7.8 ILLUMINATION OF MEANS OF EGRESS

When fire occurs in a building, the degree of visibility in corridors, stairs, and passageways might mean the difference between orderly evacuation and chaos and possibly the difference between life and death. A brief glance at the history of fires reveals several noteworthy fires in which the failure of normal or emergency lighting was a major factor in the casualties incurred. A list of some of these fires follows:

Iroquois Theater, Chicago, 1903	602 deaths[20]
Cocoanut Grove Night Club, Boston, 1942	492 deaths[21]
Baltimore Oyster Roast, 1956	11 deaths[22]
Apartment house, Boston, 1971	8 deaths[23]
Summerland, Isle of Man, 1973	50 deaths[24]
Mental hospital, Mississippi, 1978	15 deaths[25]

The report on the 1971 Massachusetts apartment fire where eight people died stated: “Among the conditions contributing to the . . . loss of life were . . . the lack of emergency lighting and the lack of illuminated exit signs.”

The report on the 1973 fire in the amusement complex on the Isle of Man in Great Britain, where 50 people died, stated, “The problems with the evacuation are . . . (5) an insufficient number of exit signs and directional signs . . . (7) The emergency lighting did not come on when the main power was shut off by a staff member in an act of misguided zeal.”

The report on the 1978 mental hospital fire in Mississippi, where 15 people died, stated:

Heat and flame . . . impinged directly on the emergency lighting conduit, causing . . . a short circuit to occur. The short tripped the circuit breaker . . . leaving the north end of the building without emergency lighting. However, in this fire, the emergency lighting circuits on the first floor were not used. The dual-function lighting circuits were switched in the “off” position in both wards. The attendant entering Ward 1 to evacuate the residents did not turn the lights on. In Ward 2, the switch could not be reached by the attendants, and the circuit shorted out soon after the discovery of the fire. The darkness contributed to the difficulty in evacuating both wards.[26]

A lack of illuminated exit signs in several key places was also noted in the report.

7.8.1 General.

7.8.1.1*

Illumination of means of egress shall be provided in accordance with Section 7.8 for every building and structure where required in Chapters 11 through 42. For the purposes of this requirement, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of this requirement, exit discharge shall include only designated stairs, aisles, corridors, ramps, escalators, walkways, and exit passageways leading to a public way.

Illumination of means of egress is not required unless specifically called for in the appropriate occupancy chapter. However, all occupancy chapters do require illumination, but there are a few exemptions. For example, in new assembly occupancies, 12.2.8 exempts private-party tents not larger than 1200 ft^2 (111.5 m^2) from the illumination requirement. Subsection ___.2.8 (for example, 36.2.8 for new mercantile occupancies) of each occupancy chapter provides illumination requirements.

A.7.8.1.1

Illumination provided outside the building should be to either a public way or a distance away from the building that is considered safe, whichever is closest to the building being evacuated.

7.8.1.2

Illumination of means of egress shall be continuous during the time that the conditions of occupancy require that the means of egress be available for use. Artificial lighting shall be employed at such locations and for such periods of time as required to maintain the illumination to the minimum criteria values herein specified.

Exception: Automatic, motion sensor-type lighting switches shall be permitted within the means of egress, provided that the switch controllers are equipped for fail-safe operation, the illumination timers are set for a minimum 15-minute duration, and the motion sensor is activated by any occupant movement in the area served by the lighting units.

7.8.1.3*

The floors and other walking surfaces within an exit and within the portions of the exit access and exit discharge designated in 7.8.1.1 shall be illuminated to values of at least 1 ft-candle (10 lux) measured at the floor.

A.7.8.1.3

A desirable form of means of egress lighting is by lights recessed in walls about 1 ft (30 cm) above the floor. Such lights are not likely to be obscured by smoke.

Exception No. 1: In assembly occupancies, the illumination of the floors of exit access shall be at least 0.2 ft-candle (2 lux) during periods of performances or projections involving directed light.

Exception No. 2: This requirement shall not apply where operations or processes require low lighting levels.*

A.7.8.1.3 Exception No. 2

Some processes, such as manufacturing or handling of photosensitive materials, cannot be performed in areas provided with the minimum specified lighting levels. The use of spaces with lighting levels below 1 ft-candle (10 lux) might necessitate additional safety measures, such as written emergency plans, training of new employees in emergency evacuation procedures, and periodic fire drills.

The *Code* requires that there be at least 1 ft-candle (10 lux) of illumination at floor level in all three elements of a means of egress, that is, the exit access, the exit, and the exit discharge. For the purposes of Section 7.8, the *Code* limits exit access to designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. Such components should include those portions of the exit access serving occupied spaces. It is not necessary to keep the lights on in all rooms if the rooms are not occupied. For the purposes of Section 7.8, the *Code* limits exit discharge to designated stairs, aisles, corridors, ramps, escalators, walkways, and passageways leading to a public way. *Designated* is meant to be designation by the authority having jurisdiction. While motion pictures, slides, and the like are being shown in theaters, auditoriums, and other assembly occupancies, Exception No. 1 to 7.8.1.3 permits the level of illumination can be reduced to 0.2 ft-candle (2 lux).

7.8.1.4*

Required illumination shall be arranged so that the failure of any single lighting unit does not result in an illumination level of less than 0.2 ft-candle (2 lux) in any designated area.

All lights, circuits, or auxiliary power must be arranged to ensure continuity of egress lighting. This arrangement can be accomplished by means such as use of duplicate light bulbs in fixtures, overlapping light patterns, or overlapping dual circuits.

A.7.8.1.4

An example of the failure of any single lighting unit is the burning out of an electric bulb.

7.8.1.5

The equipment or units installed to meet the requirements of Section 7.10 also shall be permitted to serve the function of illumination of means of egress, provided that all requirements of Section 7.8 for such illumination are met.

7.8.2 Sources of Illumination.

7.8.2.1*

Illumination of means of egress shall be from a source considered reliable by the authority having jurisdiction.

A.7.8.2.1

An example of a power source with reasonably ensured reliability is a public utility electric service.

7.8.2.2

Battery-operated electric lights and other types of portable lamps or lanterns shall not be used for primary illumination of means of egress. Battery-operated electric lights shall be permitted to be used as an emergency source to the extent permitted under Section 7.9.

7.9 EMERGENCY LIGHTING

Emergency lighting is not required unless specifically called for in the appropriate occupancy chapter. Most occupancy chapters require emergency lighting in medium-to-large buildings. Subsection ___.2.9 (for example, 12.2.9 or 36.2.9 for new assembly and new mercantile occupancies) of each occupancy chapter provides emergency lighting requirements.

7.9.1 General.

7.9.1.1*

Emergency lighting facilities for means of egress shall be provided in accordance with Section 7.9 for the following:

(1) Buildings or structures where required in Chapters 11 through 42

(2) Underground and windowless structures as addressed in Section 11.7

(3) High-rise buildings as required by other sections of this *Code*

(4) Doors equipped with delayed egress locks

(5) The stair shaft and vestibule of smokeproof enclosures, which shall be permitted to include a standby generator that is installed for the smokeproof enclosure mechanical ventilation equipment and used for the stair shaft and vestibule emergency lighting power supply

For the purposes of this requirement, exit access shall include only designated stairs, aisles, corridors, ramps, escalators, and passageways leading to an exit. For the purposes of this requirement, exit discharge shall include only designated stairs, ramps, aisles, walkways, and escalators leading to a public way.

A.7.9.1.1

Emergency lighting provided outside the building should be to either a public way or a distance away from the building that is considered safe, whichever is closest to the building being evacuated.

7.9.1.2

Where maintenance of illumination depends on changing from one energy source to another, a delay of not more than 10 seconds shall be permitted.

