PowerCraft

Emergency Lighting Solutions



1

Understanding the Code of Practice and the Design of Emergency Lighting in Buildings

2

Part 1

3

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The primary objective of Emergency Lights is the provision of visual condition that can alleviate panic and facilitate safer evacuation of buildings' occupants during failure of normal power supply / lighting, in clear (non-smoke) and smoke filled conditions

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- Emergency Lighting
  - Escape Lighting
    - Escape Route Lighting
    - Open Area / Anti Panic Lighting
    - High Risk Task Area Lighting
  - Standby Lighting

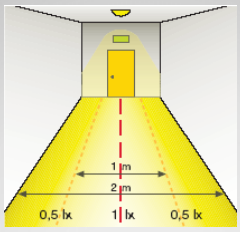
5

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Escape Route Lighting

SS 563 : Part 1 : 2010 (Clause 6)

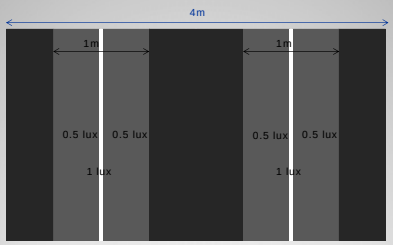
1.0 lux minimum on the centre line of the escape route



6

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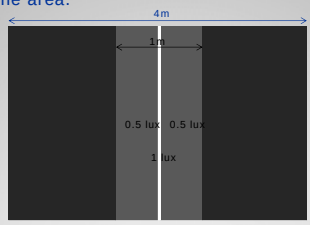
Wider escape routes can be treated as a number of 2m wide strips to allow passage for evacuation if needed.



7

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If 2m wide escape routes is sufficient for max. no. of people to escape the building, a 2m wide route can be designated through the area.



Area > 60m^2 should be treated as an open area (Min. 0.5 lux)

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Open area (Anti-panic) Lighting

SS 563 : Part 1 : 2010 (Clause 7)

- The horizontal illuminance shall not be < 0.5 lux on the floor level at each point of the empty core area which excludes a border of 0.5m of the perimeter of the area.
- The ratio of the maximum to minimum illuminance shall not be > 40:1
- Minimum value for the color rendering index R_a from a lamp shall be >40

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High Risk Task Area Lighting

SS 563 : Part 1 : 2010 (Clause 8)

- Not less than 10% of the required maintained illuminance. It shall not less than 15lx
- It shall be free of stroboscopic effects
- Illuminance ratio shall not be > 10:1
- Minimum value for the colour rendering index R_a of a lamp shall be >40

(To provide illumination for the safety of people involved in a potentially dangerous process or situation and to enable proper shut down procedures for the operator and other occupants of the premises, e.g. Medical operating rooms)

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Duration of Operation

SS 563 : Part 2 : 2010 (Clause 6.2)

- Minimum rated duration = 1 hour, or longer if required by the relevant authority
- 50% longer when the product is new.

The greater initial duration is required to allow for the depreciation in battery capacity that will occur with time

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Standby Lighting

SS 563 : Part 1 : 2010 (Clause 9)

- Standby lighting shall not be used for escape lighting purpose
- If it is modified to be used for emergency lighting purpose, it shall comply with the relevant requirement of the standard

(To enable normal activities to continue substantially unchanged)

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The Required Locations for Emergency Escape Lighting

SS 563 : Part 1 : 2010 (Clause 5)

a) at each exit door intended to be used in an emergency;
b) at stairs so that each flight of stairs receives direct light including especially the top and the bottom steps;
c) at any other change in vertical level;
d) at mandatory emergency exits and safety sign locations;
e) at each change of direction;

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The Required Locations for Emergency Escape Lighting

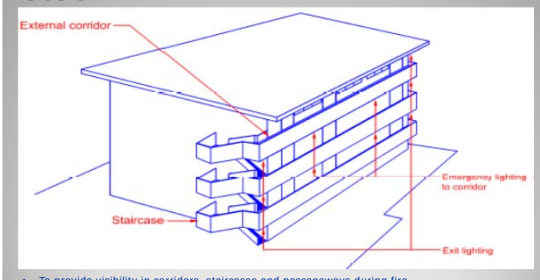
SS 563 : Part 1 : 2010 (Clause 5)

Continued…

f) at each intersection of corridors;
g) at each final exit;
h) at each first aid post;
i) at each piece of fire fighting equipment and call point;
j) if smoke is of prime concern, it is recommended to mount luminaires at least 0.5m below the ceiling

