EMERGENCY LIGHTING
DESIGN GUIDE

beş A
25 YEARS
creating value **for a bright future**

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About Beş A

Beş A, one of the leading enterprises in Türkiye in the design and manufacture of lighting electronics, was established in 1995. Initially a manufacturer of electronic ballasts, in 1999 Beş A expanded its product range in accordance with the country's needs, diversifying its production to include emergency lighting units emergency exit luminaires, and emergency lighting luminaires.

Thanks to its 25 years of experience and knowledge, Beş A has carried many innovative projects to completion. The company currently fulfils the emergency lighting needs of today's industries with a range of nearly 500 products that span 50 categories. Based out of its 2,500-square meter headquarters in the district of Beykoz in Istanbul, Beş A employs a team of 50 workers who are experts in their field.

Always a proponent of manufacturing new technologies, Beş A designs its mechanical and electronic products at its TÜV Rheinland certified Research & Development laboratory, which is located onsite.

Beş A places great importance on public, industrial, and academic collaboration, and with the support of TÜBİTAK, a Turkish organisation that funds scientific projects, it continues to develop new types of emergency lighting units and emergency lighting luminaires with built-in software and unique circuit designs.

The company derives its strength from its principle of "sustainable development" and its employees' dedication to that principle. Beş A, which **aims** to "creating value for a bright future"

is driven by a **vision** to become the leading manufacturer of products and services in the regions where it operates, and the company holds to its **mission** of continued research, development, and production in the field of emergency lighting electronics.

Beş A's strategic aims include the creation of teams of efficient and effective employees, the establishment of sustainable business partnerships with influential and capable institutions, the manufacture of industry-standard products with high price-performance ratios using the latest technologies available, providing customer-centric solutions, distinguishing itself from local and foreign competition, utilizing zero-fault and traceable production processes, and constantly improving its methods of design and manufacturing. The company's values include fostering a team spirit that is based on moral, respectful, and friendly attitudes, placing importance on ethics and environmental values, and valuing its employees as well as public health, education, and a culture of constant improvement.

The quality of Beş A products has been documented by international certification authorities such as TSE, TÜV Rheinland, and BSI. The company's quality management systems are compliant with ISO 9001 standards.

"Beş A Electronics ensures that its certified products in all categories are compliant with the latest product and manufacturing standards through regular biannual factory inspections and product control tests."

Introduction

This guide explains the fundamentals of the design, configuration, operation, and maintenance of emergency lighting systems. It is intended for use by individuals and businesses working on emergency lighting products and systems in line with current standards and regulations. More detailed technical information can be found in the relevant standards.

The standards relevant to emergency lighting products and systems are listed below.

System Standards

EN 1838: Lighting Applications — Emergency Lighting

"Describes the illumination provided by emergency lighting (including strength, duration, and colour)."

EN 50172: Emergency Escape Lighting Systems

"Describes the minimum requirements and tests emergency lighting systems in a variety of facilities."

Product Standards

IEC/EN 60598-2-22: Luminaires for Emergency Lighting

"Describes the luminaires operating independently and centrally in emergency lighting systems."

IEC/EN 62034: Automatic Test Systems for Battery-Powered Emergency Escape Lighting

"Describes the test system details required for battery-powered emergency escape lighting."

EN 50171: Central Power Supply Systems

"Describes the central power supply systems used for emergency lighting luminaires."

This guide contains detailed explanations for the following terms:

- Emergency lighting
- Emergency escape lighting
- Escape route lighting
- Open area (anti-panic) lighting
- High risk task area lighting

The purpose of **emergency lighting** is to provide security lighting in certain areas by automatically switching on the system when the mains failure.

The purpose of **emergency escape lighting** is to point the way to a safe exit from a certain area and/or building when the mains failure.

The purpose of **escape route lighting** is to facilitate a safe exit from a certain area and/or building by providing signposts that use appropriate visuals on emergency escape routes and specific locations, as well as to make the locations of fire extinguishers and safety equipment more visible.

The purpose of **open area (anti-panic) lighting** is to lessen the likelihood of mass panic and to make it possible for people to safely access escape routes by providing appropriate visual conditions and signposts.

The purpose of **high risk task area lighting** is to contribute to the safety of people working under hazardous conditions by facilitating the correct shutdown procedures that should be followed in the event of evacuation from a certain area and/or building.

In most cases, buildings will require a wide range of emergency lighting types. **Risk assessments** must be carried out to determine the correct emergency lighting set-ups and identify the locations and areas that will require illumination.

The strategic placement of emergency lighting luminaires and emergency exit luminaires signposting exit routes from buildings can help mitigate fear and confusion during emergencies. In such cases, it is vital that exits are clearly marked and visible.

Contents

1. DEFINITIONS

The following definitions pertain to terms used in emergency lighting design, configuration, utilisation, and maintenance standards.

Escape route: A route that leads to a safe location during emergencies.

Emergency escape route lighting: A type of emergency lighting that makes it possible for escape routes to be clearly identifiable and safely used during emergencies.

Open area (anti-panic) lighting: A type of emergency lighting intended for venues or buildings with an area of more than 60 square meters, as well as escape route areas or smaller areas that are high-risk because of the large number of people who may congregate there.

Emergency exit: An exit used in case of emergencies.

Final exit: The point at which an escape route terminates.

Maintained emergency lighting luminaire: A type of emergency lighting luminaire system in which emergency lights operate with the mains supply and also when the mains failure.

Non-maintained emergency lighting luminaire: A type of emergency lighting luminaire system in which emergency lights are switched on only when the mains failure.

Emergency rated duration: The duration of emergency lumen output (in hours) as declared by the manufacturer.

High risk task area lighting: A type of emergency lighting system that provides lighting for the safety of people working

in potentially hazardous areas or situations and which makes it possible for the correct shut-down procedures to be followed for the safety of operators and others in the facility.

2. EMERGENCY LIGHTING

Emergency lighting is a type of secondary lighting that activates immediately, independent of a generator system, when the usual lighting system is disabled due to emergencies involving events such as earthquakes, fires, terror attacks, sabotage, or power outages. Emergency lighting systems allow for the safe evacuation of people from a building.

The main purpose of emergency lighting systems is to prevent loss of life by making safe evacuation possible. They aid in the swift and safe evacuation of people from buildings by indicating clear exit routes that prevent them from encountering obstacles, suffering injuries, panicking, or assembling in large crowds. Emergency lighting systems also make fire alarms, fire extinguishers, and first-aid kits readily visible, thereby helping to prevent accidents in hazardous environments.

> ***"Emergency lighting is not needed under normal circumstances. However, it must work as required in emergencies. If it doesn't, then lives are put at risk."***

Emergency Lighting Systems are necessary for the following:

- Clearly signposting exit routes from buildings
- Making it possible for people to exit at walking speed without stumbling
- Preventing panic in cases of emergencies and evacuations
- Displaying and identifying the locations of fire equipment such as extinguishers and alarms
- Facilitating the application of safety procedures such as first aid

"Equipment affixed to the floor and photo-luminescent materials should be seen as complementary to routing systems. It is extremely important to have functional emergency lighting systems so that building evacuations can be carried out swiftly and safely."

Signs pointing to escape routes are a crucial part of emergency lighting systems and such signs must be visible in case of power outages or other emergencies.

In addition to facilitating evacuations, emergency lighting must also contribute to safety by illuminating equipment on escape routes and other points that would be helpful in the case of emergencies, such as fire alarm buttons, fire extinguishers, and first aid supplies.

"The correct positioning of exit signs and emergency lighting saves lives."

3. MANDATORY EMERGENCY LIGHTING SYSTEM LOCATIONS

Locations requiring emergency lighting	Buildings requiring emergency lighting
• All escape routes • Emergency gathering points • Lifts and escalators • Points at which the ground level changes and at hallway intersections • Workshops or laboratories where hazardous machinery or chemicals are located • Electricity distribution points and generator rooms • Central battery unit rooms • Service stations • Indoor car parks • Places where first aid and safety equipment are located • Areas where fire alarm buttons, fire cabinets, and similar items are located	• Hospitals, care homes, and educational institutions • Buildings where more than 200 people congregate • Buildings where 50 or more people congregate below ground level • Buildings without windows • Hotels, motels, and residence halls • High-risk areas • High-rise buildings

4. EMERGENCY LIGHTING DESIGN

At the outset, when planning the installation of emergency lighting products in any building, all available information about the building must be compiled after floor plan evaluations, site research, and interviews with the building authorities have been planned and carried out.

During the initial design stage, escape routes must be clearly defined and planned according to EN 1838.

Before the project can be designed, plans or layouts showing the locations of all exit routes in the building, whether existing or proposed, must be indicated along with fire alarm call points and the locations of fire extinguishers and first aid equipment.

In the initial design stage, consultations and exchanges of knowledge must be carried out between all parties involved, including the facility's owner, operator, architect, consultant, lighting designer, contractor, and operating authorities.

In the planning stage, it is important that discussions be held about national and/or local regulatory requirements in addition to standard advisories that might apply to the facility in question so that they can be fully understood.

A fire risk assessment must be made to determine which fire hazards exist in which areas of the building and what might happen in the case of an explosion. Additional emergency lighting requirements must be identified in light of the results of this assessment.

Design checklist

The fundamental steps that need to be followed during the emergency lighting system design process are as follows:

- Risk assessment results must be evaluated
- Emergency lighting durations must be determined
- Emergency escape routes must be defined, keeping in mind potential hazards
- Locations of fire alarm buttons, fire extinguishing equipment, and fire safety signs must be determined
- The types of emergency lighting that are needed must be identified
- Normal lighting luminaires that are to be converted into emergency lighting luminaires (luminaires where Emergency Units will be placed) must be selected
- Exit sign requirements must be determined
- High-risk areas must be defined
- Open areas larger than 60 square meters must be identified
- The external lighting requirements outside final exits and on routes leading to places of safety must be identified

5. EMERGENCY LIGHTING INSTALLATION LOCATIONS

It is important that emergency lighting luminaires are installed in such a manner that they will provide adequate lighting when the normal lighting system malfunctions.

The locations that need to be considered when designing an emergency lighting system are listed below. These locations must be clearly identified when designing an emergency lighting system.

5.1. Open Areas

Open areas generally must be equipped with anti-panic lighting. For the most part, such areas have a floor area measuring more than 60 square meters or they have been identified as needing such lighting as the result of fire risk assessments.

5.2. Emergency exits and escape routes

Emergency exits and escape routes must be clearly marked and illuminated so they indicate a clear route to a place of safety. When an emergency exit is not immediately visible, an illuminated sign or series of signs pointing in the right direction must be installed.

Changes in direction along routes to an emergency exit must be illuminated. An escape lighting luminaire (compliant with IEC/EN 60598-2-22) must be installed next to every exit and other such locations to highlight potential hazards or point the way to safety equipment.

Emergency luminaires must be installed next to fire safety equipment and near the following points:

- All exits that will be used in emergencies
- The entire length of staircases
- Points where the floor level changes
- Above mandatory emergency exits and safety signs
- Points where changes of direction occur along escape routes
- At the intersections of hallways
- Above and outside every final exit
- Above first aid cabinets
- Above fire extinguishing equipment
- Above fire alarm buttons

5.3. Outside environments in close proximity to exits

Outside environments in the immediate vicinity of final exits must be illuminated with 1 lux or more in accordance with EN 1838 escape route lighting levels to facilitate access to a place of safety. If the area outside the building has hazards such as floor level changes or steep stairs that are not sufficiently illuminated, a fire risk assessment must be conducted to ascertain whether emergency luminaires would be required up to the point where a place of safety will be reached. This might entail the installation of emergency lighting on the outer facade of a building adjacent to the final exit. An example of this would be a fire escape that exits onto the first floor.

5.4. Lift cabins

Lifts are hazardous in emergencies. Being trapped inside a confined dark area for an unknown amount of time is not only unpleasant, but also outright harmful for people who are prone to anxiety or claustrophobia. For this reason, lifts must be equipped

with emergency lighting as specified in the open area (anti-panic) lighting regulation in EN 1838.

5.5. Escalators and walkways

Escalators and walkways must be illuminated in the same manner as escape routes in the case of a power outage.

5.6. Toilets

Toilets with a total area of more than 8 square meters must be treated as open areas and equipped with the same type of emergency lighting.

Disabled toilets must be provided with emergency lighting with at least one luminaire.

Emergency lighting is not required for single-person toilets in hotel rooms or toilets that are part of a larger bathroom.

5.7. Electrical substations and distribution rooms

Emergency lighting must be provided in all generator engine rooms, control rooms, distribution rooms, and switch rooms, as well as over main electrical substations and control equipment that provide normal or emergency lighting for facilities.

5.8. Indoor car parks

Open areas and pedestrian escape routes in indoor and multi-story car parks must be equipped with emergency lighting/ direction indicators.

