



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI

Acceptable Solutions and Verification Methods

For New Zealand Building Code Clause
**D2 Mechanical Installations
for Access**



Status of Verification Methods and Acceptable Solutions

Verification Methods and Acceptable Solutions are prepared by the Ministry of Business, Innovation and Employment in accordance with section 22 of the Building Act 2004. Verification Methods and Acceptable Solutions are for use in establishing compliance with the New Zealand Building Code.

A person who complies with a Verification Method or Acceptable Solution will be treated as having complied with the provisions of the Building Code to which the Verification Method or Acceptable Solution relates. However, using a Verification Method or Acceptable Solution is only one method of complying with the Building Code. There may be alternative ways to comply.

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

Defined words (italicised in the text) and classified uses are explained in Clauses A1 and A2 of the Building Code and in the Definitions at the start of this document.

Enquiries about the content of this document should be directed to:



**MINISTRY OF BUSINESS,
INNOVATION & EMPLOYMENT**
HĪKINA WHAKATUTUKI

Ministry of Business, Innovation and Employment
PO Box 1473, Wellington 6140
Telephone 0800 242 243
Email: info@building.govt.nz

**Verification Methods and Acceptable Solutions
are available from www.building.govt.nz**

New Zealand Government

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Document Status

The most recent version of this document (Amendment 7), as detailed in the Document History, is approved by the Chief Executive of the Ministry of Business, Innovation and Employment. It is effective from 1 January 2017 and supersedes all previous versions of this document.

The previous version of this document (Amendment 6) will cease to have effect on 06 August 2017.

People using this document should check for amendments on a regular basis. The Ministry of Business, Innovation and Employment may amend any part of any Verification Method or Acceptable Solution at any time. Up-to-date versions of Verification Methods and Acceptable Solutions are available from www.building.govt.nz

D2: Document History			
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Amendment 2	19 August 1994	pp. i and ii, Document History p. vii, Contents p. viii, References p. 3, 1.0.1, 1.0.3, Rule 2.2 p. 5, Rule 14.5 p. 6, 24.18	p. 7, Rules 25.5, 25.6.1, 25.6.2 b) c), 25.7 25.7.1, 25.7.2 a) b) c) d) g) p. 8, Rule 34.2.3.3 a) p. 8A, 3.0.1 Rule 71.5.4, Figure 1
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Note: Page numbers relate to the document at the time of Amendment and may not match page numbers in current document.			

New Zealand Building Code Clause D2 Mechanical Installations for Access

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 Mechanical Installations for Access is D2.

FIRST SCHEDULE—continued	
Clause D2—MECHANICAL INSTALLATIONS FOR ACCESS	
Provisions	Limits on application
<p>OBJECTIVE D2.1 The objective of this provision is to:</p> <ul style="list-style-type: none"> (a) Safeguard people from injury and loss of amenity while using mechanical installations for movement into, within and out of <i>buildings</i>, (b) Safeguard maintenance personnel from injury while servicing mechanical installations for access, and (c) Ensure that <i>people with disabilities</i> are able to carry out normal activities and processes within <i>buildings</i>. <p>FUNCTIONAL REQUIREMENT D2.2 Mechanical installations for access into, within and out of <i>buildings</i> shall provide for the safe and easy movement of people, and for the safety of maintenance personnel.</p> <p>PERFORMANCE D2.3.1 Mechanical installations for access shall:</p> <ul style="list-style-type: none"> (a) Move people safely, and stop and hold as required for the normal use of the installation, for all loads up to and including 25% in excess of the rated load, (b) Not produce excessive acceleration or deceleration, (c) Be constructed to avoid the likelihood of people falling, tripping, becoming caught, being able to touch or be struck by moving parts, sharp edges or projections, under both normal and reasonably foreseeable abnormal conditions of use, 	<p>Objective D2.1(c) shall apply only to those <i>buildings</i> to which section 47A of the Act applies.</p>

See Note

NOTE:
 Section 47A is in the Building Act 1991. The equivalent section in the Building Act 2004 is section 118.

