

DJS 2259:2026

Second edition

ع ت ٢٠٢٦/٢٢٥٩

الإصدار الثاني

مشروع تصويت

(تبني معدل)

السلامة والصحة المهنية – تطبيقات الإضاءة – إضاءة الطوارئ

Occupational Health and Safety – Lighting applications – Emergency lighting

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مؤسسة المواصفات والمقاييس

المملكة الأردنية الهاشمية

من قبل مجلس الإدارة

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هذه الوثيقة مشروع من تطويرها لم تكن بعد لإقرارها من قبل اللجنة الوطنية للمعايير والملاحظات، لذلك فهو من حقها التنظير التبدل، ولا يجوز استخدامها إلا بعد اعتمادها من قبل مجلس الإدارة

Foreword

Jordan Standards and Metrology Organization is the national standardization body in Jordan. The work of preparing Jordanian Standards is normally carried out by technical committees composed of the interested parties, which are involved in the scope of the standard. All the interested parties have the right to vote on the draft Jordanian Standard during the enquiry stage, taking into consideration the importance of harmonizing Jordanian Standards with the international, regional or national standards (as much as possible) for the purpose of eliminating technical barriers to trade and facilitating the international trade.

Jordanian Standards are drafted in accordance with the rules given in the Jordanian Directive P-2/2005, part 2: Rules for the structure and drafting of Jordanian Standards.*

The permanent technical committee for Occupational Health and Safety 72 has studied the Jordanian Standard 2259:2019 related to "Emergency Lighting" and the prepared project 2259:2026 related to "Occupational Health and Safety – Lighting applications – Emergency lighting", and has recommended to approve the amended project as a Jordanian Standard 2259:2026, according to article (12) of Standards and Metrology Law No. 22 for the year 2000 and its amendments.

This Jordanian Standard 2259:2026 is a modified adoption of European standard 1838:2024 "Lighting applications – Emergency lighting for building" using reprint method, single vertical bars (|) in the margins are used to indicate the applicable technical modifications of the European standard which have been changed and single vertical dotted bars (·) in the margins are used to indicate the applicable editorial modifications of the European standard which have been changed. Each variation is cross-referenced to the clause of the European standard together with reasons for these deviations in annex (NA, NB).

The standards referenced in the normative references within EN 1838:2024 and the corresponding Jordanian standards (if any) can be accessed or purchased through the Standardization Department/Inquiry Point at the Jordan Standards and Metrology Organization (JSMO).

* under amendment.

هذه الوثيقة هي مشروع تم تولى إعدادها من قبل اللجنة الوطنية للمواصفات والمقاييس الأردنية وبالتعاون مع اللجنة الفنية 72 للصحة والسلامة المهنية والبيئية، والتي تم تشكيلها من قبل مجلس الإدارة.

Introduction

Emergency lighting for buildings is provided for use when the supply to the normal lighting fails and is therefore powered from a source independent of that supplying the normal lighting. It may provide lighting for both safety and operational tasks.

For the purposes of this document emergency lighting is regarded as a generic term of which there are a number of specific forms, as shown in Table 1.

Table 1 – Specific forms of emergency lighting

Emergency lighting see clause Clauses 4, 5, 6 and 7				
Emergency escape lighting , see clause Clause 4 and 5			Local area lighting see clause clause 7-1	Standby lighting see clause clause 7-2
Escape route lighting see clause clause 5-1	Open area (anti-panic) lighting see clause clause 5-2	High-risk task area lighting see clause clause 5-3		
Safety signs including adaptive safety signs see clause Clause 6				

Emergency lighting can be provided by maintained luminaires and maintained safety signs when the normal lighting is available. Maintained luminaires and maintained exit and safety signs shall operate when the normal lighting is required but fails. (Refer to EN 50172 for further details on normal lighting failures.)

Adaptive emergency escape lighting (AEEL) is a technique that can be used as a supplement to emergency escape lighting and, when applied to escape routes in addition to emergency escape lighting, can enhance their effectiveness in an emergency. These techniques are included in CEN/TS 17951.

Occupational Health and Safety – Lighting applications – Emergency lighting

1- Scope

This Jordanian standard specifies the luminous requirements for emergency lighting systems, including adaptive emergency escape lighting systems, electric emergency lighting, installed in premises or locations where such systems are required or needed and which are principally applicable to locations where the public or workers have access.

2- Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

- ISO 3864-1, Graphical symbols – Safety colours and safety signs, part 1: Design principles for safety signs and safety markings
- ISO 3864-3, Graphical symbols – Safety colours and safety signs, part 3: Design principles for graphical symbols for use in safety signs
- ISO 3864-4, Graphical symbols – Safety colours and safety signs, part 4: Colorimetric and photometric properties of safety sign materials
- ISO/CIE TS 22012: Light and lighting – Maintenance factor determination – Way of working.
- EN ISO 7010, Graphical symbols – Safety colours and safety signs – Registered safety signs (ISO 7010)
- EN 12665:2024, Light and lighting – Basic terms and criteria for specifying lighting requirements.
- EN 50172:2024, Emergency escape lighting systems
- EN IEC 60598-1, Luminaires, part 1: General requirements and tests (IEC 60598-1)
- EN 60598-2-22, Luminaires, part 2-22: Particular requirements – Luminaires for emergency lighting.

3- Terms and definitions

For the purposes of this document, the terms and definitions given in EN 12665:2024 and the following apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <http://www.iso.org/obp>

3-1

emergency lighting

lighting provided for use when the power supply to the normal electric lighting fails

[SOURCE: EN 12665:2024, clause 3-5-6]

3-2

place of safety

designated place normally outside the building where escaping people can assemble safely and are not at risk of the emergency status

[SOURCE: EN 12665:2024, clause 3-5-100]

3-3

escape route

designated route, used to evacuate in case of an emergency, to a place of safety

[SOURCE: EN 12665:2024, clause 3-5-43]

3-13

internally illuminated safety sign

safety sign that is illuminated, when it is required, by an internal light source

[SOURCE: EN 12665:2024, clause 3-5-54]

3-14

externally illuminated safety sign

safety sign that is illuminated, when it is required, by an external emergency luminaire

[SOURCE: EN 12665:2024, clause 3-5-48]

3-15

emergency exit

way out marked with a safety sign that is intended to be used during an emergency leading to a defined place of safety

[SOURCE: EN 12665:2024, clause 3-5-37]

3-16

final emergency exit

termination of an escape route from a building or premises giving direct access to a street, passageway, walkway or open space, and sited to ensure the rapid dispersal of persons from the vicinity of a building or premises

3-17

adaptive emergency escape lighting system**AEELS**

electrically operated escape lighting system which provides directional guidance and adequate illuminance by means of a set of emergency lighting luminaires and directional indication that can manually or automatically change the escape route direction and improve the conspicuity of the emergency signage and optionally adapt the lighting level on escape routes

[SOURCE: EN 12665:2024, clause 3-5-103]

3-18

adaptive safety sign

internally illuminated escape route safety sign that interacts together with luminaires to change the information it displays to indicate an alternative escape route or to indicate that the route is closed or not available for use

[SOURCE: EN 12665:2024, clause 3-5-104]

3-19

system duration

<of an emergency lighting system> minimum period of time for which the luminous requirements of the emergency lighting system are met

Note 1: A system can consist of a single luminaire.