6. EMERGENCY LIGHTING DURATION

The required duration of emergency lighting depends on building usage and evacuation strategies. A 3 hours period is required for entertainment venues (cinemas, theatres, etc.) and buildings with a sleep risk (hotels, guesthouses, etc.).

Residential buildings also require a 3 hours window of illumination. Despite residents' familiarity with the building layout and expectations for an orderly evacuation in case of an emergency, there is still a sleep risk.

A 3 hours period is also required in cases in which evacuation/escape could take a long time.

The types of building requiring a 3 hours window of emergency illumination are as follows:

Facilities that provide accommodations	Non-residential buildings used for treatment or care	Non-residential buildings used for recreation	Non-residential public buildings
• Hospitals • Care homes • Guesthouses • Student residence halls • Boarding schools • Certain types of clubs	• Private schools • Clinics and similar establishments	• Cinemas • Theatres • Concert venues • Exhibition centres • Gyms • Pubs • Restaurants	• Municipality halls • Libraries • Shops • Shopping centres • Art galleries • Museums

For certain facilities, a time window of 1 hour is considered sufficient if the evacuation is immediate. The following are examples of such facilities:

Non-residential buildings used for education and research purposes	Industrial facilities used for the production, processing, or storage of goods
• Schools • Higher education institutions • Technical institutions • Laboratories	• Factories • Workshops • Warehouses

If a building falls into more than one category, the category with the longer timeframe must be taken into account.

The required duration of emergency lighting must also be evaluated in view of the building's fire risk assessment.

Maintained emergency lighting luminaires must be installed in public areas where normal lighting could be dimmed and shared areas where accumulated smoke might render normal lighting ineffective. This type of lighting functions both as emergency and normal lighting, and it can also be used as a consequence of financial or aesthetic concerns.

Exit signs must be illuminated at all times and be visible whenever the building is occupied. Since it is impossible to ensure that normal lighting will always sufficiently illuminate direction signs without an additional source of lighting, emergency exit luminaires must be the maintained type.

7. EMERGENCY LIGHTING BRIGHTNESS LEVELS

The level of brightness required in the case of an emergency depends on the attributes of the area.

It is not the light that falls onto objects but the light that is reflected into our eyes that makes vision possible. Objects are differentiated by contrast, and changes in light are reflected in our eyes. Thus, a light object against a dark background requires much less light to see than a dark object against a dark background.

The amount of light that falls onto an object (brightness) varies not only according to the location and power of the lamps used, but also the reflections from the environment around it. In many interior areas, a large percentage of the light that falls onto a given surface is reflected from elsewhere. In places where the walls, floor, and ceiling are painted in light hues, around 60% of the light at ground level is reflected from the walls or ceiling.

In rooms where decorative surfaces are dark (meaning that there is a low level of reflection), reflected light plays a small role in brightness levels. Reflected light might be disregarded altogether for venues where dark colours are chosen for the carpets, walls, and ceiling so as to elicit a feeling of cosiness, such as in night clubs or restaurants.

All potential obstacles or hazards along an escape route must be brightly coloured. Such hazards include the edges of stairs, various barriers, and walls that are at right angles to the direction of movement.

Light-coloured decorative elements are helpful in confined areas such as hallways. Conspicuously coloured corners at points

where changes of direction in escape routes occur can be helpful during evacuations.

The level of brightness recommended as the minimum or average for a area must be regarded as the lowest acceptable level for a given timeframe, considering the possibility of voltage changes, a decrease in voltage, and battery and lamp degradation over time.

"When calculating brightness levels in the process of designing emergency lighting, the contributions of reflected light, as described above, must be disregarded."

For escape routes that have a width of up to 2 meters, the ground brightness level along the length of the centre line must not be less than 1 lux and not less than half that amount (0.5 lux) along the outer edges of the route. Wider escape routes can be illuminated at 2-meter intervals or equipped with open area (anti-panic) lighting.

For open area (anti-panic) lighting, horizontal brightness at the ground level of the central area (a distance of 0.5 meters from the edges) must be at least 0.5 lux.

In high risk areas, the level of emergency lighting brightness at working levels (the reference level) must not be less than 10% of the brightness ordinarily required for the task at hand. If the calculated brightness level is less than 15 lux, it must be implemented at no less than 15 lux and not have harmful stroboscopic effects.

The integrity of high-risk task area lighting illumination must be consistent throughout the whole area.

Certain high-output emergency luminaires can create a glare effect that makes it difficult to see safety signs and obstacles on escape routes. This is known as a disability glare. The most common systems that cause disability glare are of the frog-eye type. A typical example is shown below.

Model: Tetra-PW3

Since such luminaires deliver high levels of brightness, care must be taken when installing them. To avoid disability glare, they must be installed at intervals specified in the user manual, and care must be taken to ensure that they stand at an angle of at least 30° from the direct line of sight on escape routes.

Certain locations require specific illumination responses and durations. The table below indicates example locations and response times.

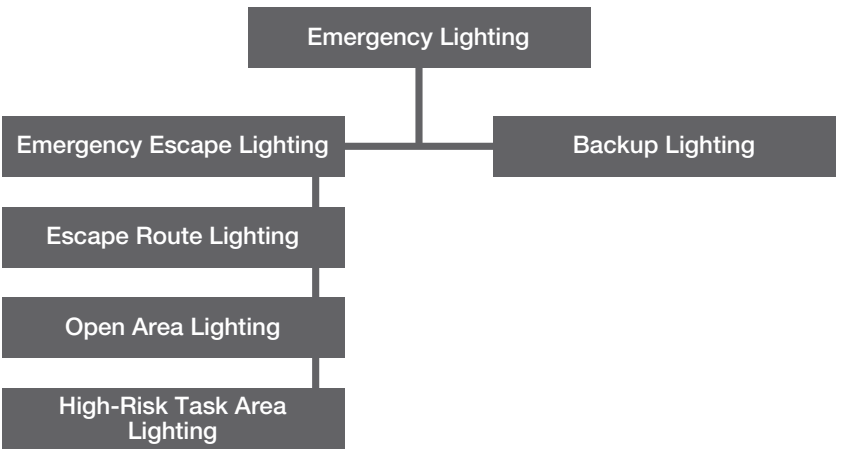
Location	Response time	Minimum illumination level	Minimum illumination duration
Kitchen	0.5 s	15 lux	30 minutes
First-aid rooms	5 s	15 lux	30 minutes
Medical treatment rooms	0.5 s	50 lux	30 minutes
Shelters	5 s	5 lux	1 or 3 hours
Distribution rooms, switch rooms, and emergency facilities for lifts	5 s	15 lux	1 or 3 hours
Fire alarm control and display equipment	5 s	15 lux	1 or 3 hours
Reception areas	5 s	15 lux	1 or 3 hours
Panic bars or safety equipment	5 s	5 lux	1 or 3 hours
Swimming pool environs and diving areas	0.5 s	5 lux	1 or 3 hours

8. EMERGENCY LIGHTING SYSTEMS AND INSTALLATION

Emergency lighting systems provide the necessary level of illumination by automatically switching on in case of a mains malfunction or power outage without the need for a generator. There are two main subtypes of such systems.

- **Self-contained systems**
- **Central battery systems**

Central battery systems are not suitable for emergency lighting in level one and level two earthquake risk areas and therefore are not permitted to be used as such. Emergency lighting in these areas must be provided by self-contained emergency lighting luminaires.



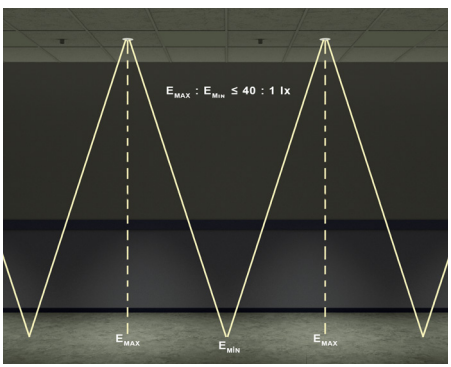
8.1 Emergency Escape Lighting

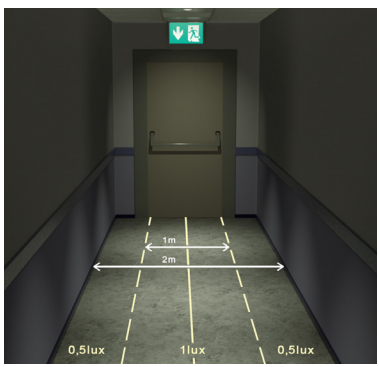
Emergency escape lighting is the type of lighting required for the safety of individuals who are exiting a building or who must conclude a hazardous process before exiting a building in case of emergencies. There are three varieties.

a) Escape Route Lighting

Escape route lighting facilitates the safe exit of individuals from a building by illuminating escape routes. Escape route emergency lighting can be used for specified locations, such as hallways or pedestrian walkways in an indoor car park. If there are no marked or controlled routes, then open area lighting must be used instead.

Escape route lighting must be installed to provide a brightness level of at least 1 lux at ground level alongside the central line of the route. Escape routes are planned as 2-meter wide corridors, and brightness levels must be no less than 0.5 lux within the 1-meter band of the central line. These brightness levels must be sustained throughout the duration of emergency lighting. The ratio between the most brightly and the most dimly illuminated points must not be greater than 40:1. Emergency lighting duration must be at least 1 hour for the purposes of evacuation.

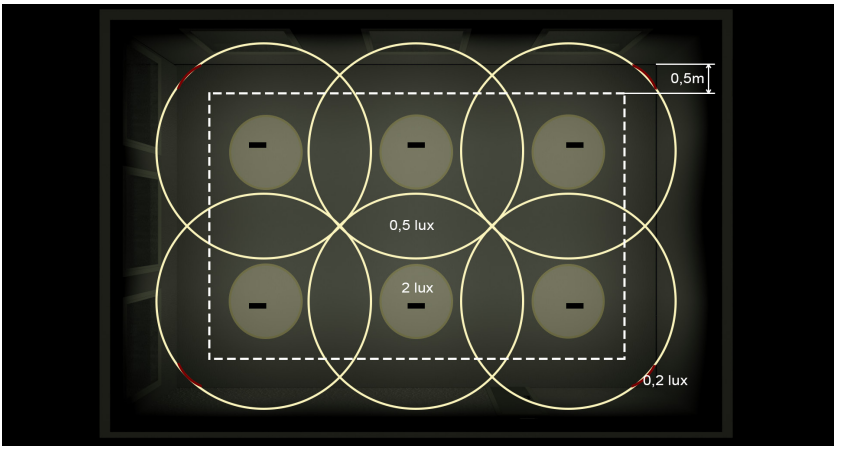




b) Open Area Lighting

Open area lighting is a type of lighting intended for areas larger than 60 square meters and for gathering points, and it is designed to point the way to pre-defined escape routes in case of emergencies. It is also called anti-panic lighting.

According to EN 1838 and IEC/EN 60598-2-22 standards, areas larger than 60 square meters and gathering points are treated as open areas. Brightness at ground level in open areas must be at least 0.5 lux. Border areas of 0.5 meters are not taken into consideration. The ratio between points with the lowest and highest brightness levels must not be greater than 40:1. For the purposes of evacuation, emergency lighting duration must be at least 1 hour.



c) High Risk Task Area Lighting

High risk task area lighting ensures the safety of people working in areas where hazardous processes or situations might arise in the case of an emergency and it allows them to follow the necessary switching off procedures. High risk task area lighting is intended to render hazardous machinery, processes, or locations safe in cases of emergencies, which means that it requires higher levels of brightness than other emergency lighting types.

Examples of high risk and hazardous areas include control rooms for power production, distribution, and industrial processes, as well as engine-generator control rooms and equipment such as machinery, lifts, and conveyor belts that do not come to an immediate halt during power outages. In high risk areas, emergency lighting brightness levels must not be under 10% of the normal lighting level or 15 lux.

Emergency Lighting Brightness Levels Chart

Emergency Lighting Type (*)	Minimum level of brightness according to EN 1838	Maximum / minimum brightness level ratio
Escape route lighting	At least **1.0 lux** along the route's central line	40:1
Open area lighting	At least **0.5 lux** in the entire area	40:1
High risk task area lighting	**10%** of the normal lighting level or at least **15 lux**	10:1

* The colour rendering index must be greater than 40 (CRI ≥ 40)

8.2 Backup Lighting

This is a type of emergency lighting designed for the continuation of work and processes in the event of a lighting outage. It does not play a role in emergency escape plans.

> ***"Emergency lighting must be provided for at least 60 minutes in the event of a lighting outage. For buildings that have more than 200 users, this period must be longer than 120 minutes."***

9. EMERGENCY LIGHTING PRODUCT COMPATIBILITY AND CERTIFICATION

It is essential that emergency lighting luminaires are designed according to the correct standards and certified by independent accredited organisations. Certified emergency lighting luminaires guarantee that the luminaire is compliant with the relevant international product standards (IEC/EN 60598-2-22, IEC/EN 60598-2-1, IEC/EN 60598-2-2) and that the control gear (EN 61347-2-7, EN61347-2-13), battery (EN 61951-1, EN 62133-1), and LED modules (EN 62031, IEC/EN 61547) in the luminaire have been tested in accordance with the relevant international standards.