FIRST SCHEDULE—*continued*

Provisions

- (d) Be constructed to prevent collision between components, or between components and the *building*,
- (e) Have a control system that ensures safe abnormal operation in the event of overloading or failure of any single component, and
- (f) Be capable of being isolated for inspection, testing and maintenance.

D2.3.2 Mechanical installations for access shall be provided with:

- (a) *Adequate* control over normal use, to ensure people's safety throughout any operation involving starting, stopping or changing the direction of travel,
- (b) Notification of position, where people are fully enclosed and the installation serves more than two levels,
- (c) *Adequate* lighting and ventilation for both normal and emergency use, and
- (d) Signs as required by Clause F8 "Signs",

D2.3.3 Mechanical installations for access shall, for emergency purposes, be provided with a means of:

- (a) Calling outside help,
- (b) Releasing people safely,
- (c) Safeguarding people from exposure to *hazardous* situations, and
- (d) Allowing authorised personnel to override the normal running procedure and take exclusive control of the installation.

D2.3.4 Potentially dangerous equipment shall be located in spaces which:

Limits on application

Performance D2.3.3(d) shall not apply to installations travelling less than 15 m vertically.

FIRST SCHEDULE—continued

Provisions

- (a) Are secure from unauthorised entry and contain only equipment associated with the installation,
- (b) Are appropriately sized and suitably guarded to provide *adequate* safe working areas for maintenance personnel,
- (c) Are provided with *adequate* power and lighting for maintenance, and
- (d) Have an environment that ensures the safe operation of the equipment under all likely conditions of use.

D2.3.5 Mechanical installations on *accessible routes* shall:

- (a) Where the passenger conveyor is manually controlled, provide:
 - (i) controls which are easily identifiable and easy to use,
 - (ii) *adequate* notification that the passenger conveyor has registered a summoning call, and
 - (iii) *adequate* notification that the passenger conveyor has arrived, and of its future direction of travel,
- (b) Where the passenger conveyor is fully enclosed and serves more than two levels, provide an *adequate* means of informing occupants of their location,
- (c) Where appropriate, have doors which:
 - (i) are power operated,
 - (ii) are readily distinguishable from their surroundings, and
 - (iii) where automatic, remain open sufficiently long to enable *people with disabilities* to pass through, and
- (d) Have *handrails* within the passenger conveyor.

Limits on application

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References

For the purposes of New Zealand Building Code (NZBC) compliance, the Standards and documents referenced in these Verification Methods and Acceptable Solutions (primary reference documents) must be the editions, along with their specific amendments, listed below. Where these primary reference documents refer to other Standards or documents (secondary reference documents), which in turn may also refer to other Standards or documents, and so on (lower-order reference documents), then the version in effect at the date of publication of these Verification Methods and Acceptable Solutions must be used.

Amend 6
Feb 2014

Standards New Zealand

		Where quoted	
Amends 6 and 7	NZS 4223:- Part 3: 2016	Glazing in buildings Human impact safety requirements	AS3 1.0.1 g)
	NZS 4332: 1997	Non-domestic passenger and goods lifts	AS1 1.0.1
Amend 6 Feb 2014	NZS 4334: 2012	Platform lifts and low-speed lifts	AS2 1.0

Amend 6
Feb 2014

The European Committee for Standardisation, Brussels

	EN 81-20: 2014	Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods. Passenger and goods passenger lifts	AS1 2.0
	EN 81-28: 2003	Safety rules for the construction and installation of lifts. Lifts for the transport of persons and goods. Remote alarm on passenger and goods passenger lifts	AS1 2.1
	EN 81-50: 2014	Safety rules for the construction and installation of lifts. Examinations and tests. Design rules, calculations, examinations and tests of lift components	AS1 2.1 Comment
Amend 7 Jan 2017	EN 81-77: 2013	Safety rules for the construction and installation of lifts. Particular applications for passenger and goods passenger lifts. Lifts subject to seismic conditions	AS1 2.1
Amend 6 Feb 2014	EN 115:- Part 1: 2008	Safety of escalators and moving walks Construction and installation <i>Amend: A1</i>	AS3 1.0.1

Definitions

Amend 6
Feb 2014

This is an abbreviated list of definitions for words or terms particularly relevant to these Verification Methods and Acceptable Solutions. The definitions for any other italicised words may be found in the New Zealand Building Code Handbook.

