

2022 NATIONAL BUILDING CODE



For SOLOMON ISLANDS

CONTENTS

PREFACE

ACKNOWLEDGEMENT

INTRODUCTION

A GENERAL PROVISIONS

- A1 Interpretation
- A2 Acceptance of Design and Construction
- A3 Classification of Buildings and Structures
- A4 United Buildings
- A5 Importance Level of Building and Design Life
- A6 Exclusions
- A7 UXO Survey and Disposal

B STRUCTURE

- Performance Requirements
- Deemed-to-Satisfy Provisions
- B1 Structural Provisions
- B2 Demolition

DWELLINGS AND OUTBUILDINGS

DC FIRE RESISTANCE

- Performance Requirements
- Deemed-to-Satisfy Provisions
- DC1 Fire Resistance and Stability

DD ACCESS AND EGRESS

- Performance Requirements
- Deemed-to-Satisfy Provisions
- DD1 Construction of Exits

DE ELECTRICITY

- Performance Requirements
- Deemed-to-Satisfy Provisions
- DE1 Electrical Safety
- DE2 Amenity

DF HEALTH AND AMENITY

- Performance Requirements
- Deemed-to-Satisfy Provisions
- DF1 Damp and Weatherproofing
- DF2 Cooking and Sanitary Facilities
- DF3 Room Sizes and Heights
- DF4 Light and Ventilation
- DF5 Watersupply Plumbing
- DF6 Sanitary Plumbing and Drainage
- DF7 Roof Drainage

DG ANCILLARY PROVISIONS

- Performance Requirements
- Deemed-to-Satisfy Provisions
- DG1 Minor Structures and Components
- DG2 Fireplaces, Chimneys and Flues

PUBLIC BUILDINGS AND GROUP DWELLINGS

NC FIRE RESISTANCE

- Performance Requirements
- Deemed-to-Satisfy Provisions
- NC1 Fire Resistance and Stability
- NC2 Compartmentation and Separation
- NC3 Protection of Openings

ND ACCESS AND EGRESS

- Performance Requirements
- Deemed-to-Satisfy Provisions
- ND1 Provision for Escape
- ND2 Construction of Exits
- ND3 Access for People with Disabilities

NE SERVICES AND EQUIPMENT

- Performance Requirements
- Deemed-to-Satisfy Provisions
- NE1 Fire Fighting Equipment
- NE2 Mechanical Ventilation
- NE3 Lift Installations
- NE4 Emergency Lighting and Exit Signs
- NE5 Maintenance of Safety Installations
- NE6 Electricity

NF HEALTH AND AMENITY

- Performance Requirements
- Deemed-to-Satisfy Provisions
- NF1 Damp and Weatherproofing
- NF2 Sanitary Facilities
- NF3 Room Sizes
- NF4 Light and Ventilation
- NF5 Watersupply Plumbing
- NF6 Sanitary Plumbing and Drainage
- NF7 Roof Drainage

NG ANCILLARY PROVISIONS

- Performance Requirements
- Deemed-to-Satisfy Provisions
- NG1 Minor Structures and Components
- NG2 Fireplaces, Chimneys and Flues
- NG3 Atrium Construction

NH SPECIAL USE BUILDINGS

- Performance Requirements
- Deemed-to-Satisfy Provisions
- NH1 Theatres, Stages and Public Halls

PREFACE

2022 Version

The National Building Code is empowered by the *National Building Code Act - 2022*.

The National Building Code applies to all NEW buildings in the Solomon Islands,
unless specifically exempted as per Part A6.1 Structural Types Excluded – Page A23.

The National Building Code is accompanied by the Solomon Islands Building Manual which covers new simple, single-story buildings such as houses, community churches, halls, school buildings, clinics and the like. Referring to and complying with the Solomon Islands Building Manual results in 'deemed to satisfy' outcomes meeting National Building Code requirements.

This **National Building Code does NOT cover** the following aspects and structures which are covered by other Ministry of Infrastructure Development Standards, Specifications and Guidelines and other SIG Ministries and jurisdictions:

- Wharves & jetties
- Masts - electricity/transmission/communication/wind/signal towers;
- Roads, bridges, culverts and associated structures;
- Tanks & water storage structures;
- Fences;
- Environmental compliance;
- Health & Safety; or
- Local Planning schemes.

The National Building Code and the Solomon Islands Building Manual are freely available via the Solomon Islands Government - Ministry of Infrastructure Development website:

<https://solomons.gov.sb/ministry-of-infrastructure-development/>



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Control Document Revisions

Revision	Status - Action	Date	Reviewed by:
DRAFT	Draft issued to Internal Stakeholders to review	24 Jan 2022	MID ABMS SIIMBA
DRAFT	Amendments to WASH Sections	27 Jan 2022	PW / RG
DRAFT	Formatted – Minister's Signature Pending	8 March 2022	JM / RS
DRAFT	Contents Page, UXO Inclusion, Corrections, Septic Update	24 May 2022	PW/RG/RS
DRAFT	Earthquake Factors Section B1.3	30 June 2022	MG / RS
DRAFT	Earthquake Factors Section B1.4	11 July 2022	MG / RS

PRINCIPLES OF APPROACH

The Ministry of Infrastructure Development recognised that the National Building Code must remain relevant to the current needs of the built environment in Solomon Islands and should be modernised in a manner that retains practical application to both the local environmental conditions, availability of building materials, delivery systems, affordability and the capability of the local construction industry.

Regular (at least once every five years) improvements will be made to subsequent revisions of this Code in consultation with implementing agencies and the building industry of the Solomon Islands to maximise its utility, address emerging national priorities and facilitate compliance.

Principle 1 - Progressive Development Framework Model

The National Building Code will be updated periodically (maximum five years) as institutional and industry capability and capacity grows in response to the ongoing development of the Solomon Islands.

Principle 2 - Climate Adaptation and Resilience

The National Building Code ensures buildings meet the Ministry's approved wind and earthquake codes. As appropriate and affordable, new sections may be added, such as relating to natural hazards (storm/surge/Tsunami/flood etc.). These progressive inclusions will help create more climate-resilient building infrastructure and contribute to reducing environmental and social impacts of buildings.

Principle 3 - Social Inclusion

The National Building Code sets out accessibility and other requirements to minimise barriers for people with disability and other minority groups to enable equal access and participation through the design and implementation of inclusive buildings.

Principle 4 - Simplicity

Industry must be able to simply, and consistently recognise and define 'bush/traditional', semi-permanent' and 'permanent' structures / classifications for the purpose of this Code's application, the industry's legal liabilities and associated insurances.

Principle 5 - Appropriate Technology and Energy Efficiency Requirements

The National Building Code is aligned to the local environment and local industry current delivery capability. New sections and standards have been introduced or referenced. Other improvements will be introduced into future revisions of the Code such as updated fire, electrical, plumbing, ventilation, renewable energy standards. International Standards that are onerously expensive or improbable to achieve consistently have been superseded, removed or set aside noted for consideration in future editions.

Mandatory material durability requirements will be progressively introduced over successive revisions of the National Building Code.

Principle 6 - Targeted Focus

To the extent practicable, the National Building Code avoids inclusion of regulation matters that correctly belong in other legislations (e.g. the Planning and Development Code). This relates to non-building activities such as restoration of natural areas, tree preservation, visual appearance of buildings etc. which require environmental management plans and environmental impact assessments.

Principle 7 - Accessible Information

The National Building Code references the latest versions of the applicable national, regional, and international standards and publications. Links to these resources are contained within. The Ministry of Infrastructure Development maintains a hard copy reference library of all referenced publications.

Both the National Building Code and the Solomon Islands Building Manual are available for download from the Ministry of Infrastructure Development website:

<https://solomons.gov.sb/ministry-of-infrastructure-development/>



ACKNOWLEDGEMENTS

Development of the National Building Code 2022 was carried out under the auspices of the Solomon Islands Government, specifically the Ministry of Infrastructure Development, with technical assistance funded by the Government of Australia.

This version of the National Building Code builds upon the original Code published in 1990 and incorporates appropriate advances in practice and knowledge. Accordingly, the Ministry acknowledges the excellent work of the many stakeholders (refer pages v to vii in the original version) who contributed to the creation of the original 1990 version.

The Ministry wishes to gratefully acknowledge the stakeholders who contributed to the drafting of this document. They include provincial leaders and communities, non-government organisations representing women, people with disabilities, and young people, development partners, state-owned enterprises and government agencies.

A thorough, inclusive consultation process was carried out by the Ministry during the second half of 2021 wherein over 350 stakeholders from 50 separate organisations were invited to twelve individual consultation meetings to discuss and provide feedback on the draft legislation and National Building Code. Of the 210 participants, 23% were female and 77% male.

Stakeholders who were unable to attend consultation meetings were invited to participate electronically via the MID's webpage where the draft National Building Code and associated draft NBC Bill were available for public review from August 2021 to November 2021.

Stakeholder feedback was recorded, collated and uploaded onto the MID webpage for stakeholder information following the consultations.

The Solomon Islands Government, specifically the Ministry of Infrastructure Development, wishes to express sincere appreciation and thanks to all contributing stakeholders for their participation and valuable contributions.

The Solomon Islands Government is grateful to the Government of Australia for supporting this project.

Tagio tumus,

(signature pending NBC Bill legislation)

Hon. Manasseh Maelanga

Deputy Prime Minister and Minister for Infrastructure Development



INTRODUCTION

The overall objective of the Code is to ensure that acceptable standards of structural sufficiency, fire safety, health and amenity, are maintained for the benefit of the community now and in the future.

The requirements included in this Code are intended to extend no further than is necessary in the public interest, to be cost-effective, not needlessly onerous in their application, and easily understood.

The National Building Code is divided into **three** general areas:

COMMON PROVISIONS FOR ALL BUILDINGS

Refer to Sections A and B

DWELLINGS AND OUTBUILDINGS

Refer to Sections DD, DE, DF and DG

PUBLIC BUILDINGS AND GROUP DWELLINGS

Refer to Sections NC, ND, NE, NF, NG and NH

What is in the Code?

The Code sets down the Performance Requirements and corresponding Deemed-to-Satisfy Provisions which apply to the construction of buildings for all classes of occupancy.

A building code cannot cover every issue concerned with the design and construction of buildings. In the case of innovative, complex or unusually hazardous building proposals, or other building work beyond the scope of the Code, legislation may provide for other suitable action.

The Code covers those aspects of buildings that are controlled by Approved Authorities such as structure, fire resistance, access and egress, fire-fighting equipment, mechanical ventilation, lift installations, and certain aspects of health and amenity.

Layout of the Code

The numbering of Sections and Parts has been made on an alpha-numeric system for ease of reference. This provides the flexibility to accommodate future additions or deletions and the future consolidation of building regulations presently contained in other legislation, without undue disruption to the layout.

Performance Requirements

These are described in terms which would allow considerable scope for innovation and the development of new materials and methods of construction. The Requirements are in some cases separated into objectives and the required performance.

Objectives are broad statements of intent and are included at the beginning of each Section to identify the objectives that the provisions of the Section are intended to achieve. They are the basic concepts which apply generally to all buildings and structures.

Required Performance gives the fundamental requirements which will satisfy the objectives and are expressed in performance terms. Accreditation certificates, test reports, detailed calculations or other documentary evidence may be used as evidence that a particular material, design or construction method meets the performance requirements of this Code.

Deemed-to-Satisfy Provisions

Alternative building solutions are acceptable under the Code on condition that they comply with per the performance requirements or be shown to be equivalent to the 'deemed-to-satisfy' requirements.

The Deemed-to-Satisfy Provisions have been drafted in sufficiently general terms to allow some flexibility without increasing the need to use administrative discretion.

In the absence of professional advice, and in the case of simple, single-story buildings, the standards for design, specifications, construction methodology and materials are provided within the accompanying Solomon Islands Building Manual. The Solomon Islands Building Manual contains detailed design guides, load tables and specifications for stakeholders in rural and remote locations.

Professional Certification

The National Building Code Act and this Code allows for certificates from professional persons to be used as evidence of compliance with particular requirements or standards.

The enabling National Building Code Act sets out the extent of the use of professional certification and the procedures for the submission of certificates, reports or other documentation to Approval Authorities (i.e. typically the Ministry) as evidence of compliance.

ADMINISTRATIVE ARRANGEMENTS

The enabling legislation is the National Building Code Act.

**BUILDING CONSENT is required for all new buildings
and for significant alterations (>50%) to existing buildings.**

Please refer to the 'Planning and Development Act 2022' and associated regulations for the application process for a Building Consent

This Code has been brought into effect by enabling building control legislation which prescribes or "calls up" the technical requirements which have to be satisfied in order to gain approval. The legislation empowers the Administration to regulate certain aspects of the building process and contains the necessary administrative provisions for the work of the Approval Authority. The legislation also imposes responsibilities on the authorities or other persons or bodies and describes particular administrative procedures.

The following administrative matters are covered in other enabling or subordinate legislation:

- Plan submission and approval procedures;
- Issue of building permits;
- Inspections during and after construction;
- Provision of evidentiary certificates;
- Issue of certificates of occupancy or compliance;
- Accreditation or approval of materials or components;
- Review and enforcement of standards;
- Fees and charges; and,
- Workplace Health and safety.

ADMINISTRATIVE DISCRETION

This Code is drafted with the object of reducing the need for the Approval Authority to make discretionary decisions. However, in many cases it is not possible to draft a provision in purely technical terms and so an informed judgement is required on the standard which would be suitable in particular circumstances.

Accordingly, in a number of clauses, the Code requires a particular material or construction method to be "suitable", meaning fit in all relevant respects for its intended purpose and use.

The Approval Authority responsible for the enforcement of building controls retains the right to question "suitability" and differences of opinion are open to appeal.

ALL BUILDINGS

SECTION **A**

GENERAL PROVISIONS

A1 Interpretation

A2 Acceptance of Design and Construction

A3 Classification of Buildings and Structures

A4 United Buildings

A5 Importance Level of Building and Design Life

A6 Exclusions

A7 UXO Survey and Disposal

SECTION A

*****THIS SECTION APPLIES TO ALL BUILDINGS*****

CONTENTS

A1 Interpretation

- A1.1 Definitions
- A1.2 Adoption of standards and other references
- A1.3 Reference standards etc
- A1.4 Differences between reference standards and this code
- A1.5 Mandatory provisions

A2 Acceptance of Design and Construction

- A2.1 Suitability of materials
- A2.2 Evidence of suitability
- A2.3 Material Durability
- A2.4 Fire resistance of building elements
- A2.5 Early fire hazard indices

A3 Classifications of Buildings and Structures

- A3.1 Principles of classification
- A3.2 Classifications
- A3.3 Multiple classification

A4 United Buildings

- A4.1 When buildings are united
- A4.2 Alterations in a united building

A5 Importance Level and Design Life of Buildings

- A5.1 Categorisation of building importance level
- A5.2 Building design life

A6 Exclusions

- A6.1 Buildings in Certain Locations and Sizes Excluded
- A6.2 Structural Types Excluded

A7 UXO Survey and Disposal

- A7.1 UXO Definition
- A7.2 Scope of UXO Issue
- A7.3 UXO Surveys
- A7.4 Methodology for Removal and Destruction of UXO

Specification

- A1.3 Standards Adopted for Reference
- A2.3 Fire Resistance of building Elements
- A2.4 Early Fire Hazard Test for Assemblies

A1 INTERPRETATIONS

A1.1 Definitions

Some of the words and phrases used in the Code have specific defined meanings. Wherever such meaning is intended the words and phrases are printed in *italics*. The defined meanings are:

Accessible - having features to enable use by people with a disability.

Accessway - a continuous accessible path of travel to, into or within a building.

Alteration - in relation to a building, includes an addition or extension to a building. If the alteration has a structural or WASH component, then the alteration will be considered significant, and the NBC will apply. Refer to the definition of a "Significant Alteration". If the alteration is purely cosmetic (e.g. office partitioning or removing a verandah) then a building permit is not required.

Approval Authority - Solomon Islands Government Ministry of Infrastructure Development (MID), or other body approved by the Minister MID, as designated in the National Building Act 2021 as relating to the requirements of this code.

Amenity - an attribute which contributes to the health, physical independence, comfort and well-being of people.

Assembly Building - a building where people may assemble for:

- civic, theatrical, social, political or religious purposes;
- educational purposes in a *school, early childhood centre, preschool*, or the like;
- entertainment, recreational or sporting purposes; or
- transit purposes.

Atrium - a space within a building that connects 2 or more *storeys*, and:

- (a) is wholly or substantially enclosed at the top by a floor or roof (including a glazed roof structure); and
- (b) includes any adjacent part of the building not separated by bounding construction; but
- (c) does not include a stairwell, rampwell or the space within a *shaft*.

Automatic - applied to a fire door, smoke door, fire shutter, *smoke-and-heat vent, sprinkler system*, alarm system or the like, means designed to operate when activated by a heat, smoke or fire-sensing device.

Baluster - a vertical support for a handrail.

Building - a 'permanent' or 'semi-permanent' or 'mixed traditional-commercial material' building or structure of any kind and includes a temporary building or structure or part of a building or structure but excludes 'traditional' structures as relating to the requirements of this code. (NOTE the application of this code is seen in the Preface (page i))

Building Element - primary structural frame members, load-bearing walls, common and interior walls, fire walls, floor and/or roof construction including secondary members, exit construction, foundations, and windows.

Building Permit - a document issued by the Government of Solomon Islands allowing the construction, alteration or demolition of a building, facility, siteworks, site servicing and/or site to proceed according to conditions of the building permit.

Building Regulations - a set of standards and procedures issued by the Government of Solomon Islands under the National Building Code Act 2022 outlining requirements for the development process including plan submission and regulations for building permit application.

Certificate of Accreditation - a certificate acceptable to the Approval Authority stating that the properties and performance of a building material or method of construction or design fulfil specific requirements of this Code.

Certificate of Compliance - a certificate acceptable to the Approval Authority stating that the materials, methodology of construction and workmanship of a completed building, building element or design fulfil specific requirements of this Code.

Charged Dry-Riser Main System - one or more *riser mains* in a building complete with all *required* fittings, not permanently connected to a *fire main*. Instead of leaving the system dry, it is charged with water from any convenient domestic supply in order to make it self-monitoring against inadvertently left open *hydrant* valves and leakage.

Cladding - exterior surface of a building attached to external walls, the roof, or any other exterior surface.

Code Compliance Certification - the action of methodology of design, construction and workmanship, including materials used, that meets the requirements of this Code and a Certificate of Compliance has been issued acceptable to the Approval Authority.

Combustible -

- (a) applied to a material - means combustible under AS1530.1
- (b) applied to construction or part of a building – means constructed wholly or in part of combustible materials.

(See definition of *non-combustible*)

Common Wall - a wall that is common to adjoining buildings.

Curtain Wall - a non-loadbearing external wall that is not a panel wall.

Customary Land - Any land that is not registered under the Land and Titles Act.

Damp-proof Course (DPC) - a continuous layer of impervious material placed in a masonry wall or pier, or between a wall or pier and a floor, to prevent the upward or downward migration of water.

Dead Load - the weight assigned to the building elements of a building, storey excluding people or goods.

Deck - an open platform projecting from an external wall of a building and supported by framing and may be open underneath or partially or fully enclosed.

Deemed-to-Satisfy Provision - a provision that is deemed to satisfy the Performance Requirements.

Deemed-to-Satisfy Solution - a method of satisfying the Deemed-to-Satisfy Provisions.

Design Flood Level (DFL) - hypothetical estimation of the height (elevation) above ground level that would be inundated by flooding as a result of storm surge or rainfall, as determined by an approval authority and/or the Government of Solomon Islands.

Design Scenario - the specific scenario of which the sequence of events is quantified, and a fire safety engineering analysis is conducted against.

Design Wind Speed - the design gust wind speed for the area where the building is located, calculated in accordance with AS/NZS 1170.2.

Desludge/Desludging - removal of accumulated sludge and scum from the septic.

Drainage Ditch - an open channel lower in elevation than the surrounding land intended to collect and convey stormwater on private or public property.

Drain - a line of pipes to carry *sewage* or *trade waste*, located within the property boundary, laid above or below ground, and includes all fittings and equipment such as inspection openings, traps and gullies.

It is a branch *drain* if it is intended to receive the discharge from fixture discharge pipes. Branch *drains* join a main *drain*.

The main *drain* collects the *waste water* from branch *drains* and/or from fixture discharge pipes and conveys them to the *sewer*.

Durability - the safe performance of a building, facility or site for the designed life expectancy assuming the design and a regular schedule of maintenance activities is conducive with site conditions, and that does not result in unforeseen cost for maintenance and repair.

Early Childhood Centre - a *preschool*, kindergarten or child-minding centre.

Effective Height - the height to the floor of the topmost *storey* (excluding the topmost *storey* if it contains only heating, ventilating, lift or other equipment, water tanks or similar service units) from the floor of

the highest *storey* providing egress to a road or *open space*. The road or *open space* must be capable of providing unobstructed access to emergency vehicles.

The *effective height* of a stepped or terraced building is the maximum *effective height* of any segment of the building.

Exit - Any, or any combination of the following if they provide egress to a road or *open space*:

- (a) An internal or external stairway;
- (b) A ramp complying with Section ND;
- (c) A fire-isolated passageway;
- (d) A doorway opening to a road or open space, or
- (e) A horizontal exit or a fire-isolated passageway leading to a horizontal exit.

Extensions - mean building works that alter an existing building or storey by increasing the floor area.

External Wall - an outer wall of a building which is not a common wall.

Fabric - the basic building structural elements and components of a building including the roof, ceilings, walls, glazing and floors.

Fascia - a material covering the end of roof supports extending past the external walls.

Fire Brigade Booster Connection - a connecting device enabling the fire brigade to pressurise or pump water into a *riser main* or other systems.

Fire Compartment - a part of a building which is separated from the remainder in accordance with this Code to resist the spread of fire and smoke.

Fire-isolated Passageway - a corridor, hallway or the like, of *fire-resisting* construction, which provides egress to or from a *fire-isolated stairway* or *fire-isolated ramp* or to a road or *open space*.

Fire-isolated Ramp - a ramp within a *fire-resisting* enclosure which provides egress from a *storey*.

Fire-isolated Stairway - a stairway within a *fire-resisting shaft* and includes the floor and roof or top enclosing structure.

Fire Main - a water supply service pipe located outside a building to supply water at adequate pressures and rates of flow for fire-fighting purposes. The *fire main* must be:

- (a) privately provided in which case it must either be permanently charged with water from a reliable supply or be provided with adequate on-site storage and fire pumps;
- (b) part of a public supply system kept permanently charged with water; or
- (c) fixed in accordance with the normal trade practice for a fire-protective covering.

Fire-protective Covering - inert material applied in such a manner that it protects other materials or building elements from the damaging effects of fire. Acceptable materials are:

- (a) 13 mm fire-protective grade plasterboard;
- (b) 12 mm cellulose fibre reinforced sheeting;
- (c) 12 mm mesh-reinforced fibrous plaster in which the mesh is 13 mm x 13 mm x 0.7 mm welded wire located not more than 6 mm from the exposed face; or
- (d) other material not less fire-protective than 13 mm fire-protective grade plasterboard.

Fire-resistance Level (FRL) - the grading periods in minutes determined in accordance with Specification A2.3, for:

- (a) structural adequacy;
- (b) integrity; and
- (c) insulation,

and expressed in that order.

Fire-resisting - applied to a *structural member* or other part of a building, means having the FRL *required* for that *structural member* or other part.

Fire-resisting Construction - one of the Types of construction referred to in Part NC1.

Fire-separated Section - a part of a building which is separated from the remainder by *fire walls* in accordance with Part NC2 and thereby regarded as a separate building.

Fire-source Feature -

- (a) the far boundary of a road adjoining the allotment;
- (b) a side or rear boundary of the allotment; or
- (c) an external wall of another building on the allotment which is not of Class 10.

Fire Wall - a wall that divides a *storey* or building to resist the spread of fire and smoke and has the FRL *required* under Specification NC1.1.

Fixture Unit - a unit of measure based on the rate of discharge, time of operation and frequency of use of a sanitary fixture that denotes the hydraulic load contributed by that fixture to the sanitary plumbing system.

Flammability Index - the index number determined under AS 1530.2.

Floor Area -

- (a) in relation to a storey - the area of that storey measured over the enclosing walls (if any) and that part of any common wall located within the allotment; and
- (b) in relation to a room - the area of the room measured within the finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting.

Flight - the part of a stair that has a continuous series of risers not interrupted by a landing or floor.

Flood - an inundation of water on the ground surface above normal levels.

Flood hazard area - the site (whether or not mapped) encompassing land lower than the flood hazard level which has been determined by the approval authority.

Flooding - a rise or overflow of water onto lands not normally submerged typically resulting from a result of heavy rainfall, storm surge, raised groundwater levels, overflow of river channels, increases in runoff from land or blocked drainage systems, among others.

Floodplain - areas adjacent to rivers and coasts which flood during periods of heavy rain from storm surge.

Floor Area -

- (a) in relation to a building: the total area of all storeys; and
- (b) in relation to a *storey*: the area of all floors of that *storey* measured over the enclosing walls (if any) and that part of any *common wall* located within the allotment; and
- (c) in relation to a *room*: the area of the *room* measured within the finished surfaces of the walls, and includes the area occupied by any cupboard or other built-in furniture, fixture or fitting.

Floor Drain - a plumbing fixture installed on the floor of a building that accepts and conveys water piping connected to a suitable discharge area.

Foundation - the ground which supports the building.

Framing - timber or metal members to which lining, wallboard, insulation, cladding, flooring or decking is attached, or which support the structure or resist forces applied to it.

Fuel Supply - pipes and associated fittings that contain pressurized flammable mixtures of hydrocarbon gases to supply energy for heating and cooling in a building facility, including Liquefied Petroleum Gas (propane) and natural gas (methane).

Glazing - a transparent or translucent element and its supporting frame located in the envelope and includes a window other than a roof light.

Going - the horizontal dimension from the front to the back of a tread less any overhang from the next tread or landing above.

Greywater - household wastewater from sinks, baths, washing machines, dishwashers and other kitchen appliances that do not contain toxic substances or faecal matter.

Groundwater - water naturally stored or flowing beneath the surface of the ground.

Growing Substrate - substance through which plant roots grow and extract water and nutrients on a green roof, which may include peat, humus, wood chips, sand, lava, or expanded clay.

Gutter - a shallow trough fixed beneath the edge of a roof for carrying off rainwater.

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

Hazard - anything with an unreasonable risk of bodily injury or deterioration of health or causes a disaster

Habitable Room - a room used for normal domestic activities, and:

- (a) includes a bedroom, living room, lounge room, music room, television room, kitchen, dining room, sewing room, study, playroom, family room and sunroom; but
- (b) excludes a bathroom, laundry, water closet, pantry, walk-in wardrobe, corridor, hallway, lobby, photographic darkroom, clothes-drying room, and other spaces of a specialised nature occupied neither frequently nor for extended periods.

Health-care Building -

- (a) a nursing home, hospital, convalescent home, infirmary or similar institution or home for sick or disabled persons needing full-time nursing care; or
- (b) a clinic or day surgery unit where:
 - (i) prescribed surgical procedures are performed on people who do not require overnight care as in-patients in a hospital; and
 - (ii) the surgical procedures include a potential requirement for general anaesthesia, major regional anaesthesia or intravenous sedation.

Horizontal Exit - a *required* doorway through a *required fire wall* separating two portions of a building with approximately the same floor level so as to establish an area of refuge affording safety from fire and/or smoke in the portion from which the escape is made.

Hydrant - a fire service outlet fitting installed in a *riser main* or a *fire main* which provides a valved outlet to permit a controlled supply of water to be taken from the main for fire fighting. *Hydrants* installed in a *riser main* system within a building are referred to as internal *hydrants* and those installed in a *fire main* outside a building, as external *hydrants*.

Insulation - in relation to a FRL, means the ability to maintain a temperature on the surface not exposed to the furnace below the limits specified in AS 1530.4.

Integrity - in relation to a FRL, means the ability to resist the passage of flames and hot gases specified in AS 1530.4.

Internal Wall - excludes a *common wall* or a party wall.

Junction - a sanitary fitting used to connect one or more branch pipes or channels to a main pipe or channel.

- (a) A square junction connects the main pipe at right angles and has an airtight removable cap to facilitate inspection and cleaning.
- (b) An inspection branch is a junction with an airtight removable cap to facilitate inspection and cleaning.

Lightweight Construction - see Specification NC1.5.

Landing - an area at the top or bottom of a *flight* or between two *flights*.

Lifespan - the duration of a building facility or site from construction to demolition.

Live Load - the weight of everything temporarily adding load to a structure, such as people or goods in/on a building storey, but not including anything permanently attached to it.

Loadbearing - intended to resist forces and moments additional to those due to its own weight.

Mezzanine Floor - an intermediate floor within a room which is not more than 1/3 of the *floor area* of the room or 200 m², whichever is the lesser.

Minor repair - a repair that is a like for like replacement of deteriorated elements of a building or the replacement of cladding or non-structural elements following localised damage. Upgrading the structural capacity of existing connections between structural elements without changes to the members is also considered a minor repair.

A **repair** is not a **minor repair** if it:

- affects the structural adequacy of the building including underpinning of foundations; or
- is a conversion of a non-habitable space into a habitable space, such as a ceiling space, underfloor space, or a garage, into a habitable room (as defined by the NBC);
- requires specialist design input from a practitioner in an area such as foundations or geotechnical design, engineering, energy efficiency, building services or fire safety; or
- affects the requirements necessary to avoid the spread of fire to or from any adjoining building; or
- is over any third party services or easements; or
- impacts on the protection of any adjoining property; or
- will adversely affect the safety, health or amenity of people using the building; or
- negatively impacts on the functioning of any existing 'Code-required' building elements; or
- would trigger a change in the building's occupancy permit; or
- involves a change of use or a change in the classification of the existing building or of the part being repaired; or,
- includes repair works to greater than 50% of the gross floor area.

Mixed traditional-commercial material buildings - These are buildings constructed from a mixture of traditional materials and commercially manufactured materials and may also be known as 'semi-permanent'. These buildings may use commercially manufactured materials for key construction elements such as the building frame and roof and are then in-filled using traditional materials. *(comment: should we include that the structural elements (only) do need to satisfy this code? – for comments / feedback)*

Non-combustible -

- (a) applied to a material - means not *combustible* except that the material may have a *combustible* surface finish if the finish is not more than 1 mm thick and the *Spread-of-flame index* of the assemblage is 0;
- (b) applied to construction or part of a building - means constructed of *non-combustible* material on all exposed faces.

The following materials, though *combustible* or containing *combustible* fibres, may be used wherever *non-combustible* materials are *required*:

- (a) plasterboard perforated.
- (b) gypsum lath with a normal paper finish.
- (c) gypsum plaster sheet conforming to AS/NZS 2588
- (d) cellulose fibre cement sheeting.
- (e) any other material not less fire-protective than any of the materials from (a) to (d).

Open-deck Carpark - a carpark in which all parts of the parking *storeys* are cross-ventilated by permanent unobstructed openings in not fewer than 2 opposite or approximately opposite sides, and:

- (a) where each side that provides ventilation is not less than 1/6 of the area of any other side; and
- (b) the openings are not less than 1/2 of the wall area of the side concerned.

Open Garage - a carport or garage with 2 or more sides substantially open.

Open Space - a space on an allotment, or a roof or similar part of a building complying with ND2.12, open to the sky and connected directly with a public road.

Open Spectator Stand - a tiered stand substantially open at the front.

Panel Wall - a *non-loadbearing external wall*, in frame or similar construction, that is wholly supported at each *storey*.

Performance Requirement - a requirement which states the level of performance which a Performance Solution or Deemed-to-Satisfy Solution must meet.

Performance Solution - a method of complying with the Performance Requirements other than by a Deemed-to-Satisfy Solution.

Permanent Building - a building complying with all the requirements of the NBC and constructed entirely from commercially manufactured materials or local including native that comply with the NBC Section A2 - Acceptance of Design and Construction.

Piping Junction - a sanitary fitting used to connect one or more branch pipes or channels to a main pipe or channel

Pitch - the maximum angle to the horizontal of a line connecting the nosings of stair treads in a single straight flight of a stairway.

Plumbing - the system of pipes, tanks, fittings, and other apparatuses required for potable water supply, wastewater removal and/or treatment, and ventilation / heating or cooling in a building, facility or site.

Private Garage -

- (a) any garage of a Class 1 building; or
- (b) any single *storey* of a building of another Class capable of accommodating not more than 3 vehicles, if there is only one such *storey* in the building.

Professional Consultant - a person with appropriate experience in the relevant field, being:

- (a) if legislation so requires, a registered *professional consultant* in the relevant discipline; or
- (b) a Corporate Member of a recognised professional institution.

Public Corridor - an enclosed corridor, hallway or the like which:

- (a) serves as a means of egress from 2 or more *sole-occupancy units* to a *required exit* from the *storey* concerned; or
- (b) is *required* to be provided as a means of egress from any portion of a *storey* to a *required exit*.

Public Carpark - a building that is used for the parking of motor vehicles but is neither a *private garage* nor used for the servicing of vehicles, other than washing, cleaning or polishing.

Registered Testing Authority -

- (a) an organisation registered by the Australian National Association of Testing Authorities (NATA) Silverwater NSW **AUSTRALIA** to test in the relevant field; or
- (b) an organisation registered by the International Accreditation New Zealand (IANZ) Auckland, **NEW ZEALAND** to test in the relevant field; or
- (c) an organisation recognised by NATA or IANZ through a mutual recognition agreement; or
- (d) alternative testing authorities may be proposed for approval if *required*. Supporting documentation for any alternative testing authority must be submitted. This must demonstrate capability, testing methodology and accreditation as necessary.

Repairs - action taken to restore the structural strength or appearance of a building without making any addition or extension to it.

Required - *required* by this Code.

Resistance to the Incipient Spread of Fire - in relation to a ceiling membrane, means the ability of a ceiling membrane to insulate the space between the ceiling and roof, or ceiling and floor above, to limit the temperature rise of *combustibles* in this space during the *Standard Fire Test* to 180°C.

Rise - in *storeys*, means the greatest number of *storeys* calculated in accordance with NC1.2 at any part of the *external walls* of the building -

- (a) above the finished ground next to that part; or
- (b) if part of the *external wall* is on the boundary of the allotment, above the natural ground level at the relevant part of the boundary.

Riser Main - a pipe to convey water for fire brigade use to all floors of a building and, where appropriate, to the roof. A *riser main* system must consist of either a *wet-riser main system* or a *charged-dry-riser main system*.

Riser - the height between consecutive treads and between each *landing* and continuous tread.

Runoff - amount of rainfall that does not percolate into soil and becomes perched on the ground-surface.

Safety Glass - toughened or laminated glass or had a safety film applied to it so that it resists shattering upon impact, is certified by an approval authority acceptable to the Government of Solomon Islands and bears identification markings indicating that the pane has been cut from safety glass material

Sanitary Compartment - a room or space containing a toilet fixture, closet pan, soil pan, chemical toilet, or the like.

Sanitary Fixture - any receptacle or apparatus that receives clean, potable water and is used for domestic cleansing, including sinks, showers, bathtubs, hot tubs, laundry tubs and associated taps, stoppers and overflow mechanisms, and accessories such as towel racks, automatic hand dryers, soap dispensers etc.

