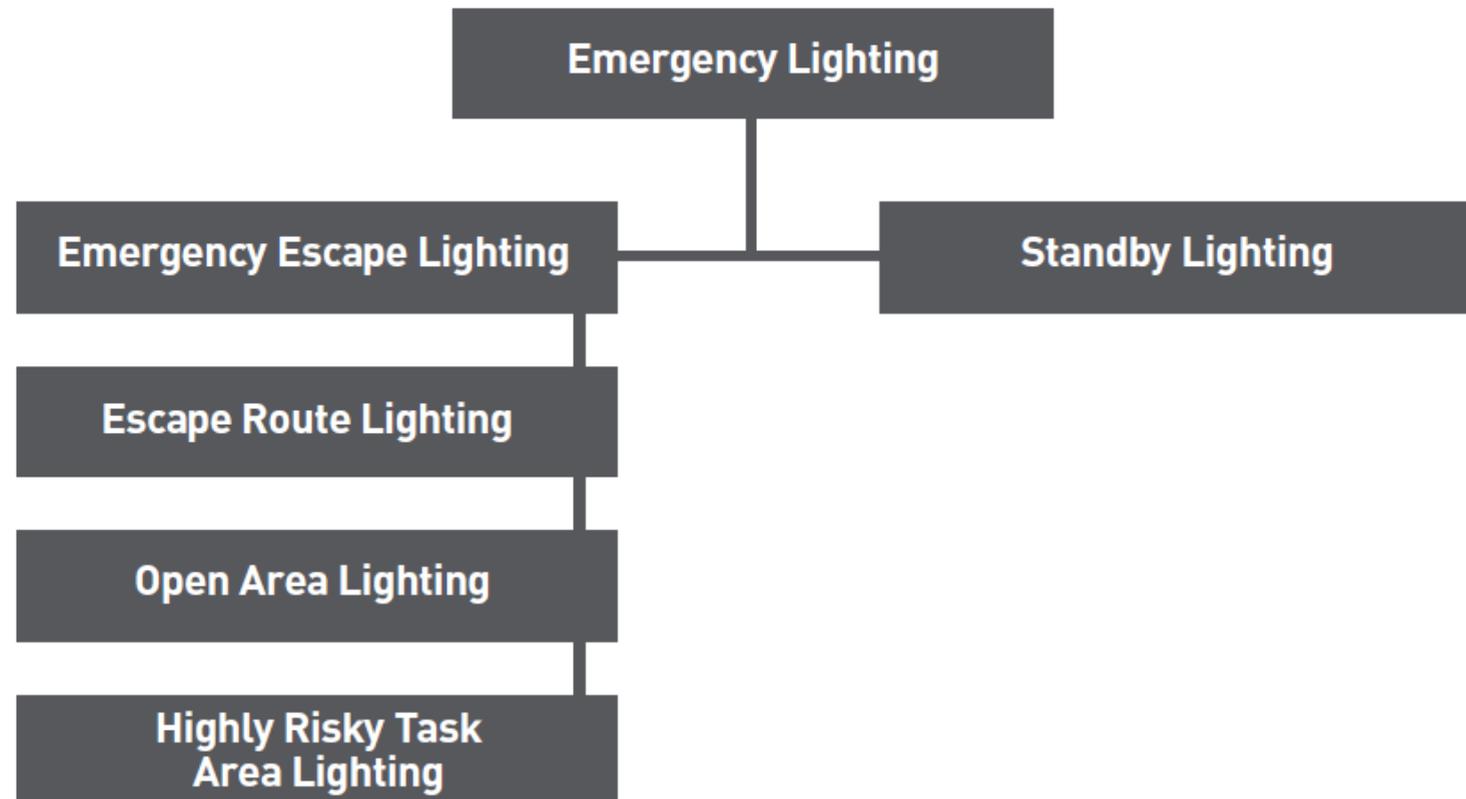


# 5eş A

Emergency Lighting User's Guide

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Emergency lighting systems are the systems that become automatically active and provide adequate lighting when the main power or a similar external electric supply is interrupted due to a breakdown, when the power in a building is cut for safety reasons in the case of a fire or an earthquake and when normal lighting is interrupted after a circuit breaker or a fuse is switched on.

### **Standby Lighting**

Standby lighting is the emergency lighting type envisaged for the continuity of the current conditions and the operations before the interruption of normal lighting. This lighting type is not included in emergency escape scenarios.

### **Emergency Escape Lighting**

Emergency escape lighting is the emergency lighting that provides the necessary lighting for the safety of the people who are evacuating a building or an area in the case of an emergency, or who are trying to finalize a potentially hazardous action before evacuation. There are 3 types of emergency escape lighting.

#### **A - Escape Route Lighting**

Escape route lighting is the emergency lighting type that assists in the safe evacuation of the people from the building by illuminating the escape routes in the case of an emergency.

#### **B - Open Area Lighting**

Open area lighting is the lighting type envisaged for areas larger than 60m<sup>2</sup> or for gathering points and it provides access to the predetermined escape routes in the case of an emergency. It is also known as anti-panic lighting.

#### **C - Highly Risky Task Area Lighting**

Highly risky task area lighting is the lighting that is manufactured for the safety of the people who are located in areas where possibly hazardous processes or conditions may occur in the case of emergency. In certain systems, it provides the users with opportunities for appropriate deactivation.