Accessible Having features to permit use by *people with disabilities*.

Accessible route An *access route* usable by *people with disabilities*. It shall be a continuous route that can be negotiated unaided by a wheelchair user. The route shall extend from street boundary or car parking area to those spaces within the *building* required to be *accessible* to enable *people with disabilities* to carry out normal activities and processes within the *building*.

Adequate *Adequate* to achieve the objectives of the *Building Code*.

Amenity An attribute of a *building* which contributes to the health, physical independence, and well being of the *building's* users but which is not associated with disease or a specific illness.

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

Building consent authority (BCA) means a person whose name is entered in the register referred to in section 273(1)(a) of the Building Act 2004.

Amend 6
Feb 2014

Building element Any structural and non-structural component or assembly incorporated into or associated with a *building*. Included are *fixtures*, services, *drains*, permanent mechanical installations for access, glazing, partitions, ceilings and temporary supports.

Compliance schedule means a compliance schedule required under section 100 of the Building Act 2004.

Amend 6
Feb 2014

Handrail A rail to provide support to, or assist with the movement of a *person*.

Hazardous Creating an unreasonable risk to people of bodily injury or deterioration of health.

Owner, in relation to land and any *buildings* on the land,—

(a) means the *person* who—

- (i) is entitled to the rack rent from the land; or
- (ii) would be so entitled if the land were let to a tenant at a rack rent; and

(b) includes—

- (i) the *owner* of the fee simple of the land; and
- (ii) any *person* who has agreed in writing, whether conditionally or unconditionally, to purchase the land or any leasehold estate or interest in the land or to take a lease of the land and who is bound by the agreement because the agreement is still in force.

Person includes—

- (a) the Crown; and
- (b) a corporation sole; and
- (c) a body of persons (whether corporate or unincorporate)

Person with a disability means any *person* who has an impairment or combination of impairments that limits the extent to which the person can engage in the processes of everyday life, including, without limitation, any of the following:

- a) a physical, sensory or neurological impairment;
- b) a mental illness.

Amend 6
Feb 2014

Verification Method D2/VM1

Passenger Carrying Lifts

No specific test methods have been adopted for verifying compliance with the Performance of NZBC D2.

Acceptable Solution D2/AS1

Passenger Carrying Lifts

1.0 Reference Document NZS 4332

1.0.1 NZS 4332 is an acceptable solution subject to the the following modifications:

- a) Where this Standard has provisions that are in non-specific or unquantified terms (such as where provisions are required to be appropriate, adequate, suitable, equivalent, satisfactory, acceptable, applicable or the like), then these do not form part of the acceptable solution and must be treated as an alternative solution.
- b) Where this Standard requires approval, verification or the like, then this must be to the satisfaction of the *building consent authority*.
- c) The structural design of the *building*, its elements and the fixings supporting the lift installation, shall comply with Clause B1 "Structure" and is outside the scope of this Standard as an acceptable solution. Structural design of parts of the lift installation where described in this Standard shall be undertaken by a suitably qualified designer and shall be to the approval of the *building consent authority*.

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Jan 2017

2.0 Reference Document EN 81-20

Amend 7
Jan 2017

2.1 EN 81-20 is an acceptable solution for electric and hydraulic passenger lifts subject to the following modifications.

COMMENT:

EN 81-20 makes extensive reference to EN 81-50.

Add a new Clause 1.5 to read:

"1.5 The Standard does not cover the following:

1.5.1 Structural Design (NZBC Clause B1)

The structural design of the lift installation including its various components and the building housing the installation are outside of the scope of this Standard. Designs need to be undertaken by a suitably qualified designer, using Verification Method B1/VM1 and EN 81-77 as considered appropriate, with proposals approved by the *building consent authority* as part of the *building consent* process.