An on-site generator driven by a prime mover must be automatically started and capable of

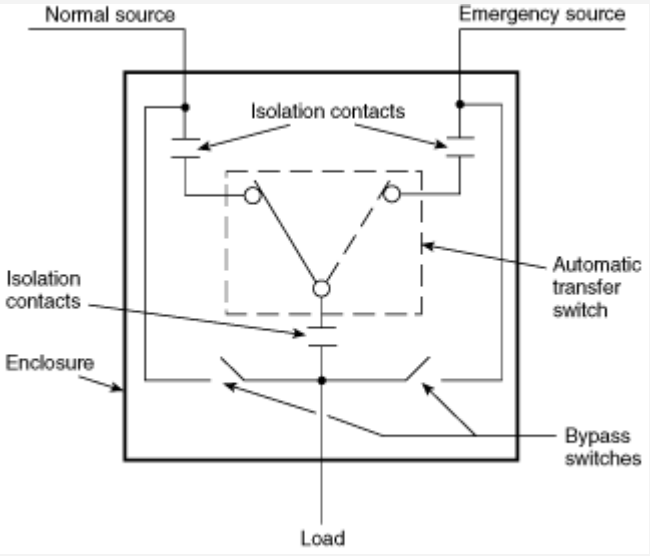
picking up the emergency lighting load within 10 seconds. Where the generator set is not able to supply power within this time frame, an auxiliary power source must be provided.

Some turbine-driven emergency generators take longer than 10 seconds to reach operating speed. A backup battery pack, such as an uninterruptible power supply (UPS), capable of delivering emergency power for a few minutes must be used in conjunction with any on-site generator that cannot meet the 10-second requirement.

Section 700-5 of NFPA 70, *National Electrical Code*,[27] allows use of an emergency generator for load shedding and peak load shaving, provided that these loads can be disconnected when normal power to the emergency lighting system is lost.

Although not required by NFPA 70, the use of bypass-isolation transfer switches should be considered. These devices allow maintenance and repair of the transfer switch mechanism without interruption of power to the emergency loads. Bypass switches are interlocked to prevent simultaneous interconnection of the two power sources, and isolation of the transfer switch is usually accomplished by operation of a drawout handle. This type of construction should be used where continuity of electrical service to the emergency system is essential. See Exhibit 7.85.

Exhibit 7.85 Schematic of bypass-isolation transfer switch.



7.9.2 Performance of System.

7.9.2.1*

Emergency illumination shall be provided for not less than $1^1/_2$ hours in the event of failure of normal lighting. Emergency lighting facilities shall be arranged to provide initial illumination that is not less than an average of 1 ft-candle (10 lux) and, at any point, not less than 0.1 ft-candle (1 lux), measured along the path of egress at floor level. Illumination levels shall be

permitted to decline to not less than an average of 0.6 ft-candle (6 lux) and, at any point, not less than 0.06 ft-candle (0.6 lux) at the end of the $1^1/_2$ hours. A maximum-to-minimum illumination uniformity ratio of 40 to 1 shall not be exceeded.

A.7.9.2.1

The illumination uniformity ratio is determined by the following formula:

$$\frac{\text{Maximum illumination at any point}}{\text{Minimum illumination at any point}}$$

The *Code* requires a 1-ft-candle (10-lux) average and establishes a 0.1-ft-candle (1-lux) minimum, with a uniformity ratio maximum of 40 to 1 to prevent excessively bright and dark spots.

7.9.2.2*

The emergency lighting system shall be arranged to provide the required illumination automatically in the event of any of the following:

(1) Interruption of normal lighting such as any failure of a public utility or other outside electrical power supply

(2) Opening of a circuit breaker or fuse

(3) Manual act(s), including accidental opening of a switch controlling normal lighting facilities

A.7.9.2.2

Where approved by the authority having jurisdiction, this requirement is permitted to be met by means such as the following.

(a) Two separate electric lighting systems with independent wiring, each adequate alone to provide the specified lighting. One such system is permitted to be supplied from an outside source such as a public utility service and the other from an electric generator on the premises driven by an independent source of power. Both sources of illumination should be in regular simultaneous operation whenever the building is occupied during periods of darkness.

(b) An electric circuit or circuits used only for means of egress illumination, with two independent electric sources arranged so that, on the failure of one, the other will automatically and immediately operate. One such source is permitted to be a connection from a public utility or similar outside power source and the other an approved storage battery with suitable provision to keep it automatically charged. Such a battery should be provided with automatic controls that, after operation of the battery due to failure of the primary power source or to turn-off the primary electric source for the lights, the battery will be shut off after its specified period of operation and will be automatically recharged and ready for further service when the primary current source is turned on again.

(c) Electric battery-operated emergency lighting systems complying with the provisions of 7.9.2.2 and operating on a separate circuit and at a voltage different from that of the primary light can be used where permitted. *(See NFPA 70, National Electrical Code ®.)*

These requirements are not intended to prohibit the connection of a feeder serving exit lighting and similar emergency functions ahead of the service disconnecting means, but such provision does not constitute an acceptable alternate source of power. Such a connection furnishes only supplementary protection for emergency electrical functions, particularly where intended to allow the fire department to open the main disconnect without hampering exit activities. Provision should be made to alert the fire department that certain power and lighting is fed by an emergency generator and will continue operation after the service disconnect is opened.

Where emergency lighting is provided by automatic transfer between normal power service and an emergency generator, it is the intent to prohibit the installation, for any reason, of a single switch that can interrupt both energy sources.

Six methods of providing emergency power are recognized in NFPA 70, *National Electrical Code*; however, some of these sources do not meet the requirements for emergency lighting under the *Life Safety Code*.

Storage batteries are an acceptable emergency source and are permitted to be used to supply continuous, required emergency lighting. For this arrangement, two separate lighting systems with independent wiring are employed. One system is permitted to be supplied from a public utility and the other from storage batteries. Either supply source must have sufficient capacity, and emergency lighting must be designed so that adequate light is available for a specified time if one system fails.

Instead of installing two separate wiring systems, a single emergency system connected to an automatic transfer switch is often used. The two sources of power, normal and emergency, are connected to the transfer switch, which automatically switches the emergency lighting load from the normal source to the emergency source upon loss of normal power. When normal power is restored, the emergency load is transferred to the normal source.

Batteries that are used for the emergency source must be suitable for the application. Automotive-type batteries are not acceptable.

Where an on-site generator is the emergency power source, it is generally controlled by a transfer switch. Upon loss of normal emergency power, a signal is sent to start the generator. When the generator is running at rated speed and its output voltage is correct, the emergency load is connected to this source by operation of the automatic transfer switch. This transfer must take place in 10 seconds or less. See Exhibit 7.86.

Exhibit 7.86 Arrangement of normal and alternate sources where emergency power is supplied from on-site generator.