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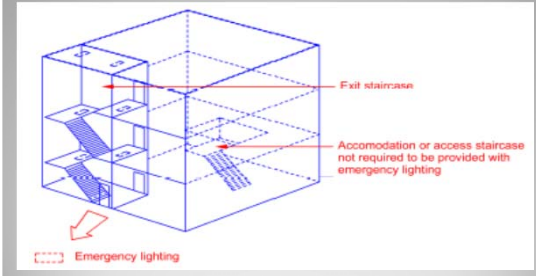


- To provide visibility in corridors, staircases and passageways during fire
- Shall be self-sufficient in the provision of artificial lighting without any reliance on other or external sources

Source of illustration: Fire Code 2013 Handbook Chapter 8

15

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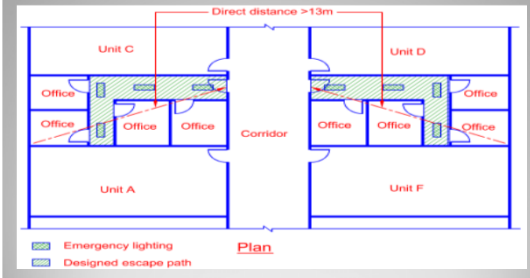


- To provide visibility in corridors, staircases and passageways during fire
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Source of illustration: Fire Code 2013 Handbook Chapter 8

16

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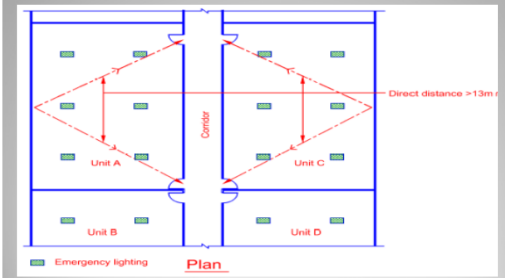


- Room having a direct distance > 13m and designed with defined escape path shall be provided with emergency light

Source of illustration: Fire Code 2013 Handbook Chapter 8

17

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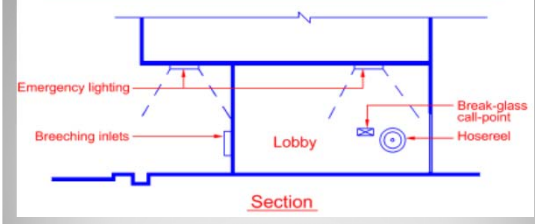
- Room having a direct distance > 13m and not provided with defined escape path or where escape path is not defined, emergency lighting shall be provided to cover the whole floor space

Source of illustration: Fire Code 2013 Handbook Chapter 8

18

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Emergency lighting to breeching inlets/alarm call point



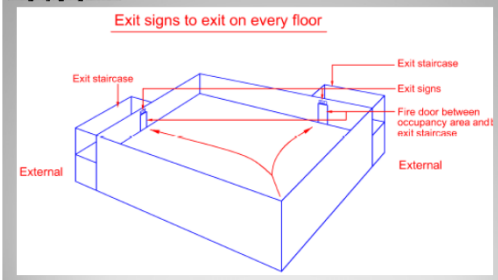
- To provide the required illumination automatically at places where fire fighting facilities are provided e.g. breeching inlets, fire alarm panels, fire alarm call points etc.
- To facilitate the occupants and fire fighters to locate the fire fighting facilities

Source of illustration: Fire Code 2013 Handbook Chapter 8

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Exit signs to exit on every floor

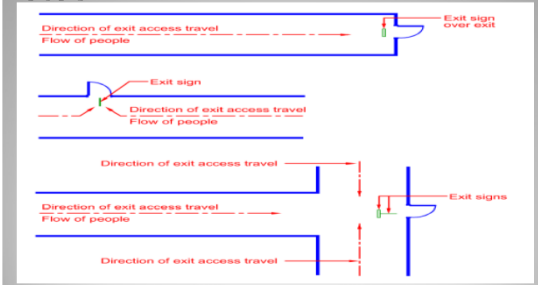


- The entrance to every exit on every floor shall be clearly indicated by an exit sign placed over the exit door. Such signs shall be placed so as to be clearly visible at all time

Source of illustration: Fire Code 2013 Handbook Chapter 8

20

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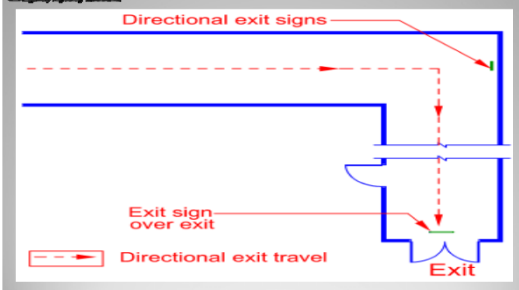


