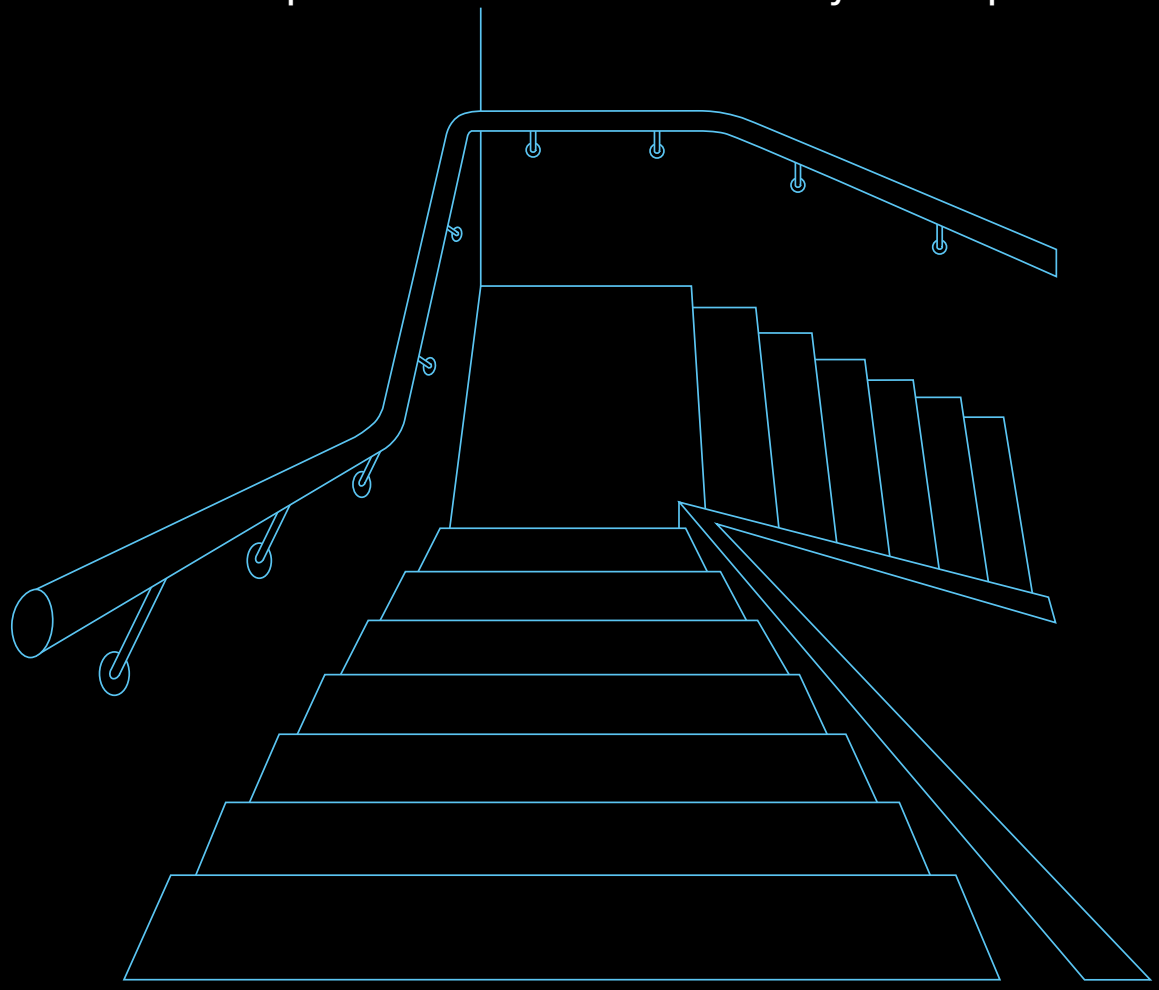
ECOGLO INTERNATIONAL LIMITED

Designers' Handbook for

Ecoglo Markings

To meet the requirements of NZBC F6 'Visibility in Escape Routes'



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This handbook provides guidance for designing systems using Ecoglo photoluminescent markings to meet the requirements of NZBC Clause F6 'Visibility in Escape Routes'.

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Introduction

This document is aimed at those wishing to design photoluminescent path marking systems to meet New Zealand Building Code Clause F6 “Visibility in Escape Routes”.

This document explains:

- Where Ecoglo path marking systems are appropriate to use;
- Which Ecoglo markings should be used and where they should be installed;
- What ongoing inspections should be carried out.

For more detail explaining how Ecoglo markings meet the requirements of Clause F6, please refer to the Technical Justification document. Go to **www.ecoglo.co.nz**
From *Homepage,* select *Technical,* then *Code compliance*.

Where can Ecoglo path markings be used?

Ecoglo produces high performance, high durability photoluminescent products for step edges, handrails, paths, doors, and hazard marking.

There are two basic requirements for Ecoglo markings to be appropriate:

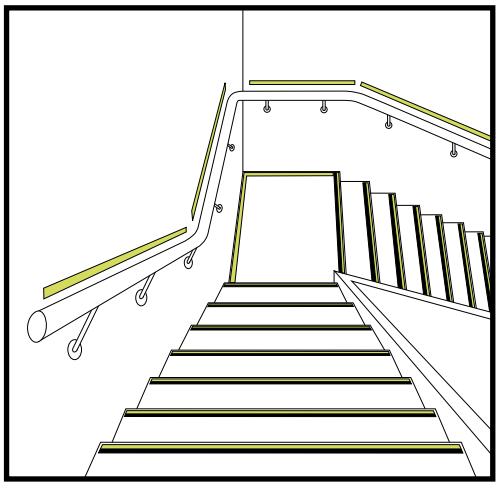
1. There needs to be a clearly definable escape path that can be marked;
2. There needs to be sufficient charging light (natural or electrical) on the markings to ensure they will remain “reasonably visible” for the times specified in Clause F6.3.4.

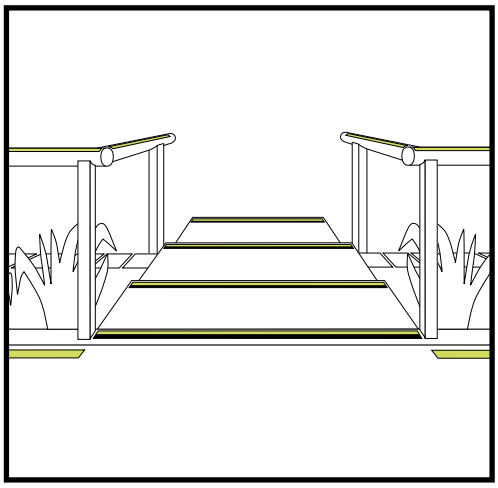
If these requirements cannot be met, an electrical emergency lighting system will be needed.

In some buildings the most appropriate complete solution may be a combination of Ecoglo markings and electrical emergency lighting.

1. Clearly Definable Escape Path

The illustrations below show examples of clearly definable escape paths that are suitable for highlighting with Ecoglo markings. In many buildings the complete escape route that is required to be made visible in an emergency (ie to meet Clause F6) is a clearly definable path.





