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1. Main parameter

The KONE TM 120 escalators are heavy duty escalator with numerous pre-engineered mechanical and electrical solutions. The escalators are designed to meet the requirement of major international codes such as EN115-1:2008+A1:2010.

The KONE TM 120 escalator is designed primarily toward the infrastructure segment including mid to high application such as railways and airports.

The KONE TM 120 escalator will be heavy duty, reversible type and capable of operating safely, smoothly and continuously in both directions for a period of 24 hours per day, 365 days per year at loads up to maximum stated.

Technical details of escalators:

Item	Details
Escalator identification	Transit Master TM 120
Escalator type	Machine inside truss, Controller inside truss
Design Standard	EN115-1:2008+A1:2010
Inclination	30°
Speed	0.5m/s
Flat steps	Three steps at both upper and lower
Step width	1000mm/800mm
Direction of travel	Up/Down
Setting in operation	Key switch control for both direction
Power supply	3 x 400 V, 50 Hz
Gearbox	Worm gear
Transition radii	Upper:1500mm; Lower 1000mm
Balustrade type	Slim Type(safety glass 10mm)
Operation mode	Automatic start/stop

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2. Component description

The KONE TransitMaster. 120 escalator contains the following main component groups.

Truss (1) - main supporting structure of the escalator.

Tracks (2) - the main guide and support system of the step band in its journey around the escalator truss. There are three main areas of the tracking system. They are the upper end track, lower end track, and inclined track.

Drive station - machinery composed of the **drive motor (3)**, **gear box (4)**, **brake (5)**, **handrail drive wheels (6)**, and **step chain sprockets (7)** that drive the step band and handrails.

Step band and handrails - rotating components used to convey passengers on the escalator. The step band consists of **steps (8)** and **step chain (9)** mechanically linked together and driven by the drive through step chain sprockets. The **handrail (10)** travels in sync with the step band and provides a hand-hold for passengers as they are conveyed by the escalator. The handrail travels around the balustrade and is driven by handrail drive wheels.

Lower reversing station (11) - turnaround area at the lower end for the step band. Step chain tension is provided by compression springs acting on the return station.

Balustrade - area above the step band consisting of **inner [balustrade] panels (12)**, **decks (13)**, **newel ends (14)**, and **skirts (15)**.

Access cover (16) - removable floor plates covering the upper and lower end pits that allow access to the upper end and lower end equipment. Access covers provide the transition from the surrounding floor area at each landing.

Comb plates (17) - plates at both landings where passengers enter and exit the step band. The comb plates contain removable **comb segments (18)** that mesh with the rotating steps.

Front plates (19) - attached to the access cover and newel end, and containing the handrail inlet where the handrail enters into and exits from the interior of the escalator.

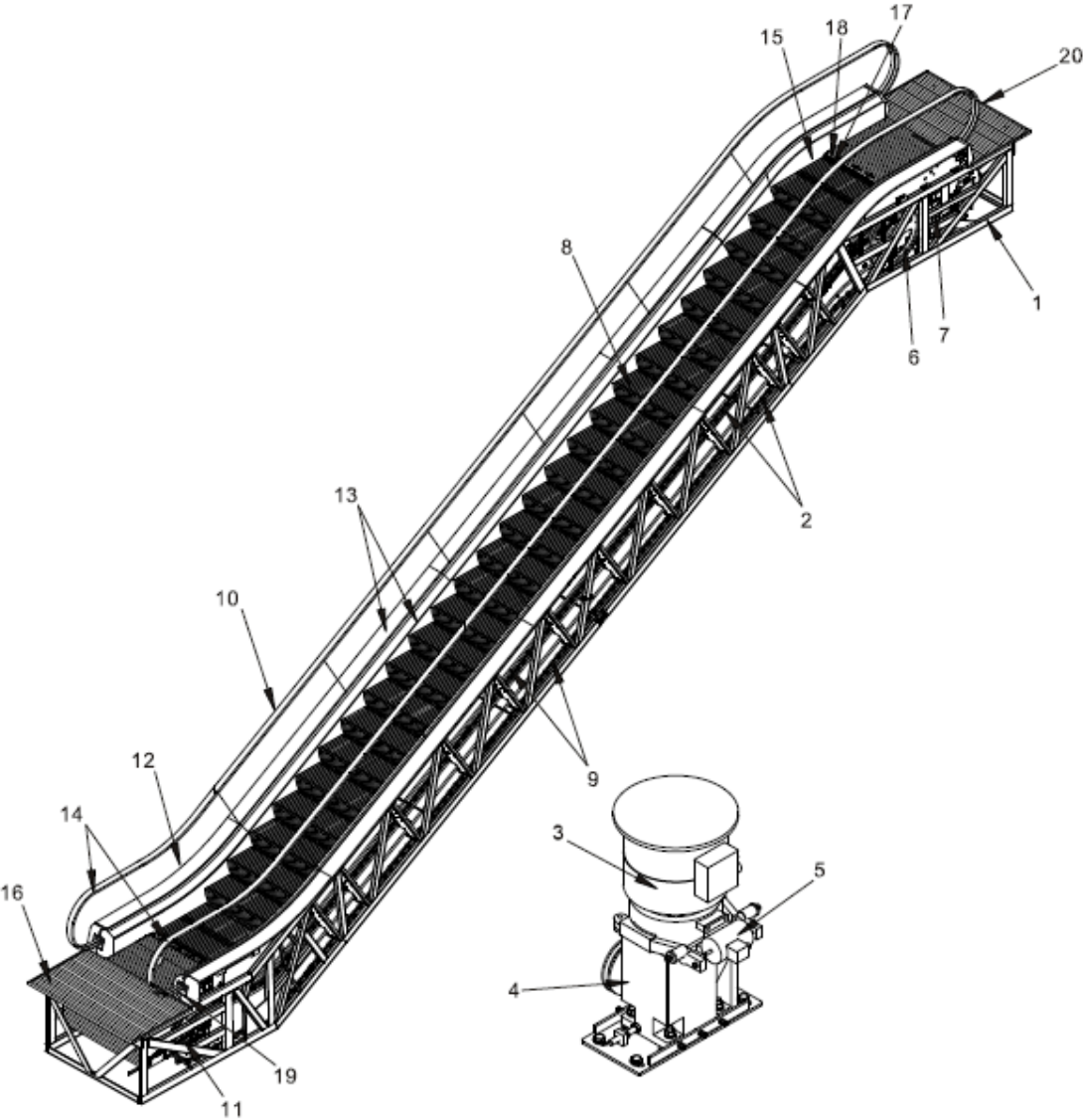
Control cabinet (20) - the central point for the electrical system. The control cabinet contains electrical components that control and monitor the unit's operation. The control cabinet is normally located in the upper end pit, but may also be located externally, either due to customer requirements or the size of the electrical inverter at higher vertical rises.

Electrical safety devices (not shown) - various electrical safety devices are connected in series to safety relays in the control cabinet. Activation of any one of the electrical safety devices will trigger the safety relays and shut down the unit.

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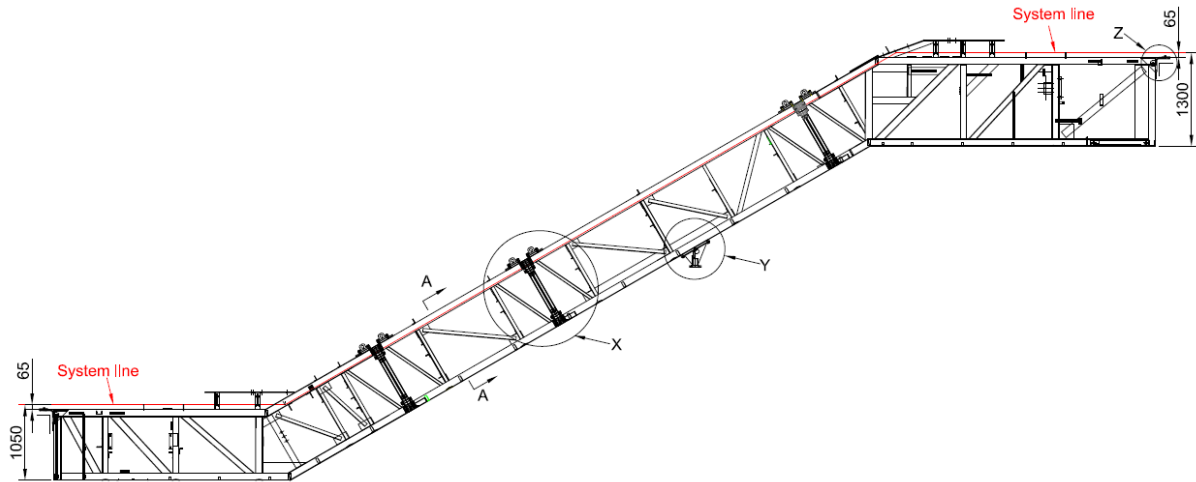
Lighting systems (not shown) - optional electrical components, which are used to provide light at various points of the escalator.



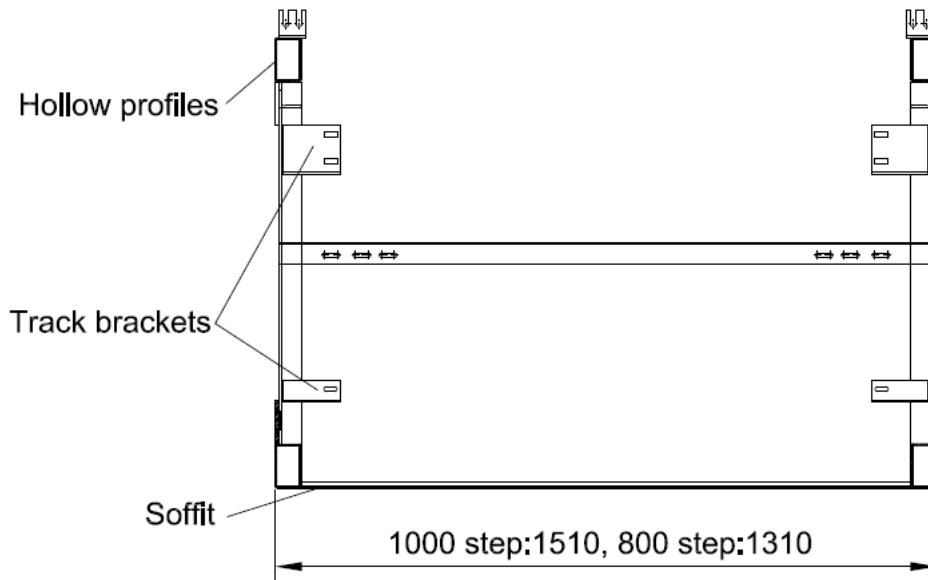
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3. Truss

The supporting structure is a non-oscillating and distortion-free jig-welded structure of rectangle steel profiles(HP100x60/Q235). The type of welding is Metal insert gas, comply with welding code EN 287-part 1/ISO15614-part 1. The deflection of the truss considering a passenger load of 5000 N/m² is less than 1/750 of the distance between supports. Structural joints are continuously welded in all planes.