- Directional signs shall be provided to serve as guides from all portions of the corridors or floors where the locations of the exits may not be readily visible

Source of illustration: Fire Code 2013 Handbook Chapter 8

21

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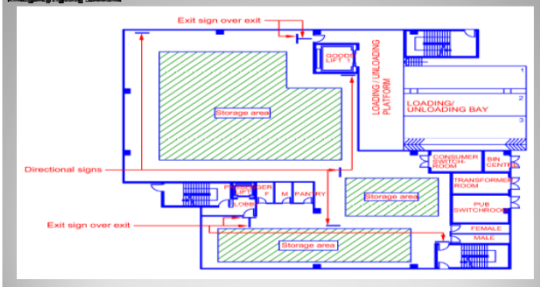


- Sign placement shall be such that no point along the exit route is more than 30m from the nearest visible sign

Source of illustration: Fire Code 2013 Handbook Chapter 8

22

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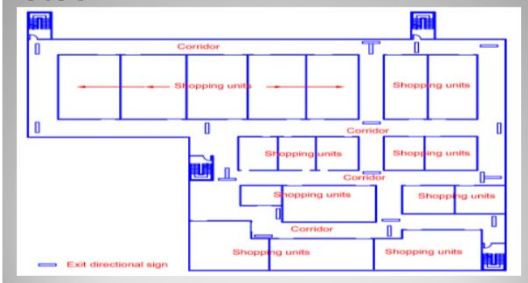


- In factory/ warehouse premises, with high storage rack areas, the vision to exits and directional exit signs may be blocked, hence the signs are shifted or additional signs should be provided to help occupants to evacuate in times of emergency

Source of illustration: Fire Code 2013 Handbook Chapter 8

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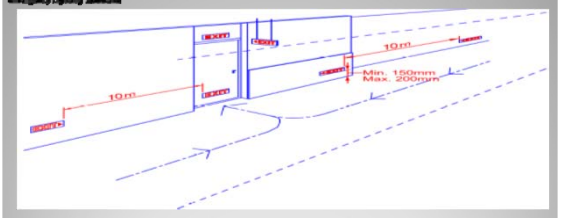


- In shopping centre/ institutional occupancy areas, exit directional signs are to be placed at strategic locations so that members of public/ shoppers could rely on the signs to evacuate in times of emergency

Source of illustration: Fire Code 2013 Handbook Chapter 8

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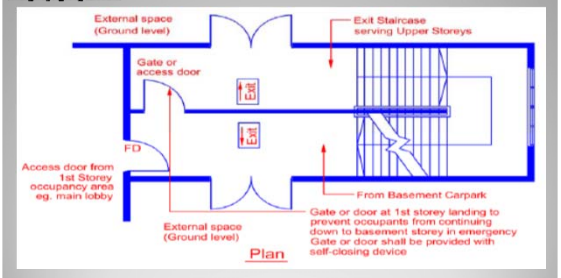


- Additional low level or floor mounted exit and exit directional sign shall be provided in hotel accommodation floors including boarding houses
- They are not intended to replace standard exit signs but are designed to aid building occupants to get to the exit in a smoke-filled environment
- The bottom of these signs shall not be less than 150mm or more than 200mm above the floor level. It shall be placed at not more that 10m interval.
- For exit door, the sign shall be on the door or adjacent to the door with the closest edge of the sign within 100mm of the door frame

Source of illustration: Fire Code 2013 Handbook Chapter 8

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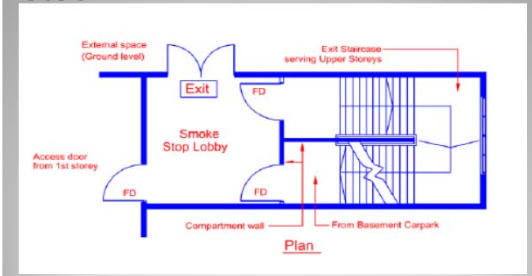


- To prevent occupants exiting continuously from upper storey into the basement floor during an emergency, appropriate signage should be provided inside the staircase enclosure to direct occupants out of the building at ground level

Source of illustration: Fire Code 2013 Handbook Chapter 8

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- To prevent occupants exiting continuously from upper storey into the basement floor during an emergency, appropriate signage should be provided inside the staircase enclosure to direct occupants out of the building at ground level