Steps and Stairways

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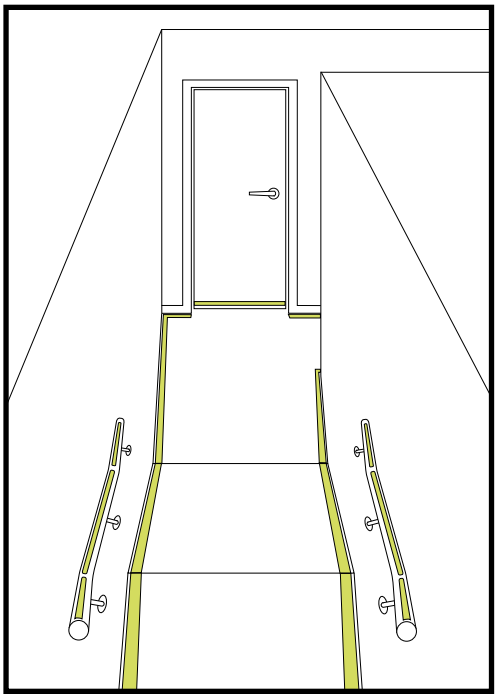
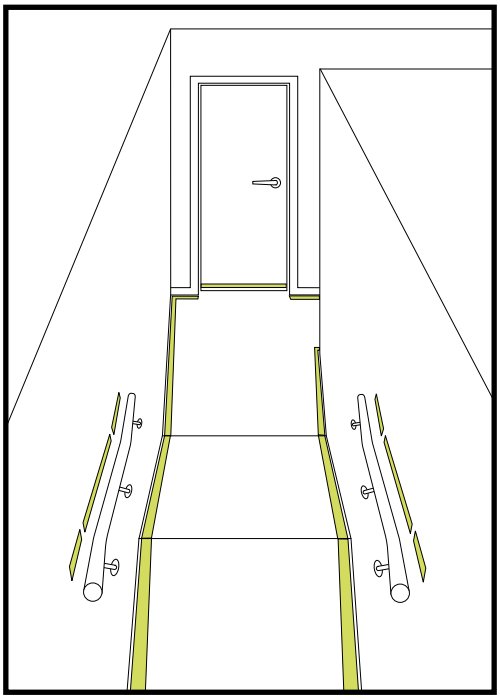
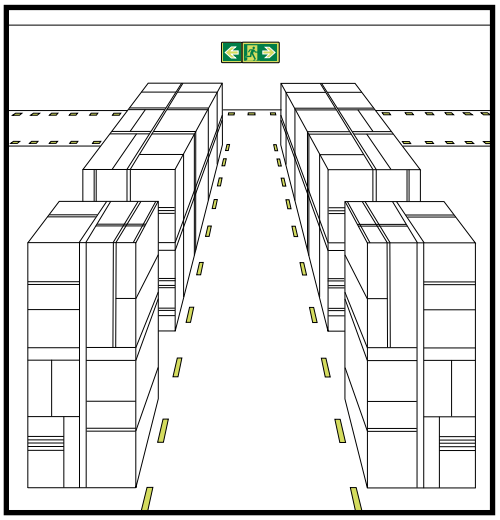


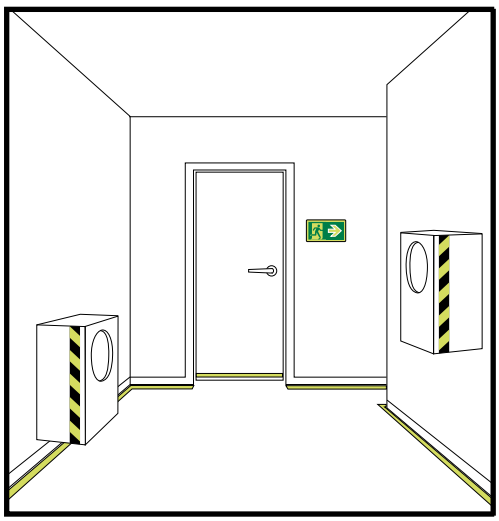
Corridors and Ramps



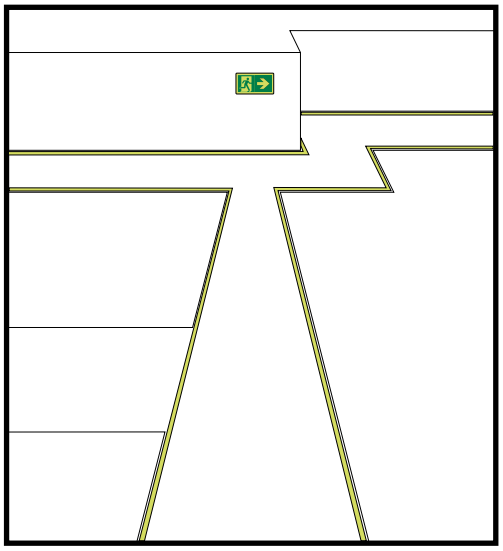
Corridors and Ramps



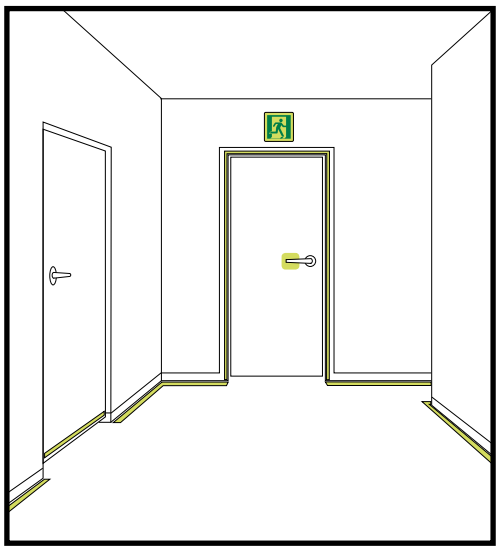
Open Spaces



Obstacles



Open Spaces



Doorways and entries to a safe place

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Limitations

Obstructions

NZBC Clause C requires escape routes to be unobstructed. However it may still be foreseeable that obstructions may be inadvertently left in an escape route. Where the escape route consists of stairs, the likelihood is that an obstruction large enough to cause a trip hazard would be highlighted by the step edge markings. However, on a level escape route where the markings are only on the sides of the path, there is potential for an obstruction to remain unseen. It is important for the system designer to be aware of this risk, and consider factors such as public access, familiarity of the users with the escape route, and likelihood of obstructions.

Dangerous Machinery

If it can be foreseen that, in the event of failure to the normal lighting, machinery or equipment could present an unseen danger to people in the area, and that hazard marking would not alleviate that danger, then emergency electrical lighting should be used to illuminate the danger.

Open Spaces

Where an escape route is required through an open space, the perimeter of the escape path can be marked, as previously shown.

If the open space acts like a concourse, with multiple routes rather than one or more clear paths through it, path marking is not appropriate and lighting is a better option.

2. Sufficient Charging Light

Building Risk Groups

NZBC F6.3.4 specifies the duration that the specified features must remain reasonably visible.

To ensure that Ecoglo markings meet the required visibility duration, they must be charged with natural or electric lighting at a sufficient brightness and for sufficient time.

NZBC Clause F6 Risk Group C[1] buildings require a 30 minute visibility duration.

NZBC Clause F6 Risk Group B[2] buildings require a 90 minute visibility duration.

NZBC Clause F6 Risk Group A[3] buildings require an indefinite visibility duration.

An indefinite visibility duration cannot be met (indoors) with Ecoglo markings, however Ecoglo may provide useful fail-safe instant strike while the main back-up system is firing up and if the emergency power generator activates normal lighting in the area, Ecoglo markings may be sufficient to meet F6 without any emergency luminaires.

Outdoor use

(That part of an escape route between the building shell and a safe place)
There is no need for charging with any electric lighting: Ecoglo markings will meet the charging requirements to ensure compliance with Clause F6 for all building risk groups.

Indoor use

How to ensure charging is at sufficient brightness and for sufficient time to meet the durations specified in F6.3.4:

What lamps can be used?

In general, any lamp with a colour temperature of 4000K or more is a suitable charging light.
4000K colour temperature is the norm for offices, commercial, and most industrial lighting.

The main source of lower colour temperature lamps is halogen downlights, or “mood” lighting where lamps may be specified at around 3000K “warm white”. These lamps will need to have greater brightness to charge Ecoglo markings as much as 4000K lamps.

How long do Ecoglo markings need to be charged for?

Ecoglo markings are designed to meet Clause F6 following no more than 5 minutes charging.

It is usually acceptable to design a system where a building (or building space) has no

1. Risk Group C Buildings are those with no more than 1000 occupants and an evacuation time of no more than 30 minutes, where the occupants are not required to remain in the building during an emergency.

2. Risk Group B Buildings are those with more than 1000 occupants and an evacuation time of up to 90 minutes, where the occupants are not required to remain in the building during an emergency.