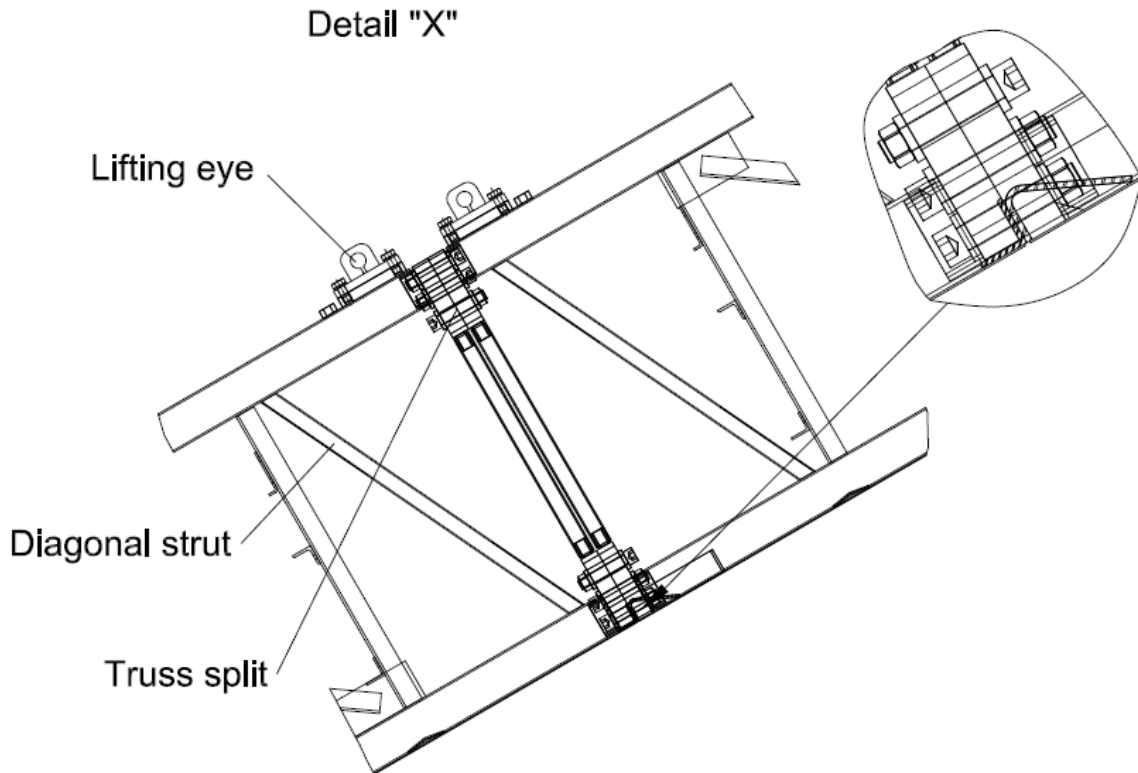
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Where required, for safe transportation or convenient handling and movement to the final installation site, the truss can be constructed in sub-sections.

The correct reuniting of sub-sections is ensured by corresponding markings and precisely matched, machine-faced jointing plates, secured by socket-headed bolts through accurately pre-drilled fixing holes.

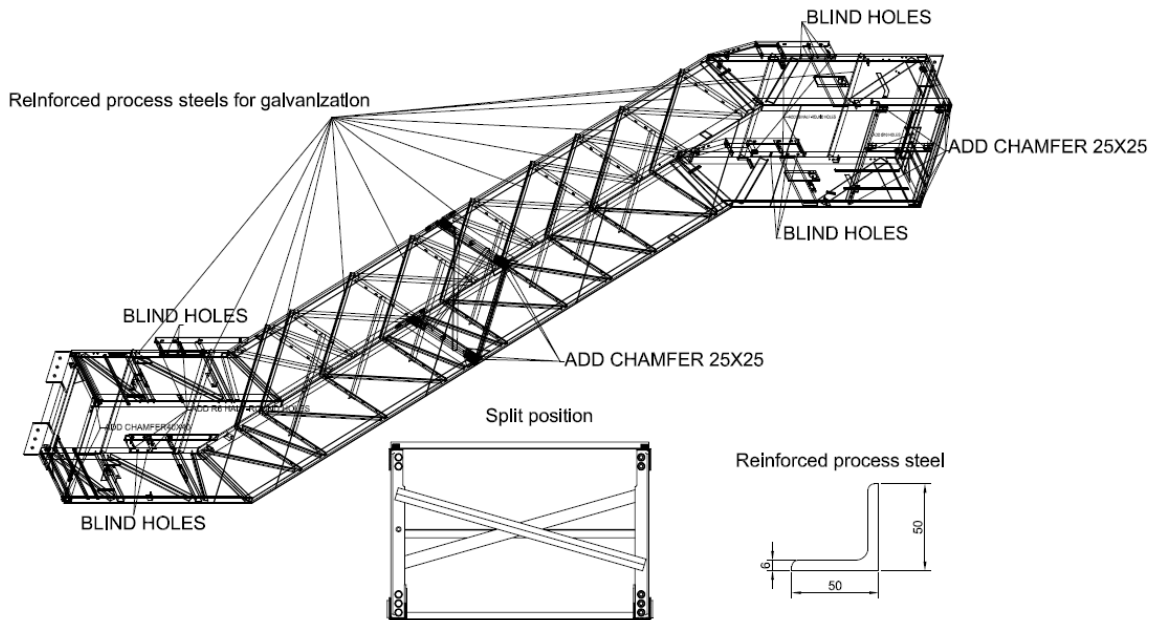


Every complete truss structure or sub-section is provided at each of its corners with a lifting eye for easy attachment of a crane lifting hook, to enable its safe lifting and handling.

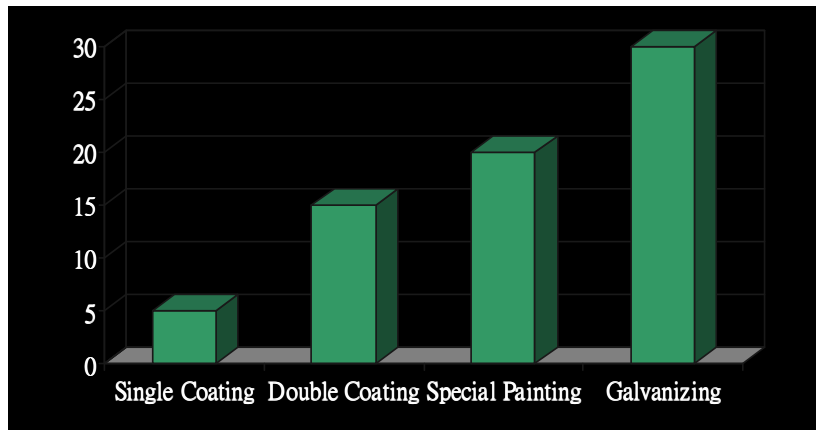
After the completion of all welding operations, the truss structure is cleaned and temporary reinforced before being entirely hot dip galvanized to protect against corrosion to ensure a long lifetime.

Before galvanization welded reinforced process steels are added and all blind holes must be covered. After galvanized, separate the steels from the truss, uncover the blind holes.

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The escalator truss is hot dipped galvanized according BS 729 (ISO1461), min. thickness 85 μ m.
 Truss Lifetime please see below approximately lifetime with different protection.

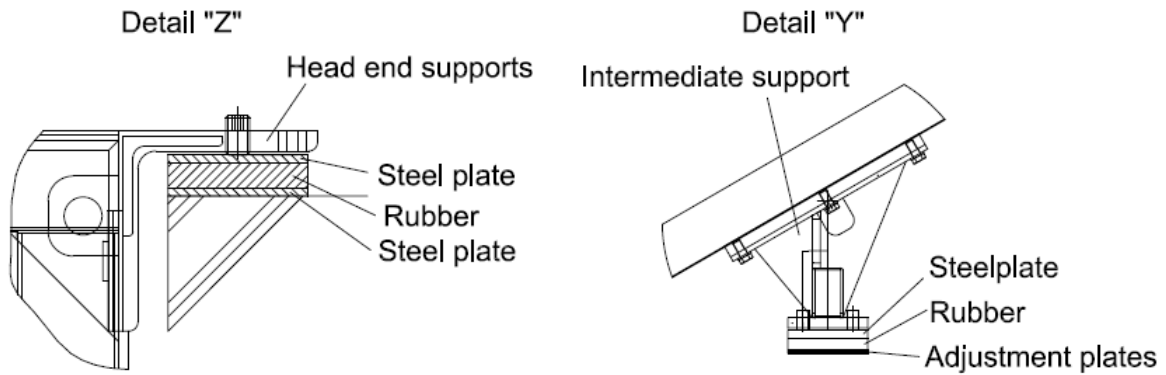


The trusses are constructed as welded frameworks mainly of angle profiles and hollow profiles. There is a bottom sheet (t=5mm) as the soffit and a lot of transverse beams, which all together build horizontal frames and make the whole escalator a stiff space truss, this three-dimensional stiffness keeps the upper chord away from buckling.

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The stabilization of the upper chord depends on the stiffness of the H frame. The overall horizontal stability of the truss is assured by the bottom plate in the lower chord level. Centre supports will be installed for (higher) longer trusses where required.


Each end of the truss is supported on vibration-damping pads, comprising high-density rubber layers between steel leveling plates. Where any intermediate supports are relevant these are also of resilient, vibration-damping arrangement.



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Certificate

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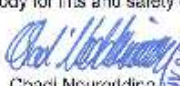

Industrie Service

Certificate

Concerning the examination of static calculation of Escalator truss

Certificate no.:	KP 264
Notified body:	TÜV SÜD Industrie Service GmbH Westendstr. 199 80686 München - Germany
Applicant/ Certificate holder:	KONE Elevators Co., Ltd. No.88 Middle GuCheng Road, Yushan Town, Kunshan, Jiangsu Province, 215300 - China
Date of application:	2012-12-25
Supplier of calculation:	Tongji University 1238# Siping Road, 200092, Shanghai - P.R. China
Product:	Escalator truss
Type:	<ul style="list-style-type: none"> - TravelMasterTM 110 Escalator standard truss - TravelMasterTM 110 Escalator reinforced truss - TransitMasterTM 120 Escalator standard truss - TransitMasterTM 120 Escalator reinforced truss
Scope of application:	<p>TravelMasterTM 110 & TransitMasterTM 120 Escalator standard truss High Rise: 2m-15m Angle of application: 30°, 35°, 27.3° Step width: 1000mm, 800mm, 600mm</p> <p>TravelMasterTM 110 & TransitMasterTM 120 Escalator reinforced truss High Rise: 2m-15m Angle of application: 30° 27.3° Step width: 1000mm, 800mm, 600mm</p>
Test laboratory:	TÜV SÜD Industrie Service GmbH Prüflaboratorium für Produkte der Fördertechnik Prüfbereich Aufzüge und Sicherheitsbauteile Westendstr. 199 80686 München - Germany
Date and number of the test report:	2013-04-17 KP 264
Test specification:	EN115-1:2008+A1:2010
Validity:	This certificate is valid until 2018-04-21
Result:	The calculation of the above mentioned escalator truss fulfils the requirements of the test specification for the respective scope of application when used for its intended purpose.
Date of issue:	2013-04-22

Certification body for lifts and safety components

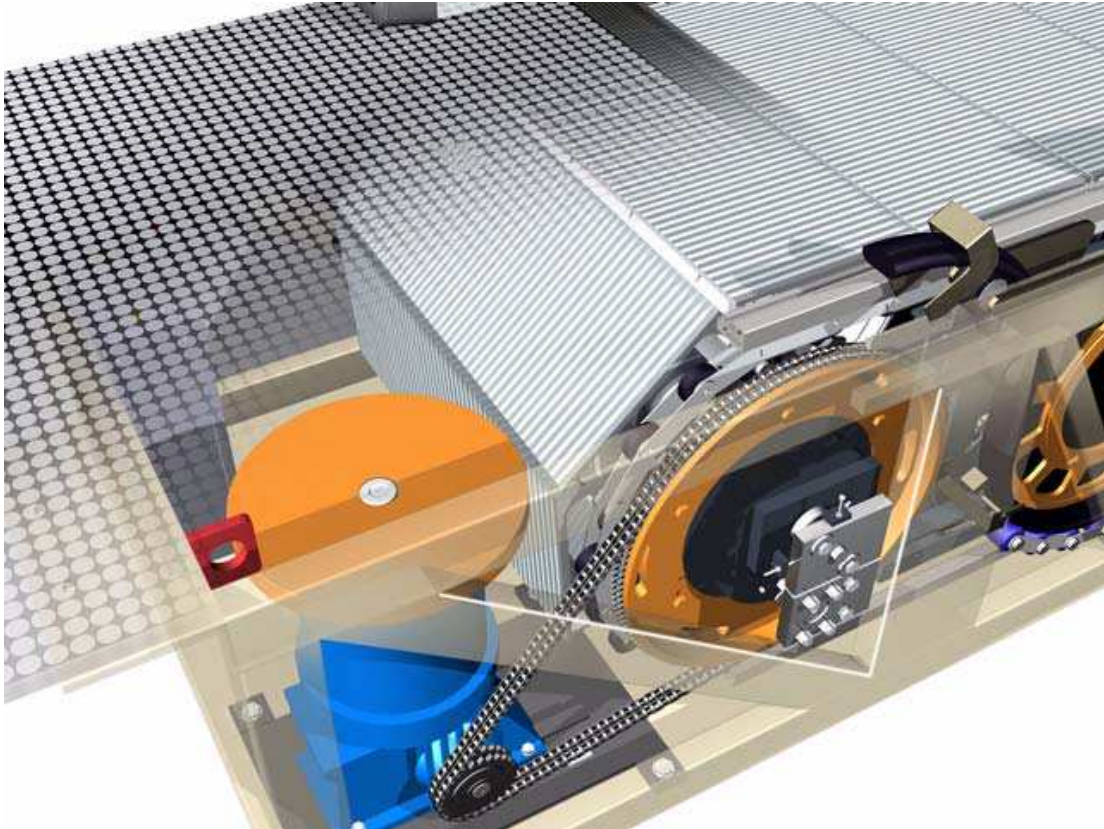



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4. Drive station

The drive station is the heart of the escalator and drives the step band as well as the handrail synchronously. The drive station is located outside the step band in the upper head of the escalator truss and powered by high efficiency motor with worm gearbox.



