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KONE

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KONE Planning guide Escalators, ramps and autowalks

I ♥
Escalators

KONE Escalators, ramps and autowalks

WELCOME & HOW TO USE IT

Welcome



- Our objective is to deliver consultative sales to our customers with innovative People Flow™ solutions to create the best user experience.
- Allowing people to move around smoothly, safely and eco-efficiently in and between buildings in a fast developing urban environment
- This Planning Guide is a clear, easy-to-understand and comprehensive guide to all the main process stages, from initial project planning to final commissioning.
- It will help you select the correct solution for each specific application, and recommend ways to optimize the People Flow™ within your building.
- It will also help you understand the relevant building regulations and the European escalator and autowalk safety code.
- Where you still have questions, please contact your local KONE sales representative, who will be delighted to give you the necessary support.

How to use



- You can flick through the table of contents and quickly access the relevant information you need.
- The index shows clearly which are the main topic in each part: you can select the most interesting for you or indulge in all the material, as you need.
- The initial part deals with an introduction to escalators and autowalks and how to optimize people flow within your building.
- Then it takes you through how to configure your solution and addresses key construction considerations.
- We also explain how to install the escalator or autowalk and look at some of the most pertinent changes to the EN 115-1 code.

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- ➔ Part 2: Introduction
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Introduction

KONE ESCALATORS, RAMPS AND AUTOWALKS

Definition



- An escalator is a moving staircase for transporting people between floors of a building. It is generally agreed that an escalator is the most efficient way to move large numbers of people between floors.
- Escalators are needed for moving people reliably, comfortably and safely from one floor to another.
- Ramps can be used in retail environments, together with shopping trolleys.



Quick Tips!



- The use of both shopping trolleys and baggage carts on [escalators](#) is unsafe and not permitted.
- Where shopping trolleys and/or baggage carts are available in the area around escalators, suitable barriers should be provided to prevent access with them.
- Baby trolleys and/or wheelchairs are not allowed, both on escalators, ramps and autowalks.

Basics for escalators

KONE's escalators come in a diverse range of specifications:

- Inclination 27.3°* | 30° | 35°
- Step width 600 ** mm | 800 mm | 1000 mm
- Speed 0.5 m/s | 0.65 m/s | 0.75 m/s
- Level steps 2 | 3 | 4*
- Environment Indoor | semi-outdoor | fully outdoor***

*) only for infrastructure escalators

**) not recommended in modern application due to the narrowness & limited space for end-users

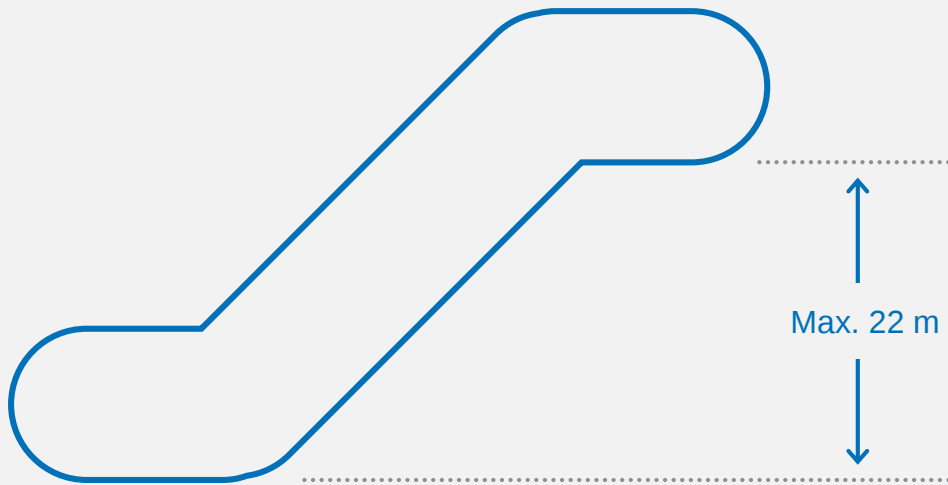
***) only for escalators

Vertical Rise

WHAT IS THAT?



Vertical Rise



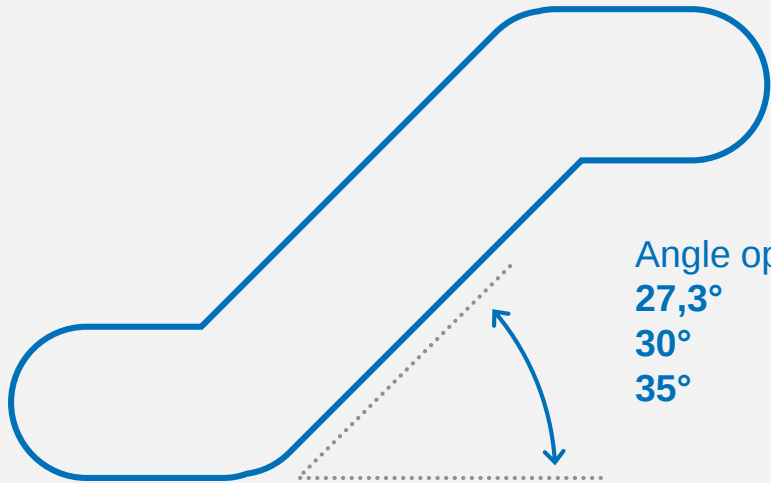
- The most important characteristic of an escalator: how tall it should be to connect floors in your building
- Our standard escalators are up to 22 m but our KONE representative will help you in case you need something higher

Inclination angle

WHAT IS THAT?



Inclination



Angle options:
27,3°
30°
35°

- Inclination is the angle with the horizontal line of your building
- Our standard escalators have 3 possible angles, depending on the service for which they have to be designed for

Quick Tips!



WHICH INCLINATION (ESCALATORS) IS BETTER FOR MY NEEDS

35° inclination

- Offers the most compact dimensions & maximize space for sales in a shopping building
- Preferable when space is restricted on site
- Offers the lowest capital cost for a given vertical rise
- Common in retail applications
- Allowed only below 6 meter VR and with max 0,5m/s speed

30° inclination

- Offers a good compromise between passenger comfort, safety and the overall length of the escalator
- used in both commercial and infrastructure applications

27.3° inclination

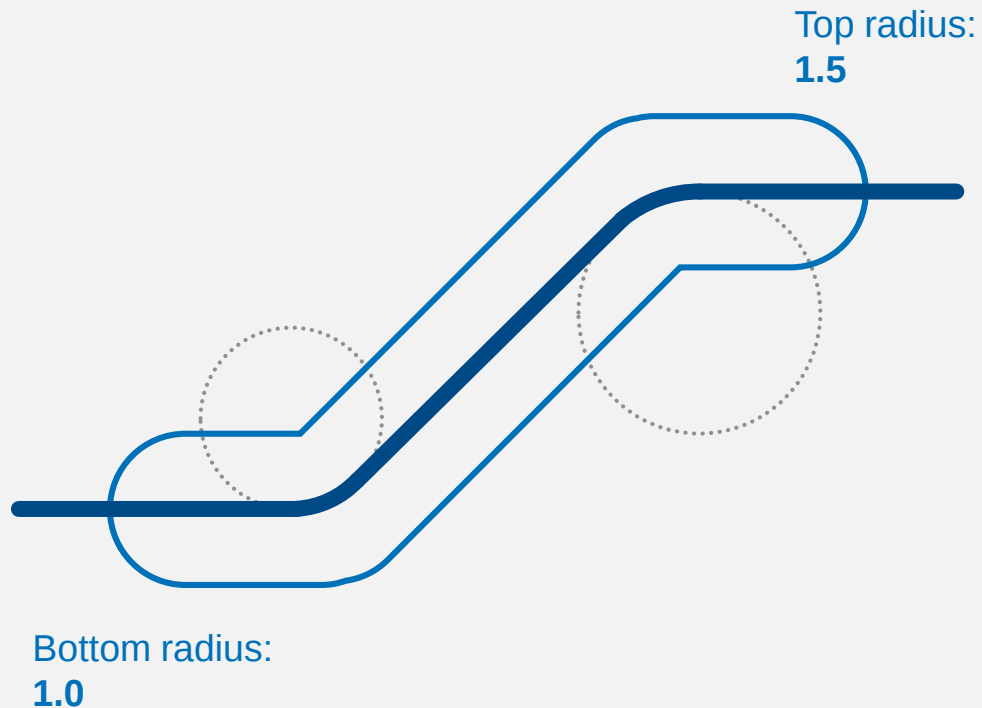
- Same angle as staircase
- Nice visual appealing when the escalator is installed adjacent to a staircase as it provides a good alignment between the escalator truss and the staircase
- More expensive
- More space is needed (span is longer)

Transition Radii

WHAT IS THAT?



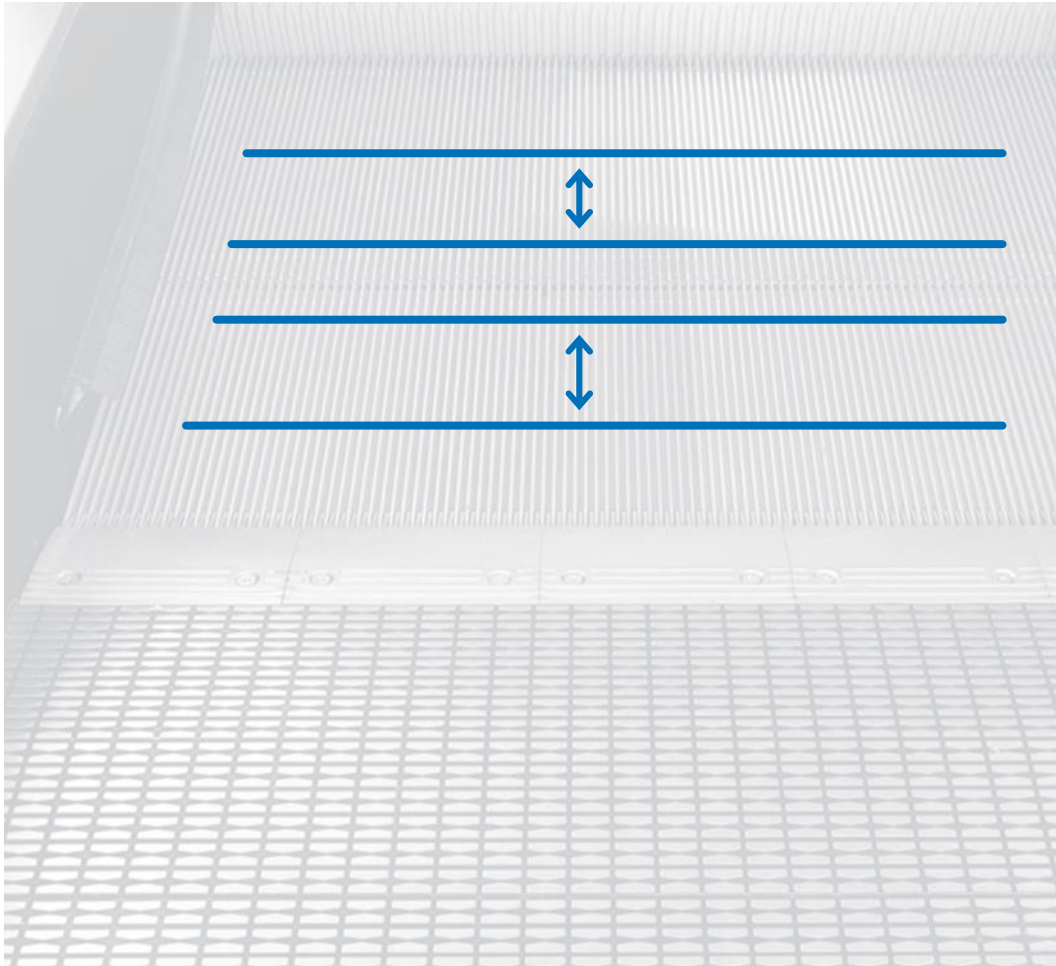
Transition Radii Example
1.5 / 1.0



- The higher the transition radius value, the more smooth and curved the transition is.
- The lower the transition radius value, the sharper, shorter and steeper the transition is.
- Our standard escalators have 3 possible transition Radii, depending on the service for which they have to be designed for

Quick Tips!

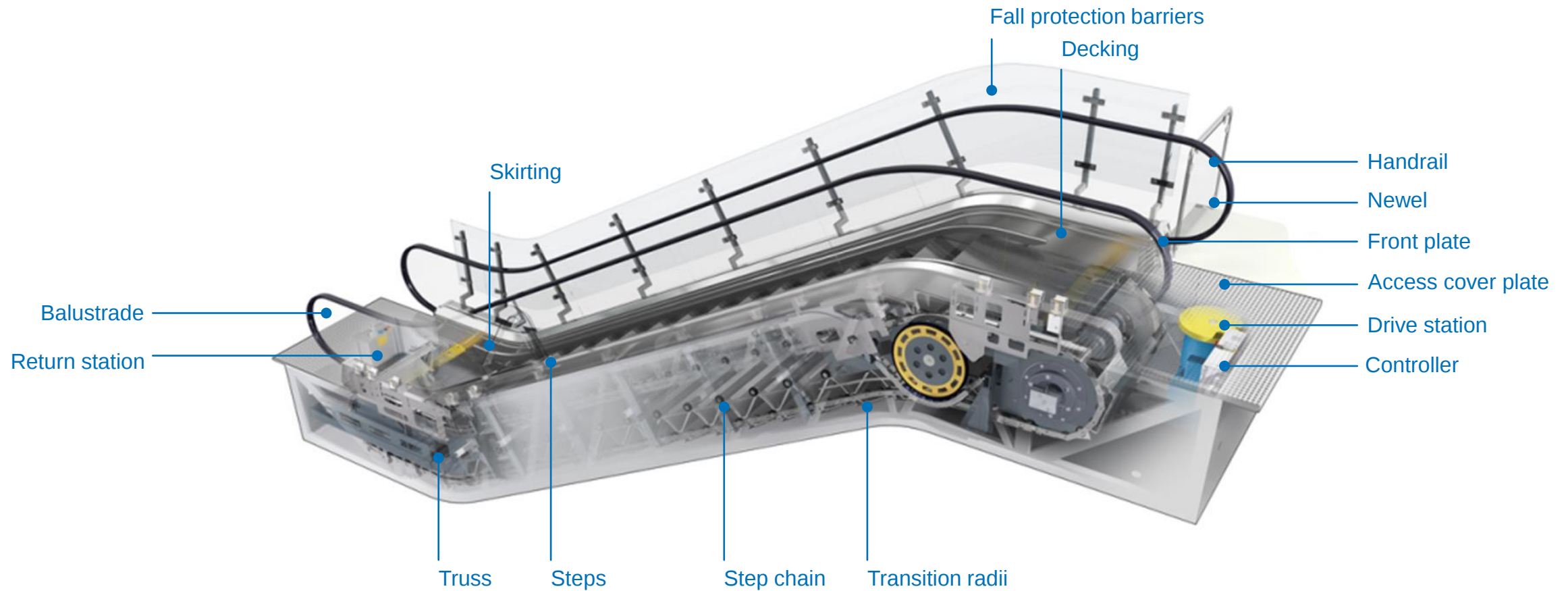
STEPS



- Escalators must be equipped with at least two horizontal steps on both landings up to 6 m Vertical Rise;
- Above 6 m, horizontal steps should be 3

Components

WHAT IS INSIDE AN ESCALATOR?



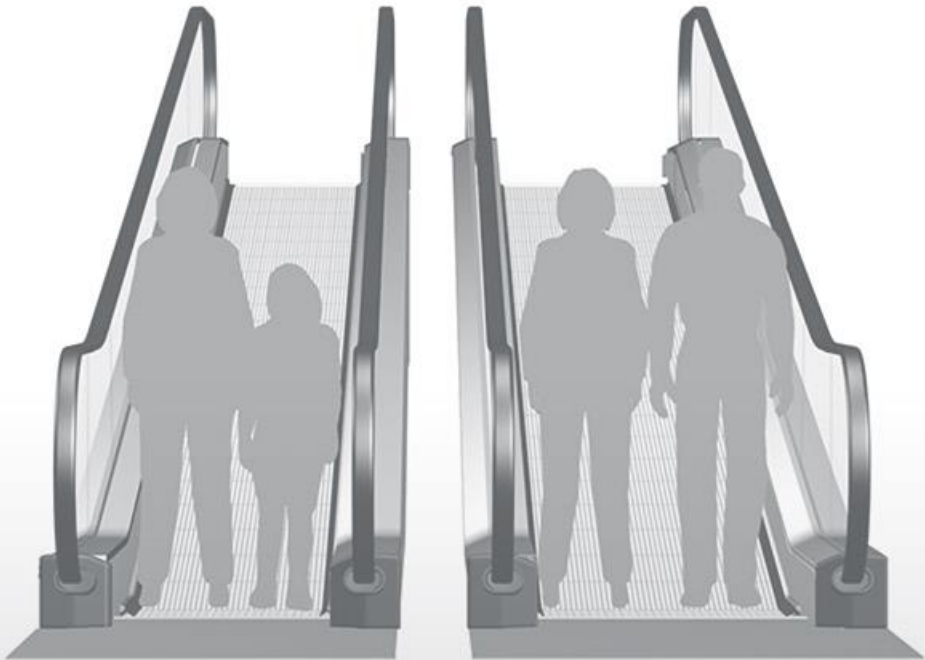
Basics for ramps

KONE's ramps come in a diverse range of specifications:

- Inclination 10° | 12°
- Pallet width 1000* mm
- Speed 0.5 m/s
- Environment Indoor | semi-outdoor

*) Smaller size pallet (such as 800 mm) is not recommended even by EN115 Code for ramps because there is not enough free space for evacuation i.e. in case of fire, when the usage of shopping trolley is needed. In case of 800 mm pallet width, please contact your KONE representative for further info

Basics for ramps



- A 1000 mm pallet width is recommended for evacuation purposes as, if a ramp with a pallet width of 800 mm is stopped, shopping trolleys could easily create a blockage on the autowalk and prevent safe evacuation.
- Accordingly to the EN Code, the width of the shopping trolley or baggage cart and contents should be at least 400 mm less than the pallet width, to leave sufficient space for passengers to pass by.

Which inclination - ramps

IS BETTER FOR MY NEEDS



12° inclination

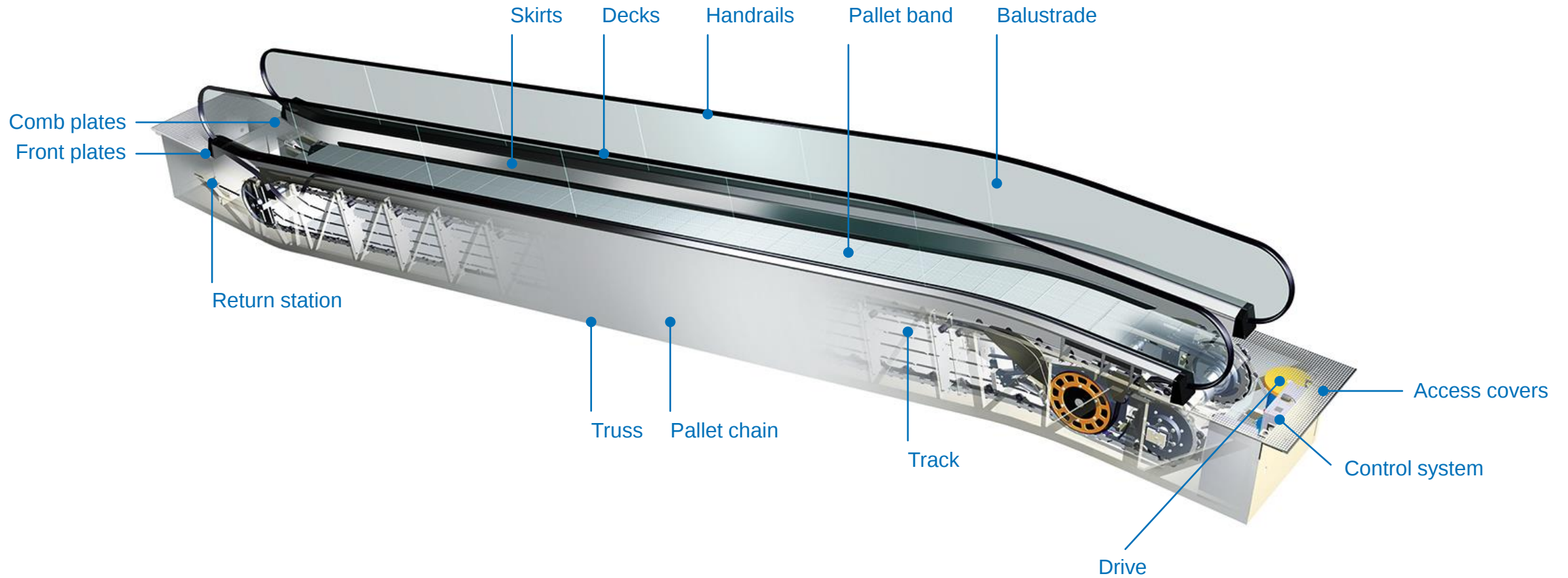
- Offers the most compact dimensions & maximize space for sales in a shopping building
- Preferable when space is restricted on site
- Offers the lowest capital cost for a given vertical rise
- Most common in retail applications

10° inclination

- Increase end users comfort

Components

WHAT IS INSIDE A RAMP?



Basics for horizontal autowalks

A horizontal autowalk is a conveyor belt that transports people horizontally. Autowalks are generally provided in areas where people need to walk long distances with luggage, baggage carts or shopping trolleys. An autowalk is generally flat, but can be slightly inclined (max 6°).



