

Compliance Document for New Zealand Building Code Clause F6 Visibility in Escape Routes – Third Edition

Prepared by the Department of Building and Housing

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Users should make themselves familiar with the preface to the New Zealand Building Code Handbook, which describes the status of Compliance Documents and explains alternative methods of achieving compliance.

Defined words (italicised in the text) and classified uses are explained in Clauses A1 of the Building Code and in the Definitions at the start of this Compliance Document.

F6: Document History			
	Date	Alterations	
First published	July 1992		
Amendment 1	1 December 1995	pp. i and ii, Document History p. iii, F6.3.1 p. v, Contents p. vi, References	p. 3, 1.2.1, 1.3 pp. 4 and 5, Table A1 p. 7, Index
Reprinted incorporating Amendment 1	July 1996		
Second edition	1 December 2000 Effective from 1 June 2001	Document revised – second edition issued	
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Third Edition	18 October 2007	Document revised – Third edition issued	
Note: Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.			

Document Status

The most recent version of this Compliance Document, as detailed in the Document History, is approved by the Chief Executive of the Department of Building and Housing. This Compliance Document is effective for building consents issued on or after 18 October 2007 and supersedes all previous versions of this document.

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New Zealand Building Code

Clause F6 Visibility in Escape Routes

The mandatory provisions for building work are contained in the New Zealand Building Code (NZBC), which comprises the First Schedule to the Building Regulations 1992. The relevant NZBC Clause for Visibility in Escape Routes is F6.

SR2007/124

Clause F6—Visibility in escape routes

Provisions

Objective

F6.1 The objective of this provision is to help safeguard people from injury in *escape routes* during failure of the main lighting.

Functional requirement

F6.2 *Specified features in escape routes* must be made *reasonably visible* by lighting systems, other systems, or both, during failure of the main lighting.

Performance

F6.3.1 *Specified features in escape routes* must, when the systems for visibility are at their design level, be *reasonably visible*.

F6.3.2 The systems for visibility must operate to the following percentages of their design levels within the following times after failure of the main lighting:

- (a) 80% in 0.5 seconds in locations (examples of which are given by performance F6.3.3) where there is a high risk of injury due to delay in operation of the systems for visibility; and
- (b) 10% in 0.5 seconds, and 80% in 30 seconds, in stairs and in locations that are unfamiliar to users; and
- (c) 10% in 20 seconds, and 80% in 60 seconds, in all other locations.

F6.3.3 Examples of locations (referred to in performance F6.3.2(a)) where there is a high risk of injury due to delay in operation of the systems for visibility include:

Limits on application

Requirement F6.2 does not apply to *Detached Dwellings, household units within Multi-unit Dwellings, Outbuildings, or Ancillary buildings*.

Performance F6.3.1 does not apply to *specified features* in the initial 20 metres of an *escape route* if the risk of injury, or impediment to movement of people, due to the *specified features* not being visible is low (for example, because people are familiar with the *escape route*, the *escape route* is level, and people do not require assistance to escape).

SR2007/124**Provisions****Performance**—continued

- (a) areas where dangerous machinery is installed:
- (b) areas where hazardous processes take place:
- (c) clinical areas of hospitals:
- (d) prisons and other *buildings* in which people are detained:
- (e) any part of an *escape route* designed for use at any time by more than 250 people.

F6.3.4 The systems for visibility must operate continuously in *buildings* or parts of *buildings* in the following risk groups for the following periods after failure of the main lighting:

- (a) *risk group A*, until restoration of the main lighting system:
- (b) *risk group B*, 90 minutes:
- (c) *risk group C*, 30 minutes.

F6.3.5 Despite performance F6.3.4, if a *building* or part of a *building* falls into both *risk group A* and *risk group B*, the systems for visibility must operate for whichever is the longer of the periods specified in performance F6.3.4(a) and (b).

F6.3.6 Signs to indicate escape routes must be provided as required by Clause F8 “Signs”.