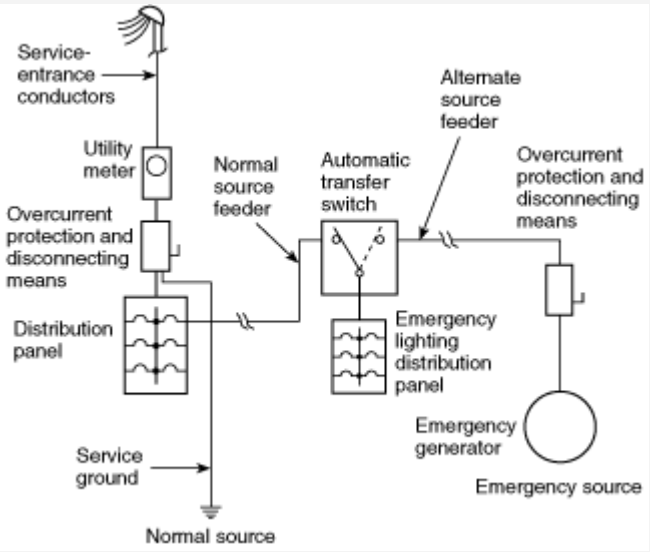
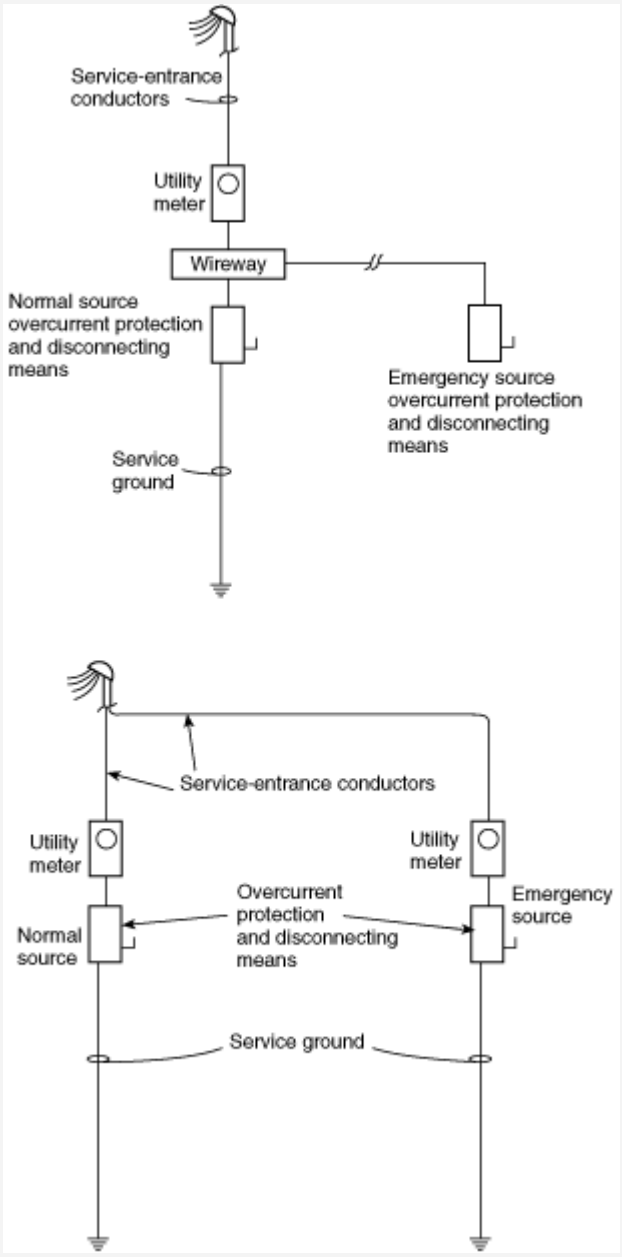


Exhibit 7.87 shows two methods of obtaining an emergency power supply by connection ahead of the service disconnecting means. Although not prohibited by NFPA 70, this method does not comply with the requirements for emergency lighting of the *Life Safety Code* and might not be acceptable to the authority having jurisdiction. Before considering this method to supply emergency power for other than emergency lighting, the reliability of the utility system in the area must be evaluated, and the risk to building occupants must be carefully thought out. This arrangement only provides protection from electrical failures in the occupancy, such as blown fuses, tripped circuit breakers, or a localized fire at such locations as the electrical service or distribution panels. In such instances, the availability of the emergency source is dependent on the reliability of the public utility.

Exhibit 7.87 Two methods (not Life Safety Code compliant) of obtaining an emergency source by connection ahead of service disconnecting means.



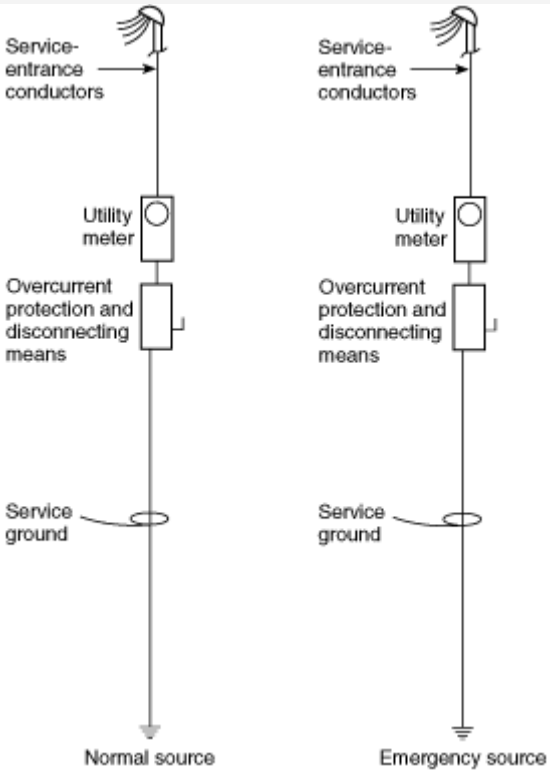
The advantage of connecting the emergency lighting circuit to the main power line on the live side of the main disconnect is service continuity if the main switch is thrown by employees or fire fighters as a precautionary measure. The *Code* does not prohibit this practice; however, it should be noted that this method does not meet the requirements for emergency lighting.

Two separate services, one for normal power and the other for emergency power, are also recognized by NFPA 70, subject to approval by the authority having jurisdiction but, again, not acceptable by the *Life Safety Code* for emergency lighting. Usually this method provides a

higher degree of reliability than the connection ahead of the service disconnecting means but does not satisfy the requirements of 7.9.2.2. However, underground loop systems in downtown areas of large cities are quite reliable. Many public utilities have not experienced an outage on their loop systems for many years, but there is no protection from any electrical failures that might occur outside of the occupancy. One way to reduce the possibility of simultaneous loss of both power sources is to use different voltages for the normal and emergency systems, taking power for each system from separate manholes or employing other schemes that provide both electrical and physical separation between the normal and emergency sources. See Exhibit 7.88.

Individual battery-operated lights can also be used for emergency lighting. Specific rules in NFPA 70 govern installation. These products are referred to in NFPA 70 as *unit equipment*.

Exhibit 7.88 Two separate services to the same building permitted by NFPA 70, National Electrical Code, but not recognized by Life Safety Code for emergency lighting.



To qualify for emergency lighting, each unit equipment must have a rechargeable battery, a battery-charging means, provisions for one or more lamps, and a relay to energize the lamps automatically upon failure of the normal supply. Unit equipment must be connected to the same branch circuit that supplies normal lighting to the area in which the unit equipment is located. Connection to this branch circuit must be ahead of, or on the line side of, any switches controlling the normal lighting. An exception in NFPA 70 allows connection of unit equipment

directly to a branch circuit from a panelboard that also supplies a minimum of three normal lighting circuits to the area in which the unit equipment is installed. The overcurrent device protecting this unit equipment circuit must be provided with a lock-on feature that will prevent accidental disconnection.

7.9.2.3

Emergency generators providing power to emergency lighting systems shall be installed, tested, and maintained in accordance with NFPA 110, *Standard for Emergency and Standby Power Systems*. Stored electrical energy systems, where required in this *Code*, shall be installed and tested in accordance with NFPA 111, *Standard on Stored Electrical Energy Emergency and Standby Power Systems*.

7.9.2.4*

Battery-operated emergency lights shall use only reliable types of rechargeable batteries provided with suitable facilities for maintaining them in properly charged condition. Batteries used in such lights or units shall be approved for their intended use and shall comply with NFPA 70, *National Electrical Code*®.