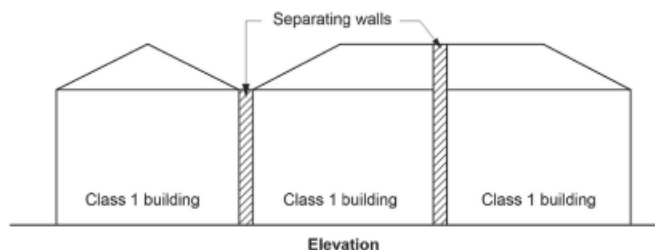
Sarking-type Material - a material such as a reflective foil or other flexible membrane of a type normally used for a purpose such as water-proofing, vapour-proofing or thermal reflectance.

School - includes a primary, community or secondary *school*, college, university or similar educational establishment.

Self-closing - applied to a door or *window* means equipped with a device which returns the door or *window* to the fully-closed and latched position immediately after each manual opening.

Separating element - a barrier that exhibits fire integrity, structural adequacy, insulation, or a combination of these for a period of time under specified conditions (often in accordance with AS 1530.4).

Separating wall - a wall that is common to adjoining Class 1 building.



Service - a mechanical or electrical system that uses energy to provide air-conditioning, mechanical ventilation, heated water supply, artificial lighting, vertical transport and the like within a building, but which does not include -

- (a) systems used solely for emergency purposes; and
- (b) cooking facilities; and
- (c) portable appliances.

Service Station - a garage which is not a *private garage* and is for the servicing of vehicles, other than only for washing, cleaning or polishing.

Sewage - waterborne human waste from domestic and commercial premises including faeces and urine, and waste from kitchens, showers, baths, domestic laundries, etc.

Sewer - a conduit vested in a public authority *and* located outside the property boundary. It is used for the conveyance of *waste water*.

Shaft - the walls and other parts of a building bounding:

- (a) a well, other than an *atrium well*; or
- (b) a vertical chute, duct or similar passage, but not a chimney or flue.

Significant Alteration – means proposed alterations of greater than 50% of the mass of structural elements or gross floor area (whichever is less) of an existing building, and in which case the entire building shall be made compliant to the requirements of this code. Extensions to an existing building exceeding 40m² but less than 50% of the existing plan size shall comply with this code. For extensions greater than 50% of the existing floor area, the entire building must be made good to comply with this code.

Site - the part of the allotment of land on which a building stands or is to be erected.

Site - the part of the allotment of land on which a building stands or is to be erected.

Sitework - work on or around a site, including earthworks, preparatory to or associated with the construction, alteration, demolition or removal of a building.

Sludge - semi-liquid solids settled from wastewater.

Smoke-and-heat Vent - a vent, located in or near the roof for smoke and hot gases to escape if there is a fire in the building.

Smoke-Developed Index - the index number for smoke developed under AS 1530.

Soil Fixture - a water-closet pan, urinal, sanitary napkin disposal unit, slop hopper, bed-pan washer or autopsy table.

Soil Pipe - a pipe which conveys discharge from *soil fixtures*.

Sole-occupancy Unit - a room or other portion of a building for occupation by one owner, lessee, tenant, or other occupier to the exclusion of any other owner, lessee, tenant, or other occupier.

Spread-of-Flame Index - the index number for spread of flame under AS 1530.3.

Sprinkler System - a system of *automatic* fire sprinklers complying with NE1.5.

Stack - a vertical *drain* including offsets and extending to more than one *storey*.

Stage - a floor or platform in Class 9b building on which performances are presented before an audience.

Standard Fire Test - the Fire-resistance Test of Structures under AS 1530.4,

Storey - a space within a building which is situated between one floor level and the floor level next above or, if there is no floor above, the ceiling or roof above, but not:

- (a) a space that contains only:
 - (i) a lift *shaft*, stairway or meter room;
 - (ii) a bathroom, shower room, water closet, or other *sanitary compartment*; or
 - (iii) 3 vehicles or less; or
 - (iv) a combination of the above.
- (b) a mezzanine floor.

Storm Surge - a rise in sea level over and above the predicted astronomical tide generated by a storm or tsunami.

Structural Adequacy - in relation to a FRL means the ability to maintain stability and adequate *loadbearing* capacity under AS1530.4.

Structural Member - a component or part of an assembly which provides vertical or lateral support to a building or structure.

Stud - an upright support in the wall of a building facility to which sheathing, drywall, etc. are attached.

Sweep Junction - a long-radius bend entering a main pipe at 45°, or a 45° junction fitted with a 45° bend.

Swimming Pool - any excavation or structure containing water and used for swimming, wading, paddling, or the like, including a bathing or wading pool, or spa.

Trade Waste - waterborne waste from business, trade or manufacturing process containing predominantly non-human waste, but not unpolluted water.

Traditional material buildings - These are buildings constructed from local materials from natural sources such as native timbers. They are built to the same standard as other traditional buildings in the community and do not need to satisfy the requirements of this code unless community public buildings in which case the structural elements, frame and connections/fixings must comply with this code.

Ward Area - that portion of a *storey* of a Class 9a building for residing patients and includes areas for sleeping, recreation and sanitary facilities, and nurses' stations.

Waste Fixture - a sanitary fixture other than a *soil fixture*. Examples are: basins, bidets, kitchen sink, laundry trough, etc.

Waste Pipe - a pipe which conveys the discharge from *waste fixtures*.

Waste Water - dissolved and suspended waterborne waste which may consist of *sewage* and/or *trade waste*.

Waterproof - the complete and total resistance of a building element or material to the ingress of moisture.

Water table - level of groundwater in soil and rock, below which the ground is saturated.

Weathertight - the resistance of a building to the weather where water and wind are prevented from entering and accumulating behind the cladding in amounts that can cause undue dampness or damage to the building.

Wet Area - an area within a building having water supplied from a water supply system which includes bathrooms, showers, laundries and sanitary compartments (excludes kitchens, bar and beverage preparation areas).

Wet-Riser Main System - one or more *riser mains* in a building with all *required* fittings, permanently charged with water from a *fire main*. The term includes all associated pipe work from the point of connection to a *fire main*.

Window - includes a roof light, glass panel, glass brick, glass louvre, glazed sash, glazed door, or other device which transmits natural light directly from outside a building to the room concerned when in the closed position.

A1.2 Adoption of Standards and Other References

The adoption of a Standard, rule, specification or provision included in any document issued by the Standards Association of Australia, Standards New Zealand or other regional body, that does not include a provision:

- (a) specifying the respective rights, responsibilities or obligations between that body and any manufacturer, supplier or purchaser;
- (b) specifying the responsibilities of any tradesman or other building operative, architect, engineer, authority, or other person or body;
- (c) requiring the submission for approval of any material, building component, form or method of construction, to any person, authority or other body;
- (d) specifying that a material, building component, form or method of construction, must be submitted to the Standards Association of Australia, Standards Association of New Zealand or other body or a committee of either Association for expression of opinion; or
- (e) permitting a departure from the Standard, rule, specification or provision at the sole discretion of the manufacturer or purchaser, or by arrangement or agreement between the manufacturer and purchaser.

A1.3 Referenced Standards, etc.

A reference to a document under A1.2 refers to the latest edition or issue, together with any amendment, listed in Specification A1.3 and only so much as is relevant in the context in which the document is quoted.

Standards for building materials and/or workmanship not covered under clause A1.2 and/or are not within the Standards referenced in Specification A1.3 must be approved by the Approval Authority.

A1.4 Differences Between Referenced Documents and this Code

This Code overrules any difference arising between it and any Standard, rule, specification or provision in a document listed in Specification A1.3. Furthermore, references in this Code to any Standard or Code of Practice issued by the Standards Association of Australia or of New Zealand or such other body, exclude the need for:

- (a) compliance with NZS 1900 wherever it is quoted in any standard;
- (b) compliance with any laws and regulations that are not of this country; and
- (c) recognition of the meaning of "Engineer".

Also, references to "FRR" in Standards issued by the Standards Association of New Zealand mean "*Fire resistance level*" as defined in this Code.

A1.5 Mandatory Provisions

- (a) The following provisions of the Code are mandatory:
 - (i) all provisions of Section A; and
 - (ii) the Performance Requirements stated at the beginning of all the other Sections.
 - (b) The Deemed-to-Satisfy Provisions of the Code are one means of satisfying the Performance Requirements. The Performance Requirements can also be met by any other means. When this latter approach is taken, it must meet the final objectives and performance that would have been achieved had the Deemed-to-Satisfy Provisions been followed.
-

A2 ACCEPTANCE OF DESIGN AND CONSTRUCTION

A2.1 Suitability of Materials

Every part of a building must be constructed in a manner which will achieve the *required* level of performance, using materials and methods that are not faulty or unsuitable for the purpose for which they are intended.

Evidence of suitability (as defined in Clause A2.3) shall be provided for all materials imported from overseas and shall be provided to the Approval Authority on request.

A2.2 Evidence of Suitability

Evidence to support the use of a material, method, form of construction or design may be:

- (a) a report issued by a *Registered Testing Authority*, showing that the material or form of construction has been submitted to the tests listed in the report, and setting out the results of those tests and any other relevant information that demonstrates its suitability for use in the building;
- (b) a current Certificate of Accreditation;
- (c) a certificate from an appropriately qualified *professional consultant* which:
 - (i) certifies that a material, design or form of construction complies with the requirements of this Code; and
 - (ii) sets out the basis on which it is given and the extent to which relevant specifications, rules, codes of practice or other publications have been relied upon; or

a Standards Mark Certificate issued by the Standards Association of Australia or Standards New Zealand; or

any other form of documentary evidence that correctly describes the properties and performance of the material or form of construction and adequately demonstrates its suitability for use in the building,

and any copy of documentary evidence submitted under this Code, must be a complete copy of the original report or document.

A2.32 Material Durability

Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional requirements of this Code throughout the life of the building.

In particular:

- (a) Unless exempted under Clause A 2.6, all locally grown plantation timber or imported timber used for structural applications shall be treated to a minimum of H3.2 (as per NZS 3602) or otherwise satisfy Clause A2.6.
- (b) all non-structural timber shall be treated to a minimum of H1.2 (as per NZS 3602) or brushed with a suitable timber treatment wood preservative.
- (c) Manufacture, grading, finishing and branding of all structural plywood shall comply with AS/NZS 2269.0 Plywood-Structural Part 0: Specifications.

A2.4 Fire-resistance of Building Elements

The FRL of a *structural member* or other building element must be determined in accordance with Specification A2.3. Any relevant testing or certification must be by an appropriately qualified *professional consultant* or *Registered Testing Authority*.

A2.5 Early Fire Hazard Indices

The Early Fire Hazard Indices of a component or assembly must be determined in accordance with Specification A2.4.

A2.6 Use of Native Timber

The use of native timber is prohibited in the construction of buildings, except when:

- (a) Specified in the Table 2.6.1 Permitted Native Timbers with Visual Stress Grading that have been proven over time to comply with durability requirements, meet Section B – Structure deemed to satisfy provisions and are demonstrated as being harvested in a sustainable manner. The table is also published on the Ministry of Infrastructure and Development website and is subject to review and updating on a regular basis.
- (b) used solely for architectural and cultural decoration i.e., non-structural applications;
- (c) permission has been granted by the Approval Authority;
- (d) used for the construction of traditional material buildings and buildings from **mixed traditional-commercial material** as described under section A5 Exclusions.

In this context, "native timber" means logs and sawn pieces of dressed and undressed timber of trees indigenous to the Solomon Islands.

Naturally dry 'seasoned' timber means milled / sawn timber that has been stacked and spaced such that all faces of each timber piece are exposed to allow airflow and air dried for a minimum period of time in a protected location. The time required for natural seasoning is subject to the locality's climate but is adopted as being no less than six months in the Solomon Islands unless moisture content testing proves otherwise.

Table 2.6.1 Permitted Native Timbers with Visual Stress Grading

GREEN (UNSEASONED) TIMBER				
F11	F8	F7	F5	F4
Vasa	Ako, Taun Bea Bea Lae Lae	Baula Mudi Torsali	Maoa	Taba'a

DRY (SEASONED) TIMBER				
F14	F11	F8	F7	F5
Vasa	Ako Taun Lae Lae Bea Bea	Baula Mudi Torsali	Maoa	Taba'a

Alternate Names for native species:

Bea Bea xxxx

Torsali

A3 CLASSIFICATION OF BUILDINGS AND STRUCTURES

A3.1 Principles of Classification

The classification of a building or part of a building is determined by the purposes for which it is designed, constructed or adapted to be used.

Each part of a building must be classified according to its purpose and comply with all the appropriate requirements for its classification.

A room that contains a mechanical, thermal or electrical facility or the like that serves the building must have the same classification as the major part or principal use of the building or fire compartment in which it is situated

Unless another classification is more suitable an occupiable outdoor area must have the same classification as the part of the building to which it is associated.

Where it is unclear which classification should apply, the approval authority has the discretion to decide.

[NOTE: the following building classification descriptions and diagrams have been adopted from the Australian Building Codes Board publication 'Building Classifications', July 2020, abcb.gov.au]

A3.2 Building Classifications

Building classifications are labelled "Class 1" through to "Class 10". Some classifications also have sub-classifications, referred to by a letter after the number (e.g. Class 1a).

A building may have parts that have different uses. In most cases, each of these parts are classified separately.

A building (or part of a building) may also have more than one use and may be assigned more than one classification.

Buildings are classified as follows:

Class 1 Buildings

Class 1 buildings are houses. Typically, they are standalone single dwellings of a domestic or residential nature.

These buildings can also be horizontally attached to other Class 1 buildings. When attached they are commonly referred to as duplexes, terrace houses, row houses and townhouses. In these situations, they must be separated by a wall that has fire-resisting and sound insulation properties.

The Class 1 classification includes two sub-classifications: Class 1a and Class 1b.

A **Class 1a** building is a single dwelling being a detached house; or one of a group of attached dwellings being a town house, row house or the like.

A **Class 1b** building is a boarding house, guest house or hostel that has a floor area less than 300 m² and ordinarily has less than 12 people living in it. It can also be four or more single dwellings located on one allotment which are used for short-term holiday accommodation.

Class 1 buildings cannot be located above or below any other dwelling (or any other class of building) other than a private garage

Class 2 Buildings

Class 2 buildings are apartment buildings. They are typically multi-unit residential buildings where people live above and below each other.

Class 2 buildings may also be single storey attached dwellings where there is a common space below. For example, two dwellings above a common basement or carpark.

Is it a Class 1b, 2 or 3 residential building? Classification is a process for understanding risk in a building (or part of a building) according to its use. Where it is unclear which classification should apply, the approval authority has the discretion to decide

Class 3 Buildings

Class 3 applies to residential buildings other than Class 1 or Class 2 buildings, or a Class 4 part of a building. Class 3 buildings are a common place of long term or transient living for a number of unrelated people. Examples include a boarding house, guest house, hostel or backpackers (that are larger than the limits for a Class 1b building).

Class 3 buildings could also include dormitory style accommodation, or workers' quarters. Class 3 buildings may also be "care-type" facilities (such as accommodation buildings for children, the elderly, or people with a disability) which are not Class 9 buildings.

Class 3 includes residential care buildings and the residential parts of hotels, motels, schools, or jails.

Class 4 Part of a building

A Class 4 part of a building is a sole dwelling or residence within a building of a non-residential nature. An example of a Class 4 part of a building would be a caretaker's residence in a storage facility. A Class 4 part can only be located in a Class 5 to 9 building.

Is it the only residence in the building? If so, then it is likely to be a Class 4 part of a building. There can only be one Class 4 part in a building. A Class 4 part cannot be located in a Class 1, 2 or 3 building.

Class 5 Buildings

Class 5 buildings are office buildings used for professional or commercial purposes. Examples of Class 5 buildings are offices for lawyers, accountants, government agencies and architects.

When is a general medical practitioner's office not a Class 5 building? Generally, a general medical practitioner's office will be a Class 5 building. However, if any medical treatment administered leaves patients unconscious or non-ambulatory, then the building would be considered a health-care building and therefore a Class 9a building

Class 6 Buildings

Class 6 buildings are typically shops, restaurants and cafés. They are a place for the sale of retail goods or the supply of services direct to the public. Some examples are:

- A dining room, bar, shop or kiosk part of a hotel or motel
- A hairdresser or barber shop
- A public laundry
- A market or showroom
- A funeral parlour
- A shopping centre.

Is a service station a Class 6 building? Yes, as they are intended for the servicing of cars and the sale of fuel or other goods. However, the term "service station" does not cover buildings where panel beating, auto electrical, tyre replacement or the like are solely carried out. These are Class 8 buildings.

Class 7 Buildings

Class 7 buildings are storage-type buildings. The Class 7 classification has two sub-classifications: Class 7a and Class 7b.

Class 7a buildings are carparks.

Class 7b buildings are typically warehouses, storage buildings or buildings for the display of goods (or produce) that is for wholesale

Reference to wholesale means “sale to people in the trades or in the business of ‘on-selling’ goods and services to another party (including the public)”

Class 8 Buildings

A factory is the most common way to describe a Class 8 building. It is a building in which a process (or handicraft) is carried out for trade, sale, or gain. The building can be used for production, assembling, altering, repairing, finishing, packing, or cleaning of goods or produce. It includes buildings such as a mechanic’s workshop. It may also be a building for food processing, such as an abattoir. A laboratory is also a Class 8 building, even though it may be small. This is due to the high fire hazard potential.

Class 9 Buildings

Class 9 buildings are buildings of a public nature. The Class 9 classification has three sub-classifications: Class 9a, Class 9b and Class 9c.

Class 9a buildings are generally hospitals, referred to in the Code as health-care buildings. They are buildings in which occupants or patients are undergoing medical treatment and may need physical assistance to evacuate in the case of an emergency. This includes a clinic (or day surgery) where the effects of the treatment administered involve patients becoming unconscious or unable to move. This in turn requires supervised medical care (on the premises) for some time after treatment has been administered.

Class 9b buildings are assembly buildings in which people may gather for social, theatrical, political, religious or civil purposes. They include schools, universities, childcare centres, pre-schools, sporting facilities, night clubs, or public transport buildings.

Class 9c buildings are residential care buildings that may contain residents who have various care level needs. They are a place of residence where 10% or more of persons who reside there need physical assistance in conducting their daily activities and to evacuate the building during an emergency. An aged care building, where residents are provided with personal care services, is a Class 9c building

Laboratories that are part of health-care buildings are classified as Class 9a buildings despite the general classification of laboratories being Class 8.

Class 10 Buildings

Class 10 buildings are non-habitable buildings or structures. Class 10 includes two sub-classifications: Class 10a and Class 10b.

Class 10a buildings are non-habitable buildings including sheds, carports, and private garages.

Class 10b is a structure being a fence, mast, antenna, retaining wall, swimming pool, or the like.

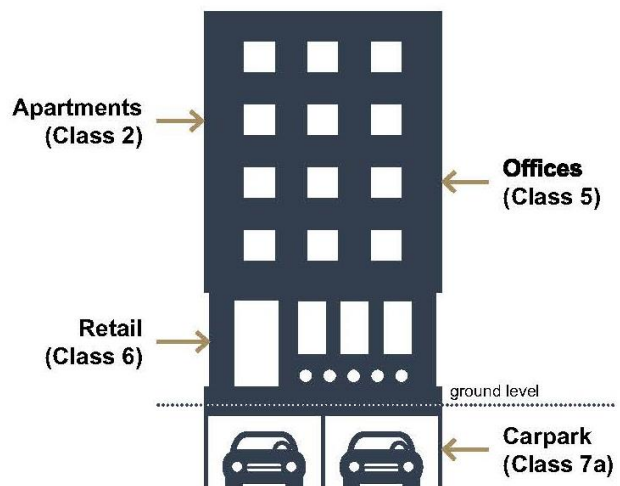
What is a private garage? A garage associated with a Class 1 building; or a single storey of a building containing not more than 3 vehicle spaces (limited to only one storey within a building); or any separate single storey garage associated with another building that contains no more than 3 vehicles.

Mixed use buildings

As buildings can have mixed uses, they can also have mixed (or multiple) classifications. For example, a building may have a basement carpark (Class 7a) with ground floor retail space (Class 6) and residential apartments (Class 2) and offices above (Class 5).

How big must a part of a building be to have its own classification?

Every part of a building must be separately classified. However, where a part has a different purpose and is not more than 10% of the floor area of the storey it is on, subject to some limitations it may be considered ancillary to the major use and adopt its classification. For instance, if a single storey warehouse (Class 7b) has an office (normally Class 5) which takes up only 8% of the floor area, the whole building can be classified as a Class 7b. However, if the office takes up 12% of the floor area then the warehouse (Class 7b) and office (Class 5) must be classified separately.



A3.3 Multiple Building Classifications

A building (or a part of a building) may be designed to serve multiple purposes and may have more than one classification. This means that it is permissible for a building to be Class 6/7, or Class 5/6, or whatever is deemed appropriate. This allows flexibility in how the building might be used. For example, if a building is intended for retail shopping, storage or office space, it may be designed as a Class 5/6/7 building.

At the design stage it may not be clear who the final tenant will be (or how they will be using their tenancy), so as long as the design meets the minimum requirements of all the classifications it could be used for any of the purposes.

A4 UNITED BUILDINGS

A4.1 When Buildings are United

Two or more buildings adjoining each other are considered to form one united building if they:

- (a) are connected through openings in the walls dividing them; and
- (b) together comply with all the requirements of this Code as though they are a single building.

A4.2 Alterations in a United Building

After any *alteration* or any other action:

- (a) a united building; or
- (b) each building forming part of a united building; or
- (c) each building if they cease to be connected through openings in the dividing walls,

must comply with all requirements for a single building.

A5 IMPORTANCE LEVEL AND DESIGN LIFE OF BUILDINGS

A5.1 Categorisation of Building Importance Level

The Importance Level of a building is dependent on its occupancy and use. Table 5.1A describes, in general terms, five categories of structure and gives some examples of each. For those buildings not specifically mentioned, the designer will need to exercise judgement in assigning the appropriate level.

Structures that have multiple uses shall be assigned the highest importance level applicable for any of those uses. Where access to a structure is via another structure of a lower importance level, then the importance level of the access structure shall be designated the same as the structure itself.

Table 5.1a Description of Building Importance Level

Consequences of failure	Description	Importance level	Comment
Low	Low consequence for loss of human life or small or moderate economic, social or environmental consequences.	1	Minor Structures (failure not likely to endanger human life)
Ordinary	Medium consequences for loss of human life, or considerable economic, social or environmental consequences.	2	Normal Structures or structures not falling into other levels
High	High consequence for loss of human life or very great economic, social or environmental consequences.	3	Major Structures (affecting crowds)
		4	Post Disaster Structures (Post Disaster Functions or Dangerous activities)
Exceptional	Circumstances where reliability must be set on a case-by-case basis.	5	Exceptional Structures (Beyond the scope of this code)

Building Importance levels shall be adopted based on the following table:

Table 5.1b Building Importance Level Definitions

Importance level	Description	Examples
1	Structures presenting a low degree of hazard to life and other property	Structures with a total floor area of <30 m ² Farm buildings, isolated structures, towers in rural situations Fences, masts, walls, in-ground swimming pools
2	Normal structures and structures not in other importance levels	Buildings not included in Importance Levels 1, 3 or 4 Single family dwellings Car parking buildings
3	Structures that as a whole may contain people in crowds or contents of high value to the community or pose	Buildings and facilities as follows: Where more than 300 people can congregate in one area Day care facilities with a capacity greater than 150

Importance level	Description	Examples
	Risks to people in crowds	<p>Primary school or secondary school facilities with a capacity greater than 250</p> <p>Colleges or adult education facilities with a capacity greater than 500</p> <p>Health care facilities with a capacity of 50 or more resident patients but not having surgery or emergency treatment facilities</p> <p>Airport terminals, principal railway stations with a capacity greater than 250</p> <p>Correctional institutions</p> <p>Public assembly buildings, theatres and cinemas of greater than 1000 m²</p> <p>Emergency medical and other emergency facilities not designated as post-disaster</p> <p>Power-generating facilities, water treatment and waste water treatment facilities and other public utilities not designated as post-disaster</p> <p>Buildings and facilities not designated as post-disaster containing hazardous materials capable of causing hazardous conditions that do not extend beyond the property boundaries</p>
4	Structures with special post-disaster functions	<p>Buildings and facilities designated as essential facilities</p> <p>Buildings and facilities with special post-disaster function</p> <p>Medical emergency or surgical facilities</p> <p>Emergency service facilities such as fire, police stations and emergency vehicle garages</p> <p>Utilities or emergency supplies or installations required as backup for buildings and facilities of Importance Level 4</p> <p>Designated emergency shelters, designated emergency centres and ancillary facilities</p> <p>Buildings and facilities containing hazardous materials capable of causing hazardous conditions that extend beyond the property boundaries</p>
5	Special structures (For structures outside the scope of the building code acceptable probability of failure to be determined by special study)	<p>Structures that have special functions or whose failure poses catastrophic risk to a large area (e.g. 100 km²) or a large number of people (e.g., 100 000)</p> <p>Major dams, extreme hazard facilities</p>

A5.2 Building Design Life

The design life of a building or structure is the period of use as intended by the designer after which it may need to be replaced. Before this period has elapsed, it should remain fit for purpose.

The design life for normal structures is generally taken as 50 years. Design life will vary according to the type and use of the element being considered. The below list gives indicative design lives for various types of structure:

Category 1: Temporary structures, not including structures or parts of structures that can be dismantled with a view to being re-used – 10 years.

Category 2: Replaceable structural parts, e.g. gantry girders, bearings – 10 to 25 years.

Category 3: Agricultural and similar buildings – 15 to 30 years.

Category 4: Building structures and other common structures – 50 years.

Category 5: Monumental building structures, bridges and other civil engineering structures – 100 years.

A6 EXCLUSIONS

A6.1 Buildings in Certain Locations and Sizes Excluded

The term 'building' is defined in A1.1. Depending on its location and size, the follow buildings are **excluded from the requirements for buildings in this Code**:

- (a) **All private buildings on Customary Land, except those built in Development Areas**, as defined in the National Building Act 2022, **or buildings used by the community** such as schools and churches, community halls, market buildings.
- (b) Any single storey buildings from **traditional building materials or mixed traditional-commercial material**, as defined under section A1.1 Definitions, **having an area not greater than 40m²**.

A6.2 Structural Types Excluded

The term 'building' is defined in A1.1. The following structural types are excluded from the requirements for buildings in this Code:

- (c) Horizontal infrastructure – including bridges, wharves, jetties and pipework infrastructure. Guidance on the design of these types of structure can be obtained from the Ministry of Infrastructure Development.
- (d) Stand-alone plant and machinery systems and their supporting structures if they are bespoke and supplied with the machinery or plant.
- (e) A mast, pole or radio or television aerial that does not exceed 6 metres in height.
- (f) Any other exclusions designated by the Approval Authority

Apart from the exclusions noted, all structures constructed in the Solomon Islands shall adhere to the principles of the National Building Code - namely that they be designed and constructed in such a manner as to ensure the safety and protection of users and the public.

A7 UXO Survey and Disposal

A7.1 UXO Definition

For the purposes of this Code, due to the prevalent use of the term in the region, 'UXO' is used to refer to all explosive ordnance whether 'abandoned' or 'unexploded', including artillery, mortar, rocket, and small arms ammunition, as well as bombs, landmines, sea mines, torpedoes, depth charges and propellant actuated devices.

A7.2 Scope of UXO Issue

UXO remains a serious issue for Solomon Islands. Specific areas affected include Guadalcanal, Savo, Makira, Temotu, Florida, New Georgia and Renell. Unfortunately, the lack of available data makes ascertaining the true extent of UXO contamination difficult – and so this national risk remains high.

UXO has the potential to cause significant impacts on local communities through:

- (a) safety issues resulting in possible loss of life or injuries;
- (b) environmental impacts resulting from the leaching of harmful chemicals contained in the UXO;
- (c) use to dynamite fishing which damages reefs and lagoon ecological systems;
- (d) impeding development activities especially those linked to excavation; and
- (e) impeding the ability of local communities to utilise land for economic activities such as those related to tourism and subsistence agriculture.

A7.3 UXO Surveys

Depending on the location and scope of works, the Approval Authority may make it a requirement to clear land of UXO before any development activities can take place.

Whenever / wherever significant bulk earthworks, excavation or Geotech investigations on any site in any Solomon Islands location are required then it is highly recommended that a UXO Investigation be undertaken.

A UXO Investigation requires the undertaking of technical surveys by an approved UXO survey and remediation organisation to assess risk and determine appropriate responses.

A7.4 Methodology for Removal and Destruction of UXO

The Royal Solomon Islands Police Force (RSIPF) is the lead agency responsible for UXO clearance. The RSIPF has a dedicated Explosive Ordnance Unit (EOU) or Explosive Ordnance Disposal (EOD) that undertakes clearance activities in response to reports from the public.

Do NOT attempt to remove UXO when found on a building site

Where UXO is suspected or discovered on a building site the RSIPF is to be immediately notified - call 999 or 7495215

<https://solomons.gov.sb/portal tender/category/uxo-clearance/>

The RSIPF EOU / EOD will respond and undertake UXO clearance activities.

UXO items will then undergo render safe procedures and will be transported to the RSIPF storage site.

Where there are no nearby police stations, reports are to be directed to relevant provincial government district agencies who then notify police at the provincial headquarters. The RSIPF EOU / EOD is based in Honiara and can attend provincial / remote UXO incidents.

SPECIFICATION A1.3: STANDARDS ADOPTED BY REFERENCE

1.3 Schedule of Referenced Documents

The Standards and other documents listed in Table 1 are referred to in this Code. In order to reduce possible confusion/conflict, the Standards produced by the Standards Australia or by Standards New Zealand as seen to be specifically relevant, have been called up. However, users of the Code are free to use any suitable mix of regional Standards provided care is taken to follow consistent technical principles and prevalent practices. Where regional Standards do not cover any specific area, the relevant Standards as may be approved by the Approval Authority should be used.

Table 1: Scheduled Referenced Documents

No	Title	Code clause
AS/NZS 1170.0	Structural design actions, Part 0: General Principles	B1.3, B1.4
AS/NZS 1170.1	Structural design actions, Part 1: Permanent, imposed and other actions	B1.3, B1.4
AS/NZS 1170.2	Structural design actions, Part 2: Wind actions	B1.3, B1.4
NZS 1170.5	Structural design actions - Part 5: Earthquake Actions	B1.3, B1.4
AS/NZS 1221	Fire hose reels	NE1.5
AS 1271	Safety valves, other valves, liquid level gauges, and other fittings for boilers and unfired pressure vessels	Spec NE1.2
AS 1530.1	Methods for fire tests on building materials, components and structures - Part 1: Combustibility test for materials	A1.1
AS 1530.2	Methods for fire tests on building materials, components and structures - Part 2: Test for flammability of materials	A1.1
AS 1530.3	Methods for fire tests on building materials, components and structures - Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke	A1.1, Spec 2.4
AS 1530.4	Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests for elements of construction	A1.1, Spec A2.4, Spec NC3.15
AS 1657	Fixed platforms, walkways, stairways and ladders - Design, construction and installation	ND2.18, NH1.6, DF6.11.5
AS/NZS 1664.1	Aluminium structures, Part 1: Limit state design	B1.5
AS/NZS 1664.2	Aluminium structures, Part 2: Allowable stress design	B1.5
AS 1668.1	The use of ventilation and air conditioning in building, Part 1: Fire and smoke control in buildings	NC3.15, NE2.7, Spec NE1.8, Spec NE1.9, NH 1.2, NE5.2

No	Title	Code clause
AS 1668.2	The use of ventilation and air-conditioning in buildings, Part 2: Mechanical ventilation in buildings	DF4.5, NF4.5, NF4.11
AS 1670.1	Fire detection, warning, control and intercom systems – System design, installation and commissioning, Part 1: Fire	Spec NE1.8, NE 2.5, NE 5.2
AS 1670.3	Fire detection, warning, control and intercom systems - System design, installation and commissioning, Part 3: Fire alarm monitoring	Spec NE1.8, NE 2.5, NE5.2
AS 1670.4	Fire detection, warning, control and intercom systems - System design, installation and commissioning, Part 4: Emergency warning and intercom systems	Spec NE1.8, NE 2.5, Ne 5.2
AS 1670.5	Fire detection, warning, control and intercom systems - System design, installation and commissioning, Part 5: Special hazards systems	Sec NE1.8, NE 2.5
AS 1720.1	Timber structures, Part 1: Design methods	B1.5
AS 1720.3	Timber structures, Part 3: Design criteria for timber-framed residential buildings	B1.5
AS 1720.5	Timber structures, Part 5: Nail plated timber roof trusses	B1.5
AS/NZS 1720.4	Timber structures, Part 4: Fire resistance of timber elements	B1.5
AS 1735.1	Lifts, escalators and moving walks, Part 1: General requirements	NE3.1
AS 1735.2	Lifts, escalators and moving walks - Passenger and goods lifts - Electric	Spec NC1.5 NE3.4, NE3.1
AS 1735.11	SAA Lift Code, Part 11: Fire-rated landing doors	NC3.10
AS/NZS 1860.1	Particleboard Flooring, Part 1: Specifications	B1.5
AS 1860.2	Particleboard flooring, Part 2: Installation	B1.5
AS 1905.1	Components for the protection of openings in fire-resistant walls, Part 1: Fire-resistant door sets	Spec NC1.6, NC3.4
AS 1926.1	Swimming pool safety – Part 1: Safety barriers for swimming pools	DG1.1, NG 1.1
AS 1926.2	Swimming pool safety – Part 2: Location of safety barriers for swimming pools	DG1.1, NG 1.1
AS 1926.3	Swimming pool safety – Part 3: Water recirculation systems	DG1.1, NG 1.1
AS 2159	Piling - Design and installation	B1.5

No	Title	Code clause
AS/NZS 2107	Acoustics - Recommended design sound levels and reverberation times for building interiors	Spec NE1.9
AS/NZS 2179	Specifications for rainwater goods, accessories and fasteners, Part 1: Metal shape or sheet rainwater goods, and metal accessories and fasteners	NF7.2
AS 2293.1	Emergency lighting and exit signs for buildings, Part 1: System design, installation and operation	NE4.4, NE4.8
AS 2327	Composite structures—Composite steel-concrete construction in buildings	Spec A2.3
AS/NZS 2588	Gypsum plasterboard	A1.1
AS 2601	The demolition of structures	B2.2
AS 2665	Smoke/heat venting systems - Design, installation and commissioning	NC2.3, NE2.5, Spec NE2.6
AS/NZS 2269.0	Plywood – Structural Part 0: Specifications	A2.2
AS/NZS 2712	Solar and Heat pump Water Heaters	NF5.4
AS/NZS 2845.1	Water Supply Backflow Prevention Devices Part 1 Material design and Performance Requirements	DF5.2, NF5.2
AS 2870	Residential slabs and footings	B1.5, DF1.9, NF1.9
AS/NZS 2904	Damp-proof courses and flashings	DF1.8, NF1.8
AS/NZS 3000	Electrical installations (known as the Australian/New Zealand Wiring Rules)	DE1.1, NE6.1.1
NZS 3101.1&2	Concrete structures standard	B1.5
NZS 3109	Concrete construction	B1.5
NZS 3124	Specification for concrete construction for minor works	B1.5
AS/NZS 3500.0	Plumbing and drainage, Part 0: Glossary of terms	
AS/NZS 3500.1	Plumbing and drainage, Part 1: Water Services	DF5.2, DF5.3, NF5.2, NF5.3
AS/NZS 3500.2	Plumbing and drainage, Part 2: Sanitary plumbing and drainage	DF6.2, NF7.2
AS/NZS 3500.3	Plumbing and drainage, Part 3: Storm water drainage	NF7.2, Spec NF7.2
AS/NZS 3500.4	Plumbing and drainage, Part 4: Heated water services	DF5.2, DF5.3, NF5.3, NF5.4, NF5.2.
AS/NZS 3600	Concrete structures	B1.5, Spec A2.3

No	Title	Code clause
NZS 3602	Timber and wood-based products for use in building	A2.2
NZS 3603	Code of practice for timber design	B1.5
AS 3660.1	Termite management, Part 1: New building work	B1.5
AS 3660.2	Termite management, Part 2: In and around existing buildings and structures	B1.5
AS 3660.3	Termite management, Part 3: Assessment criteria for termite management systems	B1.5
AS 3700	Masonry structures	B1.5, Spec A2.3
AS 4040.3	Methods of testing sheet roof and wall cladding, Method 3: Resistance to wind pressures for cyclone regions	B1.5
AS 4072.1	Components for the protection of openings in fire-resistant separating elements - Part 1: Service penetrations and control joints	Spec NC3.15
AS 4100	Steel structures	B1.5, Spec A2.3
AS/NZS 4200.1	Pliable building membranes and underlays, Part 1: Materials	DF1.5, NF1.5
NZS 4210	Masonry construction: Materials and workmanship	B1.5, Spec A2.3
NZS 4223	Glazing Standards Set: Part 1: glass selection and glazing Part 2: insulating glass units Part 3: human impact safety requirements Part 4: wind, dead, snow, and live actions	B1.5, Fig B1.6
NZS 4229	Concrete masonry buildings not requiring specific engineering design	B1.5
NZS 4230	Design of reinforced concrete masonry structures	B1.5
NZS 4232.2	Performance criteria for fire resisting enclosures - Part 2: Fire resisting glazing systems	Spec NC3.4
NZS 4503	Hand operated firefighting equipment	NE1.5, NE1.7
NZS 4510	Fire hydrant systems for buildings	NE1.2, NE1.3
NZS 4512	Fire Detection and alarm systems in buildings	Spec NE1.8, NE2.5
NZS 4541	Automatic fire sprinkler systems	Table NC2.2, Spec NE1, Spec E1.2, Spec NE1.6
AS/NZS 5033	Photovoltaic Panel Systems	DE1.3

No	Title	Code clause
ASI	Guidelines for Assessment of Fire Resistance to Structural Steel Members (Available Australian steel institute – ASI Website)	Spec A2.3
ASTM E72-15	Standard Test Methods of Conducting Strength Tests of Panels for Building Construction (Available ASTM website)	Spec NC1.5
ASTM E695-03	Standard Test Method of Measuring Relative Resistance of Wall, Floor, and Roof Construction to Impact Loading (Available ATSM Website)	Spec NC1.5
DFAT	Accessibility Design Guide: Universal Design principles for Australia's Aid Program (Available free of charge DFAT website)	ND3.2, ND3.3, NF2.5

SPECIFICATION A2.3: FIRE-RESISTANCE OF BUILDING ELEMENTS

1. Scope

This Specification sets out the procedure for determining the FRL of *structural members* and other building elements.