Basics for horizontal autowalks

KONE's autowalks come in a diverse range of specifications:

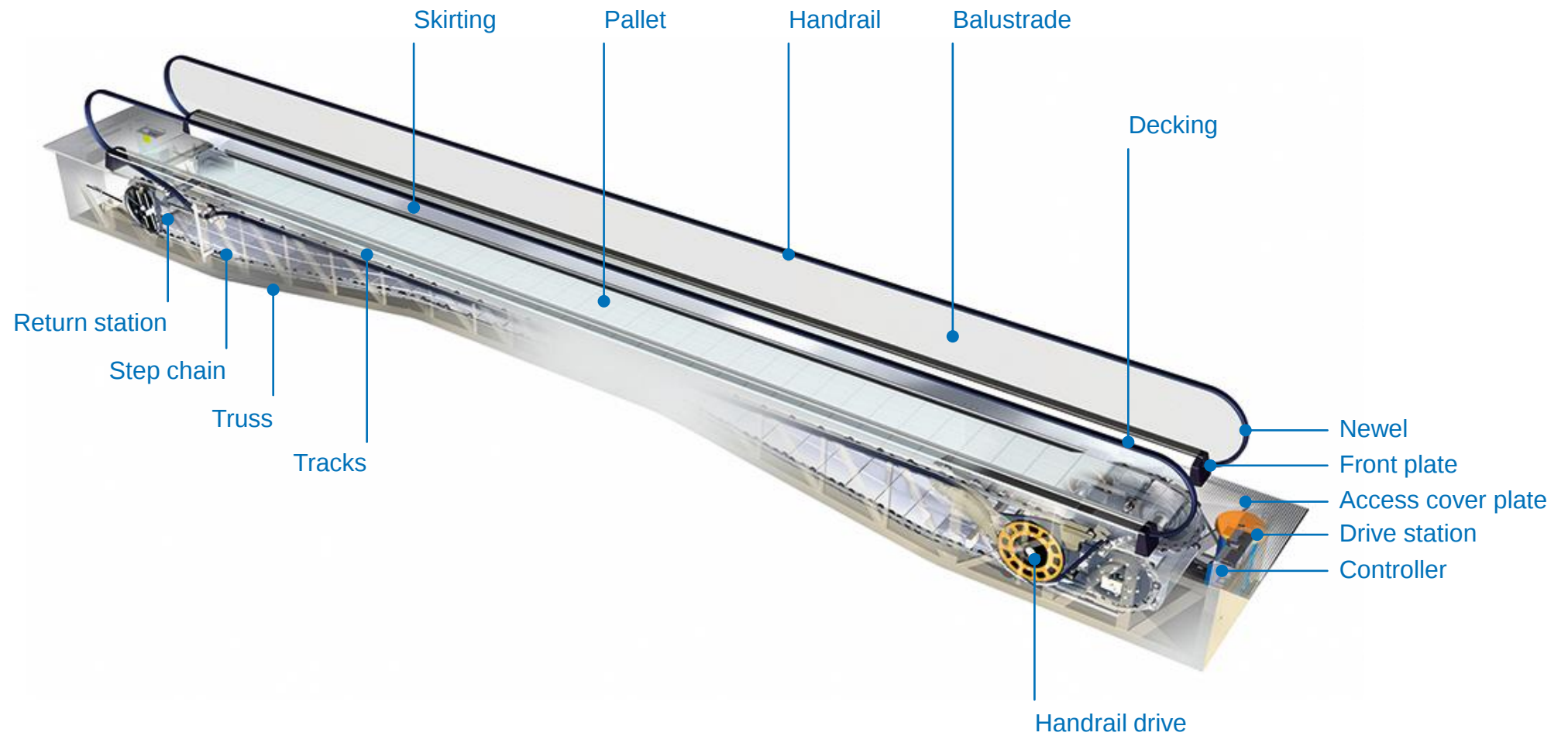
- Inclination from 0° to 6°
- Pallet width 1000 mm | 1200 mm | 1400 mm
- Speed 0.5 m/s | 0.65 m/s | 0.75 m/s
- Environment Indoor | semi-outdoor

As the majority of autowalks are for high usage installations, such as airports, a 1400 mm pallet width is always preferable:

- 1400 mm pallet allows two adult passengers to stand on each one and thereby maximizes the transport capacity
- 1000/1200 mm pallet widths are suitable for medium or low usage installations, such as smaller airports or hospitals
- 1000/1200 mm pallet width allows one adult passenger and a small child to stand on each pallet or one adult passenger with shopping bags or luggage.

Components

WHAT IS INSIDE AN AUTOWALK?





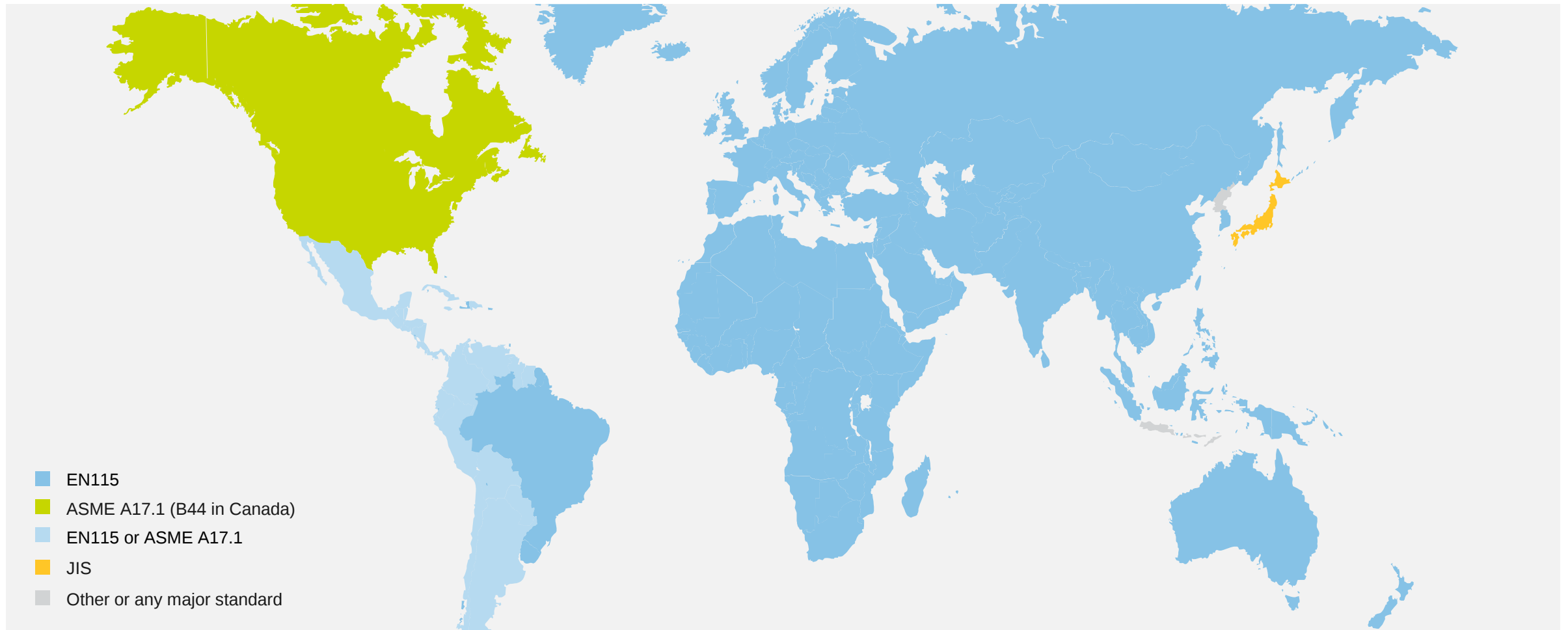
Code & building interfaces

KONE ESCALATORS, RAMPS AND AUTOWALKS

Codes Worldwide



WHERE & WHAT TO APPLY?



Which code?



UNDERSTANDING THE CODE

- The safe structural design and installation of escalators and autowalks in buildings is defined and regulated in the European Union and other European countries by the EN 115-1 standard.
- Elsewhere in the world, regional or local country specific codes as well as the EN 115-1 code may apply. Your local KONE sales organization will be delighted to provide you with details of your local regulations.
- In this Planning Guide, we refer to the latest version (EN 115-1), which was rolled out to CEN member countries on 17 July 2017 replacing the former EN 115-1:2008+A1:2010.

EN 115 CODE

The **EN115-1:2017** is an industry standard that defines and regulates the safe structural design and installation of escalators and autowalks in buildings in CEN COUNTRIES.

EN 115-1:2017



EN 115-1:2008+A1:2010 VS. EN 115-1:2017 – VALIDITY DATES

- The new EN 115-1:2017 has been published in the EU in July 2017.
- The previous version EN 115-1:2008+A1:2010 and the new version are concurrently valid for a period of 18 months after the date of publication of the new EN 115-1:2017 (transition period).
- After this overlapping period, only the new EN115-1:2017 will be valid and the old version will be withdrawn in CEN Countries.

EN 115-1:2017

WHICH COUNTRIES



All CEN countries:

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom

EN 115-1:2017



NEW EN 115-1:2017 – WHY A NEW CODE?

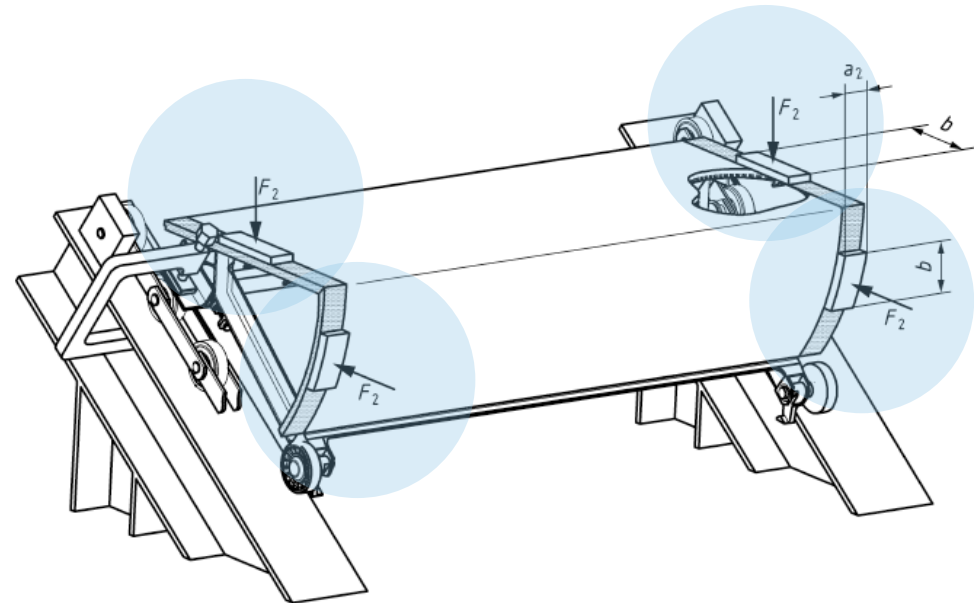
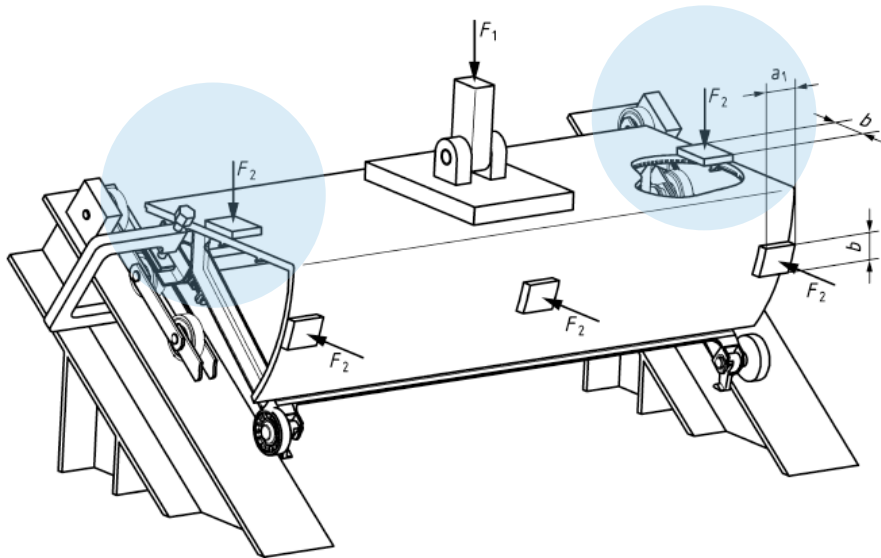
The need for the revision was based on following points:

- Improvement in safety due to changes in proven technology;
- The need to reflect changes to the state of the art:
 - new structure for electric requirements with clauses for protective, safety and control devices and functions;
 - requirements for step inserts/fixings;
 - expansion of operational brake by electrical braking;
 - update on test material for skirting;
 - inclusion of fire protection requirements;
 - introduction of 2-direction-mode;
 - inclusion of a stop switch indicator;
 - introduction of inspection control actuated by the use of both hands;
 - description of barriers to prevent access of trolley;
 - requirements for fixed devices in the unrestricted area;
 - inclusion of seismic design requirements;
- Incorporation of essential health and safety requirements from the relevant EU Directives;
- Elimination of reported errors;
- Clarification of the text and incorporation of proposals resulting from interpretation requests*

*) For information about the background of interpretations see CEN/TR 115-4

QUICK OVERVIEW

1. Definition of structural rated load (5000 N/m²)
2. Clarification that structural rated load applies also for the load of the comb plate and floor plate with a maximum permitted deflection of 4 mm and the requirement that meshing of the combs shall be ensured
3. Extension of static load test for the step tread and the step riser (5.3.3.2.1 and 5.3.3.2.2)
4. Measurement of the clearance between steps or pallets (5.3.5)



5. Fire protection

- Introduction of a compliance test materials that are not generally classified;
- Sprinklers: Reference to EN 12845 deleted. For sprinklers specific needs for machinery to be considered.

6. All requirements about monitoring & detection are now comprised in section 5.12 (restructuring of the electrical part)

- 5.12 Electric control system
 - 5.12.1 Protective devices and functions
 - 5.12.2 Safety devices and functions
 - 5.12.3 Control devices and functions
- Reallocation of safety devices from Table 6 to Table 8

7. Automatic operation (5.12.3.3.1 and 5.12.3.4.1)

- Revision of the requirements in 5.12.3.3.1 (Starting in predetermined direction)
- New clause and new definition in 5.12.3.4.1 (Starting in 2-Direction-Mode)

8. Indicator for the stop device for emergency situations (5.12.3.8.1, Fig. 12)

- “If the stop switch is located below half the balustrade height h_1 , in addition an indicator according to Figure 12 shall be placed on the inner side of the balustrade”;
- The arrow, which also may be located below half the balustrade height, shall pointing from the sign towards the stop device”.



Figure 12
— Stop device indicator

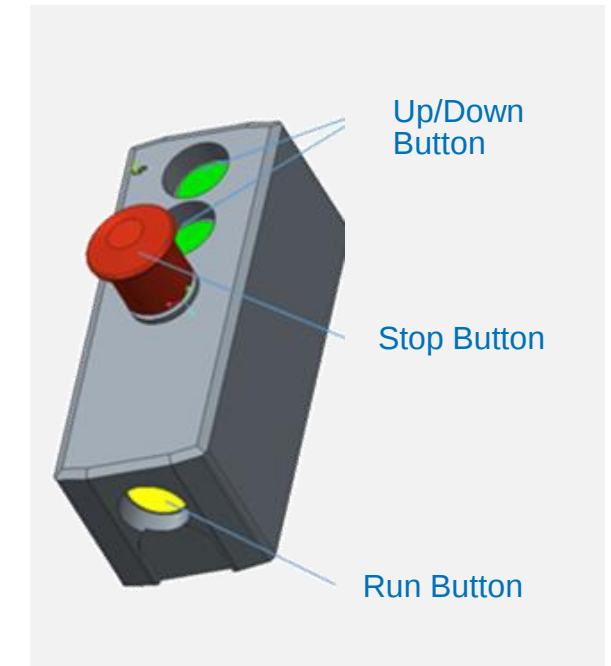
9. Inspection control – Inspection control device with 2-Hand-Operation

- “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”.
- “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”.
- Remark: This requirement is not only about an additional start/release button on the device!

Existing design

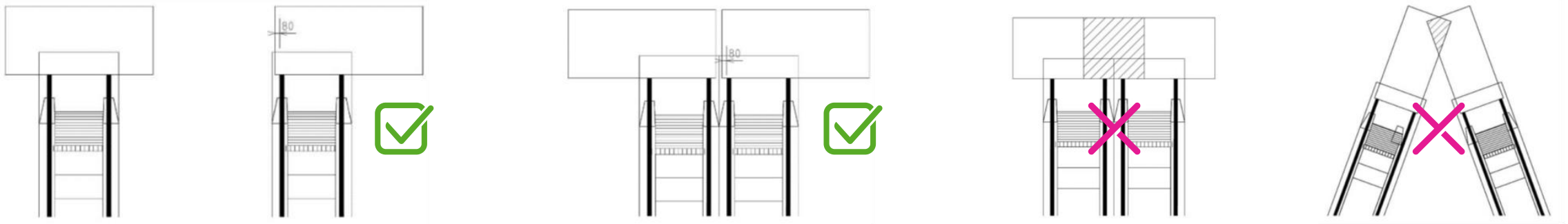


New design



QUICK OVERVIEW

- 10. Verification of the safety requirements and/or protective measures (Section 6, Table 11) revised and extended
- 11. Accompanying documents (7.4.1) revised and extended
- 12. Free space for users at the exits – Unrestricted area (A.2) revised and extended
 - A lateral shift of the unrestricted area is permitted
 - An overlapping of unrestricted areas is not permitted
 - The minimum permitted dimensions shall be applied in all conditions assuming that this unrestricted area is not affected by e.g. other passenger flows within the building



- 13. Measures to prevent access of shopping trolleys and baggage carts (A.4.1 and A.4.2) revised and extended
- 14. Requirements for fixed devices (A.5) revised and extended
- 15. Requirements on escalators and moving walks intended to transport shopping trolleys and baggage carts (I.1) revised and extended
- 16. Determination of anti-slip properties of the tread surfaces of steps and pallets, of comb plates and floor plates (Annex J) revised and extended
 - The assessment of the anti-slip properties of coverings with surface profiles shall take into account all directions. The lowest assessment group is the one relevant for safety purposes.
 - Coverings that meet at least assessment group R 9 are considered anti-slip for installations in general. When impacted by water and snow the assessment group R 10 for escalators and moving walks and R 11 for pallets of inclined moving walks shall be considered.
- 17. Determination of sliding properties of footwear on balustrade skirting (K.2) revised

A.4 Measures to prevent access of shopping trolleys and baggage carts adequate measures shall be taken to eliminate risks and access shall be

prevented if the following conditions are given:

a) for escalators: where shopping trolleys or baggage carts are available in the area around;

b) for escalators: where shopping trolleys or baggage carts are in an area not close to the escalator where it is reasonably foreseeable that they are taken onto the escalator;

c) for moving walks: where shopping trolleys or baggage carts are not intended to be used on a moving walk.

NOTE It's in the responsibility of the owner to define the width of the trolleys, that it's ensured that the trolleys can't fit through between balustrade and barrier.

If barriers are used, the following requirements shall be fulfilled:

a) The barrier shall be installed at the entrance only. An installation at the exit is not permitted in the unrestricted area.

b) The design of the barrier shall not create another risk.

c) The free entrance width between ends of the newels and barriers – and between barriers itself - shall be at least 500 mm and less than the width of the type of shopping trolley or baggage cart which will be used.

d) The height of the barrier shall be between 900 mm and 1 100 mm.

e) The barrier and its fixation shall withstand the following load:
At a height of 200 mm a horizontal force of 3 000 N applies.

18. Escalators and moving walks subject to seismic conditions (New normative Annex M)

- Considerations for seismic zones at location of installations (local information for seismicity)
- Building to be constructed in accordance with EN 1998-1 considering seismic impact
- Escalators to be regarded as equipment in the building not part of the building structure
- Values of seismicity (value of peak ground acceleration PGA) and story drift to be obtained from the customer/building owner

Safety labels or pictograms



Use the handrail



Dogs shall
be carried



Small children
shall be held firmly



Push chairs
not permitted

Passenger Circulation Areas

QUICK OVERVIEW



Handrail and Headroom Clearance



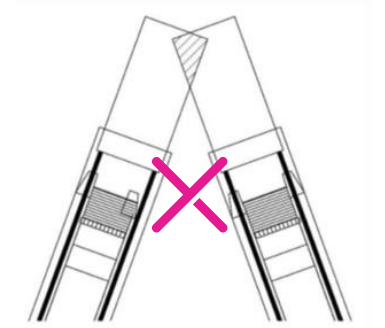
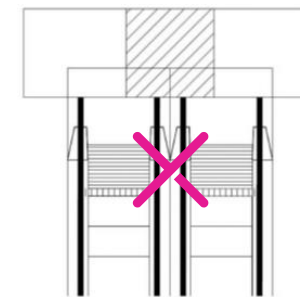
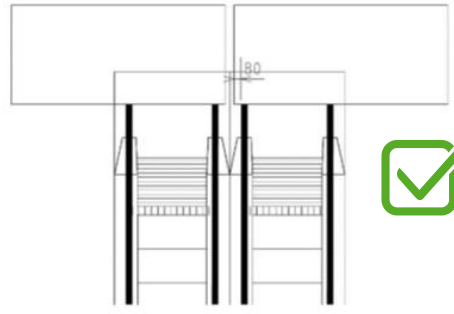
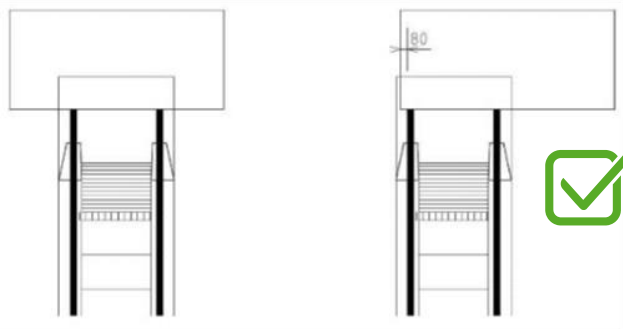
QUICK OVERVIEW



Free space for users at the exits – Unrestricted area

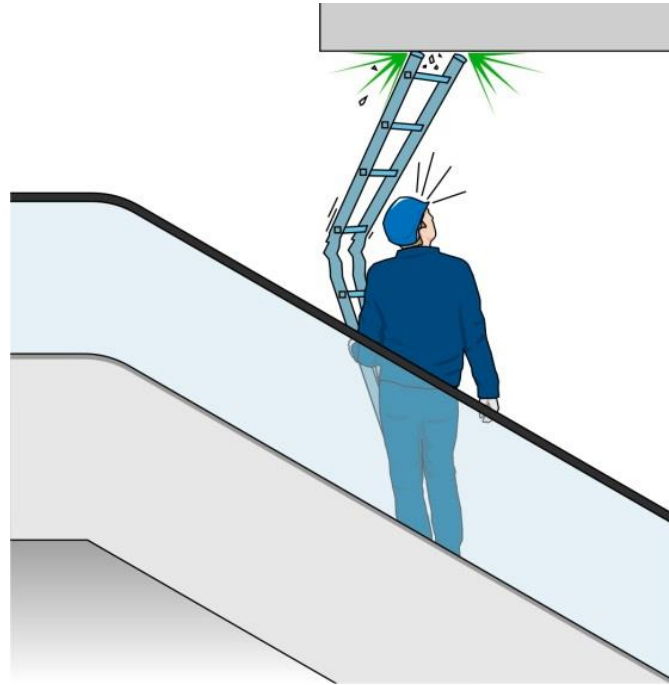
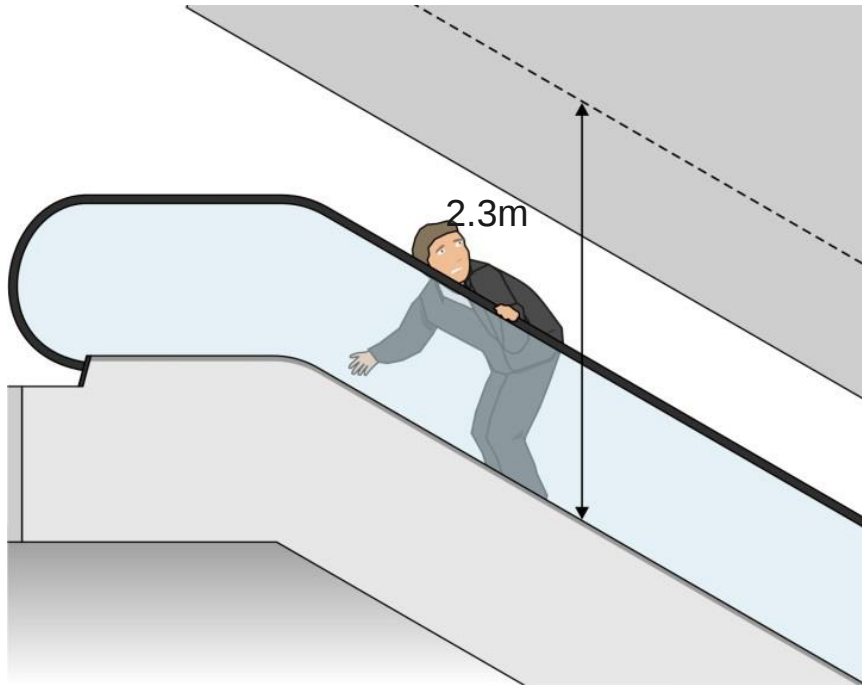


NO OVERLAPPING ADMITTED



Vertical Clearance

WHY IT IS SO IMPORTANT



- Minimum clearance between the steps and the ceiling is 2.3m
- Do not carry very long or tall objects on the equipment. There is a danger of the object getting trapped between the ceiling and escalator step or pallet, causing damage or personal injury

QUICK OVERVIEW



Technical drawing showing two cross-sections of a door threshold. The left section shows a door with a minimum 100 mm gap and a maximum 120 mm gap. The right section shows a door with a minimum 100 mm gap and a maximum 120 mm gap. Dimensions include 120 mm, 80 mm, 100 mm, 25 mm, and 100 mm.