Limits on application

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References

For the purposes of New Zealand Building Code compliance, the acceptable New Zealand and other Standards, and other documents referred to in this Compliance Document (primary reference documents) shall be the editions, along with their specific amendments, listed below. Where the primary reference documents refer to other Standards or other documents (secondary reference documents), which in turn may also refer to other Standards or other documents, and so on (lower order reference documents), then the applicable version of these secondary and lower order reference documents shall be the version in effect at the date this Compliance Document was published.

	Where quoted
Standards New Zealand	
NZS 4332: 1997 Non-domestic passenger and goods lifts	AS1 1.2 Comment
NZS 6104: 1981 Specification for emergency electricity supply in buildings	AS1 1.8.2
Standards Australia	
AS 2293: Emergency escape lighting and exit signs for buildings	
Part 1: 2005 System design, installation and operation	AS1 1.8.1, 1.8.2
Part 2: 1995 Inspection and maintenance	AS1 1.8.3
<i>Amend: 1</i>	
Part 3: 2005 Emergency escape luminaires and exit signs	AS1 1.8.1
Standards – Australia/New Zealand	
AS/NZS 1680.1: 2006 Interior and workplace lighting: General principles and recommendations	AS1 1.4.1

Definitions

This is an abbreviated list of definitions for words or terms particularly relevant to this Compliance Document. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

Building has the meaning ascribed to it by sections 8 and 9 of the *Building Act 2004*.

Building consent means a consent to carry out *building work* granted by a *building consent authority* under section 49 of the *Building Act 2004*.

Building height means the vertical distance between the floor of the lowest *final exit* from the *building*, and the highest occupied floor level containing or supporting any *purpose group* other than IE, IA or ID, or penthouses used to enclose *stairways*, lift shafts or machinery rooms located on or within the roof.

Classified use means a *classified use* listed in clause A1 of the *Building Code*.

Exitway means all parts of an *escape route* protected by *fire* or *smoke separations*, or by distance when exposed to open air, and terminating at a *final exit*.

Final exit The point at which an *escape route* terminates by giving direct access to a *safe place*.

COMMENT:

Final exits are commonly the external doors from a ground floor, but this applies only if such doors open directly onto a *safe place*. If a *safe place* can be reached only by passing down an alley, or across a bridge, then the *final exit* is not reached until the end of such an alley or bridge. *Final exits*, therefore, should be seen strictly as a point of arrival, rather than as any particular element of a *building*. They are determined entirely by the definition of *safe place*.

Illuminance means the luminous flux falling on to a unit area of surface.

Reasonably visible, in relation to a *specified feature*, and for the purposes of Clause F6, means that the *specified feature* is visible to a person who—

- (a) is 10 metres from it, or the greatest distance from it that it is possible to go in the open space surrounding it, whichever is the lesser; and
- (b) has sight that is not defective, or is corrected (for example, by an optical appliance).

Risk group A, for the purposes of performance F6.3.4 and performance F6.3.5, means *buildings*—

- (a) whose occupants are required to remain in the *building* until the main lighting system is restored; or
- (b) whose *evacuation time* is longer than 90 minutes.

Risk group B, for the purposes of performance F6.3.4 and performance F6.3.5, means *buildings*—

- (a) whose *evacuation time* is 30 minutes or longer but not longer than 90 minutes; or
- (b) whose occupant load is more than 1 000.

Risk group C, for the purposes of performance F6.3.4, means *buildings* not in *risk group A* or *risk group B*.

Safe place A place of safety in the vicinity of a *building*, from which people may safely disperse after escaping the effects of a *fire*. It may be a place such as a street, *open space*, public space, or an *adjacent building*.

Specified features, for the purposes of Clause F6, means the following:

- (a) *building elements* that may act as obstructions:
- (b) safety features required under clauses of the *Building Code* other than Clause F6 (for example, *handrails* required under Clause D1);
- (c) changes in direction:
- (d) stairs and ramps;
- (e) escape doors;
- (f) entries to a *safe place*.

Travel Distance The length of the *escape route* as a whole or the individual lengths of its parts, namely:

- (a) *Open paths*;
- (b) *Protected paths*; and
- (c) *Safe paths*.

Verification Method F6/VM1

No specific test methods have been adopted for verifying compliance with the Performance of NZBC F6.