Adhering to the relevant standards during the certification process ensures that the emergency lighting luminaire and all its components meet the required safety and performance criteria, as well as testing and certification for any additional requirements that also must be fulfilled, such as fire retardant standards for emergency lighting luminaires used on escape routes (satisfactory results from a 850°C glow wire test), confirmation of the declared IP protection rating, verification that the product's indicated lumen output level is sustained for the stipulated duration, and the compatibility of emergency exit luminaires for symbols and homogenous illumination.

Certification guaranteeing the product's compatibility also verifies that the product was manufactured in a facility with ISO EN 9001 approved quality assurance documentation.

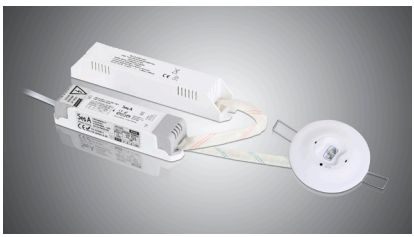
10. EMERGENCY LIGHTING LUMINAIRES

All emergency lighting and emergency exit luminaires must meet the product functionality security standards outlined in IEC/EN 60598-2-22. 50% of the declared emergency illumination level must be reached within 5 seconds and the maximum level must be reached in 60 seconds. That level must not decrease throughout the rated duration period.

10.1. Emergency Lighting Luminaires for Escape Routes and Open Areas

These luminaires are designed to illuminate escape routes and open areas during emergencies, and they are equipped with a symmetric lens (for open areas) or a asymmetric lens (for escape routes). They can be installed on walls, ceilings, and suspended ceilings.

Model: Somon XLED2



Model: RINA

10.2. Wide Area and High Risk Area Emergency Lighting Luminaires

These luminaires provide the high lumen output that is needed for wide areas and high risk areas during emergencies. They can be installed on walls, ceilings, and suspended ceilings. The

moveable heads of the lamps can be pointed in the desired direction. They are intended for use in large areas such as factories and parking garages, as well as other environments requiring high levels of brightness.

Model: TETRA-PW3

Model: TETRA-PW2

10.3. Photometric Data (Light Distribution Curve) and Product Installation Information Charts for Emergency Lighting Luminaires

Catalogues for emergency lighting luminaires must include photometric data and product installation information charts. The values presented in these charts must be independently calculated and verified using design software. The data presented is useful in selecting the type of emergency lighting luminaire required, the number of products needed, and the installation process.

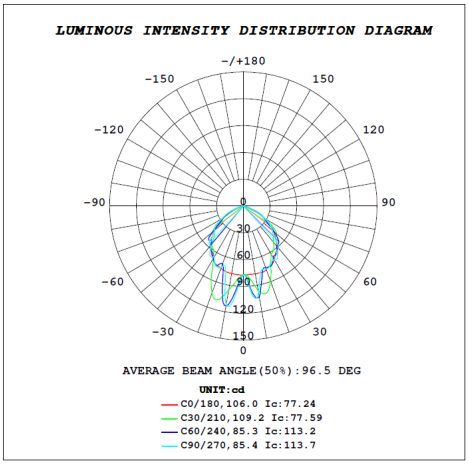
Emergency lighting operators can also use the brightness measurement data provided by the emergency luminaire manufacturer in the ".ldt" and ".ies" format in their lighting design software to complete their designs.

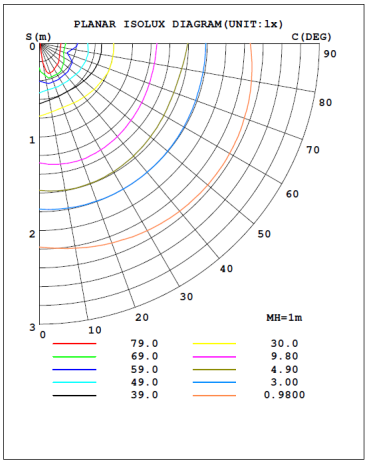
Product placement charts indicate the required distance from walls or doors to the first luminaire depending on the ceiling height and the installation area, and then the maximum allowable distance between the first and subsequent luminaires. The charts provide placement information for both open area and escape route lighting.

PHOTOMETRY DATA (3W)

Open Area (Anti-Panic) Lighting (for min. 0,5 lux)			Escape Route Lighting (for min. 1 lux)		
Mounting Height (m)	Distance Between Luminaire and Wall (m)	Distance Between Luminaires (m)	Mounting Height (m)	Distance Between Luminaire and Wall (m)	Distance Between Luminaires (m)
2,00	3,00	5,50	2,00	3,00	5,75
2,50	3,50	6,75	2,50	3,50	7,00
3,00	4,00	7,75	3,00	4,00	7,75
3,50	4,25	8,50	3,50	4,25	8,50
4,00	4,50	9,25	4,00	4,25	9,25

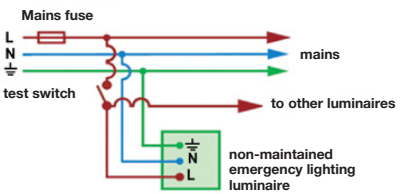
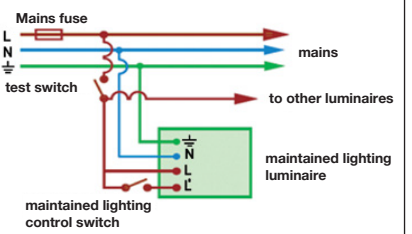
Example Chart: Installation information for the Somon XLED2 3W type luminaire.



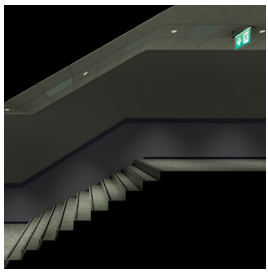


Example Chart: Light distribution curve for the Somon XLED2 3W type luminaire.

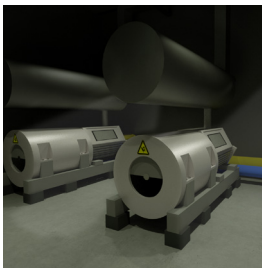
Operating Modes

Non-Maintained Mode	Maintained Mode
Lamps in these luminaires do not provide lighting when the mains voltage is at its usual level. The product provides lighting by means of a battery switch in case of a mains malfunction.	Lamps in these luminaires provide lighting when the mains voltage is at its usual level and continues to provide lighting by means of a battery switch in case of a mains malfunction.
	

11. EMERGENCY LIGHTING APPLICATIONS

		
Above fire extinguishing equipment and fire alarm buttons 5 lux of brightness must be provided on a vertical plane near fire extinguishing equipment and fire alarm buttons. This includes fire alarm control panels, which might be located on an escape route or elsewhere.	**Above first-aid equipment** Every first aid point must be illuminated with 5 lux of brightness on the vertical plane.	**Near staircases** Each step on a staircase must be directly illuminated by an emergency lighting luminaire. The minimum brightness level for each step is 1 lux. **At the start and end of staircases (including escalators)** Emergency lighting luminaires must be installed at the start and end of every set of stairs.

		
Above warning signs Emergency lighting luminaires must be used to illuminate all escape signs and warning signs. For signs that are illuminated externally, a luminaire must be positioned within two meters of the sign. It is not possible to get sufficient light from a light source that is more than 2 meters away.	**At exits** Emergency lighting luminaires must be installed in close proximity to exits to provide sufficient light in the doorway and at the threshold. Additionally, the luminaire must be closer than the 2 meters recommended in the chart to provide 1 lux brightness along the centre line.	**Near ground level changes** Every point where the ground level changes must be directly illuminated by an emergency lighting luminaire.

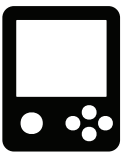
		
At points of changes in direction Emergency lighting luminaires must be installed at points on escape routes where hallways intersect, and at points where there is a change of direction.	**In high risk task areas** Emergency lighting luminaires must be installed over high risk task areas and equipment.	**Outside each final exit** The escape route outside final exits leading to a place of safety must be illuminated. (This must include an extended outside path to a point of safety, as well as obstacles such as fences with stop posts.)

Specific Locations

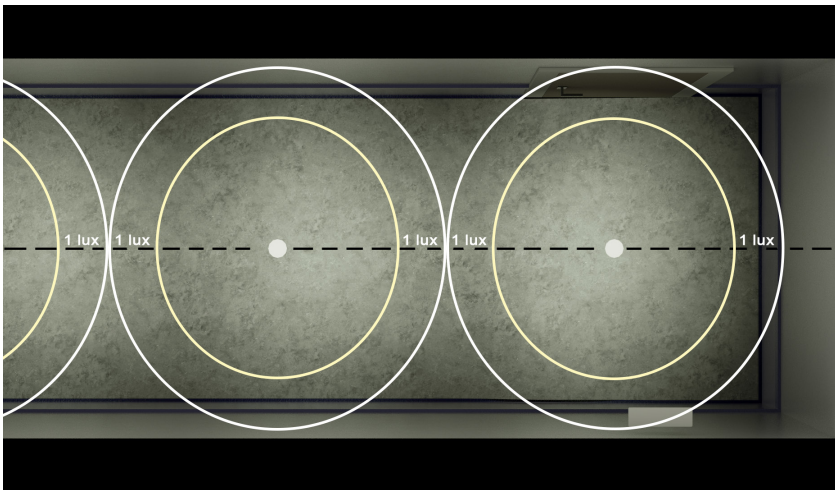
	**In kitchens:** To ensure that cooking equipment running on gas or electricity can be left behind safely. Response time: 0.5 seconds, 15 lux minimum for a duration of at least 30 minutes.
	**First-aid rooms:** To facilitate the completion of basic medical treatment (such as putting on a bandage). Response time: 5 seconds, 15 lux minimum for a duration of at least 30 minutes.
	**Medical treatment rooms:** To facilitate the completion of complex medical procedures (such as minor surgeries). Response time: 0.5 seconds, 50 lux minimum for a duration of at least 30 minutes.

	**Shelters:** To enable the use of communication devices so that people with mobility issues and those assisting them can gather and be rescued. Response time: 5 seconds, 5 lux minimum for the full duration (1 or 3 hours).
	**Near evacuation equipment for disabled people:** Emergency lighting luminaires must be installed next to evacuation equipment for disabled people, shelters, and communication points.

Other hazardous locations

	**Factory rooms/substation rooms and emergency equipment for lifts:** To ensure that maintenance crews and engineers can operate their equipment. Response time: 5 seconds, 15 lux minimum for the full duration (1 or 3 hours).
	**Above fire alarm control and display equipment:** To facilitate the supervision of panels, repeaters, area plans and instructions, and to ensure that personnel and fire crews can locate and control the source of a fire. Response time: 5 seconds, 15 lux minimum for the full duration (1 or 3 hours).
	**In reception areas:** To make sure that operators can communicate with emergency services. Response time: 5 seconds, 15 lux minimum for the full duration (1 or 3 hours).
	**Above panic buttons and security devices on exits:** To ensure that people can easily activate these devices and open doors. Response time: 5 seconds, 15 lux minimum for the full duration (1 or 3 hours).
	**Swimming pools, diving platforms and canals:** To facilitate the safe cleaning of these areas and to minimize the risk of slipping. Response time: 5 seconds, 15 lux minimum for the full duration (1 or 3 hours).

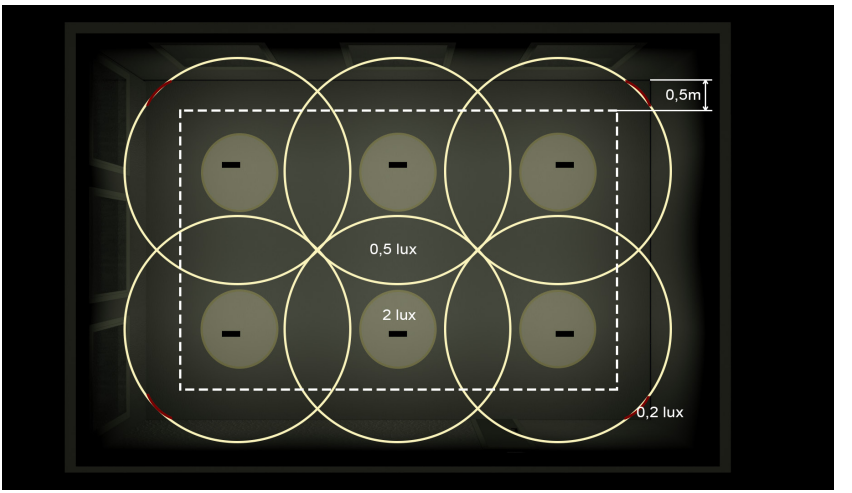
11.1. Luminaire Installation Intervals — Escape Routes



When designing an emergency escape route, it is important to pay attention to the installation intervals of luminaires to provide uniform lighting all along the route.