3-20

activation time

<of an emergency escape lighting system> time between failure of the supply to the normal lighting and emergency lighting reaching the required level of illuminance

3-21

identifiability

property of a graphical symbol which enables its elements to be perceived as the objects or shapes depicted

[SOURCE: ISO 9186-2:2008, clause 3-1]

3-22

maintenance factor

MF

DEPRECATED: light loss factor

DEPRECATED: depreciation factor

f_m

<of a lighting installation> quotient of illuminance produced by the lighting installation after a certain time interval and the illuminance produced by the installation when new

Note 1: The English term "light loss factor" and the French term "facteur de perte de lumière" are no longer used.

Note 2: The English term "depreciation factor" and the French term "facteur de dépréciation" were formerly used to designate the reciprocal of the above quotient.

Note 3: The maintenance factor takes into account light losses caused by dirt accumulation on luminaires and room surfaces (in interiors) or other relevant surfaces (in exteriors, where appropriate), and the decrease in the luminous flux of lamps.

Note 4: The maintenance factor has unit one.

[SOURCE: EN 12665:2024, clause 3-5-18]

4- Emergency lighting

4-1 General

To ensure that emergency escape lighting operates when it is required, it shall be installed, tested and maintained in accordance with EN 50172 and if automatic test facilities are installed, they shall be in accordance with EN 62034.

The requirements given in this document shall be maintained for the full rated duration to the end of the design life of the emergency lighting system.

The emergency escape lighting design shall be based on worst conditions (e.g. minimum light output, maximum glare limits and including an appropriate maintenance factor) of the luminaires during operating life and shall be based only on direct light from luminaires. Lighting calculations shall be based on the rated emergency intensity data related to the practical emergency light source flux according to EN 60598-2-22.

The contributions by room surface inter-reflections shall not be considered except, in lighting systems such as indirect luminaires or up-lights (used as an emergency luminaire in maintained mode) where the luminaire works in conjunction with a reflecting surface. When using indirect lighting for emergency escape lighting the following three points shall be taken into account.

- The first reflection may be included in the calculation of the emergency escape lighting.
- The reflective surface shall be considered in the maintenance of the emergency escape lighting as if it was part of the emergency light.
- The distance between the light source and the reflecting surface shall not be obstructed by any object.

Luminaires should be mounted at least 2 m above the floor level unless a mounting height of luminaires for lighting of 2 m is not suitable for special reasons (e.g. in outdoor areas, assembly points, places of safety, stairways, historic buildings etc.), provided that they are sufficiently protected from possible damage and that the luminous requirements of this standard are met.

Emergency luminaires shall provide the required illuminance levels, and safety signs shall achieve the required luminance values. A maintenance factor shall be applied, determined according to ISO/CIE TS 22012 and EN 12665.

To provide visibility for evacuation purposes lighting is required in the volume of the space of the escape routes. Signs that are provided at all exits intended to be used in an emergency and along escape routes shall be externally or internally illuminated to indicate unambiguously the escape route to a place of safety. Sign requirements are detailed in Clause 6.

هذا الوثيقة مقبولة للتصديق من قبل المجلس الإماراتي للمواصفات والمقاييس

Where direct sight of an emergency exit is not possible, an externally or internally illuminated directional sign (or series of signs) shall be provided to assist progression towards the emergency exit. An emergency luminaire shall comply with EN 60598-2-22 and shall be sited in such a way that it provides appropriate illuminance in particular near each emergency exit and at positions where it is necessary to emphasize potential danger or safety equipment. The positions to be emphasized shall include those given in clause 4-2.

If the premises operator needs to be able to redirect occupants away from specific emergency escape routes an adaptive emergency escape lighting system (AEELS) in compliance with CEN/TS 17991 should be used.

Table 2 gives an overview of requirements for the specific forms of emergency lighting. Requirements for specific forms are given in the subclauses shown in the table.

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Table 2 — Overview of requirements for the specific forms of emergency lighting

Application	Emergency lighting				
	Emergency escape lighting			Local area lighting Uses the emergency escape system during failures of the normal supply ^{a)}	Standby lighting Does not provide emergency escape lighting
	Escape route lighting,	Open area (anti-panic) lighting,	High-risk task area lighting,		
JS 2259 subclause	5-1	5-2	5-3	7-1	7-2
Minimum illuminance level	1 lx (see clause 5-1-1)	0,5 lx (in empty core area)	10 % of normal lighting at the hazard with a minimum of 5 lx	Minimum light level based on a risk assessment but not less than for escape routes	As required for the task
Maximum activation time	see clause 5-1-6 ^{a)}	see clause 5-2-6 ^{b)}	0,5 s, see clause 5-3-7	see clause 7-1	
Minimum rated duration	1 h ^{b)}		As required to complete the task	1 h ^{b)}	According to the visual task
Points of emphasis	Specific hazard points and safety equipment have particular requirements – see clause 4-2				
Luminaire	Emergency luminaire in accordance with EN 60598-2-22.				Applicable subpart of EN 60598-2
Safety signs	Exit signs may either be internally illuminated and compliant with EN 60598-2-22 or they may be externally illuminated by an external luminaire for emergency lighting according to EN 60598-2-22, so that a minimum of 5 lx vertical illuminance shall be provided at the sign under all conditions, see clause 6-3.				

^{a)} Developments in the light sources such as Light Emitting Diodes can now provide faster activation time. Their use is recommended as they provide safety advantages by reducing the time between mains supply failure and provision of the emergency escape lighting in most luminaires.

^{b)} For minimum rated durations as defined in Annex A, by the risk assessment or national requirements.

^{c)} If emergency escape lighting is required it shall be in accordance with the columns under 'escape lighting' see clause 5-1.

^{d)} Risk assessment is done accordingly to national requirements.