Acceptable Solution F6/AS1

Emergency Lighting Location, Illuminance and Installation

1.1 Scope

This Acceptable Solution applies to situations where emergency lighting is used as the sole means of meeting the performance requirements of Clause F6.

This Acceptable Solution does not apply to lighting that is essential to maintain safe working conditions.

COMMENT:

1. This Acceptable Solution is for illuminance-based emergency lighting systems only.
2. Examples of situations where lighting is essential to maintain safe working conditions include rotating machinery, operating theatres, and handling hazardous substances and organisms.
3. It should be noted that, irrespective of whether or not emergency lighting is required, the provision of signs must comply with Clause F8.

1.2 Location

Emergency lighting must be provided in all of the following:

- (a) in all *exitways*,
- (b) at every change of level in an *escape route*,
- (c) in an *escape route* from the point where the initial *open path* travel distance exceeds 20 metres,
- (d) in any *occupied space* designed for an *occupant load* of more than 250 people including all *escape routes* serving that space,
- (e) in any part of an *escape route* designed to serve more than 250 people,
- (f) in the *escape routes* of the *classified use* Community Care.

COMMENT:

1. To determine the *occupant load* refer to Definitions and Table 2.2 Occupant Densities of C/AS1 reproduced in Appendix A of F6/AS1.
2. Paragraph 1.2 (b) applies to stairs, steps, ramps etc.
3. Paragraph 1.2 (c) recognises that people can find their way in darkness over relatively short distances to areas provided with acceptable visual conditions. Acceptable visual conditions can be provided either by an illuminated floor surface complying with Paragraphs 1.3.1 and 1.3.2 (a) or by directly visible illuminated areas complying with Paragraph 1.3.2 (b).
4. Examples of 20 metre travel distance measurement are given in Appendix D.
5. To reach a *safe place* the *escape route* may include an external portion. The requirements of this Acceptable Solution also apply to this external portion.
6. Lighting for emergency in lifts is contained in Compliance Document D2, Mechanical Installations for Access, which references NZS 4332.

1.3 Illuminance

1.3.1 Where required by Paragraph 1.2, emergency lighting must provide a direct *illuminance* of no less than:

- (a) 1 lux in *exitways*, and
- (b) 1 lux at every change in level in an *escape route*, and
- (c) 0.2 lux everywhere else.

1.3.2 As an alternative to Paragraph 1.3.1, specific *escape routes* must be identified and provided with a direct *illuminance* of no less than:

- (a) 1 lux in *exitways* and 1 lux throughout the route, or
- (b) 10 lux across the width of the route with a uniformity ratio along the route of not greater than 100:1 (maximum to minimum) and 10 lux at changes of direction, changes of level and where the route enters an *exitway* or *final exit*.

1.3.3 For certain *buildings* or portions of *buildings* the *illuminance* specified in Paragraphs 1.3.1 and 1.3.2 may be insufficient. For locations such as noted in (a) to (d) below, Paragraphs 1.3.1 and 1.3.2 are therefore not applicable and the *illuminance* levels are to be determined by specific design:

- (a) areas with dangerous machinery,
- (b) areas containing hazardous processes,
- (c) clinical areas of hospitals, and
- (d) prisons and other places of detention.

1.4 Method of Measurement

1.4.1 *Illuminance* must be measured in accordance with Appendix B of AS/NZS 1680.1

1.4.2 Measurements must be made at floor level.

1.4.3 Measurements must not be made within 500 mm of vertical surfaces. Minimum *illuminance* will generally occur furthest from the luminaire(s) and at least four measurements shall be made around each luminaire on both axes. If the layout of luminaires is symmetrical, the number of measurements may be reduced.

1.4.4 Daylight or spill light from adjacent rooms must be excluded and the lamps switched on and allowed to stabilise prior to measurements being taken.