Source of illustration: Fire Code 2013 Handbook Chapter 8

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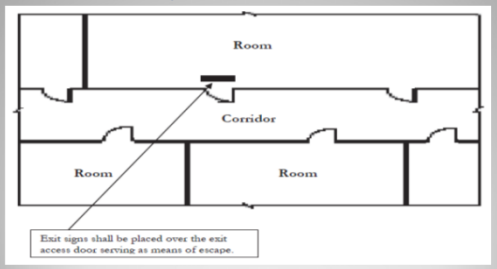
- For Corridors and Lobbies: Emergency lighting and directional exit signs shall be provided for the corridors for escape routes, common lobbies, smoke stop lobbies and fire fighting lobbies
- For Occupied Areas: Emergency lighting shall also be provided in the following locations:
  - Lift cars;
  - Fire command centres;
  - Generator rooms;
  - Basement car parks;
  - Fire pump rooms;
  - Area of refuge within the same building

Source: Fire Code 2013 Handbook Chapter 8

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Provision of Exit Signs for Room



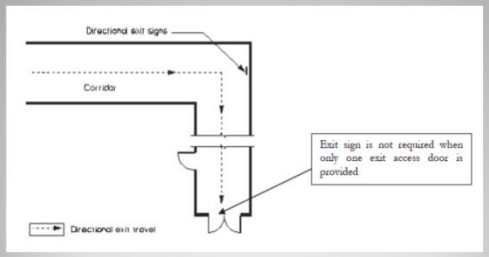
- When a room is provided with more than one door, exit signs shall be placed over the exit access doors serving as means of escape

Source of illustration: Fire Code 2013 Appendix 24

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Provision of Exit Signs for Room



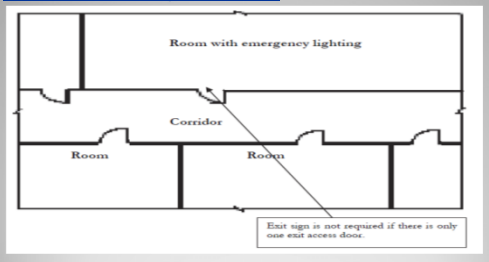
- In a room provided with emergency lighting and where the line of sight to the exit access door is obstructed, directional sign shall be provided. When only one exit access door is provided in the room, exit sign is not required at the door

Source of illustration: Fire Code 2013 Appendix 24

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Provision of Exit Signs for Room



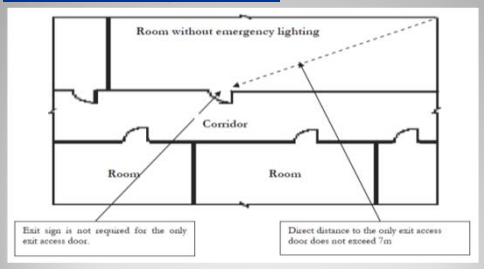
- In a room provided with emergency lighting, exit sign is not required if there is only one exit access door

Source of illustration: Fire Code 2013 Appendix 24

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Provision of Exit Signs for Room



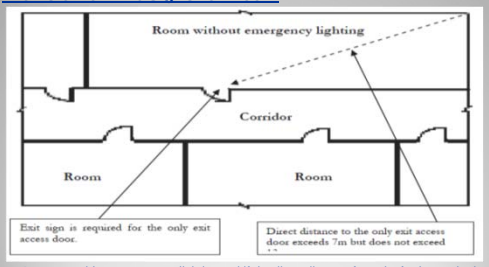
- In a room without emergency lighting and if the direct distance from the furthest point in the room to the only exit access door does not exceed 7m, exit sign is not required

Source of illustration: Fire Code 2013 Appendix 24

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Provision of Exit Signs for Room



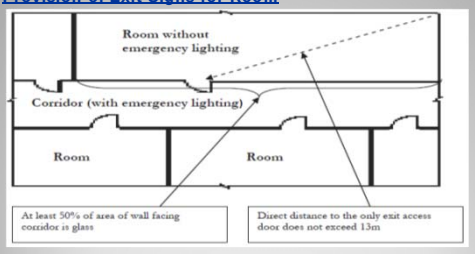
- In a room without emergency lighting and if the direct distance from the furthest point in the room to the only exit access door exceed 7m but does not exceed 13m, exit sign shall be provided over the door. Alternatively, the room can be provided with emergency lighting

Source of illustration: Fire Code 2013 Appendix 24

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Provision of Exit Signs for Room



- When the wall of a room without emergency lighting comprises of not less than 50% glazing and is facing a corridor (with emergency lighting) or external of a building, exit sign over the only exit access door is not required if the furthest point in the room to the exit access door does not exceed 13m

Source of illustration: Fire Code 2013 Appendix 24

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Maintenance procedures for self-contained emergency escape luminaires and exit signs

SS 563 : Part 2 : 2010 (Clause 13)