#### **A – Escape Route Lighting Luminaries:**

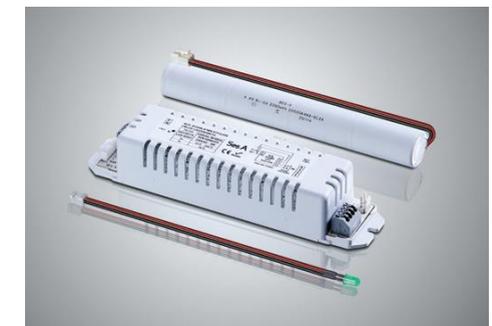
According to the standards, they must be installed at a height between 2 and 4.5 meters. They can be directly installed on the walls, ceilings or mounted ceilings or they can be hung down by using components such as hangers, chains and slings.

#### **B – Open Area Lighting Luminaries:**

Open area emergency lighting luminaries have lamps with moving head. These lamps can be projected towards the desired direction. They can be used in large areas such as factories and garages and in surroundings that require a high level of lighting.

#### **C – Emergency Lighting Units:**

It is mounted to into the selected luminary. It tracks power outage from its own feed ends. In the case of a power failure, it prevents panic and provides the necessary lighting for the fastest evacuation possible from the surroundings.



For the people to reach the exits easily during emergencies, emergency exits luminaries should be installed in buildings.

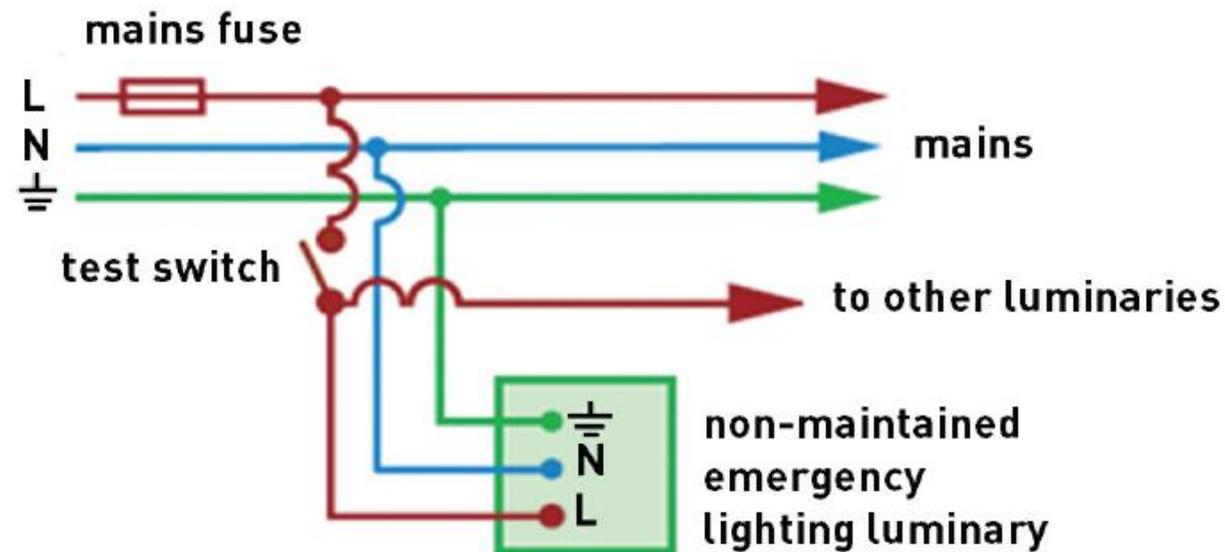
It is compulsory to install emergency exit signs in order to show people in the building the locations of the exits to be used for evacuation and the planned exit routes from every point in the building in the case of an emergency.

These luminaries, which can be one-sided or two-sided, have graphic signs on them that provide orientation. The luminaries can be installed on the wall, on the ceiling or on the suspended ceiling. They can also be hanged down by using components such as hangers, chains and slings.



