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**Emergency Lighting
New Developments in Safety
Lighting systems and
Dynamic Safety Signage Systems**

Produced by Chris and Ian Watts

Improving the contribution of Emergency Lighting to the safety of premises in BS 5266-1

Current situation - Emergency escape lighting

Provides indication and illumination of exit routes to enable them to be used at all times

New Developments - Safety lighting

Provides illumination to protect occupants who remain in a premises during a supply failure.

Dynamic Safety Signage Systems

Input of the precise location of fire and other hazards enables occupants to be directed to the safest exit routes.



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The way premises are now likely to be operated in a mains supply failure require consideration.

For many premises it may not be necessary or appropriate to evacuate the occupants just because of a failure of the supply to the normal lighting. In this case precautions need to be taken to enable occupants to remain on the premises safely. This is known as –

Emergency Safety Lighting

BS 5266-1 now gives guidance to assist the Fire Risk assessor/ and client to decide on the appropriate Emergency Safety Lighting needed if the building is to stay occupied during a supply failure and a suitable light levels, duration and controls to be used.



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Types of emergency lighting

Emergency Lighting

Emergency Escape Lighting

Standby Lighting

Escape Route
Lighting &
safety signs

Open Area
Lighting

High Risk
Task
Area Lighting

Additional Emergency Safety Lighting
for premises not evacuated in supply
failure

Types of emergency lighting

Mains Supply failure (either total or local) Fig 1

Emergency
escape lighting

Immediate total
evacuation of
the premises

Emergency safety lighting

Depending on risk, the occupants may be allowed to stay in the premises in the event of failure of the normal lighting supply:

- a) While there is at least 1 h duration left in the emergency lighting system;
- b) If the system allows occupants to be directed to a low risk location; Later escape evacuation is either by switched Luminaires or escorting safety wardens
- c) If the risk is minimal, e.g. if there is adequate daylight in the building

Standby
lighting

Normal activities can continue but additional precautions are needed to meet escape or safety requirements

The scope of BS 5266-1 has been extended to cover recommendations for premises where occupants may chose to remain inside during mains supply failures

Categories are now -

Escape lighting as previously covered (normally 3 hrs)

Safety lighting to protect occupants who stay put in the event of a supply failure by ensuring that the areas occupied are safe for the activities to be conducted as well as meeting **Escape lighting** requirements. These systems should have automatic testing to ensure the duration can be verified.

Standby lighting providing full illumination, enabling normal activities to continue, this needs special protection to also meet **Escape lighting** system requirements.



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Consultation recommendations

Should define the way in which the system is intended to operate, including information as to –

Whether the premises are to be evacuated immediately or stay in the event of failure of the supply to the normal lighting,

If a stay put solution is agreed, procedures for maintaining safety should be determined, including:

Actions to be taken at the end of emergency duration.

How to warn the occupants if they then need to evacuate the premises;

How to direct or escort the occupants to safe refuges,

It is **strongly** recommended that an automatic test system is used (it will regularly check battery duration).



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Safety Lighting to comply to BS 5266-1

Full Escape lighting requirements must also be met.

Then a Risk Assessment should be made of the protection of occupants these should cover

Increased areas that may need illumination, rooms smaller than 60 m² may not need luminaires for escape but would as a safe environment for long term occupation.

- Higher light levels are likely to be needed in many areas to support activities being conducted
- The safety lighting format supports the levels for action recommended in the current BS 5266-1 Appendix F giving typical illuminances for specific locations



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Escape Lighting	As now	0.5 – 1 lux
Low visibility task	Locating objects ie first aid box	5 Lux
Medium task	Reading 10 pt printed matter	15 Lux
Delicate work	Completing dental work etc.	50 Lux
High risk (EN 1838)	Physical risk to occupants	10-100 % Of mains



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High Risk Task areas

If emergency escape lighting is required 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 safety of the operator and other occupants, the illuminance value should be **not less than 10% of the average** of the normal lighting at the location of the risk.

NOTE 1 Some activities might need considerably higher illuminance than the minimum value in EN 1838

Dangerous processes make the initial period important, the time for the full emergency escape lighting to activate should be not less than **0.5 s**.