13.2 Monthly procedures:
Observe that the self contained emergency escape luminaires and exit signs function satisfactorily. Replace any defective lamp

13.3 Twelve-monthly procedures:
The procedures prescribed below shall carried out at intervals of not greater than 12 months

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13.3.1 Battery discharge test

13.3.1.1 Where manual battery discharge facilities are provided, the following procedures shall be carried out:

(a)Operate the emergency escape luminaires and exit signs from their battery supply by simulating failure of the monitored supply. The luminaire and exit signs shall remain illuminated for not less than the required rated period

(b) Restore the emergency escape luminaires and exit signs to normal condition and check that the battery charger operation indicator functions correctly

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13.3.2 Clean all light-emitting and/or reflecting surfaces

13.3.4 Replace any defective lamp

13.3.5 Visually check to ensure the emergency escape luminaires and exit signs operate in correct relationship to the normal lighting in the designated area

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Part 2

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PowerCraft Emergency Lighting Solutions

- ✓ Improve Productivity
  - ➢ New innovative Quick Fit Exit Signs and Side Mount Bracket
- ✓ Better Performance
  - ➢ Better light distribution resulting in greater spacing distance for Emergency Lights
  - ➢ Providing more economical solutions and lower energy use

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PowerCraft Emergency Lighting Solutions

- ✓ Higher Reliability Long Product Life
  - ➢ Full life test on electronic components, batteries and LEDs (in our reliability lab)
  - ➢ Full certification to IEC 61951 by PSB for our high temp NiCd batteries
  - ➢ High efficiency chargers and LED drivers result in lower power consumption and lower operating temperatures ➔ improved reliability and product life.

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PowerCraft Emergency Lighting Solutions

1. Exit Luminaire
2. Emergency Luminaire
3. Conversion Kits

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Quick Fit Series



Surface mount



Recessed mount

- *Mode of Operation: Maintained*
- *Lamp: 1.2W White SMD LED module*
- *life-span: >50,000 hours*
- *Rated duration: 3 Hours*
- *Diffuser: Acrylic plate (fire retardant)*
- *Fitting Construction: Injection Moulded Polycarbonate with fire retardant (UL94), high impact material*
- *Light Weight: Approximately 1.2 Kg*



Surface wall/ceiling mount



Surface mount with Side Mounting Bracket??



Surface mount with Side Mounting Bracket??

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Quick Fit Series



Surface mount with Side Mounting Bracket!

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Quick Fit Series

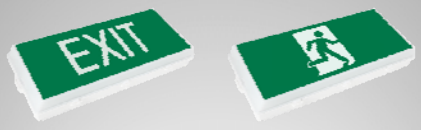


Recessed ceiling mount

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Weatherproof LED



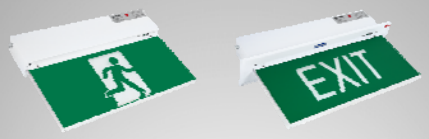
Surface wall/Semi-recessed wall mount

- Mode of Operation: Maintained
- Lamp: 1.2W White SMD LED module
- life-span: >50,000 hours
- Rated duration: 3 Hours
- Fitting Construction/Diffuser: Injection Moulded Polycarbonate with fire retardant (UL94), high impact material
- Light Weight: Approximately 1.2 Kg

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Slimline LED



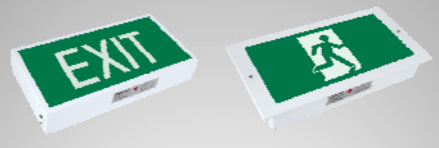
Surface mount (Recessed mount option available)

- Mode of Operation: Maintained
- Lamp: 1.2W White SMD LED module
- life-span: >50,000 hours
- Rated duration: 3 Hours
- Diffuser: Acrylic plate (fire retardant)
- Fitting Construction: Electro galvanized steel. Epoxy powder coating for casing and gear tray
- Weight: Approximately 2.1 Kg

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Box LED



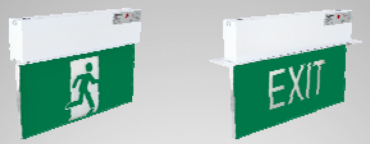
Suspended/ Surface ceiling/ Surface wall mount

- Mode of Operation: Maintained
- Lamp: 1.2W White SMD LED module
- life-span: >50,000 hours
- Rated duration: 3 Hours
- Diffuser: Acrylic plate (fire retardant)
- Fitting Construction: Electro galvanized steel. Epoxy powder coating for casing and gear tray
- Weight: Approximately 1.5 Kg