- Examples of properly done barriers at landings
- To reduce any risk of fall for End-Users, in case of free space at upper head, additional barriers may be provided by customers.
- The additional barrier shall have a lateral distance between 80 mm to 120 mm of the handrail outer edge and shall close at least the area between the actual lowest point of the handrail entry into the newel and the balustrade decking profile and shall have filled inlets with gaps < 25 mm



Little things matter in safety. The most common accidents are caused by things that we don't worry about because they seem too small and familiar.

If you see careless behavior, don't hesitate to step up for safety.



People Flow™ & Traffic Capacity

KONE ESCALATORS, RAMPS AND AUTOWALKS

What is People Flow™



ANALYZING & UNDERSTANDING PEOPLE FLOW™

- People flow varies immensely between building types. Understanding people flow will help you select the correct type, configuration and number of escalators and autowalks required to maximise passenger circulation.
- Our vision is to deliver the best People Flow™ experience.
By People Flow we mean:
 - Moving people smoothly, safely, comfortably and without waiting in and between buildings
 - Ensuring high quality accessibility for everyone.
- Furthermore, People Flow gives us direction for developing our offering to meet our customers' needs, and enables us to credibly sell, deliver and maintain complete solutions instead of just products.

Which speed do I need?



UNDERSTANDING THE PEOPLE FLOW - ESCALATORS

The speed of your escalator will have a significant effect on its transport capacity. However, it's not as straightforward as selecting the fastest escalator speed possible in order to move the most people in the shortest time. In some buildings a slower speed is preferable

0.50 m/s

- Optimal speed for the retail environment
- Combines sufficient transport capacity, optimal safety and minimum space requirements
- Gives customers an opportunity to “window shop” from the escalator

0.65 m/s

- Recommended for the public transportation environment such as railway stations and metro stations in case of very high rise
- Optimal speed for situations where passenger arrivals are intermittent & where the VR is high enough to compensate the extra time needed to enter in the escalators

0.75 m/s

- For extreme transportation situations only such as high-rise escalators. Not recommended by KONE for two reasons:
 - as the speed increases, people hesitate longer before stepping onto the escalator, thus reducing the effective transport capacity
 - This speed is less comfortable for elderly passengers and children

Which speed do I need?

UNDERSTANDING THE PEOPLE FLOW - INCLINED AUTOWALKS

0.5 m/s is the standard speed which is normally used for inclined autowalks, as these are usually installed in a commercial environment and occasionally in railway stations.

Which speed do I need?



UNDERSTANDING THE PEOPLE FLOW - HORIZONTAL AUTOWALKS

The three speeds available are:

0.5 m/s – for short autowalks or when other considerations warrant a slower speed and comfort of use

0.65 m/s – specified for long autowalks as it offers a good compromise between passenger capacity, comfort and energy efficiency

0.75 m/s – occasionally specified for heavy-duty and/or long autowalks to increase passenger capacity and reduce travel time.

In the interests of passenger safety and the service life of the autowalk, the standard 0,5 m/s pallet band speed or max 0.65 m/s pallet band speed are recommended whenever possible.

Which speed do I need?



SUMMARY OF THE SPEEDS AVAILABLE & RECOMMENDED

0.50 m/s

0.65 m/s

0.75 m/s

Commercial escalators	Standard	Not available	Not available
Infratructure escalators	Standard	Recommended	Available but not Recommended
Horizontal autowalks	Optional	Recommended	Optional
Inclined autowalks	Standard	Not available	Not available

By conveying people continuously, escalators and autowalks ensure a smooth flow of people through a building. They have a high people transportation capacity, and in multi-level retail centers play a vital role in ensuring that all floors are visited evenly. Escalators and autowalks, along with elevators and automatic doors, are a total people and goods transportation solution. However, escalators, autowalks and elevators each have their own strengths, as shown in table below, which will help you understand whether you need an escalator or an autowalk (or even an elevator).

Escalators	Horizontal autowalks	Inclined autowalks	Elevators
Continuos	Continuos	Continuos	Interrupted
Mass transport	Mass transport	Mass transport	Limited number
Short-medium distances	Medium-long distances	Short-medium	Higher rices
In between floors	On one floor	In between floors	In between floors
Steer people flow	Save time and effort	Steer people flow	Improve accessibility

Calculating traffic capacity



An important first step is to calculate the number of passengers you expect your escalator or inclined autowalk to transport.

The EN 115-1 code indicates an average practical transport capacity rather than the previous theoretical approach. The figures are based on the step width and nominal speed of an escalator or inclined autowalk.

Step / pallet width	Nominal speed		
	0.50 m/s	0.65 m/s	0.75 m/s
600 mm	3,600 persons/h	4,400 persons/h	4,900 persons/h
800 mm	4,800 persons/h	5,900 persons/h	6,600 persons/h
1000 mm	6,000 persons/h	7,300 persons/h	8,200 persons/h

Example

METRO STATION ESCALATOR



Consider a metro station escalator, with a speed of 0.65 m/s and a 1000 mm step width, in continuous operation in both directions for a period of 20 hours a day, 7 days a week and 365 days per year. If it was running at full load for the whole of its 20 hours of operation, its traffic capacity would be:

20 hours x 7,300 persons/hour	= 146,000 persons per day
-------------------------------	---------------------------

In reality, during its 20 hours of operation per day, its passenger load will vary as follows:

40%	full load (2,920 persons) for 3 hours	= 8,760 persons
100%	full load (7,300 persons) for 2 hours	= 14,600 persons
50%	full load (3,650 persons) for 8 hours	= 29,200 persons
100%	full load (7,300 persons) for 2 hours	= 14,600 persons
40%	full load (2,920 persons) for 5 hours	= 14,600 persons

This makes a total of 81,760 persons carried over its 20 hours of daily operation at 61.2% equivalent load profile.

Practical case

CASE 1: SHOPPING CENTER



As seen in Figure 4.1 the shopping center experiences three peaks:

- The first is at the beginning of the day and consists of employees and early shoppers, coffee shop visitors and people who cut through the center on their way to work
- The second is during lunch hour when people access the food court area (not on ground level) or stop at the shopping center during their lunch break
- The third is the time after work when most shoppers enter the center.

After the third peak the number of visitors quickly decreases until the center closes for the night

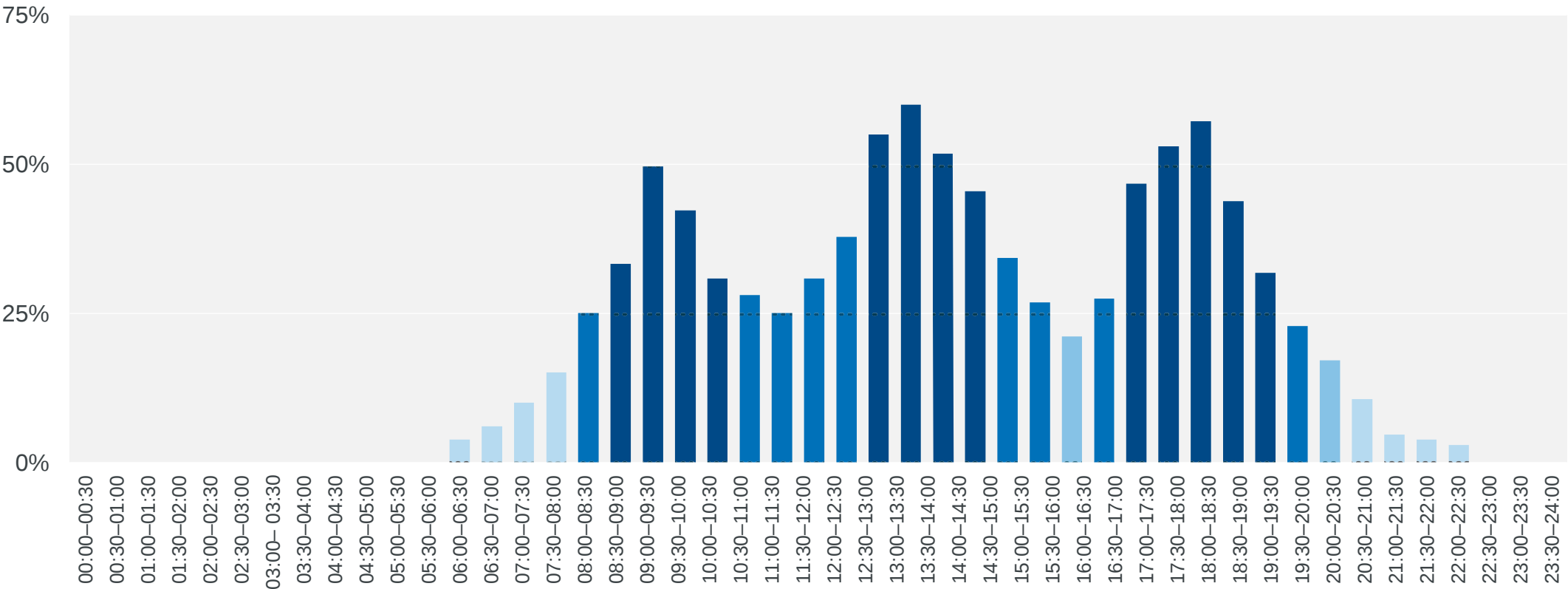


Practical case

CASE 1: SHOPPING CENTER



Typical people flow in a multi-level shopping center, showing three major peak



Practical case

CASE 2: 24H METRO STATION

- For a typical 24h metro station in a metropolitan city, two peaks are experienced; one for each rush hour when people travel to and from work, as shown in Figure 4.2.
- Both peaks are preceded and followed by a build-up period, which stretches longer into the evening as people either stay or travel for dinner, social meetings, overtime, etc.

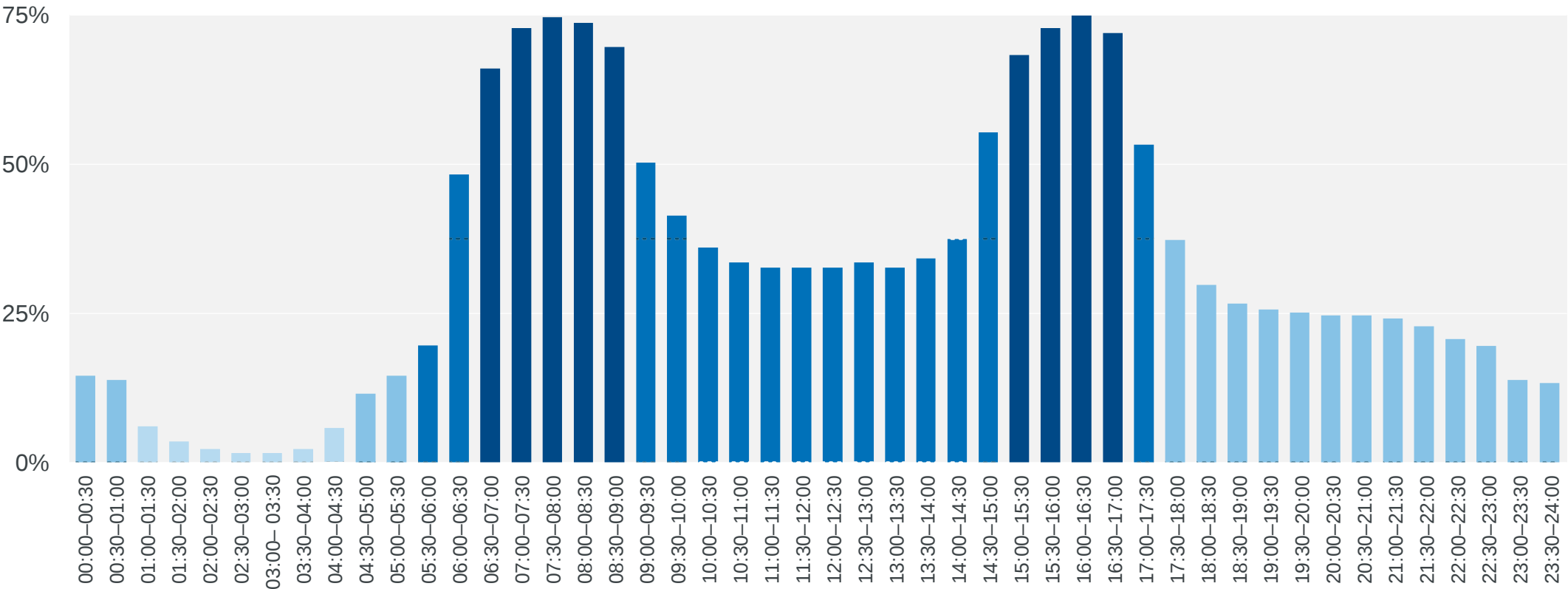


Practical case

CASE 2: 24H METRO STATION



Typical people flow in a 24h metro station with two major peak



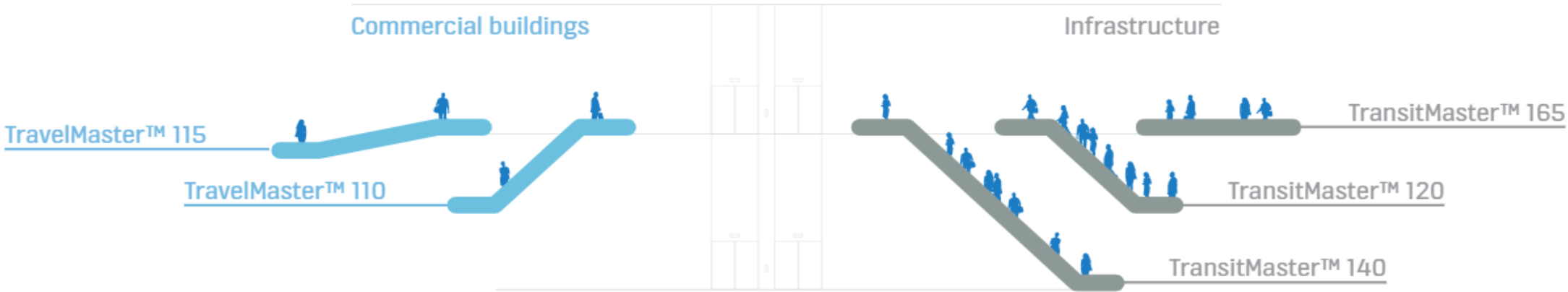


Set up the escalator for your needs

KONE ESCALATORS, RAMPS AND AUTOWALKS

KONE escalator

OFFERING



Which escalator is for me?



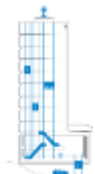
UNDERSTANDING THE BUILDING SEGMENT

Not all buildings can be described as only commercial or infrastructure; there are many building segments, each with their own people transportation requirements and segment specific needs.

Before choosing an escalator or an autowalk, it is important to be aware of the key differences between major types of building, as their use and their people flow affect the solution you will specify.



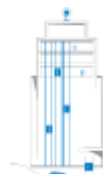
Medical



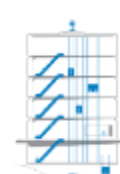
Office



Infrastructure



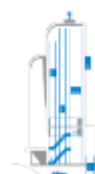
Residential



Retail



Educational
Leisure



Hotel

Main segments

PUBLIC TRANSPORTATION

- Product reliability is top priority
- Indoor, semioutdoor and full outdoor use
- Materials selections based on durability.
- High Speeds (0,65 m/s; 0,75 m/s) can be required, in particular for evacuating purposes
- 20-24h running time per day
- Operational modes most frequently required are stand-by speed and stop & go
- 24/7 maintenance can make the difference when comparing with competitors
- Ability to link to the Building Management system is a must
- Solutions improving Safety for End Users are a huge differentiator, in particular guidance packages and solution for visually impaired people (blind square)
- Longer leadtimes due to customer specification requirements



Main segments

AIRPORTS



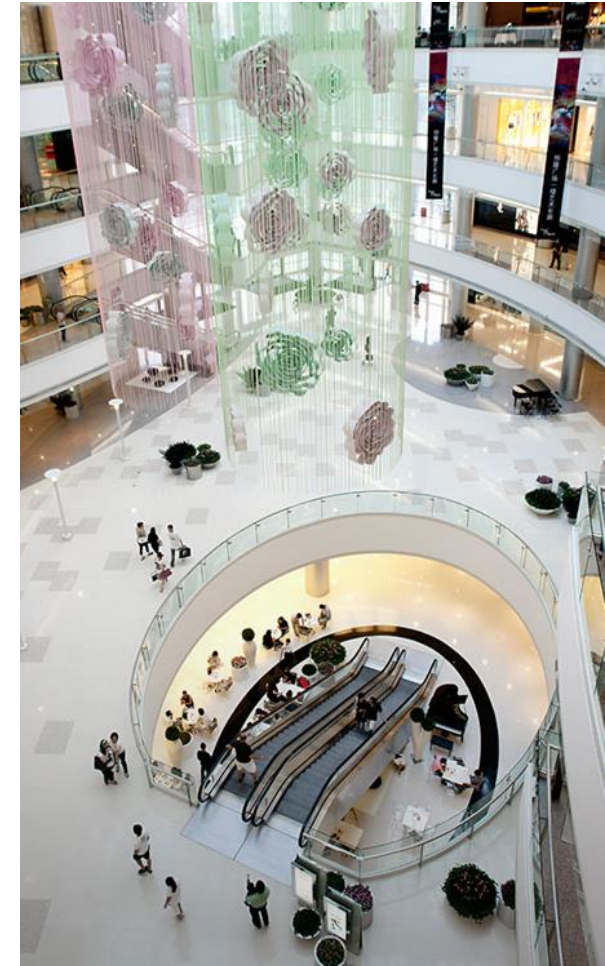
- Mostly interested in escalators & horizontal autowalks
- Product reliability is extremely important
- Mostly Indoor use
- Visual is very important, integration required with modern terminal designs
- 18-20h running time per day
- Operational modes most frequently required are stand-by speed and stop & go
- 24/7 maintenance can make the difference when comparing with competitors
- Ability to link to the Building Management system is a must
- Solutions improving Safety for End Users are a huge differentiator, in particular guidance packages and solution for visually impaired people (blind square)
- Longer leadtimes due to customer specification requirements



Main segments

HIGH END RETAIL SEGMENT (SHOPPING MALLS)

- Mostly interested in escalators
- Product reliability & visual appearance are extremely important
- Mostly Indoor use
- Finishes often done by customers, but design solution that match elevators can act as differentiators (in particular lighting options/signalisation)
- 12-14h running time per day
- Operational mode most frequently required is continuous, standby speed also sometimes requested dependant upon people flow
- 24/7 maintenance can make the difference when comparing with competitors
- Solutions improving Safety for End Users are a huge differentiator, in particular features like fall protection barriers can make the difference
- Lead times are in the most of the cases less then 6 months



Main segments

LOW END RETAIL SEGMENT (BIG RETAILERS)

- Mostly interested in ramps, due to the use of shopping trolleys
- Product reliability is extremely important
- Indoor and semi-outdoor use, in particular going to parking areas
- Visual appearance is not top priority, even if some higher end features are often required (different RAL colors on cladding and handrail lighting,)
- 12-14h running time per day
- Operational mode most frequently required is continuous, standby speed also sometimes requested dependant upon people flow
- 24/7 maintenance can make the difference when comparing with competitors
- Lead times are in the most of the cases less then 6 months (but some retailers, such as LIDL, are an exception with 3 months max from order to unit handover)



Main segments

HOTEL/OFFICE SEGMENT



- Product reliability is extremely important
- Mainly Indoor (temperature controlled environment)
- Finishes often done by customers, but design solution that match elevators can act as differentiators (in particular lighting options/ signalisation)
- 10-12h running time per day
- Operational mode frequently required are linked to peak traffic and low traffic periods: stand-by speed is frequently requested
- 24/7 maintenance can make the difference when comparing with competitors
- Solutions for improving people flow and passenger guidance (inc visually impaired passengers) can be a differentiator
- Lead times are fixed



Main segments

MEDICAL SEGMENT

- Product reliability is extremely important
- Mainly Indoor (temperature controlled environment)
- Low running speed needed for passenger comfort
- Solutions for improving people flow and passenger guidance (inc visually impaired passengers) are a must
- Solutions for improving end user safety are a huge differentiator
- 10-12 h running time per day
- 24/7 maintenance can make the difference when comparing with competitors
- Lead times are fixed
- Heavy requirements on lead times in case of FRB



Main segments

LEISURE SEGMENT

- Product reliability is extremely important
- Multi-use leisure facilities often incorporate large retail centres and have a constant flow of people
- Stadiums where duty cycle is short but with peak loads requires heavier solutions, similar to Public Transportation segment
- Indoor, semiotdoor and fully outdoor use
- 12-14h running time per day, depending heavily on the destination of use
- 24/7 maintenance can make the difference when comparing with competitors
- Solutions for improving people flow and passenger guidance (inc visually impaired passengers) are a must
- Solutions for improving end user safety are a huge differentiator
- Lead times are short and fixed



Main segments

MARINE



- Product reliability is top priority
- Indoor, semioutdoor and full outdoor use
- Visual is usually not very important, mainly ST/ST finishes
- High Speeds (0,65 m/s; 0,75 m/s) can be required, in particular for evacuating purposes
- 20-24h running time per day
- Operational modes most frequently required are stand-by speed and stop & go
- 24/7 maintenance can make the difference when comparing with competitors
- Ability to link to the Building Management system is a must
- Solutions improving Safety for End Users are a huge differentiator, in particular guidance packages and solution for visually impaired people (blind square)
- Longer leadtimes due to customer specification requirements



Arranging your escalators in the building



MAXIMIZING PEOPLE FLOW AND NEEDS

- Escalators are generally acknowledged as being the most effective method of transporting large numbers of people between two floor levels, but how your escalators are arranged within the building has a huge impact on the flow of people.
- In infrastructure buildings
 - Escalators are normally positioned on the main routes through the building
- In retail stores
 - Positioning an escalator next to the main entrance is the most effective way to encourage customers to browse sales areas on other floors
 - In a retail environment the goal is not merely to convey passengers to another floor as quickly as possible.
 - An escalator can lead people through a promotional area or alongside displays of goods.