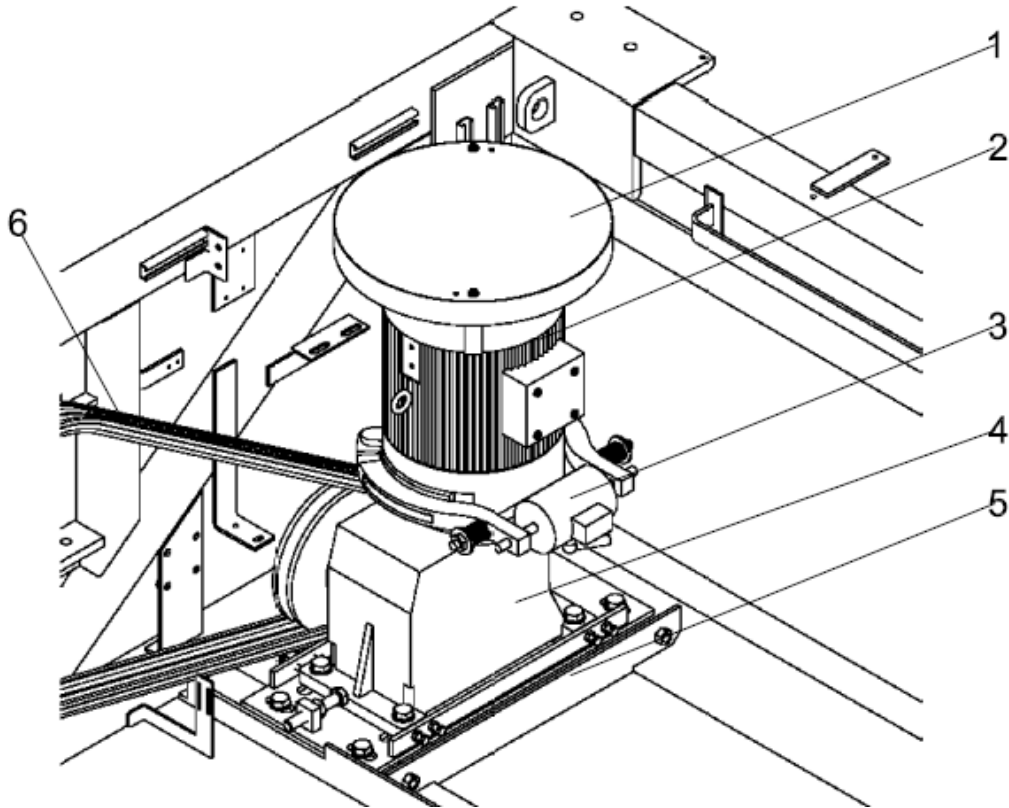
As shown in the below sketch, the drive motor(2) is directly connected to the worm gear(4). The worm gear (4) reduces the motor speed to the required nominal speed. The worm gear is connected via drive chain(6) to the main drive shaft and with it to the step chain sprocket wheel. A handrail drive sprocket is located on the main drive shaft to feed the handrail drive shaft via handrail drive chain and the handrail drive wheels.

The flywheel (1) is provided on the motor as a hand winding device. The step band can be moved manually by turning the flywheel.

The service brake (3) operates directly on the drive system through a brake drum, which is directly connected to the motor running shaft.

Motors are all conveniently interchangeable and are IP55 protection rated against the ingress of dust and water. The motor has class F insulation and incorporates a PTC thermistor within its windings to prevent damage in the event of overheating.

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1 Flywheel; 2 Drive motor; 3 Service Brake; 4 Gear box; 5 Base plate; 6 Drive chain

The motor power configuration for this project as below:

Motor Power	Escalator with 800mm step	Escalator with 1000mm step
5.5KW	VR up to 4.65m	VR up to 3.45m
7.5KW	VR up to 6.40m	VR up to 4.76m
9.2KW	VR up to 7.88m	VR up to 5.88m
11KW	VR up to 9.45m	VR up to 7.05m
15KW	VR up to 12.95m	VR up to 9.67m

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Drive unit data sheet

Basic technical parameter of the drive unit as below

Gear Box							
Manufacturer	TSUBAKI EVERBEST						
Gearbox type	FTJ125A R	FTJ125A R	FTJ160D R	FTJ160D R	FTJ160 R	FTJ160 R	FTJ160D R
Gearbox oil type	VG460 Mineral oil, 7 liter		VG460 Mineral oil, 15 liter		VG460 Synthetic oil, 12 liter		VG460 Mineral oil, 15 liter
Reduction ration	24.5:1						
Safety factor of gearbox	> 5 against 100% of load						
Efficiency of Gearbox	88%	88%	88%	88%	88%	88%	88%
Motor							
Manufacturer	Jiali	Jiali	Jiali	Jiali	Jiali	Jiali	Jiali
Motor type	YFD132M-6	YFD132L-6	YFD180M-6	YFD180M-6		YFD180L3-6	YFD180L1-6
Motor power	5.5 KW	7.5KW	7.5KW	9.2KW		15KW	11KW
Power supply	400V/50Hz	400V/50Hz	400V/50Hz	400V/50Hz		400V/50Hz	400V/50Hz
Motor nominal speed	960rpm	960rpm	960rpm	960rpm		960rpm	960rpm
Protection class	IP55	IP55	IP55	IP55		IP55	IP55
Rotation inertia	0.22kg*m ²	0.24kg*m ²	0.32kg*m ²	0.34kg*m ²		0.39kg*m ²	0.36kg*m ²
Starting current Y	25A	34A	35A	41.5A		60A	44A
Starting current D	72A	102A	100A	126A		186A	135A
Nominal current	11.5A	16A	15.5A	19.5A		29.5A	21A
Insulation class	F	F	F	F		F	F
Cos phi	0.77	0.78	0.78	0.78		0.79	0.78
Power loss (KW)	0.97	1.27	1.27	1.52		2.24	1.79

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Copenhagen Metro

Technical Specification



Pole pair	3	3	3	3	3	3
Efficiency of motor	85%	85%	85.5%	85.5%	87%	86%
Nominal torque of motor	54.74Nm	74.64Nm	74.64Nm	91.56Nm	149.29Nm	109.48Nm
Motor Brake						
Brake Type	Electrical-magnetic, block, middle position					
Brake lining material	Non-asbestos					
Brake torque	2X45Nm	2X45Nm	2X45Nm	2X65Nm	2X85Nm	2X70Nm
spring length (for reference)	48mm	48mm	48mm	44mm	38mm	38mm
supply voltage	220/230/240 (±10%)AC					
protection class for brake coil	IP55	IP55	IP55	IP55	IP55	IP55
insulation class for brake coil	F	F	F	F	F	F
brake lift monitoring switch bracket	With	With	With	With	With	With
Brake lift monitoring switch type for reference	Quantity:2					
Drive assembly						
Ambient temperature	minus 5°C to 40°C					
Ambient humidity	monthly average <=90%, t average <=25 degree					
Drive noise	full load: <58 dB(A)			full load: <60 dB(A)		
Drive weight	250kg	350kg	350kg	350Kg	380kg	350kg

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5. Tracks

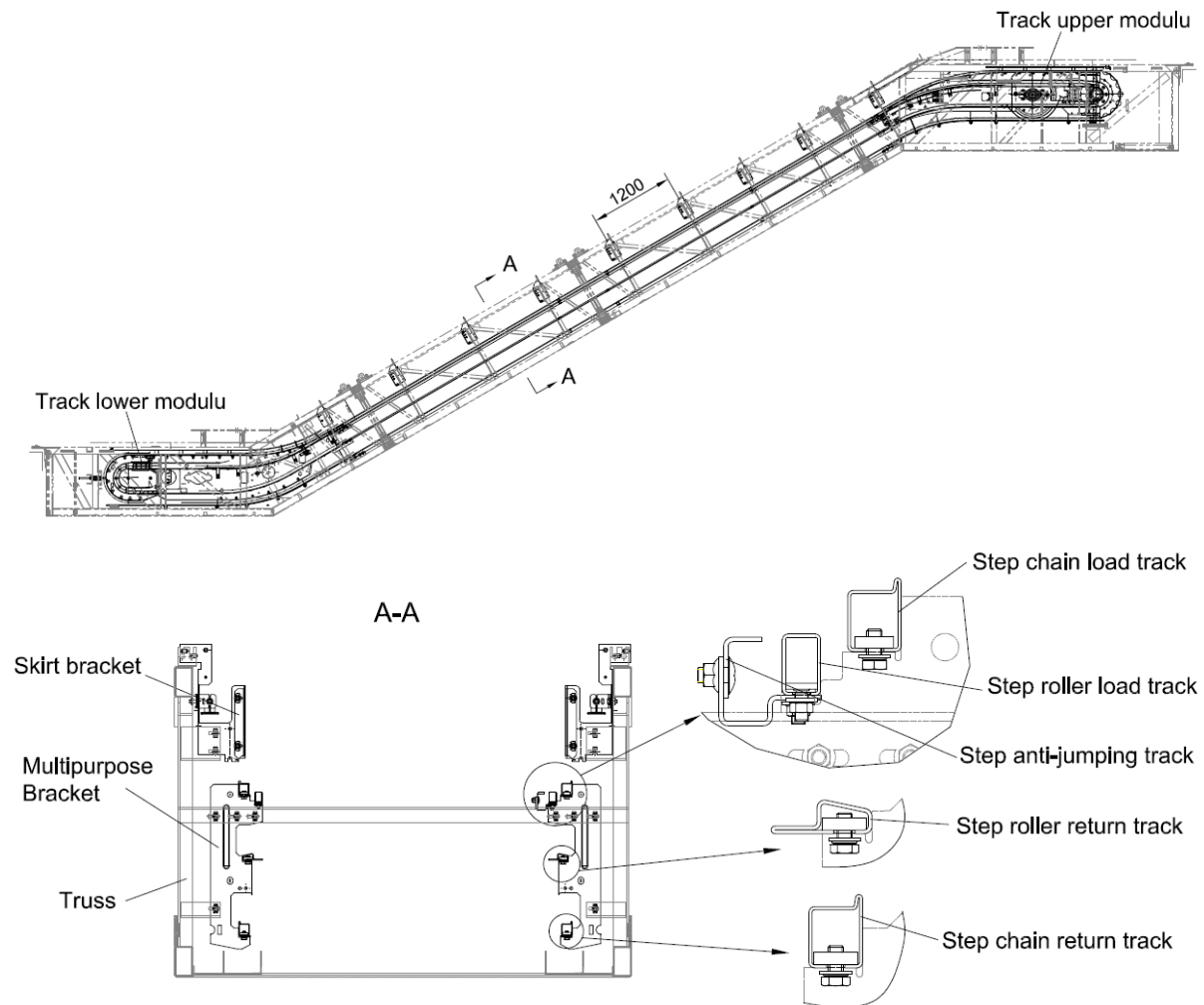
The steps and step chains are positively and accurately guided throughout their entire running path within the escalators.

