

Emergency lighting is an important and essential part of the electric system. The aspects of greatest importance are:

1 DEFINITIONS

Emergency lighting is composed of the set of luminaires, and the devices connected to them, that enable maintaining a sufficient level of lighting so that no danger is created for the safety of people if the ordinary lighting fails.

It comprises:

- **Safety lighting** composed of the part of emergency lighting designated to ensure that the evacuation routes and facilities can always be effectively identified and safely used.

Reserve lighting composed of the part of emergency lighting making it possible to continue or end ordinary work safely. Reserve lighting can also be less bright.

2 GOALS

The main purpose of emergency lighting is to:

- ensure effective signalling of exit routes;
- highlight dangerous passages: stairs, differences in level, narrowing, obstacles, etc.;
- clearly signal safety exits even if the lighting happens to go out;
- ensure sufficient lighting in places where there is equipment and/or machinery that if left or not recognised may jeopardise personal safety, as well as in places where explosive or inflammable materials are stored;
- prevent panic due to the lights suddenly going out, especially in crowded places.

3 REFERENCE STANDARDS

In relation to different types of places, there is currently a considerable number of laws, decrees and regulations defining the main requirements of systems and luminaires designated for emergency lighting. Page 160 gives the main reference standards in relation to the different places.

4 ACTIVITIES AND PLACES WHERE IT IS COMPULSORY TO HAVE A SAFETY LIGHTING SYSTEM

Safety lighting is compulsory in all public places where the approval of the fire brigade is required, and in particular:

- places of public entertainment in general, including travelling ones;
- industrial concerns with over 100 workers;
- places where explosive or inflammable materials are processed or stored;
- garages and multi-storey car parks with a capacity of over 300 vehicles;
- hotels, guest houses, dormitories, tourist accommodation with over 25 beds;
- department stores, retail shops and wholesale outlets with a total surface area of over 400 sq.m., including facilities and stores;
- companies and offices with over 500 employees;
- studios for cinema and television filming, plants for developing and printing cinema film;
- schools of every kind, boarding schools, academies and the like with over 100 persons present;
- hospitals and clinics with over 25 beds, out-patients' clinics;
- residential buildings of height > 32 m;
- places where machinery and equipment is installed that if left or not recognised may be a hazard for the safety of people and property. (For example: high-risk industries, thermal power plants, electricity transformation cabins and units, places with electrical distribution boards, etc.).

5 MINIMUM LIGHTING VALUES

To ensure safe evacuation of the general public as far as the exits, in relation to the areas identified in the regulations, the following minimum lighting values must be ensured:

- **Exit routes**
Lighting no less than 2 lux on a horizontal plane at a height of one metre and 5 lux where there are stairs and doors.
- **Panic-free areas**
- Lighting no less than 2 lux.

● High-risk areas

Lighting equal to 10% ordinary lighting and anyhow no less than 15 lux.

6 ACTION TIME

If the main lighting fails, the safety lighting must come into operation automatically within a short time (less than or equal to 0.5 second).

7 DURATION - SOURCES OF POWER CHECKS AND REPLACEMENTS

Autonomous luminaires for emergency lighting must incorporate sealed batteries that are designed for at least 4 years' normal operation. After this period it is necessary to (periodically) check that the remaining capacity still ensures a good margin of the required minimum duration. Otherwise they should immediately be replaced. The minimum duration required differs depending on the rooms the emergency luminaires are installed in. It must anyhow be no less than:

- 30 minutes = school building;
- 1 hour = places of public entertainment, public rooms, tourist-hotel accommodation, commercial areas;
- 2 hours = underground railways;
- 3 hours = hospitals (1 hour if reserve power envisaged);

8 CLASSIFICATION OF LUMINAIRES

Luminaires are divided into:

- non-maintained lighting (NM) emergency luminaires; in these luminaires the lamps only come on when the ordinary lighting fails;
- maintained lighting (M) emergency luminaires; in these luminaires the lamps are always on, also when the ordinary lighting is on;
- combined emergency luminaire, containing 2 or more lamps, at least one of which supplied by the emergency circuit;
- autonomous emergency luminaire, of the maintained or non-maintained lighting type, in which all the components, such as lamp, battery, control unit, test and signalling devices, if any, are contained inside the luminaire or adjacent to it (within 1 m);
- centralized supply emergency luminaire, type M or NM, supplied by a centralized emergency system, in other words not contained in the luminaire.