4-2 Points of emphasis

The following points of emphasis shall be illuminated and any appropriate signage should be provided:

- a) near each emergency exit;
- b) near stairs so that each flight of stairs receives direct light;
- c) near any other change in level;
- d) at change of direction if the direction of the escape route is unclear;
- e) at intersections of corridors;
- f) outside the building near each final emergency exit and to a place of safety;
- g) near each first aid post so that at least 5 lx vertical illuminance shall be provided at the first aid box;
- h) near each piece of firefighting equipment and call point so that at least 5 lx vertical illuminance shall be provided at the fire alarm call points, firefighting equipment, panel, also escape route and rescue plans as defined in ISO 23601;
- i) near safety equipment provided for people with disabilities so at least 5 lx vertical illuminance shall be provided at the safety equipment;
- j) near the point where an alarm call is received from a passenger lift car and the associated lift escape winding facilities;
- k) corridors from all passenger lift doors to the nearest escape route;
- l) near manual release controls to release electronically locked doors so that at least 5 lx vertical illuminance shall be provided.

Note: For the purpose of this clause 'near' is considered to be within 2 m measured horizontally.

4-3 Influence of Smoke

Generally, smoke accumulates at the ceiling where it can obscure high mounted safety signs. Therefore, when smoke is of prime consideration, the following considerations apply:

- near floor components of a safety way guidance system (according to ISO 16069) shall be added;
- the luminance of any area of the safety colour (according to ISO 3864-1) of exit signs and direction arrows shall be at least 10 cd/m²;
- the luminaires shall be mounted at least 0.5 m below the ceiling to avoid absorbance by smoke. Conspicuity and colour shall be taken in consideration to eliminate luminance overload;
- externally illuminated signs shall not be used.

5- Emergency escape lighting

5-1 Escape route lighting

5-1-1 The objective of escape route lighting is to provide appropriate visual conditions on escape routes. The horizontal illuminance on the escape route floor level shall not be less than 1 lx. For escape routes wider than 2 m, borders of 0.5 m of the perimeter of the escape route area are excluded. For escape routes of 2 m and narrower, borders of 1/4 of the escape route width are excluded.

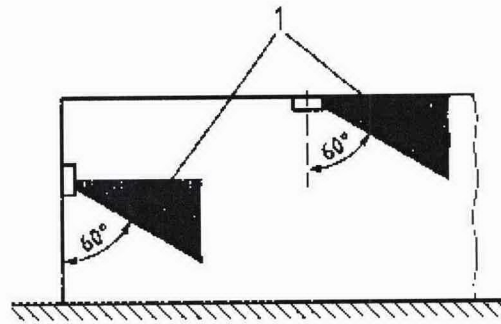
5-1-2 The diversity U_d (ratio of the minimum to the maximum illuminance in accordance with EN 12665) shall not be less than 1:40.

5-1-3 Disability glare shall be kept low by limiting the luminous intensity of the luminaires within the field of view.

Note 1: Specific requirements for disability glare limits from LED luminaires are under consideration.

For horizontal escape routes, the luminous intensity of the luminaires shall not exceed the values in Table 3 within the zone 60° to 90° from the downward vertical at all angles of azimuth (see clause Figure 1).

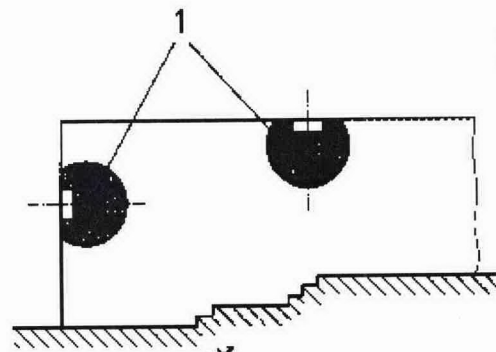
For all other escape routes and areas, the limiting values shall not be exceeded at all angles (see clause Figure 2).



Key

1: Area where the maximum luminous intensity shall not exceed the values of Table 3.

Figure 1 — Horizontal level escape routes



Key

1: Area where the maximum luminous intensity shall not exceed the values of Table 3.

Figure 2 — Other escape routes and areas

Note 2: High contrast between a luminaire and its background can produce glare. In escape route lighting the main problem will be disability glare, in which the brightness of the luminaires can dazzle and prevent obstructions or signs being seen (see clause 5.2.2).

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Table 3 – Disability glare limits

Mounting height above floor level h (m)	Escape route and open area (anti-panic) lighting maximum luminous intensity I_{max} (cd)	Local area lighting and high-risk task area lighting maximum luminous intensity I_{max} (cd)
$h < 2,5$	500	1 000
$2,5 \leq h < 3,0$	900	1 800
$3,0 \leq h < 3,5$	1 600	3 200
$3,5 \leq h < 4,0$	2 500	5 000
$4,0 \leq h < 4,5$	3 500	7 000
$h > 4,5$	5 000	10 000

5-1-4 In order to identify safety colours the minimum value for the colour rendering index R_a from a light source shall be 40. The luminaire shall not substantially subtract from this.

5-1-5 The minimum duration of the illumination of the emergency escape lighting allowed for escape purposes shall be 1 h.

5-1-6 After failure of the normal mains lighting the emergency escape route lighting shall reach 50 % of the required illuminance within an activation time of 5 s and full required illuminance within 60 s.

5-1-7 Because of the effect of aging of light sources and batteries, and the effects of pollution, periodic maintenance and measurements shall be carried out to ensure the system remains compliant with clauses 5-1-1 and 5-1-2. Maintenance and measurement shall be in accordance with EN 50172. Recommendation for on-site luminance and illuminance measurements are provided in Annex B.

5-1-8 The illumination by the emergency escape lighting system of any area of the escape route shall be from two or more luminaires so that the failure of one luminaire does not suddenly make the route completely dark or render the directional finding effect of the system ineffective. A multi-purpose luminaire that provides directional finding and escape route lighting may be used.

For areas with a floor area not greater than 8 m², if a single luminaire provides the required illumination, then an internally illuminated exit sign can meet the system integrity requirements of clause 5-1-8 for a second luminaire. The requirements for points of emphasis in clause 4-2 shall be provided.

5-1-9 When emergency escape lighting is required in a room, but the room does not have direct access to an escape route, the route from the room to the escape route shall be provided with emergency escape lighting that meets the requirements of clause 5-1.

5-1-10 Additional considerations for smoke conditions are given in clause 4-3.

5-2 Open area (anti-panic) lighting

5-2-1 The objective of open area (anti-panic) lighting is to enable safe exit for occupants by providing appropriate visual conditions and direction to escape routes and to ensure that firefighting and safety equipment can be readily located and used.

Open areas should be risk assessed to determine if they require open area lighting. Factors which require open area lighting to be provided include but are not limited to:

- if the area is larger than 60 m²;

– if the area is subject to risks such as large number of occupants, tripping hazards, etc.

Where open area lighting is to be provided, the horizontal illuminance shall be not less than 0,5 lx at the floor level of the empty core area which excludes a border of 0,5 m of the perimeter of the area.