3. Risk Group A Buildings are those whose occupants are required to remain in the building until the main lighting is restored, or whose evacuation time is greater than 90 minutes.

lights turned on prior to occupation. This is appropriate where it is reasonable to assume that if a building space is dark, the first occupier will turn on the lights.

Assuming the worst case where the building is first entered while it is still dark, or the markings are in a room with no windows, for every second that the lights have been turned on, the markings will accumulate several seconds of operational charge.

Therefore the time the markings will remain reasonably visible is greater than the time since first occupation. This allows for safe evacuation.

Designers should be aware of scenarios where this rationale may not be appropriate, such as a tall building with elevators which can rapidly take someone to an upper floor, from where their escape time could be much more than the time since first occupancy.

Also, in crowd occupancies, it is recommended that the public not be allowed entry to the building until the markings have full operational charge.

What illuminance is needed to charge Ecoglo markings?

NZBC Clause F6 Risk Group C
(30 minutes of visibility required):
Ecoglo markings require a minimum of 20 lux (for a period of 5 minutes).

NZBC Clause F6 Risk Group B
(90 minutes of visibility required):
Ecoglo markings require a minimum of 60 lux (for a period of 5 minutes).

Note that an illuminance of 20 lux is the minimum amount of light allowed by Clause G8.3 (Artificial Light) in an occupied space of a building.
In most practical situations there is a lot more than 20 lux or even 60 lux and therefore the Ecoglo markings obtain full operational charge more quickly, and remain reasonably visible for a lot longer than F6 requires. See Appendix A for typical illuminances in NZ buildings.
Therefore for most buildings all occupied spaces will have sufficient light to charge the Ecoglo markings sufficiently.

Will the prescribed charging light be on whenever the markings may need to be charged?

The designer should check those parts of the escape route that are not normally occupied and lit when the markings need to be charged. For example an enclosed stairwell used only in emergencies and not normally lit.

For these spaces a management process must be implemented to make sure that markings in these spaces are at operational charge whenever needed.

Suitable management processes include:
- The escape route is daylit, and the only non-daylight use of the building is for up to 2.5 hours after sunset.
- The escape route lights will be switched on manually by people occupying the building: warning signs will be placed by the light switches.
- Timer circuitry is (automatically) initiated by the first person entering the building, and ensures the escape route is lit with 150 lux for 10 minutes every hour.
- Smart sensor circuitry is (automatically) initiated by the first person entering the building, and ensures the escape route is lit with a minimum of 20 lux (Risk Group C) or 60 lux (Risk Group B) for 10 minutes, then gradually ramps down to 5 lux if the space remains unoccupied. Motion sensors immediately bring the light back up to the desired "normal" lighting, and in the absence of occupation, the light ramps back down to 5 lux again.
- Circuits link lighting so that when lights are switched on in an occupied space all signs in all escape paths from the occupied space are lit.

Where it is considered that a management process such as those listed above is not appropriate, electrical emergency lighting should be installed.

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Which Ecoglo path markings should be used & where should they be installed?

The following information specifies the recommended Ecoglo product in each situation where Clause F6 may require path marking.

Note that Clause F6 requires all changes in level en route to a safe place to be marked, but level travel in the first 20m of the escape path does not usually need to be marked.

There are alternative Ecoglo products that may also be appropriate to meet specific architectural requirements. Contact Ecoglo for details. (Telephone 03 348-3781).

To ensure that the Ecoglo markings will remain in place once installed, installers must follow the most recent installation instructions for each product.

Steps and Stairways

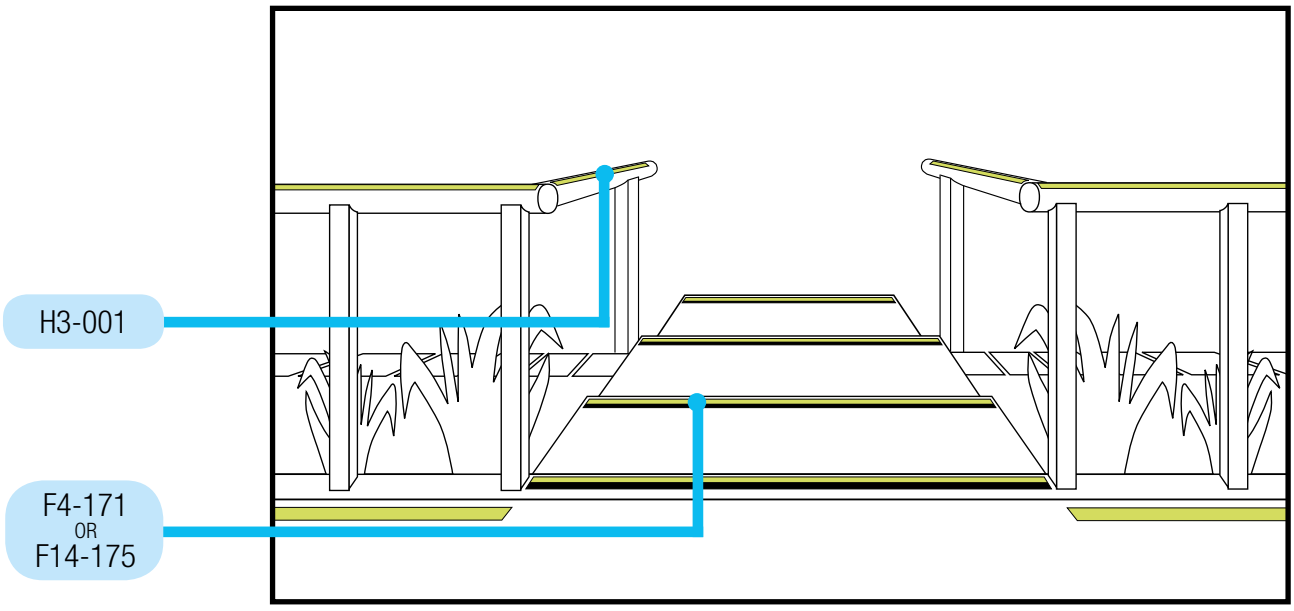
Ecoglo F4-171 or F14-175 nosings along the horizontal leading edge of all steps including the landing step at the top of any flight of stairs.

The nosings should normally be set back from the sides of the stairway by 50-100mm at each side. Ecoglo stocks F4-171 and F14-175 in 100mm increments from 600mm to 1500mm to suit all step widths from 650mm upwards. For step widths greater than 1600mm, multiple nosings should be installed with a 5mm drainage/ thermal expansion between the nosings.

Ecoglo H3-001 handrail strip along the top of all handrails adjacent to the steps or Ecoglo MS26 on the wall beside the handrail. Up to 100mm gaps are allowed where there are bends or curves in the handrail.

Handrail Alternatives

Clause F6 requires safety features required by Clause D1 to be marked. Handrails are safety features that are required by Clause D1 and therefore must be marked.
Where it is considered inappropriate or impractical to install H3-001 on a handrail, a wider and brighter strip (MS26) can be installed on the wall next to the handrail. The strip must be within 100mm horizontal and 50mm vertical of the handrail.