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Slimline Surface/ Recess CCFL



Surface mount (Recessed mount option available)

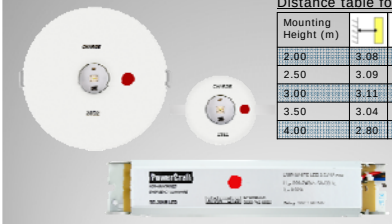
- Mode of Operation: Maintained
- Lamp: 1x4W Cold Cathode Fluorescent Lamp (CCFL)
- life-span: >30,000 hours
- Rated duration: 2 Hours
- Diffuser: Acrylic plate (fire retardant)
- Fitting Construction: Electro galvanized steel. Epoxy powder coating for casing and gear tray
- Weight: Approximately 2.1 Kg

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Recess LED

Distance table for even escape routes

Mounting Height (m)					
2.00	3.08	8.19	8.13	8.08	2.97
2.50	3.09	8.60	8.54	8.47	3.09
3.00	3.11	8.86	8.79	8.71	3.00
3.50	3.04	9.01	8.94	8.85	2.94
4.00	2.80	9.04	8.97	8.86	2.70



- Mode of Operation: Non-Maintained
- Lamp: 3W / White LED
- life-span: >50,000 hours
- Rated duration: 3 Hours (standard)
- Fitting Construction: Die casted aluminum epoxy powder coated reflector. Galvanized zinc coated charger housing
- Weight: Approximately 0.3Kg

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Self-Contained / Sustained LED

Distance table for even escape routes

Mounting Height (m)					
2.00	2.86	7.90	7.77	7.82	2.86
2.50	2.98	8.28	8.14	8.16	2.98
3.00	2.90	8.52	8.37	8.36	2.90
3.50	2.83	8.61	8.47	8.43	2.83
4.00	2.60	8.59	8.44	8.40	2.60



- Mode of Operation: Non-Maintained
- Lamp: 3W / White LED
- life-span: >50,000 hours
- Rated duration: 2 Hours / 3 Hours
- Fitting Construction: Galvanized zinc coated charger housing
- Weight: Approximately 0.3Kg

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Self-Contained / Sustained LED



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Surface LED

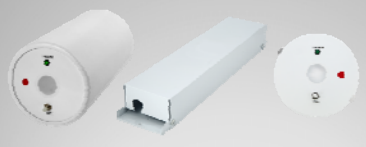


- Mode of Operation: Non-Maintained
- Lamp: 3W / White LED
- life-span: >50,000 hours
- Rated duration: 3 Hours
- Fitting Construction: Epoxy powder coated cold-rolled steel, Aluminum cylinder.
- Weight: Approximately 1.2Kg

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Surface / Recess LED for High Ceiling Mounting



- Mode of Operation: Non-Maintained / Maintained
- Lamp: 10W White LED
- life-span: >50,000 hours
- Rated duration: 2 Hours
- Fitting Construction: Aluminum epoxy powder coated reflector. Steel or Aluminum (charger housing)
- Weight: Approximately 1.3Kg

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Twin-spot LED

Distance table for even escape routes

Mounting Height (m)					
2.00	2.65	6.82	7.19	8.38	3.20
2.50	3.09	7.77	8.07	9.03	3.57
3.00	3.11	8.39	8.77	9.63	3.58
3.50	2.36	8.73	9.43	10.15	3.50
4.00	2.50	8.25	9.31	10.45	3.48



With weatherproof enclosure housing

- Mode of Operation: Non-Maintained
- Lamp: 2x3W High Power LED Module
- life-span: >50,000 hours
- Rated duration: 2 Hours (3 Hours on request)
- Fitting Construction: Injection Moulded Fire retardant (UL94) housing and diffuser
- Weight: Approximately 1.5Kg

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Weatherproof Twin Spot LED



- Mode of Operation: Non-Maintained
- Lamp: 2x3W High Power LED Module
- life-span: >50,000 hours
- Rated duration: 2 Hours
- Fitting Construction: Injection Moulded Fire retardant (UL94) housing and diffuser
- Weight: Approximately 2.5Kg

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T5 Fluorescent Bulkhead

Distance table for even escape routes

Mounting Height (m)					
2.00	2.30	5.89	6.72	7.46	2.75
2.50	2.33	6.28	7.06	7.76	2.68
3.00	2.18	6.47	7.17	7.84	2.61
3.50	2.02	6.50	7.14	7.74	2.36
4.00	1.62	6.37	6.94	7.50	1.87



