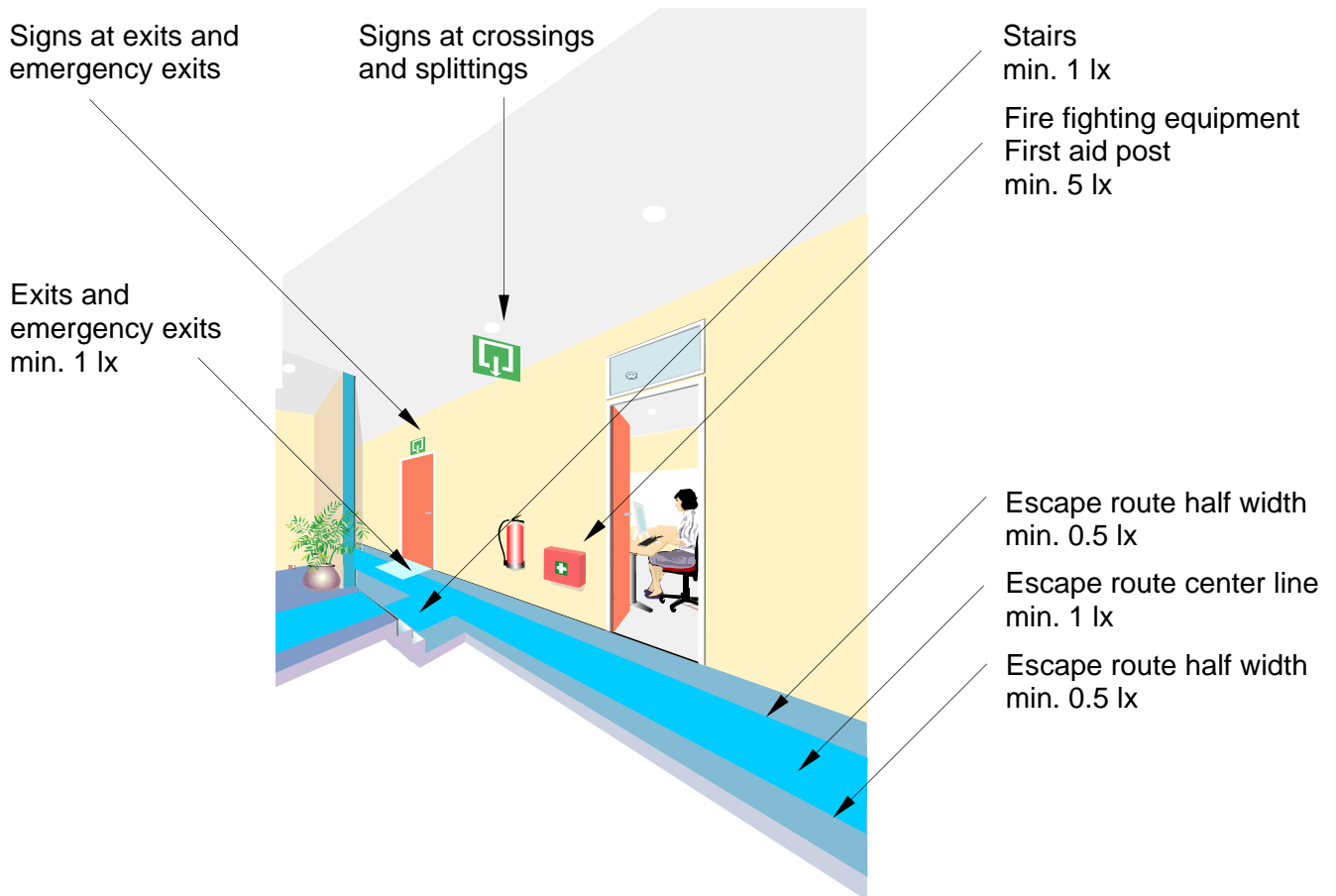




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## 1 Emergency lighting scheme