Steps

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Stairway Landings

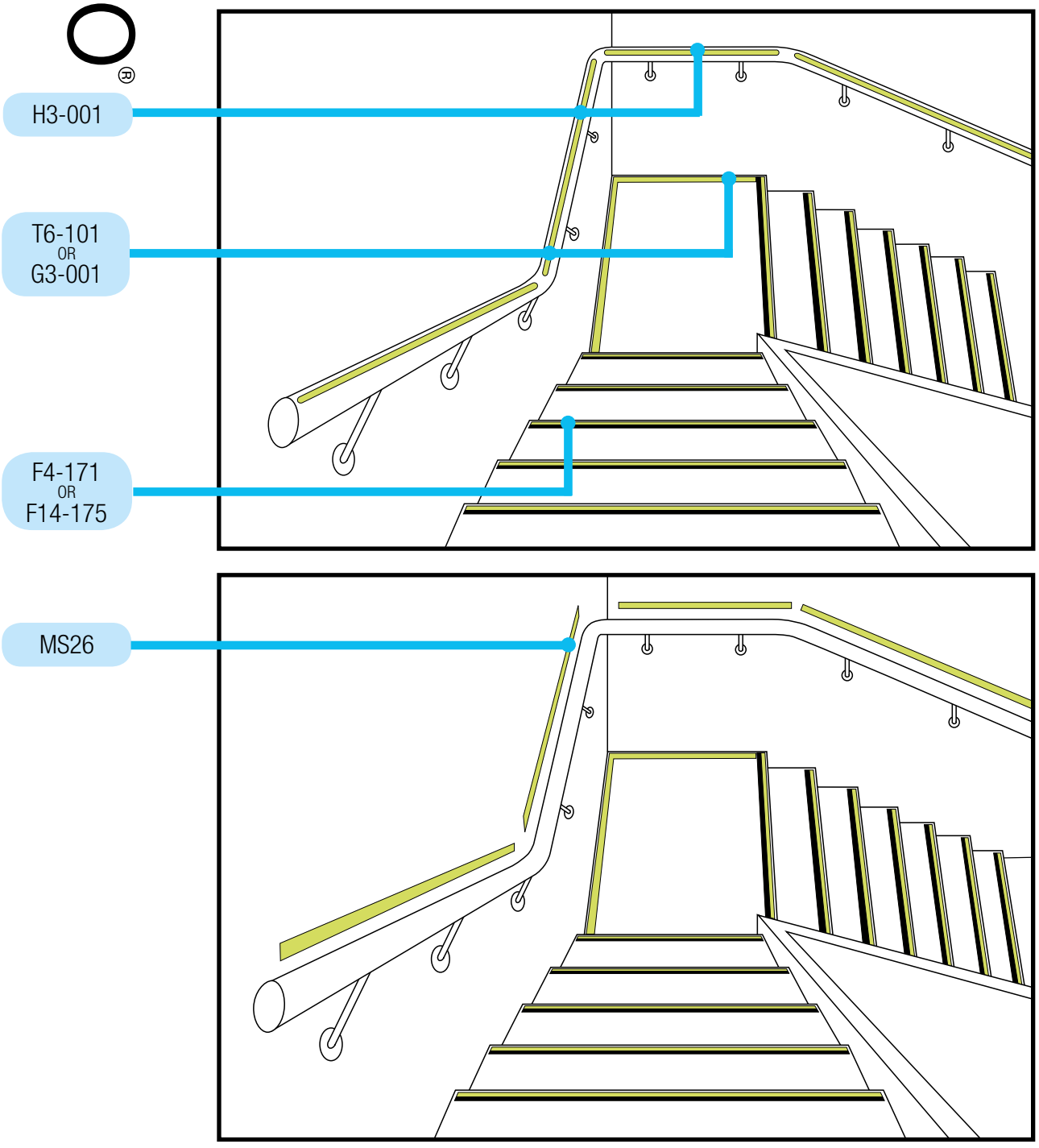
Ecoglo T6-101 (usually for exterior use) or G3-001 (16mm wide, interior use) or G4-001 (12mm wide, interior use) path marking strips along the complete perimeter of the landing.

The markings should be mounted either on the floor within 100mm of the wall, or on the wall or skirting board within 100mm of the floor.

Any doorways that should not be entered should have markings running past the door on the floor within 100mm of the door or on the door within 100mm of the floor.

Up to 100mm gaps are allowed where continuous marking would be impractical.

Ecoglo H3-001 handrail strip along the top of all handrails or MS26 on the wall beside the handrail. Up to 100mm gaps are allowed where there are bends or curves in the handrail.



Stairways and landings

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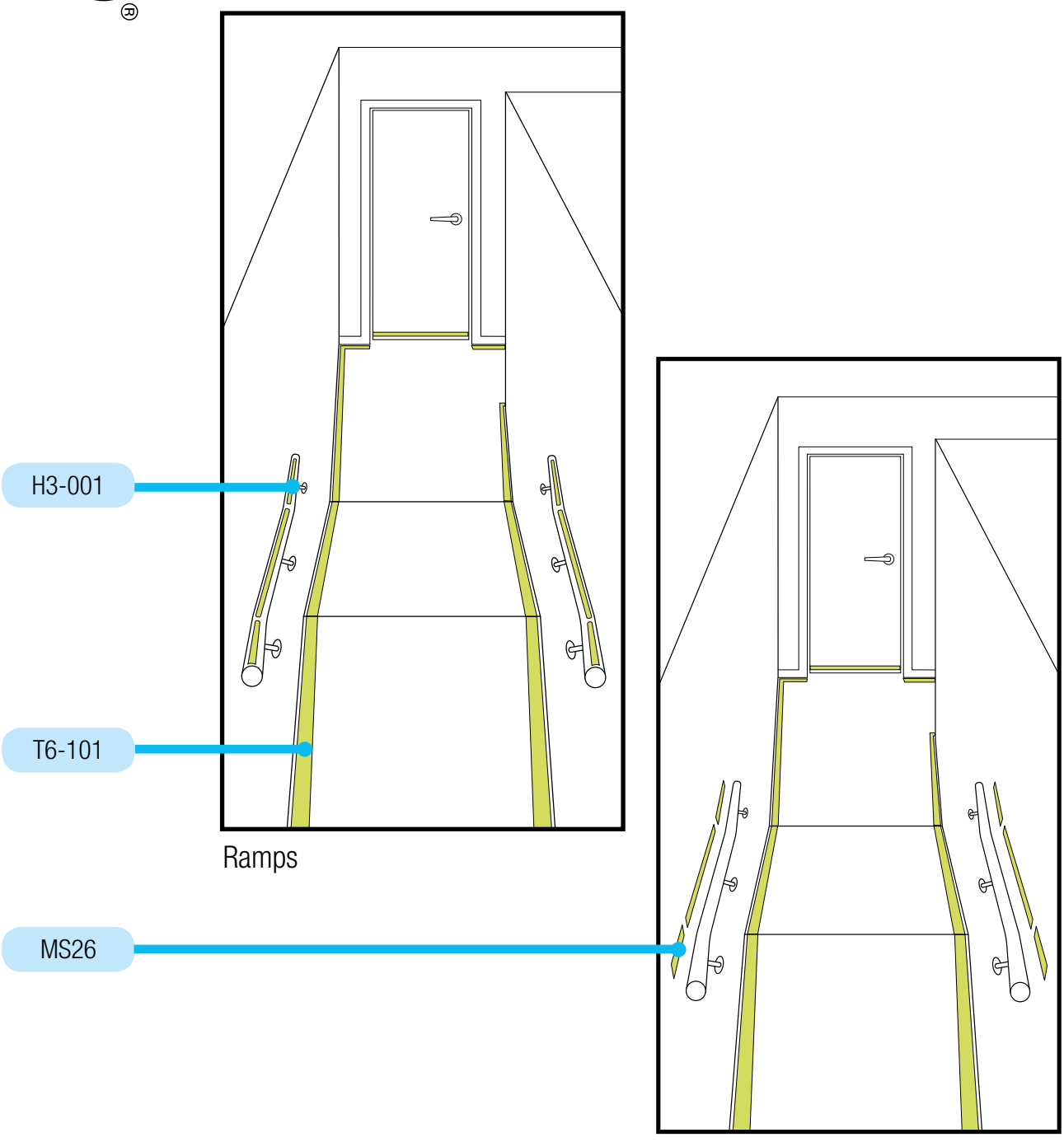
Ramps and Decks

Ecoglo T6-101 path marking strip along both sides of the ramp or deck.
The strip can be placed on top of an upstand edging as long as it is within 100mm of the walking surface.

Ecoglo H3-001 along the top of all handrails adjacent to the path needing to be marked or Ecoglo MS26 on the wall beside the handrail. Up to 100mm gaps are allowed where there are bends or curves in the handrail.