An escape route is defined as a 2-meter wide corridor, and emergency lighting luminaires must be installed at intervals to provide a brightness level of at least 1 lux along its centre line.

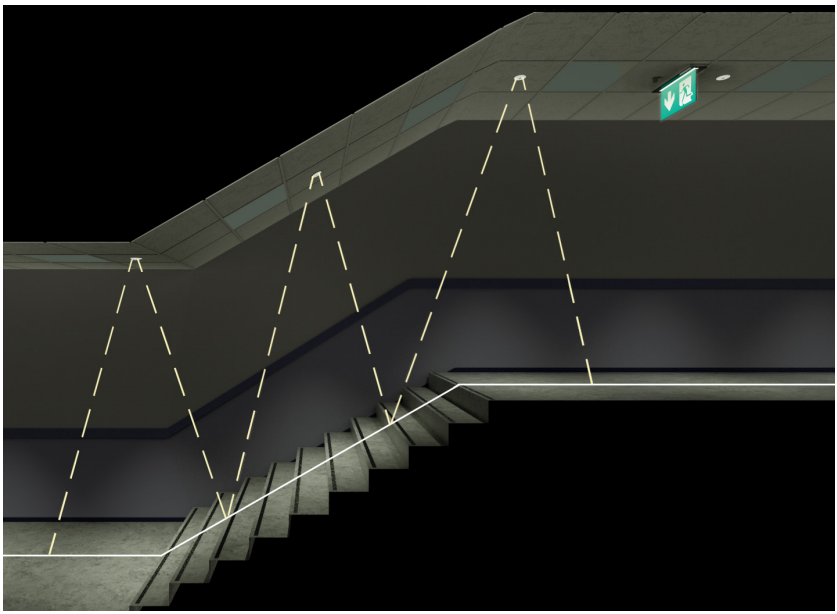
11.2. Luminaire Installation Intervals — Open Areas



Emergency lighting luminaires must be installed in open areas used as escape routes and areas larger than 60 square meters to provide at least 0.5 lux of light at ground level. This 0.5 lux level of brightness is not required in the area indicated between the dotted line and the walls.

Moveable tables, chairs, and other furniture can be disregarded for emergency lighting in open areas; however, in locations where such items are fixed, they must follow the contours of the 0.5 meter line along the edges, and those areas must be equipped with emergency lighting designed around them.

11.3. Luminaire Installation Intervals — Staircases



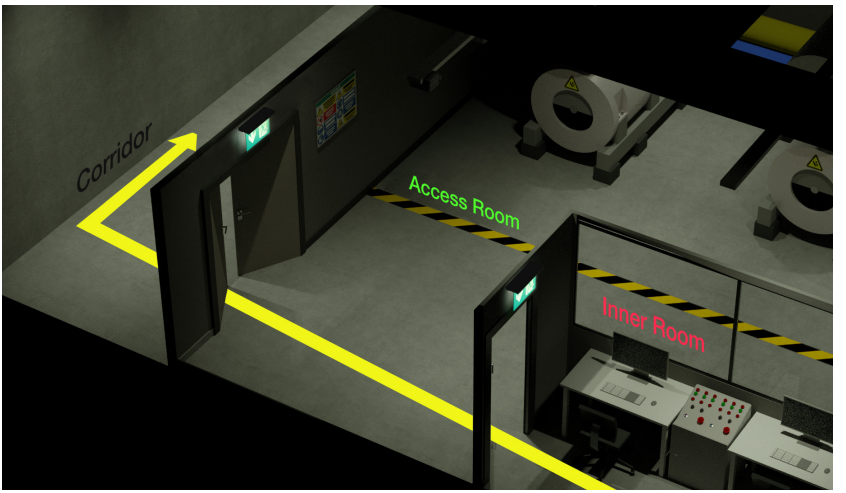
When installing luminaires in close proximity to staircases or changes in the ground level, it is important to ensure that they provide direct lighting for each flat surface.

In most cases at least two luminaires are required to provide a minimum of 1 lux brightness at the centre of each flat surface.

The gap between the two lighting luminaires shown in the illustration on the left indicates that the farther one climbs up the stairs and the lower the installation height of the luminaire, the more the light dims as a result of the cosine correction factor. Fewer steps mean that there is an improved correction angle compared to ground level, but beyond a point that is overshadowed by the increased distance from the luminaire.

Other ground level changes that can create tripping hazards in low light situations must also be illuminated.

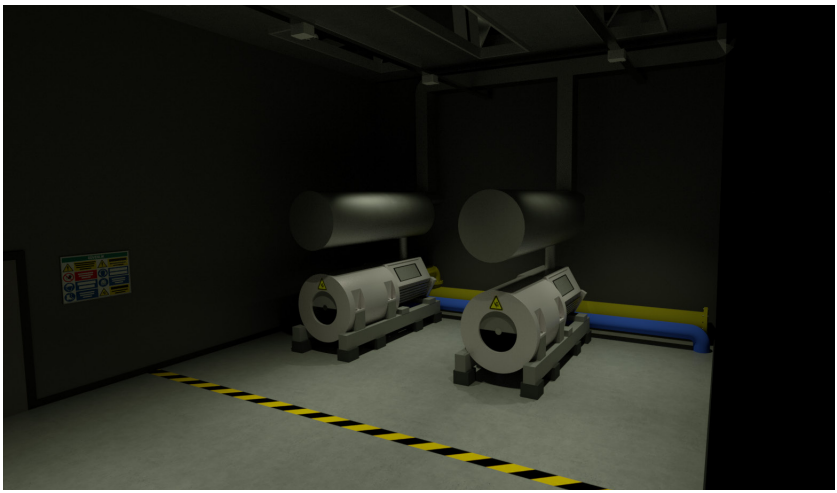
11.4. Luminaire Installation Intervals — Inner Rooms



An inner room is a room from where it is possible to escape only by going through another room (an access room). In such cases, the access room requires emergency lighting, since it will be treated as an escape route from the inner room.

This may not be necessary in cases where the access room is comparatively small and when the walls and/or the door leading to the escape corridor outside provide enough gaps or sheer panels to allow light into the access room. Such decisions can be made in line with a risk assessment.

11.5. Luminaire Installation Intervals — High Risk Task Areas



High risk task area lighting is only required when a given risk is ongoing. After hazardous machinery or processes are safely shut down or concluded, emergency lighting can resume normal levels (for example, 0.5 lux for open areas). The time required to reach that point can be up to 30 minutes.
Examples of hazardous processes:

- An acid tank
- Large spinning machinery

The response time must be swift enough to prevent workers from fleeing in a dangerous manner when the power goes out.

Disability Glare

A high level of contrast between a lighting luminaire and its background can create a disabling glare that has the potential to prevent people from seeing escape routes and obstacles. If the surface is level, then the glare must be constrained to the line of sight by making sure that the luminaires are located within the area of the glare and leaving a area of 30 degrees around the line of sight.

Discomfort Glare = Normal lighting
Disability glare = Emergency lighting

The boundaries of the glare are more critical for emergency lighting located near stairs. Care must be taken to ensure that those boundaries are not overstepped at ground level changes.

Projectors and high output luminaires must be installed with great care. Spotlights produce narrow, intense beams of light and can easily cause disability glare. They are suitable only when they are mounted high enough and point below the glare zone.

A spotlight installed next to an exit sign will undoubtedly create a glare that makes the sign impossible to see.

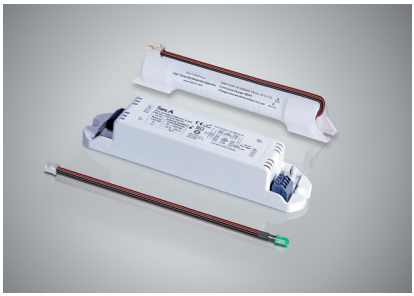
12. EMERGENCY LIGHTING UNITS

Emergency lighting units can be combined with and connected to general-purpose light sources such as LED, fluorescent, and halogen lamps. Their batteries make it possible for them to provide sufficient lighting for the surrounding areas in cases of power outages. Power must be supplied via a unswitched line, and they can detect power outages via their own supply line. During power cuts, they provide the necessary amount of lighting and prevent panic by facilitating a rapid evacuation.

12.1. LED Emergency Lighting Units

These units include electronic circuits that allow LED lamps to stay on during emergencies. LED lighting luminaires are swiftly becoming more commonplace. Beş A provides customer-oriented solutions for LED florescent lamps, LED down lights, LED spotlights, LED panels and LED strip lights.

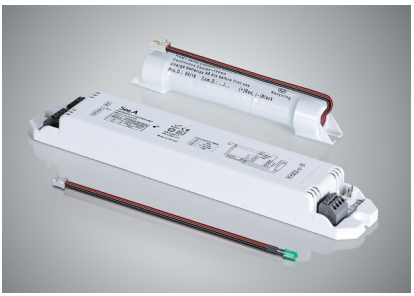
Model: EMLUS-SLED



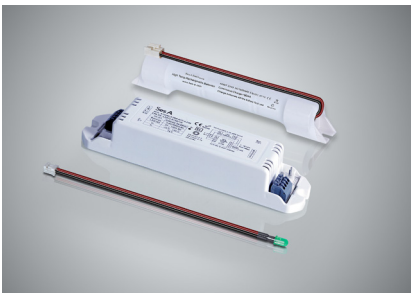
Model: EMLUS-LED

12.2. Fluorescent Emergency Lighting Units

These units include electronic circuits that allow fluorescent lamps to stay on during emergencies. Beş A provides emergency lighting unit solutions for all levels of output for 4-pin T8, T5, PLL, and PLC-type fluorescent lamps.



Model: EMLUS-FLS



Model: EMLUS-FLT

12.3. Halogen Emergency Lighting Units

These units include an electronic circuit that is supplied by 12v of steady voltage and allows halogen and LED lamps to stay on during emergencies.

Model: EMLUS-1250

Ballast Lumen Factor (Emergency Ballast Lumen Factor)

The emergency lumen factor or emergency ballast lumen factor is the ratio of the lighting level that an emergency lighting unit supplies to LED, fluorescent or halogen light sources during emergencies to the lighting level that a lighting source provides

under normal conditions. This information is stated in percentages (%) in catalogues. These ratios are taken into consideration during the design process to ascertain the level of light that will be provided during emergencies compared to the usual functioning of the luminaire.

When emergency lighting units manufactured for LED, fluorescent, or certain types of low-voltage halogen lamps are switched on, the lamp provides a lower level of emergency lighting compared to its normal lighting level. Because the purpose of these units is to provide the standard level of illumination necessary to facilitate evacuation of a building, the full strength of the lamp is not required. When designing emergency lighting systems that employ emergency lighting units a high emergency lumen factor means that fewer emergency lighting units will need to be used.

			EMERGENCY LUMEN FACTOR (3W)		
LUMINAIRE WORKING VOLTAGE	LUMINAIRE WITH 350mA DRIVE CIRCUIT	LUMINAIRE WITH 500mA DRIVE CIRCUIT	LUMINAIRE WITH 700mA DRIVE CIRCUIT	LUMINAIRE WITH 1050mA DRIVE CIRCUIT	LUMINAIRE WITH 1400mA DRIVE CIRCUIT
9 ... 30 VDC	%26,00	%18,00	%13,00	%8,50	%6,50
31 ... 50 VDC	%15,50	%11,00	%7,50	%5,50	–
51 ... 70 VDC	%11,00	%7,50	%5,50	–	–

Chart: Emergency lumen factor chart for EMLUS-SLED/DALI 3W-type emergency lighting units.

Luminaire with Independent Emergency Lighting Unit

This is a type of luminaire that includes its own battery, charging circuit, control hardware, and lamp driver circuit. They can be created by installing an emergency lighting unit within a normal lighting luminaire. They are mandatory for level one and level two earthquake risk areas.

The lamp type can be fluorescent, LED, compact fluorescent, or low voltage tungsten halogen. Systems with independent emergency luminaires can be installed quickly with low cable and fitting costs. Capacity upgrades are simple and they can easily be adapted to architectural changes.

13. EMERGENCY EXIT LUMINAIRES

Emergency guidance inside buildings is necessary to allow building users to reach exits easily in the event of an emergency. Emergency exit signs are needed to indicate to people in a given building the location of exits that will be used during emergency evacuations and escape routes to be followed from any point inside the building.

These luminaires can be single or double-sided and include guidance graphics. They can be directly attached to walls, ceilings, and suspended ceilings, and they can also be hung using rods, chains, and slings.

Model: TUNA

Model: MERCAN

Model: LAPIN

Model: SOMON

Operating Modes

Non-Maintained Mode	Maintained Mode
The light source is not on when the mains voltage is at its usual level. In case of a mains malfunction or power outage, it is illuminated by means of a battery and the electronic circuit in the luminaire.	The light source is on when the mains voltage is at its usual level. In case of a mains malfunction or power outage, it continues to provide light by means of a battery and the electronic circuit in the luminaire.