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Design implications for safety lighting systems

Risks to occupants staying put during extended supply failures, can be compensated for by appropriate controls and operation of the emergency lighting system.

In some cases such as theatres the audience may be allowed to remain for 2 hours of a 3 hour system.

Or systems may be used where the discharge duration can be split into two separate intervals. After an initial period during which occupants can be moved to safe refuges, the emergency lighting systems may be switched off until required for emergency evacuation, to be switched back on either by manual control or by operation of a fire alarm system. (rest mode).



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Consideration of other factors

Activities might require higher levels of illumination, either for shutting down processes prior to evacuation or during the stay-put activities. Luminaires with high outputs can provide suitable levels of emergency illumination to enable essential tasks to be performed.

Some low risk premises may be safe for occupants to stay in during daylight hours.

If manual patrols are required to guide occupants to places of safety, they can be provided with hand lamps conforming to [BS EN 60598-2-22:2014](#) with monitored charging circuits and which activate automatically on failure of the supply to the normal lighting.



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Future Developments-BS 5266-1

Safety lighting Switchable outputs

- Centrally powered Systems

Can be provided by Control System Devices(CSD)s

- Self Contained luminaires are being developed with-
Extended duration



Switchable outputs – Inhibit or rest mode



reserve available on demand +1hr.

Developments for Safety Lighting

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Switchable outputs – Inhibit or rest mode



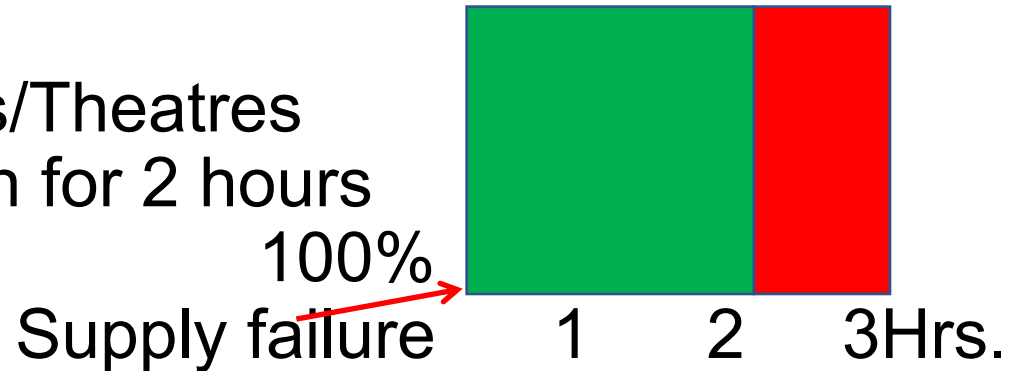
reserve available on demand +1hr.

Developments- Central Systems

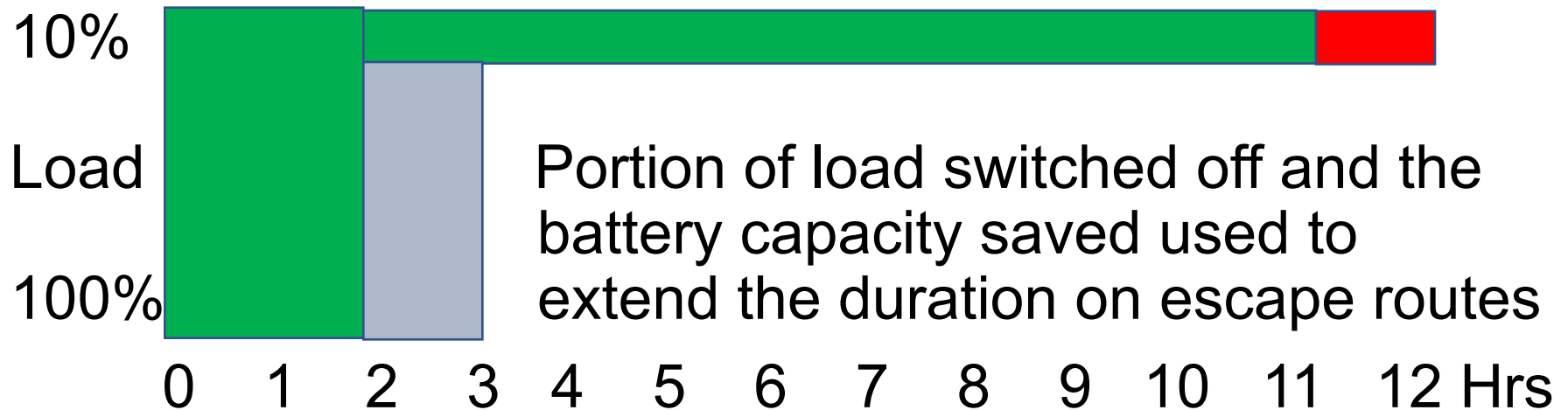
Safety Lighting – To protect occupants who chose to 'stay put' in a building