Note:
Most accesible ramps need to be marked. However, an accessible ramp within the first 20m of an escape route and with a gradient no steeper than 1:20 does not need to be marked. Clause D1 states that accessible ramps no steeper than 1:20 do not need a handrail. This indicates they present no greater risk of injury or impediment to movement (as written in F6.3) than a level surface.



Ramps

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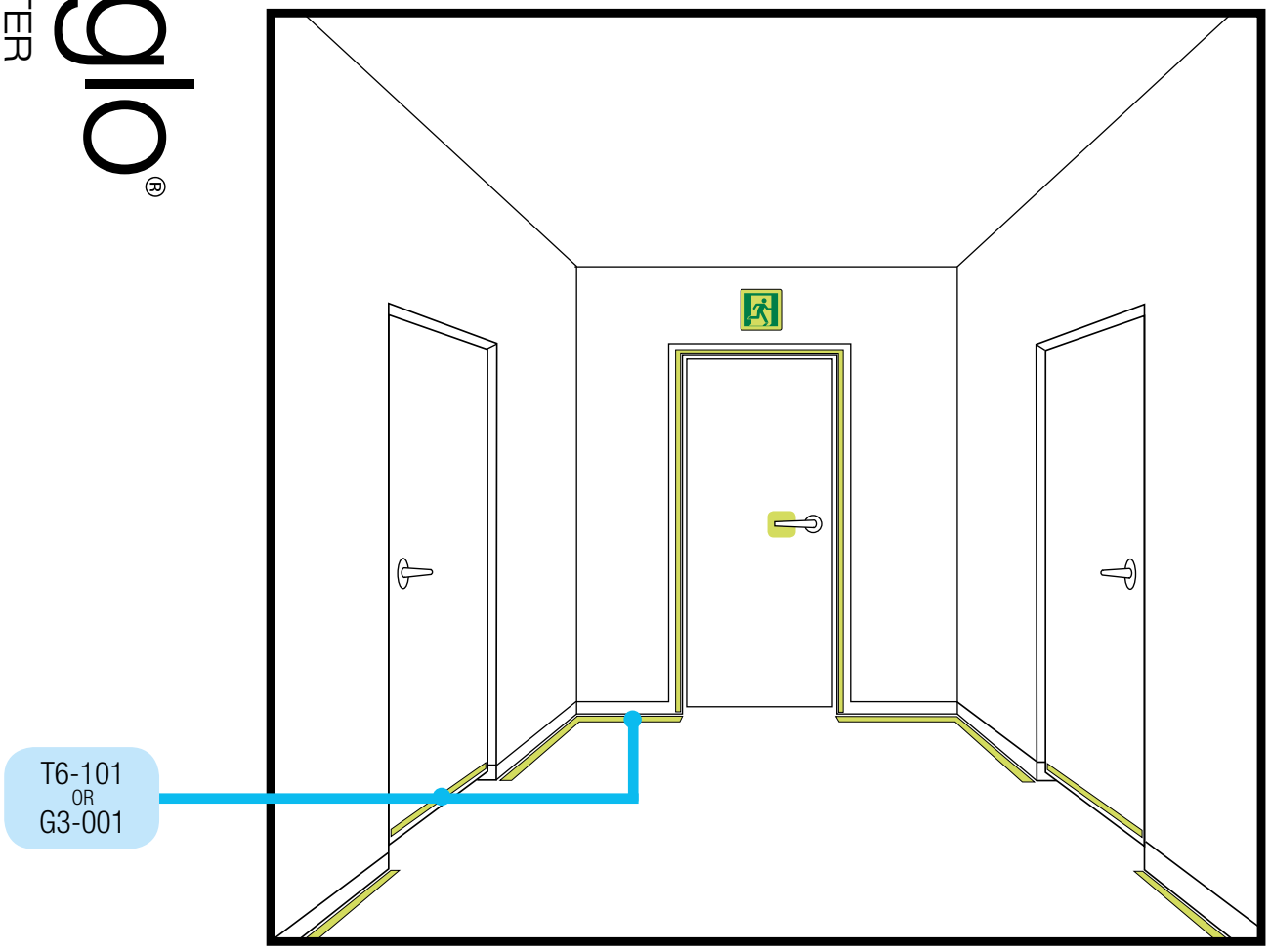
Corridors

Ecoglo T6-101 or G3-001 (16mm wide) or G4-001 (12mm wide) path marking strips along both sides of the corridor.

The markings should be mounted either on the floor within 100mm of the wall, or on the wall or skirting board within 100mm of the floor. Any doorways that should not be entered should have markings running past the door on the floor within 100mm of the door or on the door within 100mm of the floor. Up to 100mm gaps are allowed where continuous marking would be impractical.



Corridor

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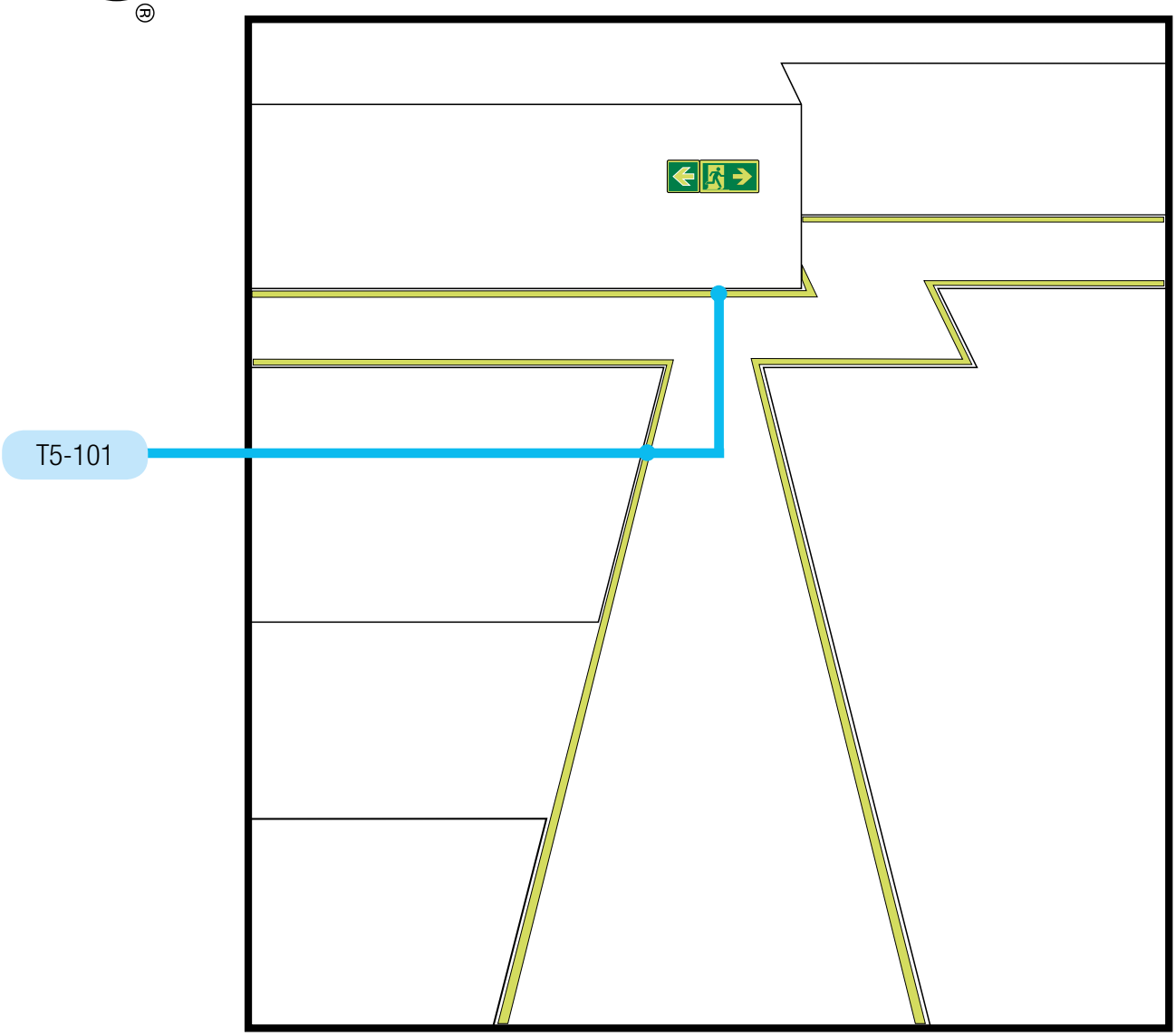
Paths through Open Spaces

Ecoglo T5-101 path marking strips along both sides of the designated path.