* Emergency exit luminaires are kept in maintained mode by default.

14. EMERGENCY EXIT LUMINAIRE APPLICATIONS

Standards EN 50172 and EN 1838 provide details regarding the installation of emergency luminaires.

At every emergency exit

At every change of direction

Along corridors

Maximum Visibility of Emergency Exit Luminaires

It is vital to ensure that signs pointing to escape routes can be seen from all directions. The maximum visibility level depends on the height of the pictogram, and that level can be calculated using the formula contained in the standard EN 1838.

$$d = s \times h$$

d: Maximum visibility

h: Pictogram height

s= 100 for signs illuminated externally

s= 200 for signs illuminated internally

For example, in the case of an emergency exit luminaire that is illuminated from within and located at the end of a corridor that is 20 meters long, the pictogram must be at least 10 cm high, and for a sign that is illuminated from the outside it must be at least 20 cm high.

200 times the sign's height for signs illuminated from within

100 times the sign's height for signs illuminated from the outside

Whenever possible, signs must not be attached to the ceiling or at an angle; rather, they must be within the line of sight and clearly visible. If a sign will be viewed from an angle, visibility decreases. For example, an angle of 60 degrees reduces visibility by 0.5. In such cases, the visibility level for a sign illuminated from within decreases from 200 times its height to 100 times its height.

15. EMERGENCY EXIT SIGN SYMBOLS

Emergency Exit Luminaire Pictogram Formats

A clearly signposted escape route is extremely important for safely evacuating an area or a building. The effectiveness of guidance depends on the size, colour, positioning, and visibility of signs. European standards approve of and recommend the use of pictograms depicting a white drawing on a green background.

EN 1838 standards stipulate the brightness levels for the green and white areas of signs. A lamp's colour rendering index must at least be CRI≥40 for the correct perception of safety sign colours. Escape routes must only include exit signs and no other illuminated signs or objects, as they could cause doubts or confusion about the route.

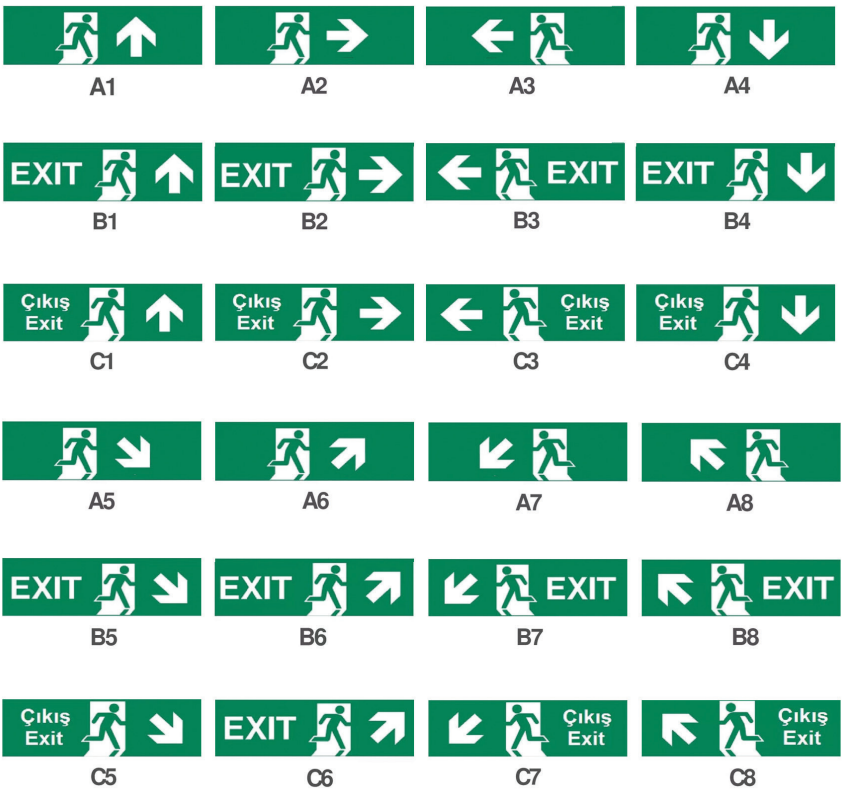
- Minimum brightness level = 2 cd/m²
- The brightness level ratio between the least and most illuminated areas of the sign must not be greater than 10:1
- The brightness level ratio between the white and green areas must be less than 5:1 and not greater than 15:1
- The green background must take up at least 50% of the sign

Escape Sign Illumination

Escape signs can be illuminated internally or externally to ensure that they are legible and get people's attention. If illuminated externally, the brightness level must be at least 5 lux.

Emergency Exit Sign Symbol Usage

Details regarding the symbols used in emergency exit luminaires can be found in the standards EN ISO 7010, ISO 3864-1 and ISO 16069.



16. BATTERY USAGE MANUAL

- Emergency lighting units must operate at the stated operational voltage on an uninterrupted mains. Mains must not be cut except for maintenance and testing. If the mains is repeatedly switched on and off, fluorescent lamps and batteries may be damaged.
- Emergency lighting units must not be operated for long durations at temperatures beyond the stated operational temperatures. Doing so may damage the device and the battery.
- Emergency lighting units must be operated in circumstances in line with their IP protection classifications. Operating devices beyond the stated parameters can cause the device or the battery to malfunction.
- The initial charging time is 48 hours for 1 hour capacity devices, and 96 hours for 3 hours capacity devices. During subsequent charges, 1 hour capacity devices require 24 hours to be fully charged, and 3 hours capacity devices require 48 hours.
- When installing an emergency lighting unit the battery must be connected to circuit of the unit prior to the luminaire being switched on. If there will be an extended amount of time between installation and switching on the luminaire, the battery must be unplugged after the necessary controls have been made.
- When installing emergency lighting and emergency exit luminaires, the devices must not be kept in storage for extended periods of time, as they are delivered with the batteries installed. If batteries are kept plugged in and not supplied with power for extended periods of time, irreversible damage may occur.
- A battery's capacity decreases by 15% for each month it is not in use. Batteries that are installed in devices prior to

delivery must not be kept in storage for longer than 3 months. That period can be extended to 6 months if the battery is unplugged. It is not recommended for batteries to be stored at temperatures above 40 degrees Celsius.

- Batteries that were kept in storage for extended periods of time might require between two to ten charging cycles to reach full capacity.
- The power supply to emergency lighting units must be cut once every six months to test their battery capacity. Before conducting this test, it is necessary to ensure that the device's battery is fully charged and that there were no cuts to the power supply 24 hours prior to the test for 1 hour capacity products and 48 hours prior to the test for 3 hours capacity products. The "Emergency Lighting Duration" of lamps must be observed following the power cut, and the operator must confirm that the duration is not shorter than the rated duration. If lighting duration of the luminaire is below the rated duration, the operator must inform the proper authorities and arrange for a change of battery.
- When changing the battery, the power supply to the device must be switched off, and the old battery must be replaced with an equivalent battery. A replacement battery that provides less power than required will prevent the device from functioning, while one that provides more power than necessary will cause malfunctions.
- Used batteries must not be thrown into the garbage. They must be taken to a recycling centre or handed over to the manufacturer for recycling.

"The battery is the most critical component of emergency lighting systems. It must have a lifespan of at least 4 years and yield the rated duration at temperatures up to 55 degrees Celsius."

17. REGULATIONS AND LEGAL REQUIREMENTS

There are legal requirements concerning the implementation and maintenance of emergency lighting products in Türkiye.

According to articles 72, 73, and 84 of the "**Regulation Concerning the Fireproofing of Buildings**," building authorities are responsible for the periodical testing, maintenance, and inspection of emergency lighting products in buildings where their usage is mandatory.

Responsible parties who breach the provisions stated in the regulation shall be tried according to article 5237 of the Turkish Penal Code or article 5236 of the Misdemeanours Bill, depending on whether their offence constitutes a crime or a misdemeanour.

Legal Basis and Regulations:

- EN 50172
- EN 1838
- Turkish RCFB (Regulation Concerning the Fireproofing of Buildings)

EN 50172: Emergency Lighting Systems

This European standard was approved and validated by CENELEC (The European Committee for Electrotechnical Standardisation) on 01.03.2004. It is also enforced in Türkiye. Products to be used for the purpose of emergency lighting must meet the technical specifications outlined in this standard. All tests, data records, reports, maintenance and repairs, and service tasks following installation of the Emergency Lighting System must be in accordance with this regulation.

EN 1838: Lighting Applications — Emergency Lighting

This European Standard outlines the rules for the application of Emergency Lighting Systems. It is enforced in Türkiye, and emergency lighting projects must be planned accordingly. The products to be used for the purposes of emergency lighting must meet the technical specifications detailed in this standard.

Turkish RCFB (Regulation Concerning the Fireproofing of Buildings)

Article 1-(1)

The purpose of this regulation is to detail the methods and principles of the precautions, organisational activities, training, and inspections to be conducted for the purposes of minimising the chances of a fire during the design, building, management, maintenance, and utilisation of all buildings, structures, facilities, and establishments used by public institutions, private corporations, and individuals, and to ensure that fires which break out are extinguished in a manner that minimises the loss of life and property.

Duties, authority, and responsibility

Article 6-

(1)The duty, authority, and responsibility for implementing the provisions contained in this regulation rest with:

a) Administrative bodies with the authority to issue building permits,
b) Investment companies,
c) Building owners,
d) Employers or their representatives,
e) The architects and engineers involved in the design and application process, and contractors and manufacturers involved in implementation,
f) Advisors, consultants, project controllers, building auditors, and management officials.

(2) If active fire safety measures such as fire detection and extinguishing, warning, and emergency lighting systems fall short of the requirements, responsibility rests with the project owners if the project is deficient, faulty, or non-standard; however, if the building is deficient, faulty, or non-standard, then responsibility falls on the building contractor or the builder.

If a system's failure to work properly can be ascribed to the managing company, then the managing company is held responsible. If fire safety systems were not installed or were installed in a sub-standard manner despite the fact that the building owner was notified of the requirements in writing, then the building owner will be held responsible.

(3) In the case of fire damage that occurs because the provisions contained in this regulation were not followed, the following will be held responsible, depending on culpability:

a) Building owners, employers, and employer representatives involved in construction,
b) Architects and engineers working on design, implementation, and audit processes,
c) Building auditors,
d) Contractors, manufacturers, and their advisors.

Source: Official Record of the Turkish Republic, issue 26735, dated 19.12.2007.

Section 3 of the regulation's Electrical Wiring and Systems chapter contains the requirements regarding Emergency Lighting and Guidance Systems.

EMERGENCY LIGHTING LUMINAIRE APPLICATIONS

SECTION THREE
Emergency Lighting and Guidance

Article 70 - (1) It is necessary to provide the required amount of light on escape routes for the evacuation of buildings. If the lighting units used for the purposes of emergency lighting and guidance do not provide lighting when normal lighting units are working, they must be installed in a way to ensure that they will automatically switch on when normal escape route lighting is cut.

Escape Route Lighting

Article 71 - (1) All escape routes and staircases must be illuminated.

(2) Escape route lighting must be constant whenever the use of escape routes in a building or structure might be necessary. Lighting is provided by lighting luminaires connected to the general lighting system of the building or structure, and natural lighting cannot be considered to be sufficient.

Emergency lighting systems

Article 72 - (1) Emergency lighting systems must be regulated so that they automatically switch on and provide the necessary amount of light when the power supply from the urban grid or other outside sources is cut, when the building or structure's electricity is cut due to safety concerns because of a fire, earthquake, or other such reasons, and when the normal lighting goes off because a circuit breaker or fuse was tripped.

(2) Emergency lighting is required for all escape routes, gathering points, escalators and lifts, workshops and laboratories housing hazardous moveable machines and chemical compounds, electricity distribution and generator rooms, central battery unit rooms, pump stations, indoor car parks, first-aid and safety equipment areas, areas where fire alarm buttons, fire cabinets and similar are located, and the following types of buildings:

a) Hospitals, care homes, and educational institutions,

e) All buildings that have more than 200 users,

f) Buildings where more than 50 users are under ground level,

g) Windowless buildings,

h) Hotels, motels, and residence halls,

i) High-risk areas,

j) High-rise buildings.

(3) Emergency lighting must be operational for at least 60 minutes after normal lighting becomes unavailable. For buildings with a user capacity exceeding 200, the emergency lighting duration must be at least 120 minutes.

(4) When selecting and installing lighting units on escape routes, care must be taken to have an emergency brightness level of at least 1 lux above floors, furnishings, walkways, and on any given point along the centre line of the escape route. The lighting level at any given point at the end of the emergency operating duration must not fall below 0.5 lux. The lighting level ratio between the most and least illuminated points must be no greater than 40:1.