1 Premises like cinemas/Theatres

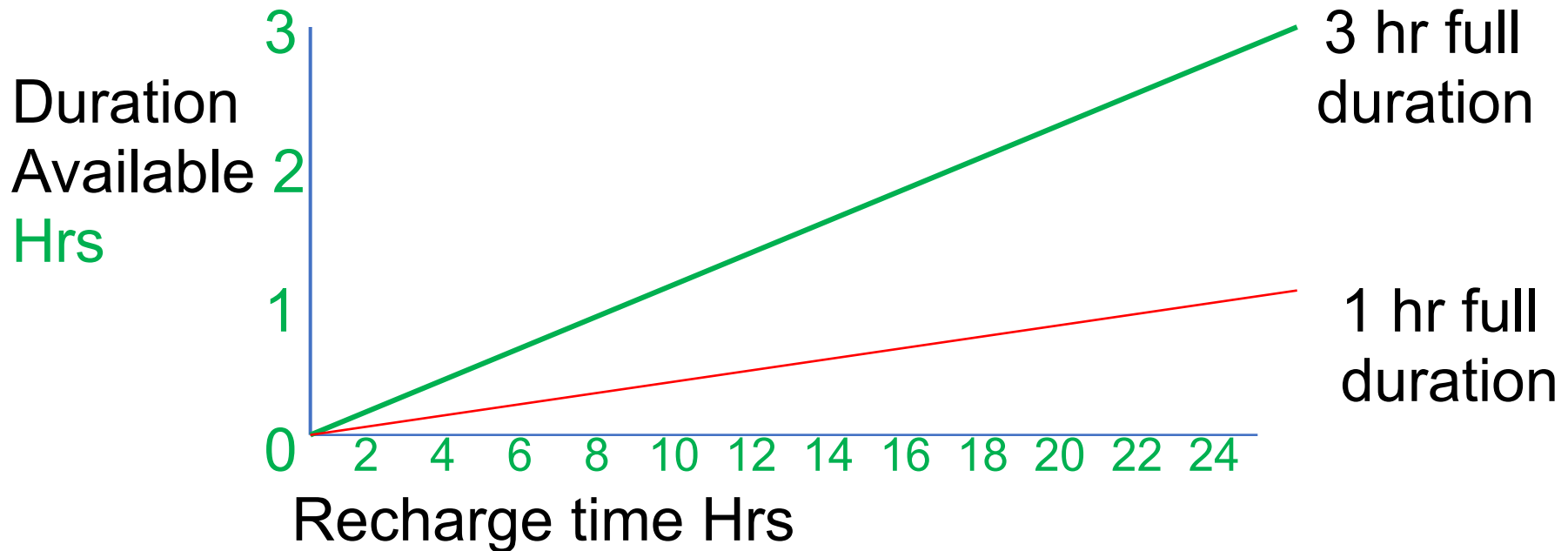
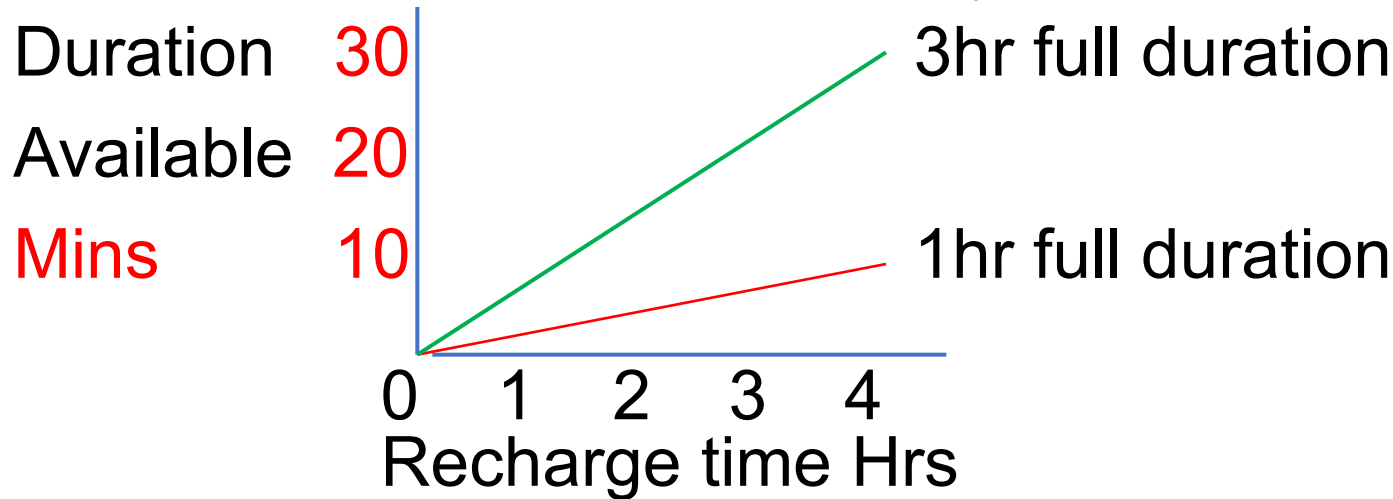
Where occupants stay in for 2 hours of a 3 hour system