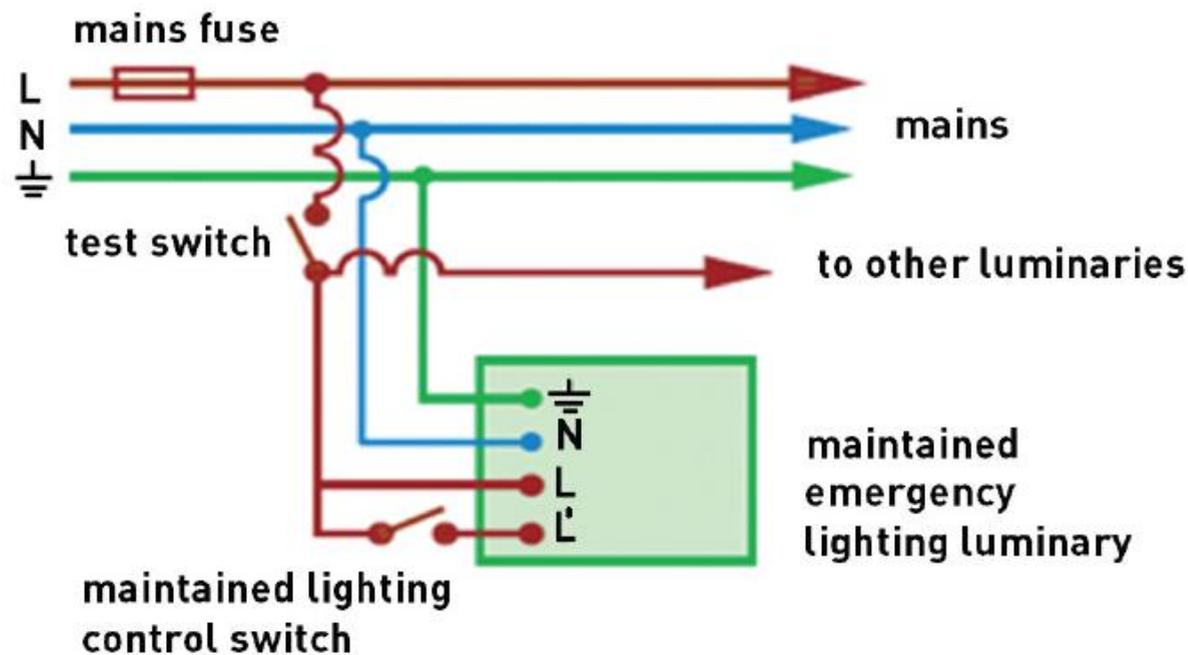
### Non-Maintained Mode

The lamp does not provide light when the main power is at its normal value. It starts providing light in the case of a main power failure. The lamp is switched on by means of the battery inside the luminary in the case of a failure.



### Maintained Mode

In this type of luminaries, the lamp provides light when the mains voltage is at its normal value. In the case of a main power failure, it continues to provide light by means of the battery in the luminary. In some versions, the lamp can be switched off when desired by installing an external switch.



### Light Flux ( $\Phi$ ) [Lumen (lm)]

Light flux (  $\Phi$  ) is a concept related to the total amount of light emitted from a light source in a unit of time. The light flux of a light source is an energy flux emitted from this light source that is measured according to the spectral sensitivity curve of a normal eye in daytime.

### Light Intensity [I - Unit: Candela (cd)]

A light source generally emits light flux (  $\Phi$  ) in various directions and with different intensity. The density of the light emitted towards a certain direction is referred to as the light intensity (I).

### Luminosity (L - Unit: $\text{cd}/\text{m}^2$ )

Luminosity defines the intensity of light emitted towards a certain direction from the unit area of the surface.

### Light Level [E - Unit: Lux (lx)]

Light level (E) is the amount of the light flux reaching the unit area of a surface in a unit of time. The light level has a value of 1 lx when 1 lm of light flux is evenly projected on a surface of  $1\text{m}^2$  ( $\text{lx}=\text{lm}/\text{m}^2$ )

### Color Temperature [Kelvin (K)]

Color temperature states the general color of the light source. When we describe a light source as hot or cold, what we are providing information about its Kelvin value. Low Kelvin values (e.g. 3000K) indicate hot light, whereas high Kelvin values (e.g. 8000K) indicate cold light. The daylight has a Kelvin value of 5000-6500.

### CRI - (Color Rendering Index)

Color rendering is the color effect that the light generates on a colored object. The light source should ensure that the colors are perceived as they are in reality as much as possible. It is accepted that the daylight has a CRI of 100.

### Luminous Efficiency (lm/W)

Luminous efficiency is also known as the efficiency factor. The luminous efficiency of the light source is the ratio of the total light flux emitted from the source to the power of the source.

### Protection Class (IP)

Protection Class is the indicator of the durability of lighting luminaries against dust, solids, water and humidity. In the international literature, it is abbreviated with the code IPX1X2. The first number in IP rating (X1) indicates the degree of protection against solids, while the second number (X2) indicates the degree of protection against humidity and water

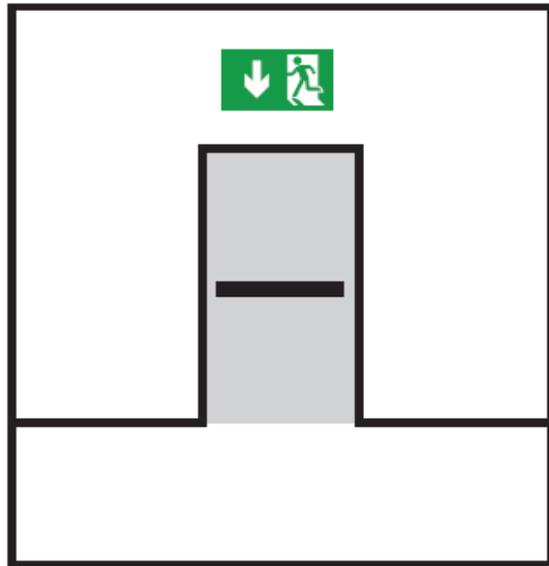
### The use of emergency lighting is compulsory in the following locations

- All escape routes,
- Locations which are used for gathering,
- Elevators and escalators,
- Locations where ground level changes and the intersections of corridors,
- Workshops and laboratories where machinery in motion and chemicals that pose high risk are located,
- Electricity distribution and generator rooms,
- Central battery unit rooms,
- Gas stations,
- Indoors car parks,
- Areas where first aid and safety kits are located,
- Areas where fire alarm buttons and fire cabinets are located.