(5) Emergency lighting is provided by means of:

a) Independent lighting luminaires that have their own storage battery, charging circuit, mains voltage monitor, and lamp drive circuit,

k) Lighting luminaires that are supplied with power via direct current from a central storage battery or through an inverter circuit from a central storage battery providing alternating current.

(6) Normal lighting luminaires can be converted into independent emergency lighting luminaires by installing emergency lighting units directly inside the luminaire cover or close by and making the necessary connections.

(7) The connecting wires between the central unit and lighting luminaires for emergency lighting systems that are supplied by a central battery or power generator must be made from fire-resistant materials, such as mineral isolation wires, or they must be encased in metal tubing. For lighting luminaires that can provide emergency lighting independently, mains voltage cables can be ordinary lighting cables.

(8) In level one and level two earthquake risk areas, emergency lighting on escape routes and staircases must be provided by maintained emergency lighting luminaires.

Emergency guidance systems

Article 73 - (1) Emergency guidance is required for all buildings with more than one exit to allow building users to reach exits easily. Emergency exit signs must be installed to show people the locations of exits to be used for an evacuation in the case of an emergency and to indicate the planned exit route from any point inside the building.

(2) Exit signs can be illuminated externally with emergency lighting units as specified in Article 72 of this regulation, and internally illuminated exit signs meeting the same criteria can also be used.

(3) Emergency exit signs must be illuminated for at least 60 minutes after normal lighting becomes unavailable. For buildings with a user capacity exceeding 200, the operational duration for emergency guidance must be at least 120 minutes.

(4) Exit signs must include symbols conforming to the relevant standards and regulations, and they must be shown in white on a green background. Exits that are used regularly must be marked “EXIT,” and exits to be used in cases of emergencies must be marked “EMERGENCY EXIT.” Exit signs must be visible from all angles and they must be no smaller than 15 centimetres in height. The maximum visibility for exit signs illuminated externally is 100 times the height of the sign, and 200 times the height for signs that are illuminated internally or from the back. Necessary signage must be added to facilitate access from farther away.

(5) Exit signs must be installed at a height ranging between 200 to 240 centimetres from the floor.

(6) Escape routes must not have any other illuminated signs or objects that could cause hesitation or confusion regarding the direction to take.

(7) Exit signs must be visible from all access points along escape routes when normal lighting and emergency lighting are in use. Lighting for externally illuminated signage must be at least 2 cd/m² from all visible points and have a minimum contrast ratio of 0.5.

18. REGULAR TESTING, MAINTENANCE, AND REGISTRATION

- Buildings that will be fitted with emergency lighting must have a project plan that is in accordance with the Interior Electrical Wiring Project Regulation, and it must be submitted to the building authorities. Correct planning saves lives.
- The project plan must include all devices to be used, and it must be signed by an expert to verify that it conforms to all relevant standards and regulations.
- If any changes are made over time, then the plan must be updated.

"Project planning in accordance with regulations is not only a legal requirement, but a vital necessity."

- The Regulation Concerning the Fireproofing of Buildings (RCFB) and the EN 50172 standard require that building users/owners must periodically test the building's emergency lighting system or have it tested, and for their own sake they must maintain all written records so they can be presented to the official and legal authorities if any adverse outcomes arise.
- All tests must be conducted by an authorised and knowledgeable business/individual, and the results must be recorded.

18.1. Registers

- The results of periodically conducted tests must be kept in a register.

- The register must be kept in the building by someone selected by the building user/owner, and it must always be at hand so it can be inspected by officials.
- The person in charge of the system must ensure that it is working correctly.
- If at the end of a one-year period the required tests are passed and the system continues to work correctly, the building authorities must be presented with a "Test Certificate."

The register must include the following information:

- The date that the system was activated;
- The dates of every regular inspection and test;
- Brief details about and the dates of tests and inspections;
- Details concerning any faults detected during tests or inspections and the precautions that were taken, along with their dates;
- Explanations for and the dates of any changes made to the emergency lighting system;
- If tests are conducted using an automatic testing device, a description of the device and its mode of operations;
- Test records must also include changes to fire alarms or lamp and battery replacements.

18.2. Function Test

This is a short test that is conducted to confirm that the device will switch on as expected during an emergency. It must be carried out at least once a month, and more generally once a fortnight (twice a month).

A brief test (around 1 minute long) must be conducted to confirm that emergency lighting and exit luminaires are clearly visible and operational. At the end of the test, the devices must be reconnected to the mains voltage supply, and their charge displays must be checked as well.

The results are to be recorded in the register.

18.3. Duration Test

This test must be performed at least once a year. It is generally performed once every six months (twice a year). It is intended to confirm that all emergency lighting devices operate for the required duration.

For example, the power is cut from all emergency lighting luminaires for a 3 hours system and the devices remain switched on for the full 3 hours. At the end of the test, the devices must be reconnected to the power supply and their charging displays must be checked as well.

The results of the test must be recorded in the register.

18.4. Maintenance and Repair Work

Some components of these devices must be replaced regularly and/or require maintenance. Maintenance must be performed during annual testing (duration testing).

The lamps used in maintained models operate for 8,750 hours over the course of a year. Fluorescent lamps generally have a lifespan of 7,500-1,000 hours. However, that doesn't necessarily mean that the lamp will malfunction after a year. All the same, the lamp must be replaced annually due to the increased risk of malfunctions. LED lamps do not require replacements.

The batteries used in devices also have a finite lifespan, and their capacity begins to decrease within 3-5 years. If any devices fail to pass the annual duration test, their accumulators/batteries must be replaced.

During maintenance, the device must be cleaned of internal and external dust, and inspections for damage caused by temperature and ultraviolet light (wear and tear) to the mains connector terminal and lamp and battery sockets must be carried out.

19. AUTOMATIC TEST SYSTEMS

The manual testing of emergency lighting system luminaires is difficult, costly, and insufficiently reliable. Particularly for systems with a large number of luminaires, automated applications are needed.

Advantages:

- The ability to check all emergency lighting equipment.
- The filing of malfunction status reports.
- The ability to check the working duration and remaining lifespan of all system components at any given moment.
- Automatic testing of systems in line with the EN 50172 standard.
- Maintenance of test records.
- The ability to send test results via e-mail to designated persons.
- The ability of multiple systems to work in sync with one another.
- System components can be checked one by one over the internet and monitored remotely.
- The ability to view an entire system from one location.

Reliability:

Automatic test systems are a major convenience for the testing, maintenance, and reporting of emergency lighting systems. However, it is also important in terms of reliability for the system to be approved by a laboratory-accredited expert according to the relevant standards.

"Emergency Lighting Automatic Test Systems must meet all the requirements of 'IEC/EN 62034: Automatic test systems for battery powered emergency escape lighting.' Emergency lighting luminaires which are the end point components of the system must meet all the requirements of 'IEC/EN 60598-2-22: Luminaires - Part 2-22: Particular requirements - Luminaires for emergency lighting.'"

The IEC/EN 62034 standard lists all the requirements that automatic test systems have to meet. They are as follows:

- System solutions and end components must be tested and certified.
- It must be verified that all the end components of the system meet the requirements of IEC/EN 60598-1 and IEC/EN 60598-2-22.
- The system must not be compromised by electromagnetic events or tested without proper instruction. IEC/EN 61547 tests, which implement the requirements and compliance criteria for emergency lighting components, must be conducted to verify compatibility. Additionally, power voltage decreases and outage tests must be conducted according to IEC/EN 61547. During tests, the system must perform flawlessly, and undesired tests must not be initiated.
- Any software issues that might arise must not prevent more than one of the emergency luminaires connected to the system from working, and they also must not result in the initiation of undesired tests.
- The system design must only make it possible for authorised personnel to modify the test duration and frequency.
- Failures which might occur during tests conducted by the system (battery failures, lamp failures, function test failures, duration test failures, etc.) must be displayed on the administrative panel.

- Possible lamp malfunctions of maintained products must be detectable in both normal and emergency mode.
- Any breakdowns in communications between system components (communication circuit failures, wiring failures, router and/or display circuit failures, etc.) must not prevent emergency lighting luminaires tethered to the system from working or initiate an unauthorised test.
- Any interruption of communications between system components must be shown as an error on the administrative panel.
- If the power is cut during a test, the product must immediately switch to emergency mode and the test must be postponed until later. If a planned test is postponed, this must be indicated on the administrative panel to inform the operator.
- The system's automated test timer must have two timing requirements. These are the timing of the test frequency and the duration of the test function. The accuracy of both must have a weekly precision of ±75s.
- The system must include a monitoring panel that can display all test results. The test results display must be configured so that any failures that occur during a duration test cannot be nullified by a subsequent successful function test.
- If there is a mains supply malfunction, existing test failure data must be preserved until power is restored and be displayed on the administrative panel once the power returns.
- The system must indicate whether the power supply to end products is working or experiencing any failures.
- Any failures that are displayed must only be removed when the fault is rectified. Removal of that information must not be carried out via the administrative panel.
- Test results can be electronically stored as well as shown on the display panel. Testing history must be available as visual and printable data.

- Plans saved on the system must be saved permanently in the case of a power outage and displayed on the panel when the power is restored.
- A real-time timer must be used to preserve the accuracy of the system clock during power outages.

Beş A offers two solutions that meet these requirements and others that are part of the application process. One of those solutions has a wired communications capability and the other has a wireless communication capability. Both of them use an internationally valid DALI infrastructure that meets all global standards, and they are also certified by Kitemark for their compliance with the relevant IEC/EN 62034 automatic test systems standard.

- **ELCO: WIRED EMERGENCY LIGHTING MONITORING SYSTEM**
- **WELCO: WIRELESS EMERGENCY LIGHTING MONITORING SYSTEM**

"The installation of an 'Emergency Lighting Monitoring System' in buildings with a user load of more than 200 people or buildings with more than 100 emergency lighting luminaires will ensure an easier testing and maintenance process, and guarantee that the emergency lighting system will be operational no matter the emergency."

20. ELCO: WIRED EMERGENCY LIGHTING MONITORING SYSTEM

ELCO is our wired monitoring system solution, which allows you to monitor the real-time status of

DALI compatible emergency lighting products and conduct regular tests via a router and a touch screen panel developed by Beş A. It works seamlessly with all Beş Beş A brand DALI compatible emergency lighting units, emergency lighting luminaires, and emergency exit luminaires.

- Central monitoring via touch screen control panel
- Addressable emergency lighting system with certified compliance with EN and IEC standards
- Instant or periodic function and duration tests
- Control software for testing, reporting, and recording test reports
- Password-protected user interface
- Omnidirectional, easily assembled 2-wire DALI data bus cabling
- Automatic addressing
- Testing and reporting

Beş A and DALI

The Digital Addressable Lighting Interface (DALI) is an open communication protocol developed by leading manufacturers in the lighting industry which meets the definitions in the international IEC 62386 technical standard.

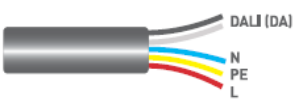
The DALI protocol was initially developed for controllable lighting ballasts, but today it also encompasses the technological requirements for various smart lighting and emergency lighting products. It provides flexibility and simplicity for system designers, installation firms, and end users, and it also offers a secure and reliable communication platform for emergency lighting products that is compliant with the Regulation Concerning the Fireproofing of Buildings and EN 50172 standards.

As an active member of the DALI framework, Beş A designs, manufactures, and tests DALI-compliant emergency lighting products.

Our Research & Development laboratory has created unique circuit designs through the embedded software we have developed for DALI compatible emergency lighting units, emergency lighting luminaires, and emergency exit luminaires. We mass-manufacture our range of products at our facilities, and our catalogue continues to expand with the addition of new technologies. Beş A is a member of the DiiA organisation, which determines and manages the DALI standard, and it guarantees the DALI compatibility of its own products by testing them at its own R&D laboratory with the aid of a ProbitLab DALI Tester device and the reporting of test results. As a member organisation, Beş A embosses those products that successfully pass the tests with the DALI logo.

elco
emergency lighting control

DALI



Monitoring and Control Panel

ELCO PANEL

- Uninterrupted time monitoring with an RTC (Real Time Clock)
- Easy management via a 7-inch touchscreen
- TCP/IP internet connection with 1xRJ45 Ethernet port and embedded WiFi
- 16 DALI router connections (ability to control a maximum of 2,048 DALI-compliant emergency lighting products) and a 1xRS485 access point
- Function and duration tests of DALI-compliant products and instant status monitoring
- Battery and LED-lamp status tracking
- Test result reporting, maintenance of reports, and the option to save data via a USB device

ELCO ROUTER

- 2x DALI ports allow connection to 128 DALI-compliant emergency lighting products
- Automatic addressing of DALI products and automatic resolution of possible address overlaps
- Instant monitoring of the DALI line and instant notification of any changes on the control panel
- Connection to the touchscreen control panel and other routers with 2xRS485 ports
- Easy addressing interface with an address key

Routine Tests

Through the control panel, all products can be grouped based on their location and automatically tested. The panel can then automatically conduct and record the function and duration tests of all emergency products in the system according to a pre-planned schedule.