2 Premises like Hotels and Stores with a central system.



Typical duration times available for 1 or 3 hr duration Luminaires after partial recharge



Product developments relevant to Safety Lighting

LED Light sources

These devices have four useful advantages when used as a light source for emergency lighting

1 Long life LED's when correctly used have a very long life typically 7-9 years of continuous operation this means that they do not require a design which allows users to safely replace lamps themselves

2 They have low power consumption and so extended durations are viable

3 They illuminate instantly so can be used in high risk locations without restriction

4 As compact sources the design of luminaires can be less obtrusive



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Product developments

New battery types

There are a wide range of Lithium batteries which can offer significant advantages in terms of physical size the combination of these batteries and LED's has dramatically reduced the physical size of emergency luminaires

To ensure long life is provided the correct cell type and charging technique has to be used because these are constantly developing selection of a quality luminaire is essential.

Other types of energy storage such as capacitors are being explored for future use.



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Dynamic Safety Signage Systems –

Use an input of the location of the fire to direct occupants to the safest exit routes By co-operation with passive protection building management and fire detection engineers we can use details of the precise information on the presence of smoke or warning of bomb threats to give warning indication not to use contaminated escape routes. This technique is referred to as –

Dynamic safety signage systems (DSSS)

In these systems the information conveyed by an exit directional sign or route marker can be controlled to change the routing information to direct occupants away from an exit route that has become unusable



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When the user conducts a risk assessment of a new or existing building they may identify specific hazards that require additional protection of the occupants.

Use of **Dynamic Safety Signage Systems** can minimise risks inherent in-

Tall buildings or those with unknown fire compartmentation.

Large numbers of occupants.

A high proportion of Old, infants or the infirm.

High risks in the rooms adjacent to the escape route.

Occupants unfamiliar with the premises.

Low staff ratios.



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Interface with the passive protection

The passive fire protection should ensure that under normal conditions there are adequate numbers of escape routes of adequate width to enable occupants to escape quickly.

They also should ensure that the fire compartmentation is adequate and appropriate

This includes that all the doors opening onto escape routes should be fire protecting and fitted with automatic closers operated by smoke detectors.