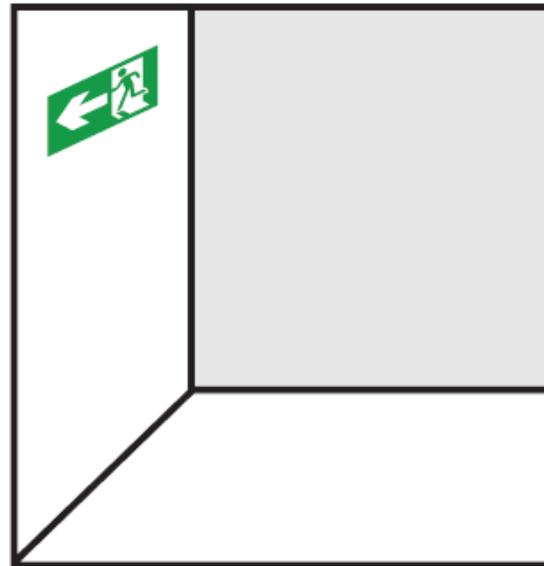
### The use of emergency lighting is compulsory in the following buildings

- Hospitals, nursing homes and buildings for education,
- All buildings with a occupants load of 200 or more,
- Buildings with 50 or more occupants under the ground level,
- Buildings without windows,
- Hotels, motels and dormitories,
- Highly hazardous locations,
- Tall buildings.

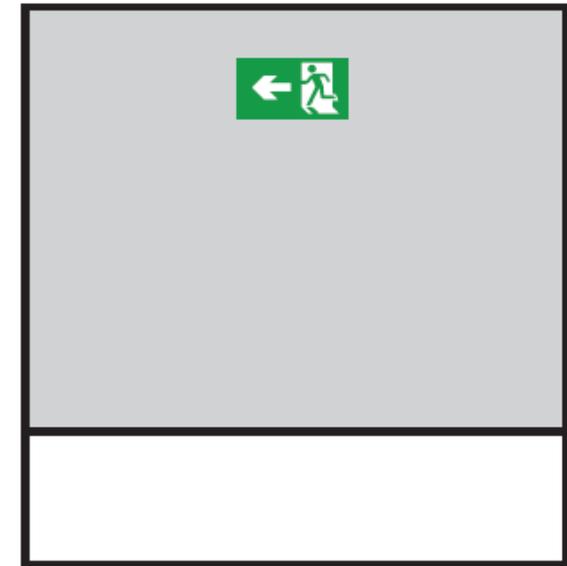
The details on the installation of the emergency exit luminaries are explained in EN 50172 and EN 1838 standards.



At all exits to be used in the case of an emergency



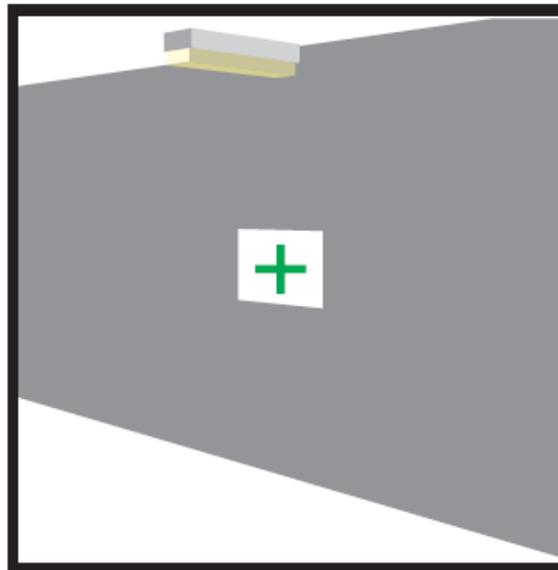
All points that dictate a change in direction