Where an escape route passes through an open area, but is not clearly defined, emergency escape lighting shall be provided on the shortest obvious route through this area. The horizontal illuminance shall be not less than 1 lx at the floor level of this shortest route with a minimum width of 2 m excluding a border of 0,5 m at the start and end of this route inside the open area.

If permanently installed architectural room dividers are present the emergency lighting shall meet the requirements both in open and closed positions.

5-2-2 The diversity U_d (ratio of the minimum to the maximum illuminance in accordance with EN 12665) shall not be less than 1:40.

5-2-3 Disability glare shall be kept low by limiting the luminous intensity of the luminaires within the field of view. These shall not exceed the values in Table 3 within the zone 60° to 90° from the downward vertical at all angles of azimuth (see clause Figure 1 and Figure 2).

Note: Specific requirements for disability glare limits from LED luminaires are under consideration.

5-2-4 In order to identify safety colours the minimum value for the colour rendering index R_a from a light source shall be 40. The luminaire shall not substantially subtract from this.

5-2-5 The minimum duration allowed for escape purposes shall be 1 h.

5-2-6 After failure of the normal mains lighting the open area lighting shall reach 50 % of the required illuminance within an activation time of 5 s and full required illuminance within 60 s.

5-2-7 Because of the effect of aging of light sources and batteries, and the effects of pollution, periodic maintenance and measurements shall be carried out to ensure the system remains compliant with clauses 5-2-1 and 5-2-2. Maintenance and measurement shall be in accordance with EN 50172. Recommendation for on-site luminance and illuminance measurements are provided in Annex B.

5-2-8 Additional considerations for smoke conditions are given in clause 4-3.

5-3 High-risk task area lighting

5-3-1 The objective of high-risk task area lighting is to ensure the safety of people involved in a potentially dangerous process or situation and to enable proper shut down procedures for the safety of other occupants of the premises.

5-3-2 In areas of high risk the maintained illuminance on the task area plane shall be not less than 10 % of the required maintained illuminance for that task and shall be not less than 15 lx. It shall be free of harmful stroboscopic effects, for example if illuminating rotating machinery.

5-3-3 The diversity U_d (ratio of the minimum to the maximum illuminance of the high-risk task area safety lighting in accordance with EN 12665) shall not be less than 1:10.

5-3-4 Disability glare shall be kept low by limiting luminous intensity of the luminaires within the field of view. These shall not exceed the values in Table 3 within the zone 60° to 90° from the downward vertical at all angles of azimuth.

5-3-5 In order to identify safety colours, the minimum value for the colour rendering index R_a from a light source shall be 40. The luminaire shall not substantially subtract from this.

5-3-6 The minimum duration shall be the period for which the risk exists to people. This should be identified by the employer.

5-3-7 High-risk task area lighting shall provide the full required illuminance permanently or within an activation time of 0,5 s, depending on application.

5-3-8 Because of the effect of aging of light sources and batteries, and the effects of pollution, periodic maintenance and measurements shall be carried out to ensure the system remains compliant with clauses 5-3-2 and 5-3-3. Maintenance and measurement shall be in accordance with EN 50172. Recommendation for on-site luminance and illuminance measurements are provided in Annex B.

5-4 Requirements for specific areas

5-4-1 Toilets and changing rooms

Toilet facilities and changing rooms exceeding 8 m² gross floor area, shall be provided with open area (anti-panic) lighting.

Toilet lobbies shall be provided with emergency escape lighting to the levels required for escape routes. In accessible toilets, shower cubicles within toilet facilities or changing rooms and single occupancy toilets with baby changing facilities a minimum horizontal illuminance of 1 lx on the floor shall be provided from one or more luminaires. For single occupancy toilets with baby changing facilities, however, a minimum horizontal illuminance of 1 lx is required on the changing table. For illuminated toilet alarms a minimum of 5 lx vertical illuminance is required, (see clause 4-2-1).

For toilet lobbies less than 8 m² floor area, light from an internally illuminated emergency exit sign may contribute to meeting the system integrity requirements (see clause 3-1-8).

Note: This clause does not necessitate the provision of emergency escape lighting in a single occupancy toilet for use by an able-bodied person.

5-4-2 Public indoor swimming pools

For increased safety in swimming pools, it is recommended to increase the emergency lighting level to 5 lx horizontal illuminance on the water surface and at floor level on circulation routes of the pool surrounds and the access routes to diving boards or ladders.

Note: Higher illuminance levels during the first period after power failure on the water are required in EN 12193:2018, clause 6-7.

5-4-3 Motor generator, control, switch and plant rooms

Emergency escape lighting shall be provided in all motor generator rooms, control rooms, switch rooms, plant rooms and adjacent to main control equipment associated with the provision of normal and emergency escape lighting to the building. The horizontal illuminance shall be not less than 0,5 lx on the floor. The illuminance on main control equipment and switchboards associated with the provision of normal and emergency escape lighting to the building shall not be less than 5 lx in the plane of the visual task.

6- Safety signs

6-1 General

A safety sign giving the location of an emergency exit or of an escape route shall be in view at all points along the escape route placed such that a person moving towards it will be directed towards an emergency exit.

In buildings or areas with occupants who are not familiar with the location, escape route safety signs shall be operated in maintained mode.

All safety signs and supplementary arrow signs required during emergency evacuation shall meet the requirements of ISO 3864-4 (photometric) and EN ISO 7010 (design).

All signs within the scope of this document and escape plans require illumination (internal or external) to ensure they are conspicuous and identifiable.

Note: Escape plans are described in ISO 23601.

Under both emergency lighting conditions and under mains healthy conditions, the sign shall be sufficiently externally or internally illuminated under all conditions, and the safety colour green stays green and the contrast colour white stays white within the colour boundaries specified in ISO 3864-4. Adaptive safety signs in compliance with CEN/TS 17951 may be used.

6-2 Conformity

Emergency escape route safety signs shall meet the requirements specified in ISO 3864-1 and ISO 3864-4 under all conditions (e.g. when normal power is operational and when normal power has failed or is absent).

Design principles and colorimetric properties of escape route safety signs shall be in accordance with ISO 3864-1, ISO 3864-3, ISO 3864-4 (photometric).

6-3 Illumination

6-3-1 Safety signs may either be internally illuminated in accordance with EN 60598-2:23 or externally illuminated by a luminaire for emergency lighting in accordance with EN 60598-2-22.

6-3-2 In emergency mode, an internally illuminated safety sign shall provide a luminance of at least 2cd/m² and an externally illuminated safety sign shall be illuminated by a vertical illuminance of at least 5 lx.

6-3-3 For illuminated escape route safety signs the ratio of the maximum to the minimum luminance within either white or the safety colour shall not be greater than 10:1. High variation of adjacent points should be avoided.