2. Rating

A building element has a FRL if:

- (a) it is listed in, and complies with Table 1 of this Specification
- (b) it is identical with a prototype that has been submitted to the *Standard Fire Test* and the FRL achieved by the prototype is confirmed in a report from a *Registered Testing Authority* which -
 - (i) describes the method and condition of test and the form of construction of the tested prototype in full; and
 - (ii) certifies that the application of restraint to the prototype complied with the Standard Fire Test;
- (c) it differs in only a minor degree from a prototype tested under (b) and the FRL attributed to the structural member is confirmed in a report from a Registered Testing Authority which -
 - (i) certifies that the structural member is capable of achieving the FRL despite the minor departures from the tested prototype; and
 - (ii) describes the materials, construction and conditions of restraint which are necessary to achieve the FRL;
- (d) it is designed to achieve the FRL in accordance with -
 - (i) AS 4100, AS/NZS 2327 and ASI Guidelines for Assessment of Fire Resistance of Structural Steel Members if it is a steel or composite structure; or
 - (ii) AS 3600 if it is a concrete structure; or
 - (iii) AS/NZS 1720.4 if it is a solid or glued-laminated timber structure.
- (e) the FRL is determined by calculation based on the performance of a prototype in the Standard Fire Test and confirmed in a report in accordance with Clause 3.

3. FRLs Determined by Calculation

If the FRL of a building element is determined by calculation based on a tested prototype:

- (a) the building element may vary from the prototype in relation to:
 - (i) length and height if it is a wall;
 - (ii) height if it is a column;
 - (iii) span if it is a floor, roof or beam;
 - (iv) conditions of support; and
 - (v) to a minor degree, cross-section and components.
- (b) the report must demonstrate by calculation that the building element would achieve the FRL if it is subjected to the regime of the Standard Fire Test in relation to:
 - (i) structural adequacy (including deflection);
 - (ii) integrity, and
 - (iii) insulation; and
- (c) the calculations must take into account:
 - (i) the temperature reached by the components of the prototype and their effects on strength and modulus of elasticity;

- (ii) appropriate features of the building element such as support, restraint, cross-sectional profile, length, height, span, slenderness ratio, reinforcement, ratio of surface area to mass per unit length, and fire protection;
- (iii) features of the prototype that influenced its performance in the Standard Fire Test although these features may not have been taken into account in the design for dead and live loads;
- (iv) features of the conditions of test, the manner of support and the position of the prototype during the test, that might not be reproduced in the building element if it is exposed to fire; and
- (v) the design loads of the building element in comparison with those of the tested prototype.

4. Interchangeable Materials

- (a) Concrete and plaster - The FRL achieved with any material of Group A, B, C, D or E as an ingredient in concrete or plaster applies equally when any other material of the same group is used in the same proportions:
 - Group A: Any Portland cement.
 - Group B: Any lime.
 - Group C: Any dense sand.
 - Group D: Any dense calcareous aggregate, including any limestone or any calcareous gravel.
 - Group E: Any dense siliceous aggregate, including any basalt, diorite, dolerite, granite, granodiorite or trachyte.
- (b) Perlite and vermiculite - The FRL achieved with either gypsum perlite plaster or gypsum-vermiculite plaster applies equally for both plasters.

5. Columns Covered with Lightweight Construction

- (a) Protection against injury - If the fire-resisting covering of a steel column is lightweight construction:
 - (i) the covering must be protected by metal or other suitable material if the column is liable to damage from the movement of vehicles, materials or equipment; and
 - (ii) the voids must be filled solid with non-combustible material to a height of not less than 1.2 m above the floor to prevent indenting if the covering is not in continuous contact with the column; and
- (b) Sealing at floor level - A plug of non-combustible material must seal all voids at each floor level, including voids between the column and its covering if:
 - (i) a steel column extends through 2 or more storeys; and
 - (ii) the fire-resisting covering is not in continuous contact with the column.

Table 1: FRLs Deemed to be Achieved by Certain Building Element

Building element	Thickness of principal material (mm)			Annex ref clause no.
	60/60/60	90/90/90	120/120/120	
WALL				
Masonry:				
Concrete with material density in kg/m3 of:				
- 1600 or more	80	100	120	1,2,3,4,5
- less than 1600	70	90	110	1,2,3,4,5
Concrete				
- Reinforced/ Prestressed	See 2(d) (ii) of this Specification and clause 6 of Annexure to this Table			
Gypsum-perlite or Gypsum-vermiculite				
Plaster on metal lath and channel	50	50	65	1,5,7
CONCRETE COLUMN				
Concrete:				
- Reinforced/ Prestressed	See 2(d) (ii) of this Specification and clause 6 of Annexure to this Table			
HOT-ROLLED STEEL COLUMN (including a fabricated column) exposed on no more than 3 sides				
Fire protection of:				
Concrete – Cast in-situ				
- Loadbearing	25			8,9,10,11
Non-loadbearing:				
- Unplastered	25	30	40	8,9,10,11
- Plastered 13 mm	25	25	30	1,5,8,9,10,11
Gypsum-perlite or Gypsum-vermiculite plaster				
Sprayed to contour	20	25	35	1,10
Sprayed on metal lath	20	20	25	1,7
Solid concrete masonry:				
Column spaces filled	50	50	50	1,2,3,4,5,8,9,11
Column spaces unfilled	50	50	65	1,2,3,4,5,8,11
	60/-/-	90/-/-	120/-/-	
HOT-ROLLED STEEL COLUMN (including a fabricated column) exposed on 4 sides:				
Fire protection of:				
Concrete – cast-in-situ:				
Loadbearing	25	40	45	8,9,10,11

Building element	Thickness of principal material (mm)			Annex ref clause no.
	60/60/60	90/90/90	120/120/120	
Non-loadbearing:				
- Unplastered	25	30	40	8,9,10,11
- Plastered 13 mm	25	25	30	1,5,8,9,10,11
Gypsum-perlite or Gypsum-vermiculite plaster:				
Sprayed to contour	25	30	40	1,10
Sprayed on metal lath	20	20	30	1,7
HOT-ROLLED STEEL COLUMN (including a fabricated column) exposed on 4 sides:				
Fire protection of:				
Solid concrete masonry				
Column spaces filled	50	50	50	1,2,3,4,5,8,9,11
Column spaces unfilled	50	50	50	1,2,3,4,5,8,11
BEAM				
Concrete Reinforced/Prestressed see 2(d)(ii) of this Specification and Clause 6 of Annexure to this Table				
Hot-Rolled Steel (including an open-web joist, girder, truss, etc.) exposed on no more than 3 sides:				
Fire protection of:				
Concrete – Cast-in-situ:	25	30	40	8,10,11
Gypsum-perlite or Gypsum-vermiculite plaster:				
Sprayed to contour	20	25	35	1,10
Sprayed on metal lath	20	20	25	1,7
	60/ - / -	90/ - / -	120/ - / -	
Hot-rolled Steel (incl. an open-web joist, girder, truss, etc.) exposed on:4 sides:				
Fire protection of:				
Concrete – Cast-in-situ:	25	40	45	8,10,11
Gypsum-perlite or Gypsum-vermiculite plaster:				
Sprayed to contour	25	30	40	1,10
Sprayed on metal lath	20	20	30	1,7
FLOOR, ROOF OR CEILING				
Concrete: Reinforced/Prestressed see 2(d)(ii) of this Specification and Clause 6 of Annexure to this Table				

ANNEXURE TO TABLE 1

1. Mortar, Plaster and Plaster Reinforcement

1.1 Mortar for Masonry

Masonry units of concrete must be laid in cement mortar or composition mortar complying with the relevant provisions NZS 4210.

1.2 Gypsum-perlite and Gypsum-vermiculite Plaster

Gypsum-perlite or gypsum-vermiculite plaster must be applied:

- (a) in either one or 2 coats each in the proportions of 1 m³ of perlite or vermiculite to 640 kg of gypsum if the required thickness of the plaster is not more than 25 mm; and
- in 2 coats if the required thickness is more than 25 mm, the first in the proportion of 1 m³ of perlite or vermiculite to 800 kg of gypsum and the second in the proportion of 1 m³ of perlite or vermiculite to 530 kg of gypsum.

1.3 Plaster of Cement and Sand or Cement, Lime and Sand

Plaster prescribed in Table 1 must consist of:

- (a) cement and sand or cement, lime and sand; and
- (b) may be finished with gypsum, gypsum-sand, gypsum-perlite or gypsum-vermiculite plaster or with lime putty.

1.4 Plaster Reinforcement

If plaster used as fire-protection on walls is more than 19 mm thick:

- (a) it must be reinforced with expanded metal lath that -
 - (i) has a mass per unit area of not less than 1.84 kg/m²;
 - (ii) has not fewer than 98 meshes/m; and
 - (iii) is protected against corrosion by galvanising or other suitable method; or
- (b) 13 mm x 13 mm x 0.710 mm galvanised steel wire mesh; and
the reinforcement must be securely fixed at a distance from the face of the wall of not less than 1/3 of the total thickness of the plaster.

2. Dimensions of Masonry

The thicknesses of masonry of calcium-silicate, concrete and fired clay are calculated as follows:

2.1 Solid Units

For masonry in which the amount of perforation or coring of the units does not exceed 25% by volume (based on the overall rectangular shape of the unit) the thickness of the wall must be calculated from the manufacturing dimensions of the units and the specified thickness of the joints between them as appropriate.

2.2 Hollow Units

For masonry in which the amount of perforation or coring of the units exceeds 25% by volume (based on the overall rectangular shape of the unit) the thickness of the wall must be calculated from the equipment thicknesses of the units and the specified thickness of the joints between them as appropriate.

2.3 Equivalent Thickness

The equivalent thickness of a masonry unit is calculated by dividing the net volume by the area of one vertical face.

2.4 Cavity Walls

The thickness of a cavity wall is the sum of the thicknesses of the leaves determined in accordance with 2.1. and/or 2.2 as appropriate.

2.5 Cavity Walls of Different Materials

If the 2 leaves of a cavity wall are of units of different type, the thickness *required* is that listed for the less fire-resistant material (i.e., the greater thickness).

3. Slenderness Ratio of Masonry

3.1 Maximum Value

The slenderness ratio of a masonry wall must not exceed the appropriate value in Table 3.1.

3.2 Calculation

The slenderness ratio of a masonry wall is calculated in accordance with AS 3700. In the case of cavity walls it is calculated for each leaf separately. Each leaf must satisfy 3.1.

Table 3.1 Maximum Slenderness Ratios for Masonry Walls

Type of unit	60/60/60	90/90/90	120/120/120
Concrete in which the basalt content of the aggregate is:			
Less than 45%	18	17	16
45% or more	22.5	21	19.5
Reinforced masonry – all types of unit designed for:			
Axial forces and flexure	27	27	27
Flexure with super-imposed axial forces less than 5% of load capacity	36	36	36

4. Protection to Masonry Reinforcement

In a building element of reinforced masonry designed for fire-resistance, the distance from the surface of the element to the surface of the reinforcement must not be less than:

- (a) for FRL 60/60/60 or 90/90/90 - 30 mm;
- (b) for FRL 120/120/120 - 40 mm;

5. Increase in Thickness by Plastering

5.1 General

The tabulated thicknesses are those of the principal material. They do not include the thickness of plaster which must be additional to the listed thickness of the material to which it is applied.

5.2 Walls

If a wall of concrete masonry is plastered on both sides to an equal thickness, the thickness of the wall for the purposes of Table 1 (but not for the purposes of Table 3.1) may be increased by the following proportions of the thickness of the plaster on one side:

- (a) For concrete masonry in which the aggregate is of a density in excess of 1800 kg/m²: 100%
- (b) For concrete masonry in which the aggregate is of a density between 1600 and 1800 kg/m²: 85%
- (c) For concrete masonry in which the aggregate is of a density less than 1800kg/m² : 75%

6. Concrete Slabs Beams Walls and Columns

The requirements to meet specific values of FRL are those contained in AS 3600. However, for simple structures, the following procedures may be adopted.

6.1 Structural Adequacy Criterion

Table 6.1A gives the minimum dimensions for meeting specific levels of *structural adequacy* for:

(A) Solid or Hollow-Core Plain Slabs

The clear cover to the longitudinal reinforcement or tendons. A slab is continuous if it is flexurally-continuous along at least one edge under the imposed loads.

(B) Ribbed Slabs with Ribs Spaced at not more than 1200mm Centre to Centre

the minimum width of the rib and the clear cover to the reinforcement or tendons of the ribs. The slabs spanning the ribs may be treated as plain slabs as at (a).

(c) Beams

The upper surface of the beams must be integral with a slab or protected by one.

the minimum width of web (rectangular or uniformly tapering cross-section) and the clear cover to the reinforcement or tendons.

(D) Solid or Hollow-Core Vertical Walls

The clear cover to the reinforcement or tendons. The effective thickness of the wall must be at least equal to that given in Table 6.3 for the FRL for the *insulation* criterion equal in period to the *required structural adequacy* criterion. In addition, the slenderness ratio must not exceed the values given in Table 6.1B

(e) Columns which are:

Exposed on all sides of fire; built into or form part of a wall that does not have a fire separating function; built into or form part of a wall that has a lower value of *structural adequacy* than *required* for the column; or built into and protrude by a distance in excess of the value of the clear cover to the longitudinal reinforcement:

The minimum cross-sectional dimension and the clear cover to the reinforcement.

Table 6.1 A FRL - Requirements for Structural Adequacy Criterion

Building element	FRL (Minutes)			
	30	60	90	120
Plain Slabs Simply supported one-way, clear cover (mm) to:				
Reinforcement	15	20	25	30
Tendons	20	25	35	40
Simply supported two-way, clear cover (mm) to:				
Reinforcement	10	15	20	25
Tendons	15	20	30	35
Continuous one-way and two-way, clear cover (mm) to:				
Reinforcement	10	15	15	15
Tendons	15	20	25	25
Ribs of plain slabs min. width x clear cover (mm) x (mm)				
Simply-supported one-way and two-way ribbed slabs				
Reinforcement	80x15	110x25	135x35	150x45
Tendons	80x25	110x35	135x45	150x55
Continuous one way and two-way ribbed slabs min. width x clear cover (mm) x (mm)				
Reinforcement	70x15	75x20	110x25	125x35
Tendons	70x25	75x30	110x35	125x45
Beams min. width of web (mm) x clear cover (mm) Simply supported:				

Building element	FRL (Minutes)			
	30	60	90	120
To reinforcement	75x20	120x30 or 150x25 or 240x20	150x45 or 200x35 or 300x30 or 500x25	200x55 or 240x45 or 360x40 or 600x33
To tendon	75x25	120x35 or 150x30 or 240x25	150x55 or 200x45 or 300x40 or 500x35	200x65 or 240x55 or 360x50 or 600x43
Continuous:				
To reinforcement	75x20	120x20	150x25 or 200x20	200x35 or 240x25 or 380x20
To tendon	75x25	120x25	150x35 or 200x30	200x45 or 240x35 or 380x30
Vertical wall Clear cover in mm				
To reinforcement	20	20	30	40
To tendon	30	30	30	30
Note: vertical walls must also satisfy the requirements of Table 6.1B				
Columns min. cross-clear sectional x cover dimension (mm)x(mm)				
To reinforcement	150x10	200x20 or 240x15	250x35 or 300x25	300x45 or 400x35

TABLE 6.1 B MAXIMUM ALLOWABLE SLENDERNESS RATIO FOR CONCRETE WALLS

Ratio of design axial force to the product of gross cross-sectional area and the characteristic compressive cylinder strength at 28 days	Corresponding maximum value of slenderness ratio (effective height/thickness)
0.0	50
0.005	35
0.03	20
0.10	15
Notes: 1. Values in between can be interpolated. 2. Design axial force = 1.1 dead load +0.6 live load including impact. 3. The characteristic compressive strength in MPa is generally expressed as the grade of the concrete.	

6.2 Integrity Criterion

This criterion is relevant only for slabs and walls and not for ribs, beams and columns. It is satisfied if the criteria for *structural adequacy* and *insulation* are *met* for the period equal to that *required* for the *integrity* of the slab or wall as appropriate.

6.3 Insulation Criterion

This criterion is also relevant only for slabs and walls. It is met by meeting the requirement for minimum effective thickness as given in Table 6.3. The effective thickness of solid slabs and walls is the actual thickness. The effective thickness of hollow core slabs and walls is the value of the nett cross-sectional area divided by the width of the cross-section. With hollow core slabs and walls the thickness of concrete between voids and between any part of a void and the nearest surface must be not less than 25 mm or 20% of the effective thickness of the slab.

Table 6.3 Minimum Effective Thickness for Insulation

FRL for insulation criterion minute	Effective thickness mm
30	60
60	80
90	100
120	120

7. GYPSUM-PERLITE OR GYPSUM-VERMICULITE PLASTER ON METAL LATH

7.1 Walls

In walls fabricated of gypsum-perlite or gypsum-vermiculite plaster on metal lath and channel:

- the lath must be securely wired to each side of 19 mm x 0.44 kg/m steel channels (used as studs) spaced at not more than 400 mm centres; and
- the gypsum-perlite or gypsum-vermiculite plaster must be applied symmetrically to each exposed side of the lath.

7.2 Columns

For the fire protection of steel columns with gypsum-perlite or gypsum-vermiculite on metal lath;

- the thickness of the plaster must be measured from the back of the lath;

- (b) the lath must be fixed at not more than 600 mm centres vertically to steel furring channels, and
 - (i) if the plaster is to be 35 mm thick or more - at least 12 mm clear of the column; or
 - (ii) if the plaster is to be less than 35 mm thick - at least 6 mm clear of the column; or
- (c) the plaster may be applied to self-furring lath with furring dimples to hold it not less than 10 mm clear of the column.

7.3 Beams

For the fire protection of steel beams with gypsum-perlite or gypsum-vermiculite on metal lath -

- (a) the lath must be fixed at not more than 600 mm centres to steel furring channels and at least 20 mm clear of the steel;
- (b) the thickness of the plaster must be measured from the back of the lath.

8. EXPOSURE OF COLUMNS AND BEAMS

8.1 Columns

A column incorporated in or in contact on one or more sides with a wall of solid masonry or concrete at least 100 mm thick may be considered to be exposed to fire on no more than 3 sides.

8.2 Beams

A beam, open-web joist, girder or truss in direct and continuous contact with a concrete slab or a hollow block floor or roof may be considered to be exposed to fire on no more than 3 sides

9 FILLING OF COLUMN SPACES

Steel columns are deemed to have FRLs of more than 120/-/-, the spaces between the fire-protective material and the steel (and any re-entrant parts of the column itself) must be filled solid with a fire-protective material like concrete or grout.

10. REINFORCEMENT FOR COLUMN AND BEAM PROTECTION

10.1 Masonry

Concrete masonry for the protection of steel columns must have steel-wire or mesh reinforcement in every second course and lapped at the corners.

10.2 Structural Concrete

If a steel column or a steel beam is to be protected with structural concrete:

- (a) the concrete must be reinforced with steel-wire mesh or steel-wire binding placed about 20 mm from its outer surface; and
- (b) for concrete less than 50 mm thick, the steel wire must be -
 - (i) at least 3.15 mm in diameter; and
 - (ii) spaced at not more than 100 mm vertically; or
- (c) for concrete not less than 50 mm thick, the steel wire must be either -
 - (i) of a diameter and spacing in accordance with (b); or
 - (ii) at least 5 mm in diameter and spaced at not more than 150 mm vertically.

10.3 Gypsum-perlite or Gypsum-vermiculite Plaster Sprayed to Contour

- (a) If a steel column or steel beam is protected with either gypsum-perlite or gypsum-vermiculite plaster sprayed to contour and the construction falls within the limits of Table 10.3, the plaster must be reinforced with -
 - (i) expanded metal lath complying with Clause 1.4; or

- (ii) galvanised steel mesh complying with Clause 1.4.
- (b) The reinforcement must be placed at a distance from the face of the plaster of at least 1/3 of the thickness of the plaster and must be securely fixed to the column or beam at intervals of not more than the relevant listing in Table 10.3.
- (c) For the purposes of Table 10.3 -
 - (i) "vertical" includes a surface at not more than 10° to the vertical;
 - (ii) "horizontal" includes a surface at not more than 100 to the horizontal; and
 - (iii) "underside" means the underside of any horizontal or non-vertical surface.

Table 10.3 Reinforcement of Gypsum-Perlite or Gypsum-Vermiculite Plaster Sprayed to Contour

Surface to be protected	Reinforcement required if smaller dimension of surface exceeds (mm)	Max spacing of fixings of the mesh to surface (mm)
Members with H or I cross-section:		
Vertical	450	450
Non-vertical	300	300
Underside	300	300
Upper side of a horizontal surface:	Not required	
Members with other shapes		
Vertical	Any size	450
Non-vertical	Any size	300
Upper side of a horizontal surface	Not required	

11 THICKNESS OF COLUMN AND BEAM PROTECTION

11.1 Measurement of Thickness

The thickness of the fire-protection to steel columns and steel beams (other than tire protection of gypsum-perlite or gypsum-vermiculite plaster sprayed on metal lath or sprayed to contour) is to be measured from the face or edge of the steel, from the face of a splice plate or from the outer part of rivet or bolt, whichever is the closest to the outside of the fire-protective construction, except that:

- (a) if the thickness of the fire-protection is 40 mm or more, rivet heads may be disregarded; and if the thickness of the fire-protection is 50 mm or more -
 - (i) any part of a bolt (other than a high-tensile bolt) may be disregarded; and
 - (ii) a column splice plate within 900 mm of the floor may encroach upon the fire protection by up to a 1/4 of the thickness of the fire protection.

SPECIFICATION A2.4: EARLY FIRE HAZARD TEST FOR ASSEMBLIES

1. Scope

This Specification sets out the procedures for determining the Early Fire Hazard indices of components and assemblies. These tests classify building materials, their surface finishes and furnishings according to:

- (a) their tendencies to ignite;
- (b) their tendencies to spread flame;
- (c) the heat they develop once ignition has occurred; and
- (d) their tendencies to produce smoke.

2. Form of Test

Tests must be carried out in accordance with AS 1530.3 and AS 1530.4.

3. Test Specimens

Test specimens must incorporate:

- (a) all types of joints; and
- (b) all types of perforations, recesses or the like for pipes, light switches or other fittings, which are proposed to be used for the member or assembly of members in the building.

4. Concession

Clause 3 does not apply to joints, perforations, recesses or the like that are larger than those in the proposed application and have already been tested in the particular form of construction concerned and found to comply with the conditions of test.

5. Smaller Specimens Permitted

A testing laboratory may carry out the test at pilot scale if a specimen (which must be not less than 900 mm) will adequately represent the proposed construction in the building, but the results of that test do not apply to construction larger than limits defined by the laboratory conducting the pilot examination.

ALL BUILDINGS

SECTION **B**

STRUCTURE

Performance Requirements

Deemed-to-Satisfy Provisions

B1 Structural Provisions

B2 Demolition

B3 Foundations and Ground Conditions

SECTION B

THIS SECTION APPLIES TO ALL BUILDINGS

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

B1 Structural Provisions

- B1.1 General requirements
- B1.2 Building importance level
- B1.3 Dwellings design criteria
- B1.4 Public buildings design criteria
- B1.5 Construction deemed-to-satisfy
- B1.6 Human impact against glazing

B2 Demolition

- B2.1 General requirements
- B2.2 Applicable standard
- B2.3 Dangerous buildings
- B2.4 Buildings containing asbestos

B3 Foundations and Ground Conditions

- B3.1 General requirements
- B3.2 Sloped ground
- B3.3 Foundation design

PERFORMANCE REQUIREMENTS

OBJECTIVES

BP1 A building and all connected services must be designed and constructed to fulfil the following objectives:

- (a) prevent death and injury to people from structural failure
- (b) avoid distress to occupants as a result of deflection vibration degradation or other similar causes
- (c) avoid damage to neighbouring property
- (d) satisfy the intended use.

BP2 Procedures and methods of demolition must be adequate to prevent death and injury to persons and avoid damage to neighbouring property.

REQUIRED PERFORMANCE

BP1.1 Design Loads

Buildings and their elements must be designed and constructed in order to prevent structural failure during the expected life of the building and to avoid unacceptable deflections and vibrations during the normal use of the building resulting from:

- (a) combinations and frequency of all possible loads, dynamic responses and internal actions
- (b) the properties of the materials used in the building, and
- (c) the foundation conditions.

Potential **abnormal conditions** in the Solomon Islands that can lead to building failure include:

- (a) **Storm surge and flooding** – refer to DFP 1.1, DFP 1.8 and NFP 9.1 Performance Requirements in consideration of Deemed-to-Satisfy compliance;
- (b) **Land slide** - refer to B3.1 and B3.2.1 Performance Requirements in consideration of Deemed-to-Satisfy compliance;
- (c) **Cyclone** – refer to AS/NZS1170 Part 2 Performance Requirements in consideration of Deemed-to-Satisfy compliance;
- (d) **Earthquake** – refer to B1.4.a) iii Performance Requirements in consideration of Deemed-to-Satisfy compliance;
- (e) **Tsunamis and volcanic eruptions** - Deemed-to-Satisfy compliance regarding very low frequency events such as Tsunamis and Volcanic eruptions is considered adequate when (a) to (g) above are compliant.

BP1.1.1 The design and construction must take into account the loads resulting from the following acting either singly or in possible combinations:

- (a) self-weight
- (b) imposed loads
- (c) temperature variations
- (d) earth pressure
- (e) wind
- (f) resonance effects
- (g) impact
- (h) explosion/implosion
- (i) fire
- (j) water and other liquids
- (k) fatigue resulting from fluctuating loads
- (l) differential displacement
- (m) adverse effects due to closeness of other buildings

- (n) any other expected loads.

BP1.1.2 The design and construction must allow for:

- (a) the consequences of failure
- (b) the quality of workmanship available
- (c) variations in material properties and *site* characteristics, and
- (d) want of accuracy in the methods used to predict the structural performance of the building.

BP1.2 Site Works

The following site works criteria must be satisfied:

- (a) Site works as necessary must be carried out to ensure the stability of the building site during the expected life of the building.
- (b) While carrying out site works, any damage to existing structures or adjacent property must be avoided.
- (c) Alterations to the ground-water level resulting from site works must not be allowed to affect the stability of any building.

BP1.3 Design Criteria

The following criteria must be satisfied:

- (a) during the design life of the building the probability of experiencing unacceptable deflections or vibrations must not exceed 5 %
- (b) the probability of risk of structural failure must not exceed 0.1 % within the design life of the building.

BP1.4 Excavations

The following criteria for all excavations must be satisfied.

- (a) Excavations greater than 1.5m deep must be either:
 - (i) battered back with a slope no greater than 45° on all sides, or
 - (ii) designed and certified by an appropriately-qualified engineer.
- (b) Excavations must be set back a minimum of 1.5m from any property boundary and batter away from the boundary with a slope of no greater than 45° unless specific permission is granted by the Building Controller.

BP2.1 Demolition of Buildings

While buildings are demolished, the following must be ensured:

- (a) safety of the public and of the *site* personnel from injury or death
- (b) avoidance of damage and nuisance from dust, vibrations, noise, water, fire, smoke and fumes
- (c) continued access to other properties
- (d) the exhibition of appropriate notices warning the public, and
- (e) prevention of damage to public services such as water and sewerage pipes, electricity and telephone lines, etc., and allow their continued use.

BP2.1.1 Design and Planning of Demolition

The method and sequence of demolition must be planned in detail with due allowance for the following:

- (a) the sudden release of locked up forces such as with pre-stressed concrete, arches, cantilevers, etc.
- (b) the height of the structure

- (c) clear space available
 - (d) the presence of dangerous or inflammable materials such as gas cylinders, aerosol spray cans, drums containing flammable material or explosive dusts, foam plastics, etc.
 - (e) the presence of either Bonded Asbestos Material (BAM- asbestos fibres compressed in fibro sheets) or Friable Asbestos Material (FAM -unbounded asbestos containing material)
 - (f) the structural condition of the building
 - (g) the presence of basements, cellars, vaults and other voids and if so the effect of removal of cross-walls and the like
 - (h) the requirement for any cutting, welding or burning
 - (i) the requirement for temporary supports, shoring, scaffolding and the like, and the loads including impact loads that they may have to take
 - (j) the loads from the stationing and operation of demolition equipment, especially if supported on parts of the building being demolished, and
 - (k) any other likely factors.
-

DEEMED-TO-SATISFY PROVISIONS

B1 STRUCTURAL PROVISIONS

B1.1 General Requirements

Materials, components and methods of construction used in a building or structure and all attached services must be capable of sustaining at an acceptable level of safety and serviceability:

- (a) the most adverse combinations of loads (including combinations of loads that might result in a potential for progressive collapse), and
- (b) other actions to which they may reasonably be subjected.

B1.2 Building Importance Level and Design Criteria

The *Importance Level* of a building shall be determined in accordance with Table 3.2 and Table 3.3 of AS/NZS1170 Part 2.

Notwithstanding the above, the following building types shall be designed as Importance Level 4 buildings:

- (a) Post-Disaster/Shelters/critical/essential/lifeline facilities and essential government services structures
- (b) hospital and *health-care buildings* with post-disaster functions.

B1.3 Dwellings (Class 1 & 10 buildings)

- (a) Solomon Islands Building Manual

Class 1 and 10 Buildings (as per Clause A3.2) which are constructed using the provisions and details in the Solomon Islands Building Manual appropriately are deemed to satisfy the structural provisions of this Building Code, subject to the limitations described in the Preface herein.

- (b) Design Actions (Loads)

The general requirements of B1.1 are satisfied if the building or structure can resist loads determined in accordance with the following:

- (i) Wind actions -

AS/NZS 1170 Structural Design Actions Part 2 – Wind Actions

When using Part 2 of the Standard the following provisions apply for Dwellings:

For the calculation of the *site* wind speed $V_{sit,\beta}$, a **Regional wind speed V_R of 69m/s** is to be used for all areas and islands of the Solomon Islands. The maps of Australia and New Zealand in the Standard are to be disregarded.

The wind direction multiplier M_d shall be taken as 1.0. All other provision of AS/NZS1170 Part 2 shall apply.

- (ii) Dead Live and earthquake loads -

AS/NZS 1170 *Part 1 – permanent, imposed and other actions*

NZS 1170 Part 5 – Earthquake Actions:

- a. Hazard Factor Z and Fault Distance D: The table and figures presenting the Hazard factor Z and the Shortest Major Fault Distances D for New Zealand. Locations shall be replaced by "Z = 1.0 for all Solomon Islands unless a site-specific hazard study has been submitted and approved by the Approval Authority"
- b. Minimum Hazard Factor: The New Zealand minimum Hazard Factor of 0.13 shall be replaced by "The Solomon Islands minimum Hazard Factor, Z, shall not be less than 0.35"
- c. Near-Fault Factor: The Table and Figure for Major Faults requiring near-fault factors > 1.0 for New Zealand shall be disregarded and replaced by "For Annual probability of exceedance < 1/250, N(T,D) shall equal N_{max}(T) regardless of fault distance for the Solomon Islands unless a site specific hazard study has been submitted and approved by the Approval Authority"
- d. Return Period Factor: The New Zealand maximum Z_{Ru} = 0.7 limit shall be replaced by "Z_{Ru} shall not exceed 1.5 for the Solomon Islands"

The maps of New Zealand shown in the Standard are to be disregarded.

(iii) Other loads -

The principles of structural mechanics shall apply. Any specific loads to which the structure shall be subjected shall be taken into account during the design.

(iv) Probability of risk of structural failure -

The probability of risk of structural failure needs to be linked to the Importance Level (IL) and Design Life (DL) of the building – 0.1% is typical for IL2 buildings, however IL3 and IL4 should have lower probabilities of failure because of their higher importance/greater consequence of failure. Refer to Table 3.3 of AS/NZS 1170.0 0, which gives Annual Probability of Exceedance for combinations of Importance Levels and Design Life.