The entire length of the forward rails for the steps is an anti rising system and at the return station a counter rail system will be installed.

For outdoor escalator, chain guards are provided to protect against water and dust.

Easily adjustable and renewable synthetic guide pieces are employed at the step inlets for accurate interfacing of the step grooves and combs.

At upper and lower truss, the track is formed by upper and lower modules, which are easy to install and require no maintenance. The tracks are bolted to the truss at intervals of 1200 mm to ensure that they give the rigid support required to aid the ride comfort and stability of the steps.



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The track system is designed and fabricated to support and retain the steps in the proper position, to provide a smooth running of the steps and prevent step up-lifting continually, under all load conditions at design speeds. The design will allow installation and removal of mechanical components without dismantling the structure. The track system will be constructed of steel. The track surface will be straight and smooth.

All joints will be diagonal across the width of the running surface.

Wearing surfaces will be a minimum of 2mm thickness. This requirement is applicable to the step roller track and the chain roller track for the passenger side.

The return tracks (unloaded area) are made of 2mm of rigid, drawn-steel sections galvanized protected material. A means of guiding the steps will be provided to ensure that the steps are in the proper position with correct clearances in accordance with EN 115.

Technical summary for step track

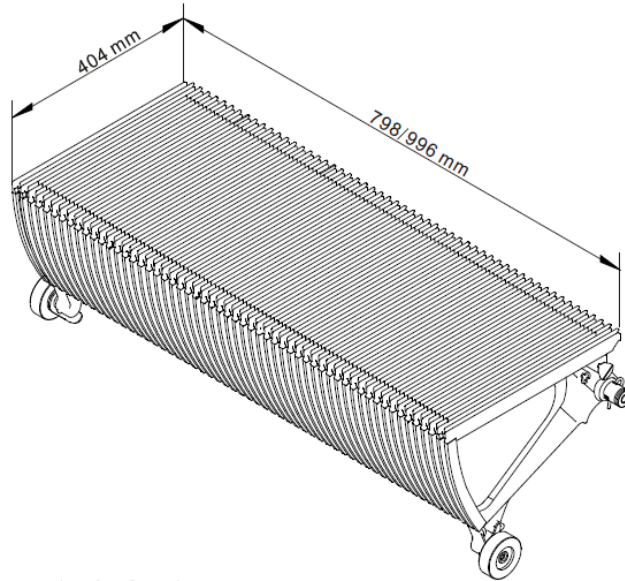
Item	Description or reference
Type	Drawn steel profiles
Surface finish	Galvanized
Material thickness	Upper tracks: - 2 mm as standard Lower tracks: - 2 mm as standard
Step band transition radii	1500 mm (upper) and 1000 mm (lower)

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6. Step

The steps are one-piece precision die-castings of special high-strength aluminium alloy (Al). The material is Al Si EN AB 44300 according to DIN EN 1676.

The finish of the step is natural Aluminium with silver colour (RAL9006). Treads and risers are ribbed and grooved in accordance with EN 115-1:2008+A1:2010 to provide the closest possible running gaps between treads and combs and between successive steps.



For this project, two type steps are used, one is step with width of 996mm and the other is step with width of 798mm. All steps with the same width are fully interchangeable. Each step is provided with two 75 mm diameter step rollers for low rolling resistance and wear. The step rollers are equipped with life-lubricated sealed precision ball bearings and bonded tyres of abrasion and oil resistant synthetic material.





The individual step rollers are attached to the step casting by means of a shouldered stub axle having a single self-locking retaining nut. Thus, rollers can be very easily detached and replaced whenever required.

The steps are connected to the step chain driving pins, on both sides, at 400 mm intervals, by means of counter-bored slide bolts having intervening synthetic bushes between their bores and the chain driving pins.

Each slide bolt is retained by a tab-locked set screw. Step removals and replacements are easily effected at either the drive or return end of the escalator and are a matter of a few moments work. No dismantling of skirt panels or other assemblies is necessary.

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The steps, though having great strength and rigidity, are sufficiently light in weight, so that their removal and installation can be comfortably handled by one man.

检测
 CNAS L0454 2011000708Z (2011)国认监认字(134)号

TX

Certificate of Type Test for Special Equipment


No. TX B380-003-13 0005

Applicant's name and address:	Guangdong Hongtai Technology (Holding) Co., Ltd. The 2 nd Development Zone, Nan'an Town, Gaoyao, Guangdong
Manufacturer's name and address:	Guangdong Hongtai Technology (Holding) Co., Ltd. The 2 nd Development Zone, Nan'an Town, Gaoyao, Guangdong
Name of product	KONE MAP Escalator Step
(Type of equipment):	(Escalator Step)
Model and specifications:	(600~996)×404.3(mm)(5270800D10)
Configuration of product:	See annex
Type test report No.:	T3-B38-13-005

This certificate is valid for products of the models and specifications below (without change of the product configuration): /

After type test, this product is accord with the *Rules of Type Test of Elevators (tryout 2012)*, *Rule for Type Test of Escalator Steps and Passenger Conveyor Pallets (tryout 2012)*, *GB 16899—2011* and *EN 115-1:2008*.

Issue date: 2015-03-15



NETEC
National Elevator Inspection and Testing Center

Note:

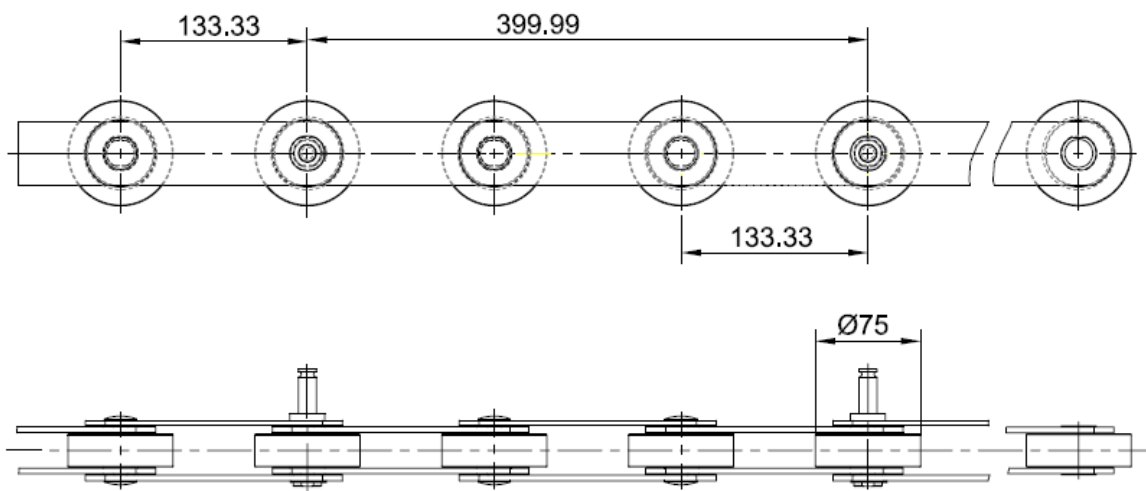
1. This certificate is to confirm the products on type and the tested sample on conformity, only valid for the products that are in conformance with the tested sample mentioned above.
2. The holder of this certificate has responsibilities to ensure that the products conform to the requirements of the codes and regulations, and to ensure that the products are consistent with the tested sample mentioned above.

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7. Step chain

Step and step chain together form the step band. The step chain (step band) is driven by the drive sprocket wheel mounted on the main drive shaft.

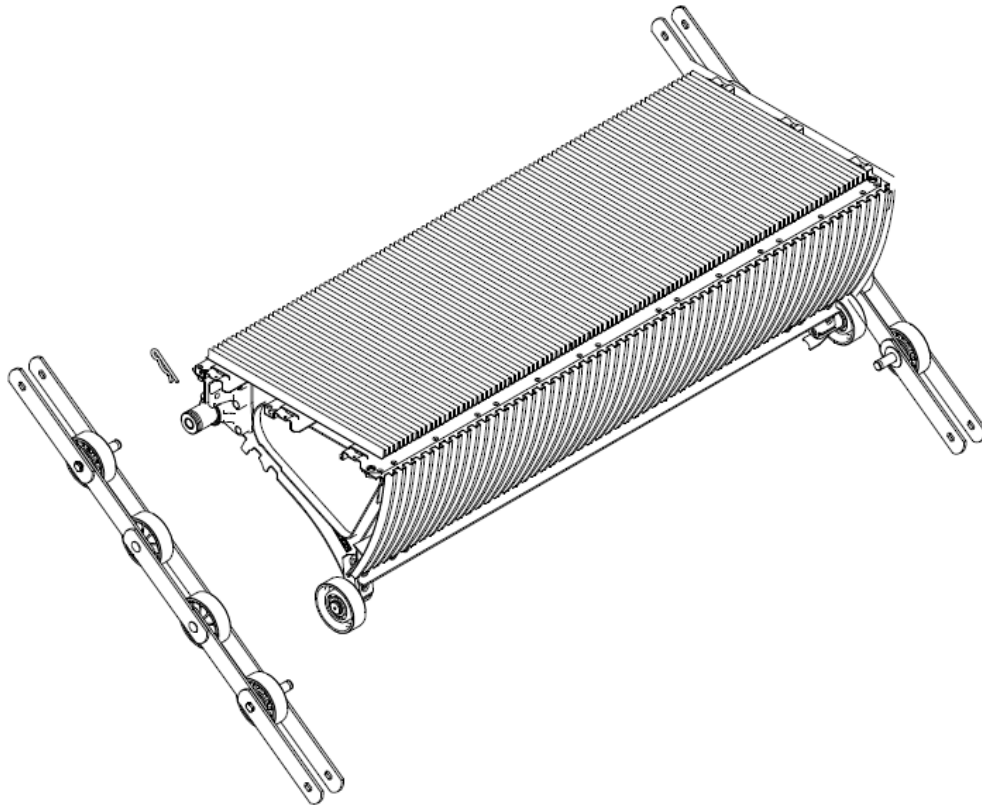
Step chains use the endless roller type and locate on both sides of the moving step. Chains are provided in matched lengths and be of high quality hardened and tempered material construction incorporating links, pins, bushes, axles and rollers.



The pitch of the step chain is 133.33mm. The diameter of the step chain rollers is 75mm with width of 23.5mm. The step axles are fitted into the chains at a pitch of 400 mm. The axles and rollers are subject to only oscillating motion and require minimum maintenance. Drawn steel sections positively guide the step chains throughout their entire length.

KONE TransitMaster™ 120 escalator uses step chain with rollers inside the chain.

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The design of the escalators of this contract is based on what is requested by specification conditions like safety factor of 5 and a pin pressure of 32N/mm² as well as what is required according to standards like EN115-1 2008+A1_2010.