9 CHARGING TIME

The time needed to fully charge the battery is normally within 24 hours. For some types of places, regulations have been issued whereby the battery charging device must be automatic and such as to permit fully charging the batteries within 12 hours and enable a duration of:

- 30 minutes (DMI 26.08.92) for school buildings;
- 1 hour (DMI 09.04.94) for tourist-hotel businesses;
- 1 hour (DMI 18.03.96) for sports centres;
- 1 hour (DMI 19.08.96) for places of public entertainment.

10 CIRCUIT CHARACTERISTICS

The supply circuits of the safety services must be independent from the other circuits. To prevent electrical failure, action or modification on a circuit from jeopardizing the correct operation of the supply circuits of the safety services, it may be necessary to use distinct multipolar cables, separate raceways (protective pipes, tubes), separate junction boxes or with separating panels, fire-proof materials, circuits with different paths, etc. The safety lighting system controls must be arranged so that unauthorized persons (for example the general public) cannot use them. All the circuits must each be controlled by a single switch.

11 OPERATION AND MAINTENANCE

The operation, control and maintenance of a safety lighting system should be assigned to suitably qualified personnel. This personnel must have at their disposal a general topographic and electrical system assembly diagram, as well as a diagram of the safety lighting system. Once a year the system must be meticulously inspected by a skilled technician, extraneous to the authorized personnel, who will report the outcome in a special register.

Once a month the efficiency of the safety power supply must be checked, especially as regards the state of repair of the component parts.

Once every six months the integrity of the luminaires should be checked. Every week the operation of the system should be checked by sight, switching it on manually.

EXIT SIGNS AND EMERGENCY LUMINAIRES: APPLICATION GUIDE



FIRE PREVENTION REGULATIONS FOR DOMESTIC BUILDINGS D.P.R. 16/05/1987 NO. 246

In newly erected buildings, with a fire fighting height (ie. Height measured from the base to the last accessible floor, considered at the lowest portion of its opening, for example the sill) greater than 32m a safety lighting system must be installed that must ensure reliable lighting and signal that exit routes. This regulation applies not only to newly erected buildings but also to existing ones in the case of renovation (in other words, works involving remaking over 50% of the floors or remaking over 50% of the floors or remaking the stairs or increasing the height). In addition, it is necessary to light arms and fire fighting equipment. The values required by the major regulations are: 5 lux (stairs, doors, and exit routes), 2 lux (in all the other areas).



IMPLEMENTATION OF THE EEC DIRECTIVES ON IMPROVING WORKER HEALTH AND SAFETY AT PUBLIC AND PRIVATE PLACES OF WORK D.L. 19/09/1994 NO. 626.

ART. 33 - PAR. 10

Emergency exits and routes must be highlighted by special signs in compliance with current regulations, have a long service life and be placed in appropriate places.

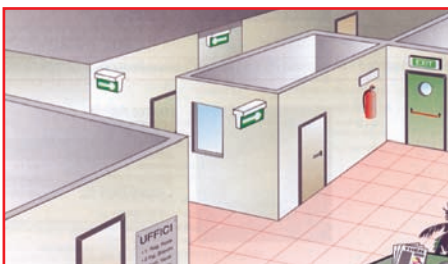
ART. 33 - PAR. 11

Emergency exits and routes requiring lighting must have safety lighting of sufficient brightness that comes into operation if the electrical system fails.