1.5 Start-up and Light Output

1.5.1 The emergency lighting system must initiate within the following times and provide:

- (a) 80% of design *illuminance* level in 0.5 seconds in locations where there is a high risk of injury due to delay in operation of the emergency lighting, such as:
 - (i) areas with dangerous machinery,
 - (ii) areas containing hazardous processes,
 - (iii) clinical areas of hospitals,
 - (iv) prisons and other places of detention, and
 - (v) any part of an *escape route* designed for more than 250 people.
- (b) 10% of design *illuminance* level in 0.5 seconds and 80% design *illuminance* level in 30 seconds in stairs or locations where the majority of the occupants/users are not familiar with the space, and
- (c) 10 % of the design *illuminance* level in 20 seconds and 80% of the design *illuminance* level in 60 seconds in all other locations.

1.6 Duration

1.6.1 Emergency lighting must be maintained for the following durations:

- (a) Continuously in *buildings* or parts of *buildings* where the occupants are required to remain in the *building* until the main lighting system is restored, or *buildings* that have an evacuation time of over 90 minutes,
- (b) 90 minutes for *buildings* with an:
 - (i) *Escape height* over 150 metres, or
 - (ii) Evacuation time between 30 and 90 minutes, or
 - (iii) Occupant load over 1000
- (c) 30 minutes for all other *buildings*.

1.7 Documentation

1.7.1 Where Paragraph 1.3.2 is used, the specific *escape routes* must be identified on the *building consent* drawings.

1.7.2 As part of the *building consent* application, the owner of the proposed emergency lighting system must submit documentation that provides:

- (a) full technical justification of the design,
- (b) the method of checking the *illuminance* of the completed design, and
- (c) the method of checking ongoing compliance for the life of the *building*.

COMMENT:

Acceptable methods of checking the illumination of the completed installation include:

- (a) *illuminance* measurements conforming with the method provided in Paragraph 1.4.1.
- (b) site verification that the luminaire type and spacing comply with the computer-based design or the manufacturer's spacing tables submitted as part of the *building consent* application.

1.8.2 Notwithstanding the requirements of Paragraph 1.8.1 (a) a generator installed and maintained in accordance with NZS 6104, as amended by Appendix C, is an acceptable emergency power supply to meet Section 3 of AS 2293: Part 1 providing the emergency lighting has priority as the initial load.

1.8.3 Inspection, maintenance and reporting procedures for central battery and single point systems shall be performed in accordance with AS/NZS 2293: Part 2.

COMMENT:

For Paragraph 1.8.2 the starting characteristics of generators make them unsuitable as initial power sources in situations where NZBC Performance Requirements F6.3.2(a) and (b) must be satisfied.

1.8 Installation, Maintenance and Equipment

1.8.1 An emergency lighting system must be installed in accordance with:

- (a) AS 2293: Parts 1 and 3 as amended by Appendix B (F6/AS1), and
- (b) NZBC Clause G9, Electricity.

Emergency lighting installations must be commissioned after the successful completion of tests to confirm automatic operation upon tripping or failure of the power supply to the normal lighting circuits and must include testing of any phase failure devices. Such tests must be repeated on the completion of any addition to, or alteration of, the installed system.

Appendix A – Occupant Densities

(Table 2.2 from C/AS1)

Table 2.2: Occupant Densities	
Activity	Occupant density (Users/m²) (see Note 1)
CROWD ACTIVITIES	
Airports – baggage claim	0.5
Airports – concourses	0.1
Airports – waiting areas, check in	0.7
Area without seating or aisles	1.0
Art galleries, museums	0.25
Bar sitting areas	1.0
Bar standing area	2.0
Bleachers, pews or similar bench type seating	2.2 users per linear metre
Classrooms	0.5
Dance floors	1.7
Day care centres	0.25
Dining, beverage and cafeteria spaces	0.8
Exhibition areas, trade fairs	0.7
Fitness centres	0.2
Gymnasias	0.35
Indoor games areas/bowling alleys, etc	0.1
Libraries – stack areas	0.1
Libraries – other areas	0.15
Lobbies and foyers	1.0
Mall areas used for assembly purposes	1.0
Reading or writing rooms and lounges	0.5
Restaurants, dining rooms and lounges	0.9
Shop spaces and pedestrian circulation areas including malls and arcades	0.3
Shop spaces for furniture, floor coverings, large appliances, building supplies and manchester	0.1
Showrooms	0.2
Space with fixed seating	as number of seats (see Note 2)
Space with loose seating	1.3
Spaces with loose seating and tables	0.9
Stadia and grandstands	1.8
Stages for theatrical performances	1.3
Standing space	2.6
Swimming pools (water surface area)	0.2
Swimming pool surrounds and seating	0.35
Teaching laboratories	0.2
Vocational training rooms in schools	0.1