A.7.9.2.4

Automobile-type lead storage batteries are not suitable by reason of their relatively short life when not subject to frequent discharge and recharge as occurs in automobile operation.

For proper selection and maintenance of appropriate batteries, see NFPA 70, *National Electrical Code*.

7.9.2.5

The emergency lighting system shall be either continuously in operation or shall be capable of repeated automatic operation without manual intervention.

7.9.3 Periodic Testing of Emergency Lighting Equipment.

A functional test shall be conducted on every required emergency lighting system at 30-day intervals for not less than 30 seconds. An annual test shall be conducted on every required battery-powered emergency lighting system for not less than $1^1/_2$ hours. Equipment shall be fully operational for the duration of the test. Written records of visual inspections and tests shall be kept by the owner for inspection by the authority having jurisdiction.

Exception: Self-testing/self-diagnostic, battery-operated emergency lighting equipment that automatically performs a test for not less than 30 seconds and diagnostic routine not less than once every 30 days and indicates failures by a status indicator shall be exempt from the 30-day functional test, provided that a visual inspection is performed at 30-day intervals.

7.10 MARKING OF MEANS OF EGRESS

In the fatal Westchase Hilton Hotel fire, which occurred in Houston, Texas, March 1982,

"several people were confused by the exit markings or the similarity of exit doors and adjacent storage room doors. The directional exit signs within the exit foyers at the ends of the hotel corridors indicated that the exit path from this point would be perpendicular to the exit access corridor. Some of the occupants moved toward the locked storage room doors and away from the exits."[28] See also commentary on Sections 7.8 and 7.9.

Chapter 10
MEANS OF EGRESS

NOTE: This chapter has been revised in its entirety.

For qualified historical buildings or properties, see Chapter 34, Division II. C A

SECTION 1001 — ADMINISTRATIVE

1001.1 Scope. Every building or portion thereof shall be provided with a means of egress as required by this chapter. A means of egress is an exit system that provides a continuous, unobstructed and undiminished path of exit travel from any occupied point in a building or structure to a public way. Such means of egress system consists of three separate and distinct elements:

1. The exit access,
2. The exit, and
3. The exit discharge.

L C L A C L A C L A C L A C *[For DSA/AC] NOTE: For additional means of egress provisions adopted by DSA/AC, see Chapters 11A for public housing, 11B for public accommodations, 11C for motor vehicle fuel facilities and Chapter 34, Division II for historical buildings.*

1001.2 Standards of Quality. The standards listed below that are labeled a "UBC Standard" are also listed in Chapter 35, Part II, and are part of this code.

L C L A C L A C *[For SFM] The standards listed below that are labeled an "Adopted Standard" are also listed in Chapter 35, Part III, and are part of this code.*

1. **Power doors.**

   1.1 UBC Standard 10-1, Power-operated Egress Doors

   1.2 UBC Standard 7-8, Horizontal Sliding Fire Doors Used in a Means of Egress

2. **Stairway numbering system.**

UBC Standard 10-2, Stairway Identification

3. **Hardware.**

L C L A C L A C *4. **Smoke-containment systems.** Adopted standard—ICBO ES AC 77, Acceptance Criteria for Smoke-Containment Systems Used with Fire-Resistive Elevator Hoistway Doors and Frames.*

UBC Standard 10-4, Panic Hardware

SECTION 1002 — DEFINITIONS

For the purpose of this chapter, certain terms are defined as follows:

AISLE ACCESSWAYS are that portion of an exit access that leads to an aisle.

EXIT. See Section 1005.1.

EXIT ACCESS. See Section 1004.1.

EXIT DISCHARGE. See Section 1006.1.

EXIT DOOR. See Section 1003.3.1.1.

MEANS OF EGRESS. See Section 1001.1.

MULTITHEATER COMPLEX is a building or portion thereof containing two or more motion picture auditoriums that are served by a common lobby.

PANIC HARDWARE is a door-latching assembly incorporating an unlatching device, the activating portion of which extends across at least one half the width of the door leaf on which it is installed.

PHOTOLUMINESCENT is the property of emitting light as the result of absorption of visible or invisible light, which continues for a length of time after excitation.

PRIVATE STAIRWAY is a stairway serving one tenant only.

PUBLIC WAY is any street, alley or similar parcel of land essentially unobstructed from the ground to the sky that is deeded, dedicated or otherwise permanently appropriated to the public for public use and having a clear width of not less than 10 feet (3048 mm).

SELF-LUMINOUS means powered continuously by a self-contained power source other than a battery or batteries, such as radioactive tritium gas. A self-luminous sign is independent of external power supplies or other energy for its operation.

SMOKE-PROTECTED ASSEMBLY SEATING is seating served by a means of egress system and is not subject to blockage by smoke accumulation within or under a structure.

SECTION 1003 — GENERAL

1003.1 Means of Egress. All portions of the means of egress shall comply with the applicable requirements of Section 1003.

1003.2 System Design Requirements. The general design requirements specified in this section shall apply to all three elements of the means of egress system, in addition to those specific design requirements for the exit access, the exit and the exit discharge detailed elsewhere in this chapter.

1003.2.1 Use.

1003.2.1.1 General. The building official shall assign a use category as set forth in Table 10-A to all portions of a building. When an intended use is not listed in Table 10-A, the building official shall establish a use based on a listed use that most nearly resembles the intended use.

1003.2.1.2 Change in use. No change in use or occupancy shall be made to any existing building or structure unless the means of egress system is made to comply with the requirements of this chapter for the new use or occupancy. See Section 3405.

1003.2.2 Occupant load.

1003.2.2.1 General. The basis for the design of the means of egress system is the occupant load served by the various components of such system.

1003.2.2.2 Determination of occupant load. Occupant loads shall be determined in accordance with the requirements of this section.

1003.2.2.2.1 Areas to be included. In determining the occupant load, all portions of a building shall be presumed to be occupied at the same time.

> **EXCEPTION:** Accessory use areas that ordinarily are used only by persons who occupy the main areas of an occupancy shall be provided with means of egress as though they are completely occupied, but their occupant load need not be included when computing the total occupant load of the building.

1003.2.2.2.2 Areas without fixed seats. For areas without fixed seats, the occupant load *[for HCD 1 & HCD 2] permitted in any building or portion thereof* shall not be less than the number determined by dividing the floor area under consideration by the *[for HCD 1 & HCD 2] square feet per* occupant load factor assigned to the use for such area as set forth in Table 10-A.

[For HCD 1 & HCD 2] When the square feet per occupant is not given for a particular occupancy, it shall be determined by the enforcing agency based on the area given for the occupancy which it most nearly resembles.

The occupant load for buildings or areas containing two or more uses or occupancies shall be determined by adding the occupant loads of the various use areas as computed in accordance with the applicable requirements of Section 1003.2.2.2.

Where an individual area has more than one proposed use, the occupant load for such area shall be determined based on that use that yields the largest occupant load.

1003.2.2.2.3 Areas with fixed seats. For areas having fixed seats, the occupant load for such areas shall be determined by the number of fixed seats installed therein.

For areas having fixed benches or pews, the occupant load shall not be less than the number of seats based on one person for each 18 inches (457 mm) of length of pew or bench. Where fixed booths are used in dining areas, the occupant load shall be based on one person for each 24 inches (610 mm) of booth length. Where fixed benches, pews or booths are curved, the larger radius shall determine the booth length.

1003.2.2.2.4 Outdoor areas. The occupant load of yards, patios, courts and similar outdoor areas shall be assigned by the building official in accordance with their anticipated use. Such outdoor areas accessible to and usable by the building occupants shall be provided with a means of egress as required by this chapter. Where an outdoor area exits only through a building, the occupant load of such outdoor area shall be considered in the design of the means of egress system of that building.