The chain types are listed below:

Installation	Step type	VR (mm)	Chain type
Indoor	S1000	≤ 6110	10DH-C
		≤ 7220	13DH-C
		≤ 11780	20DH-C
	S800	≤ 7580	10DH-C
		≤ 9410	13DH-C
Outdoor	S1000	≤ 7220	13RI-B-TS
		≤ 11780	20RI-A-TS
	S800	≤ 9410	13RI-B-TS

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Step chain main parameter as below:

Chain type	Chain breaking load	Chain pin diameter	Bushing length	Chain weight (0.8m)	Joint area
	kN	mm	mm	kg	mm ²
10DH-C	80	12.5	34.4	3.28	430
13DH-C	105	12.5	34.4	3.6	430
20DH-C	173	20	34.6	5.92	692
13RI-B-TS	105	12.5	34.4	3.6	430
20RI-A-TS	173	20	34.6	5.92	692

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8. Skirt and skirt brush

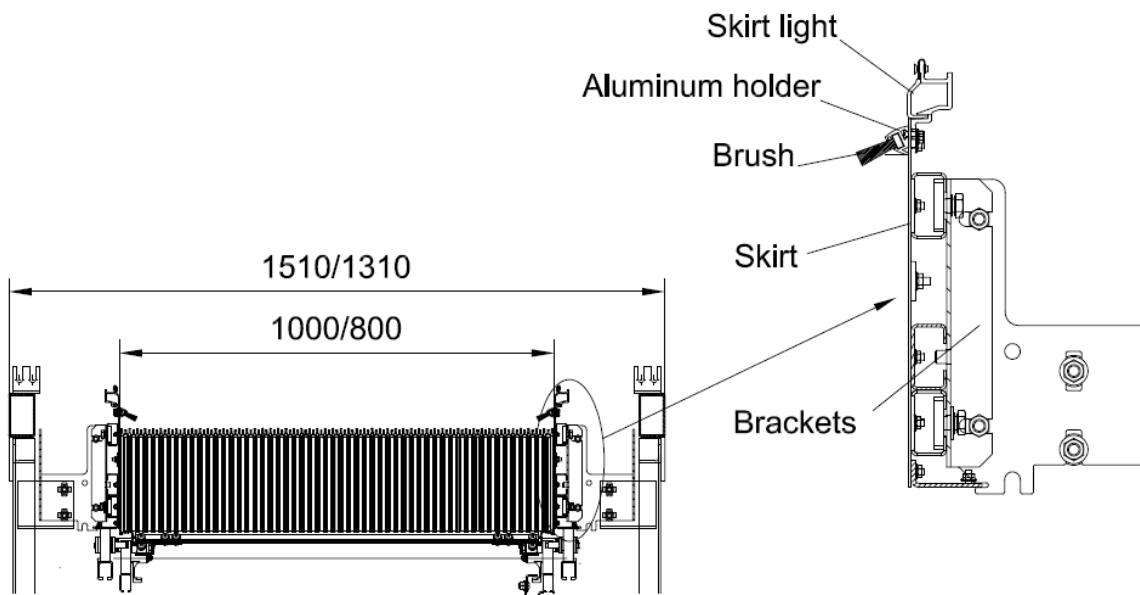
Skirt

The skirts limit the steps to both sides; the steps are not supposed to touch the skirts (distance max. 7 mm in total/ max. 4 mm at each side).



The rigid skirts are fabricated from 2 mm thick stainless steel (Grade 304), hairline finish, with a coat of low coefficient of friction.

The skirts have always to be well adjusted to prevent steps scratching the skirting or leaving too big gaps. Therefore, the skirts are easily adjustable for precise positioning in relation to the step band.

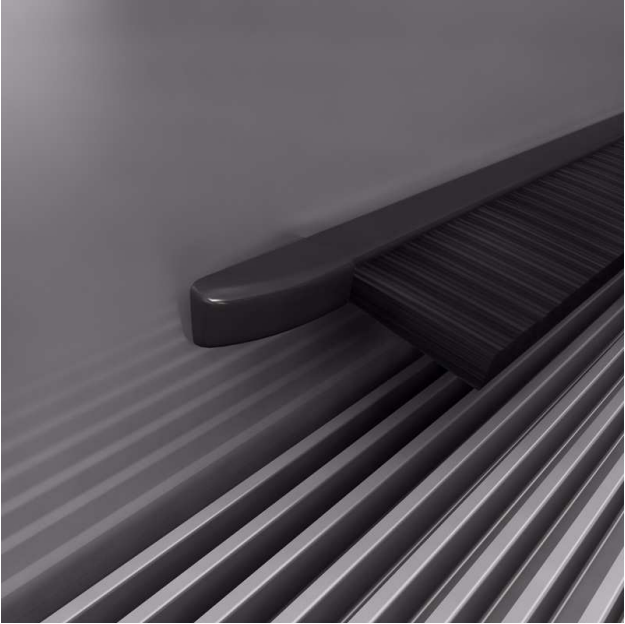


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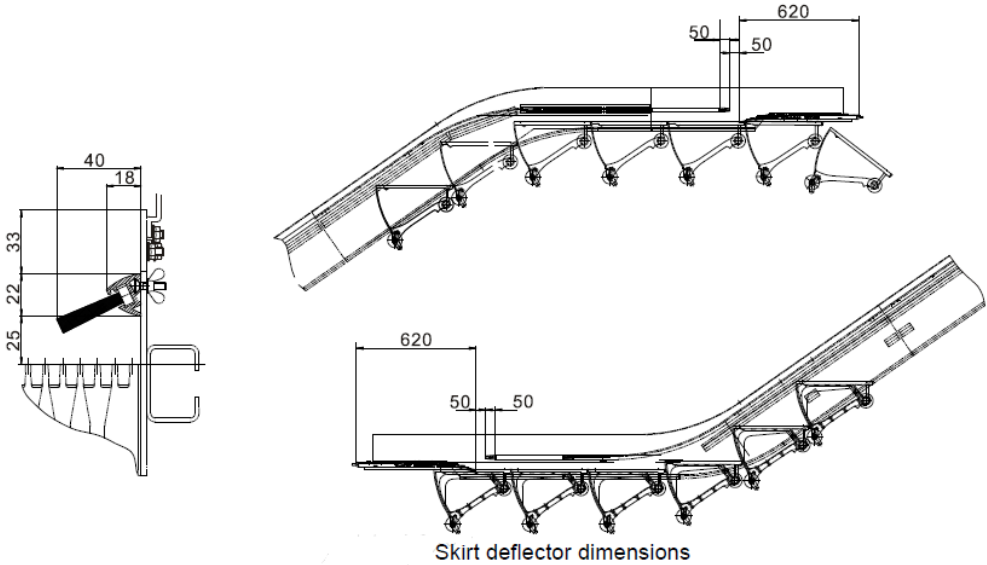


Skirt Brush Deflector

Skirt brush guards (brush guards) are installed to deflect passenger's feet away from the skirt. This considerably reduces the possibility of trapping in the gap between the step and the skirt. The skirt brush is made of single row deflector with black aluminium holder.



Layout of Skirt Brush Deflector

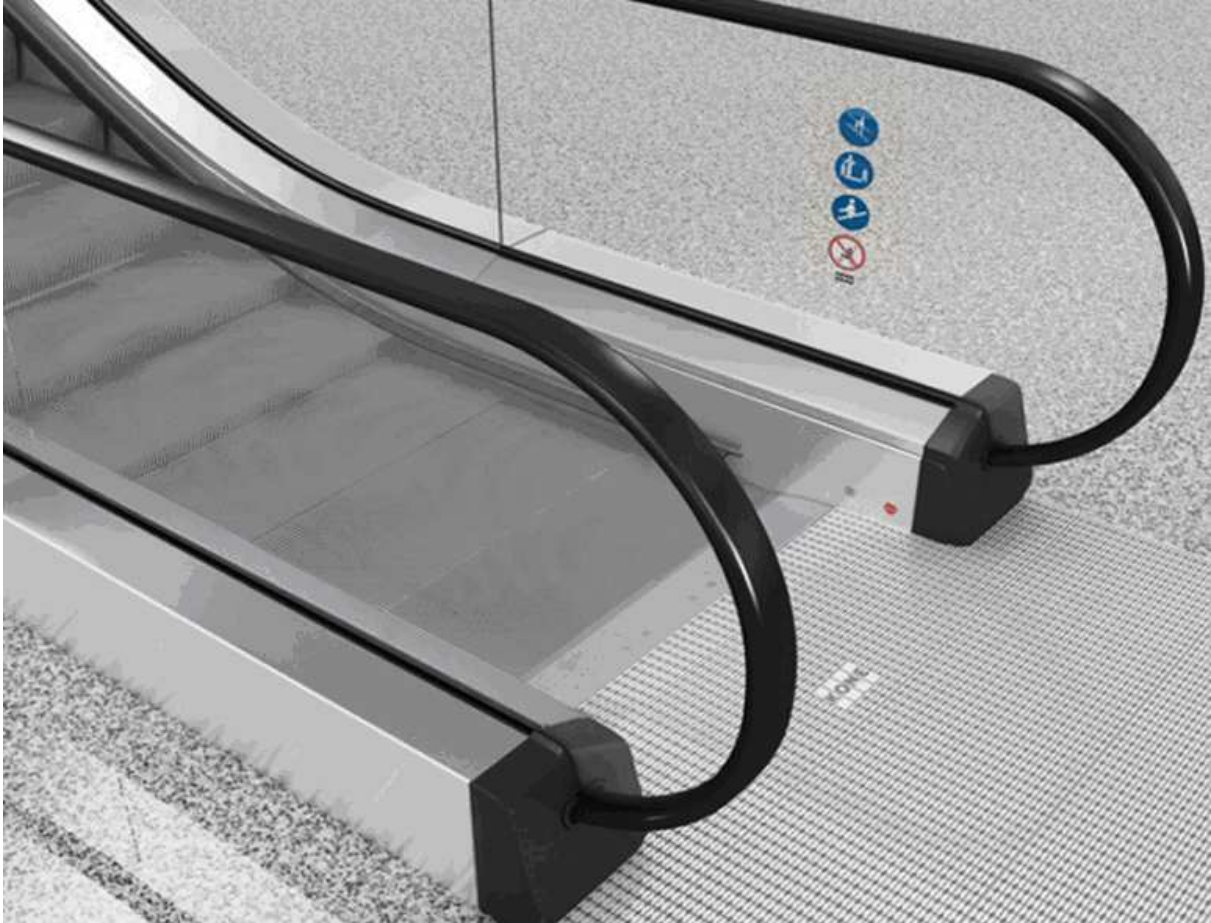


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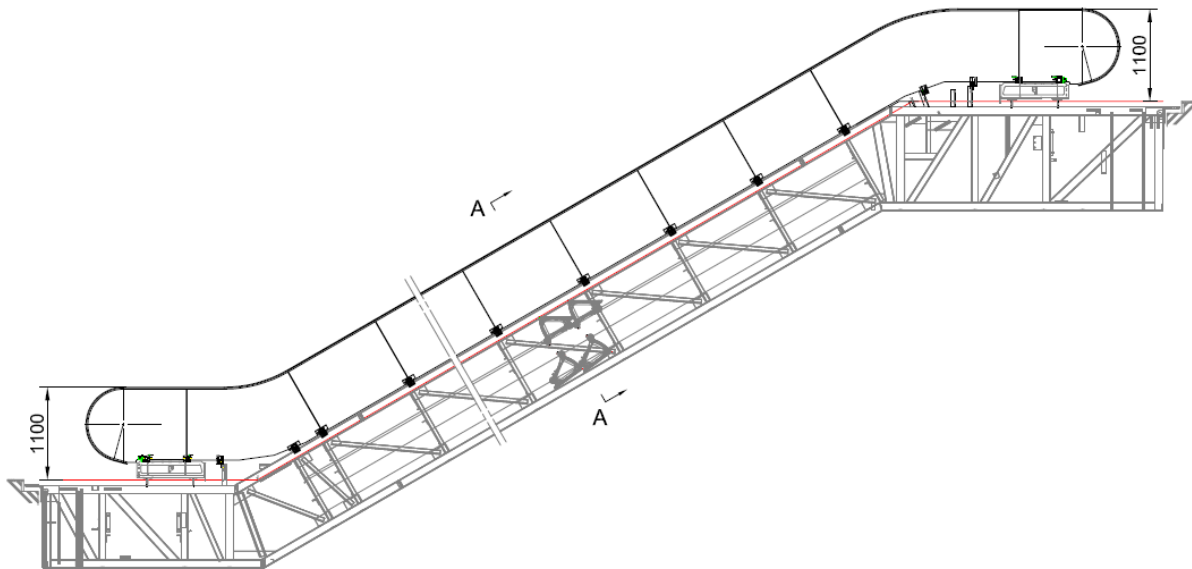