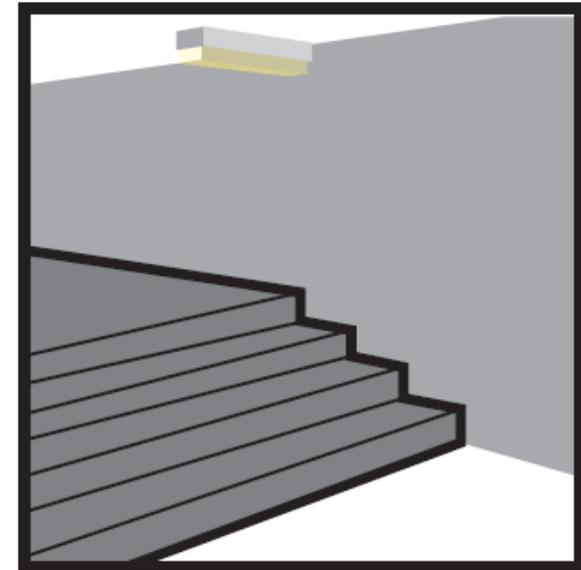
Throughout the corridor



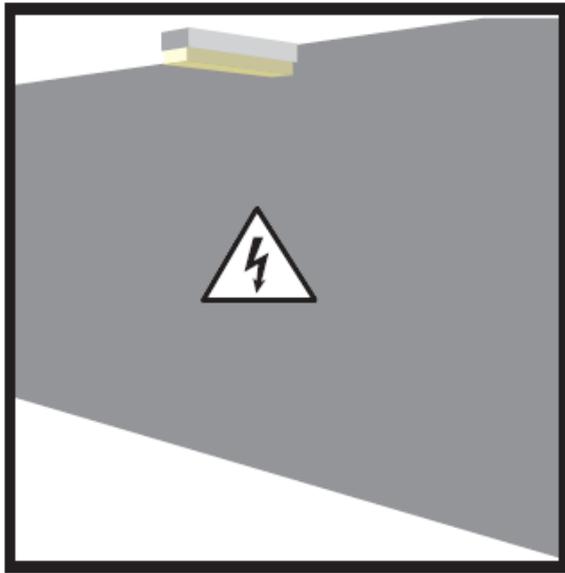
Near all fire fighting and fire alarm devices