B1.4 Public buildings (Class 2, 3, 4, 5, 8, & 9)

The Regional wind speed shall be taken from Table 3.1 of AS/NZS 1170.2 for the wind region and design working life noted in Table B 1.4.1

(a) Design Actions (Loads):

The loading requirements of B1.1 are satisfied if the building or structure can resist loads determined in accordance with the following -

(i) Wind actions -

AS/NZS 1170 *Structural Design Actions Part 2 – Wind Actions*

When using Part 2 of the Standard, the following provisions apply for public buildings:

For the calculation of the **site wind speed** $V_{sit,\beta}$, the **regional wind speed** shall be taken from Table 3 of AS/NZS 1170.2 for the wind region and design working life noted in Table B 1.4.1, and in accordance with the relevant Importance Level:

Table B1.4.1 - Regional Wind Speeds and Design Life

Building type	Wind region to be adopted	Design working life
Emergency shelters Hospitals Health-care buildings	Region D wind speeds	50 years

All buildings with post disaster functions		
All other public buildings including educational facilities ¹	Region C wind speeds	50 years
¹ Where stipulated by the Approval Authority, Educational Facilities shall have one nominated building per site designed and built to Regional wind speed $V_{sit,\beta}$, 88m/sec i.e., Region D.		

- The maps of Australia and New Zealand in the Standard are to be disregarded.
- The factors F_C and F_D noted in clause 3.4 shall apply.
- The wind direction multiplier M_d shall be taken as 1.0. All other provision of AS/NZS1170 Part 2 shall apply.

(ii) Dead Live and earthquake loads -

AS/NZS 1170 Part 1 – permanent, imposed and other actions

NZS 1170 Part 5 – Earthquake Actions:

- Hazard Factor Z and Fault Distance D : The table and figures presenting the Hazard factor Z and the Shortest Major Fault Distances D for New Zealand. Locations shall be replaced by " $Z = 1.0$ for all Solomon Islands unless a site-specific hazard study has been submitted and approved by the Approval Authority"
- Minimum Hazard Factor: The New Zealand minimum Hazard Factor of 0.13 shall be replaced by "The Solomon Islands minimum Hazard Factor, Z , shall not be less than 0.35"
- Near-Fault Factor: The Table and Figure for Major Faults requiring near-fault factors > 1.0 for New Zealand shall be disregarded and replaced by "For Annual probability of exceedance $< 1/250$, $N(T,D)$ shall equal $N_{max}(T)$ regardless of fault distance for the Solomon Islands unless a site specific hazard study has been submitted and approved by the Approval Authority"
- Return Period Factor: The New Zealand maximum $Z_{Ru} = 0.7$ limit shall be replaced by " Z_{Ru} shall not exceed 1.5 for the Solomon Islands"

The maps of New Zealand shown in the Standard are to be disregarded.

(iii) Other loads -

The principles of structural mechanics shall apply. Any specific loads to which the structure shall be subjected shall be taken into account during the design.

(iv) Probability of risk of structural failure -

The probability of risk of structural failure needs to be linked to the Importance Level (IL) and Design Life (DL) of the building – 0.1% is typical for IL2 buildings, however IL3 and IL4 should have lower probabilities of failure because of their higher importance/greater consequence of failure. Refer to Table 3.3 of AS/NZS 1170.0 0, which gives Annual Probability of Exceedance for combinations of Importance Levels and Design Life.

(v) Other loads -

The principles of structural mechanics shall apply. Any specific loads to which the structure shall be subjected shall be taken into account during the design.

B1.5 Construction Deemed-to-satisfy

The requirements of B1.1 for materials and forms of construction are satisfied if they comply with the following:

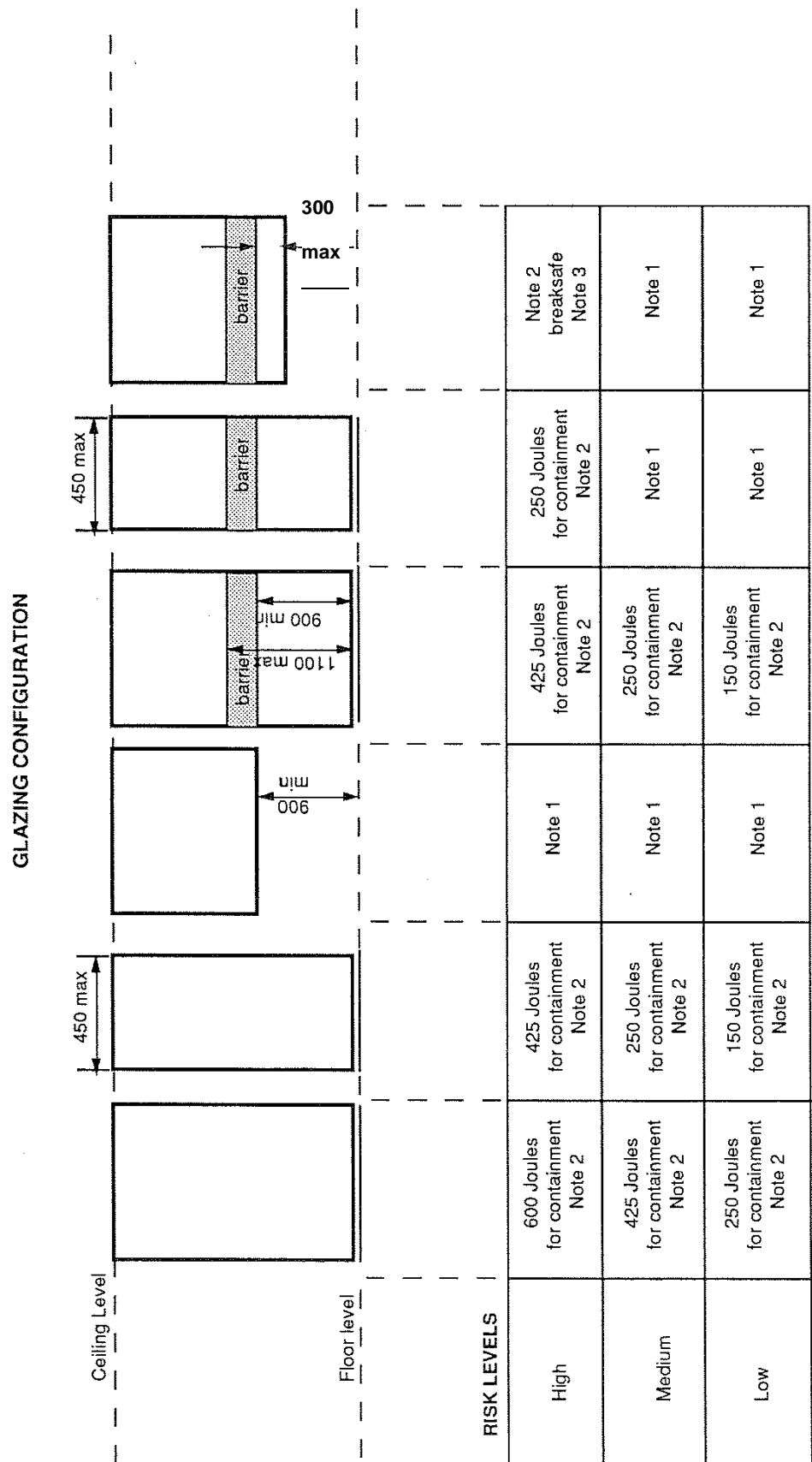
- (a) Masonry -
 - (i) Code of practice for design of masonry structures: NZS 4230
 - (ii) Code of practice for masonry buildings not requiring specific design: NZS 4229
 - (iii) Code of practice for masonry buildings, materials and workmanship: NZS 4210
 - (iv) Masonry Structures AS 3700,
- (b) Concrete -
 - (i) The design of concrete structures: NZS 3101 Parts 1 and 2
 - (ii) Specification for concrete construction: NZS 3109
 - (iii) Specification for concrete construction for minor works: NZS 3124
 - (iv) Concrete Structures NZS 3603.
- (c) Steel construction: Steel Structures Standard: AS 4100
- (d) Aluminium construction: Aluminium Structures: AS/NZS 1664 Parts 1 and 2
- (e) Timber construction: Design of timber structures: AS1720 Parts 1, 3 and 5, AS/NZS 1720 Part 4 or NZS 3603
- (f) Footings: Footings for Class 1 and 10a buildings: AS 2870
- (g) Piling: Piling – Design and Installation: AS 2159
- (h) Glass installations: Glazing in Buildings: NZS 4223 Parts 1, 2, 3 and 4 subject to Clause B1.6
- (i) Protection from termites: Termite Management: AS 3660 Parts 1, 2 and 3
- (j) Roof construction: AS/NZS1170, AS 4040.3 and manufacturer's recommendations
- (k) Particleboard structural flooring: Particleboard flooring: AS 1860 Parts 1 and 2
- External wall cladding: No structural damage when tested to AS 4040.3 to withstand impact from a 4 kg piece of timber of nominal cross-section 100 mm x 50 mm striking end-on at a velocity of 15 m/s.

B1.6 Human Impact on Glazing

- (a) Glazing of *windows* and other openings and their support systems designed only against wind loads are not safe against human impact. In order to provide for reasonable safety against injury or death resulting from glass breakage and possible falls, glazing and its support framing must be designed for the levels of risk shown in Table B1.6. The impact energy that the glass and its framing must resist for different levels of risk and for different configurations of glazing is given in Figure B1.6.
- (b) The following must be taken into account while designing glazing against human impact -
 - (i) laminated glass and toughened glass are considered to be safety glass in terms of injury potential from fragments and splinters. Wired glass and heat-strengthened glass are not safety glasses.
 - (ii) annealed or laminated glass which has minor abrasion damage or has been sand blasted on the tension face has its impact strength severely reduced.
 - (iii) the strength of glass can be substantially reduced by the lapse of time.
- (c) The barrier protection shown in Figure B1.6 must be designed to AS/NZS 1170. The deflection of the barrier must not exceed 50 % of the distance between the hand-rail and the glass when a concentrated force of 1.2 kN is applied to the face of the barrier.

Table B1.6: Risk Level for Class of Building for Assessment of Required Strength of Glazing

Height of fall in case of glazing failure	Risk		
	High	Medium	Low
More than 6 m	2, 6, 9b	3, 4, 5, 7, 8, 9a	
3 m to 6 m	-	2, 6, 9b	3, 4, 5, 7, 8, 9a
Up to and including 3 m	-	6, 9b	2, 3, 4, 5, 7, 8, 9a



Notes:

- 1) No specific impact requirement. Select glass as per NZS 4223.
- 2) Containment - fracture of glass gives no significant penetration eg. laminated glass. Containment *required* for impacts up to and including level set.
- 3) Breaksafe - fracture of glass gives either relatively harmless pieces or insufficient penetration to cause injury eg. laminated or toughened glass.
- 4) All dimensions in millimetres.

FIGURE 1.6 – CAPACITY REQUIRED OF GLAZING ELEMENTS

B2 DEMOLITION

B2.1 General Requirements

All dangerous buildings as detailed in B2.3 must either be restored to *required* standards or be demolished. The planning and execution of demolition must:

- (a) not put at risk the safety and health of the public and of the workers
- (b) avoid damage to other properties
- (c) avoid nuisance to others
- (d) allow continued access to other properties, and
- (e) prevent damage to public services and allow continued operation of such services.

B2.2 Applicable Standard

The requirements of B2.1 are satisfied if demolition is carried out to AS 2601 *The demolition of structures*.

B2.3 Dangerous Buildings

Any building which has any of the conditions or defects described below must be deemed to be a dangerous building if such conditions or defects exist to the extent that the life, health, safety or property of the public or its occupants are endangered whenever:

- (a) any *required exit* is not of sufficient width or size or is not so arranged as to provide safe and adequate means of egress in case of fire or other emergency
- (b) the stress in any materials or member due to all applicable loads, is more than 1.5 times the working stress or stresses allowed for new buildings of similar class and type of construction
- (c) any portion of the building has been damaged by fire, earthquake, wind, flood or by any other cause, to such an extent that its structural strength or stability is materially less than it was before such catastrophe and is less by 33 percent or more than the minimum requirements for new buildings of similar class and type of construction
- (d) any portion or member or attachment of the building is likely to fail, or to become detached or dislodged, or to collapse and thereby injure persons or damage property
- (e) any portion of the building has suffered distortion, cracking or settlement to such an extent that walls or other structural portions have materially less resistance to winds or earthquakes than is *required* in the case of similar new construction
- (f) the building or any portion of it is likely to collapse or fail to perform the intended function, as a result of -
 - (i) dilapidation, deterioration or decay
 - (ii) faulty construction
 - (iii) the removal, movement or instability of any portion of the ground necessary for the purpose of supporting such building
 - (iv) the deterioration, decay or inadequacy of its foundation; or
 - (v) any other cause.
- (a) the building exclusive of the foundation, shows 33 percent or more damage or deterioration of any supporting member or 50 percent damage or deterioration of its non-supporting members
- (b) any building has in any non-supporting part, member or portion less than 50 percent, or in any supporting part, member or portion less than 66 percent of the -
 - (i) strength, or
 - (ii) *fire-resisting* requirements; and

- (iii) a building because of inadequate maintenance, dilapidation, decay, damage, faulty construction or arrangement, inadequate light, air or sanitation facilities, or otherwise, is likely to cause sickness or disease.

B2.4 Buildings Containing Asbestos

Where buildings to be demolished include either Bonded Asbestos Material (BAM - asbestos fibres compressed in fibro sheets) or Friable Asbestos Material (FAM - unbounded asbestos containing material) an Asbestos Removal Control Plan must be prepared and approved by the Approval Authority and removed in accordance with the Plan by an Asbestos removal contractor approved by the Approval Authority.

Where partial demolition, refurbishment or maintenance site activities require the removal of non-friable asbestos containing material or require other work activities that involve the disturbance of any asbestos containing materials, a 'safe work method statement' approved by the Approval Authority shall be prepared and complied with by the contractor responsible.

B3 FOUNDATIONS AND GROUND CONDITIONS

3.1 General Requirements

Building foundations must be designed to transfer the loads derived from Section B1 to the ground.

The buildings foundations elements must be designed in accordance with the appropriate materials Standards, as given in Section B1.

The ground upon which the foundations are bearing shall be good ground. Good ground is defined as;

- (a) Solid ground away from areas of swamp or ground likely to settle significantly when loaded, and
- (b) Any soil or rock capable of permanently withstanding a minimum ultimate bearing capacity of 300kPa (i.e. an allowable pressure of 100 kPa using a safety factor of 3.0).

Where the *site* is not founded on good ground, geotechnical advice shall be sought from a suitable qualified geotechnical engineer for the design of foundation systems.

3.2 Sloping Ground

Where a building is to be constructed on sloping ground, due consideration shall be given to the stability of the ground under loading from the structure. The verticality of foundation elements shall be maintained, and the slope shall be battered and benched as *required*. Refer to Section BP1.4 for excavation limitations including depth and batter requirements.

If the ground is sloped at greater than 30 degrees from the horizontal, advice shall be sought from a suitable qualified geotechnical engineer prior to the design and installation of any foundation element.

The potential for landslide and land slip often extends beyond the land immediately under the building. Where the adjacent land is sloped at **greater than 30 degrees** from the horizontal in any location **within 10 m** of the proposed foundations of the building, advice shall be sought from a suitable qualified geotechnical engineer prior to the design and installation of any foundation element.

3.3 Foundation Design

For simple buildings the adequacy of foundations shall be assessed on the basis of well-established and relevant local knowledge and experience of foundation conditions in the vicinity of the proposed building.

For timber framed houses and small building's sub-structure materials and forms of construction will be satisfied if they comply with NZ3604.

For complex and multi storey buildings and public buildings of importance factor > 1 mandatory geo investigation geo-technical tests must be undertaken to determine the foundation systems as noted under clause 3.1

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DC**

FIRE RESISTANCE

Performance Requirements

Deemed-to-Satisfy Provisions

DC1 Fire Resistance and Stability

SECTION DC – FIRE RESISTANCE

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

DC1 Fire Resistance and Stability

DC1.1 External walls of Class 1 buildings

DC1.2 Class 1 buildings: Construction of external wall

DC1.3 Class 10a buildings: External walls

DC1.4 Allowable encroachments

DC1.5 Exceptions

DC1.6 Common walls

DC1.7 Separating floors

DC1.8 Sarking-type materials

PERFORMANCE REQUIREMENTS

OBJECTIVES

DCP1 A Class 1 or Class 10 building must be so designed and constructed that the following objectives are fulfilled:

- (a) it is protected from fire in any other building; and
- (b) materials used in the construction be such that if there is a fire in the building -
 - (i) the spread of fire and the generation of smoke and toxic gases will be minimised;
 - (ii) stability will be maintained for a period at least sufficient for the occupants to escape and to ensure the safety of fire-fighters; and
 - (iii) there will be little risk of collapse onto adjoining property.

REQUIRED PERFORMANCE

DCP1.1 *External walls* of Class 1 buildings, located within 1.5 m of the allotment boundary or 3 m from other buildings than of Class 10 (a) on the same allotment must:

- (a) remain stable and not allow the passage of destructive heat, flames, smoke or gases through them for an hour, in the event of a fire; and
- (b) not allow the passage of flames, smoke or gases through *windows* for an hour and such *windows* must not be openable.

DCP 1.2 The *external wall* of a Class 10 (a) building which is less than 1.5 m away from the allotment boundary other than with a road alignment or public space must not be *combustible*.

DCP 1.3 A *common wall* must:

- (a) if it separates a Class 1 building from any Class other than 10 (a), remain stable and prevent the passage of destructive heat, flames, smoke or gases for an hour, in the event of a fire;
- (b) if it separates a Class 1 building from a Class 10 (a) building on different allotment be not *combustible*.

DCP 1.4 The underside of a floor separating 2 *sole-occupancy units* each being a separate domicile must not be *combustible*.

DCP 1.5 Any *sarking-type material* used in a Class 1 building must have a *flammability index* of less than 5.

DEEMED-TO-SATISFY PROVISIONS

DC1 FIRE RESISTANCE AND STABILITY

DC1.1 External Walls of Class 1 Buildings

Except as permitted by Clause DC 1.4 or DC1.5, an *external wall* of a Class 1 building, and any openings in that wall, must comply with clause DC1.2 if:

- (a) the wall is set back less than 1.5 m from an allotment boundary other than the boundary adjoining a road alignment or other public space; or
- (b) the wall is less than 3.0 m from another building on the same allotment other than a Class 10 building.

DC1.2 Class 1 Buildings: Construction of External Walls

- (a) External walls referred to in Clause DC1.1 must have a FRL of not less than 60/60/60.
- (b) Openings in external walls referred to in Clause DC1.1 must-
 - (i) be protected with fire windows or glass block or other construction with a FRL of at least - /60/- ; and
 - (ii) not be fitted with openable windows.

DC1.3 Class 10a buildings: External walls

An *external wall* of a Class 10a building other than an *open garage* must be of *non-combustible* construction or lined externally with *non-combustible* material if it is set back less than 1.5 m from the allotment boundary other than with a road alignment or public space.

DC1.4 Allowable encroachments

The distance from an allotment boundary or between buildings must be the shortest distance measured from the outermost point of the building or buildings concerned, except that:

- (a) fascia, gutters, downpipes, non-combustible eaves lining, and the like;
- (b) masonry chimney backs, flues, pipes, cooling or heating appliances or other services;
- (c) light fittings, electricity or gas meters, aerials or antennae;
- (d) pergolas or sun blinds; and
- (e) unroofed terraces, landings, steps or ramps, not more than 1 m in height,

may encroach into that distance if thereby the distance to the boundary is not reduced to less than 1 m nor the distance between the buildings to less than 1.5 m.

DC1.5 Exceptions

Clause DC1.1 does not apply to:

- (a) an external wall that previously complied with this Part and is reclad, if the recladding does not reduce the distance to the boundary or building by more than 150 mm; or
- (b) an open garage.

DC1.6 Common Walls

A common wall must:

- (a) be of masonry or concrete, or be fully lined with *fire-protective covering* and extend to the underside of a *non-combustible* roof or not less than 450 mm above a roof with a *combustible* lining;
- (b) have a FRL of not less than 60/60/60 if it separates Class 1 buildings, or a Class 1 building and a Class 10 (a) building, on different allotments; or
- (c) be lined with a *non-combustible* material if it separates Class 10a buildings on different allotments.

DC1.7 Separating Floors

The underside of a floor separating *sole-occupancy units*, each being a separate domicile and located one above the other, must be lined with material with a FRL of not less than 30/30/30.

DC1.8 Sarking-type Materials

Any *sarking-type material* used in a Class 1 building must have a *Flammability Index* of not more than 5.

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DD**

ACCESS AND EGRESS

Performance Requirements

Deemed-to-Satisfy Provisions

DD1 Construction of Exits

DD2 Access for People with a Disability

SECTION DD – ACCESS AND EGRESS

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

DD1 Construction of Exits

DD1.1 Treads and risers

DD1.2 Curved stairs

DD1.3 Balustrades

DD1.4 Parapets on flat roofs criteria

DD1.5 Number of *exits*

DD1.6 Ramp in *exits*

DD1.7 Dimensions of *exits*

DD2 Access for People with Disabilities

DD2.1 Access to buildings

PERFORMANCE REQUIREMENTS

OBJECTIVES

DDP 1 A Class 1 or 10 (a) building must be so designed and constructed that the following are fulfilled:

- (a) Stairways, ramps and passageways must be such as to provide safe passage for the users of the building.
- (b) Stairways, ramps, floors and balconies, and any roof to which people normally have access, must have bounding walls, balustrades or other barriers where necessary to protect users from the risk of falling.
- (c) Stairways must provide safe and reasonably comfortable dimensions for goings and risers. In any case the *pitch* of the stairway must be maintained within limits of 23° and 42°.
- (d) If any ramp is used the slope must not exceed 1:8.
- (e) A Class 1 building must have provision for fast *exit* during any emergency.

DEEMED-TO-SATISFY PROVISIONS

DD1 CONSTRUCTION OF EXITS

DD1.1 Treads and Risers

- (a) A stairway must be suitable to provide safe passage in relation to the nature, volume and frequency of likely usage.
- (b) A stairway in any building satisfies (a) if it has:
 - (i) not more than 18 risers in each flight
 - (ii) going and riser dimensions in accordance with Figure DD1.1 and Table DD1.1 that are constant throughout each flight
 - (iii) risers which do not have any openings that would allow a 100 mm sphere to pass through between the treads
 - (iv) treads which have a non-slip finish or a suitable non-skid strip near the edge of the nosings
 - (v) treads of solid construction (not mesh or other perforated material) if the stairway connects more than three storeys; and
 - (vi) the tread must not exceed the going by more than 20 mm.

DD1.2 Curved Stairs

Curved stairs must comply with the relevant requirements of DD1.1 as well as the following:

- (a) For the purposes of satisfying Table DD1.1 the going must be measured:
 - (i) along half way across the width of the stair where the clear width is less than 900 mm; and
 - (ii) 300 mm from each side of the stair where the clear width is 900 mm or more.
- (b) All steps must have the same uniform taper.
- (c) The going at the narrow end of the steps must be not less than 75 mm.
- (d) Winders are not permitted.

Figure DD1.1 - Measurement of Riser Going and Tread

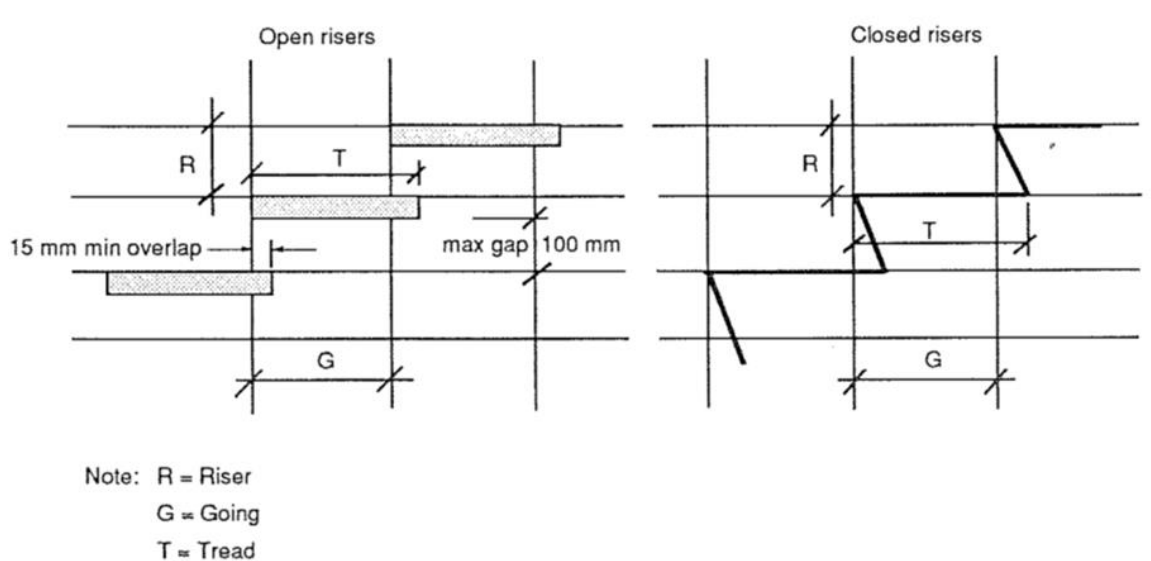


Table DD1.1 Riser Dimensions (mm) to Match Going

GOING (mm)											
Pitch	230	240	250	260	270	280	290	300	310	320	330
42°											
41°	200										
40°	192	200									
39°	186	194	200								
38°	180	187	195	200							
37°	173	181	188	196	200						
36°	167	174	182	188	196	200					
35°	161	168	175	182	189	195	200				
34°	155	162	168	175	182	188	195	200			
33°	149	156	162	169	175	181	188	195	200		
32°		144	156	162	168	174	181	187	194	200	
31°			150	156	162	167	174	180	186	192	198
30°				150	156	161	167	173	179	185	190
29°					150	155	161	167	173	179	183
28°						150	155	160	165	170	175
27°							148	153	158	163	168
26°								146	151	156	161
25°										149	154
24°											147

Note:

Actual riser dimension may be selected to suit the inter-landing height. However the value of the riser dimension must not be outside the maximum or minimum dimensions shown for each value of going.

DD1.3 Balustrades

- (a) A continuous balustrade must be provided along the side of any stairway or ramp, or any corridor, hallway, balcony, bridge or the like, if -
- (i) it is not bounded by a wall; and
 - (ii) the change in level is more than 1 m
- (b) A balustrade must prevent, as far as practicable -
- (i) children climbing over or through it
 - (ii) persons accidentally falling from the floor; and
 - (iii) objects which might strike a person at a lower level accidentally falling from the floor surface.
- (c) At balconies a balustrade satisfies (b) if -
- (i) it has a height of not less than 930 mm above the balcony floor
 - (ii) the space between balusters or the width of any opening in the balustrade is not more than 100 mm except where the space between the rails or the height of the opening is not more than 100 mm
 - (iii) all parts of the balustrade more than 150 mm and less than 760 mm from the floor or nosings are vertical or otherwise do not provide a toe-hold; and

- (iv) it does not have any openings more than 100 mm wide within 150 mm of the floor level.
- (d) In stairways and ramps (including access bridges and landings) a balustrade satisfies (b) if -
 - (i) it has a height of not less than 865 mm above the nosings of the stair treads and the floor of the landing, balcony, corridor, hallway, access bridge or the like
 - (ii) the space between balusters or the width of any opening in the balustrade (including any openable window or panel) is not more than 100 mm except where the space between rails or the height of the opening is not more than 100 mm; and
 - (iii) all parts of the balustrade more than 150 mm and less than 760 mm from the floor or nosings are vertical or otherwise do not provide a toe-hold.

DD1.4 Parapets on Flat Roofs

Where a flat roof or other elevated place has regular access a parapet or balustrade of not less than 1 m height above the surface of the roof or elevated place must be provided. The width of any opening in the parapet or balustrade must not exceed 100 mm.

DD1.5 Number of Exits

Every Class 1 building must have two *exits*. At least one of these *exits* must provide an easy means of egress in case of any emergency without reducing security to the building. Such emergency *exits* may take the form of a trap door on an elevated floor or some such arrangement. *Windows* and other such openings used as emergency *exits* must have a minimum clear dimension of 560 mm and a minimum clear area of opening of 0.6 m². The shutter must be capable of opening to 90° to the wall. The top of the *window* sill must be no more than 900 mm from the floor inside. The height of the *window* sill from the ground or floor outside must not exceed 1800 mm.

DD1.6 Ramp in Exits

A ramp may be used in place of a stairway. The gradient of any such ramp must be no steeper than 1:8.

DD1.7 Dimensions of Exits

The clear minimum width of a stairway or ramp must be 760 mm. The unobstructed height throughout must be not less than 2m.

DD2 ACCESS FOR PEOPLE WITH DISABILITIES

DD2.1 Access to Buildings

While for Class 1, 2, 4 and 10 buildings it is not mandatory to provide access for people with disabilities., note should be taken of the guidelines set out in the Australian Department of Foreign Affairs (DFAT): Accessibility Design Guide: Universal Design principles for Australia's Aid Program – Annex E; Housing - (Available free of charge DFAT website).

If the occupants require disabled access, or the building is to be future-proofed to allow disabled access, access requirements shall be as per Section ND3 of the Building Code.

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DE**

ELECTRICITY

Performance Requirements

Deemed-to-Satisfy Provisions

DE1 Electrical Safety

DE2 Amenity

SECTION DE ELECTRICITY

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

DE1 Electrical Safety

DE1.1 General requirements

DE1.2 Plug sockets

DE1.3 Photovoltaic energy systems

DE2 Amenity

DE2.1 Light switch layout

PERFORMANCE REQUIREMENTS

OBJECTIVES

All electrical work associated with a Class 1 or 10 building must meet the following objectives -

DEP1 Electrical Safety

It must prevent electrocution, burns or fire.

DEP2 Amenity

It must satisfy the reasonable expectations of the occupants by ensuring that it is adequate for their intended use, both current and anticipated.

REQUIRED REFORMANCE

DEP1.1 Electrical Safety

The supply system must:

- (a) have suitable devices of adequate interruptive duty to automatically shut off the supply in the event of a fault or overload. Such devices must allow easy reinstatement of the supply after interruption;
- (b) have devices which are clearly identified and easily reached to isolate live parts from the incoming supply;
- (c) when the neutral of the supply is earthed, have socket outlet or plug - socket adaptor construction which would ensure that the live, neutral and earth conductors can only be connected to the corresponding live, neutral and earth conductors of the plug;
- (d) be adequately protected against damage arising from exposure to weather, water or excessive dampness mechanical loads and other such agents expected under normal conditions of use; and
- (e) ensure that the main switch is normally accessible only to the occupants.

DEP2.1 Amenity

The supply system must have an adequate number of plug sockets of minimum 10 Amperes capacity to serve the reasonable anticipated needs of the occupants.

DEEMED-TO-SATISFY PROVISIONS

DE1 ELECTRICAL SAFETY

DE1.1 General Requirements

All electrical wiring and installations in or on any class 1 and 10 building must ensure safety from electric shock and fire. This requirement is satisfied if all electrical work associated with the building is done to comply with AS/NZS 3000 - Electrical installations - buildings, structures and premises (known as the SAA Wiring Rules). The capacity of the system must allow for the long term anticipated requirements of the occupants.

Prior to the liveing of any electrical system, the systems shall be reviewed and certified as being compliant with the relevant standards by an appropriately qualified electrician. A **Certificate of Compliance** shall accompany application for **Code Compliance Certification**.

DE1.2 Plug sockets

Plug sockets must:

- (a) have their individual switch;
- (b) be located so that -
 - (i) cords need not be taken across doorways;
 - (ii) trailing cords do not have to cross circulation routes;
- (c) not be located behind door-swings; and
- (d) in the kitchen be located 250 mm above worktops at the back of benches or on a return wall where it exists.

DE1.3 Photovoltaic Energy Systems

All photovoltaic energy systems shall fully comply with the requirements of AS/NZS 5033. Photovoltaic panel systems shall be fixed to the main structure of the building. Fixings shall be designed in accordance with the requirements of Section B – Structure.

DE2 AMENITY

DE2.1 Light Switch Layout

The layout of light switches must follow the main night-time circulation routes such as from the entrance hall to the living area to the bed-rooms to the bathroom and toilet. Crossing any major space in the dark must be avoided. The switches must be located close to door openings.

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DF**

HEALTH AND AMENITY

Performance Requirements

Deemed-to-Satisfy Provisions

- DF1 Damp and Weatherproofing
- DF2 Cooking and Sanitary Facilities
- DF3 Room Sizes and Heights
- DF4 Light and Ventilation
- DF5 Water Supply Plumbing
- DF6 Sanitary Plumbing and Drainage
- DF7 Roof Drainage

SECTION DF HEALTH AND AMENITY

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

DF1 Damp and Weatherproofing

- DF1.1 *Site drainage*
- DF1.2 Building on land subject to dampness
- DF1.3 Drainage of land external to building
- DF1.4 Weatherproofing of roofs and walls
- DF1.5 Pliable roof sarking
- DF1.6 Water proofing of wet areas in bldgs.
- DF1.7 Damp-proof courses and mortars
- DF1.8 Acceptable damp-proof courses
- DF1.9 Damp-proofing of floors on the ground

DF2 Cooking and Sanitary Facilities

- DF2.1 Facilities *required*

DF3 Room Sizes and Heights

- DF3.1 Height of rooms
- DF3.2 Reduced height permissible
- DF3.3 Ceiling fans

DF4 Light and Ventilation

- DF4.1 Provision of natural light
- DF4.2 Methods and extent of natural lighting
- DF4.3 Natural light borrowed from adjoining room
- DF4.4 Artificial lighting
- DF4.5 Ventilation of rooms
- DF4.6 Natural ventilation
- DF4.7 Ventilation borrowed from adjoining room

- DF4.8 Restriction on position of WCs and urinals

- DF4.9 Airlocks

- DF4.10 Sub-floor ventilation

DF5 Water Supply Plumbing

- DF5.1 General requirements
- DF5.2 Means of compliance
- DF5.3 Pipes which are not easy to access
- DF5.4 Access to domestic-type water heaters
- DF5.5 Rainwater storage

DF6 Sanitary Plumbing and Drainage

- DF6.1 General
- DF6.2 Means of compliance
- DF6.3 Fixture unit ratings
- DF6.4 Trapping of fixtures and appliances
- DF6.5 Fixture discharge pipes
- DF6.6 Unvented branch drains
- DF6.7 Venting
- DF6.8 Design of pipes and drains
- DF6.9 Gully traps other than floor waste gullies
- DF6.10 Floor waste gullies
- DF6.11 Inspection openings

DF7 Roof Drainage

- DF7.1 Roof Drainage

PERFORMANCE REQUIREMENTS

OBJECTIVES

DFP1 Design and Construction

The design and construction of a Class 1 building must meet the following objectives:

- (a) freedom from unhealthy and uncomfortable damp and wet conditions
- (b) proper facilities for the preparation and cooking of food and the cleaning of utensils
- (c) adequate facilities for personal washing and the washing of clothes
- (d) hygienic toilet facilities with adequate privacy and which will not be a nuisance to anyone
- (e) sufficient living space for privacy and comfort
- (f) adequate light and ventilation consistent with the requirements of health hygiene and comfort
- (g) where a public or private water supply exists, an appropriate safe and hygienic system of plumbing for the supply of water for domestic needs
- (h) where a reticulated system of water supply is installed in the building, an appropriate system of drainage for the hygienic conveyance of *sewage* and *waste water*
- (i) where a roof drainage system is provided, it must give reasonable protection against the overflow of rainwater into the building; and
- (j) unhealthy pending of water in the allotment must not be allowed and the erection of the building or any *alteration* to it must not adversely affect the drainage of other allotments or of any public land.