Arranging your escalators in the building



SINGLE ESCALATOR

An inexpensive method of transporting passengers between two floor levels

- ++ Particularly suitable for small retail stores where available floor space is restricted
- ++ Only one side of decorative truss side cladding is required if against the wall
- Only really suitable for installations where passenger flow is in one direction (usually escalator goes up and people can walk down using fixed stairs)
- An easily accessible staircase is required for passengers to return to the ground floor level

Arranging your escalators in the building



PARALLEL ARRANGEMENT 2 UNITS

Passenger flow within the building is maximized by moving the users between the two floors

- ++ Increased passenger convenience in comparison to single arrangement
- ++ One unit running up and one running down.

Arranging your escalators in the building



PARALLEL ARRANGEMENT 3 UNITS

Passenger flow within the building is maximized by moving the users between the two floors

- ++ increased passenger comfort in comparison to single arrangement
- ++ maximise the reliability of the floors
- ++ allows for 2 units to be operated in the same direction to easy passenger flow during peak hours
- ++ normally specified with one unit which is reversible to deal with people flow demand in a given direction.

Arranging your escalators in the building



ESCALATORS IN ONE TRAVEL DIRECTION (INTERRUPTED TRAFFIC FLOW)

Cost-effective method for transporting passengers between three floors

- ++ In retail installations, passengers have to make a short detour to the next escalator; strategically placed displays alongside the route of this detour can help to increase sales by encouraging impulse buying
- Only really suitable for installations where passenger flow is in one direction
- Passenger flow through the building is interrupted, so overall traveling time to higher floor levels is increased
- Readily accessible staircases are required for passengers to return to the ground floor level

Arranging your escalators in the building



MULTI-LEVEL SCISSOR ARRANGEMENT (CONTINUOUS TRAFFIC FLOW)

Cost-effective and efficient method for transporting passengers between three floor levels

- ++ Continuous arrangement allows the fastest movement of passengers over two or more floor levels, so is particularly suitable for public service buildings, office buildings or large department stores
- + normally consists of both up and down running units, to allow access to both upper and lower levels.

Arranging your escalators in the building



MULTI-LEVEL CRISS-CROSS ARRANGEMENT (CONTINUOUS TRAFFIC FLOW)

Continuous arrangement allows the fastest movement of passengers over two or more floor levels, so is particularly suitable for public service buildings, office buildings or large department stores

- ++ Reduces congestion at the landing areas by separating upwards and downwards traveling passengers
- ++ Frequently used to make an attractive feature of the escalators in the center of retail stores

Arranging your escalators in the building



MULTI-LEVEL PARALLEL ARRANGEMENT (INTERRUPTED TRAFFIC)

In retail installations, passengers have to make a short detour to the next escalator; strategically placed displays alongside the route of this detour can help to increase sales by encouraging impulse buying

- ++ The possibility to reverse the direction of travel of both escalators depending on the usage or traffic flow
- Passenger flow through the building is interrupted, so overall traveling time to higher floor levels is increased



Upgrade the Visual

KONE ESCALATORS, RAMPS AND AUTOWALKS

Which type of cladding do I need?



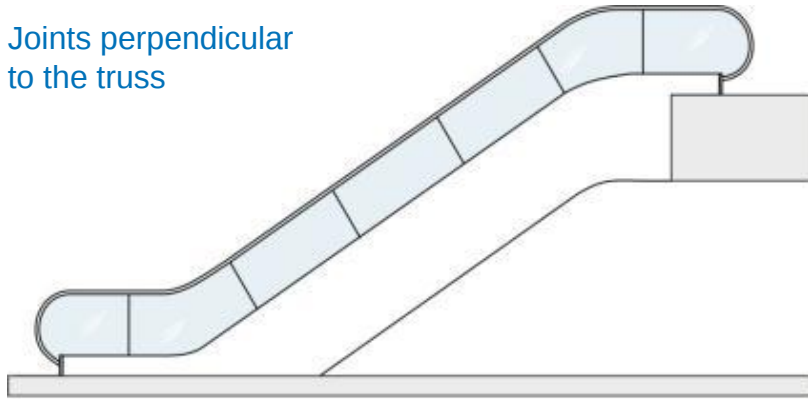
CHOOSING THE PROPER MATERIAL

- All available KONE options are suitable for indoor applications.
- You can also select your own materials, however please pay attention to the maximum weight allowable to be added to the escalator truss and the available fixing locations.
- For semioutdoor/outdoor application better to go for stainless steel materials.
We recommend AISI 304 for normal outdoor use and AISI 316 when higher corrosion level is needed.

Quick tip! Increase the visual appealing

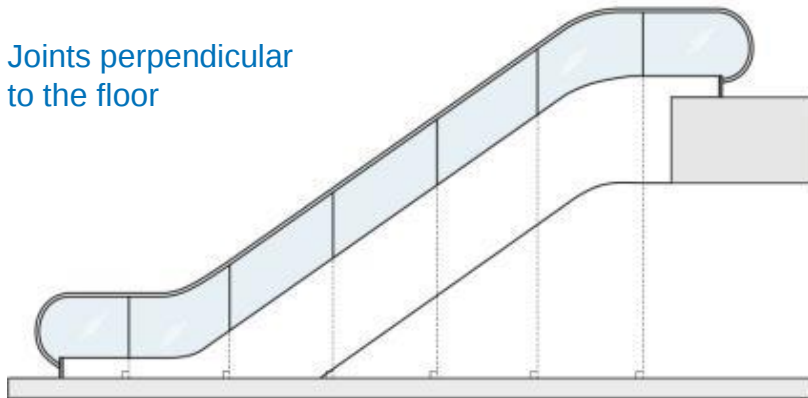
CHOOSING THE PROPER DIRECTION OF CLADDING JOINTS

Joints perpendicular
to the truss



If the building is extremely high level, & you have stainless steel cladding please ask for cladding alignment perpendicular to floor: this selection arranges the panel surface finish in the same direction, eliminating shading caused by light reflections & improving the overall visual design of your building.

Joints perpendicular
to the floor



Which type of signalisation

CHOOSING THE PROPER TYPE



For indoor application, any type of signalisation can be chosen, You just have to consider the passenger approach route and complements your building architecture.

Moving Arrow

- Standard design
- Functional design
- Lowest cost

Road Sign

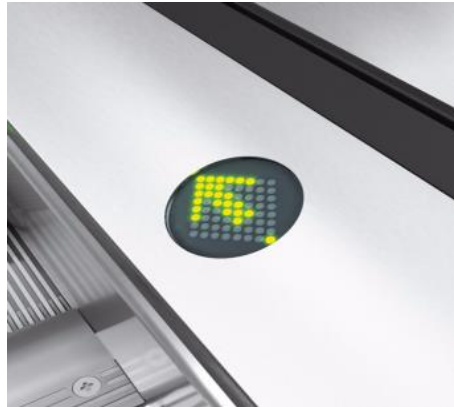
- Very visible for end users
- Modern design
- Higher costs

Cube

- Modern design
- Lower cost if compared to road sign but higher if compared to Moving Arrow

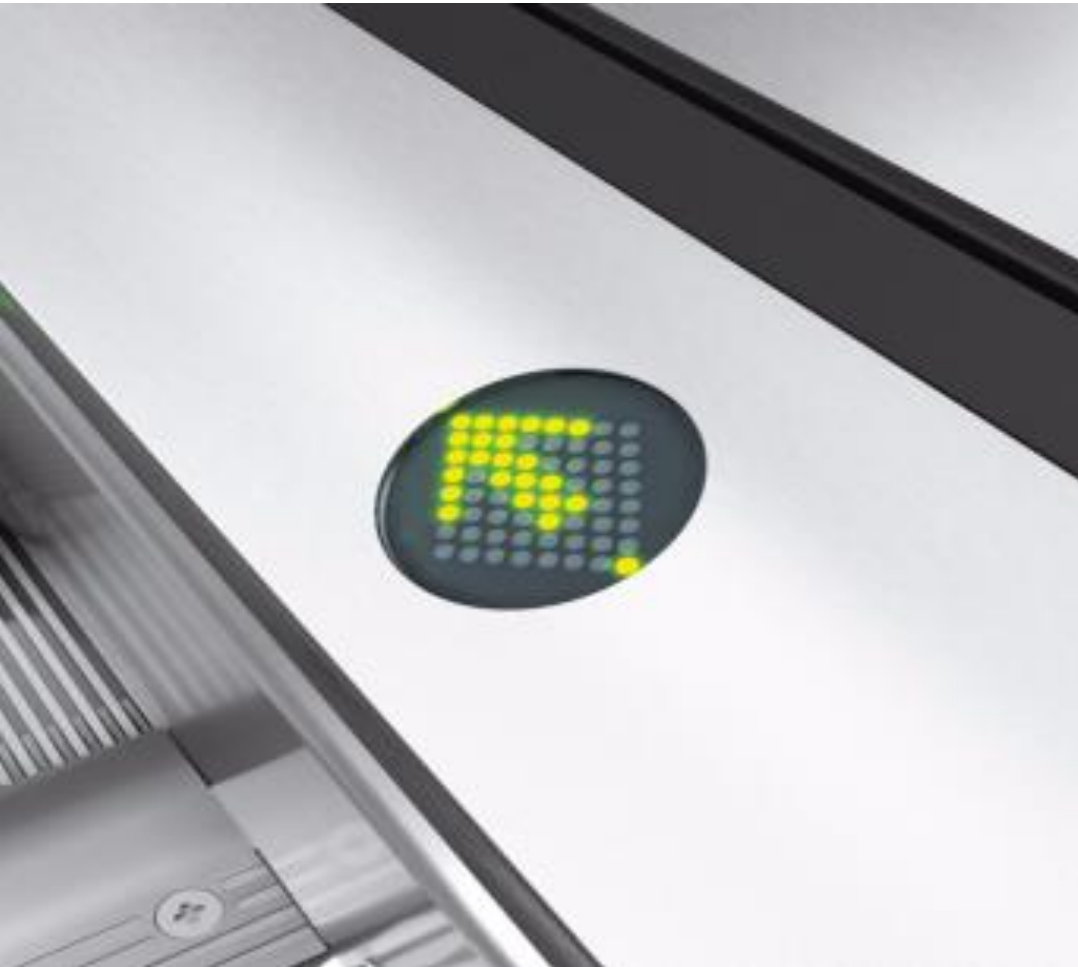
Pole

- Also for Public Transportation
- Can be integrated with your specific signalisation requirements.



Lighting

LED TRAFFIC LIGHTS

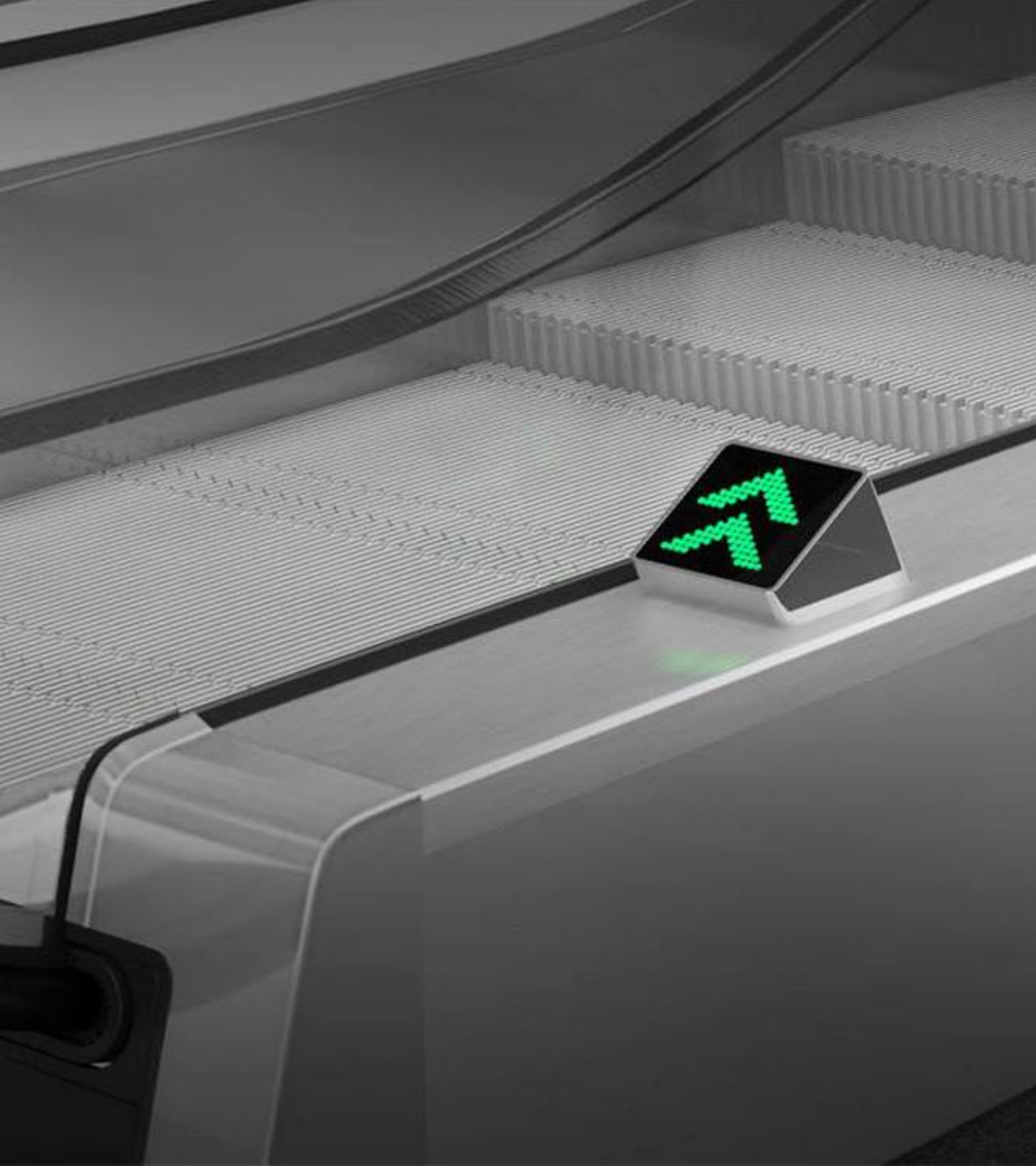


- The LED traffic lights are fitted in the inner deck to indicate the direction of travel.
- The traffic lights are equipped as a standard when the optional Stop and Go operation mode is selected.
- For stand-by speed, the traffic lights are optional, because there is no need to indicate the travel direction as the step band never stops.

Designed by KONE

TRAFFIC SIGNALIZATION – ROAD SIGN





Designed by KONE

TRAFFIC SIGNALIZATION – CUBE



Designed by KONE

TRAFFIC SIGNALIZATION – POLE

Which type of lighting?

CHOOSING THE PROPER TYPE



For indoor application, any type of lighting can be chosen, you have just to consider the one that complements your building architecture.

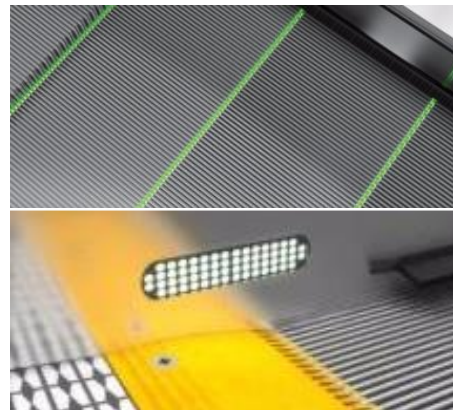
Handrail lights

- Most common used
- Highlights the entire escalator
- Very good for end users (defines the escalator area)



Understep gap and comb lighting

- Highly visible for end users
- Define the entrance and exist area
- Increase safety for end users



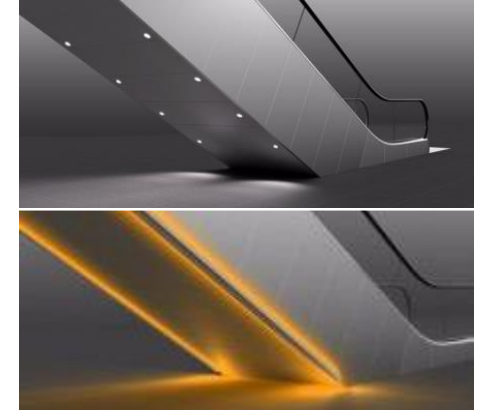
Skirt lighting

Not to be selected in when shopping trolley are in use, due to the risk of damage



Soffit and cove lighting

- Very modern
- Provides additional lighting to complement store lighting, and highlights areas under the escalator





QUICK TIP!

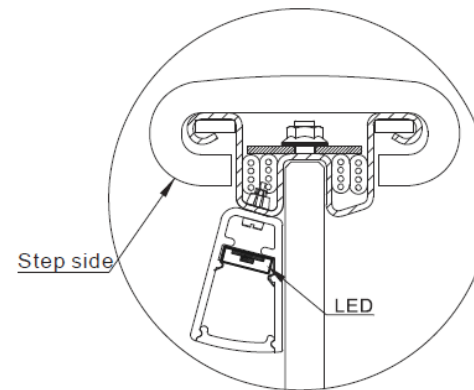
Choosing the proper LIGHT:
**Select just one color (possibly white),
to avoid sense of confusion in the escalator area**

Lighting

LED HANDRAIL LIGHTING



- There are two available options: LED continuous handrail lighting(available colors are green, yellow, red, blue and white) and LED RGB continuous handrail lighting
- Practical tip: go for white LED continuous handrail lighting for a more luxury feeling
- The light intensity is 100 lux on the step area.