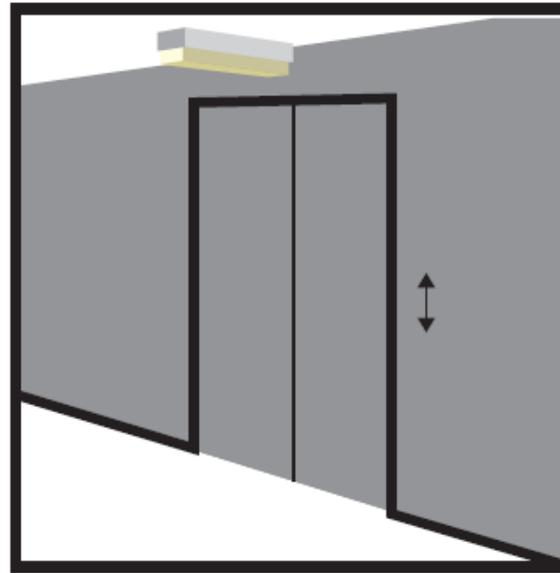
Close to all the first aid point



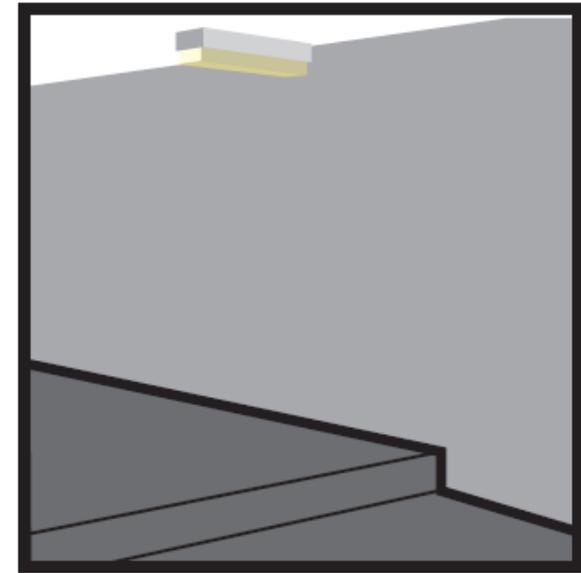
At the stairs to illuminate every step



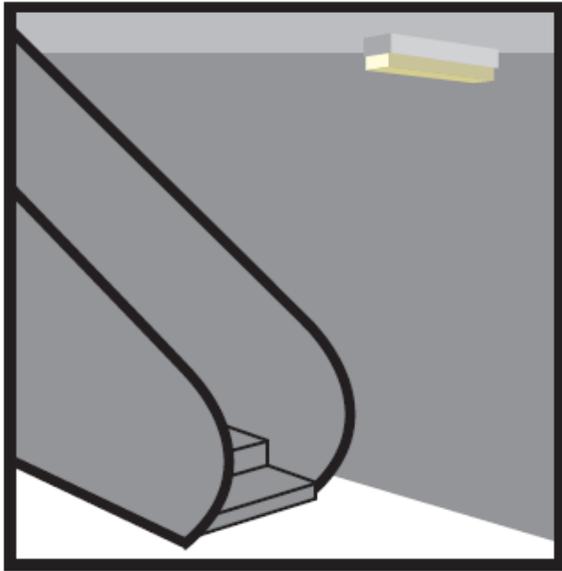
Near the safety equipment



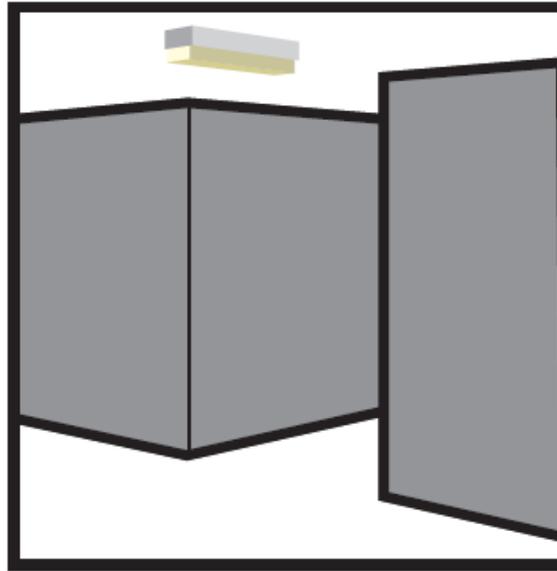
Out exit points



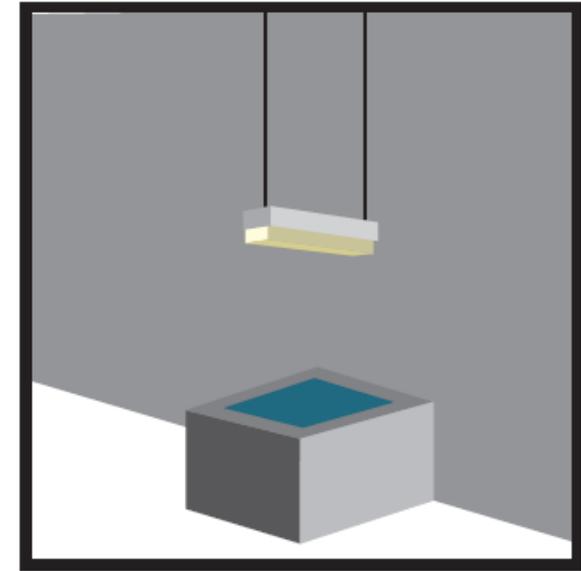
In places where the floor level



At the escalator



All intersections in the corridor



High-risk forms moving machinery or chemical workshops and substances in the laboratory

It is very important that the escape route is marked clearly in order to provide a quick and safe evacuation in areas and buildings. The effect of an exit sign depends on the size, the color, the position and the high visibility of the sign. The European standards approve and support the use of pictograms that use white drawings on a green background.

The lighting level ratios of green and white colors with respect to each other are defined in EN 1838 standards. The color rendering index of the lamp must be at least 40 for the safety sign colors to be perceived. On the escape route, apart from the exit signs, there must not be any illuminated signs or objects that may cause hesitation or confusion regarding the escape direction.

# 5eş A

## The Sign (Pictogram) Formats of The Emergency Exit Luminaries



- Minimum lighting intensity =  $2\text{cd/m}^2$
- The lighting intensity ratio between the most and the least illuminated parts of the areas with the same color must not be greater than 10:1.
- The lighting intensity ratio between the white and green area must not be less than 5:1 and more than 15:1.
- The green background should constitute at least 50% of the area of the sign.

It is very important to assure that the signs that show the escape routes are visible from everywhere. For this purpose, EN 1838 standard states that the maximum viewing distance should be determined in accordance with the height of the pictogram. The standard provides the formula below:

$$d = s \times h$$

d: Maximum viewing distance

h: Pictogram's height

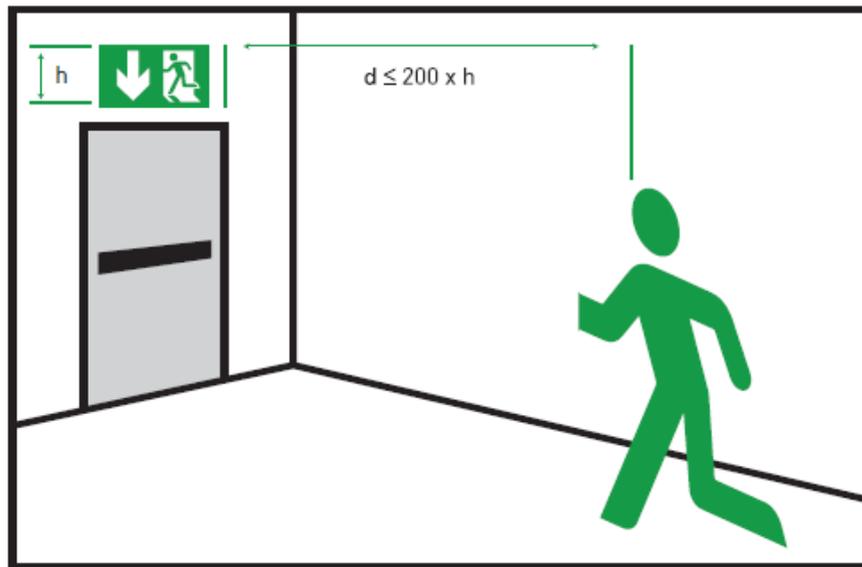
s= 100, for signs illuminated from outside