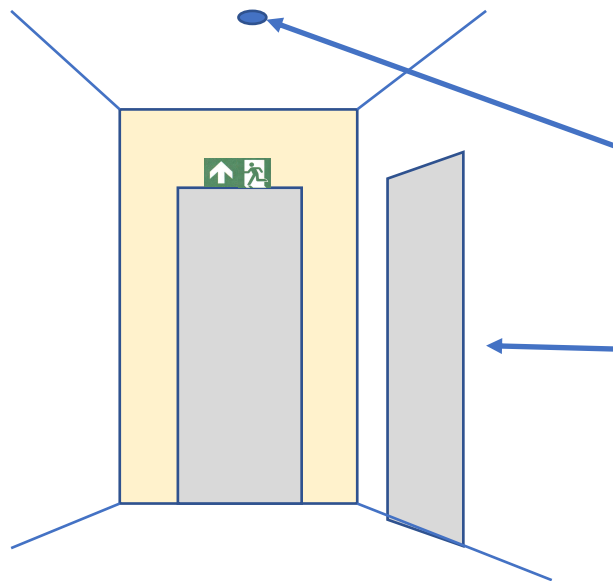
While the building regulations detail requirements for normal conditions unforeseen problems such as a door being obstructed can render an escape route unusable



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Interface with fire alarm systems

L1,L2 & L3 systems have detection monitors in rooms adjacent to the escape routes and will pick up a hazard before the escape route is compromised, they are the minimum category recommended for dynamic signage. (L4 would be too late as fire would be in the escape route)



Corridor escape route smoke detection

Adjacent rooms have detection to pick up a fire before it burns through the fire resistant door



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Interface with building management systems

In addition to input of the risks to an escape route from fire some buildings may also be subject to bomb attacks which may make the selection of specific escape routes preferable.

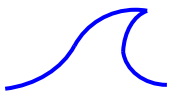
Building staff may have other reasons for directing occupants from one route to another .

Dynamic signage can be used in either of these cases.

Pre alarm indication from the fire panel enables fire warden to investigate and initiate dynamic escape evacuation if needed.



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The input systems

User /risk assessor - requirements and function

Defines escape routes

Confirmation of viability Structural protection engineer

Provides passive structural protection of escape routes

Design of fire alarm system

Determines the location of the fire hazard

Design of the building management procedures

Advises on manual inputs and interface with door entry devices

Input to the dynamic signalling control

The indication systems



Input from Fire alarm and building management



May be part of the fire alarm control

Dynamic signalling control –

Or may be part of emergency lighting or voice evacuation system



Visual indication



Exit Visual warning indication



Way finding to preferred exit



+Audible indication



+Audible indication



Types of control of route indication

Passive –As traditional systems at all material times the exit routes are all indicated –no facilities to re-direct occupants if the route is contaminated.

Dynamic safety signage – At the start of the evacuation routes can be selected either automatically or under manual control directing occupants away from routes at hazard and towards safer routes.

Adaptive Dynamic systems can be modified as conditions change during the evacuation

Design points for consideration

The input must be reliable the fire alarm must be correctly designed and maintained to minimise false alarms .

The form of warning indication has to be agreed with the user/risk assessor to ensure it will be understood by the occupants

The Indicator system should fail safe this would normally be for the indication to be removed by a fault, The system control needs battery back up of at least the time period of sign duration. Risks of the indication being interrupted by fire should be minimised by routing through low risk fire areas or using fire protected cable.



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FIREscape+®

Your Safety, Our Technology



CERTIFIED TO BS
EN 60598-2-22
EN 62034 TYPE PERC



A new concept

This is achieved by use of our dual function exit signs.

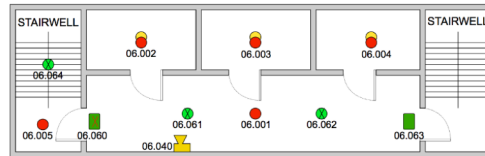
Under normal circumstances the exit sign is illuminated and carries the internationally recognised symbols of a running man, door and direction arrow.