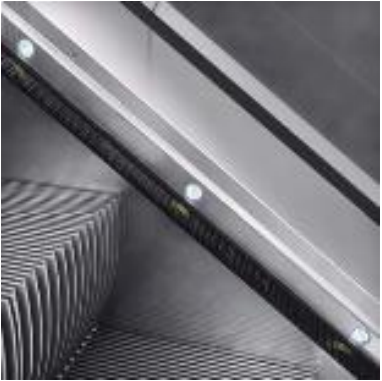


Lighting

LED SKIRT LIGHTING



LED skirt
spot lighting

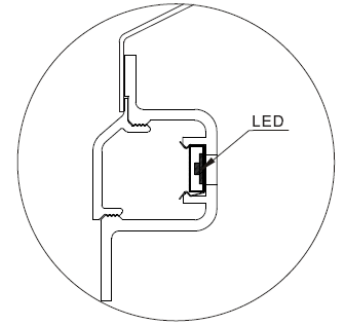


LED continuous
skirt lighting



- LED skirt spot only available in white, are installed starting from the curve and inclined sections at an interval of 300 mm. The light intensity is 29 lux for normal LED and 80 lux for premium LED on the middle of step band surface.
- LED continuous skirt lighting are available in white, blue, red, green and yellow colors.
- LED RGB continuous skirt lighting has same mechanical structure of LED continuous skirt lighting with more light modes
- Practical tip: go for white LED skirt spot lighting premium for a more luxury feeling

Continuous

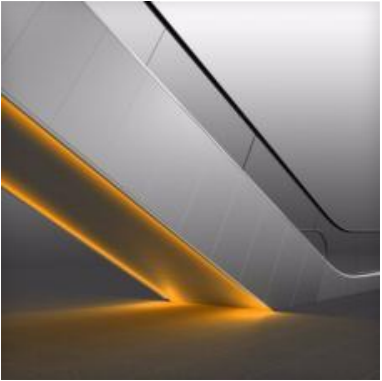


Lighting

LED COVE LIGHTING



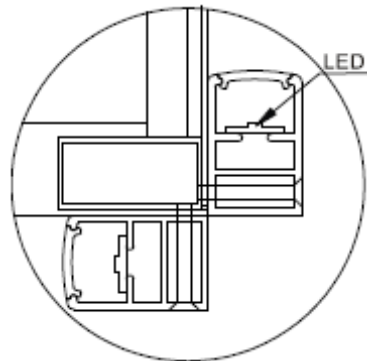
Yellow LED cove lighting at bottom



Yellow LED cove lighting on sides and at bottom

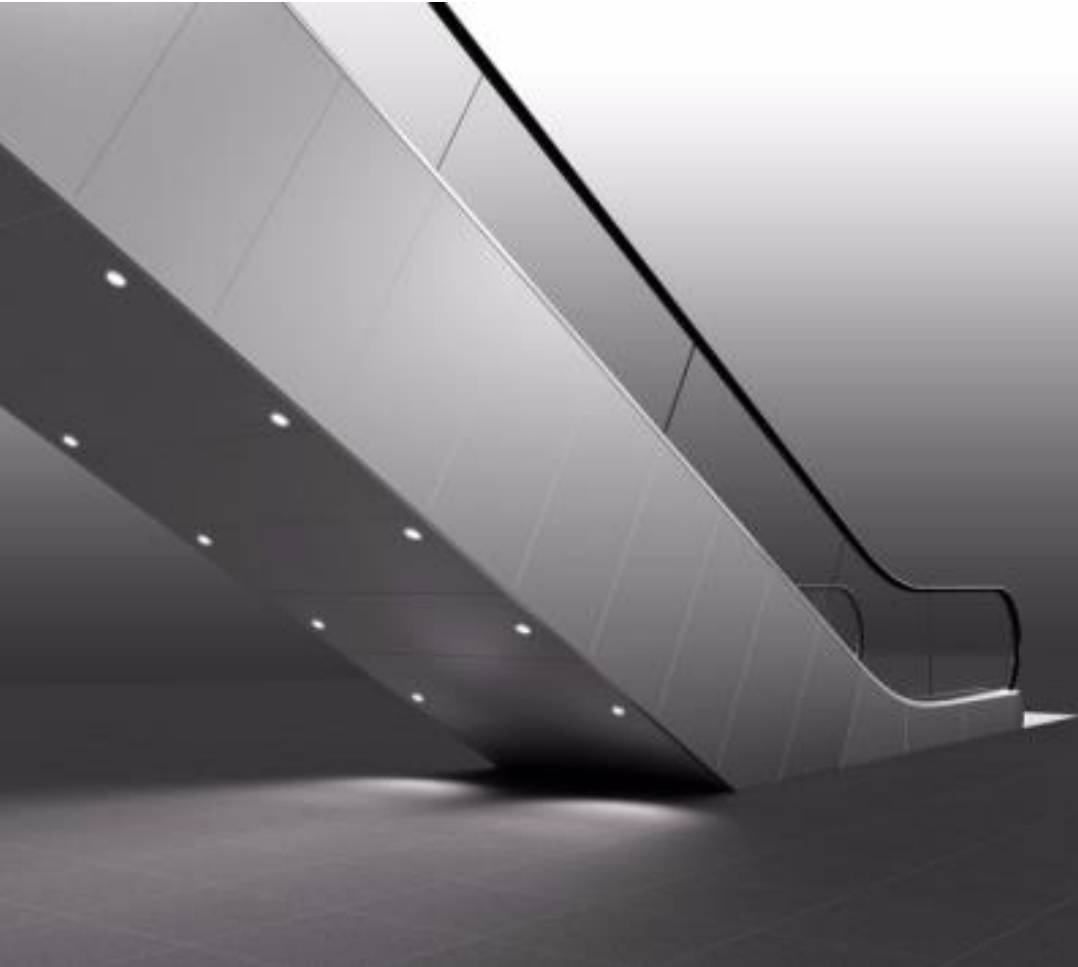


- Lights in directional coves are available to light the soffit and the side cladding.
- The lights are available in white, blue, red, green and yellow colors.
- The light illuminates horizontally along the cladding panel
- Soffit cladding is required for soffit lighting options



Lighting

LED SOFFIT SPOT LIGHTING



- Soffit can be decorated with LED spot lights.
- These lights are available in white color and in either one or two rows.
- Soffit cladding needed for soffit lighting.

Lighting

LED COMB LIGHTS

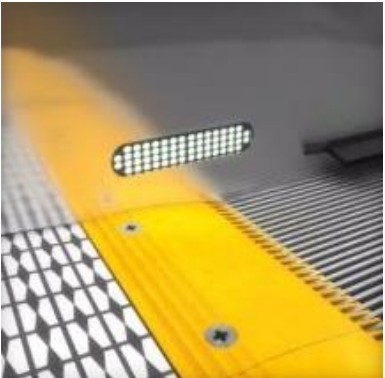


LED comb lights
in white



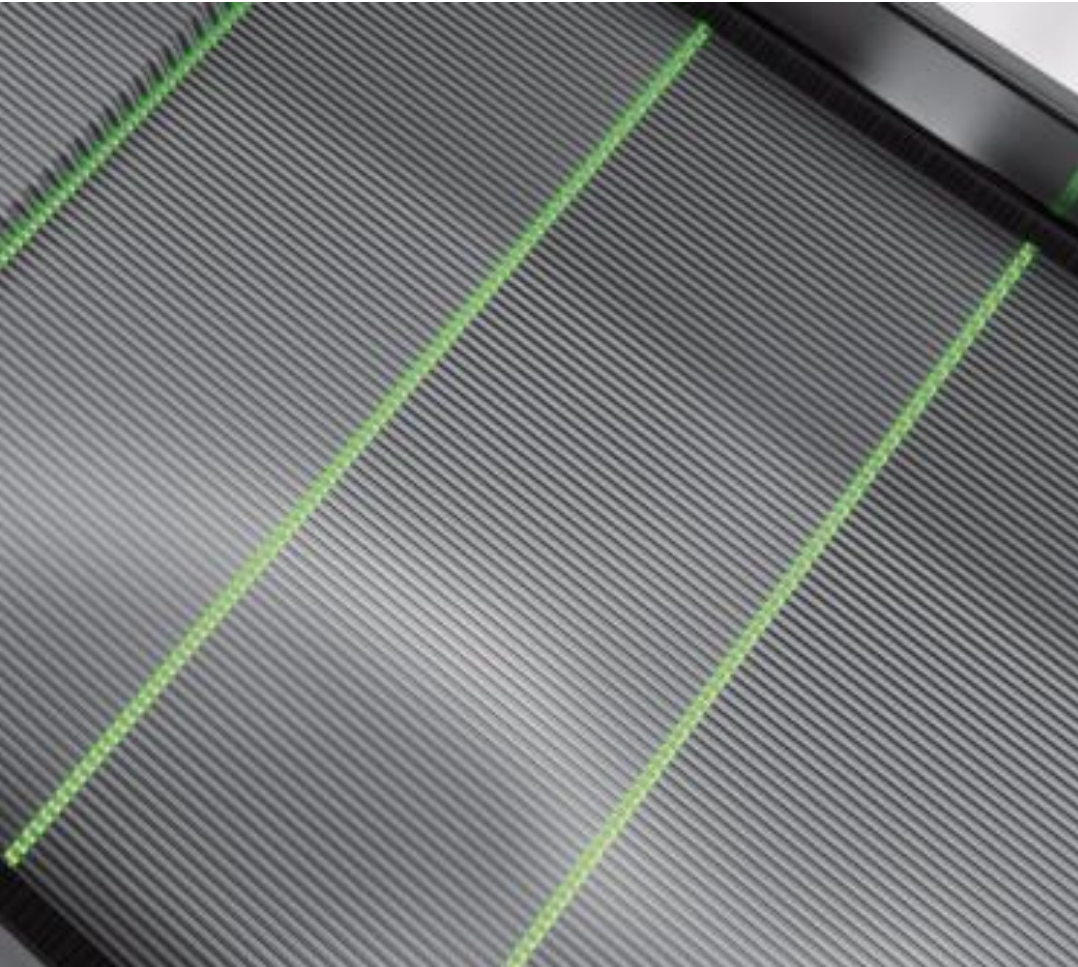
- The LED comb lights aid passengers when boarding or disembarking from the moving step band, by highlighting the comb segment line.
- The LEDs are available in either static or flashing mode and in white, blue, red, green and yellow colors.
- EN 115 requires 50 lux on the comb section

LED comb
lights



Lighting

STEP DEMARCATION LIGHTING



- Step demarcation light is also known as step gap lights and installed with the green fluorescent tubes at the landings under the comb segments to aid passengers during boarding or disembarking.
- It's a very good feature, in particular improving End Users safety (highlights the area of entrance/exit from escalators)



Optimize Eco-efficiency

KONE ESCALATORS, RAMPS AND AUTOWALKS

How to improve Eco-efficiency of Escalators?

KONE ECO-EFFICIENT SOLUTIONS FOR ESCALATORS

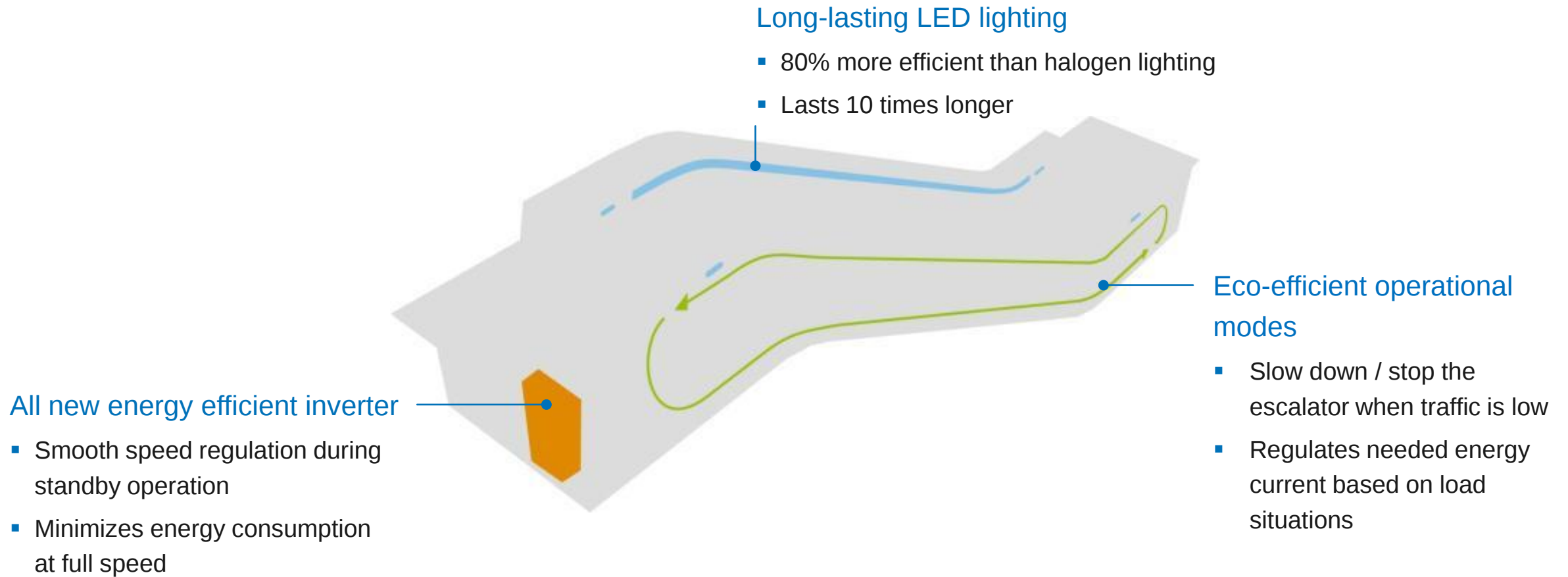
There are at least 3 way of increasing your escalators eco-efficiency & saving you money:

- Select the suitable operational mode
- Select only LED lighting solutions
- Use KONE SMART Inverter

How to improve Eco-efficiency of Escalators?



KONE ECO-EFFICIENT SOLUTIONS FOR ESCALATORS



Designed for KONE Eco Efficiency

SMART INVERTER

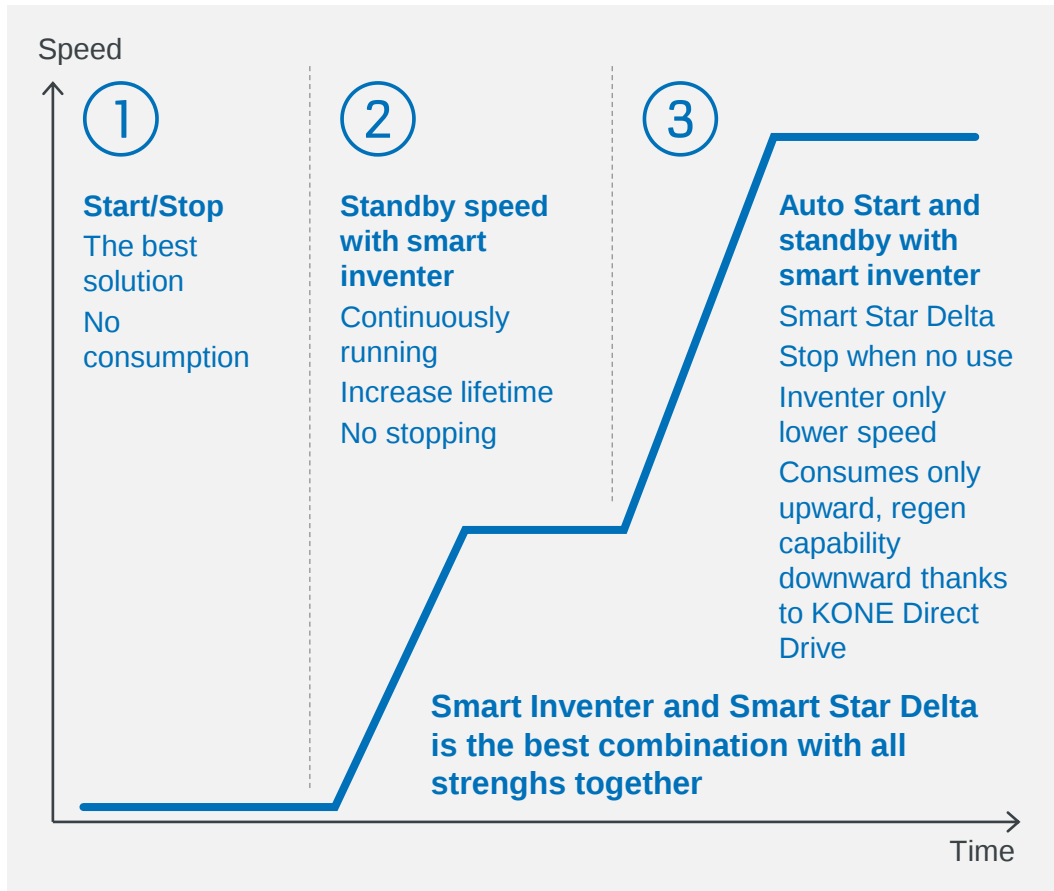


- The most energy-efficient technology: KONE Smart Inverter is activated only to control standby speed. Continuous running can be powered Net directly which makes Smart Star Delta mode possible.
- More options for operational Modes: KONE Smart Inverter increases the operational mode option combinations, which are based on customers' People Flow needs.
- Energy saving, no power wasted on braking resistors
- Longer service time of Inverter due to part-time running.

Designed for KONE Eco Efficiency



ENERGY SAVING OPERATIONAL MODES



- Smart Star Delta
- Standby speed with smart inverter
- Standby speed with full inverter
- Automatic start/stop
- Autostart and standby with Smart inverter
- Autostart and standby with Full inverter
- Autostart comes with pre-selected direction, external photocells and traffic lights

Designed for KONE Eco Efficiency



KONE LED LIGHTING OPTIONS

With LED Lighting

Up to 80%

More energy-efficient than
traditional fluorescent lighting

LED continuous handrail lighting

LED continuous skirt lighting

LED soffit spot lighting

LED cove lighting (soffit or side cladding or both)

LED comb lighting (static and flashing)

LED traffic lights standard

LED traffic lights Cube, Sign and Pole

LED skirt spot lighting – Normal

LED skirt spot lighting – Premium

LED under step demarcation lighting



Maximize Safety for End Users

KONE ESCALATORS, RAMPS AND AUTOWALKS

Ensuring End-user Safety

OUR COMMITMENT IS YOUR SAFETY



- Safety is the starting point for every KONE solution. All our escalators are designed to meet and exceed all applicable safety standards, codes, and regulations
- We offer new and innovative features to ensure that KONE escalators are the benchmark whenever safety is concerned.
- All KONE manufacturing units are ISO 14001 certified
- KONE escalators comply with international codes such as EN115, as well as local codes
- KONE promotes features/options for enhancing safety of End-Users. KONE is active member in code committees, develops pro-actively product for better end-user safety and is active in its sales approach.

Standard Safety Features in KONE Escalators



OUR COMMITMENT IS YOUR SAFETY



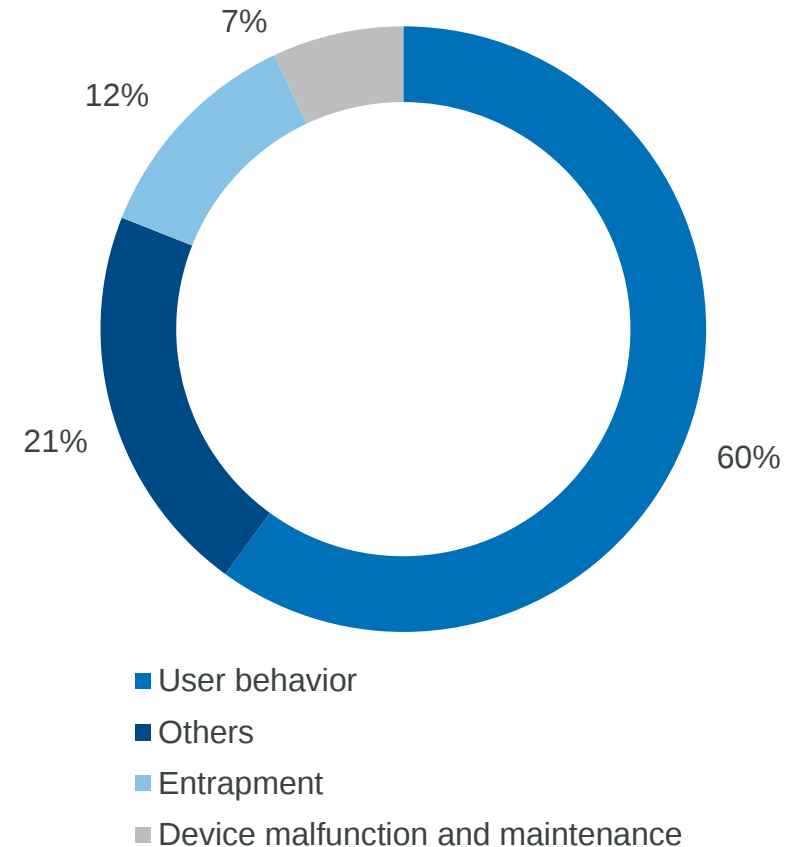
1. Complete impact devices
2. Handrail inlet switches (upper and lower)
3. Step sag switches (upper and lower)
4. Broken step chain switches
5. The speed sensor system
6. Motor thermal protection
7. The main supply isolator
8. Emergency stop buttons beside key switches for passenger use.
- 9-10. Stop switches
11. Handrail speed and breakage monitors
12. Access cover safety switches
13. The mechanical step band lock
14. The missing step detector
15. The brake lift monitoring switch
16. The broken drive chain device
17. Skirt brush
18. Skirt switches

How to increase Safety for your End Users



USER FACTS

- Passenger falls attributed to behaviour result in 60% of all escalator incidents according to KONE study.
- Distraction, loss of balance multi tasking and types of disabilities including visual impairment form the main causes.
- 60% of all accidents are caused by user behavior, by introducing the following additional safety features, studies have shown a dramatic shift in users behavior and reductions in accidents.



Designed for KONE Safety

ESCALATOR GUIDANCE PACKAGE

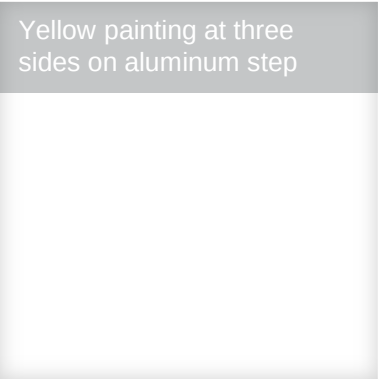
- Passenger safety awareness: Increase user safety awareness through visual safety enhancement, help to minimize the risk of passenger incidents
- Better user experience: Easy building navigation and clear guidance support smooth and safe passenger journeys and improve overall user experience
- An investment that pays off: Increased building and asset value through enhanced safety features that minimize disruptions to operations

Designed for KONE Safety

END USER GUIDANCE PACKAGE



Yellow step demarcation



Yellow comb segments



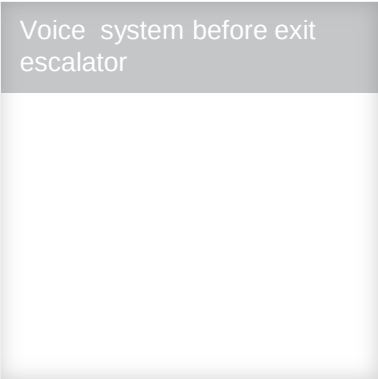
Understep lighting



Comb lighting



Audible / visual warning



- It is crucial to increase passengers’ awareness regarding safe behaviors while traveling on escalators, significantly decreasing risk of incidents.
- KONE End User Guidance Package provides additional safety features to enhance passengers’ awareness and consequently, reduces risk of incidents.