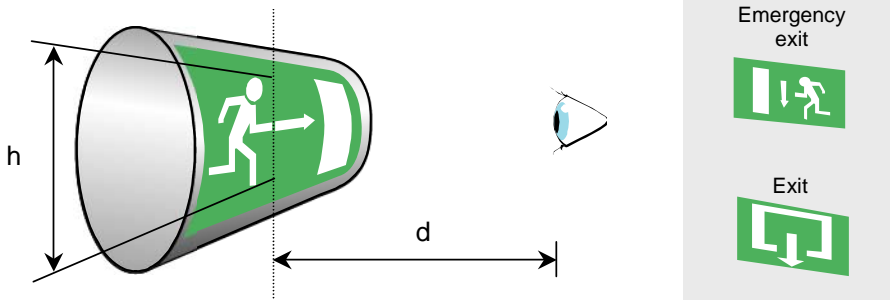
This guide summarizes the main requirements for emergency lighting schemes as laid down in European directives. In some countries and in specific projects, different regulations may apply. If in doubt, consult an expert.



Emergency schemes must comply with the following requirements:

- The whole escape route must be illuminated with a minimum of 1 lx in the middle of the escape route and at least 0.5 lx on 50% of the width of the escape route.
- Fire extinguishers and first aid posts must be illuminated with at least 5 lx.
- For anti-panic lighting in spaces where people gather, such as theatres, a minimum of 0.5 lx is required.
- At high-risk working areas, such as saw-mills, a minimum of 15 lx and at least 10% of the normal light level applies.
- Emergency lighting should start automatically as soon as the mains voltage drops below 70% of its rated value.
- The minimum lighting time in emergency operation (duration) shall be 1 hour and, in certain cases, 3 hours (theatres, hotels, hospitals, shopping centres, buildings of 10 or more storeys and underground buildings).
- Illuminated signs to emergency exits must be placed at every change of direction, at every

crossing or splitting of corridors and at every exit and emergency exit.



Minimum height of the pictograms: 0.01 x viewing distance with lighting from the outside and 0.005 x viewing distance with lighting from the inside.

**2 Standards**

Application requirements regarding emergency lighting are laid down in an European standard: EN 1838 Lighting applications – Emergency lighting.

Electrical safety and photometric characteristics of emergency lighting fixtures are laid down in: EN 60598-2-22 Luminaires Part 2: Particular requirements, Section 22: Luminaires for emergency lighting.

Lumiance emergency lighting fixtures satisfy these requirements and they also satisfy the general standards for lighting fixtures:

- EN 60598-1 Luminaires Part 1: General requirements and tests
- EN 60598-2-1 Luminaires Part 2: Particular requirements, Section 1: Fixed general purpose luminaires
- EN 55015 Limits and methods of measurement of radio interference characteristics of fluorescent lighting
- EN 61000-3-2 Electro magnetic compatibility (EMC) Part 2: Limits – section 2: Limits for harmonic currents emissions.

**3 Photometric data**

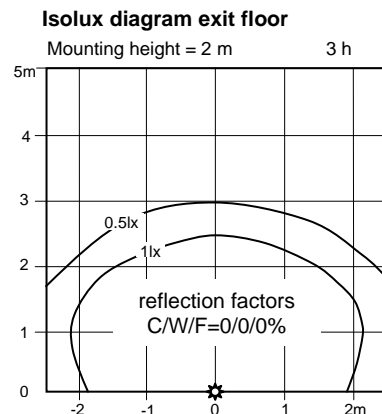
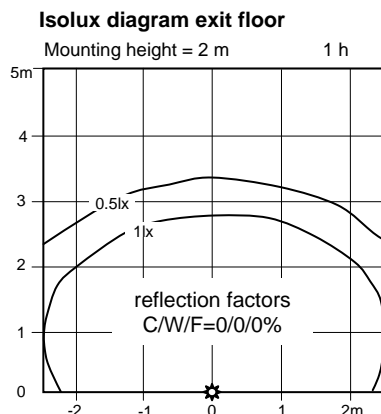
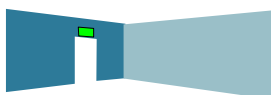
**3.1 Isolux curve**

Isolux curves connect points of equal illuminance. They give an impression of the illuminance distribution on the floor.