However, in the event of a fire affecting a specific escape route, the appropriate signage is switched off and replaced by an illuminated RED "X" symbol



Exit Signs Illumination – Mains Healthy

FLOOR 3

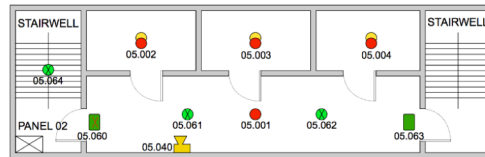


Loop 06

Panel 02

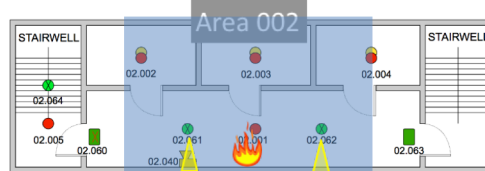


FLOOR 2



Loop 05

FLOOR 1

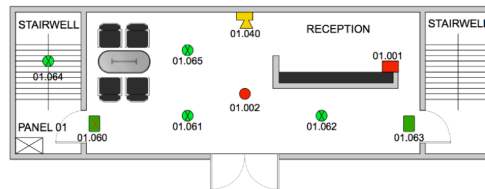


Loop 02

Panel 01

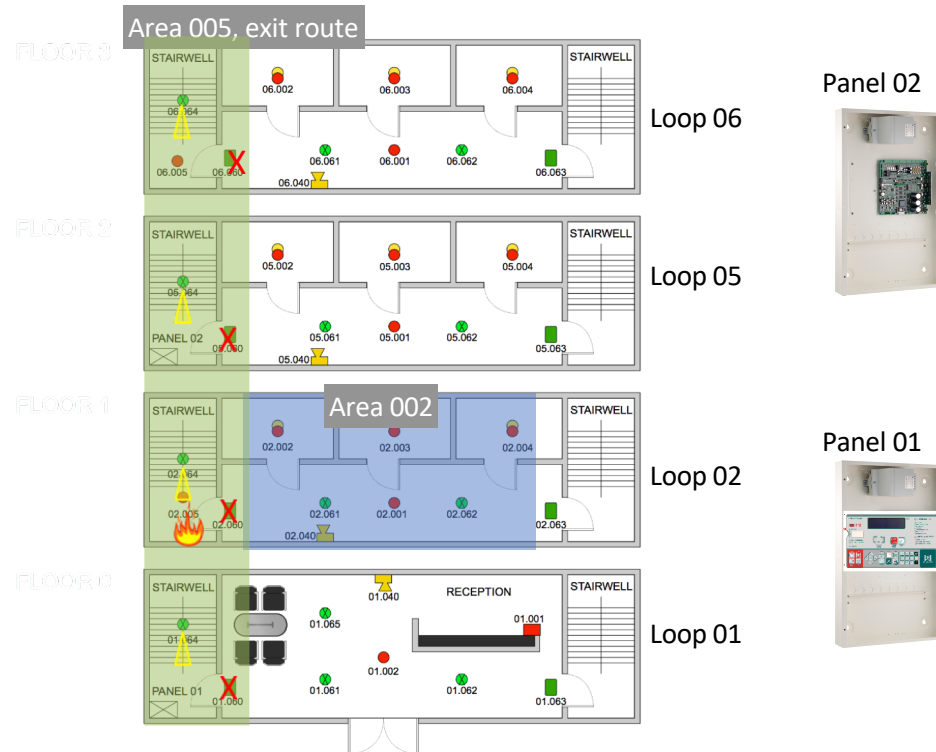


FLOOR 0



Loop 01

Block exit route with compromised exit signal



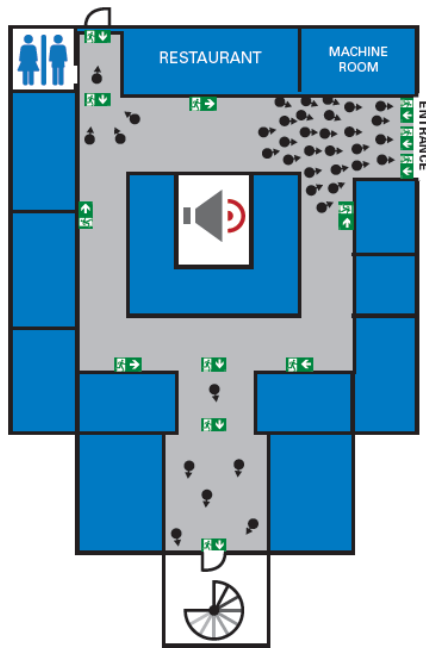
Key Benefits

- One control panel and operator interface for both systems
- Directional guidance during fire situations
- Cost efficiency throughout the entire product life cycle – from installation to operation, maintenance and recycling
- Automatic testing of the emergency luminaires and signs
- Low power consumption
- Long life expectancy
- Reduced potential for false alarms
- Environmentally friendly components – batteries, plastics and electronics are fully recyclable



What is an adaptive evacuation system ?

Static: 'Classic' Emergency Lighting

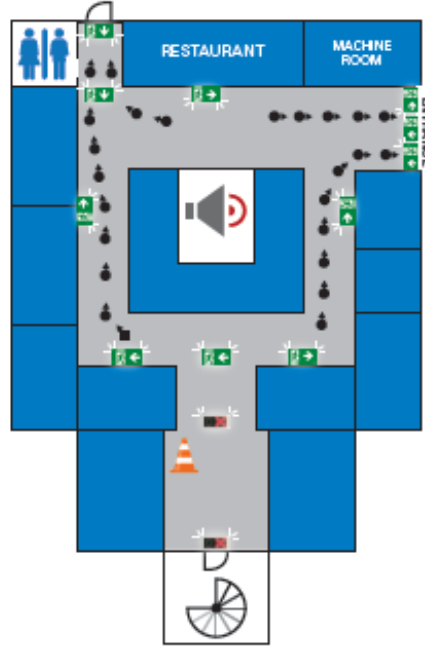


Static Emergency Lighting:

In an emergency situation, people may ignore the exit signs and just get back to where they are coming from when trying to evacuate the building