1003.2.2.2.5 Reviewing stands, grandstands and bleachers. The occupant load for reviewing stands, grandstands and bleachers shall be calculated in accordance with Section 1003.2.2.2 and the specific requirements contained in Section 1008.

1003.2.2.3 Maximum occupant load.

1003.2.2.3.1 Assembly occupancies. The maximum occupant load for an assembly occupancy shall not exceed the occupant load determined in accordance with Section 1003.2.2.2.

EXCEPTION: When approved by the building official, the occupant load for an assembly occupancy may be increased, provided the maximum occupant load served does not exceed the capacity of the means of egress system for such increased number of occupants.

For temporary increases of occupant loads in places of assembly, see the Fire Code.

1003.2.2.3.2 Other occupancies. For other than assembly occupancies, an occupant load greater than that determined in accordance with Section 1003.2.2.2 is permitted; however, the means of egress system shall comply with the requirements of this chapter for such increased occupant load.

1003.2.2.4 Minimum occupant load. An occupant load less than that determined in accordance with Section 1003.2.2.2 shall not be used.

1003.2.2.5 Revised occupant load. No increase in occupant load shall be made to any existing building or structure unless the means of egress system is made to comply with the requirements of this chapter for such increased occupant load. See Section 3405.

1003.2.3 Width.

1003.2.3.1 General. The width of the means of egress system or any portion thereof shall be based on the occupant load served.

1003.2.3.2 Minimum width. The width, in inches (mm), of any component in the means of egress system shall not be less than the product determined by multiplying the total occupant load served by such component by the applicable factor set forth in Table 10-B. In no case shall the width of an individual means of egress component be less than the minimum required for such component as specified elsewhere in this chapter.

Where more than one exit or exit-access doorway serves a building or portion thereof, such calculated width shall be divided approximately equally among the means of egress components serving as exits or exit-access doorways for that area.

1003.2.3.3 Maintaining width. If the minimum required width of the means of egress system increases along the path of exit travel based on cumulative occupant loads served, such width shall not be reduced or otherwise diminished to less than the largest minimum width required to that point along the path of exit travel.

EXCEPTION: In other than Group H, Divisions 1, 2, 3 and 7 Occupancies, the width of exterior exit doors from an exit enclosure may be based on the largest occupant load of all levels served by such exit enclosure multiplied by a factor of 0.2 (5.08) inch per person.

1003.2.3.4 Exiting from adjacent levels. No cumulative or contributing occupant loads from adjacent building levels need be considered when determining the required width of means of egress components from a given level.

Where an exit enclosure from an upper floor and a lower floor converge at an intermediate floor, the width of the exit from the intermediate floor shall be based on the sum of the occupant loads of such upper and lower floors.

1003.2.3.5 Two-way exits. Where exit or exit-access doorways serve paths of exit travel from opposite directions, the width of such exit or exit-access doorways shall be based on the largest occupant load served. Where such exit or exit-access doorways are required to swing in the direction of exit travel by Section 1003.3.1.5, separate exit width for each path of exit travel shall be provided based on the occupant load of the area that is served.

1003.2.4 Height. Except as specified elsewhere in this chapter, the means of egress system shall have a clear height of not less than 7 feet (2134 mm) measured vertically from the walking surface to the lowest projection from the ceiling or overhead structure.

EXCEPTION: Sloped ceilings permitted by Section 310.6.1.

1003.2.5 Exit continuity. The path of exit travel along a means of egress shall not be interrupted by any building element other than a means of egress component as specified in this chapter. Obstructions shall not be placed in the required width of a means of egress except projections permitted by this chapter. The required capacity of a means of egress system shall not be diminished along the path of exit travel.

1003.2.6 Changes in elevation. All exterior elevation changes and interior elevation changes of 12 inches (305 mm) or more along the path of exit travel shall be made by steps, stairs or stairways conforming with the requirements of Section 1003.3.3.3 or ramps conforming with the requirements of Section 1003.3.4.

Interior elevation changes of less than 12 inches (305 mm) along the path of exit travel serving an occupant load of 10 or more shall be by ramps conforming with the requirements of Section 1003.3.4.

[For SFM] In Group I, Division 1.1 Occupancies, any change in elevation of the floor in a hallway, corridor, exit passageway or exterior exit balcony serving nonambulatory persons shall be by means of a ramp.

EXCEPTIONS: 1. In Group R, Division 3 Occupancies and within individual dwelling units of Group R, Division 1 Occupancies.

2. Along aisles adjoining seating areas.

1003.2.7 Elevators or escalators. Elevators or escalators shall not be used as a required means of egress component.

1003.2.8 Means of egress identification.

1003.2.8.1 ***[For DSA/AC & SFM] Visual exit signs.*** For the purposes of Section *1003.2.8.1*, the term "exit sign" shall mean those required signs that *visually* indicate the path of exit travel within the means of egress system.

1003.2.8.2 Where required. The path of exit travel to and within exits in a building shall be identified by exit signs conforming to the requirements of Section 1003.2.8. Exit signs shall be readily visible from any direction of approach. Exit signs shall be located as necessary to clearly indicate the direction of egress travel. No point shall be more than 100 feet (30 480 mm) from the nearest visible sign.

EXCEPTIONS: 1. Main exterior exit doors that obviously and clearly are identifiable as exit doors need not have exit signs when approved by the building official.

2. Rooms or areas that require only one exit or exit access.

3. In Group R, Division 3 Occupancies and within individual units of Group R, Division 1 Occupancies.

4. Exits or exit access from rooms or areas with an occupant load of less than 50 where located within a Group I, Division 1.1, 1.2 or 2 Occupancy or a Group E, Division 3 day-care occupancy.

1003.2.8.3 Graphics. The color and design of lettering, arrows and other symbols on exit signs shall be in high contrast with their background. Exit signs shall have the word "EXIT" on the sign in block capital letters not less than 6 inches (152 mm) in height with a stroke of not less than $^3/_4$ inch (19 mm). The word "EXIT" shall have letters having a width of not less than 2 inches (51 mm) except for the letter "I" and a minimum spacing between letters of not less than $^3/_8$ inch (9.5 mm). Signs with lettering larger than the minimum dimensions established herein shall have the letter width, stroke and spacing in proportion to their height.

1003.2.8.4 Illumination. Exit signs shall be internally or externally illuminated. When the face of an exit sign is illuminated from an external source, it shall have an intensity of not less than 5 footcandles (54 lx) from either of two electric lamps. Internally illuminated signs shall provide equivalent luminance and be listed for the purpose.

EXCEPTIONS: *1.* Approved self-luminous signs that provide evenly illuminated letters that have a minimum luminance of 0.06 foot lambert (0.21 cd/m^2).

2. ***[For SFM]*** *Approved internally illuminated exit signs which use light-emitting diodes or electroluminescent lamps are not required to have two electric lamps.*

1003.2.8.5 Power source. All exit signs shall be illuminated at all times. To ensure continued illumination for a duration of not less than $1^1/_2$ hours in case of primary power loss, the exit signs shall also be connected to an emergency electrical system provided from storage batteries, unit equipment or an on-site generator set, and the system shall be installed in accordance with the Electrical Code. For high-rise buildings, see Section 403.

EXCEPTIONS: *1.* Approved self-luminous signs that provide continuous illumination independent of an external power source.