6-3-4 For illuminated escape route safety signs the ratio of the luminance contrast colour to the luminance safety colour shall not be less than 5:1 and not greater than 15:1.

6-3-5 The safety colour and contrast colour shall conform to the requirements of ISO 3864-1 and ISO 3864-4.

6-3-6 The minimum duration of illumination of the escape route safety signs shall be 1 h.

6-3-7 All escape route safety signs shall be externally or internally illuminated to at least 50 % of the required luminance within 5 s and full required luminance within 60 s.

6-3-8 Because of the effect of aging of light sources and batteries, and the effects of pollution, periodic measurements in accordance with EN 50172:2024, clause 7-4 shall be carried out to ensure the system remains compliant with clause 6-3-2.

6-3-9 To aid visibility under high ambient lighting conditions when normal power is operational, increased illumination of the escape route safety signs should be considered.

6-4 Viewing distance and mounting height

As an internally illuminated sign is identifiable at greater distance than an externally illuminated sign of the same size the maximum viewing distance (see clause Figure 3) shall be determined by use of the following formula:

$$l = z \times h \tag{6-1}$$

where:

l is the distance of observation;

h is the height of the sign ¹⁾

z is the factor of distance (*z* is a constant: 100 for externally illuminated signs; 200 for internally illuminated signs).

The dimensional units of *h* and *l* shall be the same.

¹⁾ Refers to the dimensions of the sign and not to its mounting height above the floor.

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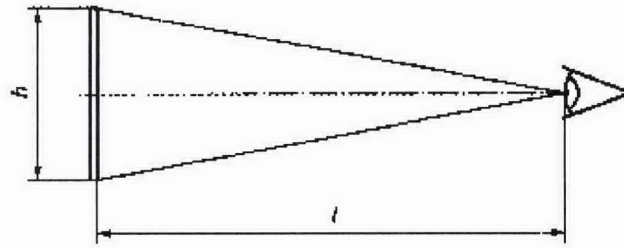
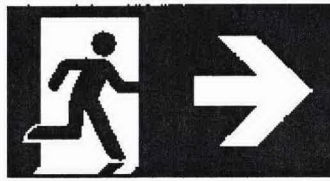


Figure 3 — Maximum viewing distance

Where practicable, escape route safety signs should be positioned between 2 m and 3 m above floor level, measured to the base of the sign.

For unambiguous identifiability of a sign in large, high open areas, it can be appropriate for the sign to be mounted above surrounding obstructions. In such a case, the sign should not be mounted higher than 20° above the horizontal eye height at 1,5 m when observed from the maximum viewing distance.

Note: Where additional emergency exit signs are applicable for walking impaired people those signs could be mounted at a viewing height below 2 m.

7- Local area lighting and standby lighting

7-1 Local area lighting

7-1-1 The objective of local area lighting is to ensure the safety of people allowed to stay temporarily in a premise. Evacuation may be ordered if main supply is not restored in due time considering the declared duration of the safety lighting. See clause also Annex C.

Note: In some cases, this is the safer option as it might be impractical and perhaps dangerous to evacuate, for example, care home residents out of the building and onto the street for an unknown period of time.

7-1-2 The maintained illuminance shall be based on risk assessment but shall be at least as required for emergency escape lighting as given in clauses 5-1 or 5-2. The local area lighting may be part of the emergency escape lighting.

7-1-3 The minimum duration shall be not less than the declared duration of the associated emergency escape lighting.

7-1-4 The escape route lighting from the area of safety to the final emergency exit shall have a duration equal to or greater than the local area lighting.

7-1-5 After failure of the normal mains lighting the local area lighting shall reach 50 % of the required illuminance within an activation time of 5 s and full required illuminance within 60 s.

7-1-6 Because of the effect of aging of light sources and batteries, and the effects of pollution, periodic maintenance and measurements shall be carried out to ensure the system remains compliant with clause 7-1-2. Maintenance and measurement shall be in accordance with EN 50172. Recommendation for on-site luminance and illuminance measurements are provided in Annex B.

7-2 Standby lighting

Standby lighting is a lighting system to provide sufficient illumination for normal activities to be conducted in the event of a failure of the normal lighting supply.

Standby lighting does not provide a substitute for emergency escape lighting. Its luminaires shall meet the requirements of EN IEC 60598-1 and the relevant parts of EN 60598-2.

In buildings or areas with emergency escape lighting, standby lighting may be used if the effectiveness of emergency escape lighting is ensured for the complete rated duration of standby lighting. The safe exit from a location shall be allowed in the event of failure of the standby lighting and until the end of the rated duration of the emergency escape lighting.

Recommendations for illuminance measurements are provided in Annex B.

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Annex A
(Informative)
System durations and activation times

A-1 System durations

In designing an emergency escape lighting system for a building, based on a risk assessment it may be appropriate to select a system duration for the system that is greater than 1 h.

Note 1: According to this document a minimum system duration of 1 h is required for all emergency escape lighting installations.

A risk assessment should be carried out to determine a system duration that is appropriate to the building type. The following factors should be considered during the design process and risk assessment:

- Is sleeping accommodation provided
- Do the intended occupants have any impairments
- Will the building be used by people who will be unfamiliar with the layout
- Is the layout of the building complex
- Will the building employ a delayed or staged evacuation strategy
- Will the occupants remain in the building during a failure of the supply system
- Will the occupants remain in the building during an emergency
- Will the emergency escape lighting be used to assist emergency services in search and rescue operations
- Is rest mode and inhibition mode of emergency luminaires according to EN 60598-2-22 applied

Note 2: This list is non-exhaustive.

System duration should meet the minimum recommendations as given in Table A-1 if no national legislation applies.

A-2 Activation times

An activation time below 2 s is recommended for escape route lighting and open area (anti-panic) lighting, as this further reduces the risk of panic to occupants by providing the required levels of illumination within a faster period, for example at stairs.

Note 1: With the development of new technology, corresponding products are broadly available.

Note 2: This document specifies the following maximum system activation times:

- Escape route lighting and open area (anti-panic) lighting shall reach 50 % of the required illuminance within 5 s and full required illuminance within 60 s.
- High risk task areas: lighting shall provide full required illuminance permanently or within 0,5 s depending upon application.

Annex B
(informative)
On-site luminance and illuminance measurements

B-1 Introduction

This annex has been prepared by Technical Committee CLC/TC 34 "Lighting" together with CEN/TC 169 "Light and Lighting". The responsibility for the contents and possible future revisions lies within CEN/TC 169 and not within CLC.

B-2 General

Compliance of emergency escape lighting systems with the photometric requirements of JS 2259 should be complemented by on-site measurements. This annex provides guidance for the corresponding initial and five-year verification.