REQUIRED PERFORMANCE

DFP 1.1 Damp and Weatherproofing

Buildings must be so *sited* and suitable damp and weatherproofing provided where necessary to prevent:

- (a) moisture or damp affecting the stability of the building
- (b) the creation of any unhealthy or dangerous condition
- (c) damage or defacement from moisture present at the completion of construction
- (d) causing undue damage to adjoining property; or
- (e) the accumulation of surface water against the building or beneath the floor.

DFP1.2 Cooking and Sanitary Facilities

Adequate cooking toilet and washing facilities must be provided for the occupants to allow reasonable comfort, hygiene and privacy.

DFP1.3 Room Sizes

The *floor area*, plan dimensions and ceiling heights of rooms and other spaces must be adequate for living purposes.

DFP1.4 Light and Ventilation

The standard of light and ventilation within a budding must be adequate for the occupants, having regard to health hygiene and comfort.

DFP1.5 Water Supply Plumbing

Plumbing for water supply must use materials which do not react with the water and thereby make it unsuitable for domestic use. Suitable precautions must be taken to ensure that unsafe or unhygienic materials have no chance of entering the supply system. The installation of hot water systems must not impair the safety of the users. All concealed and difficult-to-access plumbing work must be suitably protected so that there is no likelihood of damage and leakage. The plumbing must take into account the current and anticipated needs of the users and allow for the simultaneous use of the connected system by others. Where rainwater from the roof run off is the source of supply care must be exercised to ensure that there is no reasonable chance for the water to become contaminated. Allowance must be made for lean years of rainfall.

DFP1.6 Sanitary Plumbing and Drainage

Sanitary plumbing must be laid to self-cleansing grades consistent with their discharge loading, unless other suitable arrangements are made to ensure that the system is kept free of the accretion of *sewage* and other waste matter. The size of *drains* and the layout of their connections must reasonably ensure the current and anticipated needs of the users. The connections to sanitary installations must ensure that foul gases are not allowed to produce unhygienic conditions nor create any nuisance to anyone and are suitably vented.

DFP1.7 Roof Drainage

The roof drainage system must be capable of handling peak intensities of rainfall as follows:

- (a) Eaves gutters and downpipes - a 20-year return intensity.
- (b) Internal box gutters, valley gutters and downpipes - a 100-year return intensity.

Any known local variation in rainfall intensity must be taken into account. Sufficient allowance must be made for the possibility of overflow into the building due to ripples and turbulence in the flowing water during cyclonic winds.

DFP1.8 Site Drainage

The immediate *site* around the building must have suitable drainage so that no ponding results. Visible water must not be allowed to remain under or around for more than 1 hour after 10 minutes of maximum rainfall resulting from a storm with a return period of 5 years. Flood waters or waves resulting from a storm or cyclone with a return period of 30 years must not be allowed to enter a building.

DEEMED-TO-SATISFY PROVISIONS

DF1 DAMP AND WEATHERPROOFING

DF1.1 Site Drainage

The construction of a *site* drainage system, including overflows, and the position and manner of discharge of a stormwater *drain* must not:

- (a) result in the entry of water into any building or other allotments
- (b) affect the stability of any building; or
- (c) create any unhealthy or dangerous condition within or around any building.

DF1.2 Building on Land Subject to Dampness

One or more of the following measures must be carried out if it is warranted by the dampness of the building *site*:

- (a) The subsoil must be adequately drained.
- (b) The ground under the building must be regraded or filled and provided with outlets to prevent accumulation of water.
- (c) The surface of the ground under the building must be covered with a suitable damp-resisting material.

DF1.3 Drainage of Land External to Building

A suitable system of drainage must be provided if paving, excavation or any other work on an allotment will cause undue interference with the existing drainage of rainwater falling on the allotment whether the existing drainage is natural or otherwise.

DF1.4 Weatherproofing of Roofs and Walls

Roofs and *external walls* must be constructed to prevent rain or dampness penetrating to the inner parts of a building.

DF1.5 Pliable Roof Sarking

Pliable roof sarking - type material used under roof or wall coverings must comply with AS/NZS 4200.1.

DF1.6 Water Proofing of Wet Areas in Buildings

The following parts of a building must be impervious to water:

- (a) In any building - the floor surface or substrate in a shower enclosure, or within 1.5 m measured horizontally from a point vertically below the shower fitting if there is no enclosure.
- (b) The wall surface or substrate -
 - (i) of a shower enclosure, or if the shower is not enclosed, within 1.5 m and exposed to a shower fitting, to a height of 1.8 m above the floor
 - (ii) immediately adjacent or behind a bath, trough, basin, sink, or similar fixture, to a height of 300 mm above the fixture if it is within 75 mm of the wall.

The junction between the floor and wall if the wall and floor are *required* to be impervious to water.

- (c) The junction between the wall and fixture if the wall is *required* to be impervious to water.

DE1.7 Damp-proof Courses and Mortars

Moisture from the ground must be prevented from reaching:

- (a) the lowest floor timbers and the walls above the lowest floor joists
- (b) the walls above the damp-proof course; and
- (c) the underside of a suspended floor constructed of a material other than timber, and the supporting beams or girders.

DF1.8 Acceptable Damp-proof Courses

A damp-proof course must consist of:

- (a) a material that complies with AS/NZS 2904; or
- (b) suitable termite shields placed on piers; or
- (c) other suitable material.

DF1.9 Damp-proofing of Floors on the Ground

If a floor of a room is laid on the ground or on filling moisture from the ground must be prevented from reaching the upper surface of the floor and adjacent walls by:

- (a) the insertion of a vapour barrier in accordance with AS 2870 or
 - (b) other suitable means.
-

DF2 COOKING AND SANITARY FACILITIES

DF2.1 Facilities Required

Cooking and sanitary facilities must be provided as shown in Table DF2.1

Table DF2.1 Provision of Cooking and Sanitary Provisions

Minimum facilities required	
In all cases	a) facilities for the preparation and cooking of food, and for the cleaning of utensils
When there is piped water supply to kitchen and ablution areas	b) a kitchen sink in a kitchen c) a shower or other adequate personal washing facilities d) clothes washing facilities e) a closet pan and facilities for washing hands
Where there is piped water supply only to a tap in the kitchen or up to a stand-pipe in the vicinity of the building or where there is no piped water supply	f) a paved raised platform with a paved area and drain around it g) a suitable type of privy as per specification DF2.1
NOTE: i) If any of these facilities are detached from the main building, they must be set aside for the exclusive use of the occupants of the building. ii) Where the layout allows it, facilities in c), (d) and e) can be in the same room.	

DF3 ROOM SIZES AND HEIGHTS

DF3.1 Height of Rooms

Minimum heights between the ceiling and any framing excluding minor projections such as cornices, are:

- (a) Habitable room – average 2.4 and minimum of 2.1, and
- (b) Bathroom, shower room, water closet, laundry, pantry or the like – 2.1m.

DF3.2 Reduced Height Permissible

These heights may be reduced if the reduction does not unduly interfere with the proper functioning of the room.

DF3.3 Ceiling Fans

Ceiling fans and other such appliances must be at a minimum vertical clearance of 2.1m.

DF 4 LIGHT AND VENTILATION

DF4.1 Provision of Natural Light

Natural lighting must be provided to all *habitable rooms*.

DF4.2 Methods and Extent of Natural Lighting

Direct natural lighting must be provided by *windows* that:

- (a) have an aggregate light transmitting area measured excluding framing members, glazing bars or other obstructions of not less than 10% of the floor area of the room face -
 - (i) a court or other space open to the sky; or
 - (ii) an open verandah, open carport, or the like,

are not less than a horizontal distance of 1 m from any boundary of an adjoining allotment that they face.

DF4.3 Natural Light Borrowed from Adjoining Room

Natural lighting to a room may come through a glazed panel or opening from an adjoining room (including an enclosed verandah) if:

- (a) the glazed panel or opening has an area of not less than 10% of the floor area of the room to which it provides light
- (b) the adjoining room has windows with an aggregate light transmitting area of not less than 10% of the combined floor areas of both rooms,

and the areas specified in (a) and (b) may be reduced as appropriate if direct natural light is provided from another source.

DF4.4 Artificial Lighting

Artificial lighting must be provided to *sanitary compartments*, bathrooms, shower rooms, airlock and laundries, if natural lighting of a standard equivalent to that *required* by DF4.2 is not available and the periods of occupation, or use of the room or space will create undue hazard to occupants seeking egress in an emergency.

DF4.5 Ventilation of Rooms

A *habitable room*, *sanitary compartment*, bathroom, shower room, laundry and any other room occupied by a person for any purpose must be provided with natural ventilation complying with DF4.6. Where it is not practical to provide natural ventilation for any *sanitary compartment*, bathroom, shower or laundry, it is permissible to substitute natural ventilation with a mechanical ventilation system. In such a case the system must satisfy the requirements of AS 1668:2.

DF4.6 Natural Ventilation

Required natural ventilation must be provided by permanent windows, openings, doors or other devices:

- (a) with an aggregate opening or openable size not less than 10% of the *floor area* of the room *required* to be ventilated; and
- (b) which open to –
 - (i) a court, or space open to the sky; or
 - (ii) an open verandah, open carport, or the like.

DF4.7 Ventilation Borrowed from Adjoining Room

Natural ventilation to a room may come through a *window*, opening, ventilating door or other device from an adjoining room (including an enclosed verandah) if:

- (a) the room to be ventilated or from which ventilation is borrowed is not a *sanitary compartment*
- (b) ventilation is not borrowed from one bedroom to another or between a bedroom and the kitchen
- (c) the *window*, opening, door or other device has a ventilating area of not less than 10% of the *floor area* of the room to be ventilated; and
- (d) the adjoining room has a *window*, opening, door or other device with a ventilating area of not less than 10% of the combined *floor areas* of both rooms.

Note: The ventilating areas specified may be reduced as appropriate if direct natural ventilation is provided from another source.

DF4.8 Restriction on Position of WCs and Urinals

A room containing a closet pan or urinal must not open directly into:

- (a) a kitchen; or
- (b) a room for storage or consumption of food, except if it is in a building containing only one *habitable room*.

DF4.9 Airlocks

If a room containing a closet pan or urinal is prohibited under DF4.8 from opening directly to another room:

- (a) access must be by an airlock, hallway or other room; or
- (b) the room containing the closet pan or urinal must be provided with an exhaust fan.

DF4.10 Sub-floor Ventilation

- (a) Suitable provision must be made to prevent undue deterioration of the lowest floor of a building because of dampness, other conditions on the allotment or the design of the building.
- (b) The following would satisfy the requirements of (a) -
 - (i) where timber is used, the floor framing must be suspended with an absolute minimum of 250 mm and an average minimum of 400 mm clearance from the ground underneath, to the floor and the immediate surrounds of the building. The average clearance must be determined as the average of the clearances at the corners of a 3 m square grid covering the building plan. Subfloor ventilation must be provided with ventilation openings totalling not less than 3% of the peripheral vertical area between the ground and the boundary of the floor. These openings are to be spaced uniformly at not more than 1.8 m apart,
 - (ii) where other than timber is used the following must be provided -
 - subfloor ventilation if the floor is suspended
 - an impervious cover over the ground surface beneath the building; or
 - the floor members suitably treated.

DF5 WATERSUPPLY PLUMBING

DF5.1 General Requirements

The plumbing work for water supply must ensure:

- (a) the appropriateness of the materials and products used
- (b) the correct sizing of water services for the intended use
- (c) the control of cross-connections and prevention of backflow
- (d) adequate care in the installation of the services
- (e) suitable provision of main and subsidiary storage as *required*
- (f) adequate connections to sanitary services without endangering health and hygiene; and
- (g) that the installation of hot water systems provides safe and adequate service.

DF5.2 Means of Compliance

The requirements of DF5.1 are satisfied if all plumbing for water supply is carried out to the relevant provisions of:

- (a) AS/NZS 3500 Part 1 - Water Services and its amendments
- (b) AS/NZS 3500 Part 4 – Heated Water Services and its amendments
- (c) AS/NZS 2845.1 Water Supply Backflow Prevention Devices – Part 1: Materials, Design and Performance Requirements and its amendments.

DF5.3 Pipes which are not Easy to Access

Particular attention is drawn to the provisions in AS 3500 - Parts 1 and 4 which prohibit the installation of pipes and fittings of certain materials in locations which are concealed or difficult to access. These include pipes made of ABS, galvanised steel, polybutylene and UPVC. Pipes and fittings made of copper, copper alloy, stainless steel, ductile iron, cast iron and polyethylene when used in concealed or difficult to access locations must follow the special precautions specified in AS 3500 - Parts 1 and 4.

DF5.4 Access to Domestic-type Water Heaters

A household water heater which is installed in a building must:

- (a) be supported on construction sufficient to carry its full capacity weight and braced against any possible wind or earthquake loads
- (b) be positioned to enable adequate access for operation, maintenance and removal; and
- (c) provide suitably for any overflow, especially if installed in a concealed location.

AS 3500 - Part 4 is the relevant standard for the installation of a household water heater.

DF5.5 Rainwater Storage

Where rainwater is collected and stored, the storage and distribution must reasonably ensure that the water is not contaminated by unsafe or unsuitable materials. The capacity of the catchment and storage must be adequate to provide a continued supply of water during years of low rainfall.

For more information on rainwater storage systems refer to the Solomon Islands Building Manual.

DF6 SANITARY PLUMBING AND DRAINAGE

DF6.1 General

DF6.1.1 Requirements

Sanitary plumbing and drainage must ensure:

- (a) the appropriateness of the products and materials used
- (b) the correct sizing of drainage services for the intended use
- (c) adequate care in the installation of the services including the provision of appropriate grades; and
- (d) that foul gases are not allowed to produce unhygienic conditions or any nuisance to anyone.

DF6.1.2 Some Common Terms

Apart from the defined terms given in A1.1 the following terms used in this Section are explained:

- (a) Nominal size (DN)

While converting to metric dimensions some manufacturers of pipes and fittings have used hard conversion whereas others have used soft conversion. For these and other reasons it is impractical to specify exact pipe and fitting dimensions. All pipes and fittings in this Section are therefore specified by their nominal size. This is indicated by the letters "DN" followed by a number.

Since this number is only an approximation of the actual size, it is not subject to exact measurement and must not be used in calculations. The nominal size is thus only a numerical designation of the size which is common to all components in a piping system (other than components such as steel tubes which are designated by their outside diameter and other components by their thread size). It is just a convenient round number for reference purposes and is only loosely related to the manufacturing dimensions.

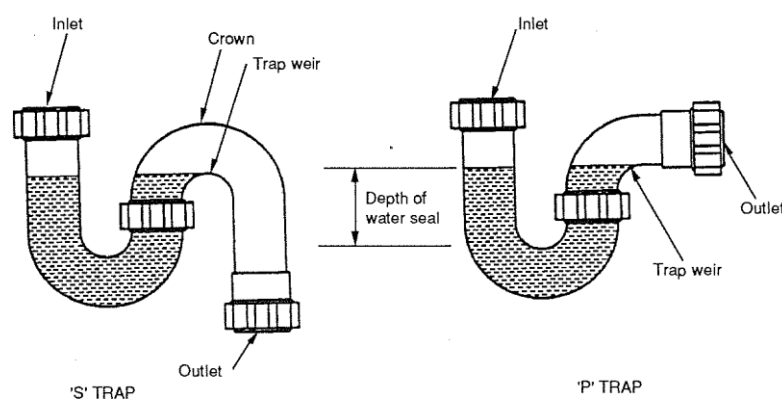
- (b) Trap

A trap is a device which retains a water seal for preventing the escape of sewer gases from sanitary plumbing. Figure DF6.1.2 shows two common types of fixture traps. There are also traps integral with gullies, water closet pans etc.

The water seal can be broken by self-siphonage or induced siphonage as well as by positive pressure of the gases breaking through the seal. It is also possible for the seal to be dried out by prolonged non-use of the associated part of the system.

The best means of preventing the loss of the seal by siphonage or by positive pressure is to vent the trap to the outside air. Air admittance valves (AAV's) may be used where atmospheric venting of a trap cannot be achieved.

Figure DF6.1.2 - Examples of Fixture Traps



(c) Fixture discharge pipe

This is the discharge pipe to which any single sanitary fixture is connected.

(d) Gullies

A gully is an assembly used for providing a water seal when handling the discharge from only *waste fixtures* and not any *soil fixture*. The water seal prevents the escape of foul gases into the building or into the atmosphere in the vicinity of the assembly.

It is a disconnector gully when it provides a separation through the water seal, between the discharge from *waste fixtures* and the rest of the sanitary system.

A floor waste gully is a disconnector gully used inside a building with a floor grating or waste outlet fitting on a riser pipe. Discharge pipes from *waste fixtures* may also connect to a floor waste gully.

An overflow relief gully functions as a self-cleaning trap and is provided with a loosely fitted grating. This allows for the relief of any possible surcharge or overflow from the *drain*. The riser of the gully may have inlets for discharge from *waste fixtures*.

DF6.2 Means of Compliance

The requirements of DF6.1.1 are satisfied if all sanitary plumbing and drainage works are carried out to the relevant provisions of AS 3500 - Part 2 - Sanitary plumbing and drainage and its amendments, as well as this part of the Code.

DF6.3 Fixture Unit Ratings

In the design of discharge pipes and *drains* the *fixture unit* ratings shown in Table DF6.3 must be used. For the fixtures listed in the Table the maximum unvented length of the associated fixture discharge pipe must not exceed 2.5 m except that this may be 6 m for a water closet pan with a DN100 trap and discharge pipe. The length of the pipe is measured along the centre line from the weir of the trap to the point of connection to a graded discharge pipe, *drain*, *stack* or other drainage trap.

Table DF6.3 - Fixture Unit Ratings

Fixture	Nominal size of trap outlet and fixture discharge pipe	Fixture unit rating
Basin	DN32 or DN40	1
Bath (with or without shower)	DN40	4
Bidet	DN40	1
* Clothes washing machine	DN40	5
* Dishwashing machine	DN40	3
Floor waste gully:		
– without fixture	DN50	0
– with fixture	DN40 or DN 50	as per fixture rating
Laundry trough	DN40 or DN 50	5
Shower	DN40 or DN50	2
Sink:		
– less than 45 litres	DN40	2
– more than 45 litres	DN50	3
Water closet pan	DN80 or DN100	5

- * (i) When a clothes washing machine connects to a trough trap, only the trough unit fixture rating is considered.
- (ii) When a dishwashing machine connects to a sink trap only the sink *fixture unit* rating is considered.

DF6.4 Trapping of Fixtures and Appliances

DF6.4.1 The discharge from all sanitary fixtures and appliances must pass through traps before entering the drain, soil/pipe or waste pipe. The fixture trap must retain a water seal of:

- (a) 50 mm for traps of size DN50 or less
- (b) 75 mm for traps of size greater than DN50.

The traps must be located as close as possible to the fixture and not farther than 600 mm from the fixture outlet, except in case of permitted fixture pairs and floor waste gullies.

DF6.4.2 The following fixtures may be connected in pairs to a single fixture trap:

- (a) Wash basins
- (b) Sinks
- (c) Laundry troughs
- (d) Showers

The fixture pairs must be connected so that the centre to centre distance between their outlets is no more than 1.2 m.

DF6.5 Fixture Discharge Pipes

DF6.5.1 Minimum grades

Discharge pipes must be laid to the minimum grades shown in Table DF6.5.1

Table DF6.5.1 Minimum Grades of Discharge Pipes

Nominal size	Minimum grade
DN32	1 in 30
DN40	1 in 40
DN65	1 in 40
DN80	1 in 60
DN100	1 in 60

DF6.5.2 Connections

The connection of any fixture discharge pipe to a graded discharge pipe or between two graded discharge pipes must be made as follows:

- (a) With 450 or sweep junction fittings

Where the pipes are of different sizes -

- (i) the soffits of both must be in continuous alignment, and
- (ii) where an unequal junction fitting is used the soffit of the branch pipe must be at the same level or higher than the soffit of the pipe to which it connects; and

The level of the trap or floor waste gully weir must be at a higher level than the soffit of the graded discharge pipe to which it connects.

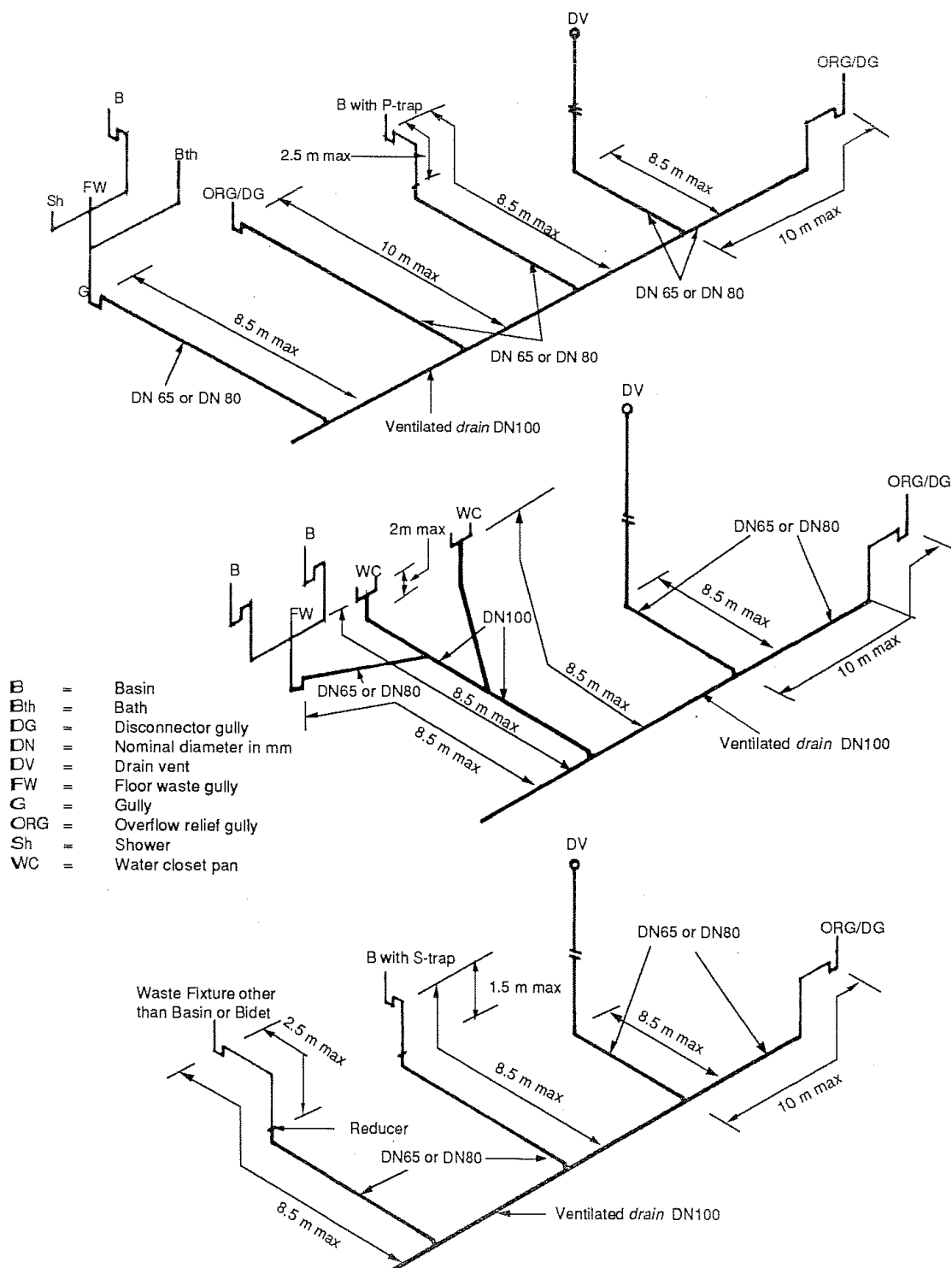
DF6.5.3 Cleaning Eyes

Fixture discharge pipes must have accessible cleaning eyes at all bends.

DF6.6 Unvented Branch Drains

Where the risk of escape of dangerous and unpleasant gases into occupied premises is minimal the venting of branch drains is not required. However, all of the limitations given in the following sub-clauses and illustrated in Figure DF6.6 must be met in such cases. (For limitation of length of fixture discharge pipes, see DF6.3.)

Figure DF6.6 - Limitations on Unvented Branch Drains



DF6.6.1 Limitations on Location or Nature of Connection

- (a) The connection of any unvented branch *drain* to a vented *drain* must be located at the ground floor level and the vented *drain* installed on grade below or above ground
- (b) In the case of an unvented *drain* receiving discharge from only *waste fixtures*, it must connect to a gully
- (c) An unvented drain other than in (b) must conned to a disconnector gully; or
- (d) The connection must be from a discharge pipe serving a single fixture and the length of the discharge pipe is -
 - (i) less than 3.5 m when serving a waste fixture; or
 - (ii) less than 3.0 m when serving a soil fixture.

DF6.6.2 Limitations on size, length and bends

- (a) The size of any unvented branch drain must comply with the limitations given in Table DF6.6.2

Table DF 6.6.2 - Size of Unvented Branch Drains

Nominal size	Maximum sum of fixture unit loadings discharging into the branch drain
DN65	5 (but not from a water closet pan) or 8 from one floor waste gully
DN80	12 (but not from a water closet pan)
DN100	30 (no more than 2 water closet pan connected)

- (b) The length of an unvented branch drain together with that of the fixture discharge pipe must not exceed:
 - (i) 8.5 m from the weir of the fixture trap
 - (ii) 10 m to a disconnector gully; and
 - (iii) 2.5 m from the reducer to the weir of the trap, where the fixture discharge pipe is of smaller size than the unvented branch drain.
- (c) The maximum vertical drop from the crown of the trap to the top of the vented drain to which the unvented branch drain connects must not exceed:
 - (i) 1.5 m in the case of basins and bidets; and
 - (ii) 2.5 m in the case of all other fixtures.
- (d) The total combined number of long bends in a fixture discharge pipe and branch drain, up to the connection with a vented drain must be limited to:
 - (i) 2 horizontal and 2 vertical with basins and bidets; and
 - (ii) 2 horizontal and 3 vertical with all other fixtures. The distance between any adjacent horizontal bends must be not less than 300 mm and the vertical drop between two adjacent vertical bends must not exceed 2 m.

Note: A bend of 45° or less is not considered to be a bend for the purposes of this clause.

DF6.7 Venting

In order to prevent the escape of dangerous and unpleasant gases into occupied premises and to ensure that water seals in traps are not destroyed by siphonage, adequate venting must be provided for all fixture discharge pipes and drains except as allowed by DF6.6.

DF6.7.1 Trap Vents

The minimum size of a trap vent must be related to the nominal size of the fixture trap as follows:

Size of fixture trap	Size of trap vent
DN32 or DN40	DN32
DN50 to DN100	DN40

Every trap vent must be extended upward at least 50 mm above the flood level rim of the fixture. This may be accomplished in one of the following ways:

- (a) As a vertical vent to open air, the outlet of which is no closer than 900 mm from any opening to the building
- (b) On an ascending grade of at least 1: 80 and then -
 - (iii) as a vertical vent to the open air; or
 - (iv) to a connection with a vertical or branch vent.
- (c) Take the vent above the flood level rim of the fixture, then loop it down either vertically or on a downward grade of 1: 80 and connect to a vertical or branch vent.

Trap vents must be located no closer than 75 mm and no farther than 1500 mm from the crown of the trap.

DF6.7.2 Drain Vents

(a) General

Vents in *drains* must be provided -

- (i) at the upstream end of any drain
- (ii) at the upstream end of any branch drain to which a fixture trap or floor waste gully is connected and if the distance from the weir of the trap to the vented drain exceeds 8.5 m
- (iii) at the upstream end of any DN100 branch drain to which 3 or more water closet pans are connected; and
- (iv) at the upstream end of any DN100 branch drain to which no more than 2 water closet pans are connected.

(b) Location

The upstream vent of any *drain* must be connected -

- (i) at or close to the end of the drain; or
- (ii) at the vent extension of a stack located at or near the upstream end of the drain.
- (iii) In either case it is permissible to have an unvented length of drain upstream of the vent connection if the unvented length complies with DF6.6.

(c) Size of vents

The minimum size of an upstream vent of any *drain* is DN50. Subject to this, the vent must be sized by using the ratings given in Table D6.7.2.

Table DF6.7.2 Size and Rating of Drain Vents

Fixture units discharging into drain	Vent rating	Vent size
1 to 10 (incl)	0.5	DN40
10 (excl) to 30 (incl)	1	DN50
30 (excl) to 175 (incl)	2	DN65
175 (excl) to 400 (incl)	3	DN80

When two or more vents are directly connected to the *drain* these can take the place of a single vent provided the sum of their ratings is not less than the rating *required* for venting the *drain*.

DF6.7.3 Termination of Vents

- (a) Vent pipes from waste fixtures discharging into disconnector gullies and from gullies located within buildings must be vented independently and not be interconnected to any other system vent. Such vents must terminate in the open air -
- (i) at a height of at least 50 mm above the overflow level of the associated fixture
 - (ii) at least 900 mm from any opening to the building which is within a horizontal distance of 3 m from the vent; and
 - (iii) not less than 150 mm above its point of penetration through any roof covering.
- (b) Vents other than in (a) must terminate in the open air -
- (i) not less than 600mm above any opening into any building which is within a horizontal distance of 3m from the vent
 - (ii) not less than 150mm above its point of penetration through any roof covering
 - (iii) not less than 3m above any trafficable roof deck which is within a horizontal distance of 3 m from the vent
 - (iv) not less than 2m above or 600 mm below any chimney or similar opening within a horizontal distance of 3m from the vent
 - (v) not less than 5m from any air intake; and
 - (vi) not less than 600mm above any cave, coping or parapet which is within a horizontal distance of 600mm from the vent.

DF6.8 Design of Pipes and Drains**DF6.8.1 Sizing of Discharge Pipes**

Discharge pipes must be not less than the size of the fixture traps to which they are connected. The size must be determined from Table DF6.3 and take into consideration:

- (a) the sum of the *fixture unit* rating of all fixtures connected to the pipe
- (b) the proposed pipe gradient; and
- (c) the maximum *fixture unit* loadings given in Table DF6.8.1

Table DF6.8.1 - Maximum Fixture Unit Loadings for Graded Discharge Pipes

Grade	Nominal pipe size (mm)				
	40	50	65	80	100
1 in 20	6	15	51	65	376
1 in 30	5	10	29	39	248
1 in 40	4	8	21	27	182
1 in 50	x	x	x	20	142
1 in 60	x	x	x	16	115

Note

- i) x indicates that the combination of pipe size and gradient is not permitted.
- ii) Not more than two W.C. pans are to be connected to any DN100 pipe

DF6.8.2 Sizing of Drains

The size of a vented *drain* must be determined by taking into account the total number of *fixture units* (obtained from Table DF6.3) discharging into the *drain*.

- (a) Normal grades

The minimum normal grade of *drains* must be as give in Table DF6.8.2A.

Table DF6.8.2A Minimum Gradient of Drains

Nominal size (mm)	Minimum grade
80	1 in 60
100	1 in 60
125	1 in 80
150	1 in 100

(b) Maximum fixture unit loadings for vented drains

The *fixture unit* loadings for vented *drains* must not exceed the values given in Table DF6.8.2 B for the size and grade of the *drain* shown.

Table DF6.8.2B Maximum Fixture Unit Loadings for Vented Drains

Grade	Nominal pipe size (mm)			
	80	100	125	150
1 in 20	215	515	1450	2920
1 in 30	140	345	1040	2200
1 in 40	100	255	815	1790
1 in 50	76	205	665	1510
1 in 60	61	185	560	1310
1 in 70	50	140	485	1180
1 in 80	42	120	425	1040
1 in 90	x	x	380	935
1 in 100	x	x	340	855
1 in 120	x	x	x	725
1 in 150	x	x	x	595

Note: x indicates that the combination of nominal size and grade is not permitted.

(c) Reduced grades

Where the minimum grades given in Table DF6.8.2A are not achievable *drains* may be laid at the reduced grades given in Table DF6.8.2C. In such a case the minimum *fixture unit* loadings given in the Table must be connected in advance of the top end of the reduced grade. Where even these reduced grades cannot be achieved provision must be made for regular and automatic flushing of the *drain*.

Table DF6.8.2A - Minimum Fixture Unit Loadings for Reduced Grade Drains

Reduced grade	Nominal pipe size (mm)			
	80	100	125	150
	Minimum fixture unit loading			
1 in 70	9	10	See Table DF6.8.2A	
1 in 80	10	18	"	"
1 in 90	x	x	27	"
1 in 100	x	x	38	"
1 in 120	x	x	x	75
1 in 150	x	x	x	160

Note: x means that the grade is not permitted unless special automatic flushing arrangements are made.

A drain must not be oversized for the only purpose of using a lower gradient than the minimum gradient given in Table DF6.8.2A. The size of a drain must not reduce in the direction of flow.

DF6.8.3 Cover Over Drains

- (a) *Drains* must be protected against any mechanical damage and deformation resulting from the loads over them. Adequate cover must be provided to comply with Table DF6.8.3 unless exempted under (b).

Table DF6.8.3 Minimum Depth of Cover Over Drains

Location	Minimum cover from top of pipe socket to ground surface (mm)	
	Pipes of cast iron	Pipes of other materials
Household driveways	300	450
Other locations where no vehicular loadings are expected	Nil	300

- (b) *Where it is not practical to provide the minimum cover to Table DF6.8.3, drains must be covered by a sandy overlay of at least 50 mm and provided with -*
- (i) 75 mm thick concrete paving where light vehicular traffic may be expected; and
 - (ii) 50 mm thick concrete paving at other locations where vehicular traffic is not expected.

The paving must be symmetric to the *drain* alignment and must have a minimum width equal to the depth of the base of the *drain* from the top of the paving plus 300 mm.

DF6.8.4 Drains close to buildings

- (a) Drains under buildings

Where it cannot reasonably be avoided *drains* may be laid below ground under buildings in which case -

- (i) inspection openings must be provided at both ends of the *drain* adjacent to the building; and

- (ii) a minimum of 50 mm of sandy overlay provided over the pipe and below a reinforced concrete floor slab; or
- (iii) the *drain* must be protected from damage.