9. Balustrade

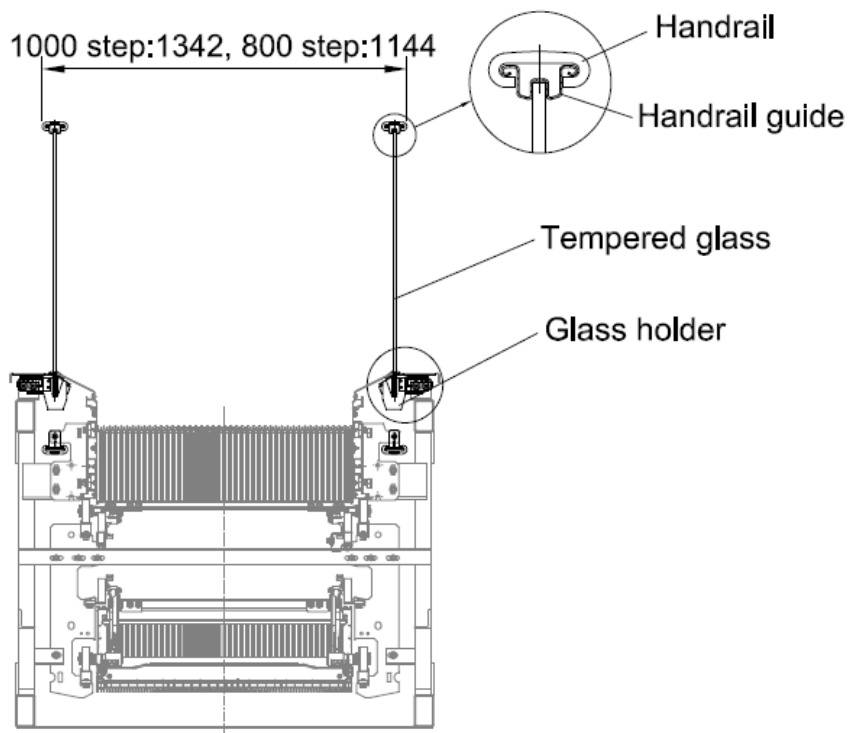
The glass balustrades are made of 10 mm thick clear tempered glass. They are self-supporting without the need of support mullions. The inclined panels are separated into standard lengths of 1200 mm and neatly butt up to each other without cover strips.



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A-A

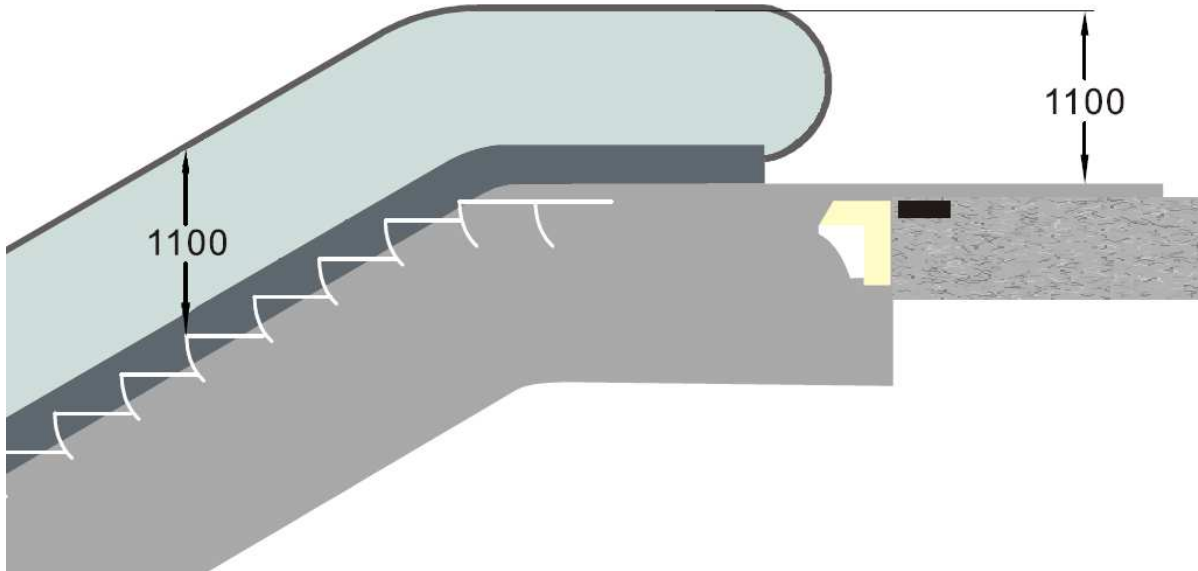


The handrail guide profile is made of 1.5mm stainless steel 316L.

The balustrade height is measured vertically to the top surface of the handrail from the nose of the steps on the inclined section and from the finished floor level at the landings. The balustrade heights

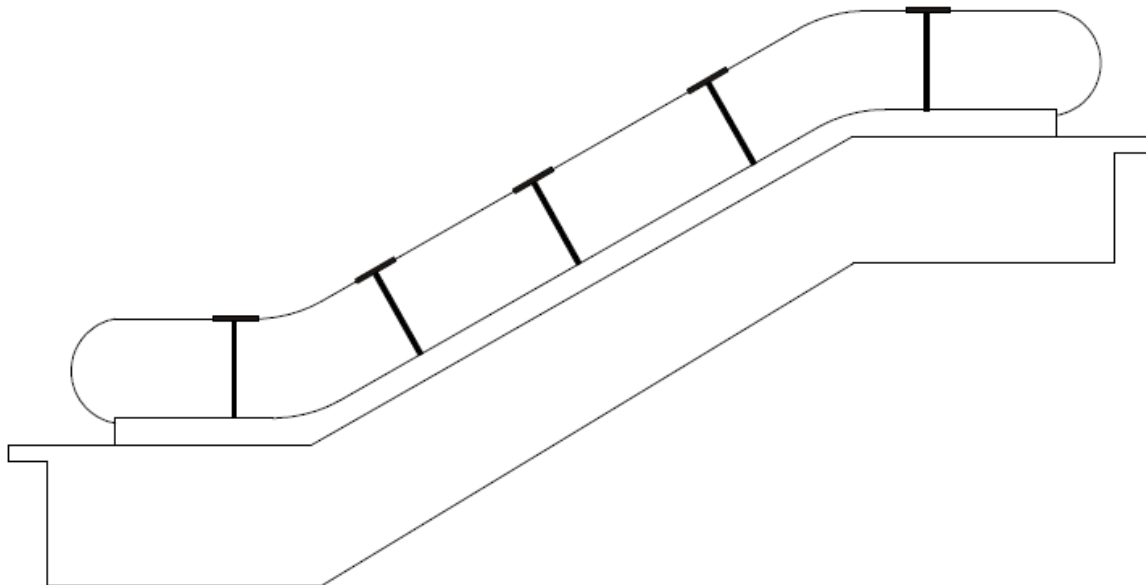
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of 1100 mm, higher balustrades increase safety for adults. The higher the balustrade is, the less likely passengers fall over the balustrade if they lose their balance.



The joints between the glass balustrade panels are arranged perpendicular to the truss.

The inclined panels are 1200 mm wide, except that one or two make-up panels at the upper curve compensate for the individual vertical rise.



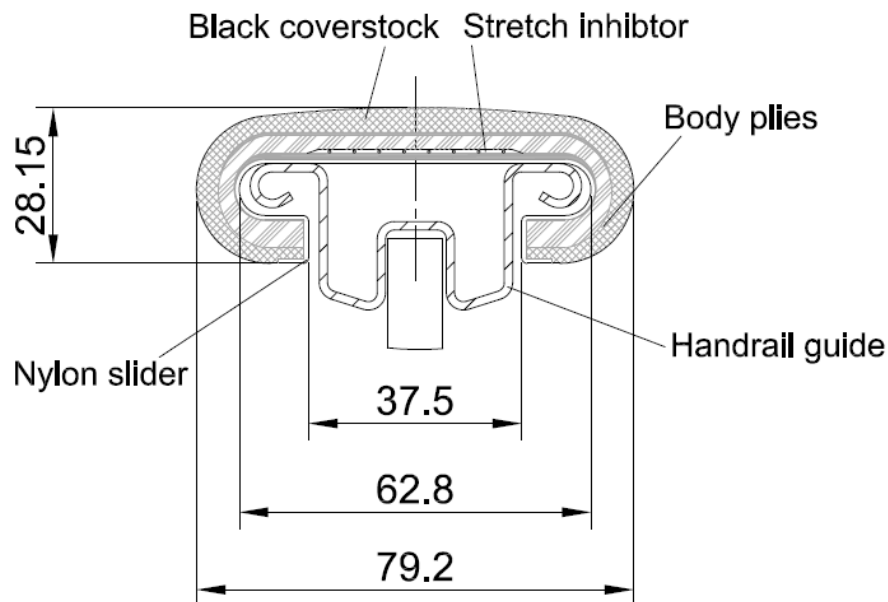
Joints perpendicular to the truss

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10. Handrail

A smooth and continuous running handrail is provided on each side along the escalator balustrade. Handrail guides made of stainless steel 316 material that are mounted on the balustrade control the path of each moving handrail and are designed assure minimum friction between the moving handrail and the guiding surface. The handrail will be black color. The handrail's cross-section will be of "C-shape" type.

Handrails will be constructed of good quality fire resistant synthetic rubber with pre-stretched yarn inlays and steel wire reinforcement to eliminate stretch of the handrail. The hardness of the outer stock will be at least Shore A 70 ± 5 . The ultimate breaking strength of the handrail will be not less than 25kN. There will be one factory made vulcanized joint in each handrail (endless handrail). So far, the design is in compliance with the requirement of the specification.