s= 200, for signs illuminated from within

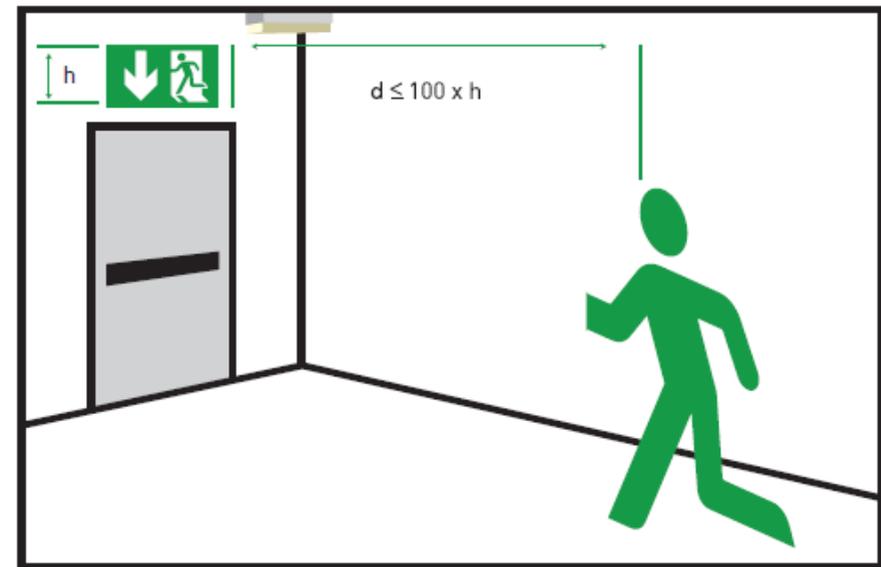
For example, for an emergency exit luminary located at the end of a 20 meter corridor the height of the sign (pictogram) must be at least 10 cm if it is illuminated from within and at least 20 cm if it is illuminated from outside.

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## The Maximum Viewing Distance of The Emergency Exit Luminaries



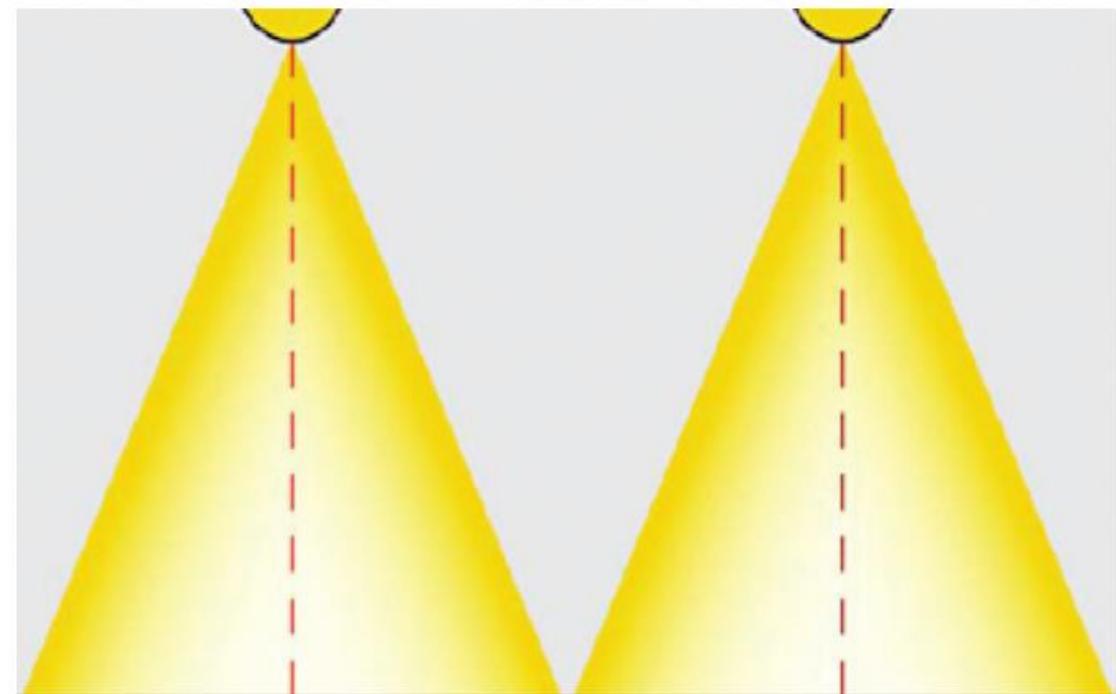
For the signs illuminated from within it has to be 200 times of the height of the sign



For the signs illuminated from outside it has to be 100 times of the height of the sign

The emergency lighting level has to be set at 1 lux at least at any point of the central line of the escape route.

At the end of the emergency operating period, the lighting level should not fall below the level of 0.5 lux at any point.