(b) Proximity of buildings -

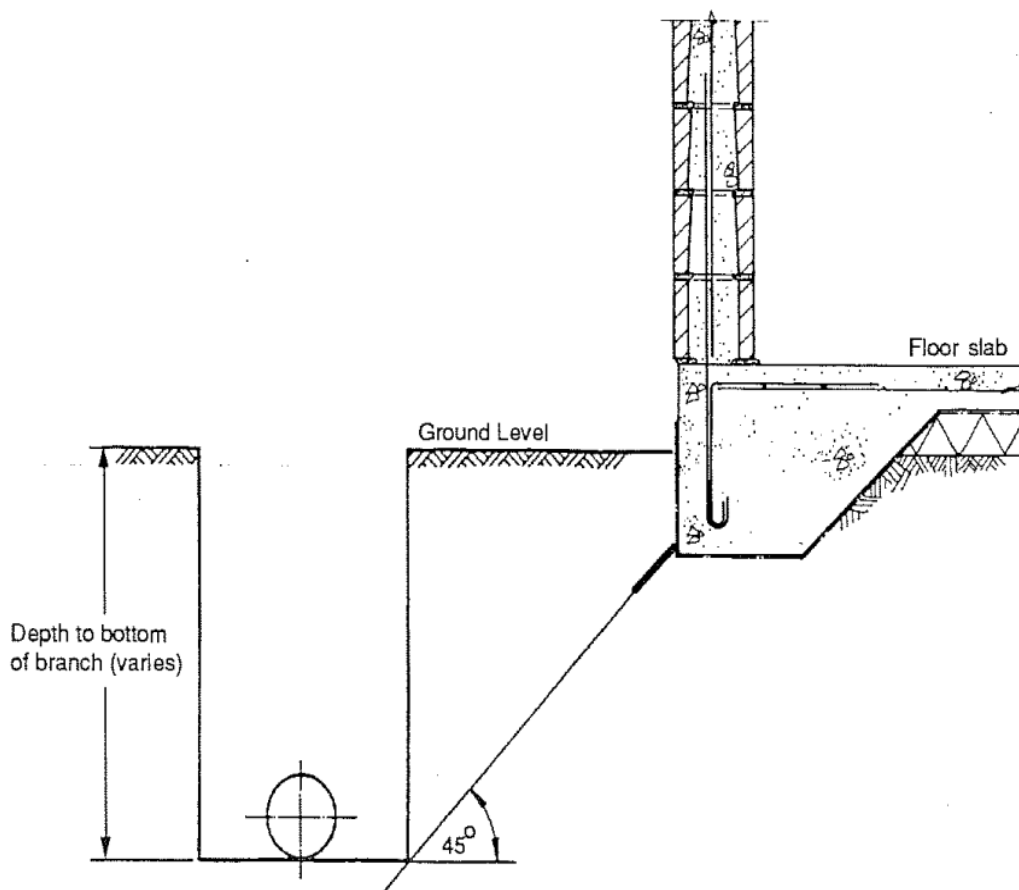
- (i) where a *drain* is to be laid parallel to a footing the excavation for it must clear a line at 45° from the extremity of the footing. (See Figure DF6.8.4)
- (ii) where a *drain* crosses a strip footing, the angle of crossing must be not less than 45° and the top of the *drain* must clear the bottom of the footing by not less than 50 mm

(c) Building over drains -

Where it is not practical to divert *drains* in order to avoid erecting buildings over them –

- (i) the restrictions listed in (a) and (b) must be observed; and
- (ii) other appropriate engineering precautions taken against damage.

Figure DF6.8.4



DF6.9 Gully Traps other than Floor Waste Gullies

Gully traps may be used:

- (a) as overflow relief gullies to provide in the event of sewage surcharge; or
- (b) to provide disconnection between waste discharges and the remainder of the sewerage installation (disconnecter gullies).

DF6.9.1 General

- (a) A gully must be installed such that -
- (i) it is supported on a minimum 75 mm thickness of concrete of 17.5 MPa grade; and
 - (ii) it is protected from damage at floor level by a concrete surround of minimum width and depth of 75 mm.
- (b) The following discharges must not be allowed into a gully -
- (iii) from any *soil fixture*; and
 - (iv) any rain water drainage from the roof or ground.
- (c) The gully must have its water seal maintained from a *waste fixture* or floor waste gully. The maximum length of unvented *waste pipe* discharging into the gully must be 2.5 m from basins or bidets, 6 m from all other waste gullies and fixtures with DN50 or smaller pipes, and 8.5 m from floor waste gullies and fixtures with DN65 or larger pipes.

DF6.9.2 Overflow Relief Gullies

At least one overflow relief gully must be installed in a *drain* which is connected to a public sewer.

(a) Size

The size of the overflow relief gully is related to the size of the main *drain*. For a size of main *drain* of DN80 the gully must also be DN80. For main *drains* of DN100 to 150 size, the gully must be DN100.

(b) Location

An overflow relief gully must be located within the property, external to the building, as far as practicable from the downstream end of the *drain*, and so that the top of the gully is accessible and positioned where any overflow can be easily noticed.

(c) Height

A minimum height of 150 mm must be kept between the top of the overflow gully riser and the lowest fixture connected to the *drain*. The point of measurement on fixtures is given in Table DF6.9.2.

Table DF6.9.2 - Point of Measurement of Fixtures for Height Above Overflow Level of Gully

Fixture	Point of measurement
Soil fixture with integral trap	Level of water seal surface
Floor waste gully or shower outlet	Top surface level of grate
Other fixtures	Top surface level of fixture outlet

DF6.9.3 Disconnecter Gully Traps

Where installed within a building these must:

- (a) have the gully riser extend to floor level and be sealed with an airtight removable cover; and
- (b) a DN50 vent pipe must branch from the riser at an upward grade of not less than 1 in 80 and terminate with a grating at an *external wall* of the building above any likely flood level. Alternately the vent pipe can terminate as in DF6.7.3(a). No other fixture or appliance must be connected to the vent pipe.

DF6.10 Floor Waste Gullies

Floor waste gullies are functionally similar to fixture water traps. Shower outlets may be used as floor waste gullies. Any *waste fixture* may be connected to a floor waste gully. No trap is *required* other than for discharge outlets from basins. For other than basins the maximum length of the untrapped *waste pipe* must not exceed 1.2 m. if any of the fixtures is trapped, the maximum length of the *waste pipe* is allowed to be up to 2.5 m. However, the traps must not be vented. With the exception of allowed fixture pairs, each fixture must connect individually with the gully at a grade of not less than 1 in 40.

DF6.10.1 Size

The outlet size of a floor waste gully trap is based on the total *fixture units* of the fixtures and appliances discharging into it. The outlet size must be:

- (a) DN50 for a total fixture unit rating of 3 units or less; and
- (b) DN65 to DN100 for a total fixture unit rating of 10 or less.

A DN50 outlet and a DN50 riser may be used if the sole function of the gully is to dispose of water spillage and wash down water. All other gullies must have a minimum riser size of DN80 at floor level. A floor waste gully must have an accessible, removable grate.

DF6.10.2 Height of Gully Riser

The minimum height of the gully riser from the top of the water seal to the floor surface must comply with Table DF6.10.2. The maximum height must not exceed 600 mm.

Table DF6.10.2 - Minimum Height of Floor Waste Gully Risers

Fixture connected	Minimum height from water	
	Waste pipe entry at 88.5°	Waste pipe entry at 45°
Shower	150	100
Bath (only one)	250	200
Clothes washing machine	300	250
Other waste fixtures	250	150

DF6.10.3 Maintenance of Water Seal

At least one *waste fixture* must be connected to any floor waste gully in order to maintain the water seal. For this reason the minimum depth of water seal must be 65 mm or the values in DF6.4.1, whichever is more.

DF6.11 Inspection Openings

DF6.11.1 General

Inspection openings comprise:

- (a) inspection branches or square *junctions*; or
- (b) inspection chambers.

DF6.11.2 Location

Inspection openings must be provided:

- (a) outside the building on each branch connecting one or more water closet pans
- (b) at intervals of not more than 30 m
- (c) downstream and upstream ends of any section of *drain* that passes under a building
- (d) where any new section of *drain* is connected to an existing *drain*; and
- (e) at the connection to the public sewer.

Appropriate locations are illustrated in Figure DF6.11.2 (overleaf).

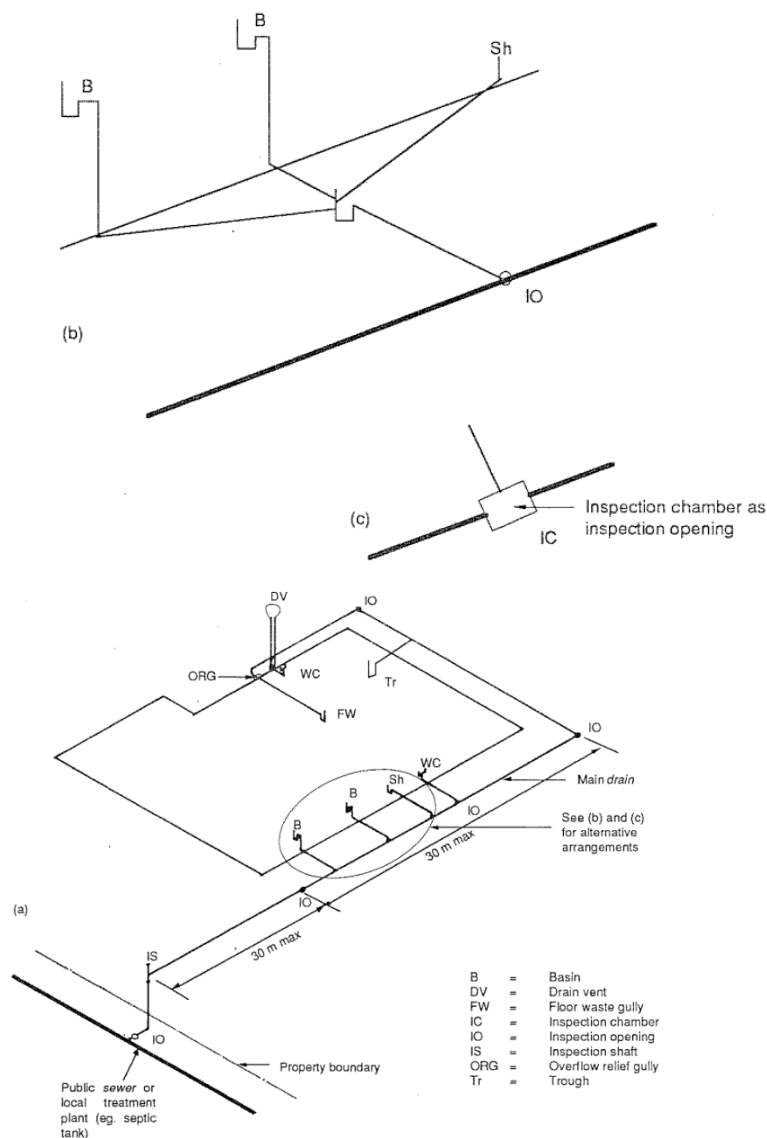
DF 6.11.3 Size

- (a) The size of inspection branches or square junctions must be -
 - (i) The same size as the drain for drains up to DN150; and
 - (ii) Not less than DN150 for larger drains
- (b) The dimensions of inspection chambers must comply with Table DF6.11.3

Table DF 6.11.3 - Size of Inspection Chambers

Minimum internal measurements (mm)			
Depth of floor to chamber	Rectangular		Circular
	Length	Width	Diameter
Less than 600	600	450	600
600 to 900	900	600	900
More than 900	1200	750	1050

Figure DF6.11.2 - Location of Inspection Openings



DF6.11.4 Access for Inspection Branches and Square Junctions

Inspection branches and square *junctions* must be so located that it is possible to use them for inspection and for clearing obstructions in the associated sections of the *drain*. When located inside buildings inspection branches and square *junctions* must have their openings readily accessible. Such openings must have airtight removable caps or plugs with gaskets, rubber rings or such other accessories to maintain tightness. When the caps or plugs are removed for inspection/maintenance, the gasket/rubber ring must be replaced with a new one.

DF6.11.5 Construction of Inspection Chambers**(a) Where required**

An inspection chamber is *required* where an inspection branch or square *junction* -

- (i) cannot accommodate all the convergent *drains*; or
- (ii) will not permit proper inspection or the clearing of obstructions.

(b) Conduits and channels

The conduits in inspection chambers may be open channels of size and shape equal to the associated *drains*. The floor in inspection chambers must slope at a grade of between 1 in 10 and 1 in 15 towards the channel. Any formed *junction* must have a centre line radius of not less than 300 mm. A fall of at least 30 mm must be provided in the invert of any channel that curves through 45° or more.

(c) Access opening

A circular or rectangular access opening of 530 mm minimum dimension and fitted with a removable water tight cover must be provided at surface level. The cover must have been designed and installed to take any likely load on it. Where the size of the inspection chamber is larger than the size of the access opening, the top section of the chamber may be suitably tapered. Where this is done the full dimensions of the chamber must be maintained for a height from the chamber floor of at least 1.5 m, and the depth of the narrower *shaft* at the top not exceed 350 mm. The minimum dimension of the *shaft* except at the opening must be 600 mm,

(d) Access ladder

Where the depth of the chamber exceeds 1.2 m rungs or rung ladders must be provided to AS 1657.

(e) Materials of construction

Inspection chambers must have base and walls of a minimum thickness of 150 mm and constructed of -

- (i) base - concrete; and
- (ii) walls - concrete or fully grouted concrete block masonry.

The concrete must be of 20 MPa grade. The walls and base must be suitably reinforced if *required*. The channels may be formed of half sections of pipes and fittings. Any access rungs or ladder must be of galvanised steel. The cover and any frame to seal it must be of reinforced concrete or cast iron with safe lifting devices.

The walls and base of any inspection chamber must be cement rendered to a smooth finish. The render may contain a suitable water proofing agent to ensure a waterproof finish. Where there is any likelihood of seepage of sub-soil water into the manhole the external surfaces of the wall must be plastered to a waterproof finish or a suitable water proofing agent added to the concrete in the walls and base.

(f) Inserts

The contact area between pipes or fittings and the walls formed around them, as well as holes broken into or formed in the walls of inspection chambers for insertion of pipes or fittings must be made water tight by -

- (i) the application of a suitable bonding agent around the pipes
- (ii) caulking the annular space between the wall and the pipe or fitting with a stiff mix of one part cement and 2 parts sand
- (iii) sealing with an epoxy based or other suitable sealant; or
- (iv) a combination of these methods.

DF6.11.6 Junctions

(a) Junctions of drains must:

- (i) be swept in the direction of flow or have an oblique *junction* fitting with an upstream angle of no more than 60°
- (ii) not be Y *junctions* in the horizontal plane; and
- (iii) where unequal *junctions* are used have the soffit of the branch in level with or higher than the soffit of the larger size.

(b) Square junctions in drains must only be used:

- (i) at the connection of an inspection shaft to a graded drain
 - (ii) as the inlet riser of a gully or a floor waste gully
 - (iii) as an inspection opening; or
 - (iv) at the top of a drop junction in place of a bend and inspection opening.
-

DF7 ROOF DRAINAGE

DF7.1 Roof Drainage

Roof gutters where provided must be sized on the basis of rainfall intensity data.

The minimum slope minimum slope requirements for gutters are:

- (a) 1 in 500 for eaves gutters; and
- (b) 1 in 200 for internal box gutters

The minimum area of cross-section of a downpipe must be the greater of:

- (c) half the area of cross-section of the gutter it serves; or
- (d) the area calculated for each 10 m² of the roof area drained by it at the rate of:
650 mm² per m² for eaves gutters; and 930 mm² per m² for internal box gutters.

Care must be taken to avoid bimetallic corrosion occurring in the guttering and storage tanks.

The inclusion of gutter accessories such as Leaf Diverters and First Flush Devices can help minimize debris entering rainwater storage tanks and improve the water quality.

Further information on roof drainage can be found in the Solomon Islands Building Manual and AS/NZS 3500 Part 3 – Stormwater Drainage.

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DG**

ANCILLARY PROVISIONS

Performance Requirements

Deemed-to-Satisfy Provisions

DG1 Minor Structures and Components

DG2 Fireplaces, Chimneys and Flues

SECTION DG ANCILLARY PROVISIONS

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

DG1 Minor Structures and Components

DG1.1 Swimming pools

DG1.2 Poultry and other domestic animal
houses

DG1.3 Fences

DG2 Fireplaces, Chimneys and Flues

DG2.1 General requirements

DG2.2 Open fireplaces deemed-to-satisfy

PERFORMANCE REQUIREMENTS

OBJECTIVES AND REQUIRED PERFORMANCE

This Section contains more specific requirements for particular parts of Class 1 and 10 buildings.

Parts of buildings and structures must be so designed and constructed that the following requirements in addition to those listed for Sections B, DC, and DF where relevant, are fulfilled.

DGP1 **Minor Structures and Components**

DGP1.1 Swimming pools

- (a) Suitable means for the disposal of waste and drainage must be provided to a *swimming pool*.
- (b) Access by unsupervised young children to *swimming pools* must be restricted.

DGP1.2 Aesthetics

Any minor structure such as fencing awnings and the like must be suited to the general surroundings as well as the occupancy of the building and the neighbourhood.

DGP1.3 Animal houses

Accommodation for animals and poultry must not lead to unsanitary conditions for the occupier or neighbours and the public. The accommodation must be such that the animals or poultry are not subjected to serious discomfort or overcrowding.

DGP2 **Fireplaces, Chimneys and Flues**

Fireplaces, chimneys and flues must be adequately constructed or separated to prevent-

- (a) ignition of nearby parts of the building; or
- (b) escape or discharge of smoke to the inside of the building or to adjacent windows, ventilation inlets, or the like.

DEEMED-TO-SATISFY PROVISIONS

DG 1 MINOR STRUCTURES AND COMPONENTS

DG1.1 Swimming Pools

- (a) Drainage: A *swimming pool* must have suitable means of drainage.
- (b) Safety fencing: A *swimming pool* with a depth of water more than 300 mm must have suitable barriers or safety fencing in accordance with AS 1926.1 and AS1926.2 to restrict access by young children to the immediate pool surrounds if the *swimming pool* is associated with a Class 2 or 3 building or is a public pool.
- (c) Water recirculation systems: A *swimming pool* must have suitable means of water reticulation in accordance with AS 1926.3.

DG1.2 Poultry and Other Domestic Animal Houses

A building used for keeping domestic birds or animals must be not less than:

- (a) 12 m from any Class 1 building;
- (b) 10 m from any boundary; and
- (c) 20 m from the boundary adjoining an allotment containing or intended to contain any building other than a Class 1 building.

The floor of the building must be constructed of suitable material. Suitable arrangements must be made for the collection and disposal of animal wastes, so that they do not create a nuisance or encourage the breeding of flies and other pests. The size and general arrangements in the building must be conducive to the welfare of the poultry or animals.

DG1.3 Fences

Building and planning approvals are generally not required for a proposed front, side or rear boundary fence, if the fence is:

- associated with a dwelling house (or other residential use);
- less than two metres high;
- not a swimming pool fence (swimming pool fences have their own requirements – see DG 1.1);
- not part of a retaining wall; and
- not restricting water run-off from adjoining properties.

Any fence above 2m in height above natural ground surface requires building approval and shall be designed in accordance with this Code.

Solid fencing, barriers or walls constructed from earth, concrete or concrete blocks greater than 1.2m in height above natural ground surface requires building approval and shall be designed in accordance with this Code.

Common types of fencing and retaining walls less than 2m in height are detailed in the Solomon Islands Building Manual. SIBM compliant construction meets Deemed-to-Satisfy requirements.

Broken glass topping, metal spikes, barbed wire, razor wire or similar fence security materials must be located / fixed at a height of not less than 2 m above the finished level of any existing or intended adjacent footpath.

DG2 FIREPLACES, CHIMNEYS AND FLUES

DG2.1 General requirements

A chimney or flue must be constructed:

- (a) to withstand the temperatures likely to be generated by the appliance to which it is connected
- (b) so that the temperature of the exposed faces will not exceed a level that would cause damage to nearby parts of the building
- (c) so that hot products of combustion will not -
 - (i) escape through the walls of the chimney or flue; or
 - (ii) discharge in a position that will cause fire to spread to nearby *combustible* materials or allow smoke to penetrate through nearby *windows*, ventilation inlets, or the like

in such a manner as to prevent rainwater penetrating to any part of the interior of the building such that its termination is not less than -

- (i) 600 mm above any point of penetration of or contact with the roof; and
 - (ii) 900 above any opening or openable part in any building, which is within 3 m horizontal distance of the chimney or flue; and
- (d) so that it is accessible for cleaning.

DG2.2 Open Fireplaces Deemed-to-Satisfy

An open fireplace, or solid-fuel burning appliance in which the fuel-burning compartment is not enclosed, satisfies DG2.1 if it has:

- (a) a hearth constructed of stone, concrete, masonry or similar non-*combustible* material so that -
 - (i) it extends not less than 300 mm beyond the front of the fireplace opening and not less than 150 mm beyond each side of that opening
 - (ii) it extends beyond the limits of the fireplace or appliance not less than 300 mm if the fireplace or appliance is free-standing from any wall of the room
 - (iii) its upper surface does not slope away from the grate or appliance; and
 - (iv) *combustible* material situated below the hearth (but not below that part *required* to extend beyond the fireplace opening or the limits of the fireplace) is not less than 155 mm from the upper surface of the hearth
- (b) walls forming the sides and back of the fireplace up to not less than 300 mm above the underside of the arch or lintel which -
 - (i) are constructed in 2 separate leaves of solid masonry not less than 180 mm thick, excluding any cavity; and
 - (ii) do not consist of concrete block masonry in the construction of the inner leaf;
- (c) walls of the chimney above the level referred to in (b) -
 - (i) constructed of masonry units with a net volume, excluding cored and similar holes, not less than 75% of their gross volume, measured on the overall rectangular shape of the units, and with an actual thickness of not less than 90 mm; and
 - (ii) lined internally to a thickness of not less than 12 mm with rendering consisting of 1 part cement, 3 parts lime, and 10 parts sand by volume, or other suitable material; and
- (d) suitable damp-proof courses or flashing to maintain weatherproofing.

NOTE: As Clause A5 Exclusions, this clause does not apply to kitchens from traditional materials or “leaf kitchens”.

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION NC

FIRE RESISTANCE

Performance Requirements

Deemed-to-Satisfy Provisions

NC1 Fire Resistance and Stability

NC2 Compartmentation and Separation

NC3 Protection of Openings

SECTION NC FIRE RESISTANCE

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SAFETY PROVISIONS

NC1	Fire Resistance and Stability	NC3	Protection of Openings
NC1.1	Type of construction <i>required</i>	NC3.1	Application of Part
NC1.2	Calculation of rise in storeys	NC3.2	Protection of openings in external
NC1.3	Mixed Types of construction	NC3.3	Separation of openings in different
NC1.4	Open spectator stands and indoor sports stadiums	NC3.4	Acceptable methods of protection
NC1.6	Early Fire Hazard	NC3.5	Doorways in fire walls
NC2	Compartmentation and Separation	NC3.6	Sliding fire doors
NC2.1	Application	NC3.7	Protection of doorways in horizontal exits
NC2.2	General floor area limitations	NC3.8	Openings in fire-isolated exits
NC2.3	Large isolated buildings	NC3.9	Service penetrations in fire-isolated
NC2.4	Requirements for open spaces and	NC3.10	Openings in fire-isolated lift shafts
NC2.5	Class 9a buildings	NC3.11	Bounding construction: Class 2, 3 and 4 buildings
NC2.6	Separation of openings in external walls	NC3.12	Openings in floors for services
NC2.7	Separation by fire walls	NC3.13	Openings in shafts
NC2.8	Separation of classifications in the same	NC3.14	Openings for service installations
NC2.9	Separation of classifications in different storeys	NC3.15	Installation deemed-to-satisfy
NC2.10	Separation of lift shafts		Specifications
NC2.11	Stairways and lifts in one shaft	NC1.1	Fire-Resisting Construction
NC2.12	Separation of equipment	NC1.5	Structural Tests for Lightweight Construction
NC2.13	Electricity substations	NC1.6	Early Fire Hazard Indices
		NC 3.4	Fire Doors, Smoke Doors, Fire Windows and Shutters

PERFORMANCE REQUIREMENTS

OBJECTIVES

The design and construction of buildings must fulfill the following objectives -

NCP1 Fire Resistance and Stability

- (a) A building must be constructed so that it is protected from fire in any other building.
- (b) Materials used in the construction must be such that if there is a fire in the building -
 - (i) the spread of fire and the generation of smoke and toxic gases will be minimised;
 - (ii) stability will be maintained for a period at least sufficient for the occupants to escape and to ensure the safety of fire-fighters; and
 - (iii) there will be little risk of collapse onto adjoining property.

NCP2 Compartmentation and Separation

Buildings must be constructed to localise the effects of fire to the areas of origin. Adequate levels of passive fire protection must be provided so that sufficient time is available for the users and others to escape from the effects of fire and as an alternative, to allow the users to stay safely within unaffected compartments for the duration reasonably *required* to put out the fire by active means.

NCP3 Protection of Openings

Openings must be protected and service penetrations must be fire-stopped to maintain separation and compartmentation.

REQUIRED PERFORMANCE

NCP1.1 In order to maintain the *structural adequacy* and stability of any building for a sufficient time for the safety of the users fire fighters and others, the following must be ensured:

- (a) the loadbearing elements must have the FRL appropriate to their function in the building, the expected fire load density, the fire risk, the height of the building, its location with reference to the availability of external firefighting resources, and the fire control measures available within the building;
- (b) the FRL of structural elements must be at least equal to that of other elements to which they provide support; and
- (c) the collapse of elements with a lower FRL must not result in the collapse of elements with a higher FRL.

NCP2.1 The size of a fire compartment must also be consistent with the fire severity of the fire load density it contains and the likely spread of fire between it and any other compartment, *storey* or building.

Building compartment size and separating construction must be such that the potential size of a fire and the spread of fire and smoke are limited in order to -

- (a) protect the occupants of one part of a building from the effects of fire elsewhere in the building;
- (b) control the spread of fire or smoke to adjoining buildings; and
- (c) facilitate access to the building by fire-fighters.

NCP 3.1 Openings of any nature in the envelope surrounding *fire compartments* must be so protected that they do not allow the passage of dangerous amounts of heat, flames, smoke and gases in the event of a fire within or outside the compartment and for a period sufficient to:

- (a) allow the safe evacuation of all affected people; and
- (b) allow fire fighters to fight the fire.

The sufficiency of the duration allowed must take into account the nature of occupancy of the building as well as the proximity of other buildings and their occupancy.

DEEMED-TO-SATISFY PROVISIONS

NC 1 FIRE RESISTANCE AND STABILITY

NC1.1 Type of Construction Required

- (a) The minimum Type of *fire-resisting construction* of a building must be that give in Table NC1.1, except as allowed for -
- (i) *open spectator stands* and indoor sports stadiums in NCI .4; and
 - (ii) lightweight construction in NC1.5
- (b) Type A construction is the most fire-resistant and Type C the least fire-resistant of the Types of construction.

Table NC1.1 Type of Construction Required

Rise (in storeys)	Class of building or part							
	2	3	4	5	6	7	8	9
5 or more	A	A	A	A	A	A	A	A
3 or 4	B	B	B	B	B	B	B	B
1 or 2	C	C	C	C	C	C	C	C
Note: See Specification NC1.1 for details of Types A, B and C construction.								

NC1.2 Calculation if Rise in Storeys

In calculating the rise in *storeys*:

- (a) a *storey* that has an average internal height of more than 6 m is counted as -
- (i) one *storey* if it is the only *storey* above the ground; or
 - (ii) 2 *storeys* in any other case; and
- (b) a *storey* is not counted if -
- (i) it is situated at the top of the building and contains only service units or equipment; or
 - (ii) it is situated partly below the finished ground and the underside of the ceilings is not more than 1 m above the average finished level of the ground at the *external wall*, or if the *external wall* is more than 12 m long, the average for the 12 m part where the ground is lowest.

NC1.3 Mixed Types of Construction

A building may be of mixed Types of construction if no part of the building is supported by, or vertically over, a part of less *fire-resisting* Type.

NC1.4 Open Spectator Stands and Indoor Sports Stadiums

An *open spectator stand* or indoor sports stadium which has only changing rooms, sanitary facilities or the like below the tiered seating, need not comply with the other provisions of this Part if it contains not more than 1 tier of seating and is of Type C and non-*combustible* construction.

NC1.5 Lightweight Construction

Lightweight construction must comply with Specification NC1.5 if it is used in construction which is required to be *fire-resisting*.

NC1.6 Early Fire Hazard Indices

The Early Fire Hazard Indices of materials and assemblies inside Class 2 to 9 buildings must comply with Specification NC1.6.

NC 2 COMPARTMENTATION AND SEPARATION

NC2.1 Application

This Part does not apply to an open-deck carpark or open spectator stand.

NC2.2 General Floor Area Limitations

- (a) The size of any *fire compartment* in a Class 5, 6, 7, 8 or 9b building must not exceed the relevant maximum *floor area* and volume set out in Table NC2.2 except as permitted in NC2.3.
- (b) A part of a building which contains only heating, ventilating, or lift equipment, water tanks, or similar service units is not counted in the *floor area* or volume of a *fire compartment* if it is situated at the top of the building.

Table NC2.2 - Maximum Size of Fire Compartments

	TYPE OF CONSTRUCTION OF BUILDING			
		Type A	Type B	Type C
CLASS 5, 6, 7, 8 or 9b	Max floor area	2000 m ²	1500 m ²	1000 m ²
	Max volume	12000 m ³	9000 m ³	6000 m ³

Note: Subject to the requirements of table NE1.6 and if fully protected with a *sprinkler system* and water supply to NZS 4541 these areas and volumes of the *fire compartment* can be increased to a maximum of -

- i) 8 times where the *sprinkler system* has two independent water supplies to Class A; and
 - ii) 4 times where the *sprinkler system* has a single water supply to Class C.
- (c) The size of any fire compartment in a Class 3 building must not exceed 600 m² except if fully protected by a sprinkler system to any Class of water supply to NZS 4541, this area may be increased to 1500 m².

NC2.3 Large Isolated Buildings of Class 5,6,7,8 or 9b

The *floor area* of a *fire compartment* in a large, isolated building may exceed that specified in Table NC2.2 to the following limits and conditions:

- (a) Up to 18000 m² if -
 - (i) the building is Class 7 or 8, it contains not more than 2 *storeys* and an *open space* complying with NC2.4(a) not less than 18 m wide is provided around the building; or
 - (ii) the building is of any Class and is protected throughout with a *sprinkler system* and perimeter vehicular access complying with NC2.4(b) is provided.
- (b) More than 18000 m² if -
 - (i) the building is protected throughout with a *sprinkler system* and perimeter vehicular access complying with NC2.4(b) is provided;
 - (ii) if the ceiling height of the *fire compartment* is not more than 12 m, it has a smoke exhaust system in accordance with specification NE2.6 or *smoke-and-heat vents* and the space below the roof is divided into compartments in accordance with AS 2665; and
 - (iii) if the ceiling height is more than 12 m, it has a smoke exhaust system in accordance with Specification NE2.6.
- (c) If more than one building is on the allotment -

- (i) each building complies with (a) or (b); or
- (ii) if the buildings are closer than 6 m to each other and no building is more than 45 m from the *required* vehicular access, they are regarded as one building and collectively comply with (a) or (b).

NC2.4 Requirements for Open Spaces and Vehicular Access

(a) An open space required by NC2.3 must -

- (i) be wholly within the allotment except as in (iii);
- (ii) include vehicular access in accordance with (b);
- (iii) be next to the boundaries of the allotment, and may include any road, river, or public place adjoining the allotment;
- (iv) not be used for the storage or processing of materials; and
- (v) not be built upon, except for guard houses and service structures (such as substations and pump houses) which may encroach upon the width of the space if they do not unduly impede fire-fighting at any part of the perimeter of the allotment or unduly add to the risk of spread of fire to any building on an adjoining allotment.

(b) The vehicular access required by this Part -

- (i) must be capable of providing emergency vehicle access and passage from the public road;
- (ii) must have a minimum unobstructed width of 6 m and in no part be built upon or used for any purpose other than vehicular or pedestrian movement;
- (iii) may be substituted by a public road if the building faces and is accessible from the road and is no further than 45 m from it;
- (iv) must be such that reasonable pedestrian access from the vehicular access to the building is available; and
- (v) must be of adequate load bearing capacity and unobstructed height to permit the operation and passage of Fire Brigade vehicles.

NC2.5 Class 9a Buildings

The building must be divided into *fire compartments* with a maximum *floor area* of 1700 m² and further:

- (a) Ward areas must be subdivided with walls of minimum FRL of 60/60/60 into floor areas of not more than 850 m² and again subdivided into parts of 425 m² maximum floor area with smoke proof walls complying with (c);
- (b) other than ward areas must be subdivided into parts with a maximum floor area of 425 m² with smoke proof walls complying with (c);
- (c) a wall required to be smoke-proof must -
 - (i) be *non-combustible* and extend to the underside of the floor above or of the roof covering;
 - (ii) only have doorways which are fitted with smoke doors complying with Specification NC3.4 and which do not extend higher than 800 mm from the underside of an imperforate roof covering, floor or ceiling above it; and
 - (iii) not incorporate any other opening which is not smoke-proof; and
- (d) Fire compartments must be separated from the remainder of the building by fire walls and -
 - (i) in Type A construction - floors and roof or ceiling as *required* in Specification NC1.1;
 - (ii) in Type B construction - floors with a FRL of not less than 90/90/90, and if fully protected with a *sprinkler system* of 60/60/60; and
 - (iii) in Type C construction - floors with a FRL of not less than 60/60/60.

NC2.6 Separation of Openings in External Walls

In any building which is other than:

- (a) fully protected with a *sprinkler system*;
- (b) an open deck car park; or
- (c) of one or two *storeys* rise,

if any part of a *window* or other opening in an *external wall* (except openings in the same stairway) is situated above another opening in the *storey* next below, the opening must be protected by -

- (a) a slab or other horizontal construction that -
 - (i) projects outwards from the external face of the wall not less than 1100 mm;
 - (ii) extends along the wall not less than 450 mm beyond the openings concerned; and
 - (iii) is non-*combustible* and has a FRL of not less than 60/60/60; or
- (b) a spandrel which -
 - (i) is not less than 1100 mm in height;
 - (ii) extends not less than 600 mm above the upper surface of the intervening floor; and
 - (iii) is of non-*combustible* material having a FRL not less than 60/60/60; or
- (c) providing the *window* or opening in the upper *storey* with a glazing system with a FRL of not less than -/60/30. Any gap in the construction which separates the two *storeys* must be packed with a non-*combustible* material that will withstand the relative thermal or structural movements of the walling and glazing without loss of seal.

Note: These requirements are separate from the structural requirements for glazing at B1.3 and B1.4.

NC2.7 Separation by Fire Walls

A part of a building separated from the remainder of the building by a *fire wall* is treated as a separate building if:

- (a) the fire wall -
 - (i) extends through all *storeys* and spaces in the nature of *storeys* that are common to that part and any adjoining part of the building;
 - (ii) is carried through to the underside of the roof covering; and
 - (iii) has the relevant FRL prescribed by Specification NC1.1 for each of the adjoining parts; and if these are different, the greater FRL;
- (b) any openings in a *fire wall* comply with Part NC3;
- (c) timber purlins or other *combustible* material do not pass through or cross the fire wall; and
- (d) where the roof of one of the adjoining parts is lower than the roof of the other part, the fire wall extends to the underside of -
 - (i) the covering of the higher roof, or not less than 6 m above the covering of the lower roof;
 - (ii) the lower roof if it has a FRL not less than that of the *fire wall* and no openings closer than 3 m to any wall above the lower roof;
 - (iii) the lower roof if its covering is non-*combustible* and the lower part has a *sprinkler system*;or
 - (iv) the design of the building must otherwise restrict the spread of fire from the lower part to the higher part.