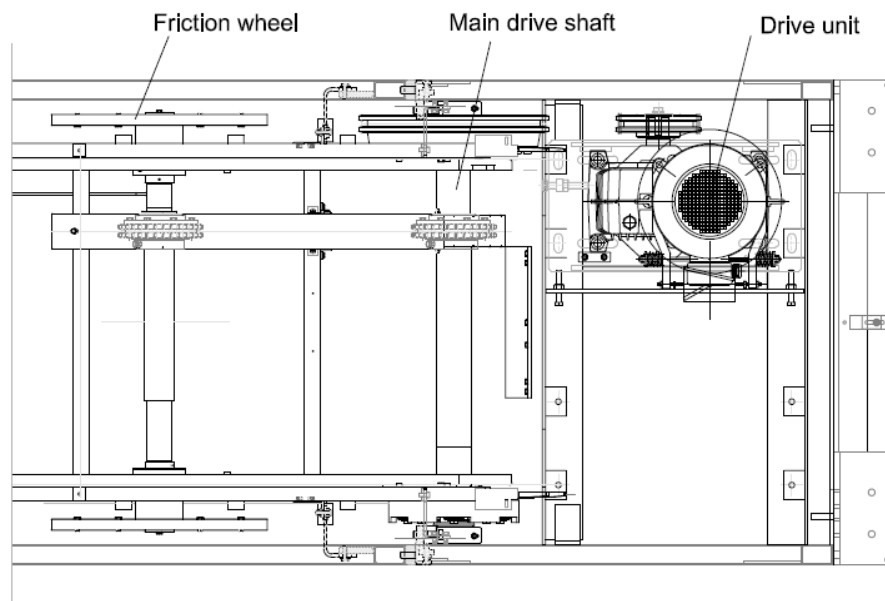
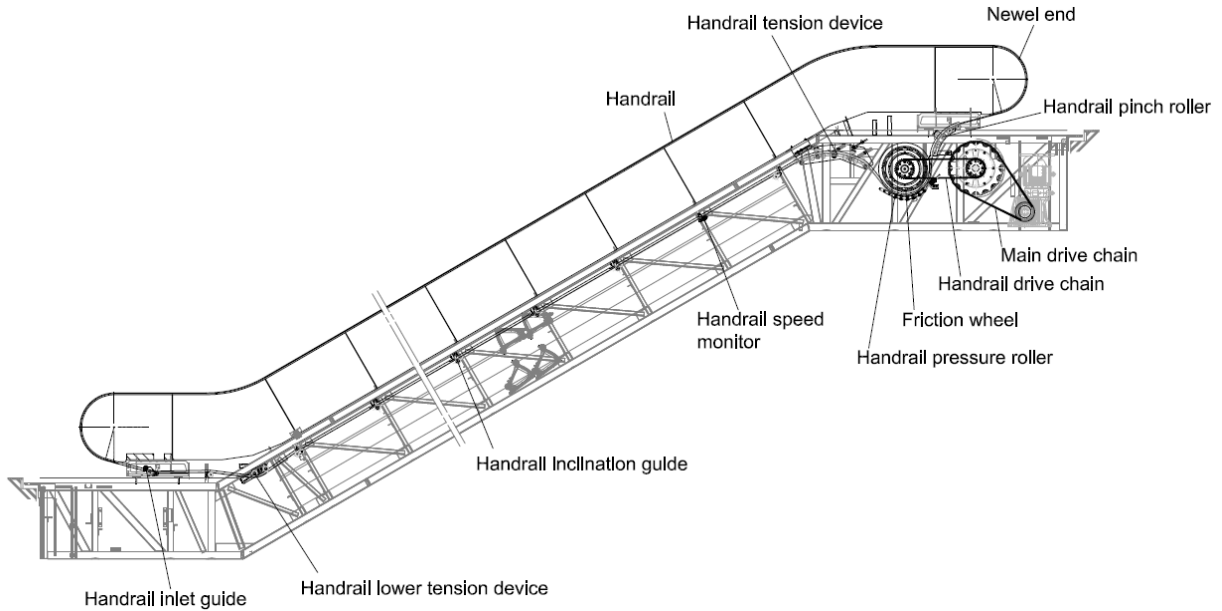


The handrail drive is a traction type system and arranged to run with minimum friction. A tension device for the handrail will be provided. The drive is located at the upper landing. It combines the function to run the step band and the handrail. The drive transmits the driving force via the gear, the drive chain, the main shaft, the handrail chain, the handrail shaft and the handrail wheel which drives

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the handrail. The Handrail is driven by the Handrail wheel at both sides and the handrail pressure roller chain.

An adjustable tension device is installed at the upper end of the escalator truss to provide initial adjustment of the handrail. The tension device can be easily accessed by opening the inner decking / inner balustrade at the upper curve.



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Hand and finger guards are provided at the point where the handrails enter the balustrade. Electrostatic charges accumulated on the handrail surface due to the running motion of the handrail in dry environment will be effectively removed by a metallic roller directly grounded to earth. Each handrail is grounded by one roller.



TX

Type Examination Certificate for Special Equipment

No. TX B3D0-026-09 0030

Name and address of manufacturer: EHC Escalator Handrail (Shanghai)Co., Ltd
58# Chanbo Road, Malu County, Jiading, Shanghai, China

Name of Product: Handrail (No Splice)

Type of Product: 7838VW NX BLACK

Product Configuration: /

Number of Type Examination Report: TX B3D0-026-09 0030

Certificate issued on the basis of the requirements: Regulation for Type Tests of Elevator, GB16899-1997 and EN115:1995.

Date of submission: 2010-02-02



Shanghai Jiao Tong University Elevator Test Center

- Note:**
- 1 This certificate is used to confirm the type of product with definite scope and only responsible for the test result of the sample.
 - 2 The owner of this certificate is responsible for confirming that the products comply with their standard specifications and are in accordance with the sample for type examination;
 - 3 Period of validity of this certificate is always calculated from the date of submission even if the certificate is modified.

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Special Equipment Type-Examination Report

No: TX B3D0-026-09 0030

Product Kind: Elevator

Product Name: Handrail (No Splice)

Product Type: 7838VWNX BLACK

Applicant: EHC Escalator Handrail (Shanghai) Co., Ltd

Manufacturer: EHC Escalator Handrail (Shanghai) Co., Ltd

**Shanghai Jiao Tong University
Elevator Test Center**



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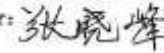
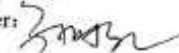

Type Examination Report

SJTUETC

No: TX B3D0-026-09 0030

Page 1 of 3

Product Name		Handrail (No Splice)		
Sample Type		7838VWNX BLACK	Brand	/
Serial Number		/		
Applicant	Name	EHC Escalator Handrail (Shanghai)Co., Ltd		
	Address	58# Chanbo Road, Malu County, Jiading, Shanghai, China		
Manufacturer	Name	EHC Escalator Handrail (Shanghai)Co., Ltd		
	Address	58# Chanbo Road, Malu County, Jiading, Shanghai, China		
Design Specifications	Tensile Strength (kN)	> 25kN	Handrail Width(mm)	79.2
	Inner Width (mm)	62.8	Inner Depth(mm)	10.6
Testing Place	Shanghai Jiao Tong University Elevator Test Center (800# Dongchuan Road, Shanghai, China)			
Date of Testing	2010-02-02	Kind of Testing	Type Examination	
Testing Conditions	OK	Examination Items	All Suitable Items	
Basis of Testing	Rules of Handrail Type Examination, GB16899-1997, EN115:1995,			
Testing Conclusions	<p>According to the test results, the handrail complies with Rules of Handrail Type Examination, GB16899-1997 and EN115:1995</p> <p>The sample is regarded as a qualified product.</p> <p style="text-align: center;">  Shanghai Jiao Tong University Elevator Test Center Date of submission: 2010-02-02 </p>			

Approver:  Verifier:  Inspector: 

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Type Examination Report

SITUETC

No: TX B3D0-026-09 0030

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No.	Items	Result	Conclusion
1	Tensile strength (> 25kN)	46.60 kN	OK
2	Handrail Width 79.2±2.5 (mm)	81.00mm	OK



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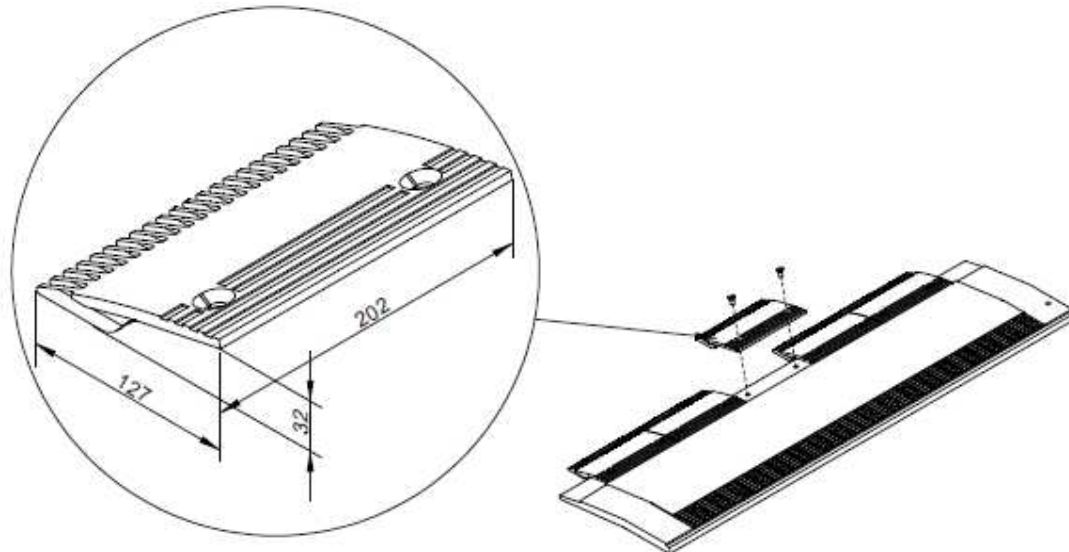
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11. Comb plates and access covers

Comb plates

Each escalator landing features a non-slip, ribbed aluminium surfaced comb plate.

The comb plates carry a series of easily renewable step comb segments across their leading edges and are designed to resist deflection under load and remain free of distortion when subjected to high passage and impact loading. Each comb plate is equipped with electrical safety devices at both sides.



Comb plate and comb segments

For greater user safety, the comb segments present a very flat landing angle of 21.9° relative to the escalator step surface.

The comb segments are precision die-cast aluminium components. The three combs in the middle segments are fully interchangeable. The comb segments at the outer edge are of different size and versions left and right.

The teeth are designed to be breakable so that if subjected to excessive load, they will break, rather than bend and perhaps cause mechanical interference or a snag hazard.

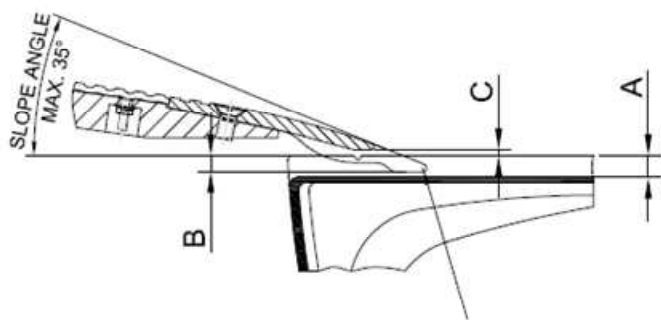
The plate lies on rollers that allow a small horizontal and vertical movement. The plate is fixed in horizontal and vertical direction by four roller supports.

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Comb plate safety contacts are arranged to be actuated in the event of any lateral or upward disruption of any individual comb segment or of the entire comb plate assembly, caused by a predetermined minimum force (approx. 510N horizontal / 300N upward).

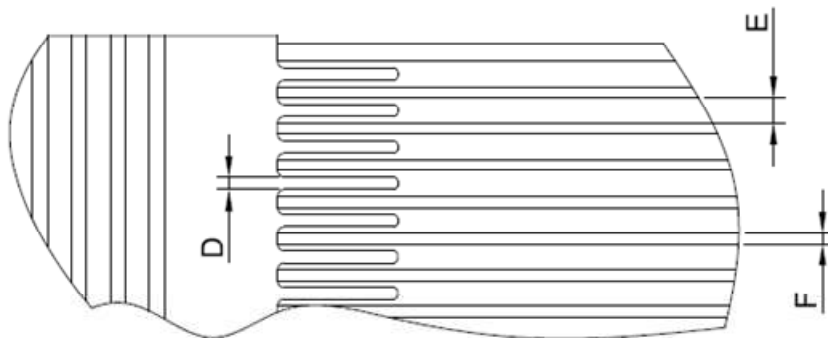
Individual adjustment of the comb segments, to maintain the desired minimal safety clearances with the step treads, is a straightforward matter, as is any required renewal.