2. ***[For SFM]*** *The power supply for internally illuminated exit signs and exit path marking, which do not contain electric lamps, shall normally be provided by the premises' wiring system. In the event of its failure, power shall be automatically provided from storage batteries or an on-site generator set and the system shall be installed in accordance with the California Electrical Code.*

1003.2.8.6 [For DSA/AC & SFM] Tactile Exit Signage. *For the purposes of Section 1003.2.8.6, the term "tactile exit signs" shall mean those required signs that comply with Section 1117B.5.1-B.*

1003.2.8.6.1 [For DSA/AC & SFM] Where required. *Tactile exit signs shall be required at the following locations:*

1. Each grade-level exterior exit door shall be identified by a tactile exit with the word, "EXIT."

2. Each exit door that leads directly to a grade-level exterior exit by means of a stairway or ramp shall be identified by a tactile exit sign with the following words as appropriate:

A. "EXIT STAIR DOWN"

B. "EXIT RAMP DOWN"

C. "EXIT STAIR UP"

D. "EXIT RAMP UP"

3. Each exit door that leads directly to a grade-level exterior exit by means of an exit enclosure or an exit passageway shall be identified by a tactile exit sign with the words, "EXIT ROUTE."

4. Each exit access door from an interior room or area to a corridor or hallway that is required to have a visual exit sign, shall be identified by a tactile exit sign with the words, "EXIT ROUTE."

5. Each exit door through a horizontal exit shall be identified by a sign with the words, "TO EXIT."

1003.2.9 Means of egress illumination.

1003.2.9.1 General. Any time a building ***[for SFM]*** *or portion of a building* is occupied, the means of egress *serving the occupied portion* shall be illuminated at an intensity of not less than 1 footcandle (10.76 lx) at the floor level.

EXCEPTIONS: 1. In Group R, Divisions *2.1.1, 2.2.1, 2.3.1, 6.1.1, 6.2.1 and* 3 Occupancies and within individual units of Group R, Division 1 Occupancies.

2. In auditoriums, theaters, concert or opera halls, and similar assembly uses, the illumination at the floor level may be reduced during performances to not less than 0.2 footcandle (2.15 lx), provided that the required illumination be automatically restored upon activation of a premise's fire alarm system when such system is provided.

3. ***[For SFM]*** *Sleeping rooms in Group I Occupancies, and sleeping rooms in Group R, Divisions 2.1, 2.2, 2.3, 6.1 and 6.2 Occupancies.*

1003.2.9.2 Power supply. The power supply for means of egress illumination shall normally be provided by the premise's electrical supply. In the event of its failure, illumination shall be automatically provided from an emergency system for Group I, Divisions 1.1 and 1.2. ***[For SFM]*** *Occupancies in rooms or areas requiring two or more exits or exit access doorways, or a combination thereof and Group R, Divisions 2.1 and 2.2* Occupancies and for all other occupancies where the means of egress system serves an occupant load of 100 or more. Such emergency systems shall be installed in accordance with the Electrical Code.

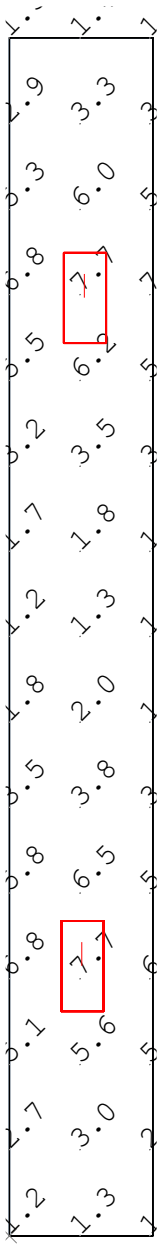
For high-rise buildings, see Section 403.

1003.2.10 Building accessibility. In addition to the requirements of this chapter, means of egress, which provide access to, or egress from, buildings for persons with disabilities, shall also comply with the requirements of Chapter 11.

EXCEPTIONS: *1.* ***[For HCD 1/AC, DSA/AC]*** *For housing accessibility, see Chapter 11A.*

2. ***[For DSA/AC]*** *For accessibility to public accommodations, commercial buildings and publicly funded housing, see Chapter 11B.*

1003.3 Means of egress components. Doors, gates, stairways and ramps that are incorporated into the design of any portion of the means of egress system shall comply with the requirements of this section. These means of egress components may be selectively included in the exit access, the exit or the exit discharge portions of the means of egress system.



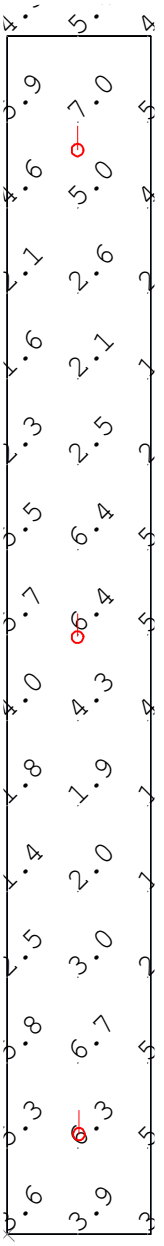
SAMPLE EGRESS PATH EM LIGHTING - Plan View

Scale: 1/8"=1'-0"

6' wide egress path, 30' fixture spacing, required UBC FC value = 1FC

2'x4' TROFFER W/B30 EM 2L 3000 LUMEN BAL.@10'0"

MICHAEL JOBE ENGINEERING	MILPITAS, CA 95035
3/23/2004	Prepared for: ELECTRICAL CONTRACTORS
	Project No.: SAMPLE PROJECT



SAMPLE EGRESS PATH EM LIGHTING - Plan View

Scale: 1/8"=1'-0"

6' wide egress path, 20' fixture spacing, required UBC FC value = 1FC

32W CF DOWN W/B30 EM 1L 2300 LUMEN BAL.@10'0"

3/23/2004	MICHAEL JOBE ENGINEERING	MILPITAS, CA 95035
	Prepared for: ELECTRICAL CONTRACTORS	Project No.: SAMPLE PROJECT

Lamp Photometrics

Horizontal Isofootcandle Distribution Curves for lamps used with emergency lighting products and remote fixtures

General Information

These curves allow a reasonable prediction of the footcandle levels that may be expected at various points from the light source. Actual levels of output intensity may differ by as much as ± 15%, due to normal variables inherent in the manufacturing process.
This data should only be used to develop a rough estimate of the type and number of fixtures required for emergency lighting layouts. In actual applications, variables such as the color and reflectivity of ceiling, wall and floor surfaces may greatly impact illumination performance.
The intent of emergency lighting is to provide a level of illumination sufficient to allow people to safely exit a building in case of a power failure or other emergency.
It is advisable to check actual illumination levels on-site to determine if code requirements have been met.

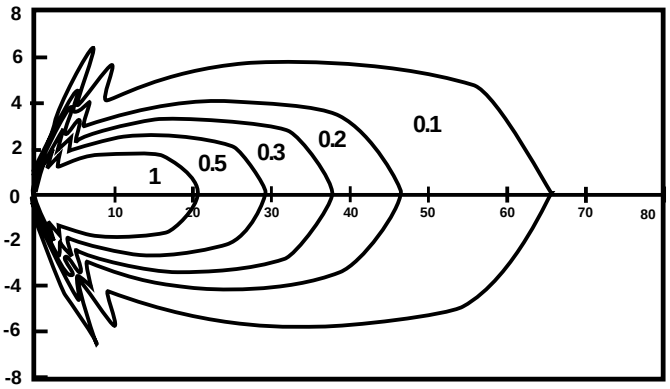
MR-16 Lamps (Halogen)

Lamp Data (Photometrics)