Table 2.2: Occupant Densities (continued)

Activity	Occupant density (Users/m ²) (see Note 1)
SLEEPING ACTIVITIES	
Bedrooms	as number of beds
Bunkrooms	(see Note 2)
Detention quarters	
Dormitories, hostels	
Halls and <i>wharenui</i> (Note 5)	
Wards containing more than two beds	
WORKING BUSINESS AND STORAGE ACTIVITIES	
Aircraft hangars	0.02
Bulk storage (e.g. solid stacked)	0.01
Commercial laboratories, laundries	0.1
Computer rooms (not used as classrooms for training)	0.04
Factory space in which layout and normal use determines the number of people using it in working hours	as approved (see Note 3)
Heavy industry	0.03
Interview rooms	0.2
Kitchens	0.1
Manufacturing and process areas, staffrooms	0.1
Offices and staffrooms	0.1
Personal service facilities	0.2
Reception areas	0.1
Workrooms, workshops	0.2
Warehouse storage (e.g. racks and shelves)	0.03
INTERMITTENT ACTIVITIES (see Note 4)	
Boiler rooms, plant rooms, service units and maintenance workshops	0.03
Parking <i>buildings</i> , garages	0.02
<i>Exitways</i> , enclosed corridors, lifts (no occupants counted)	0.0
Laundry and house keeping facilities	0.2
Storage	0.02
Toilets and subordinate spaces (no occupants counted)	0.0

Notes:

1. The floor area to be used shall be the total *firecell* floor area including that occupied by internal partitions and *fixtures*. The occupant densities in this table already allow for a proportion of floor area, appropriate to the activity, being occupied by furniture, partitions, *fixtures* and associated equipment.
2. For fixed seating and beds, the number of seats or beds is used instead of an occupant density (users per m²).
3. In such cases, the *occupant load* must be specified when seeking a *building consent*. Future increase in numbers shall be treated as a change of use.
4. Spaces for intermittent activities (*purpose groups* IE, IA, ID), are normally not assessed for *occupant load*. It is assumed that the occupation is temporary and by people who would already have been included in the *occupant load* of another space. The figures given in the table apply where people are specifically employed to perform the functions for which the spaces are provided.
5. For halls and *wharenui*, the maximum *occupant load* is determined by the *fire safety precautions* and the escape capacity. See [C/AS1] Paragraphs 3.3.2 h), 3.4.2 e), 6.7.2 and 6.7.9.

Appendix B – Modifications to AS 2293.1: 2005 and AS 2293.3: 2005

PART 1

Section 2 – System Performance, Arrangement and Control

2.3.1 General

Add Note after paragraph –

Note – Where generators are used as a means of electrical supply for the emergency lighting system the generator installation must comply with NZS 6104 as amended by Appendix C of F6/AS1.

2.3.3.1 Centrally supplied systems

Add after first paragraph –

“Where a generator is used as the means of providing emergency power it must start if any of the final sub-circuit sensors detect the loss of power to a final sub-circuit.”

Section 3 – Emergency Lighting Power Sources

3.2.2 Fire Resistance – Delete

3.2.4.3 Maintenance of Fire Resistance
– Delete

Section 5 – Design of Emergency Escape Luminaire Installations

5.2 Provision of Emergency Luminaires

Amend the first paragraph to read “Emergency luminaires must be installed throughout the designated area in accordance with New Zealand Building Code Clause F6”. Delete last sentence of the first paragraph.

5.4.2.1 General

Delete (a)

5.4.2.3 Illuminance Calculations

Delete “...is not less than 0.2 lux” and add “...is as required by the New Zealand Building Code Clause F6”.

Tables 5.1 to 5.5 inclusive – Delete tables.

Note – Spacing tables specifically designed to comply with the requirements of the New Zealand Building Code Clause F6 may be used to position emergency lighting luminaires in New Zealand.