NOTE: Although this Standard provides some design criteria and information on the loads resulting from the operation and use of the lift installation, it does not fully account for all loadings that must be taken into consideration, e.g. earthquake. The overall structural design of the lift installation and of its components is therefore outside of the scope of this Standard.

1.5.2 Durability (NZBC Clause B2)

The design of the lift installation with respect to durability is outside of the scope of this Standard.

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NOTE This Standard does not specifically address the durability of all components of the lift installation. As part of the *building consent* process the *building consent authority* may require evidence that the various components of the lift installation will meet the *building code's* durability provisions.

1.5.3 Protection from Fire (NZBC Clauses C1-C6)

The design of the lift installation with respect to protection from *fire* is outside of the scope of this Standard. Designs need to be undertaken by a suitably qualified designer with proposals approved by the *building consent authority* as part of the *building consent* process. The appropriateness of any information in this Standard that relates to *fire* safety needs to be considered as part of that design.

NOTE 1 The Standard provides some limited information however any *fire* design cannot look at the lift installation in isolation and needs to consider the building as a whole before determining requirements.

NOTE 2 This acceptable solution, by reference to Clause 25.6 of NZS 4332, aims to ensure lifts are not used during a firecall in the *building*. Lifts specifically designed to be used during a *fire* require special engineering consideration and are outside of the scope of this acceptable solution and NZS 4332.

Add a new Clause 1.6 to read:

"1.6 Requirements from NZS 4332

The lift installation shall meet the requirements of the following clauses from NZS 4332. If there is conflict between these clauses and provisions in EN 81-20, these clauses shall take precedence:

Clause 2.5 Maintenance and inspection

Clause 7.9 Hatches in machine rooms

Clause 7.15 Protection of machine rooms against weather

Clause 7.17 Ventilation of machine rooms

Clause 7.18 Machine room lifting beams

Clause 11.3 Pit maintenance

Clause 11.5.3 Access from bottom landing doors

Clause 11.9 Dryness of pits

Clause 22.20.2 Internal lighting.

The Clause shall be modified by adding the words "Where batteries provide the emergency lighting source, the batteries shall be secured in such a manner that they cannot be displaced or the contents spilled by the operation of the safety gear or by earthquake."

Clause 24.10 Lift circuit drawing in machine room

Clause 25.6 Operation of lifts under fire or other emergency conditions (excluding earthquakes)

Clause 25.7 Detection of fire in machine rooms (including sheave rooms and governor rooms containing electronic equipment) and liftwells

Clause 25.8 Operation of lifts under earthquake conditions

The Clause shall be modified by adding the words "The requirements of Clause 25.8 may be replaced with an earthquake detection system complying with Clauses 5.10.3 and 5.10.4 of EN 81-77".

Clause 28.2 Emergency communication and alarm

The Clause shall be modified by adding the words "The requirements of Clause 28.2 may be replaced with a telephone alarm system that complies with EN 81-28 provided it complies also with the requirements of Clause 70.4 of NZS 4332."

Clause 70 Requirements for lifts on access routes for people with disabilities

NOTE NZS 4332 does not provide for the use of touch screens for calling or controlling lifts. Further, touch screens by themselves do not comply with *Building Code* Clause D2.3.5 as, among other things, they do not provide tactile

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interaction. Touch screens need to be supplemented with tactile activation linked to audible notifications to ensure ease of use by people with visual impairments (see Codewords 71 article 'Compliant lifts are easy to use for everyone')."

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Jan 2017

Add a new Clause 1.7 to read:

"1.7 Interpretation

Where this Standard has provisions that are in non-specific or unquantified terms (such as where provisions are required to be suitable, special, adequate, appropriate, equivalent, 'within easy reach' or the like) then proposals to meet those provisions must be to the satisfaction of the *building consent authority*.