6-volt, 5.0-watt, MR-16 halogen lamp Horizontal

Lamp Type: MR-16 6V5W

Dual-Lite Part Number: 0110256

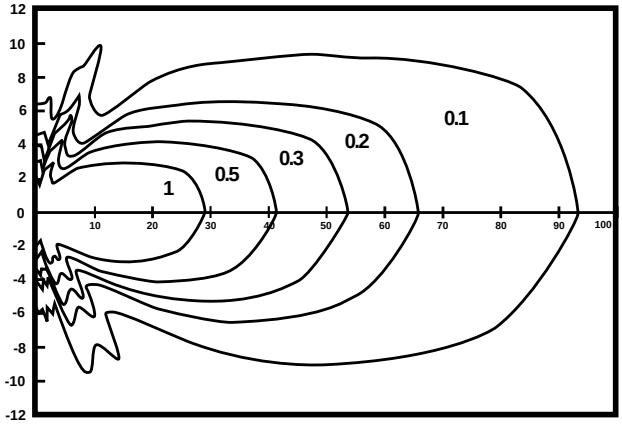


Lamp Data (Photometrics)

6-volt, 10-watt, MR-16 halogen lamp Horizontal

Lamp Type: MR-16 6V10W

Dual-Lite Part Number: 0110261

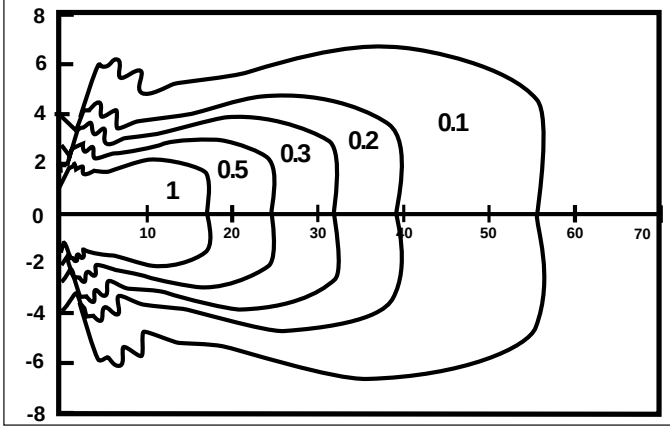


Lamp Data (Photometrics)

12-volt, 5.0-watt, MR-16 halogen lamp Horizontal

Lamp Type: MR-16 12V5W

Dual-Lite Part Number: 0110263

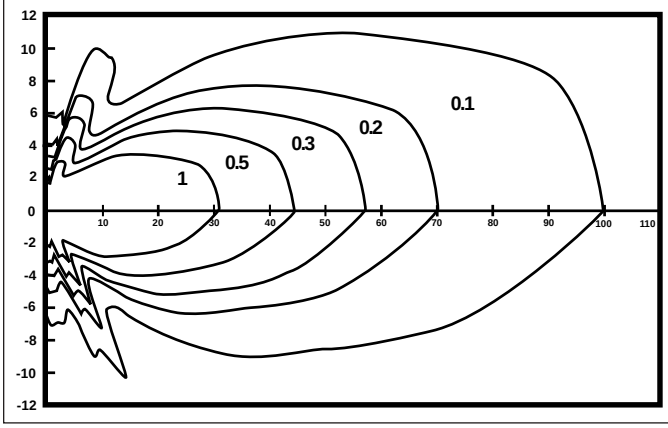


Lamp Data (Photometrics)

12-volt, 10-watt, MR-16 halogen lamp Horizontal

Lamp Type: MR-16 12V10W

Dual-Lite Part Number: 0110264



Hubbell Lighting, Inc.

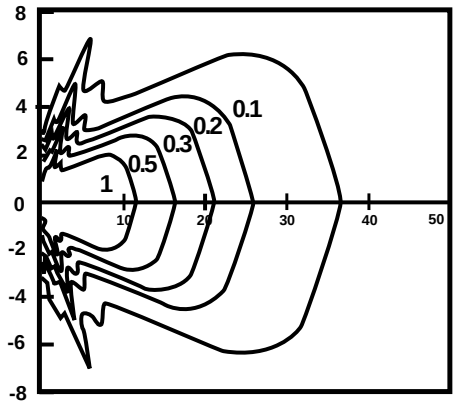
Sealed Beam Type Lamps (Incandescent)

Lamp Data (Photometrics)

4-volt, 5.0-watt, SBT incandescent lamp Horizontal

Lamp Type SBT4 Par 36

Dual-Lite Part Number 011025307

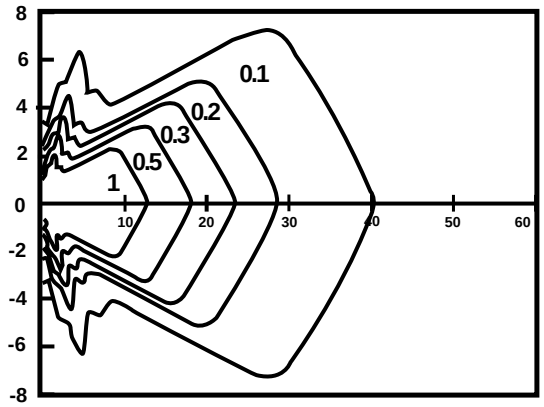


Lamp Data (Photometrics)

6-volt, 7.2-watt, SBT incandescent lamp Horizontal

Lamp Type SBT6 Par 36

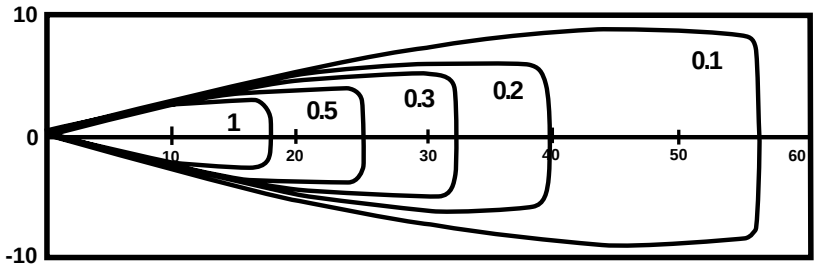
Dual-Lite Part Number 011017201



Lamp Data (Photometrics)

12-volt, 7.2-watt, SBT incandescent lamp Horizontal

Lamp Type SBT12 Par 36 **Dual-Lite Part Number** 011015801

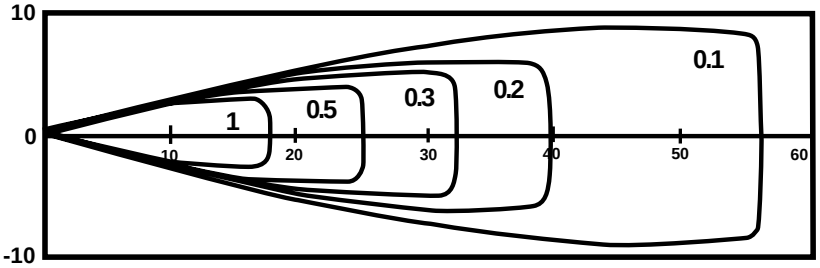


Sealed Beam Lamps (Incandescent)

Lamp Data (Photometrics)

6-volt, 7.2-watt, sealed beam incandescent lamp Horizontal

Lamp Type #7672 Par 36 **Dual-Lite Part Number** 0110172



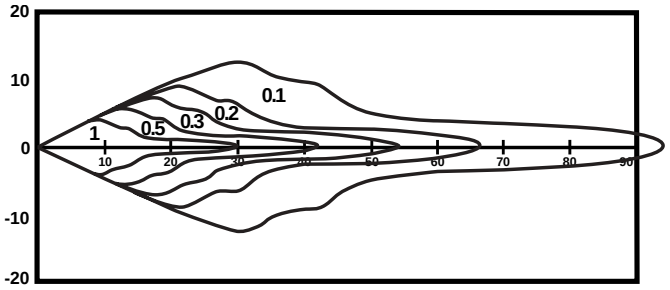
Sealed Beam Lamps (Incandescent) (cont.)