5.6.1 General

Delete (a)

5.6.2 Direct Lighting (Spacing Rules)

– Delete clause

Note – Spacing tables specifically designed to comply with the requirements of the New Zealand Building Code Clause F6 may be used to position emergency lighting luminaires in New Zealand.

5.6.3 Direct Lighting (Illuminance Calculations)

Delete “not less than 1 lx.” Replace with “as required by F6/AS1 Paragraph 1.3.”

5.6.4 Indirect Lighting (Illuminance Calculations)

Delete “not less than 1 lx.” Replace with “as required by F6/AS1 1.3.”

Section 6 – Design of Exit Signs, Installation

6.2 Required Locations

Delete “...Building Code of Australia” and add “New Zealand Building Code Clause F6”.

6.3 Use of Externally Illuminated Signs

Delete clause and add “Installation of external illuminated exit signs must comply with the requirements of New Zealand Building Code Clause F8”. Retain the Note.

6.4 Sign Colours

Delete Clause 6.4.1, Areas of normal illumination and 6.4.2, Area of low illumination and refer to New Zealand Building Code Clause F8.

6.5 Choice of Images

Delete and refer to New Zealand Building Code Clause F8.

6.6 Size of Pictorial Element

Delete

6.7 Illumination

Delete "Building Code of Australia" and add "New Zealand Building Code Clauses F6 and F8..."

Section 7 – Installation of Electrical Wiring and Equipment for Centrally Supplied Systems

7.4 Protection of the Electrical Installation Against Fire

Delete

7.5 Segregation or Identification of Submains

Change the last sentence to read "Where emergency lighting submain conductors are of different voltages to the normal supply they must not be installed in the same conduit, duct or troughing." Retain second sentence.

Appendix A

Add: AS/NZS 1680.1: 2006 Interior and workplace lighting: General principles and recommendations

NZS 6104: 1981 Specification for emergency electricity supply in buildings

NZS 6742: 1971 Code of practice for emergency lighting in buildings

Appendix B – Delete

Appendix C – Delete figures C3, C4, C5, C6, C7 and C8

Appendix D – Delete

PART 3

Section 2 – General Requirements for Emergency Escape Luminaires

2.3 Illumination at switch on

2.3.1 Maximum delay Emergency luminaires must provide a light output as specified in F6/AS1 Paragraph 1.5.

Delete (a) and (b) and the sentence following.

Amend the beginning of Paragraph 3 to read "These requirements shall apply"

Delete the Note.

Section 3 – General requirements for exit signs

Delete entire section.

Section 4 – Particular requirements for self-contained emergency luminaires and exit signs

Delete all references to Exit Signs – these are required to comply with New Zealand Building Code Clause F8.

4.8.3 Required indication

Paragraph after (c) change to read "Where a single indicator is used to provide all of the indications required by items (a) to (c), the following illuminated states shall have the meanings given:"

Appendix C Classification of emergency escape luminaires

Attention is drawn to the need to provide spacing tables that comply with the New Zealand requirements for the required illumination levels. The basic formulae and methods of deriving classifications and spacing tables remain the same. Clause 2.2 and Appendix C of this Standard may be used to formulate appropriate spacing tables for New Zealand requirements.