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Where the Standard requires that manufacturer's advice be followed, the adequacy of that advice shall be to the satisfaction of the *building consent authority*.

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Where this Standard requires approval, verification or the like, this shall be to the satisfaction of the *building consent authority*.

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The word "shall" identifies a mandatory requirement for compliance with this Standard. The word "should" refers to practices which are advised or recommended.

The word "normative" identifies a mandatory requirement for compliance with this Standard.

The words "NOTE" and "informative" identify commentary material. Such material is given for the purposes of general information and explanation and does not form part of the mandatory requirements of this Standard."

Add the following to Clause 5.2.1.4.1

"d) at least 50 lux maintained vertical illumination at landing door headers."

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NOTE: The required illumination may be provided by lighting mounted on the car roof.

Maintained illumination is the minimum illumination during the life of the installation taking into account the drop in light output as the light sources age and the effect of dirt accumulating on optical surfaces etc.

Amend Clause 5.2.2.5 to read:

"5.2.2.5 A safe access for persons to machinery spaces and pulley rooms shall be provided. Where level access from the nearest lift landing is not available access between levels shall be provided by stairs.

Delete 5.2.5.2.2.1c)

Add new clause 5.2.5.8.3 to read:

"5.2.5.8.3 Devices to hold car above the lowest floor

For direct-acting electrohydraulic lifts, suitable devices shall be provided to hold the car above the lowest floor. Such devices shall support the car as necessary during all testing and maintenance without impinging on the clearances required by this Standard.

If the device is not permanently fixed in place it shall remain on the site in an area exclusively for the use of the lift installation. If stored in the pit it shall not interfere with the lift installation nor with any clearance required by this Standard.

Proposals for the device, demonstrating compliance with the requirements of this Clause, shall be to the satisfaction of the *building consent authority*."

Amend Clause 5.4.3.3 to read:

"5.4.3.3 Car walls with glass placed lower than 1.10 m from the floor shall have a support rail at a height between 0.95 m and 1.05 m. This support rail shall be fastened independently from the glass. "

Amend Clause 5.4.10.2 to read:

"5.4.10.2 Lift cars shall have a minimum of two lights, one to be connected to the lift supply and one to be connected to some other part of the electrical installation of the building in which the lift is located or to some other source of supply."

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Amend Clause 5.4.10.4 to read:

“**5.4.10.4** There shall be an automatically rechargeable emergency supply, which is capable of ensuring at least a lighting intensity of 10 lux for 2 hours at the alarm initiation device and in the centre of the car one metre above the floor. This lighting shall come on automatically upon failure of the normal lighting supply. At least two lamps of approximately equal wattage shall be used. The recovery rate of the emergency supply after 2 hours continuous use shall be such that a further 2 hours illumination can be maintained after not more than 16 hours recharging. ”

Amend Clause 5.9.3.2.5.1 to read:

“**5.9.3.2.5.1** Any hole bored in the ground to house a hydraulic jack shall be lined with a waterproof caisson. The inner diameter of the caisson shall be at least 100 mm greater than the outer diameter of the hydraulic jack. There shall be a minimum of 100 mm clearance between the caisson bottom and the bottom of the jack. The caisson shall extend at least 150 mm above the floor of the pit. The lift shall not impose any load on the caisson.

If the jack itself is weatherproof then subject to demonstration of adequate performance the caisson can be open-ended so as to act as a drain with its upper end finishing flush with the pit floor.

NOTE: The caisson performs the two functions of preventing collapse of the bored hole and protecting the jack from damage and deterioration caused by contact with water. An example of a jack that may be weatherproof could be a water hydraulic jack.

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Verification Method D2/VM2

Platform Lifts and Low-speed Lifts

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No specific test methods have been adopted for verifying compliance with the Performance of NZBC D2.