Up to 100mm gaps are allowed where continuous marking would be impractical.

Ecoglo G7-100 path markers can be applied as discontinuous markings in the following circumstances:

- Where it is not practical to install continuous markings (for example because of uneven ground or floor surfaces, or the presence of working forklifts); and
- Where all occupants are familiar with the escape route and the escape path markings; and
- Where the minimum frequency of markers is 1 per metre.
- Where the escape route has many changes in direction and few straight runs of 10 metres or more, the minimum frequency of markers should be 3 per metre.



Path through open space

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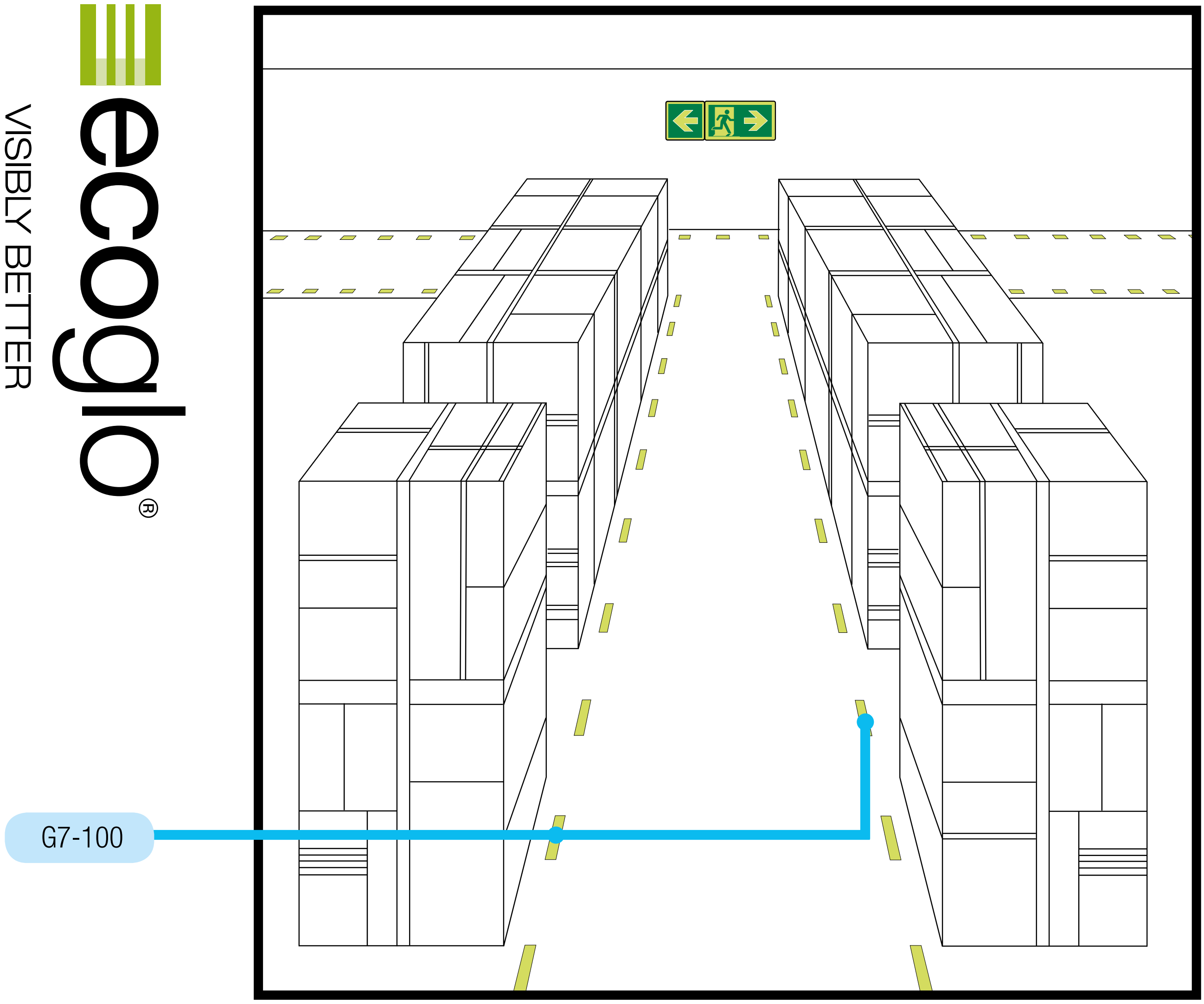

Path through open space (where occupants are familiar with the escape route)

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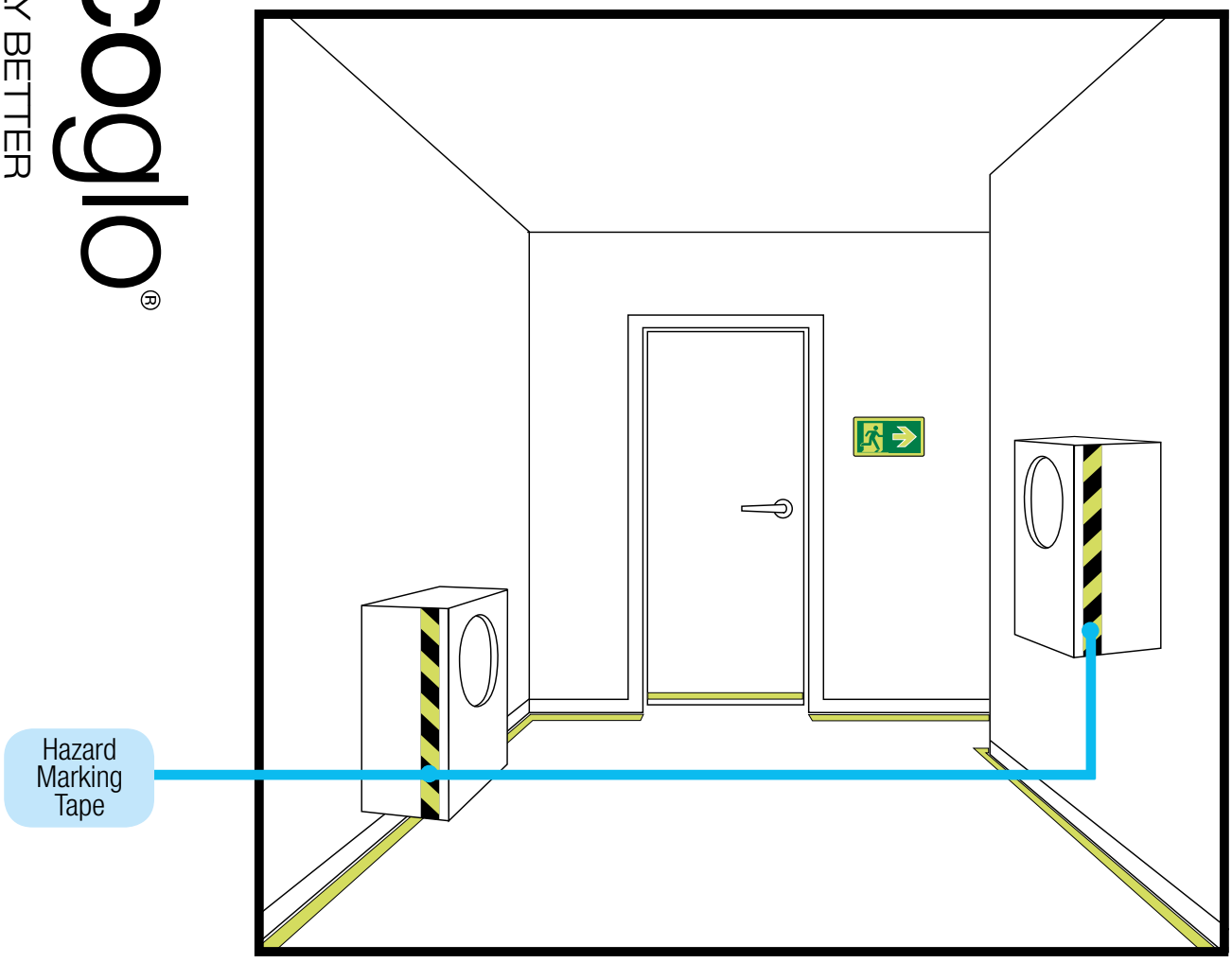
Obstacles

Ecoglo Hazard marking tape applied to any obstacles at or below 2 metres in height and projecting more than 100mm into an escape route.