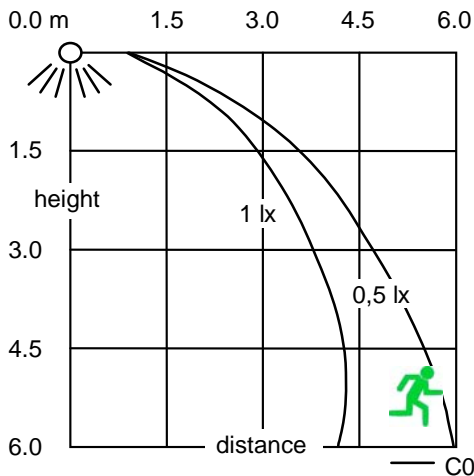
The 0.5 lx curve is used to determine the maximum distance to other fixtures (2 x 0.5 lx is 1 lx).

The diagram indicates the guaranteed illuminance until the end of the autonomy. Completely black walls, a maintenance factor of 0.8 and an ambient temperature of 25°C are assumed.

**Illuminated exit sign mounted above exit**



### 3.2 Polar isolux diagram

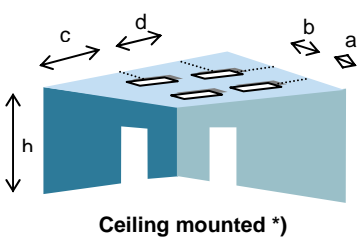
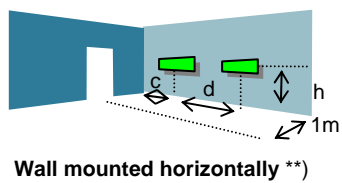
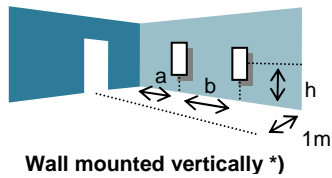


The maximum distance between two emergency lighting fixtures can be determined with the aid of this diagram. The 0.5 lx curve is used to determine the maximum distance between two fixtures (because 2 x 0.5 lx is 1 lx). The 1 lx curve is used to determine the distance of the fixtures to the wall.

The diagram indicates the guaranteed illuminance until the end of the autonomy. Completely black walls, a maintenance factor of 0.8 and an ambient temperature of 25°C are assumed.

### 3.3 Spacing to 1 lx table

This table indicates the maximum distances that the fixtures may be apart. The table is based on a minimum of 1 lux in the middle of the escape route and a minimum of 0.5 lux on 50% of the width of the escape route, until the end of the autonomy. Furthermore, a maintenance factor of 0.8 and an ambient temperature of 25°C are assumed. In practice, the illuminance will be higher because completely black walls are assumed in the calculation.



\*) Without stickers    \*\*) With stickers

#### Max. spacing to 1 lx

Wall mounted 1 h duration

h	a	b	c	d
2,0	3,4	9,2	2,6	6,6
2,5	-	-	2,9	7,1
3,0	-	-	2,9	7,7
3,5	-	-	2,8	7,9
4,0	-	-	2,6	7,7
4,5	-	-	2,2	7,7
5,0	-	-	1,6	7,4

#### Max. spacing to 1 lx

Wall mounted 3 h duration

h	a	b	c	d
2,0	-	-	2,2	5,6
2,5	-	-	2,2	5,7
3,0	-	-	2,0	5,9
3,5	-	-	1,7	5,8
4,0	-	-	0,9	5,3
4,5	-	-	-	-
5,0	-	-	-	-

#### Max. spacing to 1 lx

Ceiling mounted 1 h duration

h	a	b	c	d
2,5	5,0	13,0	2,9	7,2
3,0	5,2	13,6	3,0	7,8
3,5	5,2	14,2	3,1	8,2
4,0	5,0	14,6	3,1	8,6
4,5	4,5	14,8	3,1	8,8
5,0	2,1	15,5	3,0	9,0

#### Max. spacing to 1 lx

Ceiling mounted 3 h duration

h	a	b	c	d
2,5	3,9	10,8	2,4	6,2
3,0	3,8	11,2	2,4	6,6
3,5	2,7	11,2	2,4	6,8
4,0	1,3	11,2	2,1	6,9
4,5	1,1	10,6	1,9	6,8
5,0	0,8	8,8	1,3	6,8

### **3.4 EULUMDAT**

The photometric data of Lumiance fixtures are available as computer files in EULUMDAT format. This makes it possible to perform calculations for lighting projects with your own software. EULUMDAT data can be used in virtually all European software for lighting calculations and also in most North-American software packages for lighting calculations.