Model: EL28NM

- Mode of Operation: Non-Maintained
- Lamp: 2x8W T5 Fluorescent
- Rated duration: 2 Hours (3 Hours on request)
- Degree of protection: IP54 (IP65 with test switch mounted internally)
- Fitting Construction: Injection Moulded with fire retardant (UL94), high impact material
- Weight: Approximately 1.0Kg

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LED Bulkhead Bulkhead

Distance table for even escape routes

Mounting Height (m)					
2.00	2.97	7.31	7.84	7.92	2.97
2.50	3.09	8.01	8.60	8.69	3.09
3.00	3.22	8.54	8.69	8.70	3.11
3.50	3.26	8.71	8.90	8.84	3.15
4.00	3.13	8.95	9.09	8.97	3.24



Model: EL-LED2-NM

- Mode of Operation: Non-Maintained
- Lamp: 2x3W High Power LED Module
- Rated duration: 2 Hours (3 Hours on request)
- Degree of protection: IP54 (IP65 with test switch mounted internally)
- Fitting Construction: Injection Moulded with fire retardant (UL94), high impact material
- Weight: Approximately 1.0Kg

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Fluorescent Conversion Kits



ECP- Professional Range

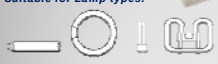


ECL-Low Profile Range



ECS- Standard Range

Suitable for Lamp types:



- Mode of Operation: Maintained / Non-Maintained
- Lamp Type: T5, T8 Fluorescent, 4 Pin CFL and 2D Lamps
- Rated duration: 1 Hour / 2 Hours / 3 Hours
- Casing Construction: Electro-galvanized steel

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LED Conversion Kits



ECL- LED Range

- Mode of Operation: Maintained / Non-Maintained
- Lamp Type: 3-70V LED load
- Rated duration: 2 Hours / 3 Hours
- Casing Construction: Electro-galvanized steel

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Emergency Lighting Solutions

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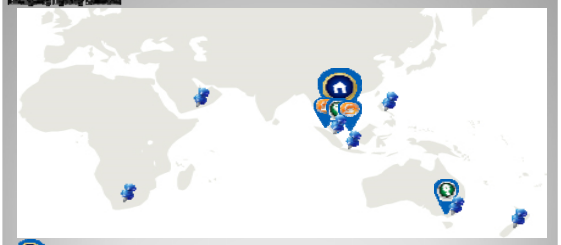
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PowerCraft Electronics Pte. Ltd. was established in year 2000. We design and manufacture extensive range of emergency lightings luminaires, EXIT signs and emergency lighting conversion kits for commercial and industrial use. The products are certified to Singapore, Australia and European Standards. Certification under Singapore Product Listing Scheme (PLS), TUV-SUD PSB.

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HQ: Singapore

Sales: Singapore, Southeast Asia, Australia, New Zealand, Middle East, South Africa

Product Development: Singapore & Australia

Production: Singapore & Indonesia

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Project Reference



NUH Medical Center



Toa Payoh SAFRA



ITE Central



CT Hub



Greenwich



Kovan Residences

76

Project Reference


V Hotel @ Lavender


Punggol Waves (HDB)


Resort World Sentosa


The Elitist



One Commonwealth

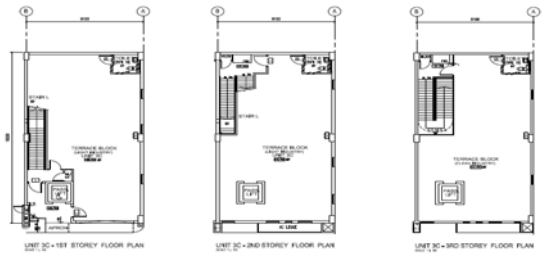

Synergy @ KB

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Lux Simulation

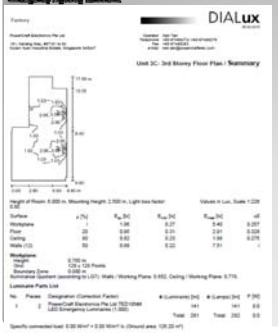
NEED ANOTHER EM. LIGHT TO MEET 0.5 LUX IN FACTORY?