Obstacles

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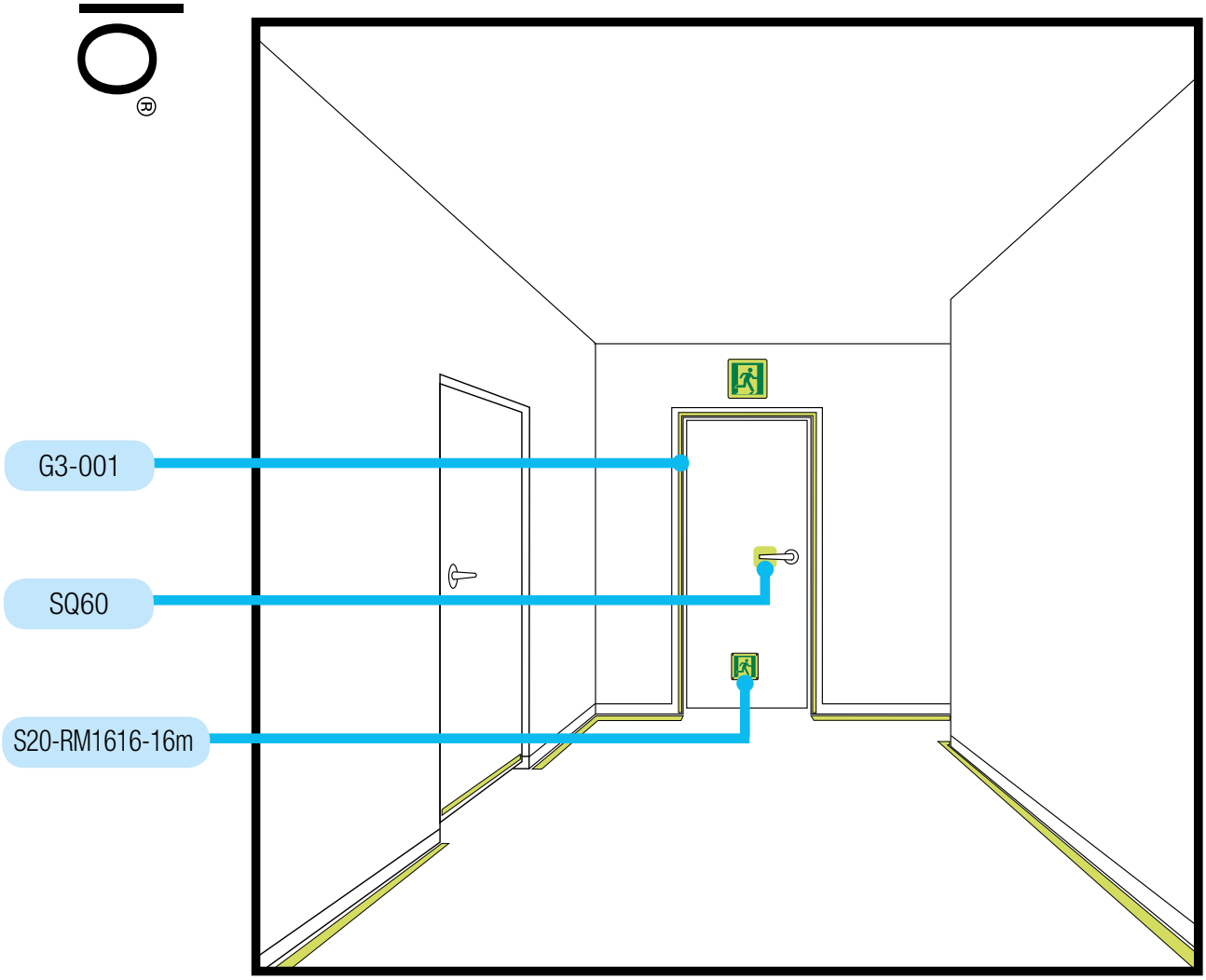
Escape Doors and Entries to a Safe Place

Ecoglo G3-001 strips to mark the complete door surround.

Ecoglo SQ60 door handle marker on the door as close to the handle mechanism as possible to highlight its position.

In areas where there is a reasonably foreseeable risk of smoke obscuring the top of the doorway and/or the installed exit exit sign at the door, a pictogram exit sign (S20-RM1616-16m) should be placed on the door, centred horizontally, and with the top of the sign no higher than 450mm above floor level.

Note that this is in addition to the requirements under Clause F8 for exit signs.



Escape door

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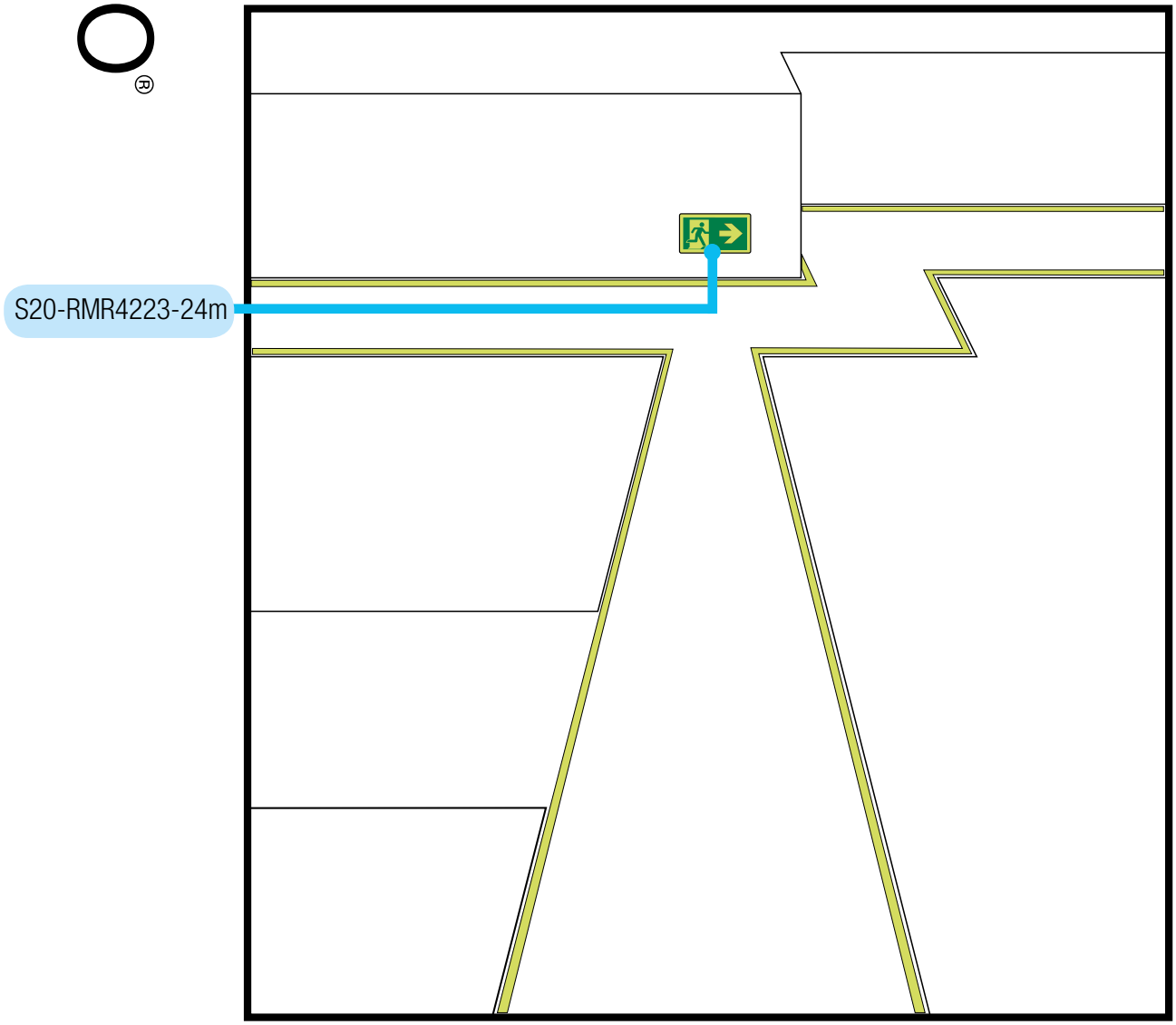
Unexpected Direction Changes & Merging Routes