Acceptable Solution D2/AS2

Platform Lifts and Low-speed Lifts

1.0 Reference Document NZS 4334

1.0.1 NZS 4334 is an Acceptable Solution for platform lifts and low-speed lifts.

Amend 6
Feb 2014

Amend 6
Feb 2014

Verification Method D2/VM3 Escalators and Moving Walks

No specific test methods have been adopted
for verifying compliance with the Performance
of NZBC D2.

Acceptable Solution D2/AS3

Escalators and Moving Walks

1.0 Reference Document EN 115

1.0.1 EN 115 is an Acceptable Solution subject to the following modifications:

- a) Where the Standard uses the word 'shall' this refers to requirements that are essential for compliance with the Standard; while the word 'should' refers to practices that are advised or recommended. A 'Normative' appendix is an integral part of the Standard and contains requirements; an 'Informative' appendix contains recommendations only.
- b) Where this Acceptable Solution does not nominate the specific details of what is required for an escalator or moving walk component or feature but instead describes the required performance or is otherwise non-specific (such as where provisions are required to be appropriate or suitable) the details of the component or feature, along with justification of its adequacy, shall be included on plans and specifications for consideration by the *building consent authority* as part of the normal *building consent* process.
- c) Where escalators or moving walks are provided an alternative *Building Code* compliant non-mechanical means of access, such as stairs or ramps, shall also be provided. Escalators and moving walks shall not comprise part of an *escape route*.
- d) Escalators shall not be used on *accessible routes*.
- e) Moving walks on *accessible routes* shall meet the following requirements:
 - i) the maximum slope shall be 1 in 10 (5.7 degrees)

Comment

A maximum slope of 1 in 14 (4.1 degrees) is recommended.

- ii) the width of the pallet or belt shall be no less than 900 mm and no greater than 1200 mm

- iii) the pallets or belt shall move horizontally for at least 1200 mm before entering the combs

- iv) the *handrails* shall extend 300 mm beyond the combs

- f) The structural adequacy of the escalator or moving walk, its supports and of the *building* supporting the escalator or moving walk, to withstand all likely loads including earthquake, shall be demonstrated by a suitably qualified structural designer. The person proposing to install the escalator or moving walk shall supply to the structural designer all necessary information to enable the design to be carried out, including weights of escalator or moving walk components and all working tolerances necessary for safe operation.

COMMENT

It is expected that evidence would be furnished to the *building consent authority (BCA)* with the *building consent* application showing that a competent structural designer, Chartered Professional Engineer (CPEng) or other, has designed or otherwise checked the proposed escalator or moving walk, and the *building* supporting it, and considers the proposals to be *adequate*. The evidence about the escalator or moving walk itself could, depending on circumstances, be either specific engineering calculation or it could be a consideration of a design carried out overseas by others. It is envisaged that most *BCAs* would accept the advice of a CPEng working within a known area of expertise.

- g) All glazing associated with the escalator or moving walk installation shall be Grade A safety glass complying with NZS 4223.3.
- h) The electrical requirements of the Standard are additional to the normal requirements for an electrical installation. All wiring shall comply with NZBC Clause G9 'Electricity'.
- i) Signs complying with F8/AS1 may be used instead of those required by the Standard.

Where moving walks are intended for transporting trolleys, safety signs describing safe and correct use shall be provided.

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- j) For *building consent* purposes the *person* proposing to install the escalator or moving walk shall supply the following information:
- i) drawings and specifications detailing the escalator or moving walk installation (including the circuit diagram) and its attachment to the *building*
 - ii) demonstration of structural adequacy – see f) above
 - iii) justification for components or features meeting performance or other unspecific requirements of the Standard – see b) above
 - iv) the specific data, test reports and certificates noted in Clause 6.2 of the Standard
 - v) details of inspections and tests to be performed on behalf of the *owner* during installation of the escalator or moving walk and on completion of the work
 - vi) requirements for inspection and routine maintenance for inclusion in the *building's compliance schedule*.

Comment

This information comprises 'plans and specifications' as defined in the Building Act. It is expected that the person proposing to install the escalator or moving walk will receive the above information from the escalator or moving walk manufacturer or supplier, the structural designer, and others.

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