Reporting

A printable record of the test results and any recorded failures can be transferred to a USB memory stick plugged into the panel and automatically sent to a specific e-mail address entered via the panel.

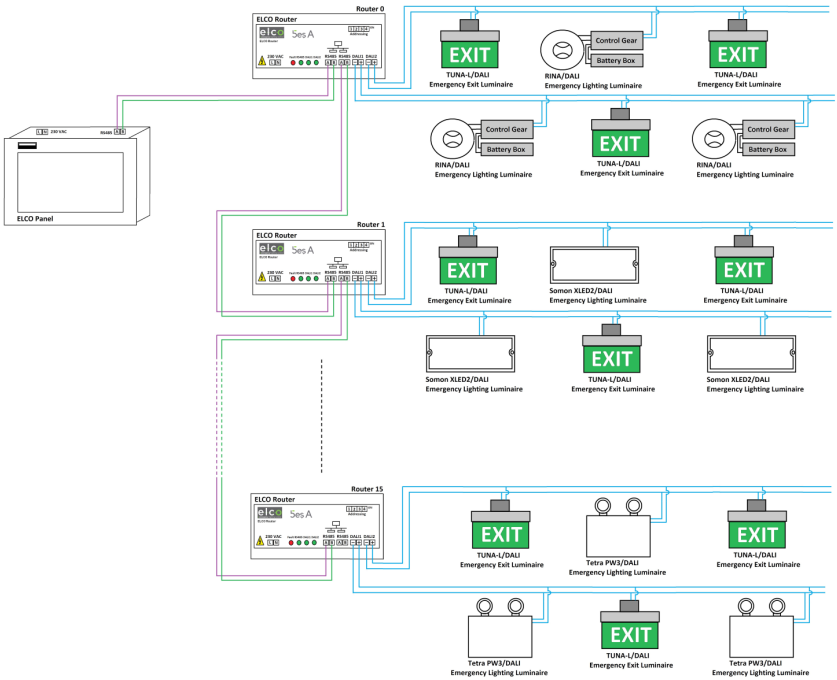
Using the Panel via Remote Desktop

If the panel is connected to an existing internet network through an Ethernet port or embedded Wi-Fi connection, it can be remotely managed with any computer on the same network via the VNC viewer app.

Connection Chart

The connection chart shown below depicts the communication connections of the ELCO system and all its components. The components displayed on the chart must be connected to the mains.

The ELCO system end products shown on the chart are DALI-compliant self-contained products, and they must be connected to an uninterrupted power supply. The products shown on the chart are the most popular Beş A brand DALI-compliant self-contained emergency lighting and emergency exit luminaires. All Beş A brand DALI-compliant self-contained emergency lighting and emergency exit luminaires can be used with the ELCO system.



All details pertaining to system installation (wire lengths, cabling properties, etc.) can be found in the relevant system's user guide.

System Properties

- 16 routers can be managed with a single panel.
- Each router allows connections to up to 128 (2x64) products.
- Up to 2,048 products can be managed via a single panel.
- The multi-coloured 7" LCD touchscreen offers ease of use and management.
- The panel can be managed via remote desktop if connected to an existing network by an Ethernet connection or Wi-Fi.
- If the panel is connected to the internet, the results of all tests can be delivered to any e-mail address.

- Additionally, test results can easily be transferred to a USB memory stick that is plugged into the panel and then be printed out.
- The distance between the panel and routers can be as far as 1,200 meters with the RS485 connection.
- Each port from a router allows for cabling up to a distance of 300 meters.
- In total, the system allows for a cable network of up to 10,800 meters.
- The panel has a battery-protection mode that protects against power outages. During a sudden power outage, the panel automatically shuts down within 10 seconds, thus avoiding damage.
- Luminaires can be connected to a 2-way cable from the router without polarity. This prevents faulty connections.
- All products connected to the system are automatically given addresses by the routers. This makes system set-up significantly easier.
- Our system can only be used with Beş A brand DALI-standard compliant emergency products.

21. WELCO: WIRELESS EMERGENCY LIGHTING MONITORING SYSTEM

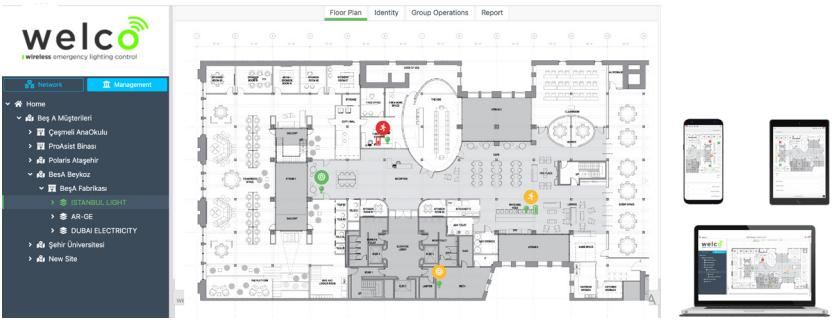
WELCO is our wireless system solution. It allows for the instant monitoring of our emergency lighting products via the internet or an online server.

All of our emergency lighting products include a wireless communication model that utilizes the proven effectiveness of Wi-Fi technology. The only prerequisite for setting up the system is connecting the emergency lighting luminaires to the mains. No additional cabling is required.

- Wireless, Wi-Fi (802.11 b/g/n), and cloud-based communications.
- Does not require additional cabling costs or labour for set-up.
- Tests can be conducted and reported at anytime from anywhere in the world.
- Resources are used effectively through the use of existing Wi-Fi infrastructure.
- The functionality and duration tests of products are regularly conducted according to a pre-planned schedule.
- Tests and reports can be offered as services.

Regular system controls must be carried out to ensure that an emergency lighting system is fully functional in the event of an emergency. Building management is required to routinely test emergency lighting systems, keep detailed records of the test results, and share the results with the authorities when necessary.

Emergency lighting monitoring systems monitor all connected devices from a single central point, automatically conduct periodical tests, and create reports. This makes it possible for management to stay informed regarding the functionality of products during emergencies such as earthquakes and fires.



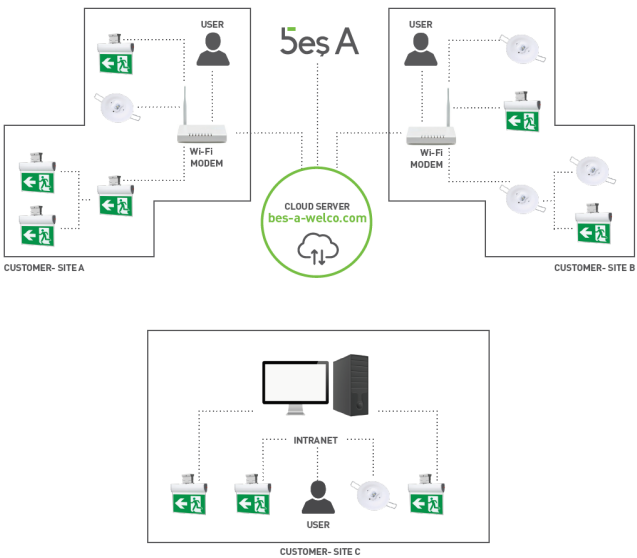
WELCO Cloud-Based Software Interface

- Ease of management with a single software package
- Ability to conduct remote tests with a single click
- Display and monitor site locations on a map base
- Ability to divide locations into buildings and floors
- Monitor emergency lighting products with floor plans
- Monitor various locations and components through the same interface in a tree branch format
- User-friendly icons show the battery, LED, and test statuses of emergency lighting products
- Schedule and automatically conduct periodical function and duration tests
- Compile test reports with date and time stamps
- Ability to receive detailed test reports

Cloud Technology

The WELCO system developed by Beş A employs cloud technology to allow you to access information regarding your emergency lighting products such as malfunction reports and past test data from anywhere with an internet connection by means of the web browser on your computer, tablet or mobile phone. All you have to do is enter your username and password.

- The status of emergency lighting products and past test data are easily accessible online, meaning that you do not have to access the data from a physical panel.
- Ability to control and monitor products from a single point even if they are located in separate geographical areas.
- Warnings such as test failures are automatically delivered to your inbox.
- The real-time status of products can be monitored in groups or individually.
- Test reports can be downloaded in Excel format, which allows for easy grouping of products based on failure type or location data that can then be shared with technical support teams.



22. RELATED STANDARDS

IEC/EN 60598-1	Luminaires - Part 1: General requirements and tests
IEC/EN 60598-2-22	Luminaires - Part 2-22: Particular requirements - Luminaires for emergency lighting
EN 62031	LED modules for general lighting - Safety specifications
EN 62384	DC or AC supplied electronic control gear for LED modules - Performance requirements
EN 62471	Photobiological safety of lamps and lamp systems
EN 61347-1	Lamp controlgear - Part 1: General and safety requirements
EN 61347-2-7	Lamp controlgear - Parts 2-7: Particular requirements for battery supplied electronic controlgear for emergency lighting (self-contained)
EN 61347-2-13	Lamp controlgear - Parts 2-13: Particular requirements for DC or AC-supplied electronic controlgear for LED modules
EN 62386-102	Digital addressable lighting interface - Part 102: General requirements - Controlgear
EN 62386-202	Digitally addressable lighting interface - Part 202: Particular requirements for controlgear - Self-contained emergency lighting (device type 1)
EN 62386-207	Digitally addressable lighting interface - Part 207: Particular requirements for controlgear - LED modules (device type 6)
IEC/EN 62034	Automatic test systems for battery powered emergency escape lighting
EN 60929	AC and/or DC-supplied electronic controlgear for tubular fluorescent lamps - Performance requirements
IEC/EN 61547	Equipment for general lighting purposes - EMC immunity requirements
EN 55015	Limits and methods of measuring the radio disturbance characteristics of electrical lighting and similar equipment
EN 1838	Lighting applications - Emergency lighting
EN 50172	Emergency escape lighting systems
ISO 16069	Graphical symbols - Safety signs - Safety route guidance systems (SWGS)
ISO 3864-1	Graphical symbols - Safety colours and safety signs - Part 1: Design principles for safety signs in workplaces and public areas
EN ISO 7010	Graphical symbols - Safety colours and safety signs - Registered safety signs

23. FREQUENTLY ASKED QUESTIONS

Emergency Lighting Systems

Question: Do emergency lighting products require a test switch? Can't I use the fuse instead?
Answer: A test switch is required. It can be a hidden switch or a specially designed switch to isolate the current powering the emergency lighting product. It must not be a normal lighting fuse, as that could entail certain risks during periodical inspections.

Question: If a change is made to the security standards of a given emergency lighting luminaire installed in a building according to a previous standard, does the entire system in the building need to be modified? Or is it enough to update individual circuits and the relevant equipment?
Answer: The entire building must be brought up to date with the new safety standard. It is not enough to modify a single field.

Question: What is the recommended frequency for replacing the batteries of emergency lighting luminaires?
Answer: There are no clear-cut recommendations. Batteries usually have a designated lifespan of 4 years, and the standards indicate that the required minimum level of lighting must be sustained throughout the rated duration. If this does not occur, the batteries must be replaced to meet the system's required rated duration. If emergency lighting luminaires require a replacement battery sooner than 4 years, the battery must be properly charged

and not subjected to temperatures exceeding the temperature limits of the luminaire. A high temperature environment shortens the battery's lifespan and a low temperature environment decreases the battery's capacity to last the discharge duration.

Question: Can emergency lighting luminaires be supplied with power with a line drawn from a distribution panel?
Answer: The power for emergency lighting units must not be supplied from a switched line. It must be directly supplied with an uninterrupted line.

Question: Should an emergency light be installed outside the final exit on an escape route?
Answer: Yes, if the natural lighting is not sufficient for people to safely vacate the building.

Question: Can a non-maintained exit sign be used in a cinema or a theatre?
Answer: Not all exit signs need to be maintained models to prevent confusion in the event of lighting malfunctions. However, maintained emergency lighting luminaires must be used in public areas where normal lighting may be dimmed or rendered inadequate by smoke accumulation.
Exit signs must be illuminated at all times and be visible whenever the building is occupied. Since it is impossible to ensure that normal lighting will sufficiently illuminate exit signs at all times, emergency exit luminaires generally must be the maintained type.

Question: What are the emergency lighting requirements for an ordinary open-plan office?
Answer: Assessing the exact emergency lighting requirements is

part of carrying out fire risk assessments, but a brightness level of 0.5 lux is generally acceptable for open-plan offices.

Question: Can I use normal lighting luminaires as emergency lighting luminaires?
Answer: Normal lighting luminaires can be converted into emergency luminaires by installing emergency lighting units. However, the luminaire must meet the required product standards.

Question: Is emergency lighting necessary for toilets?
Answer: Yes, all toilets that do not have natural lighting and are larger than 8 square meters require emergency lighting.