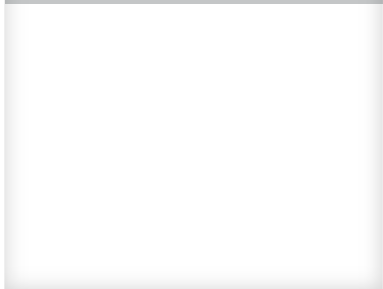
Designed for KONE Safety



VISUAL GUIDANCE PACKAGE

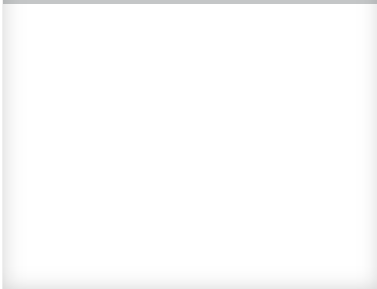
Yellow step
demarcation

Yellow painting at three
sides on aluminum step



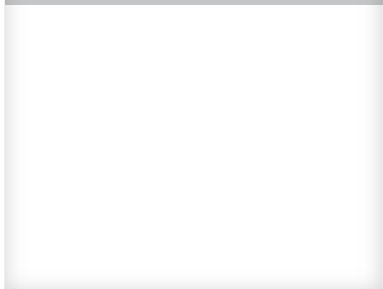
Yellow comb
segments

Aluminum comb with yellow
powder coating



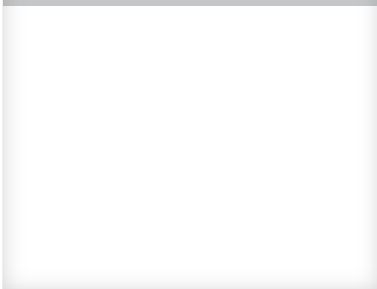
Understep
lighting

Understep lighting
– green



Comb
lighting

Comb light
– flashing type white



- KONE Visual Guidance Package provides additional safety features to improve visibility between moving and static parts reducing the risk of incidents, in particular slips and trips (represents more or less 51% of the full accidents)
- Clearly marks the boundary between moving and static parts
- Defines the ideal passenger standing zone
- Helps also to reduce the risk of object entrapment between steps/pallets and skirting/combs (14%)

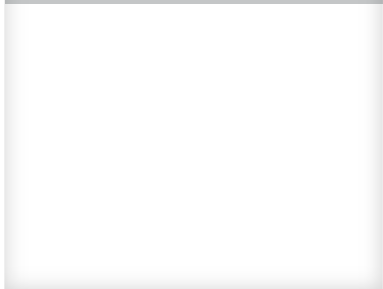
Designed for KONE Safety

VISUAL AND VOICE GUIDANCE PACKAGE



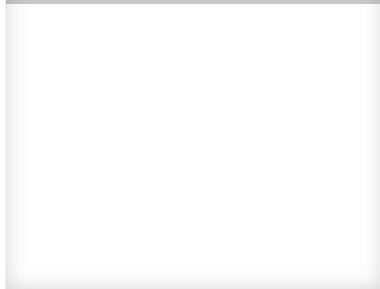
Yellow step demarcation

Yellow painting at three sides on aluminum step



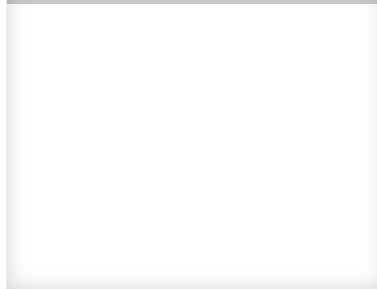
Yellow comb segments

Aluminum comb with yellow powder coating



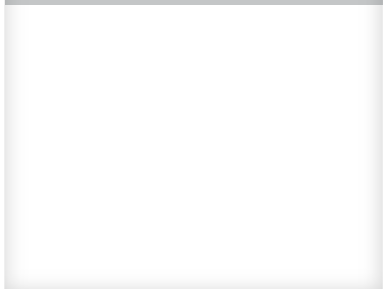
Audible / visual warning

Voice system before exit escalator



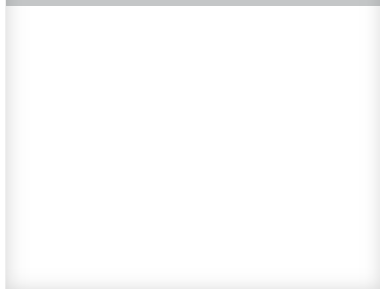
Understep lighting

Understep lighting – green



Comb lighting

Comb light – flashing type white



- Combination of the 2 previously explained packages.
- Combine the effects of visual guidance package & provide also advanced audible warning of the need to exit the escalator
- Reduces the risk of passenger trips on exit due to being otherwise distracted

Designed for KONE Safety

FULL GUIDANCE PACKAGE – ROAD SIGN



Yellow step demarcation

Yellow painting at three sides on aluminum step

Yellow comb segments

Aluminum comb with yellow powder coating

Understep lighting

Understep lighting – green

Comb lighting

Comb light – flashing type white

Audible / visual warning

Voice system before exit escalator

Traffic light – road sign

- Visual and voice guidance package
- Provides high visibility direction information even from distance
- Increasing passenger circulation maintaining uninterrupted smooth and safe people flow

Designed for KONE Safety

PASSENGER FALL PROTECTION BARRIERS



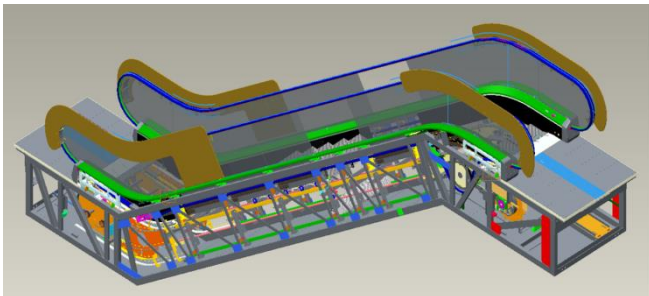
- KONE passenger fall protection barriers are installed outside the balustrades for additional protection in case of the passengers fall over the balustrade.
- It is made of toughened glass panels, with stainless steel support brackets fixed directly to the truss and runs full length of the unit.

Designed for KONE Safety

ANTI RIDE (ANTI SURF) BARRIERS



- KONE Anti Surf barriers are installed outside the balustrades for additional protection to help reduce the possibility of passengers, particular children from being propelled by the handrail over the balustrade "surfing".
- It is made of toughened glass panels, with stainless steel support brackets, fixed to the balustrade profile, however doesn't cover the incline section.





Requirements for Outdoor Locations

KONE ESCALATORS, RAMPS AND AUTOWALKS

Locating your units

INDOOR, OUTDOOR OR SEMIOUTDOOR

- To ensure the reliability and availability of your escalators and autowalks over their lifetime, it is essential that their specifications match the environmental conditions.
- Most escalators and autowalks will normally be installed indoors. They are designed for such an environment as standard. An indoor environment is defined as a weather-tight, temperature controlled environment where the escalator or autowalk will not be exposed to the elements such as rain and snow.

Outdoor or semioutdoor

END USERS OVERVIEW



- An outdoor environment can be either semi-outdoor or fully outdoor
 - Semi-outdoor is an uncontrolled environment in which the unit might be exposed at times to the elements. However, as it is covered with a roof and walls, the escalator is not directly exposed to the elements.
 - Fully outdoor is an uncontrolled environment where the unit will be fully exposed to the elements. A key consideration is therefore the temperature; heaters and/or coolers may have to be install
- But what is the best for End Users Safety and Shopping Experience? **Indoor or Semioutdoor are the answers**

Why semioutdoor is advisable

FOR END USERS SAFETY



- Imagine to go on a ramp with your shopping trolley & starts raining.
- How can you hold the umbrella?
- One hand should hold the handrail,
- One hand should hold the shopping trolley



So you get completely wet after 1 sec... and your shopping items too

And the Code?

SAME ADVISE

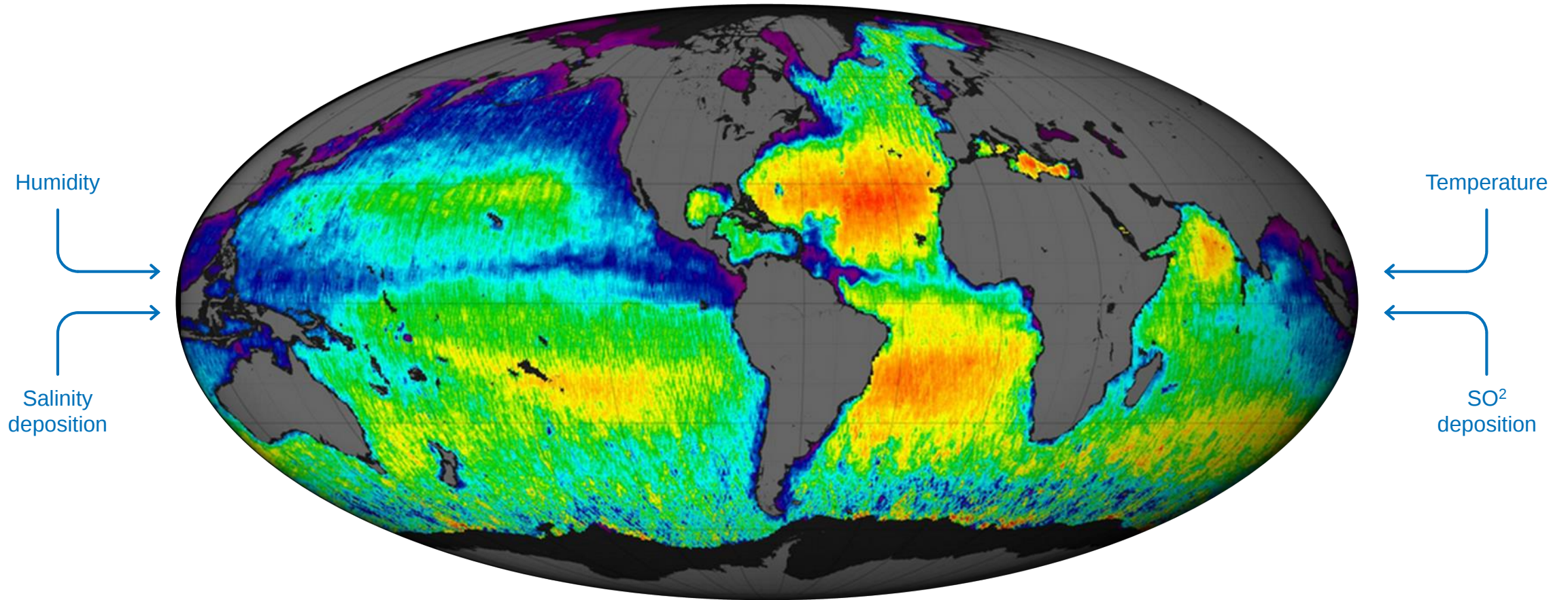


- EN 115-1 recommends that outdoor escalators are covered by a roof. This is for safety reasons.
- For example, passengers on a fully outdoor escalator when it is raining are likely to hold umbrellas as well as shopping trolleys/bags and therefore not the handrail, which could be dangerous



Environment classification, corrosion on steel

FROM ISO9223



Environment classification, corrosion on steel



CORROSION RATE CALCULATION

$$r_{\text{corr}} = 0,0129 \cdot P_{\text{d}}^{0,44} \cdot \exp(0,046 \cdot \text{RH} + f_{\text{Zn}}) + 0,0175 \cdot S_{\text{d}}^{0,57} \cdot \exp(0,008 \cdot \text{RH} + 0,085 \cdot T)$$

$$f_{\text{Zn}} = 0,038 \cdot (T - 10) \text{ when } T \leq 10 \text{ }^{\circ}\text{C}; \text{ otherwise, } -0,071 \cdot (T - 10)$$

r_{corr} is first-year corrosion rate of metal, expressed in micrometres per year ($\mu\text{m/a}$);

T is the annual average temperature, expressed in degrees Celsius ($^{\circ}\text{C}$);

RH is the annual average relative humidity, expressed as a percentage (%);

P_{d} is the annual average SO_2 deposition, expressed in milligrams per square metre per day [$\text{mg}/(\text{m}^2 \cdot \text{d})$];

S_{d} is the annual average Cl^- deposition, expressed in milligrams per square metre per day [$\text{mg}/(\text{m}^2 \cdot \text{d})$].

Environment classification, corrosion on steel

NATURAL ENVIRONMENT CORROSION LEVEL DEFINE BASE ON ISO9223

Corrosivity category	Corrosion rates of metals				
	Unit	Carbon steel	Zinc	Copper	Aluminium
C1	g/(m ² ·a)	$r_{\text{corr}} \leq 10$	$r_{\text{corr}} \leq 0,7$	$r_{\text{corr}} \leq 0,9$	negligible
	µm/a	$r_{\text{corr}} \leq 1,3$	$r_{\text{corr}} \leq 0,1$	$r_{\text{corr}} \leq 0,1$	—
C2	g/(m ² ·a)	$10 < r_{\text{corr}} \leq 200$	$0,7 < r_{\text{corr}} \leq 5$	$0,9 < r_{\text{corr}} \leq 5$	$r_{\text{corr}} \leq 0,6$
	µm/a	$1,3 < r_{\text{corr}} \leq 25$	$0,1 < r_{\text{corr}} \leq 0,7$	$0,1 < r_{\text{corr}} \leq 0,6$	—
C3	g/(m ² ·a)	$200 < r_{\text{corr}} \leq 400$	$5 < r_{\text{corr}} \leq 15$	$5 < r_{\text{corr}} \leq 12$	$0,6 < r_{\text{corr}} \leq 2$
	µm/a	$25 < r_{\text{corr}} \leq 50$	$0,7 < r_{\text{corr}} \leq 2,1$	$0,6 < r_{\text{corr}} \leq 1,3$	—
C4	g/(m ² ·a)	$400 < r_{\text{corr}} \leq 650$	$15 < r_{\text{corr}} \leq 30$	$12 < r_{\text{corr}} \leq 25$	$2 < r_{\text{corr}} \leq 5$
	µm/a	$50 < r_{\text{corr}} \leq 80$	$2,1 < r_{\text{corr}} \leq 4,2$	$1,3 < r_{\text{corr}} \leq 2,8$	—
C5	g/(m ² ·a)	$650 < r_{\text{corr}} \leq 1\,500$	$30 < r_{\text{corr}} \leq 60$	$25 < r_{\text{corr}} \leq 50$	$5 < r_{\text{corr}} \leq 10$
	µm/a	$80 < r_{\text{corr}} \leq 200$	$4,2 < r_{\text{corr}} \leq 8,4$	$2,8 < r_{\text{corr}} \leq 5,6$	—
CX	g/(m ² ·a)	$1\,500 < r_{\text{corr}} \leq 5\,500$	$60 < r_{\text{corr}} \leq 180$	$50 < r_{\text{corr}} \leq 90$	$r_{\text{corr}} > 10$
	µm/a	$200 < r_{\text{corr}} \leq 700$	$8,4 < r_{\text{corr}} \leq 25$	$5,6 < r_{\text{corr}} \leq 10$	—

Which Corrosion Level

SOME REFERENCES FOR YOUR CONVENIENCE



Corrosion level required	C2	C3	C4	C5
Truss	Painting	Hot gal 50 µm	Hot gal 80 µm	Hot gal 80 µm
Step	Alu	Alu	Alu	Alu
Decking Skirting, cladding	SST304 SST443	SST304	SST304	316L

Other environment factors effect to outdoor unit options



EFFECT FACTORS PARTITION

						
Temperature		Rainfall impact		Dust impact		UV-light
-20~30°C		YES		YES		YES
-10~40°C		YES		YES		YES
5~50°C		NO		NO		NO

Semi-outdoor escalator



RECOMMENDED SPECIFICATIONS

For semi-outdoor or outdoor applications, numerous features are available to upgrade the escalator specification to suit the environmental conditions.

Options in Order Form

Semi-outdoor

Truss with zinc painting	Mandatory
IP55 motor	Mandatory
Key switch and stop button with water protection (standard for outdoor application)	Mandatory
Electrical System: Semi-outdoor or outdoor type (IP54 control cabinet, mandatory for option standby speed with inverter or autostart and standby select un EN 115-2008 code)	Mandatory
Harness protection semi-outdoor or outdoor type (IP54)	Mandatory
Automatic lubrication (standard for full-outdoor application)	Optional
Two-way automatic lubrication (main drive chain, handrail drive chain and step chain)	Optional
Hot dip galvanized truss	Optional
Water drainage at lower truss (simple design for semi-outdoor with oil separator design for outdoor)	Mandatory
Step and drive chain covers	Optional
Stainless steel handrail guide profile	Mandatory
Outdoor painting for upper / lower module	Mandatory
Chain oil groove	Optional
Oil pan	Optional
Stainless steel 316L	Optional

Outdoor escalator

RECOMMENDED SPECIFICATIONS



The following table details the recommended specifications for semi-outdoor and outdoor installations.

Options in Order Form

Truss with zinc painting
IP55 motor
Key switch and stop button with water protection (standard for outdoor application)
Electrical System: Semi-outdoor or outdoor type (IP54 control cabinet, mandatory for option standby speed with inverter or autostart and standby select un EN 115-2008 code)
Harness protection semi-outdoor or outdoor type (IP54)
Automatic lubrication (standard for full-outdoor application)
Two-way automatic lubrication (main drive chain, handrail drive chain and step chain)
Hot dip galvanized truss
Water drainage at lower truss (simple design for semi-outdoor with oil separator design for outdoor)
Step and drive chain covers
Stainless steel handrail guide profile
Outdoor painting for upper / lower module
Chain oil groove
Oil pan
Stainless steel 316L

Outdoor escalator

RECOMMENDED SPECIFICATIONS



The following table details the recommended specifications for not controlled environments in terms of temperature.

Heating options

Application	Heating options are for use with the semi-outdoor or outdoor packages when the ambient temperature of the installed escalator may fall below 4°C
Recommended options	▪ Comb plate heaters ▪ Thermostatically controlled truss heaters ▪ Control cabinet heating
Remarks	In cases where the sides of the escalator are exposed to cold winds, the truss must also be thermally insulated, either by the customer or by contacting Customer Service

Cooling options

Application	Cooling options are for use in conjunction with the semi-outdoor packages when ambient temperature of the installed escalator may rise above 40°C
Recommended options	Additional control cabinet ventilation
Remarks	Truss ventilation and / or cooling must be provided by the customer

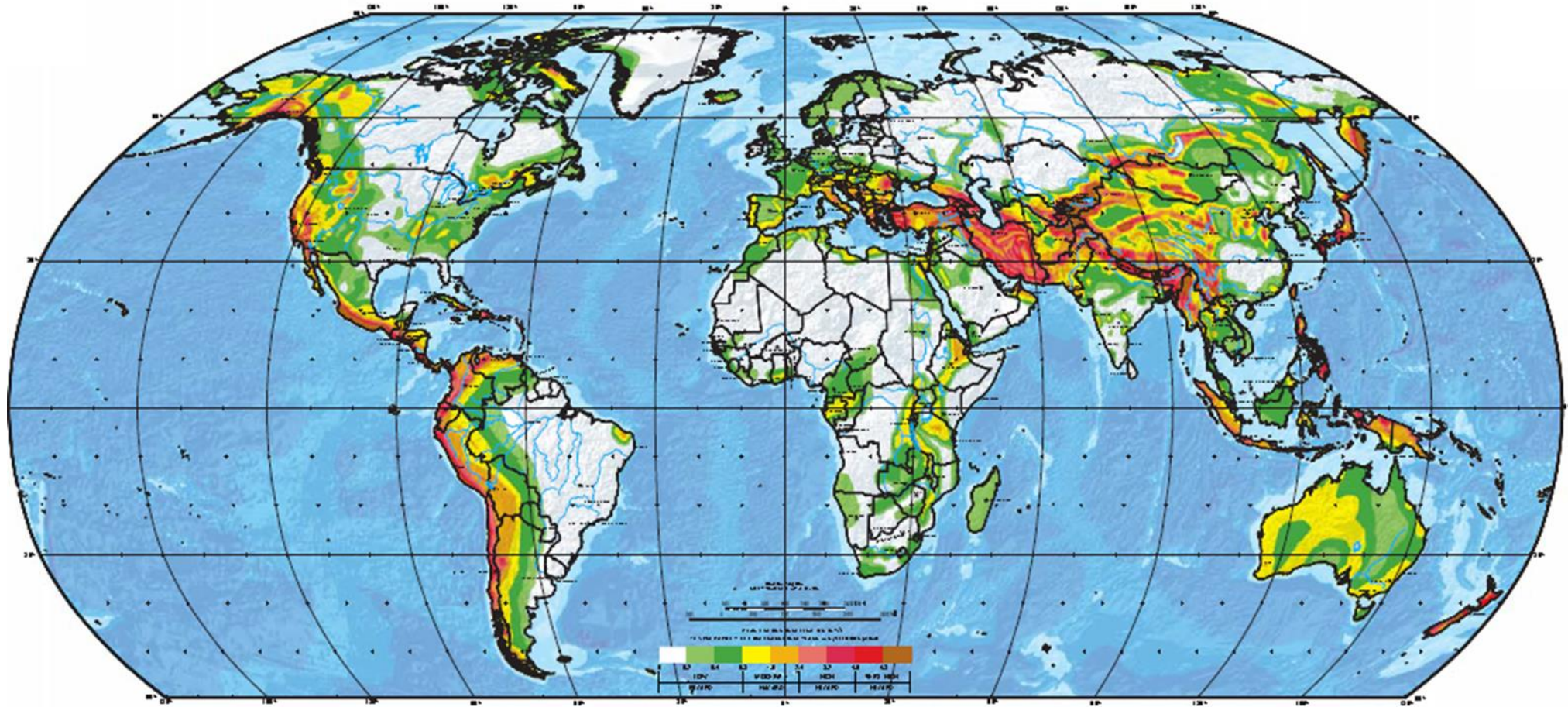


Seismicity: how to approach it?

