure 5 and detail X). A vertical difference in level between two consecutive steps of 4 mm is permitted.		
87	5.7.3.3	5.7.3.3 Mesh depth of the combs into the grooves 5.7.3.3.1 The mesh depth h8 of the combs into the grooves of the tread (see Figure 5, detail X) shall be at least 4 mm. 5.7.3.3.2 The clearance h6 (see Figure 5, detail X) shall not exceed 4 mm.	Pass	OK
88	5.8.1	5.8.1Machinery spaces, driving station and return stations-general These rooms/spaces shall be used only for accommodating the equipment necessary for the operation and maintenance and inspection of the escalator or moving walk. Fire alarm systems, equipment for direct fire abatement and sprinkler heads, provided they are sufficiently protected against incidental damage, are permitted in these rooms provided they do not generate additional risks for maintenance operation. NOTE See 7.4.1 d) for maintenance requirements and inspection activities. According to Clause 5 of EN ISO 12100:2010, 6.3, effective protection and guards shall be provided for moving and rotating parts if they are accessible and dangerous, in particular for: a) keys and screws in shafts; b) chain, belt; 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 shall be entered for maintenance purposes; g) Handwheel and brake disc (drum).	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
89*	5.8.2	5.8.2 Dimensions and devices 5.8.2.1 In machinery spaces, especially in driving and return stations inside the truss, space with a sufficiently large standing area shall be kept free from permanently installed 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. It is permitted to occupy this standing area by permanently installed parts, provided that the permanently installed parts are placed behind rounded corners of max. 0,25 m radius (see Figure 4) and at a height of at least 0,12 m above the free standing area. Figure 4 Standing area  5.8.2.2 If the controller cabinet shall be moved or lifted for maintenance purposes, then suitable attachments for lifting shall be provided, e.g. eyebolts, handle. 5.8.2.3 Where the main drive or brake is arranged between the user side of the step, pallet or belt and the return line, a level 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 standing area is permitted to be fixed or removable.	0.6×0.8m	OK
90	5.8.3	5.8.3Lighting and socket outlets 5.8.3.1 The electric lighting and the socket outlets shall be independent of the power supply to the	Pass	OK

No.	Item No.	Test item	Test result	Conclusion
		machine being fed either by a separate cable or a branch cable which is connected before the main switch of the escalator or moving walk. It shall be possible to break the supply of all phases by means of a separate switch (see 5.11.3.1). 5.8.3.2 Electric lighting installations in driving and return stations and machinery spaces 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 light intensity shall be at least 200 lx in working areas. 5.8.3.3 The socket outlets shall be: a) either of type 2 P+PE (2 poles + earth conductor), 250 V, directly supplied by the mains, or b) of a type that is supplied at a safety extra low voltage in accordance with HD 60364-4-41:2007.		

Annex:

N.A.