The assumptions made for the light calculations usually only roughly meet the real lighting conditions after installation. Therefore, there can be discrepancies between the design results and the actual situation: for instance, in typical calculations reflections which can be present are not considered. Also, design quantities such as the maintenance factor describe average characteristics rather than the individual characteristics of a set of installed luminaires.

Any measurement relates to a practical situation at a certain time and is dependent on several parameters (actual luminous flux and intensity distribution of the luminaires, real spatial position, applied voltage and temperature at the moment of measurement, wall reflections and stray light, charging status of the battery etc). Therefore, meaningful measurement results can only be obtained, if those parameters are carefully considered.

With the very large number of spatial positions that would need to be screened, a complete assessment of an emergency escape lighting system by measurement see clauses overly demanding with respect to time consumption and efforts.

This is why light calculations may be used to reduce the number of measurements points. However, this is only possible, if a correlation between measurements and calculations can be established.

B-3 Illuminance and luminance meters

The quality of the illuminance and luminance meters should be according to Class 2* or better, in accordance with CIE 231:2019, clause A-1.

Note 1: The following characteristics are part of the CIE 231:2019, Class 2* specifications:

- The spectral responsivity should closely match to the CIE spectral luminous efficiency function for photopic vision, $V(\lambda)$. The photometer should have a general $V(\lambda)$ mismatch characteristic value $f_1 \leq 6\%$.
- The illuminance photometer head should have a cosine corrected entrance optic. The cosine response of the photometer determines the accuracy of the measurement results for light that arrives at angles other than the normal to the photometer head. The photometer should have a cosine characteristic value $f_2 \leq 6\%$.

Note 2: DIN 5032-7:2017, Class B is considered equivalent to CIE 231:2019, Class 2*.

The photometer responsivity can be affected by changes in ambient temperature. A temperature-controlled detector or temperature correction may be appropriate to reduce the measurement uncertainty.

The resolution should be at least 0,01 lx for the illuminance meter and 0,1 cd/m² for the luminance meter.

The photometer should be calibrated with reference standards traceable to the international system of units (SI).

B-4 Measurement of emergency lighting illuminance levels

B-4-1 General considerations

When measuring emergency lighting illuminance levels on site, stray light should be reduced as much as possible, as emergency lighting illuminance levels are very low and therefore even weak light sources present inside or outside the area to be measured interfere significantly with the measurement.

Note 1: In many cases, measurements at night-time minimize stray light effects.

Measurements should be performed in spaces that are unoccupied by normal users.

There are four measurement methods available (see clause Figure B-1):

Method A should be applied, if both the levels of emergency lighting and stray light are constant. Method A is described in clause B-4-2.

Example 1: (for method A) Emergency luminaires with LED light sources operated at constant current in a room without windows.

Method B should be applied if the level of emergency lighting varies over the system duration, but the level of stray light is constant. Method B is described in clause B-4-3.

Example 2: (for method B) Emergency luminaires with fluorescent lamps typically show a significant decrease in light output over the system duration of emergency operation.

Method C should be applied if the emergency lighting levels are constant, but stray light levels vary. Method C is described in clause B-4-4.

Example 3: (for method C) Stray light variation can result from switching or dimming of the public lighting or lighting in a building in the neighbourhood, full moon and passing clouds etc. and is most prominent when measuring at daytime.

Method D should be applied if both the emergency lighting and the stray light levels vary. Method D is described in clause B-4-5.

Note 2: Method D is essentially a combination of method B and method C.

The correction methods should not be applied, if stray light levels are above 10 lx. In this case, it is recommended to reduce the stray light level by appropriate correction actions.

Low levels of stray light may be neglected as described under clause B-4-2.

For an overview of the different measurement correction methods, see clause Figure B-1.

B-4-2 Method A

The following steps should be performed:

- The measuring points should be marked.
- The general lighting and the emergency lighting should be switched off. The stray light illuminance $E_{OFF}(i)$ at each measuring point i should be measured.
- The emergency lighting should be switched on. The total illuminance $E_{ON}(i)$ at each measuring point i should be measured.
- The emergency lighting illuminance $E_{EL}(i)$ for each measuring point i should be calculated as follows:

$$E_{EL}(i) = E_{ON}(i) - E_{OFF}(i) \dots\dots\dots (B-1)$$

If the measured stray light illuminance E_{OFF} is less than 5 % of the emergency lighting illuminance E_{EL} , the stray light influence may be neglected; a correction is not required.

B-4-3 Method B

For this method, two photometers are needed: One for the actual measurements of the measuring points and one for monitoring of the temporal changes of the light output of the emergency luminaires. In this context, it is assumed that these are essentially the same for all luminaires. This is the case if most of the emergency luminaires within the area to be measured use the same lighting technology (e.g. power controlled light sources, centrally supplied emergency luminaires).

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The (emergency lighting) monitor photometer should be placed at an appropriate place where stray light is least contributing.

The following steps should be performed:

- The measuring points should be marked.
- The general lighting and the emergency lighting should be switched off. The stray light illuminance $E_{OFF}(i)$ at each measuring point i should be measured.
- The emergency lighting should be switched on. The total illuminance $E_{ON}(i)$ at each measuring point i in parallel with the (emergency lighting) monitor illuminance $E_{ONmon,i}$ should be measured.
- At the end of the system duration of the emergency escape lighting system the end value of the (emergency lighting) monitor illuminance $E_{ONmon,end}$ should be recorded.
- The emergency lighting illuminance $E_{EL}(i)$ for each measuring point i should be calculated as follows:

$$E_{EL}(i) = E_{ON}(i) \times \frac{E_{ONmon,end}}{E_{ONmon,i}} - E_{OFF}(i) \dots \dots \dots (B-2)$$

B-4-4 Method C

For this method, two photometers are needed: one for the actual measurements of the measuring points and one for monitoring the temporal changes of the stray light. The (stray light) monitor photometer should be placed at an appropriate place where the emergency lighting is least contributing.

It is assumed that the stray light levels at different measuring points are correlated. This means, that a change in time of the stray light level at any of the measuring points is assumed to induce a proportional change at any of the other measurement points.

The following steps should be performed:

- The measuring points should be marked.
- The general lighting and the emergency lighting should be switched off. The stray light illuminance $E_{OFF}(i)$ at each measuring point i and the corresponding (stray light) monitor illuminance $E_{OFFmon,i}$ should be measured in parallel.
- The emergency lighting is switched on and the emergency lighting illuminance $E_{ON}(i)$ at each measuring point i in parallel with the (stray light) monitor illuminance $E_{ONmon,i}$ should be measured.
- The emergency lighting illuminance $E_{EL}(i)$ for each measuring point i should be calculated as follows:

$$E_{EL}(i) = E_{ON}(i) - \frac{E_{OFF}(i)}{E_{OFFmon,i}} \times E_{ONmon,i} \dots \dots \dots (B-3)$$

B-4-5 Method D

If both stray light and the emergency light output temporally change during measurement, two monitor photometers should be used and the correction of both phenomena should be made.