Emergency Lighting Luminaires

Question: What is an emergency lighting luminaire? How is it connected to the mains?
Answer: Emergency lighting luminaires are luminaires that provide normal lighting and continue to provide lighting in case of power cuts with Emergency Lighting Units. When connected to the mains, in addition to a "switched line" and "neutral" a "unswitched line" line must be available to supply power to the Emergency Lighting Unit. That line must not be interrupted under any circumstances except for testing and instances of malfunctions. To prevent Emergency Lighting Luminaires from affecting other luminaires when they are being tested, their power supply lines must be separated by an independent fuse on the switchboard.

Question: When I turn off the switch supplying the Emergency Lighting Luminaire with power, the lamp continues to provide light. Why is this?

Answer: You might have connected the switch to the end of the Emergency Lighting Unit phase in the luminaire. This point must be supplied by the direct phase. When you cut the power connected to it, the Emergency Lighting Unit continues to illuminate the lamp through battery power, as it assumes that a power cut has occurred. You should confirm that the electronic ballast/ LED drive is supplied by the switch phase while the Emergency Lighting Unit itself is supplied by a direct current.

Question: Can I supply the "Switched Line" and the "Unswitched Line" points in the Emergency Lighting Luminaire through different phases? Could doing so cause damage to the circuit or the lamp/LED?

Answer: As Beş A emergency lighting units are designed with a 2-relay system, such a configuration would not harm the switch or the lamp/LED. However, a certain disadvantage could arise: If one of the phases, particularly the phase supplying the electronic ballast, is cut and the Emergency Lighting Unit phase continues to work, the lamps will go out since the electronic ballast will not be provided with power, but the Emergency Lighting Unit will not switch to emergency mode because it is still supplied with power. This means that the Emergency Lighting Luminaire will not perform properly. Bearing that possibility in mind, we recommend that the ballast and the emergency lighting unit in the luminaire be supplied through the same phase.

Question: The lamps/LED in my emergency lighting luminaire do not provide light when there is power, but when I cut the power they switch to emergency mode and provide light. What is the reason for this?

Answer: If the lamp/LED does not light up when connected to a power supply but does provide lighting when the power is cut,

this means that the Emergency Lighting Unit in the luminaire is functioning. In such cases, the electronic ballast/LED driver in the luminaire should be checked to see if it is being supplied with power and the ballast/driver and lamp/LED must be checked for possible faults. If the ballast/driver is being supplied with power and the ballast/driver and the lamps/LEDs are working, then the wiring and particularly the cables plugged into the sockets must be checked for any loss of connectivity.

In emergency lighting units with fluorescent lamps, the lamp only switches on when the ends of two opposite cables are brought into contact. However, if any of the cable ends in lamps with electronic ballasts are not connected, then the lamps will not provide light.

Question: The lamps in my emergency lighting luminaire provide light when supplied with power, but when the power is cut none of them switch to emergency mode. What might be the cause of this?

Answer: If all the lamps provide light when supplied with power but none of them light up when the power is cut, then the battery connected to the Emergency Lighting Unit should be checked. The first step should involve checking whether the plug connecting the battery to the emergency lighting unit has connectivity issues, and then, after making sure that no power outages have occurred, the battery must be left to charge for a minimum of 24 hours. If the problem persists, the battery should be connected to another functioning luminaire and left charging to ascertain whether the fault stems from the battery or the Emergency Lighting Unit. If the failure persists in the second luminaire, this means the battery has come to the end of its lifespan, while the opposite means that the initial Emergency Lighting Unit has a fault in its charging circuit.

Question: None of the lamps in my emergency lighting luminaire provide light regardless of whether there is power or not. What could be the reason for this?
Answer: In such situations, you must first check to see if both the emergency lighting unit and the electronic ballast/LED driver in the luminaire are being supplied with power. If only the ballast is being supplied with power and not the emergency unit, the lamps will not turn on. The emergency unit and the ballast/driver must be simultaneously provided with power for the lamps to turn on. The LED charge indicator can be used to check whether the emergency unit is being supplied with power.

Question: I have an emergency lighting luminaire with fluorescent lamps. The lamps both light up when there is power, but when the power is cut only one lamp functions in emergency mode. I would like both lamps to turn on in emergency mode. Is this possible?
Answer: It isn't possible with your existing unit. There are emergency lighting unit solutions for lamps up to 18W that allow both lamps to light up in emergency mode. A higher wattage than that would require two emergency lighting units.

Question: My emergency lighting luminaire is working properly but the light provided is very faint in emergency mode. Is that normal?
Answer: Emergency lighting unit solutions are designed to provide a minimum brightness level of 1 lux on escape routes and 0.5 lux in open areas. That is a somewhat low level of brightness but it is normal for the lamp to appear dim in emergency mode.

Emergency Exit Luminaires

Question: What do the single-sided and double-sided options for emergency exit luminaire mean, and what is their determining factor?

Answer: This refers to whether the exit symbols on luminaires are visible from both sides or only one side. The option depends on the purpose of the emergency lighting luminaire. For example, if luminaires must be compliant with fire regulations, then single and double-sided applications are both acceptable for areas such as corridors and doorframes.

Question: How do I use the emergency testing button, and what is its purpose?

Answer: Pressing the button runs a test that simulates a power outage. Once the button is pressed, the emergency lighting unit will switch to emergency mode, which will allow the operator to test how the device functions on battery power.

Question: What do the terms AC and DC mean?

Answer: AC stands for alternative current and DC stands for direct current. AC refers to the variable and sinusoidal voltage that has an effective voltage value of 230V already in the mains, while DC refers to stable direct voltage. DC voltage can be obtained by converting AC current.

Question: What are the symbol and language options for emergency exit luminaires?

Answer: There are no language restrictions for symbols and written directions. They vary depending on our customers' preferences. We include a symbol chart in our catalogues that indicates the standard usage symbols.

Emergency Lighting Units

Question: I have an emergency lighting unit with the product code EMLUS/SLED/M050/3H. I connected the wires according to the chart shown on the unit, but the luminaire does not work when supplied with mains. It only operates in emergency mode when I cut the mains. Why is this?

Answer: As you may know, LEDs have (+) and (-) poles. For your product to work as intended, the LED and the LED driver outputs must be correctly connected to the emergency unit. If your product is working in emergency mode but not in normal mode and you can detect 230V AC of mains voltage in the LED driver terminals, most likely the LED driver terminals were cross-connected to the emergency unit. This is a common occurrence.

Question: I have an emergency lighting unit with the product code EMLUS-SLED/M150/1H. I connected the wires according to the chart on the unit, but the luminaire only works when supplied with power and it does not switch to emergency mode when I cut the power. What is the reason for this?

Answer: As you may know, LEDs have (+) and (-) poles. For your product to work as intended, the LED and the LED driver outputs must be correctly connected to the emergency unit. If your device functions when connected to the main power supply but not in emergency mode, then you should check to see if the battery is installed correctly and verify that there are no connection problems with the plug connections. Also, check to make sure the battery is charged. If possible, the battery voltage should be checked to make sure that it is equal to or higher than the value that is indicated. If you confirm that there are no battery issues, check to see if the LED and the LED driver outputs were cross-connected to the emergency unit, since in such cases

the product will work when connected to the power supply but not in emergency mode.

Question: Do LED emergency unit products include protective measures?

Answer: Our LED emergency unit products have short circuit and open circuit protection features. If the LED connectors short-circuit or are disconnected during the installation process or when the product is working in emergency mode, the product will go into self-protect mode. After the LED connection is fixed, the product should be supplied with power and then cut from the power supply so it will continue working in emergency mode.

Question: What are the differences between the emergency LED unit types referred to as L, M, and H?

Answer: The L, M, and H specifications of LED emergency lighting units indicate the amount of brightness provided during emergencies. L stands for low, M stands for medium, and H stands for high levels of light. Our emergency lighting unit catalogue includes detailed charts showing the maximum lumen output of each model and the level of emergency lighting that can be obtained by installing these units in luminaires.

Question: Can I use the EMLUS-LED and EMLUS-LED type LED emergency units to power my LED tube/LED spot products that run on 230V AC mains?

Answer: EMLUS-LED and EMLUS-SLED-type emergency lighting unit products are LED driver circuits that operate on a battery in emergency mode. They can be used to directly supply LEDs within the range of certain stable current values. For this reason they can only be used in luminaires with independent drivers.

Question: Do you have any emergency lighting unit products that can power my LED tube/LED spot products that run on direct 230V AC mains?
Answer: We do offer emergency unit solutions that can be used to power LED products operating on direct 230V AC mains. You can use our EMLUS-220/5W type model for 3W-5W LED spot products, and our EMLUS-220/10W-30W model for LED fluorescent lamps, down lights, and panel luminaires between 10W-30W.

Question: What level of brightness does your EMLUS-220-type 230V LED emergency lighting unit line of products provide?
Answer: Our EMLUS-220-type 230V LED emergency lighting unit products emit the same level of brightness that they provide when connected to the main power supply. In other words, the usual 100% level of brightness.

Question: Do you have any products that can make my LED tube/LED spot products that run on direct 230V AC mains operate with a lower level of brightness?
Answer: We have a special emergency lighting unit solution for such cases, the EMLUS-220SP model. However, that solution is not included in our catalogues, since it can only work based on luminaire compatibility and it is especially designed for the luminaires with which it is intended to be used. If you would like to request that model, you can send us a sample luminaire.

24. EMERGENCY LIGHTING PRELIMINARY INSPECTION CHECKLIST

The following preliminary inspections must be carried out prior to regular Emergency Lighting System tests to prevent delays in the test process and to ensure that the test is completed as quickly as possible. This checklist is required for businesses that conduct their own tests and we also provide it for companies in case outside testing is carried out.

CHECKLIST FOR PRELIMINARY INSPECTIONS PRIOR TO EMERGENCY LIGHTING SYSTEMS TESTS

Make sure that the technician can easily access the emergency lighting units. Obstacles preventing access to emergency lighting units can make it impossible to carry out a proper inspection.
Note the installation heights of the emergency lighting units in the system. This will allow you to arrange for any necessary ladders/access points before testing, and the units will thus be easily accessible during the test.
Make sure that all emergency lighting units are supplied by a direct power line. Units that are not properly powered cannot be tested.
The entire system can be put through a preliminary test one hour prior to the actual test to ensure that all the luminaires are in working condition.
The number of emergency lighting luminaires that will be tested and their locations must be listed beforehand. Following that list during the inspection will ensure that all the units are tested.
Make sure that all the emergency lighting luminaires have test switches.
Maintain all reports and schematics related to the installation of the emergency lighting system during the test.
Make sure that no power cuts occurred 24 hours prior to testing.

25. EMERGENCY LIGHTING PRODUCTS AND SYSTEMS CHECKLIST AND REGISTRATION FORMS FOR USERS AND OPERATORS

Emergency Lighting and Exit Luminaires Registration Form

This record pertains to section/building ……../…….. at the following address: ……

Please note: The details of each independent emergency lighting and emergency exit luminaire, and emergency lighting units must be recorded.

Luminaire N.	**Product Model Code**	**Operating Mode** (Maintained/ Non-Maintained)	**Product Type** Emergency Exit Emergency Lighting Luminaire with Emergency Unit	**Rated Duration** (1 or 3 hours)	**Product Location**	**Mounting Height** (meter)

Emergency Lighting and Exit Luminaires Test Registration Form

This record pertains to section/building ……../…….. at the following address: ……

Function test (Monthly): Simulate a power outage (using the test button) to activate every independent luminaire and internally illuminated exit signs in emergency mode on battery power.
Duration Test (Annual): Cut the power supply to the luminaires and operate them on battery power in emergency mode for the rated duration (check the manufacturer's instructions for the correct rated duration, e.g. 60 minutes or 180 minutes). Make sure that the batteries are fully charged prior to the test and that there were no power cuts in the 24 hours leading up to the test.
Important: When there is no specially designated test button to test the emergency lighting luminaire, you will need to cut the power via the switchboard. Do this only if it is safe to do so.

Make sure that the mains supply is turned back on after the tests (by checking the indicator lights).

Please note: This test registration form was prepared in accordance with EN 50172 recommendations. It must be retained for 3 years.

Test Date		Test Conductor		Signature	

Luminaire N.	Product Model Code	Is the luminaire intact, clean, and in working condition? (Yes/No)	Was the function test successful? (Yes/No)	Was the duration test successful? (Yes/No) If not, what is the resulting emergency lighting duration?	Details of faults discovered after testing

Record of Faults Discovered After Testing and Corrections Made

This record pertains to section/building ……../…….. at the following address: ……

Please Note: Add details of each fault and corrections made. This form must be retained for 3 years.

Faulty Luminaire N.	Description of Fault	Discovery Date	Steps Taken	Correction Date	Signature

BEŞ A ELEKTRİK VE ELEKTRONİK SANAYİ TİCARET A.Ş.

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