NC2.8 Separation of Classifications in the Same Storey

If a building has parts of different classifications located alongside one another in the same *storey*:

- (a) each building element in that *storey* must have the higher FRL prescribed in Specification NC1.1 for that element for the classifications concerned; or

- (b) the parts must be separated in that *storey* by a *fire wall* with whichever is the greater of the higher FRL prescribed in Specification NC1.1 for the classifications concerned.

NC2.9 Separation of Classifications in Different Storeys

If parts of different classification are situated one above the other in adjoining *storeys* they must be separated as follows:

- (a) Type A or B construction - The floor between the adjoining parts must have a FRL not less than that prescribed in Specification NC1.1 for the classification of the lower *storey*.
- (b) Type C construction - The underside of the floor (including the sides and underside of any floor beams) must have a *fire-protective covering*.

NC2.10 Separation of Lift Shafts

Any lift (other than if wholly in an *atrium*) must be separated from the remainder of the building by enclosure in a *shaft* with its FRL as prescribed by specification NC1.1 if it connects more than:

- (a) Two *storeys* in an un-sprinklered building; or
- (b) Three *storeys* in a sprinklered building.

The openings for the lift landing doors and services must be protected in accordance with Part NC3.

NC2.11 Stairways and Lifts in One Shaft

A stairway and lift must not be in the same *shaft* if either the stairway or the lift is *required* to be in a *fire-resisting shaft*.

NC2.12 Separation of Equipment

A wall having a FRL of not less than 60/60/60 must bound a room housing equipment comprising:

- (a) lift motors and lift control panels;
- (b) the main electrical switchboard in a building with an *effective height* of more than 25 m;
- (c) *required* stair pressurizing equipment; or
- (d) boilers, emergency batteries, emergency generators or central smoke control plant, except -
 - (i) equipment located in a separate *storey* (or in the topmost *storey*) and separated from the remainder of the building by floor construction having a FRL of 60/60/60;
 - (ii) smoke control exhaust fans located in the air stream if they are constructed for high temperature operation in accordance with Specification NE2.6; or
 - (iii) equipment that is otherwise adequately separated from the remainder of the building.

NC2.13 Electricity Substations

If an electricity substation is situated within a building:

- (a) it must be separated from any other part of the building by construction having a FRL of not less than 120/120/120;
- (b) doors *windows* and any other openings on an *external wall* need not have a FRL if such openings are no closer to a fire source feature or *exit* than 3 m. Any other doorways including those opening to any other part of the budding must be protected with *self-closing* - /120/60 fire doors;
- (c) electricity supply cables between a main and the substation, and between the substation and the main switchboard, must be enclosed or otherwise protected by construction having a FRL of not less than 120/120/120; and
- (d) any openings, fans or grilles for natural or mechanical ventilation must be located only on an *external wall* unless projected with an *automatic* -/120/60 fire shutter.

NC3 PROTECTION OF OPENINGS

NC3.1 Application of Part

- (a) This Part does not apply to -
- (i) control joints, weep holes, and the like, in masonry construction, and joints between pre-cast concrete panels, if they are not larger than necessary for the purpose; or
 - (ii) non-*combustible* ventilators for sub-floor or cavity ventilation, if each does not exceed 45x1000 mm² in face area and is spaced not less than 2 m from any other ventilator in the same wall.
- (b) This Part applies to openings in building elements *required* to be *fire-resisting*, including doorways, *windows* (including any associated fanlight or infill panel) and other fixed or openable glazed areas that do not have the *required* FRL.

NC3.2 Protection of Openings in External Walls

Openings in an *external wall* that is *required* to have a FRL must:

- (a) be not less distant from a *fire-source feature* to which it is exposed than -
- (i) 1 m in a building not more than 1 *storey* in rise; or
 - (ii) 1.5 m in a building more than 1 *storey* in rise;
- (b) be protected in accordance with NC3.4 if it is situated closer from a *fire-source feature* to which it is exposed than -
- (i) 3 m from a side or rear boundary of the allotment;
 - (ii) 6 m from the far boundary of a road adjoining the allotment; or
 - (iii) 6 m from another building on the allotment that is not Class 10; and
- (c) if *required* to be protected under (b), not occupy more than 1/3 of the area of the *external wall* of the *storey* in which it is located unless -
- (i) they are in a Class 9b building used as an *open spectator stand*; or
 - (ii) they face a public road and are located in a *storey* at ground level.

NC3.3 Separation of Openings in Different Fire Compartments

Unless they are protected in accordance with NC3.4, the distance between openings in *external walls* in compartments separated by a *fire wall* must not be less than that set out in Table NC3.3.

Table NC3.3 - Distance Between Openings in Different Compartments

Angle between walls	Minimum distance between openings
0° (walls opposite)	6 m
more than 0° to 45°	5 m
more than 45° to 90°	4 m
more than 90° to 135°	3 m
more than 135° to 160°	2 m

NC3.4 Acceptable Methods of Protection

- (a) Where protection is *required*, doorways, *windows*, and other openings must be fitted with suitable -

- (i) Doorways - /60/30 *self-closing* or *automatic* fire doors and fire shutters ;
 - (ii) Windows- /60/30 fire *windows* (*automatic* or permanently fixed in the closed position) or - /60/30 *automatic* fire shutters;
 - (iii) Other openings-construction having a FRL not less than - /60/30.
- (b) These methods of protection may be replaced with specifically engineered external drenchers provided an adequate supply of water can be ensured.
- (c) Fire doors, smoke doors, fire windows and fire shutters satisfy (a) if they comply with Specification NC3.4.

NC3.5 Doorways in Fire Walls

The aggregate width of openings for doorways in a *fire wall* which are not part of a *horizontal exit* must not exceed 1/2 of the length of the *fire wall*, and each doorway must be protected by:

- (a) Two fire doors or fire shutters, one on each side of the doorway each of which -
 - (i) has a FRL of not less than 1/2 as *required* by Specification NC1.1 for the *fire wall*; and
 - (ii) is *self-closing* unless provided with an *automatic* release mechanism for any hold-open device which will close the door upon actuation of any of the fire/smoke detection systems installed on both sides of the *fire wall*;
- (b) a fire door on one side and a fire shutter on the other side of the doorway, each of which complies with (a); or
- (c) a single fire door or a non-metallic fire shutter, which -
 - (i) has a FRL of not less than that *required* by Specification NC1.1 for the *fire wall*; and
 - (ii) is *self-closing* unless provided with an *automatic* release mechanism for any hold-open device which will close the door upon actuation of any of the fire/smoke detection systems installed on both sides of the *fire wall*.

NC3.6 Sliding Fire Doors

If a doorway in a *fire wall* is fitted with a sliding fire door which is open when the building is in use:

- (a) it must be held open with a fusible link, or an electromagnetic device which when de-activated, allows the door to be fully closed not less than 20 seconds, and not more than 30 seconds, after release; and
- (b) thermal or smoke detectors as appropriate must be installed on each side of the doorway, in accordance with AS 1905.1 and
- (c) an audible warning device located near the doorway and a red flashing warning light of a suitable intensity on each side of the doorway must be activated when a *required* detector or *sprinkler system* in the part of the building served by the door is activated; and
- (d) signs must be installed on each side of the doorway located directly over the opening stating –
 "WARNING - SLIDING FIRE DOOR"
 in capital letters not less than 50 mm high in a colour contrasting with the background.

NC3.7 Protection of Doorways in Horizontal Exits

A doorway that is part of a *horizontal exit* must be protected:

- (a) in a Class 7 or 8 building - by 2 fire doors, one on each side of the doorway, each with a FRL of not less than 1/2 that *required* by Specification NC1.1 for the *fire wall*; or
- (b) in all classes of buildings, by a single fire door which has a FRL of not less than that *required* by Specification NC1.1 for the *fire wall*,

and each door must be *self-closing*, or provided with *automatic* release of any hold-open device upon detection of smoke or fire.

NC3.8 Openings in Fire-isolated Exits

- (a) A doorway that does not open to a road or *open space* must be protected by a *self-closing* or *automatic* - /60/30 fire door if it opens to a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp*.
- (b) A *window* in an *external wall* of a *fire-isolated stairway*, *fire-isolated passageway* or *fire-isolated ramp* must be protected in accordance with NC3.4 if it is within 6 m of, and exposed to -
 - (i) a fire-source feature; or
 - (ii) another *window* or other opening in a wall of the same building unless they both serve the same fire-isolated enclosure.

NC3.9 Service Penetrations in Fire-isolated Exits

Fire-isolated *exits* must not be penetrated by any service other than:

- (a) electrical wiring associated with a lighting or pressurizing system serving the *exit*;
- (b) ducting associated with the pressurizing system if it -
 - (i) is constructed of material having a FRL of not less than 60/60/60 where it passes through any other part of the building; and
 - (ii) does not open into any other part of the building; or
- (c) water supply pipes for fire services or domestic use.

NC3.10 Openings in Fire-isolated lift Shafts

- (a) **Doorways:** If a lift *shaft* is *required* to be fire- isolated under Part NC2, an entrance doorway to that *shaft* must be protected by - /60/30 fire doors that -
 - (i) comply with AS 1735.11; and
 - (ii) are set to remain closed except when discharging or receiving passengers, goods or vehicles.
- (b) **Lift indicator panels:** A lift call panel, indicator panel or other panel in the wall of a fire-isolated lift *shaft* must be backed by construction having a FRL of not less than 60/60/60 if it exceeds 35x1000 mm² in area.

NC3.11 Bounding Construction: Class 2, 3 and 4 Buildings

- (a) A doorway in a Class 2 or 3 building must be protected if it provides access from a *sole-occupancy unit* to -
 - (i) a *public corridor*, public hallway, or the like;
 - (ii) a room not within a *sole-occupancy unit*;
 - (iii) the landing of an internal *non-fire-isolated stairway* that serves as a *required exit*; or
 - (iv) another sole-occupancy unit.
- (b) A doorway in a Class 4 part must be protected if it provides access to any other internal part of the building.
- (c) Protection for a doorway must be at least -
 - (i) in a building of Type A or B construction – a *self-closing* - /30/30 fire door; and
 - (ii) in a building of Type C construction - a self- closing tight fitting solid core door not less than 35 mm thick in a rebated frame.
- (d) Other openings in *internal walls* which are *required* to have a FRL to inhibit the lateral spread of fire must not reduce the *fire-resisting* performance of the wall.

NC3.12 Openings in Floors for Services

In a building of Type A and B construction, services associated with the functioning of the building and passing through a floor must either be installed in *shafts* complying with Specification NC1.1 or protected in accordance with NC3.14.

NC3.13 Openings in Shafts

In a building of Type A or B construction, an opening in a wall providing access to a ventilating, pipe, garbage or other service *shaft* must be protected by:

- (a) if it is in a *sanitary compartment* a door or panel which, together with its frame, has a FRL of not less than - /30/-; or
- (b) a *self-closing* - /30/- fire door or hopper; or
- (c) an access panel having a FRL of not less than - /30/-.

NC3.14 Openings for Service Installations

An electrical, electronic, plumbing, mechanical ventilation or air-conditioning, or other service that penetrates a building element (other than an *external wall* or roof) that is *required* to have a FRL or a *resistance to the incipient spread of fire*, must be installed so that the *fire-resisting* performance of the building element is not impaired.

NC3.15 Installation Deemed-to-Satisfy

Installation satisfies NC3.14 if:

- (a) the method and materials used are identical with a prototype assembly of the service and building element which has achieved the *required* FRL or *resistance to the incipient spread of fire*,
- (b) it complies with (a) except for the *insulation* criterion relating to the service when –
 - (i) the service is farther than 100 mm from any *combustible* material; and
 - (ii) it is not located in a *required exit*;
- (c) in the case of ventilating or air-conditioning ducts or equipment the installation is in accordance with AS 1668.1;
- (d) the service is a metal pipe installed in accordance with Specification NC3.15 and it penetrates a wall, floor or ceiling, but not a ceiling *required* to have a *resistance to the incipient spread of fire*;
- (e) the service is sanitary plumbing installed in accordance with Specification NC3.15 and it -
 - (i) is of metal or UPVC pipe; and
 - (ii) penetrates the floors of a Class 5, 6, 7, 8 or 9b building; and
 - (iii) is in *sanitary compartments* which are separated from other parts of the building by walls with the FRL *required* by Specification NC1.1 for a stair *shaft* in the building and a *self-closing* - /60/30 fire door;
- (f) the service is a wire or cable, or a cluster of wires or cables installed in accordance with Specification NC3.15 and it penetrates a wall, floor or ceiling, but not a ceiling *required* to have a *resistance to the incipient spread of fire*; or
- (g) the service is an electrical switch, outlet, or the like, and it is installed in accordance with Specification NC3.15.

SPECIFICATION NC1 FIRE-RESISTING CONSTRUCTION

1. Scope

This Specification contains requirements for the *fire-resisting construction* of building elements.

2. General Requirements

2.1 Exposure to Fire-source Features

- (a) A part of a building element is exposed to a *fire-source feature* if there is no obstruction to any horizontal line between that part and the *fire-source feature* or a vertical projection of the feature. Where another part of the building obstructs any such horizontal line, the part under consideration will still be considered exposed if the obstruction has -
 - (i) a FRL of not less than 30/-/-; or
 - (ii) is transparent or translucent.
- (b) A part of a building element is not exposed to a *fire-source feature* if the *fire-source feature* is -
 - (i) an external wall of another building that stands on the allotment and the part concerned is more than 15 m above the highest part of that external wall; or
 - (ii) a side or rear boundary of the allotment and the part concerned is below the level of the finished ground at every relevant part of the boundary concerned.
- (c) If various distances apply for different parts of a building element -
 - (i) the entire element must have the FRL applicable to that part having the least distance between itself and the relevant fire-source feature; or
 - (ii) each part of the element must have the FRL applicable according to its individual distance from the relevant fire-source feature,

but this provision does not override or permit any exemption from Clause 2.2.

2.2 Fire Protection for a Support of Another Part

A part of a building that gives direct vertical or lateral support to another part *required* to have a FRL, must have a FRL in respect of *structural adequacy* not less than the greater of:

- (a) that *required* for the part it supports; or
- (b) that *required* for the part itself,

and be *non-combustible* if the part it supports is *required* to be *non-combustible*.

2.3 Lintels

A lintel must have the FRL *required* for the part of building in which it is situated. It need not have the FRL if it does not contribute to the support of a fire door, fire *window* or fire shutter, and:

- (a) it spans an opening in -
 - (i) a wall of a building containing only one storey;
 - (ii) a non-loadbearing wall of a Class 2 or 3 building; or
- (b) it spans an opening in masonry which is not more than 150 mm thick and -
 - (i) not more than 3 m wide if the masonry is nonloadbearing; or
 - (ii) not more than 1.8 m wide if the masonry is loadbearing and part of one of the leaves of a cavity wall.

2.4 Attachments not to Impair Fire-resistance

- (a) A *combustible* material may be used as a finish or lining to a wall or roof, or in a sign, sunscreen or blind, awning, or other attachment to a building element which has the *required* FRL if -
 - (i) the material is exempt under clause 7 of Specification NC1.6 or complies with the Early Fire Hazard Indices prescribed in clause 2 of the same Specification.
 - (ii) it is not located near or directly above a *required exit* so as to make the *exit* unusable in a fire; and
 - (iii) it does not otherwise constitute an undue risk of fire spread via the facade of the building.
- (b) The attachment of a facing or finish, or the installation of ducting or any other service, to a part of a building *required* to have a FRL must not impair the *required* FRL of that part.

2.5 General Concessions

- (a) Steel columns - Except in a *fire wall* or *common wall*, a steel column need not have a FRL in a building that contains only one *storey*.
- (b) Timber Columns - In a building that contains only one *storey* a timber column may be used provided -
 - (i) in a fire wall or common wall the column has the required FRL.
 - (ii) in all other cases, the column has a FRL of not less than 30/-/-.
- (c) Structures on roofs - A non-*combustible* structure situated on a roof need not comply with the other provisions of this Specification if it only contains one or more of the following -
 - (i) Hot water or other water tanks.
 - (ii) Ventilating ductwork, ventilating fans and their motors.
 - (iii) Air-conditioning chillers.
 - (iv) Window cleaning equipment.
 - (v) Lift equipment.
 - (vi) Other service units that are non-*combustible* and do not contain *combustible* fluids.

3. Type A Fire-Resisting Construction**3.1 Fire-resistance of Building Elements**

In a building *required* to be of Type A construction:

- (a) each part mentioned in Table 3, and any beam or column in it, must have a FRL not less than that listed in the Table, for the particular Class of building concerned;
- (b) external walls, common walls and floors must be non-combustible;
- (c) any *internal wall required* to have a FRL must extend to -
 - (i) the underside of the floor next above;
 - (ii) the underside of a roof complying with Table 3; or
 - (iii) a ceiling which is immediately below the roof and has a *resistance to the incipient spread of fire* to the roof space of 60 minutes;
- (d) an internal wall required to be fire-resisting; and
- (e) ventilating, pipe, garbage, or similar shaft that is not for the discharge of hot products of combustion,
- (f) must be of non-combustible construction and if of lightweight construction comply with Specification NC1.5;
- (g) any flooring and floor framing in a lift pit must be *non-combustible*; and
- (h) the FRLs specified in Table 3 for an external column apply also to those parts of an internal column that face and are within 1.5 m of a *window* and are exposed through that *window* to a *fire-source feature*.

Table 3 - Type A Construction: FRL if Building Elements

Building element		FRL: (in minutes)	
		Structural adequacy/integrity/insulation	
		Class of building	
		2, 3 or 4 part	5, 6, 7, 8 or 9
EXTERNAL WALL or other external building element excluding a roof, where the distance from any <i>fire-source feature</i> to which it is exposed is -			
For <i>loadbearing</i> parts -			
	less than 1.5 m	90/90/90	120/120/120
	1.5 to less than 3 m	90/60/60	120/90/90
	3 or more	90/60/30	120/60/30
For <i>non-loadbearing</i> parts -			
	less than 1.5 m	90/90/0	120/120/120
	1.5 to less than 3 m	90/60/60	120/90/90
	3 or more	-/-/-	-/-/-
EXTERNAL COLUMN not incorporated in an <i>external wall</i> , where the distance from any <i>fire-source feature</i> to which it is exposed -			
	less than 3 m	90/-/-	120/-/-
	3 m or more	-/-/-	-/-/-
COMMON WALLS AND FIRE WALL		90/90/90	120/120/120
INTERNAL WALLS			
<i>Fire-resisting lift or stair shafts</i> -			
	Loadbearing	90/90/90	90/90/90
	Non-loadbearing	90/90/90	90/90/90
Bounding <i>public corridors</i> , public hallways and the like -			
	Loadbearing	90/90/90	90/-/-
	Non-loadbearing	60/60/60	-/-/-
Between or bounding <i>sole-occupancy units</i> -			
	Loadbearing	90/90/90	90/-/-
	Non-loadbearing	60/60/60	-/-/-
Ventilating, pipe, garbage, and like <i>shafts</i> not used for the discharge of hot products of combustion -			
	Loadbearing	90/90/90	90/90/90
	Non-loadbearing	90/90/90	90/90/90
OTHER LOADBEARING INTERNAL WALLS; AND INTERNAL BEAMS, TRUSSES AND COLUMNS		90/-/-	90/-/-
FLOORS		90/90/90	120/120/120
ROOFS		90/60/30	120/60/30
MAIN ROOF BEAMS		90/-/-	120/-/-

3.2 Concessions for Floors

The following floors need not comply with clause 3.1:

- (a) A floor laid directly on the ground.
- (b) In a Class 2, 3, 5 or 9 building if the space below is not a *storey*, does not accommodate motor vehicles, is not a storage or work area, and is not used for any other ancillary purpose.
- (c) It is a timber *stage* floor in a Class 9b building laid over a floor having the *required* FRL if the space below the *stage* is not used as a dressing room, store room, or the like.
- (d) It separates 2 *storeys* within the same *sole-occupancy unit* in a Class 2 building.

3.3 Floor Loading of Class 5 and 9b Buildings: Concession

If a floor in a Class 5 or 9b building is designed for a live load not exceeding 3 kPa:

- (a) the floor next above (including floor beams) may have a FRL, of 90/90/90; or
- (b) the roof, if that is next above (including roof beams) may have a FRL 90/60/30.

3.4 Roof Superimposed on Concrete Slab: Concession

A roof not complying with clause 3.1 as to *fire-resisting construction* may be superimposed on a concrete slab roof if:

- (a) the superimposed roof and any construction between it and the concrete slab roof are *non-combustible* throughout; and
- (b) the concrete slab roof complies with Table 3.

3.5 Roofs: Concession

A roof need not comply with Table 3 if:

- (a) in other than a Class 2 or 3 building -
 - (i) it has an *effective height* of not more than 25 m and the roof covering and its supporting members are of *non-combustible* construction; or
 - (ii) the ceiling immediately below the roof has a resistance to the incipient spread of fire to the roof space of not less than 60 minutes; or
 - (iii) the building has a *non-combustible* roof covering and the *storey* immediately below the roof has an *automatic sprinkler system* installed throughout; or
- (b) in a Class 2 or 3 building -
 - (i) all *internal walls* bounding the *sole-occupancy units* on the topmost *storey* extend to the underside of a *non-combustible* roof covering; or
 - (ii) the *sole-occupancy unit* is the only unit in that *storey*.

3.6 Roof lights

If a roof is *required* to have a FRL or be *non-combustible*, a roof light installed in that roof must:

- (a) have an area not more than 20% of roof surface;
- (b) be not less than 3 m from -
 - (i) any boundary of the allotment other than the boundary with a road or public place;
 - (ii) any part of the building which projects above the roof unless that part has the FRL *required* of a *fire wall* and any openings in the wall are protected in accordance with NC3.4;
 - (iii) any roof light in an adjoining *sole-occupancy unit* if the walls bounding the unit are *required* to have a FRL; and
 - (iv) any roof light in an adjoining *fire-separated section* of the building; and

- (c) be installed in a way that will maintain the level of protection to the roof space provided by a required ceiling with a resistance to the incipient spread of fire.

3.7 Internal Columns and Walls: Concession

If under Clause 3.5 a roof that does not have a FRL is used in a building with an *effective height* of not more than 25 m, internal columns which are not those referred to in clause 3.1(f) and load bearing *internal walls* which are not *fire walls*, in the *storey* immediately below that roof may have a FRL of 60/60/60.

3.8 Open Spectator Stands and Indoor Sports Stadiums Concession

In an *open spectator stand* or indoor sports stadium, the following building elements need not have the FRL specified in Table 3:

- (a) The roof if it is *non-combustible*
- (b) Columns and *loadbearing* walls supporting only the roof if they are *non-combustible*
- (c) any non-*loadbearing* part of an *external wall* less than 3 m -
 - (i) from any fire-source feature to which it is exposed if it has a FRL of not less than 60/60/60 and is non-combustible; or
 - (ii) from an external wall of another open spectator stand if it is non-combustible.

3.9 Carparks: Concessions

The FRLs in Table 3.9 apply to a carpark instead of those at Table 3.

Table 3.9 - FRL for Carparks

Building element	FRL
Column or beam – less than 4.5 m from a fire-source feature to which it is exposed	60/-/-
Wall – less than 3 m from a fire-source feature to which it is exposed	60/60/60
Other steel column – ratio of exposed surface area to mass per unit length not greater than 26 m ² /tonne	-/-/-
Any other column (other than a column supporting only the roof)	60/-/-
Fire wall or lift or stair shaft	90/90/90
Any other steel floor beam – which is in continuous contact with a concrete floor slab and has a ratio of exposed surface area to mass per unit length not more than 30 m ² /tonne	-/-/-
Any other floor beam	60/-/-
Floor slab or vehicle ramp	60/60/60
Roof and columns supporting only the roof	-/-/-

3.10 Mezzanine Floors: Concession

Except in a Class 9b building which is a spectator viewing area that accommodates more than 100 persons under MD1.13, *mezzanine floors* and any supporting building elements need not have a FRL or be *non-combustible* if every wall or column that supports any part of the building other than the *mezzanine floor* or floors within 6 m of a *mezzanine floor* has its FRL increased from that otherwise required, as set out in Table 3.10.

Table 3.10 - Increased FRLs: Construction Surrounding Mezzanines

Level otherwise required for any FRL criterion (mins)	Increase in level to (not less than):
90	60
60	90
90	120
The increase in level applies to each FRL criterion (<i>structural adequacy, integrity or insulation</i>) relevant to the building element concerned.	

3.11 Sprinklers: Concession

Each of the three criteria of the FRL otherwise *required* under Tables 3 and 3.g may be reduced by 30 minutes if the building is fully protected with a *sprinkler system*.

4. Type B Fire-Resisting Construction

4.1 Fire-resistance of Building Elements

In a building required to be of Type B construction:

- (a) each part mentioned in Table 4, and any beam or column in it, must have a FRL not less than that listed in the Table for the particular Class of building concerned;
- (b) a common wall, the flooring and floor framing in any lift pit, and an external wall where a FRL is listed in Table 4, must be non-combustible;
- (c) if a stair shaft supports any floor or a structural part of it -
 - (i) the floor or part must have a FRL of 60/ - / - or more; or
 - (ii) the junction of the stair shaft must be constructed so that the floor or part will be free to sag or fall in a fire without causing structural damage to the shaft;
- (d) any internal wall which is required to have a FRL must extend to -
 - (i) the underside of the floor next above;
 - (ii) the underside of a ceiling having a resistance to the incipient spread of fire to the space above itself of not less than 60 minutes; or
 - (iii) the underside of the roof covering if it is non-combustible, or 450 mm above the roof covering if it is combustible, and must not be crossed by timber purlins or other combustible material,

unless the wall bounds a sole-occupancy unit in the topmost (or only) storey and there is only one unit in that storey -

- (e) an internal wall required to be fire-resisting must be of non-combustible construction, and if it is of lightweight construction, it must comply with Specification NC1.5;
- (f) lift, ventilation, pipe, garbage, and similar shaft which are not for the discharge of hot products of combustion and not loadbearing, must be of non-combustible construction in Class 2 to 9 buildings; and
- (g) all external walls and fire walls within 1.5 m of the boundary, excluding a boundary adjoining a public road or stream or other open water channel, must be extended to not less than 450 mm above the adjoining roof line to form a parapet.

Table 4 - Type B Construction: FRL of Building Elements

Building element	FRL: (in minutes) structural adequacy/integrity/insulation
------------------	--

		Class of building	
		2, 3 or 4 part	5, 6, 7, 8 or 9
EXTERNAL WALL or other external building element excluding a roof, where the distance from any <i>fire-source feature</i> to which it is exposed is -			
For <i>loadbearing</i> parts:			
	less than 1.5 m	60/60/60	90/90/90
	1.5 to less than 3 m	60/60/30	90/90/60
	3 or more	60/30/-	90/30/30
For <i>non-loadbearing</i> parts:			
	less than 1.5 m	60/60/60	90/90/90
	1.5 to less than 3 m	60/60/30	90/90/60
	3 or more	-/-/-	-/-/-
EXTERNAL COLUMN not incorporated in an <i>external wall</i> , where the distance from any <i>fire-source feature</i> to which it is exposed:			
	less than 3 m	90/-/-	120/-/-
	3 m or more	-/-/-	-/-/-
COMMON WALLS AND FIRE WALL		90/90/90	120/120/120
INTERNAL WALLS			
<i>Fire-resisting lift or stair shafts:</i>			
	Loadbearing	60/60/60	60/60/60
	Non-loadbearing	60/60/60	60/60/60
Bounding <i>public corridors</i> , public hallways and the like:			
	Loadbearing	60/60/60	60/-/-
	Non-loadbearing	60/60/60	-/-/-
Between or bounding <i>sole-occupancy units</i> :			
	Loadbearing	60/60/60	60/-/-
	Non-loadbearing	60/60/60	-/-/-
OTHER LOADBEARING INTERNAL WALLS; AND INTERNAL BEAMS, TRUSSES AND COLUMNS		60/-/-	60/-/-
FLOORS		60/30/30	60/60/60
MAIN ROOF BEAMS		60/-/-	60/-/-
Note: See NC2.5(d) for Class 9a buildings			

4.2 Carpark: Concessions

The FRLs in Table 4.2 apply to a carpark instead of those at Table 4.

Table 4.2 - FRL for Carparks

Building element	FRL
Column or beam - less than 4.5 m from a <i>fire-source feature</i> to which it is exposed	60/-/-
Wall - less than 3 m from a <i>fire-source feature</i> to which it is exposed	60/60/60
Other steel column - ratio of exposed surface area to mass per unit length not greater than 26 m ² /tonne	-/-/-
Any other column	60/-/-
Fire wall or lift or stair shaft	60/60/60
Any other steel floor beam - which is in continuous contact with a concrete floor slab and has a ratio of exposed surface area to mass per unit length not more than 30 m ² /tonne	-/-/-
Any other floor beam	60/-/-

4.3 Sprinklers: Concession

Each of the three criteria of the FRL otherwise *required* under Tables 4 and 4.2 may be reduced by 30 minutes if the building is fully protected with a *sprinkler system*.

5. Type C Fire-Resisting Construction

5.1 Fire-resistance of Building Elements

In a building *required* to be of Type C construction:

- (a) A building element listed in Table 5, and any beam or column incorporated in it, must have a FRL not less than that listed in the Table for the particular Class of building concerned.
- (b) An *external wall* that is *required* by Table 5 to have a FRL may be considered to have a FRL if the outer part of the wall has the *required* FRL.
- (c) A *fire wall* or an *internal wall* bounding a sole occupancy unit or separating adjoining units, if it is of *lightweight construction*, must comply with Specification NC1.5.
- (d) In a Class 2 or 3 building an *internal wall* which is *required* by Table 5 to have a FRL must extend
 -
 - (i) to the underside of the floor next above if that floor has a FRL of at least 30/30/30 or to a fire protective covering on the underside of the floor;
 - (ii) to the underside of a ceiling having a *resistance to the incipient spread of fire* to the space above itself of not less than 60 minutes; or
 - (iii) to the underside of the roof covering if it is *non-combustible*, or 450 mm above the adjoining roof covering if it is *combustible*, and must not be crossed by timber purlins or other *combustible* material,

unless the wall bounds a *sole-occupancy unit* in the topmost (or only) *storey* and there is only one unit in that *storey*.
- (e) All *external walls* and *fire walls* within 1.5 m of the boundary, excluding a boundary adjoining a public road or stream or other open water channel, must be extended to not less than 450 mm above the adjoining roof line to form a parapet.

Table 5 - Type C Construction: FRL of Building Elements

Building element	FRL: (in minutes) Structural adequacy/Integrity/Insulation			
	Class of building			
	2	3 or 4 part	5, 6, 7, 8 or 9	
EXTERNAL WALL or other external building element excluding a roof, where the distance from any <i>fire-source feature</i> to which it is exposed is:				
	less than 1.5 m	60/60/60	60/60/60	60/60/60
EXTERNAL COLUMN not incorporated in an <i>external wall</i> , where the distance from any <i>fire-source feature</i> to which it is exposed:				
	less than 1.5 m	60/-/-	60/-/-	90/-/-
COMMON WALLS AND FIRE WALL		60/60/60	60/60/60	60/60/60
INTERNAL WALLS				
Bounding <i>public corridors</i> , public hallways and the like:		30/30/30	60/60/60	-/-/-
Between or bounding <i>sole-occupancy units</i>		30/30/30	60/60/60	-/-/-
Bounding a Stair if required to be rated		30/30/30	60/60/60	-/-/-
Note: See NC2.5(d) for floors of Class 9a buildings				

5.2 Carparks: Concessions

The FRLs in Table 5.2 apply to a carpark instead of those at Table 5.

Table 5.2 - FRLs for Carparks

Building element	FRL
Column or beam: less than 1.5 m from a <i>fire-source feature</i> to which it is exposed	60/-/-
Wall: less than 1.5 m from a <i>fire-source feature</i> to which it is exposed	60/-/-
Other steel column: ratio of exposed surface area to mass per unit length not greater than 26 m ² /tonne	-/-/-
Any other column	60/-/-
Any other steel floor beam: which is in continuous contact with a concrete floor slab and has a ratio of exposed surface area to mass per unit length not more than 30 m ² /tonne	-/-/-
Any other floor beam	60/-/-

SPECIFICATION NC1.5: STRUCTURAL TESTS FOR LIGHTWEIGHT CONSTRUCTION

1 Scope

This Specification contains the tests to be applied and criteria to be satisfied by *lightweight construction*.

2. Definition

Lightweight construction is:

- (a) fire-resisting construction which -
 - (i) is not in continuous contact with the principal construction that it protects from fire; or
 - (ii) is of sheet or board material, plaster, render, sprayed application, or other material similarly susceptible to damage by pressure or abrasion;
- (b) fire-resisting construction which incorporates or comprises -
 - (i) concrete containing pumice, perlite, vermiculite, or other soft material; or
 - (ii) masonry having a thickness less than 70 mm.

3. Application

The tests prescribed in this specification apply to construction other than concrete or masonry which need not be tested in accordance with this specification if it is designed:

- (a) in accordance with this Code; and
- (b) to resist, as serviceability loads, the appropriate pressure and impact defined in this Specification.

4. Test Methods

Tests must be carried out in accordance with the following:

- (a) **Materials tests** - in accordance with the methods specified for the constituent materials of construction in the Standards adopted by reference in this Code.
- (b) **For resistance to static pressure** - The provisions for testing walls under transverse load in ASTM E72-15, except that the chamber method must not be used.
- (c) **For resistance to Impact** - The provisions for testing wall systems in ASTM E695-03 except that -
 - (i) the points of impact must be set at 1.5 m above finished floor level or 1.5 m above the part of the specimen that corresponds to finished floor level; and
 - (ii) the diameter of the impact bag must be between 225 mm and 260 mm and the bag must weigh 27.2 ± 0.1 kg;
 - (iii) the mass must be achieved by putting loose, dry sand into the bag and must be adjusted before each series of impact tests; and
 - (iv) the method may be used also for Walls that depart from the vertical or that are curved and in cases where the pendulum bag and suspension cannot be vertical at the instant of impact on a concave surface or a surface inclined towards the impact, the height of drop is the net height at the point of impact.
- (a) For resistance of lift shaft construction to repetitive load - as for 3(b) except that -
 - (i) the load must be applied dynamically at a frequency not less than 1 Hz and not more than 3 Hz; and
 - (ii) it is sufficient to test one specimen with the pressure applied from the side of the construction on which the lift will operate.

5. Test Specimens

Tests must be carried out on construction in situ or on specimens of-the construction in accordance with clause 4 except that:

- (a) test specimens of the construction must be supported at top and bottom (or at each end if tested horizontally) by components identical with, and in a manner identical with, the actual construction; and
- (b) the heights of the test specimens (or lengths, if the specimens are tested horizontally) must be identical with the height between those supports in the actual construction.

6. Criteria of Compliance

The following criteria must be adopted to determine compliance with this specification:

- (a) **Material:** Must comply with the applicable Standard adopted by reference in this Code.
- (b) **Damage:** The construction must show no crack, penetration or permanent surface-deformation to a depth of more than 0.5 mm nor must there be any other non-elastic deformation nor fastener failure.
- (c) **Deflection: Static pressure** - Under static pressure the deflection of the construction must not be more than -
 - (i) 1/240th of the height between supports (the span of the construction as tested);
 - (ii) 30 mm; or
 - (iii) 20 mm for lift shafts unless the requirements of Clause 15.2(a) of AS 1735.2 are fulfilled.
- (d) **Deflection: impact** - Under impact the instantaneous deflection of the construction must not be more than -
 - (i) 1/120th of the height between supports (the span of the construction as tested);
 - (ii) 30 mm; or
 - (iii) 20 mm for lift *shafts* unless the requirements of Clause 15.2(a) of AS1735.2 are fulfilled.
- (e) **Surface indentation:** No impression must be more than 5 mm in diameter.