The emergency lighting monitor photometer should be placed at an appropriate place where the stray light is least contributing, while the stray light monitor photometer should be placed at an appropriate place where emergency lighting is least contributing.

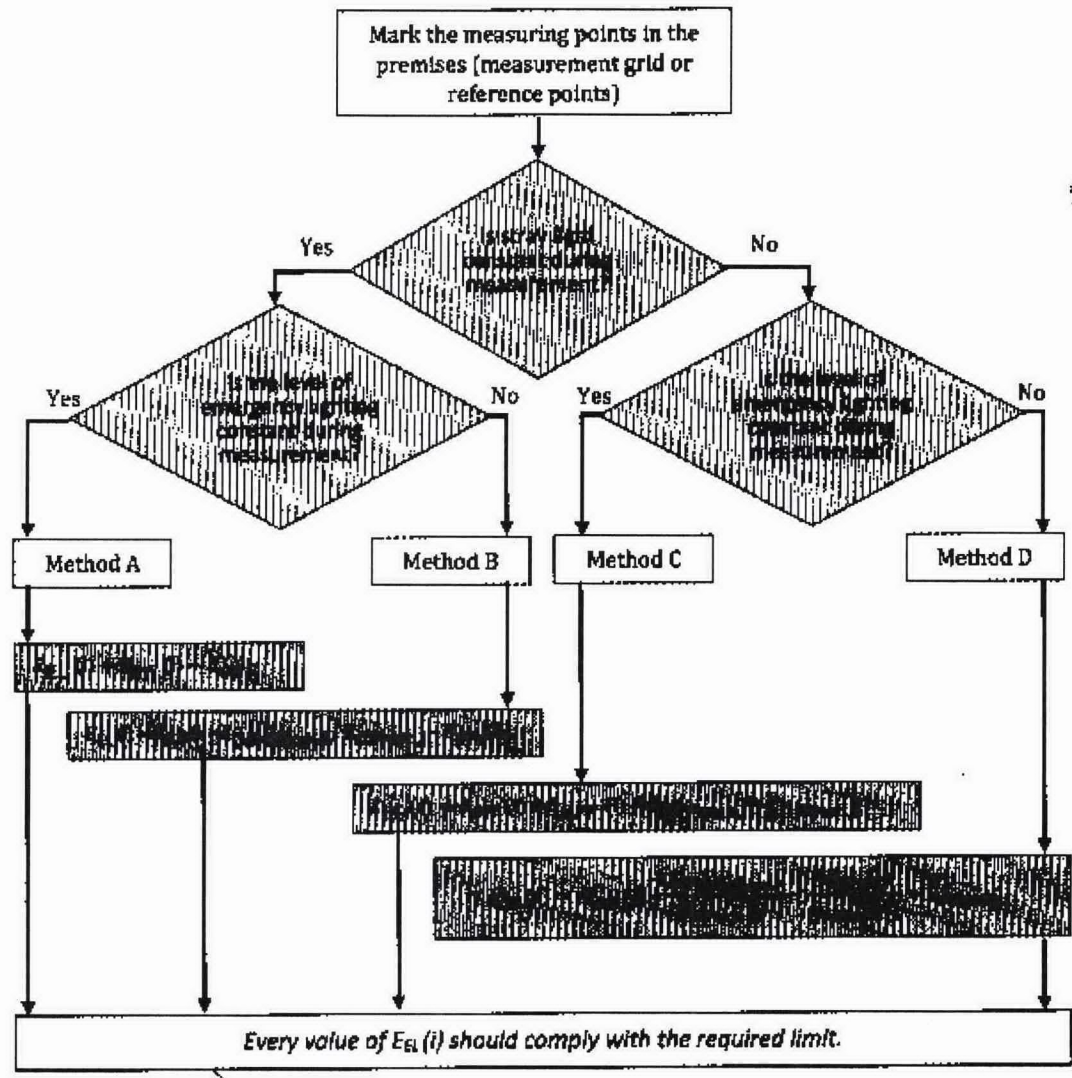
The following steps should be performed:

- The measuring points should be marked.
- The general lighting and the emergency lighting should be switched off. The stray light illuminance $E_{OFF}(i)$ at each measuring point i and the (stray light) monitor illuminance $E_{OFFmon1,i}$ should be measured in parallel.
- The emergency lighting is switched on and the emergency lighting illuminance $E_{ON}(i)$ is measured at each measuring point i in parallel with the (emergency lighting) monitor illuminance $E_{ONmon2,i}$ and the (stray light) monitor illuminance $E_{ONmon1,i}$.
- At the end of the system duration of the emergency escape lighting system the end value of the emergency lighting monitor illuminance $E_{ONmon2,end}$ should be measured.

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- The emergency lighting illuminance $E_{EL}(i)$ for each measurement point i should be calculated as follows:

$$E_{EL}(i) = E_{ON}(i) \times \frac{E_{ONmax,i,ind}}{E_{ONmon2,i}} - \frac{E_{OFF}(i)}{E_{OFFmon1,i}} \times E_{ONmon1,i} \dots \dots \dots (B-4)$$



هذه الوثيقة مملوكة لشركة

Figure B – 1 – Overview of measurement correction methods

B-5 Illuminance measurements on site

B-5-3 General

The following defined measuring grids should be respected. If measuring points of the measuring grid are omitted, the error on the maximum, minimum or average illuminance, and accordingly the uniformity, is increased.

Note: Leaving out every second measuring point in a system with a ratio of the minimum to the maximum illuminance of 0,5, the error can be doubled. With lower ratios, the error will further increase.

Similar zones within an emergency escape lighting system may be assessed by the measurement of only one such zone, in which case the criteria for defining zones as similar should be given.

الرقم الا بعد الاصلاح
بطلب الإجازة

B-5-3-2 Measurements

Escape routes should be measured at the centre line of the central band and its width as specified in JS 2259. Illuminance should be measured according to EN 12464-1 or at regular intervals that should be selected according to Table B-1.

Table B – 1 – Measuring grid for escape route lighting

Length of the escape route	Distance between measuring points
d (m)	(m)
< 10	0,5
10 to 20	1,0
20 to 30	1,5
30 to 40	2,0

Note: Values are rounded values from the measuring grid according to EN 12464-1:2021.

For stairs as part of the escape route, measurements should be performed at least at every second step. In order to avoid shadowing from the steps and to evaluate the visibility of the (front) edge of the steps (nosings), the horizontal illuminance should be measured at the (front) edge of the steps.