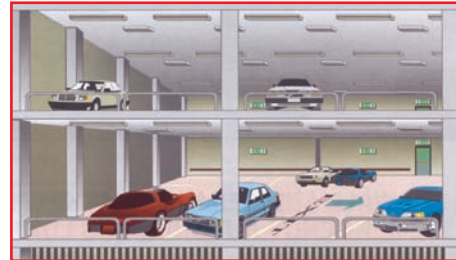
FIRE PREVENTION REGULATIONS FOR SCHOOL BUILDINGS, D.M. 26/08/ 92

In school buildings it is compulsory to install a safety lighting system that ensures a lighting level no less than 5 lux and adequate indication of the exit routes and emergency exits. In addition, the battery charging device must be automatic and such as to enable a full battery charge with 12 hours and a duration of the emergency source of no less than 30 min.



EXIT ROUTES

It is necessary for the safety lighting to be immediately visible so as not to create indecision prejudicing rapid, orderly evacuation. Double-sided luminaires, both wall and flush-mounting ones, ensure clear, unambiguous instructions for the exit routes and emergency exits if there are several ordinary passages that intertwine with changes in direction.

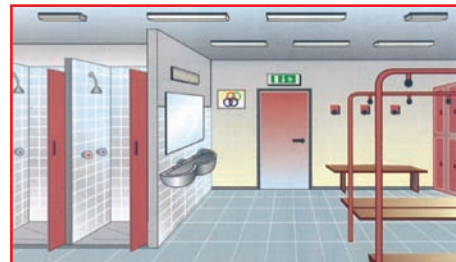


SAFETY STANDARDS FOR FIRE PREVENTION IN THE CONSTRUCTION AND OPERATION OF GARAGES AND THE LIKE, D.M. 1/02/1986.

ART. 5- ELECTRICAL SYSTEM

Garages with a capacity of over 300 vehicles and multi-storey car parks must be equipped with safety lighting systems supplied by independent sources from the normal lighting network. In particular, said safety lighting systems must have the following features:

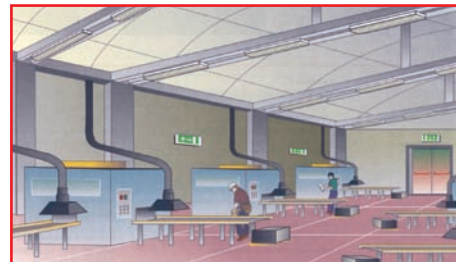
- 1) They activate automatically and immediately as soon as the ordinary lighting fails.
- 2.) Lighting intensity necessary to enable evacuation and anyhow not less than 5 lux. CEI 64-2, CEI-64-8 standards, luminaires must have a protection rating of no less than IP44.



SAFETY STANDARDS FOR THE CONSTRUCTION AND OPERATION OF SPORTS CENTRES, D.M. 18/03/1996

The battery charge device must be automatic and such as to allow a full charge within 12 hours. The duration of the safety supply must allow a safe rescue and switch off for the necessary time, in any case, the minimum duration is established for each system as follows:

- Safety lighting, 60 min. The safety lighting system must ensure a lighting level of no less than 5 lux at a height of 1 m above the walkway along the exit routes, single lamps are admitted with an autonomous supply that ensure operation for at least 1 h. CEI 64-8 standard.
- In places used as bathrooms and showers, in cases where cleaning involves using jets of water, the protection rating required is IPX5.



HIGH RISK AREAS

D.P.R. 547 - ART. 31, ART. 32

When the control of machines or equipments is unexpectedly and immediately abandoned prejudices the safety of people or systems.