EN115 LIMITS



- A = NOT LESS THAN 10 mm
- B = NOT LESS THAN 4 mm
- C = NOT MORE THAN 4 mm
- D = COMB TEETH MIN. 2.5 mm
- E = STEP GROOVE 5-7 mm
- F = STEP RIB 2.5-5 mm

COMB NOSING MAX. 2 mm RADIUS



Access covers

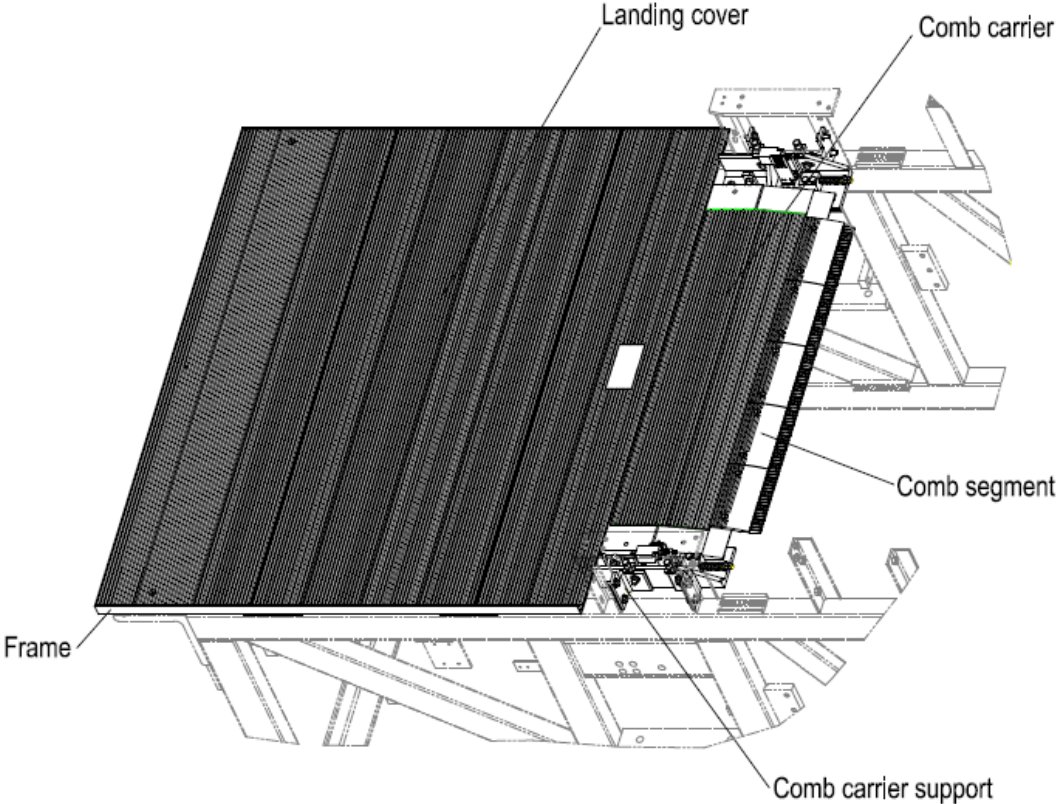
The access covers with aluminum surface are made of 30 mm thick aluminum profile with pattern surface. There is an overlapping structure between the two plates to strengthen the stiffness and to withstand the required passenger loads.

The access cover is removable to allow access into the machine compartment. It sits within a frame. Lifting handles will be provided to facilitate opening of the floor plate.

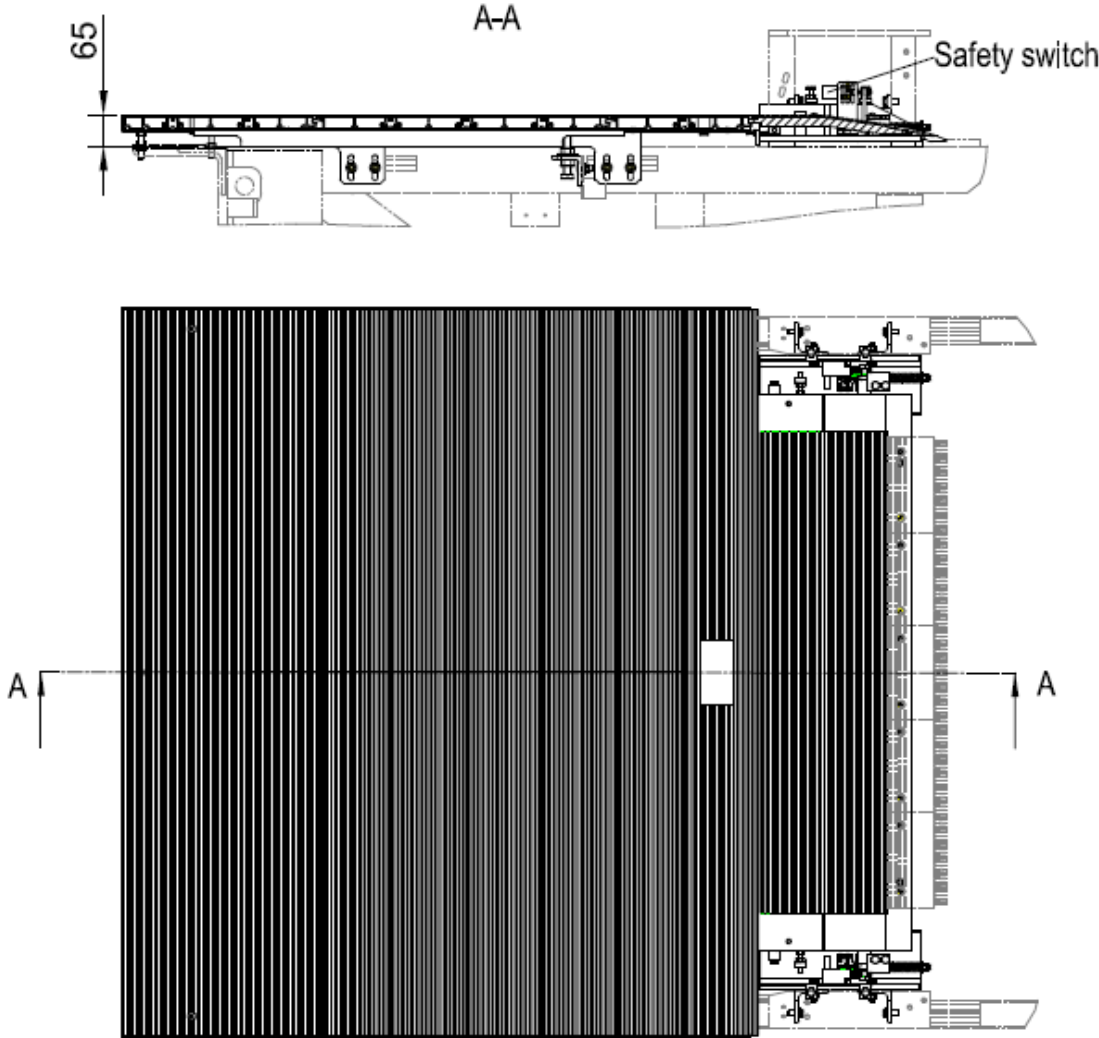
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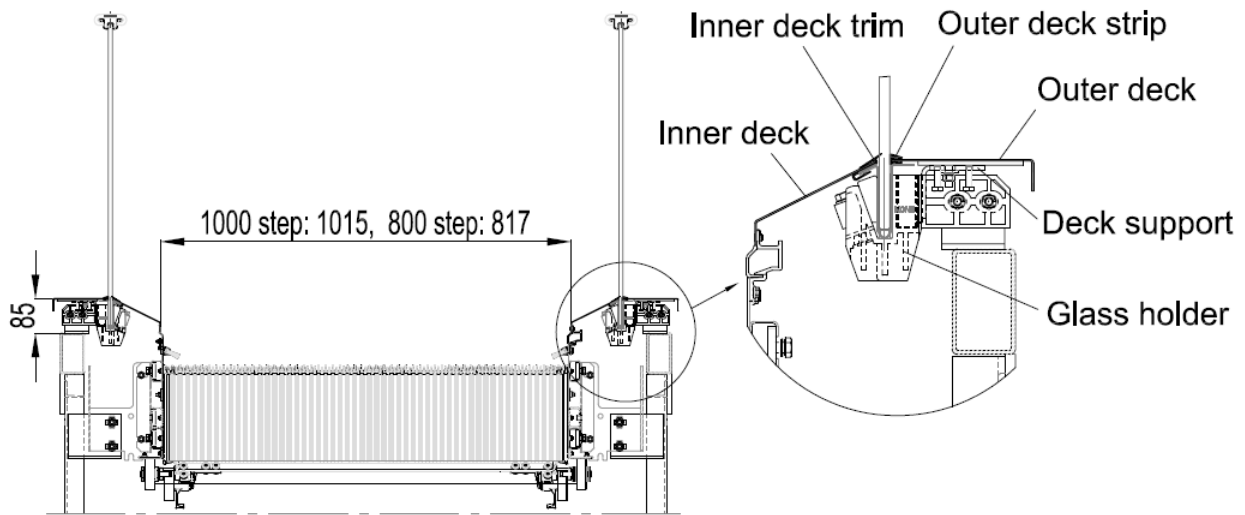
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12. Decking

The inner and outer decking are made of 1.5mm hairline stainless steel 316L, the decks are cut in pieces of 1200 mm and 2400 mm for easy installation. The standard design also includes a make-up piece of individual length in the inclined section to accommodate the rise in question.



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13. Operating and safety devices

13.1. Starting switches

The escalators are operated by spring-return; key operated starting switches located on skirt at both upper and lower end. They are removable only in the neutral position.

All Escalators of KONE designed two direction of travel, choice by a key switch which at both head. Customer can choose Rated direction of travel or one way direction of travel or Reversible direction of travel.

13.2. Emergency stop switches

On skirt at both upper and lower end, emergency stop buttons are provided according to the EN 115 requirements.

13.3. Speed Governor

An electronic monitoring system controls the speed of the motor and disconnects the power and activates the brakes when the speed exceeds the rated speed by more than **15%**

13.4. Broken Chain Safety Device

Chain monitoring contacts are installed in the lower return station which activate the brakes and stop the escalator in case of elongation or failure of the chain.

13.5. Handrail Safety Device

Safety devices are installed where the handrail enters the newels at both the upper and lower balustrade ends. In case of an object entering the gap between the handrail and the newel, the brakes get activated and the escalator stops.

13.6. Comb plate Safety Devices

Safety devices are installed both at the upper and lower comb plates which disconnect the electrical power and activate the brakes in case of any object becoming wedged between the comb and the step. This safety device operates in both the vertical and the horizontal direction.

13.7. Inspection Control

An inspection control with necessary sockets according to the EN115 requirements is installed at both the upper and lower landing.

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13.8. Step Missing Device

A safety device is installed to detect a missing step appearing at the passenger side which stops the escalator before reaching the landing.

13.9. Handrail Speed / Breakage Detecting

A handrail speed / breakage detection devices are installed to stop the escalator in case of over-/under speed exceeding the rated speed by -15%.

13.10. Skirt brush

Skirt brush is installed along the entire length of the skirt panels to keep feet and clothing clear of the possible trapping point between steps where applicable.

13.11. Phase Failure

To protect the motor and all other installed component a phase monitoring device controls the distribution voltage from the supply network.

13.12. Motor Protection

Motor protection is provided by the thermal and magnetic protection elements with manual reset incorporated in the motor circuit breaker.

To monitor the motor temperature, the motors are series-equipped with a PTC. This sensor will be monitored by the main control system EMB501.

13.13. Brake lift monitor

Brake lift monitor is provided at the motor's electro-magnetic brake to prevent the escalator from starting if the brake does not lift.

13.14. Step sag device

Step sag devices monitor the vertical step guidance of the escalator. It is installed within the step band at both upper and lower part to stop the escalator if a step sags by more than 5 mm before it enters into the comb segments. The step sag can be caused by a deformed step tread or a damaged step/chain roller.

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13.15. Electrical interlocking

According to the EN115-1:2008+A1:2010, if two or more escalators serve an intermediate landing without an exit, they must be linked together so that they stop simultaneously. This is to prevent potentially dangerous overcrowding situations caused by a running escalator feeding passengers onto an intermediate landing where the exit escalator is stationary.

13.16. Access cover monitor

Access cover monitor under the first landing plate at both lower and upper landing will disconnect the electrical power to the drive mechanism and activates the brake system to stop the escalator if the floor plate is opened unless under maintenance or inspection mode.

13.17. Broken drive chain monitor

Broken drive chain monitor underneath the drive chain to stop the escalator when the drive chain is broken.

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