Ecoglo S20-RML2916-16m and S20-RMR2916-16m (for up to 16 metre viewing distance), or S20-RML4223-24m and S20-RMR4223-24m (for up to 24m viewing distance) where there are direction changes which may seem surprising or sudden to someone escaping, or intersections where one way is a dead end.

They should be mounted on a vertical surface, the top of the signs no more than 450mm above floor level. Note that this is in addition to the requirements under Clause F8 for exit signs.



Merging routes

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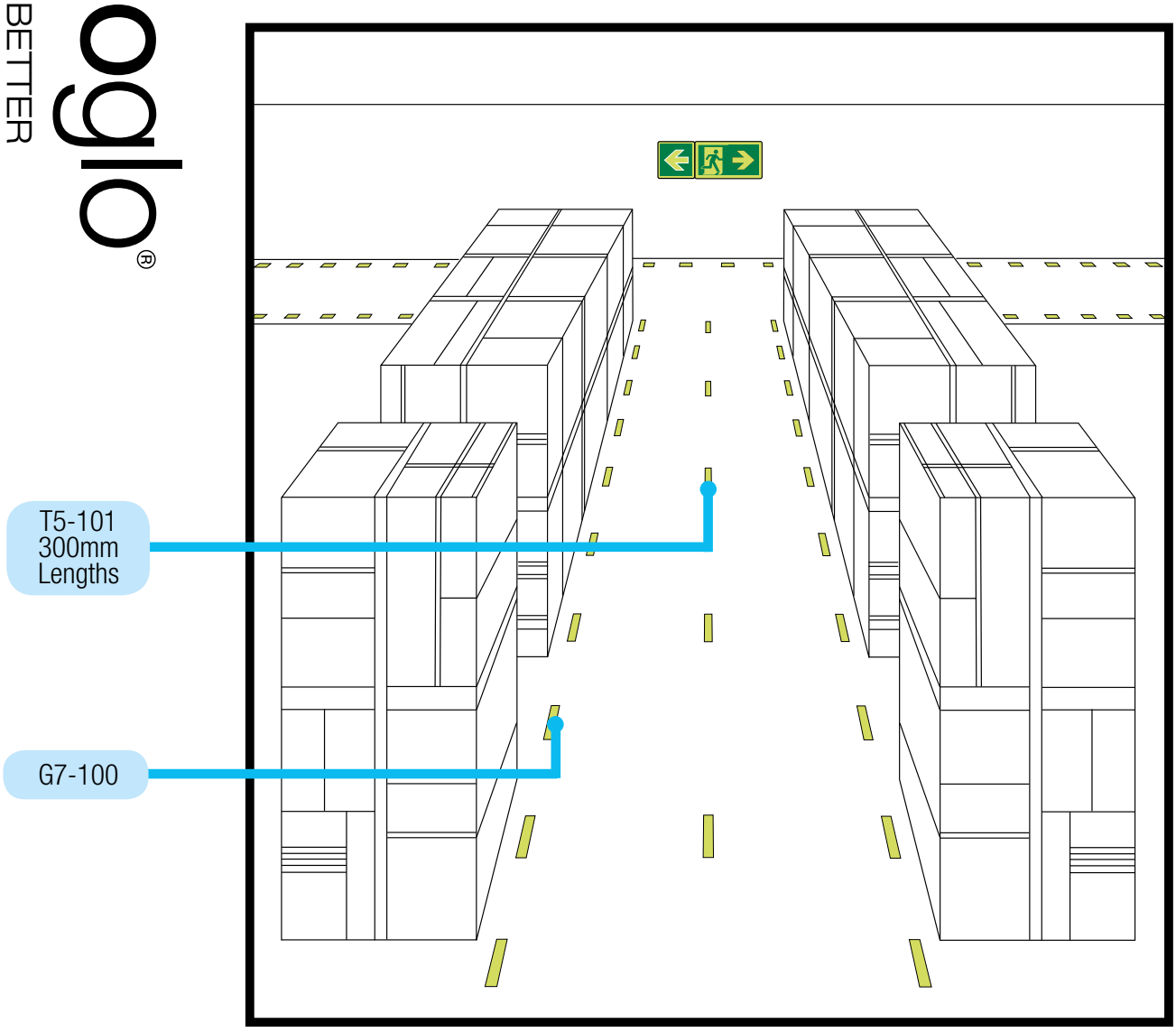
Wide Paths

T5-101, 300mm lengths with a frequency of 1 per 3m, to form “lane markings” where the escape route is required to be 3m wide or greater, and spaced to ensure that no individual lane is wider than 3m.



Wide path (greater than 3m)

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What ongoing inspection should be carried out?

Ongoing luminance verification is not required, but inspection is still required to make sure that the markings as installed have not been damaged or removed, that any electrical light needed to charge the markings is still functioning as intended, and that the marked escape route is still an appropriate path.

The following inspections are recommended to ensure ongoing compliance with Clause F6:

6 Monthly Maintenance Check

(to be carried out by the Owner or their appointed agent)

Action	Complete
All products are still configured as at installation and there is no material damage to any of these products.	
All products are clean from general dust build up and any other specific obscuring deposits.	
All products are clearly visible and have not been covered up by carpet or other materials.	
All products mark a clear path and have not been obstructed by physical hazards such as trolleys, machinery, partitions, etc.	
All products can be used to provide clear escape path marking and there has been no change to the configuration of the building which renders the escape path unusable.	
All lights checked that the positions have not altered from design.	
All lights are in working order and clean.	
All timer/smart sensor lights are working as designed.	
All linked connections are working as designed.	

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Annual Inspection
(to be carried out an IQP)

Action	Complete
All products are still configured as at installation and there is no material damage to any of these products.	
All products are clean from general dust build up and any other specific obscuring deposits.	
All products are clearly visible and have not been covered up by carpet or other materials.	
All products mark a clear path and have not been obstructed by physical hazards such as trolleys, machinery, partitions, etc.	
All products can be used to provide clear escape path marking and there has been no change to the configuration of the building which renders the escape path unusable.	
All lights checked that the positions have not altered from design.	
All lights are in working order and clean.	
All timer/smart sensor lights are working as designed.	
All linked connections are working as designed.	

APPENDIX A
Recommended maintained illuminances* in New Zealand buildings

Corridors	40 lux
Loading bays, staff changing rooms	80 lux
Waiting rooms, simple manufacturing work, checking stock	160 lux
Offices, classrooms, general inspection of work	320 lux
Proof reading, fine inspection/work	640 lux

*maintained illuminance is the minimum expected before the electric light should be cleaned or replaced.

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