EMERGENCY LIGHT (EQUIVALENT TO "MICKEY MOUSE")



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Lux Simulation

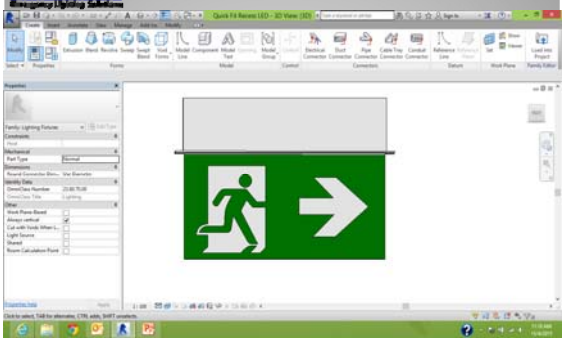




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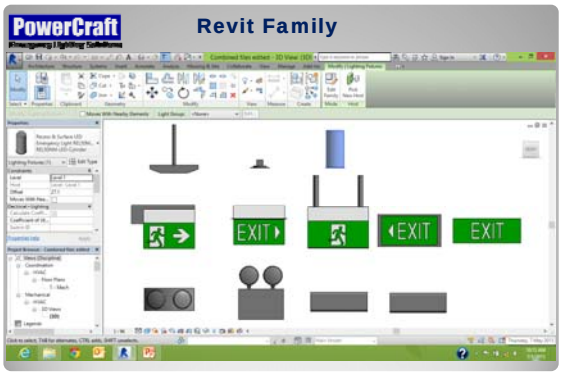
Revit Family



80

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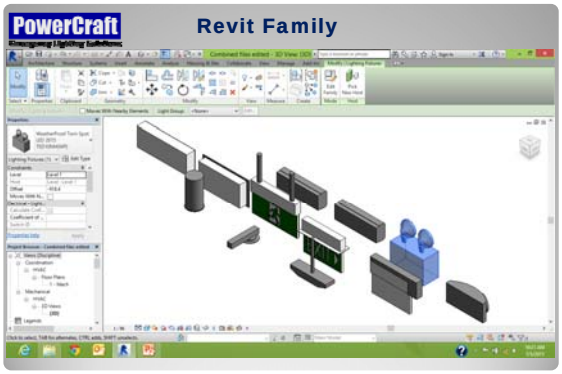
Revit Family



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PowerCraft

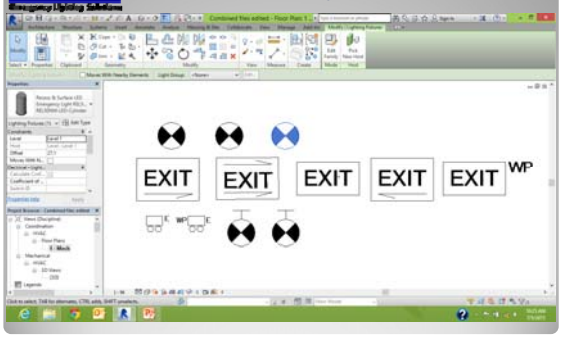
Revit Family



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Revit Family



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Part 3

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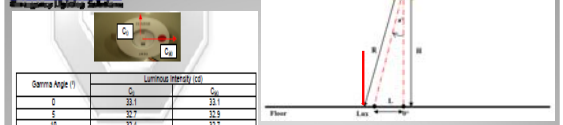
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Exercise:

Lux level and
Spacing/Distance Calculation

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Gamma Angle (γ)	Luminous Intensity (cd)	
	C_0	C_{90}
0	33.1	33.1
5	32.7	32.9
10	32.4	32.7
15	31.8	32.4
20	31.2	31.9
25	30.4	31.3
30	29.6	30.7
35	28.8	29.9
40	27.9	29.2
45	26.8	28.2
50	25.7	26.8
55	24.5	25.5
60	23.5	24.4
65	22.5	23.4
70	21.4	22.1
75	4.1	4.0
80	2.6	2.4
85	1.2	1.1
90	0.0	0.0

given:
H=3m, a^o=55° at C_o Plan
$E_{v(lx)}=(I_{v(cd)}/R^2)XCOSa^o$
Please find:
L and Lux level on the surface normal?

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Gamma Angle (γ)	Luminous Intensity (cd)	
	C_0	C_{90}
0	33.1	33.1
5	32.7	32.9
10	32.4	32.7
15	31.8	32.4
20	31.2	31.9
25	30.4	31.3
30	29.6	30.7
35	28.8	29.9
40	27.9	29.2
45	26.8	28.2
50	25.7	26.8
55	24.5	25.5
60	23.5	24.4
65	22.5	23.4
70	21.4	22.1
75	4.1	4.0
80	2.6	2.4
85	1.2	1.1
90	0.0	0.0

$COSa^o=H/R$
$R=3/COS55^o=5.23m$
$R^2=L^2+H^2$
$L=\sqrt{(5.23^2-3^2)}=\underline{4.28m}$
$E_{v(lx)}=(I_{v(cd)}/R^2)xCOSa^o$
$=(24.5/5.23^2)xCOS55^o$
$=\underline{0.51lx}$

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Emergency Lighting Solutions

Thank you

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