**AS/NZS 2293.2: 1995
(including amendment 1)**

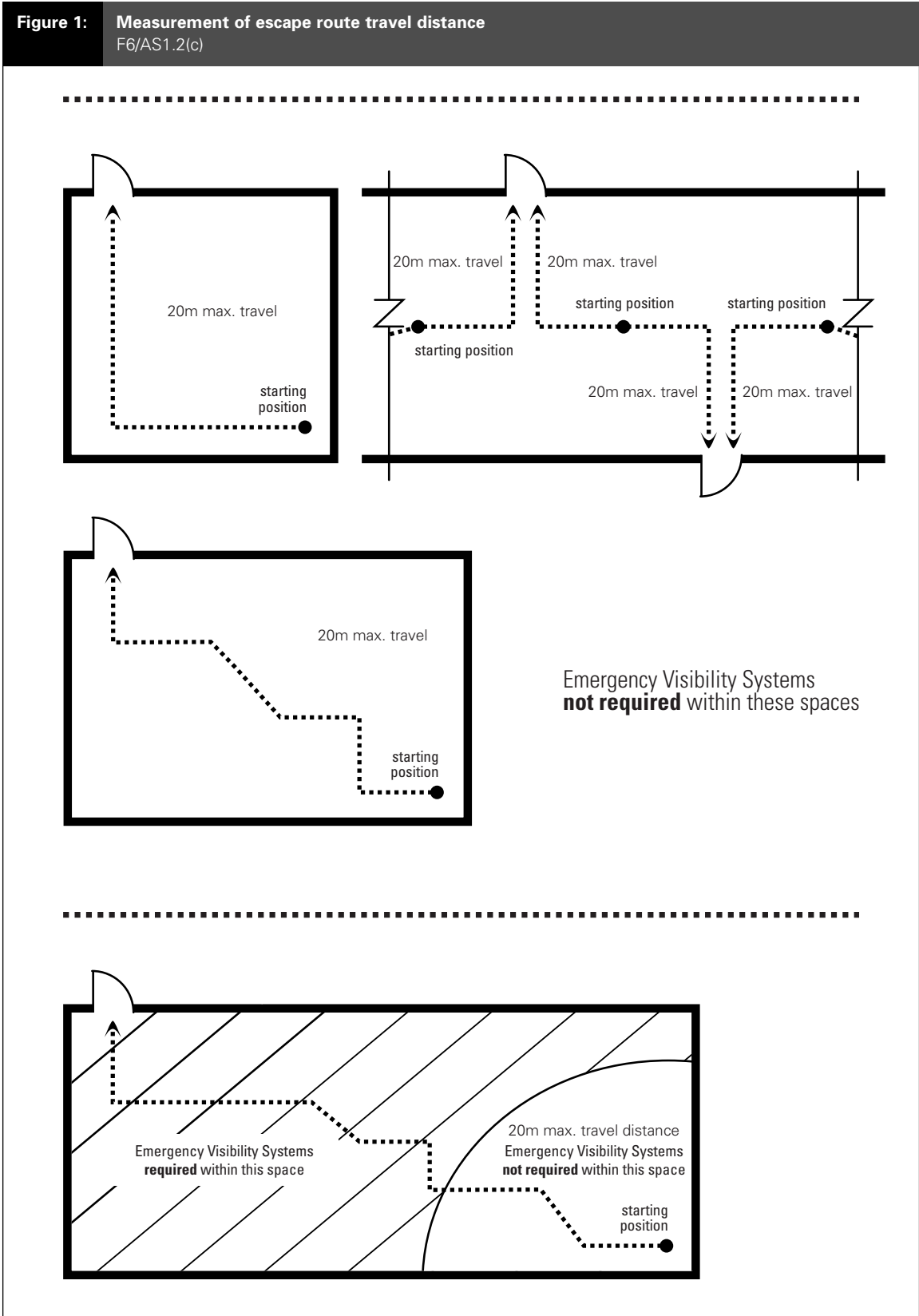
.....
No changes are required to this Standard.

Appendix C – Modifications to NZS 6104

Clause 302.1 “Response Criteria” shall be amended to read:

“The emergency plant must be such that full speed is attained and initial load applied within a maximum of 15 seconds from the initiating signal.”

Appendix D – Measurement of escape route travel distance F6/AS1 1.2 (c)



Index F6/VM1 & AS1

References are to Paragraphs.

Visibility in Escape Routes

Duration	AS1	1.6
Documentation	AS1	1.7
Equipment	AS1	1.8
Illuminance	AS1	1.3
Installation	AS1	1.8
Location	AS1	1.2
Maintenance	AS1	1.8
Method of Measurement	AS1	1.4
Light Output	AS1	1.5
Scope	AS1	1.1
Start-up	AS1	1.5

Occupant DensitiesAppendix A

**Modifications to AS 2293.1: 2005
and AS 2293.3: 2005**Appendix B

Modifications to NZS 6104Appendix C

Measurement of escape route travel distanceAppendix D