Lamp Data (Photometrics)

6-volt, 12-watt, sealed beam incandescent lamp
Horizontal

Lamp Type #4042 Par 36

Dual-Lite Part Number 0110175

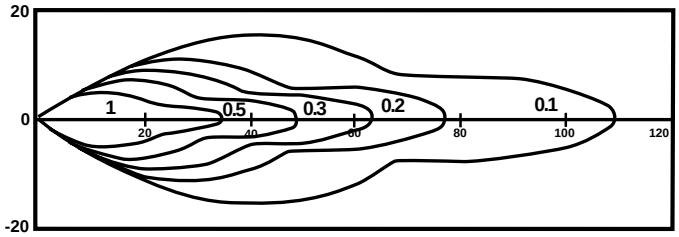


Lamp Data (Photometrics)

6-volt, 18-watt, sealed beam incandescent lamp
Horizontal

Lamp Type #4014 Par 36

Dual-Lite Part Number 0110127

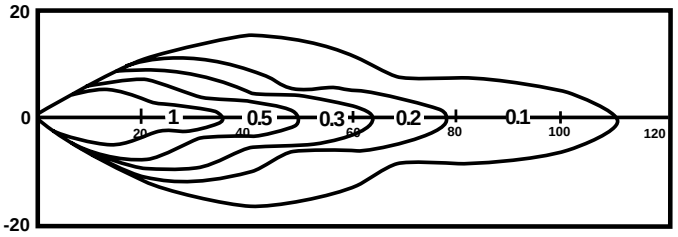


Lamp Data (Photometrics)

12-volt, 18-watt, sealed beam incandescent lamp
Horizontal

Lamp Type #4414 Par 36

Dual-Lite Part Number 0110128

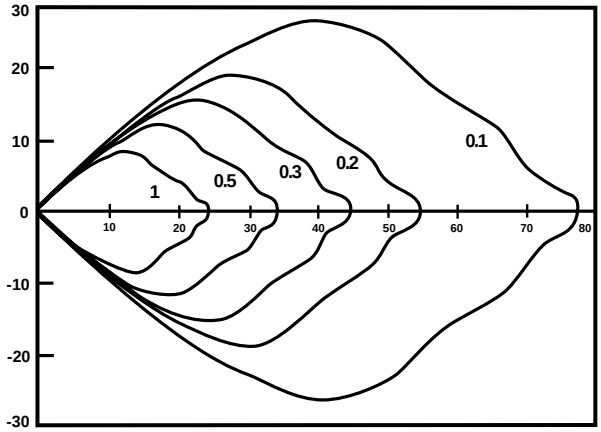


Lamp Data (Photometrics)

6-volt, 25-watt, sealed beam incandescent lamp
Horizontal

Lamp Type #4510 Par 36

Dual-Lite Part Number 0110041

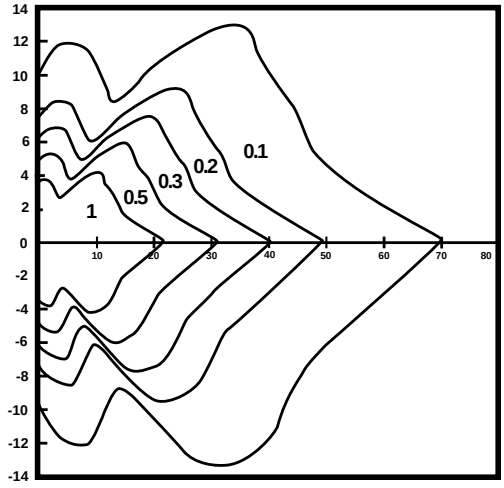


Lamp Data (Photometrics)

12-volt, 25-watt, sealed beam incandescent lamp
Horizontal

Lamp Type #4446 Par 36

Dual-Lite Part Number 0110132



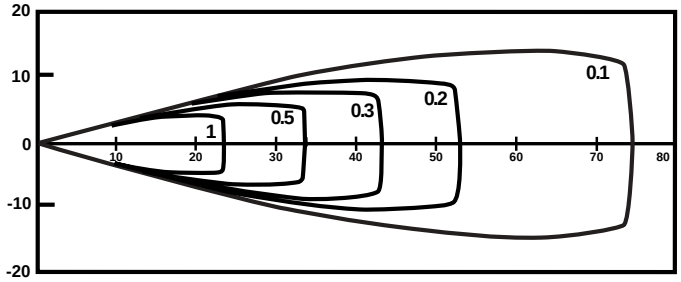
Sealed Beam Lamps (Halogen)

Lamp Data (Photometrics)

6-volt, 8-watt, sealed beam halogen lamp
Horizontal

Lamp Type #7551 Par 36

Dual-Lite Part Number 0110162

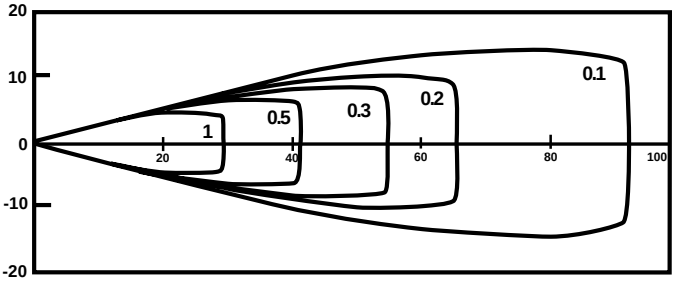


Lamp Data (Photometrics)

6-volt, 12-watt, sealed beam halogen lamp
Horizontal

Lamp Type #H7553 Par 36

Dual-Lite Part Number 0110159

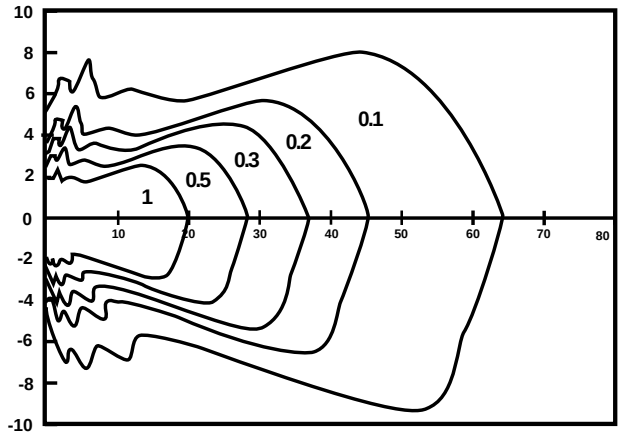


Lamp Data (Photometrics)

12-volt, 8-watt, sealed beam halogen lamp
Horizontal

Lamp Type #H7555 Par 36

Dual-Lite Part Number 0110189

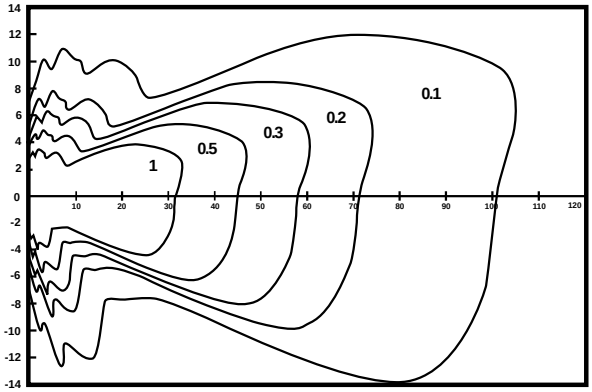


Lamp Data (Photometrics)

6-volt, 20-watt, sealed beam halogen lamp
Horizontal

Lamp Type #H7554 Par 36

Dual-Lite Part Number 0110157



Lamp Data (Photometrics)

12-volt, 12-watt, sealed beam halogen lamp
Horizontal

Lamp Type H7557 Par 36

Dual-Lite Part Number 0110190