Note: Minimum illuminance requirements can vary for different elements and sections along the escape route. For details, see clause 5-1.

The illuminance should be measured at each grid point and comply with the required limits.

B-5-3-3 Uniformity

In every area measurements are carried out, the diversity between the maximum and the minimum illumination grid point along the centre line should be checked in compliance with JS 2259.

B-6 Safety signs

B-6-1 Internally illuminated safety signs

B-6-1-1 Initial verification

No measurement requirements.

Note: Initial minimal photometric requirements are covered by compliance with EN 60598-2-22, which is required according to EN 5072:2024, clause 5-2-2.

B-6-1-2 Five-year verification

For a selected number of each type of internally illuminated safety signs the luminance requirements according to JS 2259 should be measured at latest every five years. The selection should be based on visual inspection and include those that appear to be of the lowest light output.

B-6-2 Externally illuminated safety signs

B-6-2-1 Initial verification

Each externally illuminated safety sign should be measured under emergency lighting conditions to be sufficiently illuminated according to JS 2259.

Similar zones within an emergency escape lighting system may be assessed by the measurement of only one such zone in which case the criteria for defining zones as similar should be given.

Example: In an office building with identical floor layouts and an identical lighting installation (same type of luminaires, safety signs etc.) the measurement of one floor is typically considered sufficient.

B-6-2-2 Five-year verification

At latest every five years, if initial verification documentation is available, then it is sufficient to re-measure selected illuminance values for each type of externally illuminated safety sign. This should include a re-measurement of the lowest 10 % in each major space of the recorded illuminance values for each combination and geometry of luminaire and type of sign and at least two externally illuminated safety signs per combination and geometry.

Note: A type of each externally illuminated means all luminaires of the same design and age.

If initial verification documentation is not available, then clause B-6-2-1 should be applied.

B-7 Conformity assessment

Luminance and illuminance values should comply with the minimum requirements of JS 2259. Measurements should be reported in the logbook in compliance with EN 50172:2024, clause 7-2.

To ensure that the minimum photometric requirements are reliably achieved, measurement uncertainties and the measurement conditions should be taken into account.

Even with adequate precautions during measurements using a "class 2" meter, measurement uncertainties can hardly be reduced below 10 %. The photometer measurement results should be within the acceptance interval.

Example: If the required minimum illuminance is 1 lx and the measurement uncertainty is 10 %, then the acceptance value is 1,1 lx. This means that the measured value of a measuring point corrected according to clause B-4 and related to the end of the system duration would therefore need to be at least 1,1 lx.

Note 1: The quality of the results can significantly be influenced not only by the measuring device quality, but also the care taken during measurements (measuring position and orientation, care of the measuring staff etc.).

Minimum requirements according to JS 2259 refer to the end of the system duration. Measurements that are not carried out at the end of the system duration should be corrected to the final value in accordance with clause B-4.

Note 2: For tolerances on rated characteristics of luminaires see clause Annex D of EN 62722-1:2016.

Note 3: Lighting design values can substantially deviate from on-site measurement results: Design calculations are based on data sheet values (rated luminaire characteristics) and a number of assumptions (rated working conditions, wall reflections and maintenance factors). The deviations between these calculations and the practical installation and working conditions on site can lead to large discrepancies. For example, \bar{E} , E_{min} and E_{max} can only be determined if there are no deviations between planning and implementation and the complete measuring grid can be measured. Mostly this is not the case.

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Annex C
(informative)
Local area lighting

The evacuation procedures to be adopted by the building operator should be considered and risk assessed before an emergency evacuation is needed. There are a number of ways that the emergency lighting can be used to minimize risks if the duty holder decides to allow occupants to remain in the premises during a mains supply failure.

Typical system options are as follows.

a) By having a longer emergency system duration so that the emergency lighting operates while occupants wait for the return of power. If this is not likely, evacuation can be performed during the evacuation time of system battery duration.

Note: Because this relies on the full duration being available it is important that the system is regularly tested for full duration ideally by an automatic testing system.

b) In premises like care homes during the evacuation time of emergency system duration the occupants should be escorted to their rooms and arrangements made for fire wardens with handlamps (in accordance with EN 60598-2-22) to escort them to the final exit in the event of an emergency such as a fire.

c) An alternative to using fire wardens is to install an emergency lighting system with telecommand or inhibit circuits that can be used to enable a portion of the battery to be conserved for use in an emergency.

d) In some premises like shops and stores, the manager may decide to evacuate customers immediately while staff remain in the premises (typically in a staff room) with an extended emergency duration so they can reopen for business when the mains lighting is restored.

To design an appropriate system the emergency duration, light intensity, testing procedure and the areas of the building covered may need to be increased to compensate for the risk.

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(Informative)
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من قبل مجلس الإدارة

Annex NA
(Normative)
National technical modifications

Table NA-1 in this annex illustrates the technical deviations from European standard 1838:2024 "Lighting Application — Emergency Lighting".

Single vertical bars (|) in the margins are used to indicate the applicable technical modifications of the standard which are changed.

Technical deviations are cross-referenced to the clause of the European standard together with reasons for these deviations.

Table NA - 1 - List of national technical modifications

No.	Clause	Technical modification	Explanation
1	4-3	Addition of a specific sub-clause on "Influence of Smoke"	ISO 30061
2	5-1-10	Addition of cross-reference to clause 4-3	To guarantee consistency
3	5-2-8	Addition of cross-reference to clause 4-3	To guarantee consistency

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Annex NB
(Informative)
National editorial modifications

Table NB-1 in this annex illustrates the editorial deviations from European standard 1838:2024 "Lighting Application – Emergency Lighting".

Single vertical dotted bars (:) in the margins are used to indicate the applicable editorial modifications of the international standard which have been changed.

Editorial deviations are cross-referenced to the clause of the European standard together with reasons for these deviations.

Table NB - 1 – List of national editorial modifications

No.	Clause	Editorial modification	Explanation
1	The title	Modifying the title to start with "Occupational Health and Safety "	To align with the name of the adopting technical committee
2	The whole document	Replacement of "this european standard" by "this Jordanian Standard".	Applying the Jordanian Directive 1-1/2009, Regional or national adoption of international standards and other international deliverables, part1: adoption of international Standards
3	The whole document	Numbering the editions	Applying the Jordanian Directive 1-2/2005, part 2: Rules for the structure and drafting of Jordanian standards.
4	-	Omitting the annex of "A-deviations" and any related cross-references	Specified for the European union
5	Annex D	Insertion of bibliography under the annex D and adding mentioned references in the document.	Applying the Jordanian Directive 1-2/2005, part 2: Rules for the structure and drafting of Jordanian standards.