KONE ESCALATORS, RAMPS AND AUTOWALKS

EN 115-1:2017

SEISMIC IN THE WORLD

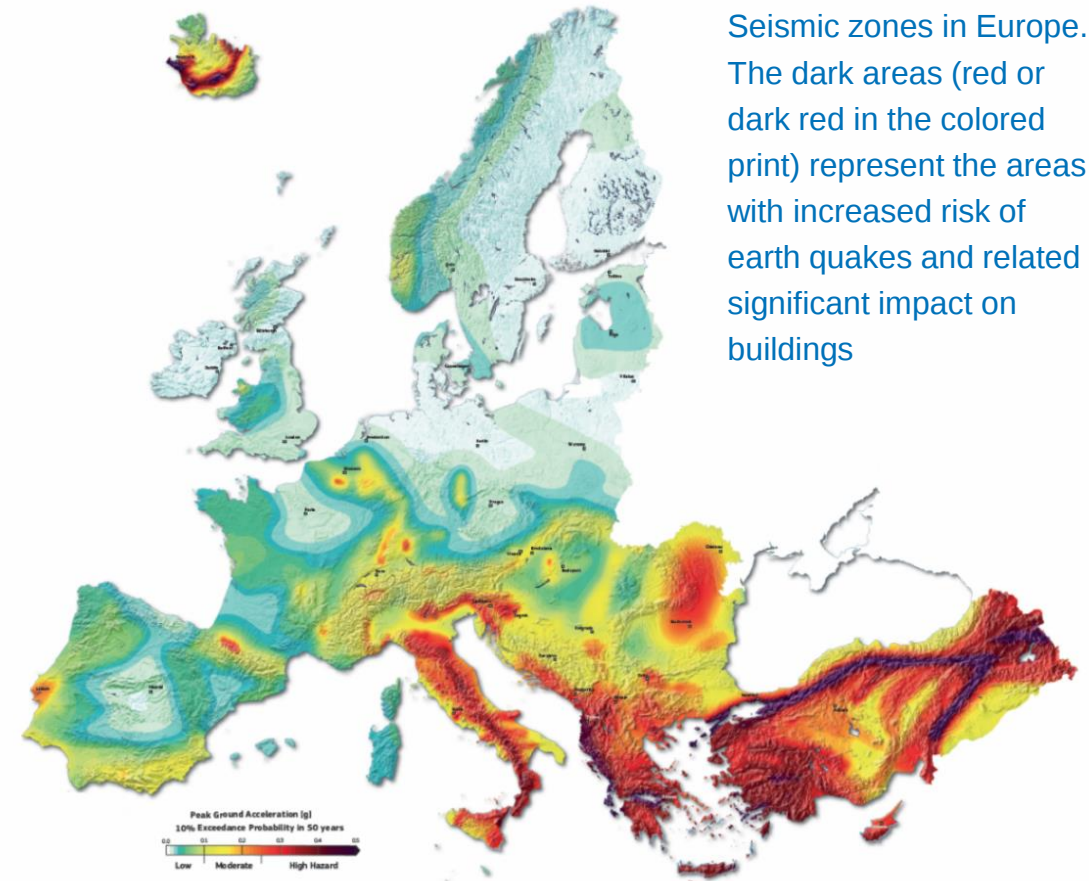


EN 115-1:2017

SEISMIC IN EUROPE



- There are different actions and measures in the European Union to reduce the impact of earth quakes resulting in injuries or death of human being and economical effects by destroying of residential, public and industrial buildings
- EN 1998-1 (Eurocode 8 - Design of structures for earthquake resistance - Part 1: General rules, seismic actions and rules for buildings) specifies requirements for building constructed in seismic zones
- A fundamental issue in EN 1998-1 is the definition of general seismic actions with a common basic model (for specific local parameters the national annex to be regarded)



- Each CEN country provides country specific values for the relevant seismic zones: buildings in seismic zone 3 in one country are not automatically exposed to same seismic level as buildings in seismic zone 3 in another country.
- The seismic level is categorized in very *low*, *low*, *medium* and *high seismicity* for EN Code, but this rule can be different in each country.
- Therefore let's just consider the values for PEAK GROUND ACCELERATION

Seismicity is defined by a value for Peak Ground Acceleration PGA measured in g or m/s² where **0.05 g** = $0.05 * 9.81 \text{ m/s}^2 = \textbf{0.49 m/s}^2$

ANNEX M: SEISMIC



ESCALATORS AND MOVING WALKS SUBJECT TO SEISMIC CONDITIONS – NEW NORMATIVE ANNEX

Annex M specifies the special provisions and safety rules for escalators and moving walks permanently **installed in buildings that are in compliance with EN 1998-1** (Eurocode 8).

Escalators and moving walks within the scope of this standard shall comply with the relevant safety requirements and/or protective measures when escalators are subject to seismic conditions when installed in the building.

EN 115-1:2017

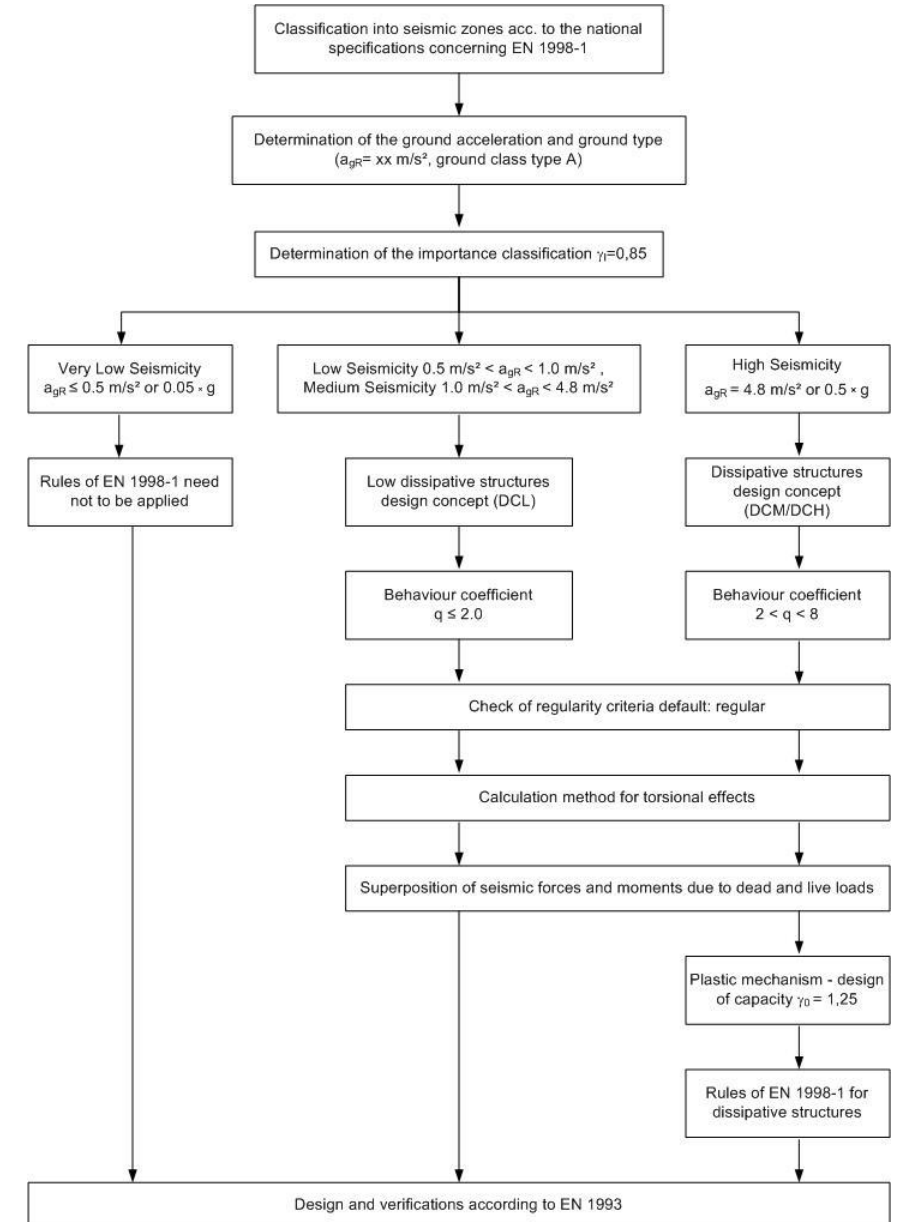
CALCULATION PROCEDURE

The calculation procedure according is provided in Figure M.1 referring to EN 1998-1 as reference standard.

DEFAULT VALUES

- Ground type (type A)
- and the importance factor gamma ($\gamma = 0.85$)

These values are default values for the EN Code when discussing about escalators, ramps and autowalks.



Buildings are directly exposed to the seismic event and shall be designed in accordance with EN 1998-1. Escalators and moving walks are not part of building structure and shall be regarded as equipment in the building,

In case of seismic events

- the escalators shall retain on the supports and the support ends shall be designed so that they overlap the building and interface considering the “**story drift**” (story drift = the relative movement between consecutive stories where the escalator is installed)
- The story drift value should be measured in the DIRECTION OF THE SPAN
- The truss structure and the supports shall be calculated and designed to meet the reaction forces applied when fixed to the building and related to the level of impact of seismic. Reference for this is the seismicity defined as “**peak ground acceleration a_{gR}** ”

Peak ground acceleration a_{gR}



EN 1998-1:2004 (EUROCODE 8): 3.2 SEISMIC ACTION

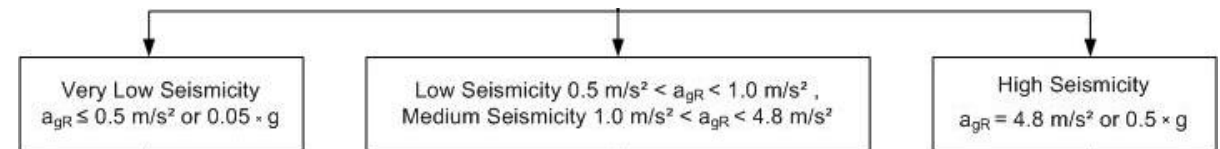
- For the purpose of EN 1998, national territories shall be subdivided by the National Authorities into seismic zones, depending on the local hazard. By definition, the hazard within each zone is assumed to be constant.
- For most of the applications of EN 1998, the hazard is described in terms of a single parameter, i.e. the value of **the reference peak ground acceleration on type A ground, a_{gR}** . Additional parameters required for specific types of structures are given in the relevant Parts of EN 1998.
- NOTE The reference peak ground acceleration on type A ground, a_{gR} , for use in a country or parts of the country, may be derived from zonation maps found in its National Annex.

Peak ground acceleration a_{gR}

EN 1998-1:2004 (EUROCODE 8): 3.2 SEISMIC ACTION

We have 4 types of zones in EN code:

- VERY LOW SEISMICITY ($a_{gR} \leq 0,5 \text{ m/s}^2$):
no seismic, standard Offerring
- LOW SEISMICITY ($0,5 \text{ m/s}^2 < a_{gR} < 1,0 \text{ m/s}^2$):
SEISMIC SELECTION
- MEDIUM SEISMICITY ($1,0 \text{ m/s}^2 < a_{gR} < 4,8 \text{ m/s}^2$):
SEISMIC SELECTION
- HIGH SEISMICITY ($a_{gR} = 4,8 \text{ m/s}^2$):
SEISMIC SELECTION



EN 115-1:2017

SEISMIC CONDITIONS – ANNEX M – RELEVANT KEY VALUES

Which information shall be shared with the escalator producer?

For suitable configuration and code compliant design and installation the following data have to be provided by building owner or architect:

- The value of “**peak ground acceleration a_{gR}** ” for the building the escalator is intended to be installed
- The value of “**interstory drift**” for the floors between the lower and upper end of the escalators.

- Based on value of interstory drift provided, we will have one of the 4 different types of mounting details.
- Based on value of peak ground acceleration, we may need an smaller or stronger reinforcement of the truss

Interstorey drift



UNDERSTANDING OF THE INTERSTOREY DRIFT

$$\theta = \frac{P_{\text{tot}} \cdot d_r}{V_{\text{tot}} \cdot h} \leq 0,10 \quad (4.28)$$

where

- θ is the interstorey drift sensitivity coefficient;
- P_{tot} is the total gravity load at and above the storey considered in the seismic design situation;
- d_r is the design interstorey drift, evaluated as the difference of the average lateral displacements d_s at the top and bottom of the storey under consideration and calculated in accordance with **4.3.4**;
- V_{tot} is the total seismic storey shear; and
- h is the interstorey height.

It's the responsibility of the builder to inform KONE about this value, that can affect deeply the seismic construction of the escalator

EN 115-1:2017

DESIGN OF THE TRUSS END SUPPORTS



Product type:	TM110
Maximum story drift:	TYPE 1: +/- 55 mm
Design:	Type 1
Pocket dimensions:	see Fig. 1a & 1b

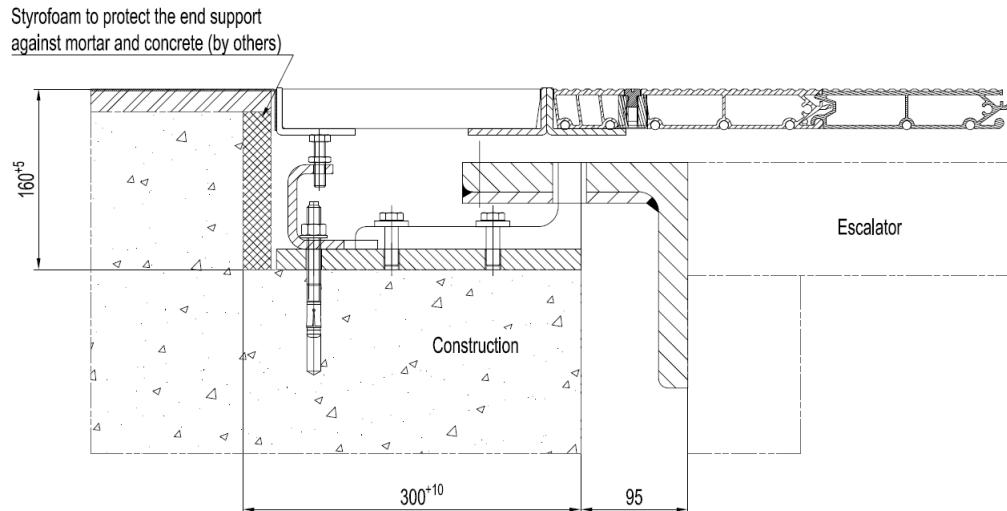


Fig. 1a - Lower end (fixed end)

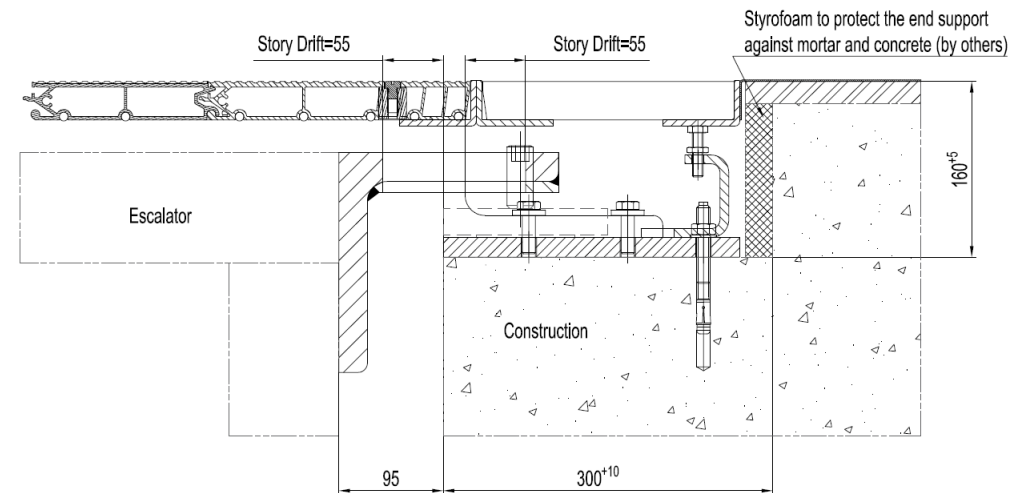


Fig. 1b – Upper end (movable end)

EN 115-1:2017

DESIGN OF THE TRUSS END SUPPORTS



Product type:	TM110
Maximum story drift:	TYPE 2: +/- 80 mm
Design:	Type 2
Pocket dimensions:	see Fig. 2a & 2b

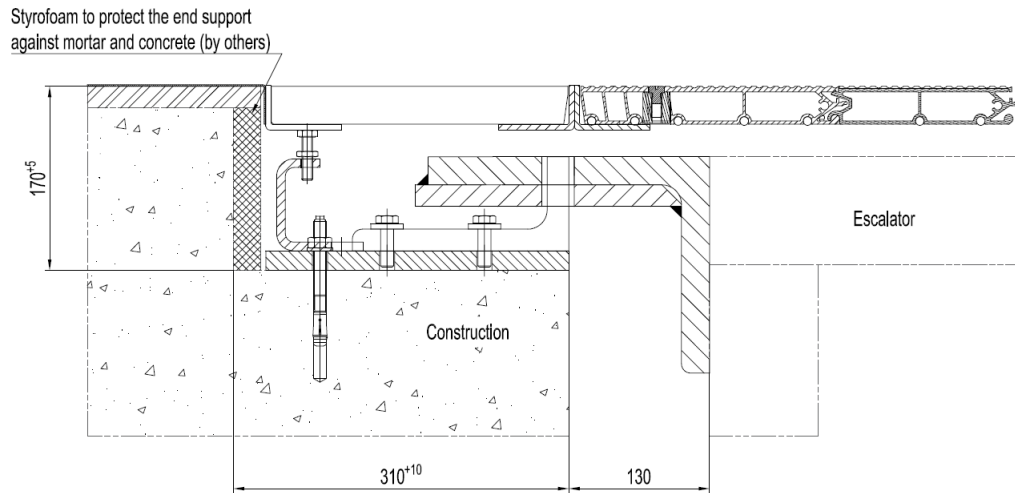


Fig. 2a - Lower end (fixed end)

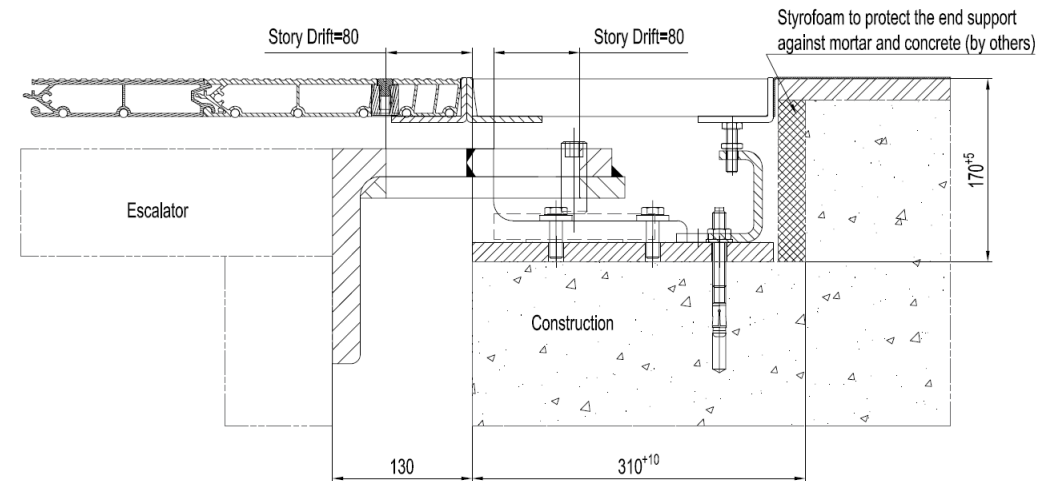


Fig. 2b – Upper end (movable end)

EN 115-1:2017

DESIGN OF THE TRUSS END SUPPORTS



Product type: TM110
Maximum story drift: TYPE 3: +/- 105 mm
Design: Type 3
Pocket dimensions: see Fig. 3a & 3b

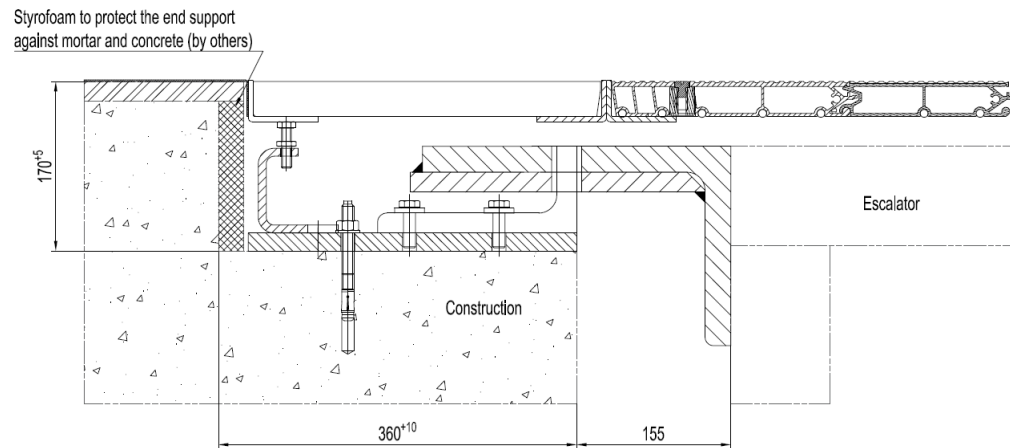


Fig. 3a - Lower end (fixed end)

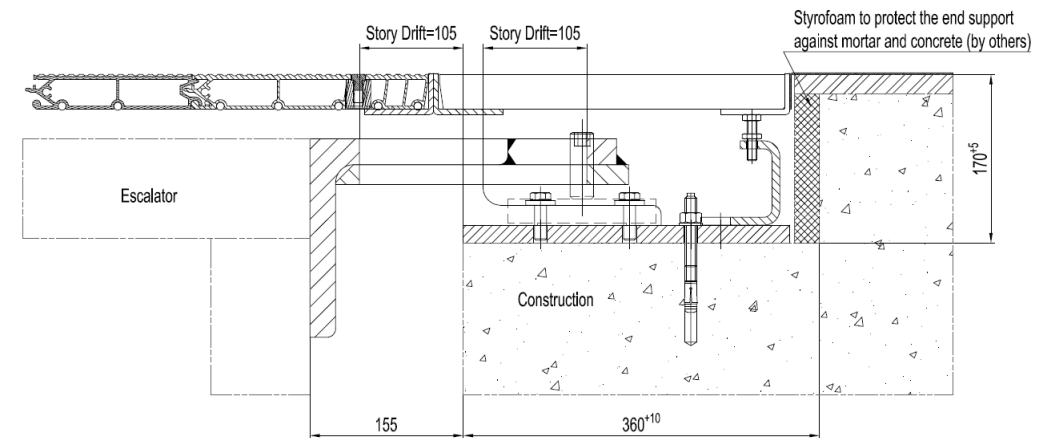


Fig. 3b – Upper end (movable end)

EN 115-1:2017



DESIGN OF THE TRUSS END SUPPORTS

Product type: TM110
Maximum story drift: TYPE 4: +/- 160 mm
Design: Type 4
Pocket dimensions: see Fig. 4a & 4b

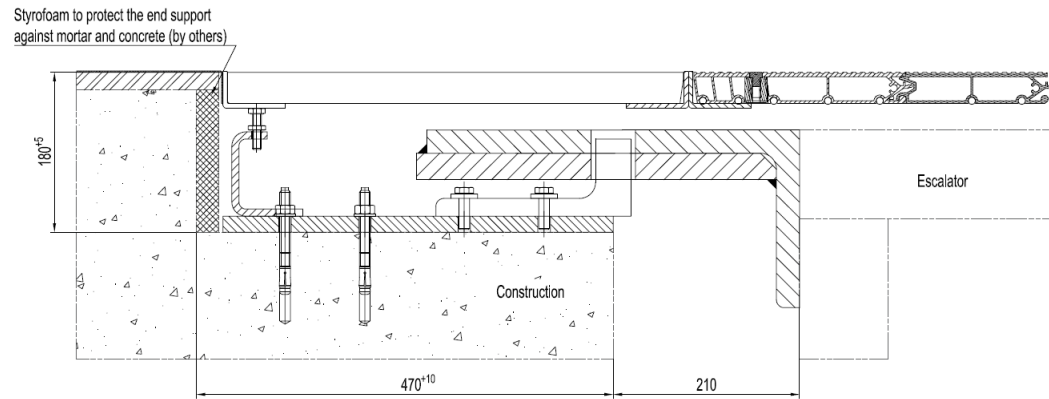


Fig. 4a - Lower end (fixed end)

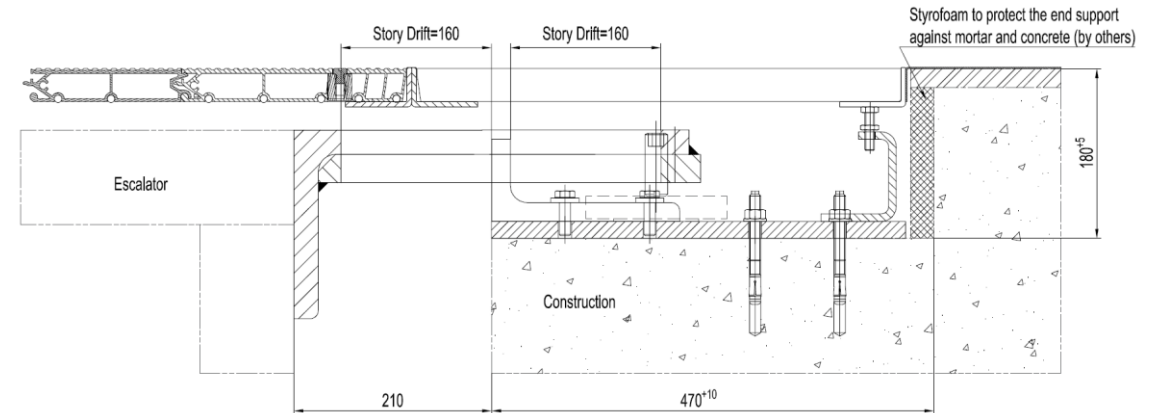


Fig. 4b – Upper end (movable end)



Preparing the installation site

KONE ESCALATORS, RAMPS AND AUTOWALKS

General transportation information



WHAT KIND OF INFORMATION ARE NEEDED FOR TRANSPORTATION PREPARATION?