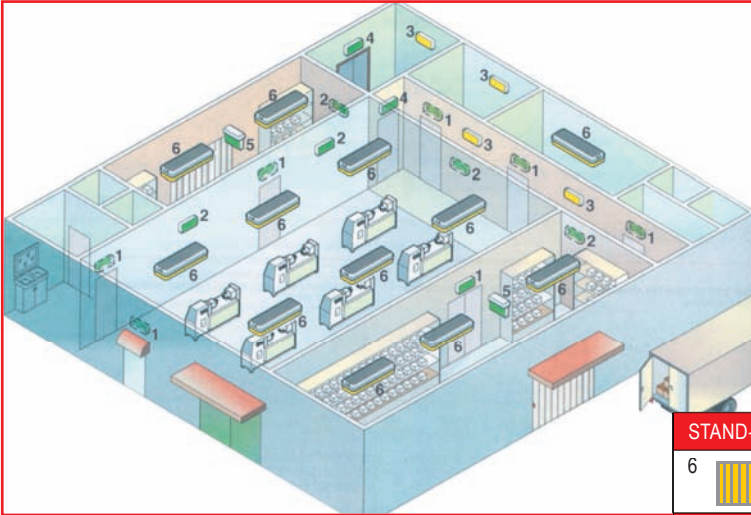
D.L. 19/09/94 N. 626







In work places where workers are especially exposed to risk in the event of failure of the artificial lighting there must be safety/reserve lighting designed to ensure sufficiently bright lighting to allow work to continue in conditions of sufficient visibility. (The lighting value adopted is usually equal to 10% the ordinary one and anyhow no less than 15 lux).

EMERGENCY LIGHTING: DESIGN GUIDE

Application example of Emergency Industrial Lighting:

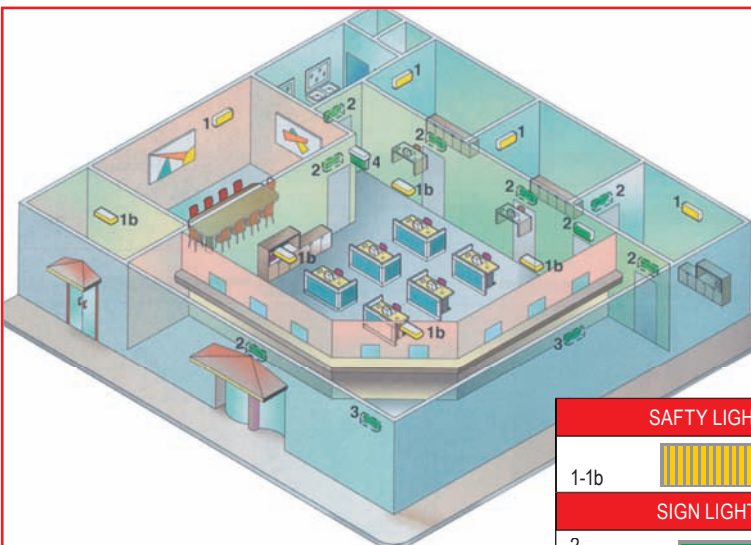
Requirement: Emergency lighting with autonomous luminaires for production activities (sheds, warehouses,...etc.)








| STAND-BY LIGHTING | LUMINAIRE CODE | CHARACTERISTICS |
|---|----------------|-----------------|
| 6  | NLCP 60 | 2X36W M 3H |
| SAFETY LIGHTING | | |
| 3  | NLCP 20 | 1X8W NM 3H |
| SIGN LIGHTING | | |
| 1  | NLCP 654 | 4M NM 1H |
| 2  | NLCP 654 | 4M NM 1H |
| 4  | NLCP 654 | 4M NM 1H |
| 5  | NLCP 655 | 4W M 1H |

Application example of Emergency Commercial Lighting:

Requirement: Emergency lighting with autonomous luminaires for public utility offices (banks, post offices, ...etc.)



| SAFETY LIGHTING | LUMINAIRE CODE | CHARACTERISTICS |
|---|----------------|-----------------|
| 1-1b  | NLCP 20 | 2X18W M 3H |
| SIGN LIGHTING | | |
| 2  | NLCP 650 | 8W NM 3H |
| 3  | NLCP 650 | 8W NM 3H |
| 4   | NLCP 655 | 4W M 1H |