## **4 Maintenance**

Propper maintenance of emergency lighting installations is essential for safety. Lumiance advises to keep a logbook, stating the dates on which a defect was established and the dates on which maintenance was carried out on the installation. We advise to carry out the following periodical inspections:

Daily

- Check on the operation of the lamp
- Check whether the LED indicator functions

Monthly

- Simulation of power supply failure by interrupting the mains voltage as briefly as possible, and certainly no longer than 45 minutes

Every 6 months

- A minimum of 1 hour burning in emergency use

After 3 years

- A minimum of 3 hours burning in emergency use
- Check of the light output in emergency operation

If the battery package is not replaced after 3 years, we recommend annually carrying out the test mentioned under "After 3 years". After the battery package has been replaced, we advise to measure the light output in emergency operation after 3 years again.

Notes:

- After a test, the specified burning time in emergency operation is not immediately available.
- Different regulations may apply in some countries and in specific projects. If in doubt, consult an expert.

## **5 Terminology**

### **5.1 Escape route lighting**

Lighting of the escape route and possible obstacles.

### **5.2 Anti-panic lighting**

Lighting that is intended to prevent panic at places where there will be lots of people.

### **5.3 Stand-by lighting**

Lighting that ensures that the activities can be safely continued or terminated with a power failure.

### **5.4 Escape route signalling**

Signalling that indicates the way to escape routes and emergency exits (white symbols on a green background). Signs to the (emergency) exits must be placed at:

- Every change of direction
- Every crossing or splitting of corridors

**5.5 Continuous**

The lamp works with a normal power supply.

**5.6 Maintained**

The lamp works with a normal power supply and switches to the emergency power supply when there is a failure.

**5.7 Non-maintained**

The lamp does not work with normal power, it only works when there is a power failure, fed by the emergency power supply.

**5.8 Sustained**

Two lamps, of which one lights on normal power supply and the other with a failure on the emergency power supply.

**5.9 Autonomy (duration)**

Lighting time in emergency mode.

**5.10 LED indicator**

Gives information about the state of the fixture. A green LED indicates that the normal mains voltage is present and that the batteries are charged up. If several LEDs are present, the other LEDs indicate possible faults.

**5.11 Manual test**

A test pushbutton, which enables the user to simulate a voltage interruption and test the fixture for good operation.

**5.12 Remote test facility**

The distribution board in an installation may be used as a test facility. In this case the unswitched mains should be supplied to the luminaires directly from the distribution board. Only authorized persons should have access to this distribution board.

**5.13 ATS**

Automatic Test System that automatically tests the fixture on correct functioning. Here, an electrical circuit runs through a previously-programmed test procedure.

**5.14 BLF (Ballast Lumen Factor) (%)**

For emergency operation it is not necessary that the lamps burn at full strength. The BLF is the ratio between the light output of the lamp during emergency operation and the rated light output of the lamp.

**5.15 Maintenance factor**

As a result of contamination of the lamp and fixture, plus degradation of the lamp, the illuminance reduces in the course of time. This must be taken into account during the lighting design. For interior lighting, 0.8 is a normal value for the maintenance factor.

**5.16 ELDL (Emergency Lighting Design Lumen) (lm)**

The ELDL is the guaranteed light output of the lamp until the end of the lighting time of the batteries.

This value is used in the calculation of the number of fixtures required.

With calculations for emergency lighting, the reflection values of the walls, ceiling and floor must be set to zero; 0.8 is assumed for the maintenance factor.

**5.17 RLLIEM (Rated Luminaire Lumen output In Emergency Mode) (lm)**

The RLLIEM is the guaranteed luminous flux of the fixture in emergency operation until the end of the lighting time of the batteries. This value is used for certification purposes.