Contact & General Information

- Address of installation site
- Contact details on site
- Project details
- Any special requirement at site (delivery day, night time, historical city center)

Delivery & Transportation

- Delivery time and sequence, position of equipment on transport vehicle
- Transportation dimensions, type of vehicle, equipment needed for unloading
- Road closing permissions and access permit requirements

Additional Information

- Such as special truck length or where to meet the person who will guide the truck to site (if needed)

Unloading the escalator at site



HOW IT IS DONE?

①

Plan the unloading before moving any equipment carefully considering the site requirements

②

Position the truck for safe and efficient unloading

③

Use a strong enough vehicle to transport the materials from the delivery truck to the designated area

④

Store the material close to the wellway, if possible, and in the order they will be needed for Installation, to minimize impact on site

Preparing the site

SITE ABSOLUTES



- KONE's 6 Site Absolutes are minimum requirements or conditions which must be met before the escalator or autowalk can be delivered
- to the site and installed.
- Adhering to the 6 Site Absolutes will ensure smooth cooperation between all parties involved in the project and will help to prevent unnecessary delays or additional costs.
- The Site Absolutes must be agreed upon with the building contractor prior to order and they must be available at the date of installation.
- Regulations in different countries may vary, but the Site Absolutes are not negotiable.
- Note also that the Site Absolutes are used for planning; the job specific conditions are defined in the contract

Prior to delivery and truss installation:

1. WELL WAY / PIT CONSTRUCTION

All of the following items must comply with approved KONE layout drawings:

- Escalator support angles
- Face-to-face dimensions
- Pit dimensions
- Pocket depth
- Rise
- Mounting locations

Prior to delivery and truss installation:

2. SAFETY REQUIREMENTS

Approved safety barricades must be installed around all wellway / pit openings.

Prior to delivery and truss installation:



3. ROUTE OF ENTRY TO THE SITE

- The agreed route of entry to the site must be available when required. The unloading area must be defined and available.
- Space depends on the equipment (crane, forklift, etc.) required to remove the escalator or autowalk from the truck and hoist it into final position.
- All installation routes must be prepared as/if required to accommodate the weight of the escalator or autowalk..



Prior to delivery and truss installation:

4. PROVISION FOR EQUIPMENT PROTECTION

Arrangements must be made to protect the equipment from damage by other trades during the entire project, as well as from weather if the unit is installed in a building before the roof is completed.

Prior to final assembly:

5. SITE AND STORAGE CLEAN-UP

The working and storage areas must be clean, dry and protected from the weather.

Prior to final assembly:

6. 3-PHASE POWER

Permanent final 3-phase power must be available for assembly, commissioning and testing..

Mounting locations



HOW THE ESCALATOR IS CONNECTED WITH THE BUILDING

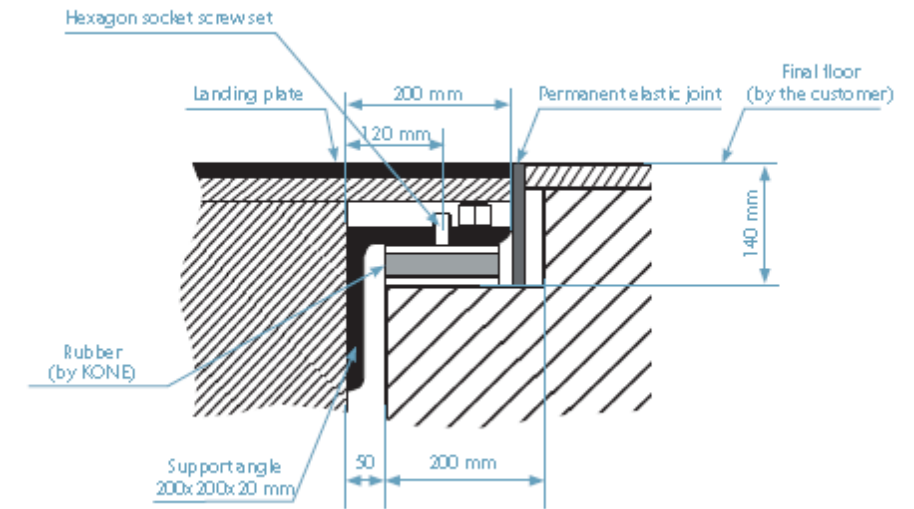
- The escalator or autowalk is supported at each end by mounting angles which sit on support beams within the building structure. These are not provided by KONE.
- When designing and constructing the building structure, you must ensure that the building is able to accommodate the loads imposed by the escalator, i.e. the dead weight of the escalator and the live passenger load.
- In installations where the escalator spans an expansion joint in the building structure, mountings can be provided to accommodate up to +/-20 mm of expansion/contraction.
- In building installed in seismic areas, a seismic mounting will be provided.

Mounting locations

HOW THE ESCALATOR IS CONNECTED WITH THE BUILDING



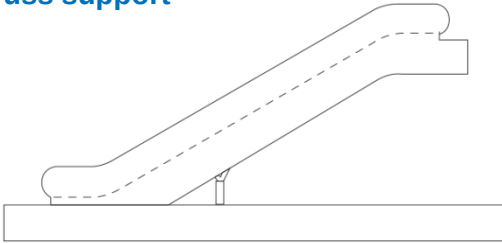
- The mounting locations at each end of the escalator are provided with isolation (anti-vibration) pads which dampen vibration and prevent structure-borne noise being transmitted to the building structure.
- Steel shims and/or jacking bolts between the isolation pads and the mounting location (support angle) are used to adjust the level of the escalator during installation to ensure the access covers fit flush with the finished floor level of the building.
- Between the floor finish and the escalator, a nominal 15 mm gap must be left. This gap should be filled with a flexible filler such as silicon, so that the vibration isolation between the escalator and the building structure is not compromised..



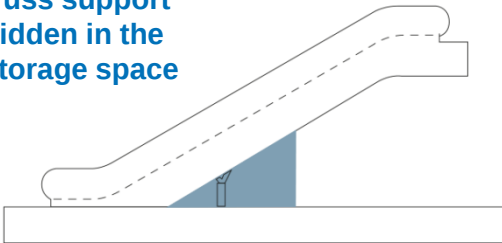
Intermediate truss support

HOW THE ESCALATOR IS CONNECTED WITH THE BUILDING

Intermediate
truss support



Intermediate
truss support
hidden in the
storage space



- When the length of the escalator/inclined autowalk would result in the truss exceeding the maximum permitted deflection of $1/750$ of the distance between supports, an intermediate truss support should be provided.
- The support should sit on a structural support (not provided by KONE).
- For ease of installation, you are advised to omit the structural support until the escalator or inclined autowalk is ready to be lowered into its finally installed position.
- It is possible to make the most of the space under the truss with an intermediate support i.e. creating a “cleaning area location”

Electrical requirements

HOW THE ESCALATOR IS CONNECTED WITH THE BUILDING



- In general, the electrical supply is connected at the upper machine compartment of the escalator or autowalk. The layout drawings will specify the number and minimum cross-section of the connecting cables.
- NOTE: All electrical supply connections are your responsibility following KONE's instructions on
- the layout drawings, and should be implemented by an authorized electrician.

Sprinkler system



HOW THE ESCALATOR IS CONNECTED WITH THE BUILDING

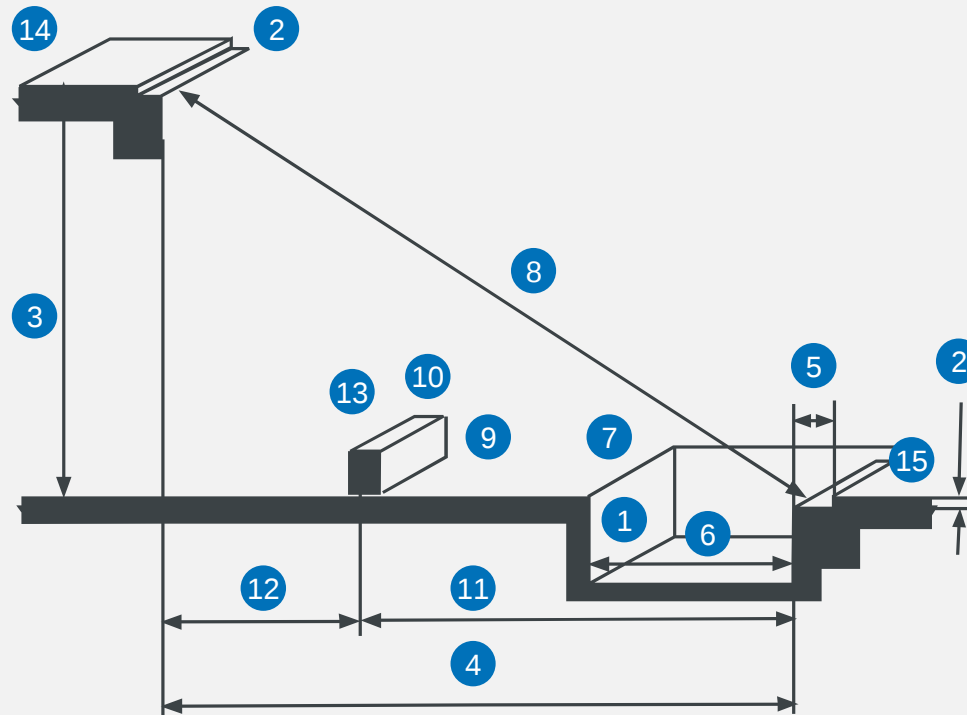
- Sprinkler pipe work within the escalator truss and inclined autowalk is available with our units. Only the pipe work is supplied by KONE and this incorporates outlets for the sprinkler heads both internally within the upper and lower machine compartments, and externally in the soffit. The sprinkler heads and connection to the water supply are not provided by KONE..
- As the position and spacing of the sprinkler head outlets depend on the local building regulations and code requirements, you are advised to contact your local KONE sales organization for the specific positions

Measurements prior to installation

HOW TO ASSURE THAT THE ESCALATOR FITS

Building structural dimensions to be verified prior to installation

1. Pit depth
2. Pocket depth in reference to finished floor
3. Vertical rise
4. Face-to-face of supports
5. Pocket width
6. Pit length
7. Rough opening width
8. Face-to-face measurement
9. Intermediate support height
10. Intermediate support width
11. Intermediate support position from lower end
12. Intermediate support position from upper end
13. Intermediate support length
- 14-15. Pocket opening width



You should ensure that the following measurements are taken prior to installation of the escalator. The dimensions should be checked against the contract-specific KONE layout

Installation Method



HOW THE ESCALATOR IS INSTALLED WITH THE BUILDING

The escalator installation process is divided in three main sections:

①

Rigging and hoisting

②

Assembly

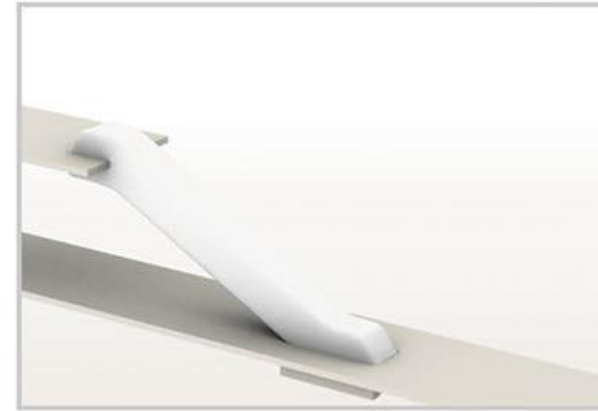
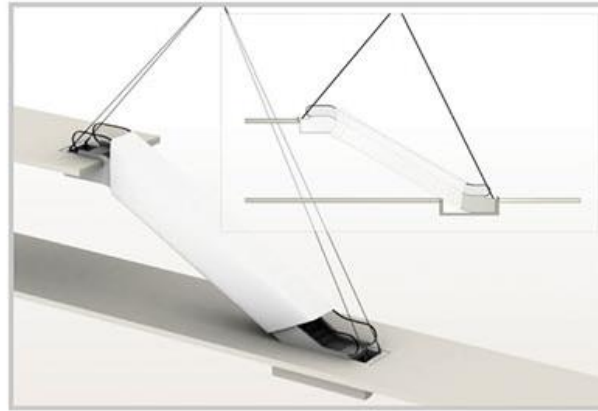
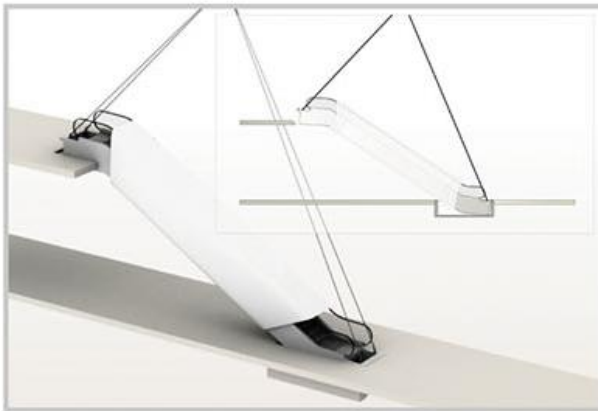
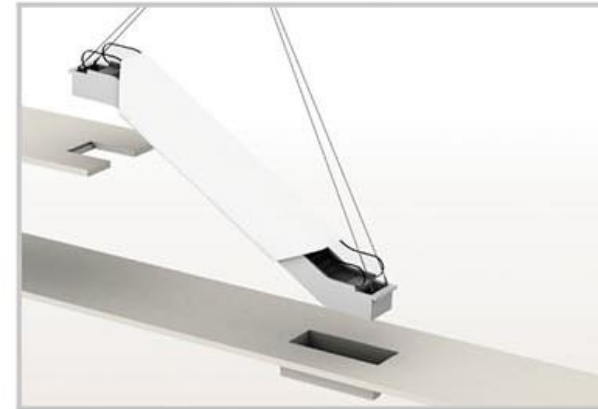
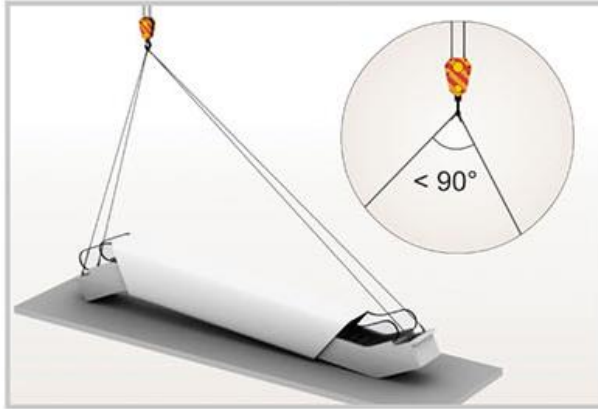
③

Commissioning

Due to the customer project plan all sections can run parallel, or in a completely different time frame, or in a combination of both.... But everything will be agreed with the customer, considering site conditions & requirements.

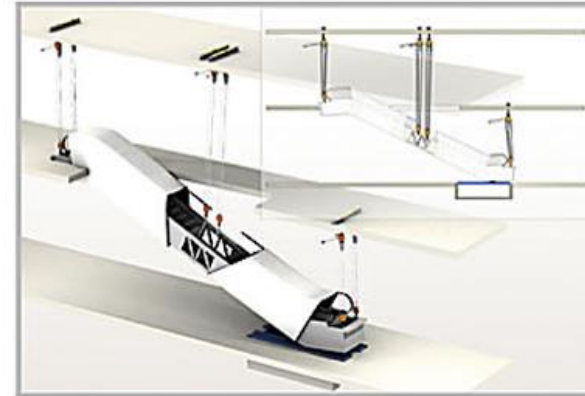
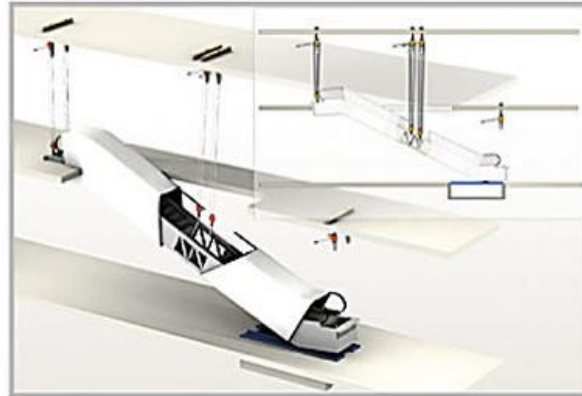
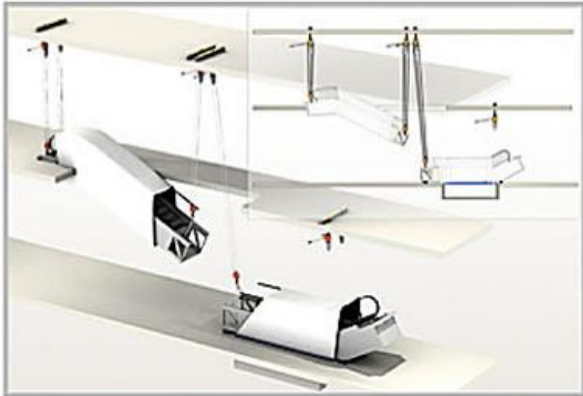
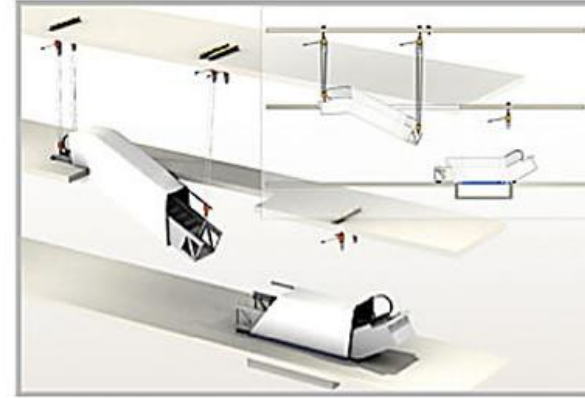
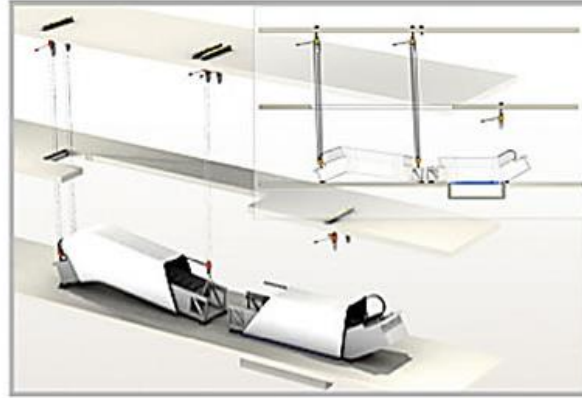
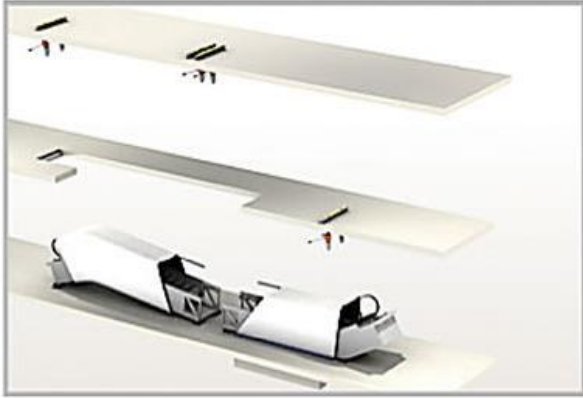
Installing the unit

INSTALLATION IN ONE COMPLETE SECTION BY MOBILE/SITE TOWER CRANE DIRECTLY INTO POSITION



Installing the unit

INSTALLATION THROUGH THE BUILDING IN TWO OR MORE SECTIONS





Dedicated to People Flow™