$E_{\max}$

$E_{\min}$

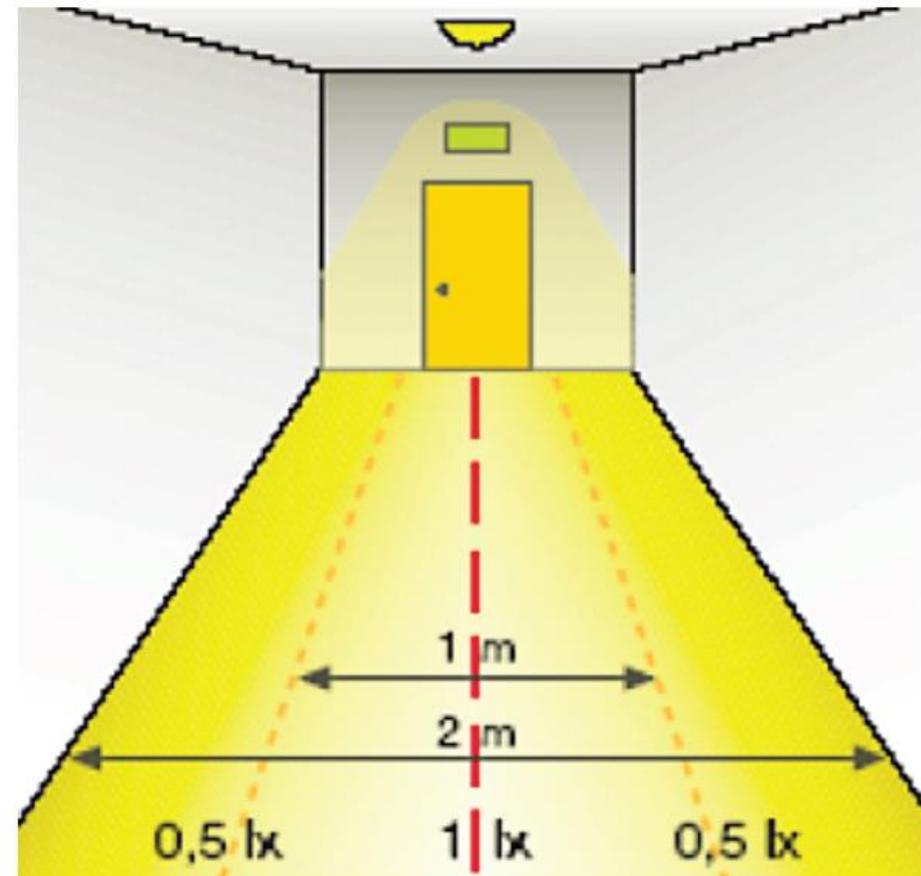
$E_{\max}$

$$E_{\max} : E_{\min} \leq 40 : 1 \text{ lx}$$

The lighting level ratio between the points with the highest and lowest lighting levels must not be more than 1/40.

50% of the required level of the emergency lighting must be provided within 5 seconds and full capacity must be reached within 60 seconds.

Emergency lighting for the purpose of evacuation must be on at least for one hour.



According to EN 1838 and EN 60598-2-22 standards, areas and gathering points larger than 60m<sup>2</sup> are classified as open areas.

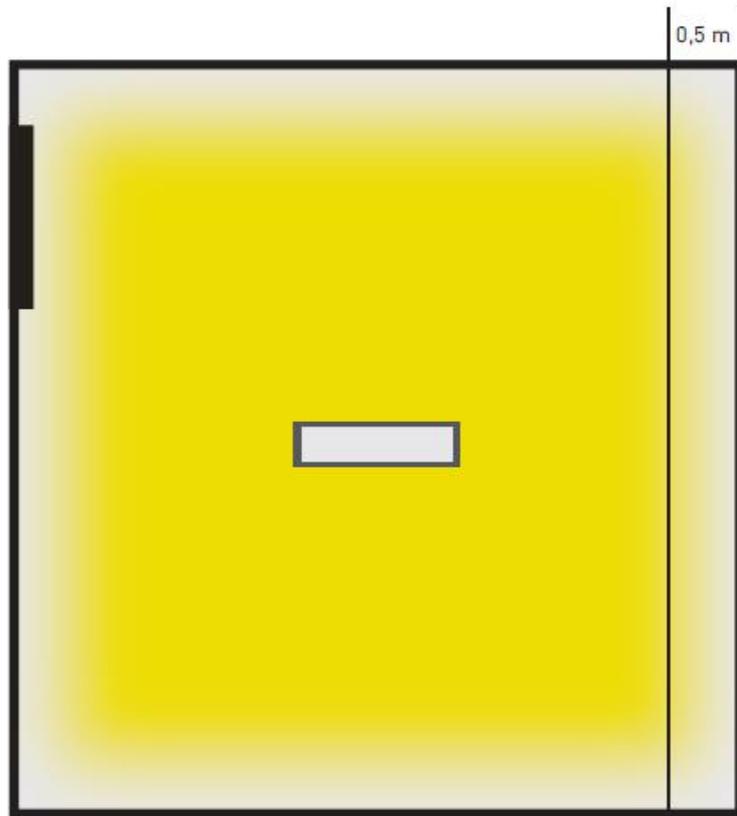
The magnitude of illumination above the floor level at open areas must be at least 0.5 lux.

The edges and the area surrounding the edges within 0.5 meter are not included in this scope.

The ratio of the magnitude of illumination between the most and the least illuminated points in open areas must not be more than 40:1.

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## Open Area (Anti-Panic) Lighting



### Minimum lighting level

$$E_{\min} = 0.5 \text{ lx}$$

### Minimum-maximum lighting level ratio

$$E_{\max} : E_{\min} \leq 40 : 1 \text{ lx}$$

### Color rendering index

$$\text{CRI} \geq 40$$

### Period specified for emergency escape

1 hour

Energy distribution, production and industrial process control rooms, engine-generator control rooms, locations that have machines in motion, elevators and conveyors that do not immediately stop when the power is cut are classified as highly risky and hazardous areas.

Emergency lighting level in areas with a high risk of a dangerous situation must not be less than 10% of the normal lighting level.

### Minimum lighting level

$$E_{\min} = 15 \text{ lx}$$

### Minimum-maximum lighting level ratio

$$E_{\max} : E_{\min} \leq 10 : 1 \text{ lx}$$

### Color rendering index

$$\text{CRI} \geq 40$$

### Period specified for emergency escape

As long as the risk exists

# Thanks

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[info@bes-a.com](mailto:info@bes-a.com)