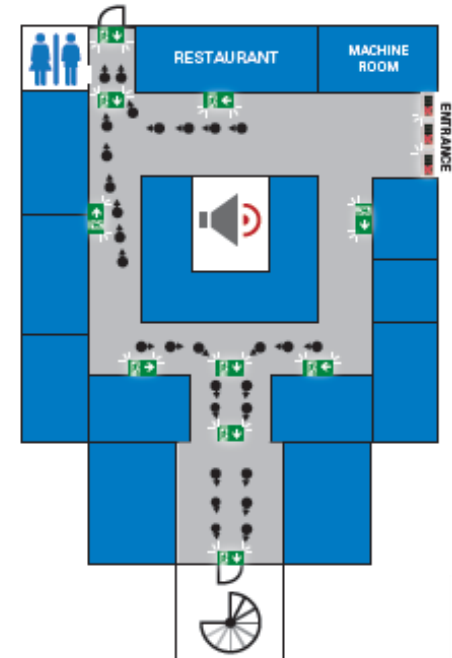
→ overcrowded exit routes

Adaptive: Capable of changing in response to changes in the environment



Adaptive evacuation → Safer & quicker

- The system takes in account the exit blocked by works / danger
- Dynamic blinking Exit signs more visible
- Less confusion
- Faster and safer evacuation



Luminaires with Pulsing function



Use of Adaptive Dynamic safety sign systems



Feature	Benefits
Floating input to control the red cross	Universally controllable by switching actuators, e.g. key switch, remote switch, I / O module, etc.
Static, blinking or interval blinking red cross	Adjustable display of the red cross for increased affordance
Normative Design and lighting technology in normal operation acc. to BS 5266-1	In normal operation, escape sign operates according to standard
Red cross is shown on a pictogram and not visible in normal operation	No need for 2 separate luminaires – cost-efficient
Universal surface mounting set enables the use of pictograms with different viewing distances (20m/30m)	Only one mounting set is needed for different viewing distances
Identical design for all „GuideLed“ luminaires, no special AE design	Consistent look throughout the building