7. Wall systems

Wall systems that are *required* to be fire resisting bounding *public corridors*, public hallways and the like, and between or bounding *sole-occupancy units* must be subjected to the following tests and must fulfil the following criteria:

- (a) The materials tests of clause 4(a) and the materials properties criteria of clause 6(a).
- (b) A static test by the imposition of a uniformly distributed load (or its equivalent) of 0.25 kPa in accordance with clause 4(b) and the damage and deflection criteria of clauses 6(b) and (c) respectively.
- (c) A dynamic test by the imposition of the impact of the impact bag falling through a height of 100 mm in accordance with clause 4(c) and the damage and deflection criteria of clause 6(b) and (d) respectively.
- (d) The surface indentation test of clause 4(d) and the surface indentation criterion of clause 6(e).

8. Construction Bounding Means of Egress

Construction bounding means of egress including wall systems for use in lift *shafts*, stair *shafts*, *fire-isolated passageways* and *fire-isolated ramps* that are *required* to be *fire-resisting* must be subjected to the following tests and must fulfil the following criteria:

- (a) The materials tests of clause 4(a) and the materials properties criteria of clause 6(a),
- (b) A static test by the imposition of a uniformly distributed load (or its equivalent) of 0.35 KPa in accordance with clause 4(k) and the damage and deflection criteria of clauses 6(b) and (c) respectively.

- (c) A dynamic test with the impact bag falling through a height of 150 mm in accordance with clause 3(c) and the damage and deflection criteria of clause 6(b) and (d) respectively.
- (d) The surface indentation test of clause 4(d) and the surface indentation criterion of clause 6(e),

9. Requirements for Certain Class 9b Buildings

Wall systems for use in spectator stands, sports stadia, cinemas or theatres, railway or bus stations, or airport terminals in:

- (a) lift *shafts* or stair *shafts*;
- (b) external and *internal walls* bounding *public corridors*, public hallways and the like, including *fire-isolated* and *non-fire-isolated passageways* or ramps,

must be subjected to the following tests and must fulfil the following criteria -

- (i) The materials tests of clause 4(a) and the materials properties criteria of clause 6(a).
- (ii) A static test by the imposition of a uniformly distributed load (or its equivalent) of 1.0 kPa in accordance with Clause 4(b) and the damage and deflection criteria of clauses 6(b) and (c) respectively.
- (iii) A dynamic test with the impact bag falling through a height of 350 mm in accordance with Clause 4(c) and the damage and deflection criteria of clauses 6(b) and (d) respectively.
- (iv) The surface indentation test of clause 4(d) and the criterion of clause 6(e).

10. Lift Shafts

In addition to the requirements of clauses S and 9, wall systems for use in lift *shafts* that are *required* to be *fire-resisting* must be subjected to dynamic test by the imposition of 10,000,000 cycles of a uniformly distributed load (or its equivalent) between 0 and 0.35 kPa in accordance with clause 4(e) and must fulfil the damage criteria of clause 6(b).

SPECIFICATION NC1.6 - EARLY FIRE HAZARD INDICES

1. Scope

This Specification sets out requirements in relation to the Early Fire Hazard Indices of materials, linings and surface finishes inside buildings.

2. Class 2 to 9 Buildings: General Requirements

Except where superseded by clause 3 or 4, any material or component used in a Class 2, 3, 5, 6, 7, 8, or 9 building must:

- (a) in the case of a sacking-type material, have a *Flammability Index* not more than 5;
- (b) in the case of other materials, have -
 - (i) a *Spread-of-flame index* not more than 9; and
 - (ii) a *Smoke-developed index* not more than 8 if the *Spread-of-flame index* is more than 5;
- (c) be completely covered on all faces by concrete or masonry not less than 50 mm thick; or
- (d) in the case of a composite member or assembly, be constructed so that when assembled as proposed in a building -
 - (i) any material which does not comply with (a) or (b) is protected on all sides and edges from exposure to the air;
 - (ii) the member or assembly, when tested in accordance with Specification A2.4, has a Smoke-developed index and a Spread-of-Flame Index not exceeding those prescribed in (b); and
 - (iii) the member or assembly retains the protection in position so that it prevents ignition of the material and continues to screen it from access to free air for a period of not less than 10 minutes.

3. Fire-isolated Exits

In a fire-isolated stairway, *fire-isolated passageway*, or *fire-isolated ramp* in a Class 2 to 9 building:

- (a) a material, other than a sacking-type material, used in a ceiling, as an attachment to a *structural member* or as the finish, surface or lining of a *structural member* must -
 - (i) have a Spread-of-flame index of 0;
 - (ii) have a Smoke-developed index of not more than 2; and
 - (iii) if combustible, be attached directly to a non-combustible substrate and not exceed 1 mm in finished thickness;
- (b) a sacking-type material used in the form of an exposed wall or ceiling, or as a finish or attachment thereto, must have a Flammability Index of 0.

4. Class 2, 3 and 9 Buildings: Public Areas

A material, other than a *sacking-type material* must have a *Spread-of-flame index* of 0 and a *Smoke-developed index* not more than 5 if it is used:

- (a) in a Class 2, 3, 9a or 9b building - as a finish, surface, lining or attachment to any wall or ceiling in an internal *public corridor*, hallway, or the like, which is a means of egress to -
 - (i) a stairway *required* to be *fire-isolated* or an external stairway used instead; or
 - (ii) a passageway, or ramp, *required* to be *fire-isolated*; or
- (b) in a Class 9b building which is used as a theatre, public hall, or the like -
 - (i) as a finish, surface, lining, or attachment to any ceiling, wall or floor;

- (ii) as the covering of fixed seating in the audience seating area; or
- (iii) in a cinema projection room.

5. Acceptable Materials

A material complies with clauses 2, 3 or 4 if it is:

- (a) plaster, cement render, concrete, terrazzo, ceramic tile or the like; or
- (b) a fire-protective covering.

6. Fire-retardant Coatings

When paint or fire-retardant coatings are used in order to make a substrate comply with a *required Spread-of-flame index*, *Smoke-developed index* or *Flammability Index*, this fact must be clearly marked on an easily visible label or labels and permanently fixed to the building element so that the coating will not be scraped off or otherwise made ineffective, without re-coating to preserve the fire-retardant properties. If any coating used will retain the *required* fire-retardant properties for only a limited period, it must be replaced before the expiry of such period so that the *required* properties are not diminished.

7. Exempted Building Parts and Materials

The requirements in this Specification for a *Spread-of-flame index*, *Smoke-developed index* or *Flammability Index* do not apply to:

- (a) timber-framed *windows*;
 - (b) solid timber handrails or skirtings;
 - (c) timber-faced solid-core or fire doors;
 - (d) electrical switches, outlets, cover plates or the like;
 - (e) materials used for -
 - (i) roof covering or membranes, or roof insulating material, applied in continuous contact with a substrate;
 - (ii) adhesives; or
 - (iii) damp-proof courses, lashings, caulking, sealing, ground moisture barriers, or the like;
 - (f) paint, varnish, lacquer or similar finish, other than nitrocellulose lacquer;
 - (g) a clear or translucent roof light of glass fibre reinforced polyester if -
 - (i) the roof in which it is installed forms part of a building in Type C construction;
 - (ii) the material is used as part of the roof covering;
 - (iii) it is not prohibited by any other clause of this Code;
 - (iv) it is not closer than 1.5 m from another roof light of the same type;
 - (v) each roof light is not more than 14 m² in area; and
 - (vi) the area of the roof lights is not more than 20% of roof surface; or
 - (h) any other material which does not significantly increase the hazards of fire.
-

SPECIFICATION NC3.4 - FIRE DOORS, SMOKE DOORS, FIRE WINDOWS AND SHUTTERS

1.Scope

This Specification sets out requirements for the construction of fire doors, smoke doors, fire *windows* and fire shutters.

2. Fire Doors

A *required* fire door must comply AS 1905.1, except that:

- (a) it may be fully glazed or incorporate glazing if the tested prototype was similarly glazed;
- (b) the radiation level at a distance of 365 mm from the face of the glazing must not exceed 10 kW/m² during the period corresponding to that for *insulation* in the *required* FRL;
- (c) the rise in average temperature on the side of the tested prototype remote from the furnace must not exceed 140°C (except in any glazed part) during the first 30 minutes of the fire test.

3. Smoke Doors

A *required* smoke door:

- (a) may have one or two door leaves;
- (b) must swing -
 - (i) in the direction of egress; or
 - (ii) in both directions if the path of travel to *exits* is in either direction;
- (c) must be self-closing and may be fitted with an automatic release device; and
- (d) must be constructed of –
 - (i) solid-core timber at least 35 mm thick, glazed panels in a timber frame at least 35 mm thick, or a metal frame, with a mid-rail or suitable crash bar; or
 - (ii) PVC, or other suitable material;
- (e) and if necessary, be fitted with smoke seals.

4. Fire Shutters

A *required* fire shutter must:

- (a) be a shutter that -
 - (i) is identical with a tested prototype that has achieved the *required* FRL;
 - (ii) is installed in the same manner and in an opening that is not larger than the tested prototype; and
 - (iii) did not have a rise in average temperature on the side remote from the furnace of more than 140°C during the first 30 minutes of the test; or
- (b) is a steel shutter complying with AS 1905.1 if a metallic fire shutter is not prohibited by NC3.5.

5. Fire Windows

A *required* fire *window* must comply with NZS 4232.2 and must be:

- (a) identical in construction with a prototype that has achieved the required FRL; and
- (b) installed in the same manner and in an opening that is not larger than the tested prototype.

SPECIFICATION NC 3.15 - PENETRATION OF WALLS, FLOORS AND CEILINGS BY SERVICES

1. Scope

This Specification prescribes materials and methods of installation for services that penetrate walls, floors and ceilings *required* to have a FRL.

2. Application

- (a) This Specification applies to installations permitted under this Code as alternatives to systems that have been demonstrated by test to fulfil the requirements of NC3.14.
- (b) This Specification does not apply to installations in ceilings *required* to have a *resistance to the incipient spread of fire* nor to the installation of piping that contains or is intended to contain a flammable liquid or gas.

3. Metal pipes

- (a) A metal pipe that is not normally filled with liquid must not penetrate a wall, floor or ceiling within 100 mm of any *combustible* material unless wrapped or fire stopped to satisfy the requirements of Clause 7, and must be constructed of -
 - (i) copper alloy or stainless steel with a wall thickness of at least 1 mm; or
 - (ii) cast iron or steel (other than stainless steel) with a wall thickness of at least 2 mm,
- (b) An opening for a metal pipe must -
 - (i) be neatly formed, cut or drilled;
 - (ii) be no closer than 200 mm to any other service penetration; and
- (c) accommodate only one pipe
- (d) A metal pipe must be wrapped but must not be lagged or enclosed in thermal insulation over the length of its penetration of a wall, floor or ceiling unless the tagging or thermal insulation fulfils the requirements of clause 7
- (e) The gap between a metal pipe and the wall, floor or ceiling it penetrates must be fire-stopped in accordance with clause 7.

4. Pipes Penetrating Sanitary Compartments

If a pipe of metal or UPVC penetrates the floor of a *sanitary compartment* in accordance with NC3.15(e) of this Code:

- (a) the opening must be neatly formed and no larger than is necessary to accommodate the pipe or fitting; and
- (b) the gap between pipe and floor must be fire-stopped in accordance with clause 7.

5. Wires and Cables

If a wire or cable or cluster of wires or cables penetrates a floor, wall or ceiling:

- (a) the opening must be neatly formed, cut or drilled and no closer than 50 mm to any other service opening; and
- (b) the opening must be no larger in cross-sectional area than -
 - (i) 2000 mm² if only a single cable is accommodated and the gap between cable and wall, floor or ceiling is no wider than 15 mm; or
 - (ii) 500 mm² in any other case; and

- (c) the gap between the service and the wall, floor or ceiling must be fire-stopped in accordance with clause 7.

6. Electrical Switches and Outlets

If an electrical switch, outlet, socket or the like is accommodated in an opening or recess in a wall, floor or ceiling:

- (a) the opening or recess must not -
 - (i) be located opposite any point within 300 mm horizontally nor 600 mm vertically of any opening or recess on the opposite side of the wall; nor
 - (ii) extend beyond half the thickness of the wall; and
- (b) the gap between the service and the wall, floor or ceiling must be fire-stopped in accordance with clause 7.

7. Fire-stopping

- (a) **Material:** The material used for fire-stopping of service penetrations must be in accordance with AS 4072.1, and must have -
 - (i) demonstrated in a system tested in accordance with NC3.15(a) of this Code that it does not impair the *fire-resisting* performance of the building element in which it is installed; or
 - (ii) demonstrated in a test in accordance with (e) that it does not impair the *fire-resisting* performance of the test slab.
- (b) **Installation:** Fire-stopping material must be packed into the gap between the service and wall, floor or ceiling in a manner, and compressed to the same degree, as adopted for-testing under 7(a)(i) or (ii).
- (c) **Hollow construction:** if a pipe penetrated a hollow wall (such as a stud wall, a cavity wall or a wall of hollow blockwork) or a hollow floor/ceiling system, the cavity must be so framed and packed with fire-stopping material that the material is -
 - (i) installed in accordance with 7(b) to a thickness of 25 mm all round the service for the full length of the penetration; and
 - (ii) restrained, independently of the service, from moving or parting from the surfaces of the service and of the wall, floor or ceiling.
- (d) **Recesses:** if an electrical switch, socket, outlet or the like is accommodated in a recess in a hollow wall or hollow floor/ceiling system -
 - (i) the cavity immediately behind the service must be framed and packed with fire-stopping material in accordance with 7(c); or
 - (ii) the back and sides of the service must be protected with refractory lining board identical with and to the same thickness as that in which the service is installed.
- (e) **Test:** The test to demonstrate compliance of a fire-stopping material with this Specification must be conducted as follows -
 - (i) The test specimen must comprise a concrete slab not less than 1 m square and not more than 100 mm thick, and appropriately reinforced if necessary for *structural adequacy* during manufacture, transport and testing.
 - (ii) The slab must have a hole 50 mm in diameter through the centre and the hole must be packed with the fire-stopping material.
 - (iii) The slab must be conditioned in accordance with AS 1530.4.
 - (iv) Two thermocouples complying with AS 1530.4 must be attached to the upper surface of the packing each about 5 mm from its centre.

The slab must be tested on flat generally in accordance with Section 10 of AS 1530.4

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION ND

ACCESS AND EGRESS

Performance Requirements

Deemed-to-Satisfy Provisions

ND1 Provision for Escape

ND2 Construction of Exits

ND3 Access for People with Disabilities

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

ND1	Provision for Escape	ND2.6	Smoke lobbies
ND1.1	Application	ND2.7	Installations in exits and paths of travel
ND1.2	Number of exits required	ND2.8	Enclosure of space under stairs and ramps
ND1.3	When smoke or fire-isolated exits are required	ND2.9	Width of stairways
ND1.4	Exit travel distances	ND2.10	Ramps
ND1.5	Distance between alternative exits	ND2.11	Fire-isolated passageways
ND1.6	Dimensions of exits	ND2.12	Roof as open space
ND1.7	Travel via smoke or fire-isolated exits	ND2.13	Treads and risers
ND1.8	External stairways	ND2.14	Landings
ND1.9	Travel by non-fire-isolated stairways or ramps	ND2.15	Thresholds
ND1.10	Discharge from exits	ND2.16	Balustrades
ND1.11	Horizontal exits	ND2.17	Handrails
ND1.12	Non-required stairways, ramps or escalators	ND2.18	Fixed platforms, walkways and ladders
ND1.13	Number of persons accommodated	ND2.19	Doorways and doors
ND1.14	Measurement of distances	ND2.20	Swinging doors
ND1.15	Method of measurement	ND2.21	Operation of latch
		ND2.22	Re-entry from fire-isolated exits
ND2	Construction of Exits	ND3	Access for People with Disabilities
ND2.1	Application of part	ND3.1	Application of part
ND2.2	Fire-isolated stairways and ramps	ND3.2	Access to building
ND2.3	Non-fire-isolated stairways and ramps	ND3.3	Parts of buildings to be accessible
ND2.4	Separation of rising and descending stair flights		
ND2.5	Open access ramps and balconies	ND3.4	Common Building elements

SECTION ND ACCESS AND EGRESS

PERFORMANCE REQUIREMENTS

OBJECTIVES

A building must be so designed and constructed that the following objectives are fulfilled:

NDP1 Provision for Escape

There must be adequate means of escape in case of fire or other emergency from all parts of the building to a place of safety.

NDP2 Construction of Exits

- (a) Stairways, ramps and passageways must be such as to provide safe passage for the users of the building.
- (b) Stairways and ramps must not be uncomfortable or strenuous to use.
- (c) Stairways, ramps, floors and balconies, and any roof to which people normally have access, must have bounding walls, balustrades or other barriers where necessary to protect users from the risk of falling.
- (d) Vehicle ramps and any floor to which vehicles have access must have kerbs or other barriers where necessary to provide protection to pedestrians and to the structure of the building.

NDP3 Access for People With Disabilities

Reasonable provision must be made in the design of a building, having regard to its use and location, to facilitate access and circulation by people with disabilities.

REQUIRED PERFORMANCE

NDP1.1 The design and construction of buildings must allow all occupants in any or all *fire compartments* to get to:

- (a) any one of more than one exit within 2.5 minutes; or
- (b) in the case of buildings with 3 or fewer stories or a basement of less than 50 m² floor area, to a single exit within 1 minute.

NDP2.1 The design and construction of *exits* must allow for the following optimum conditions during evacuation in any emergency:

- (a) a density in the *exit* of 2.0 persons/ m² of *exit floor area*
- (b) a speed of movement along the slope of the *exit* of 0.5 m/s; and
- (c) an average flow of 1.18 persons per second per metre effective width of *exit*.

In the case of occupancies such as hospitals where evacuation needs the assistance of others and/or of equipment, additional consideration must be given to the design of *exits*.

The *pitch* of any stairway or slope of a ramp must not be unsafe or uncomfortable.

The size of openings in any bounding wall, balustrade or the like must be such as to prevent very young mobile children from going through them and injuring themselves. These must also be designed to discourage young children under 5 years of age from gaining any foothold and climbing over them.

NDP3.1 People with disabilities must have the facility to gain reasonable access to buildings so that they are not at any material disadvantage when compared with others.

DEEMED-TO-SATISFY PROVISIONS

ND1 PROVISION FOR ESCAPE

ND1.1 Application

This Part applies to all buildings except the internal parts of a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part.

ND1.2 Number of Exits Required

- (a) **All buildings:** Every building must have at least one *required exit*.
- (b) **Class 2 to 8 buildings:** In addition to any *horizontal exit*, not less than two *exits* must be provided from each *storey* if the building has a rise of three or more *storeys* or an *effective height* of more than 10 m.
- (c) **Basements:** In addition to any *horizontal exit*, not less than 2 *exits* must be provided from any *storey* if egress from that *storey* involves an upward vertical climb within the building of more than 1.5 m, unless:
 - (i) in addition to a single *exit* other than a *horizontal exit*, one or more openable or easily breakable *windows* or other openings are available in which case the top of the sill must be no higher than 1.5 m from the floor level of the room. In addition the *windows* or openings must have one clear dimension of at least 600 mm and a minimum opening of 0.6 m². The *windows* or openings must be clear of any surrounding ground by at least 1 m horizontally and the vertical drop from the sill to the ground outside, no more than 2 m; or
 - (ii) the area of the *storey* is not more than 50 m² as well as the distance of travel from any point on the floor to a single *exit*, not more than 20 m.
- (d) **Class 9 buildings:** In addition to any *horizontal exit* and subject to (e) and (f) not less than 2 *exits* must be provided from -
 - (i) each *storey* if the building has a rise of three or more *storeys* or an *effective height* of more than 10m
 - (ii) any *storey* which includes a ward area in a Class 9a building
 - (iii) each *storey* in a Class 9b building used as an early childhood centre; and
 - (iv) any *storey* or mezzanine that accommodates more than 100 persons, calculated under ND1.13.
- (e) **Exits from divided wards:** In a Class 9a building, at least one *exit* must be provided from every portion of a *storey* which has been divided in accordance with NC2.5.
- (f) **Exits in open spectator stands:** In an *open spectator stand* containing more than one tier of seating, every tier must have not less than 2 stairways or ramps, each forming part of the path of travel to not less than 2 *exits*.

ND1.3 When Smoke or Fire-isolated Exits are Required

Every *required exit* other than an external stairway or open ramp must be:

- (a) smoke isolated to the relevant requirements of ND2.6(b) and (c) if it connects 3 or more consecutive stories ; and
- (b) fire isolated if it connects 5 or more consecutive stories.

Exception: These requirements do not apply to *exits* that form part of an *open spectator stand*.

ND1.4 Exit Travel Distances

(a) Class 2 and 3 buildings and class 4 parts -

- (i) The entrance doorway of any *sole-occupancy unit* must be not more than 6m from an *exit* or from a point at which travel in different directions to 2 *exits* is available. Further the route of travel within the unit from any point other than from a kitchen or cooking area, to the doorway must not traverse through a kitchen or cooking area; and
- (ii) no point on the floor of a room which is not in a *sole-occupancy unit* must be more than 20 m from an *exit* or from a point at which travel in different directions to 2 *exits* is available, in which case the maximum distance to one of those *exits* must not exceed 40 m from the starting point.

(b) Class 5 to 9 buildings -

Subject to (c), (d) and (e) -

- (i) No point on a floor must be more than 20 m from an *exit*, or a point from which travel in different directions to 2 *exits* is available, in which case the maximum distance to one of those *exits* must not exceed 40 m from the starting point.
- (ii) In a Class 5 or 6 building, the distance to a single *exit* serving at the level of access to a road or *open space* may be increased to 30 m.

(c) Class 9a buildings: In a *ward area* in a Class 9a building -

- (i) no point on the floor must be more than 12 m from a point from which travel in different directions to 2 of the *required exits* is available; and
- (ii) the maximum distance to one of those *exits* must not be more than 30 m from the starting point.

(d) Open spectator stands: The distance of travel to an *exit* in a Class 9b building used as an *open spectator stand* must be not more than 60 m.

(e) *Assembly buildings*: in a Class 9b building other than a *school* or *early childhood centre*, the distance to one of the *exits* may be 60 m if -

- (i) the path of travel from the room concerned to that *exit* is through another area which is a corridor, hallway, lobby, ramp or other circulation space
- (ii) the room is smoke-separated from the circulation space by construction such that
- (iii) any wall be *non-combustible* and extend to the underside of the floor above or of the roof covering
- (iv) only have doorways which are fitted with smoke doors complying with Specification NC3.4 and which do not extend higher than 800 mm from the underside of an imperforate roof covering, floor or ceiling above it; and
- (v) the maximum distance of travel does not exceed 40 m within the room and 20 m from the doorway to the room through the circulation space to the *exit*.

ND1.5 Distance Between Alternative Exits

Exits that are *required* as alternative means of egress must be:

- (a) distributed as uniformly as practicable within or around the *storey* served;
- (b) not less than 9 m apart; and
- (c) not more than -

- (i) 45 m apart in a Class 2 or 3 building or a *storey* containing a *ward area* in a Class 9a building; or
- (ii) 60 m apart in all other cases.

ND1.6 Dimensions of Exits

In a *required exit* or path of travel to an *exit*:

- (a) the unobstructed height throughout must be not less than 2 m
- (b) if the *storey* or mezzanine pertains to a Class 2 or 3 buildings or accommodates not more than 100 persons, the unobstructed width except for doorways must be -
 - (i) not less than 1 m; or
 - (ii) 2 m in a passageway from a *ward area*
- (c) if the *storey* or mezzanine accommodates more than 100 persons and not more than 200 persons the aggregate width, except for doorways, must be not less than -
 - (i) 1 m plus 250 mm for each 25 persons (or part) in excess of 100; or
 - (ii) 2 m in a passageway from a *ward area* in class 9a buildings
- (d) if the *storey* or mezzanine accommodates more than 200 persons, the aggregate width, except for doorways, must be increased to -
 - (i) 2 m plus 500 mm for every 60 persons (or part) in excess of 200 persons if egress involves a change in floor level by a stairway or ramp with a gradient more than 1:12; or
 - (ii) in any other case, 2 m plus 500 mm for every 75 persons (or part) in excess of 200
- (e) in an *open spectator stand* which accommodates more than 2000 persons the width except for doorways must be increased to 17 m plus a width (in meters) equal to the number in excess of 2000 divided by 600
- (f) the clear openings of a doorway must be not less than -
 - (i) in *ward areas* – 1.6 m wide or 1.25 m if it is a *horizontal exit*
 - (ii) in areas used by students in a *school* – 870 mm wide
 - (iii) the width of *exit required* by (b), (c), (d) or (e), minus 250 mm, or
 - (iv) in any other case except where it opens to a *sanitary compartment* or bathroom -760 mm wide; and
- (g) the *required* width of *exit* must not diminish in the direction of travel to a road or *open space*.

ND1.7 Travel via Smoke or Fire-isolated Exits

- (a) A doorway from a room must not open directly into a stairway, passageway or ramp that is *required* to be smoke or fire-isolated unless it is from -
 - (i) a public lobby, *public corridor*, hallway, or the like
 - (ii) a *sole-occupancy unit* occupying all of a *storey*; or
 - (iii) a *sanitary compartment*, airlock or the like.
- (b) Each stairway or ramp that is *required* to be smoke or fire isolated must provide independent egress from the *storey* served and discharge -
 - (i) directly, or by way of a *fire-isolated passageway*, to a road or *open space*; or
 - (ii) into a *storey* or space within the confines of the building that is enclosed for not more than 1/3 of its perimeter and used only for pedestrian movement, car parking, or the like, to a point where an unimpeded path of travel not further than 20 m is available to a road or *open space*.
- (c) if more than 2 access doors, other than from a *sanitary compartment* or the like, open to a fire-isolated *exit* in the same *storey* -
 - (i) a smoke lobby in accordance with ND2.6 must be provided; or
 - (ii) the *exit* must be pressurised in accordance with NE2.7.

- (d) A ramp must be provided at any change in level less than 600 mm in a fire-isolated passageway in a Class 9 building.

ND1.8 External Stairways

An external stairway may serve as a *required exit* instead of a smoke isolated or *fire-isolated stairway* in a building with an *effective height* of not more than 25 m if the stairway (including any connecting bridges) is of *non-combustible* construction throughout, and:

- (a) if any part of the stairway is exposed to, and less than 6 m from, a *window*, doorway or the like in an external wall, the stairway must be fully shielded in the affected area from such *window* or doorway by *non-combustible* construction with a FRL of not less than 60/60/60
- (b) if any part of the stairway is exposed to, and less than 6 m but more than 3 m from, a *window*, doorway or the like in an *external wall* of any building, the *window* doorway or the like must be protected in accordance with NC3.4.

ND1.9 Travel by Non-fire-isolated Stairways or Ramps

- (a) A *non-fire-isolated stairway* serving as a *required exit* must provide a continuous means of travel by its own flights of stairs and landings from every *storey* served to the level at which egress to a road or *open space* is provided.
- (b) in a Class 2, 3 or 4 building, the distance between the doorway of a room or *sole-occupancy unit* and the point of egress to a road or *open space* by way of any *required* stairway or ramp that is not fire-isolated must not exceed -
 - (i) 30 m in a building of Type G construction; or
 - (ii) 60 m in all other cases.
- (c) In a Class 5 to 9 building, the distance from any point on a floor and a point of egress to a road or *open space* by way of a *required non-fire-isolated stairway* or ramp must not exceed 80 m.
- (d) In a Class 2, 3 or 9a building, a *required non-fire-isolated stairway* or ramp must discharge at a point not more than -
 - (i) 15 m from a doorway providing egress to a road or *open space* or from a *fire-isolated passageway* leading to a road or *open space*; or
 - (ii) 30 m from one of 2 such doorways or passageways if travel to each of them from the stairway or ramp is in opposite or approximately opposite directions.
- (e) In a Class 5 to 8 or 9b building, a *required non-fire-isolated stairway* or ramp must discharge at a point not more than -
 - (i) 20 m from a doorway providing egress to a road or *open space* or from a *fire-isolated passageway* leading to a road or *open space*; or
 - (ii) 40 m from one of 2 such doorways or passageways if travel to each of them from the stairway or ramp is in opposite or approximately opposite directions.
- (f) If 2 or more *exits* are *required* and are provided by means of internal *non-fire-isolated stairways* or *non-fire isolated ramps*, each *exit* must -
 - (i) provide separate egress to a road or *open space*; and
 - (ii) be suitably smoke-separated from each other at the level of discharge.

ND1.10 Discharge from Exits

- (a) An *exit* must not be blocked at the point of discharge and where necessary, suitable barriers must be provided to prevent vehicles from blocking the *exit*, or access to it.
- (b) if a *required exit* leads to an *open space*, the path of travel to the road must have an unobstructed width throughout of not less than:

- (i) the minimum width of the *required exit*, or
 - (ii) 1 m; whichever is the greater.
- (c) If an *exit* discharges to *open space* that is at a level different from the public road to which it is connected, the path of travel to the road must be by -
 - (i) a ramp or other incline having a grade of not more than 1:8 at any part, or 1:14 if *required* by Part ND3; or
 - (ii) a stairway complying with this Code, except if the *exit* is from a Class 9a building.
- (d) The discharge point of alternative *exits* must be located as far apart as practicable.
- (e) In a Class 9b building which is an *open spectator stand* that accommodates more than 500 persons a *required* stairway or *required* ramp must not discharge to the ground in front of the stand.
- (f) In a Class 9b building containing an auditorium which accommodates more than 500 persons, not more than 2/3 of the *required* width of *exits* must be located in the main entrance foyer.

ND1.11 Horizontal Exits

Horizontal exits must:

- (a) not be counted as a *required exit*, when -
 - (i) between sole-occupancy units; or
 - (ii) in a Class 9b building used as an *early childhood centre*, primary or secondary *school*;
- (b) not comprise more than 50% of the number of *required exits* from any part of a *storey* which has been divided by a *fire wall*; and
- (c) have a clear area on each side of the *fire wall* to accommodate the total number of persons (calculated under ND1.13) from both parts of the *storey*, of not less than -
 - (i) 2.5 m² per patient in a Class 9a building; and
 - (ii) 0.5 m² per person in any other case.

ND1.12 Non-required Stairways, Ramps or Escalators

Escalators, moving walkways or non-*required* non-*fire-isolated* stairways or pedestrian *ramps*:

- (a) must not be used in a *ward area* in a Class 9a building
- (b) may connect any number of *storeys* if they are -
 - (i) in an *open spectator stand* or indoor sports stadium
 - (ii) in a carpark or an *atrium*; or
 - (iii) outside a building
- (c) must not connect, directly or indirectly, more than two consecutive *storeys* at any level in a Class 5, 6, 7, 8 or 9 building; and
- (d) in any other case, must not connect more than two consecutive *storeys*, provided that one of those *storeys* is situated at a level at which there is direct egress to a road or *open space*.

ND1.13 Number of Persons Accommodated

The number of persons accommodated in a *storey*, room or *mezzanine floor* must be determined with consideration to the purpose for which it is used and the layout of the *floor area* by:

- (a) calculating the sum of the numbers obtained by dividing the *floor area* of each part of the *storey* by the number of square metres per person listed in Table ND1.13 according to the use of the part, excluding spaces set aside for -
 - (i) lifts, stairs, ramps and escalators, corridors, hallways, lobbies, and the like
 - (ii) service ducts and the like, *sanitary compartments* or other ancillary uses

- (b) reference to the seating capacity in an assembly building or room; or
 - (c) any other suitable means of assessing its capacity.
-

Table ND1.13.1 - Area Per Person According to Use

Type of use		m ² per person
Art gallery, exhibition area, museum		4
Bar, café, church, dining room		1
Board room		2
Boarding house		15
Computer room for main frame and computers		25
Court room	Judicial	10
	Public seating	1
Dance floor		0.5
Dormitory		8
Early childhood centre		4
Factory	(a) Machine stop, fitting shop, or like place for cutting, grading, finishing or fitting of metals or glass, except in the fabrication of structural steelwork or manufacture of vehicles or bulky products	5
	(b) Areas used for fabrication and processing other than those in (a)	50
	(c) A space in which the layout and natural use of fixed plant or equipment determine the number of persons which will occupy the space during working hours	Area per person determined by the use of the plant or equipment
Garage	Public	30
Gymnasium		3
Hospital <i>ward area</i>		10
Hostel, hotel, motel, guest house		15
Indoor sports stadium arena		10
Kiosk		1
Kitchen, laundry (other than domestic) and laboratory		10
Library:	Reading space	2
	Storage space	30
Office, including one for typewriting or document copying or with desk-top computers		10
Plant room for:	Ventilation, electrical or other service units	30
	Boilers or power plant	50

Type of use		m ² per person
Reading room		2
Restaurant		1
School	Common staff room	2
	Individual staff room	10
	General classroom	2
	Only as for others	
Multi-purpose hall		1
	Trade and practical area:	
	Primary	4
	Secondary	As for workshop
Shop	Space for sale of goods	
	(a) At a level entered direct from the open air or any lower level	3
	(b) All other levels	5
Showroom	Display	5
Skating rink, based on rink area		1.5
Spectator stand, audience viewing area:		
	Bench seating	450 mm/person
	Fixed seating	number of seats
	Seating not fixed	1
	Standing viewing area	0.3
Storage space		30
Swimming pool, based on pool area		1.5
Telephone exchange – private		30
Theatre dressing room		4
Transport terminal		2
Workshop	For maintenance staff	30 (in the whole area)
	For manufacturing processes	as for factory

ND1.14 Measurement of Distances

The nearest part of an *exit* means in the case of:

- (a) a fire-isolated stairway, fire-isolated passageway, fire-isolated ramp, the nearest part of the doorway providing access to them
- (b) a non-fire-isolated stairway, the nearest part of the nearest riser
- (c) a non-fire-isolated ramp, the nearest part of the junction of the floor of the ramp and the floor of the storey

- (d) a doorway opening to a road or *open space*, the nearest part of that doorway
- (e) a *horizontal exit*, the nearest part of the doorway.

ND1.15 Method of Measurement

The following rules apply:

- (a) In the case of a room that is not a *sole-occupancy unit* in a class 2 or 3 building or class 4 part of a building, the distance includes the straight-line measurement from any point on the floor of the room to the nearest part of a doorway leading from it, together with the distance from that part of the doorway to the single *required exit* or point from which travel in different directions to 2 *required exits* is available.
 - (b) Subject to (d) and (f), the distance from the doorway of a room or *sole-occupancy unit* in a Class 2, 3 or 4 building is measured in a straight line to the nearest part of the *required single exit* or point from which travel in different direction to 2 *required exits* is available.
 - (c) Subject to (d) and (f), the distance between *exits* is measured in a straight line between the nearest parts of those *exits*.
 - (d) Only the shortest distance is taken along a corridor, hallway, external balcony or other path of travel that curves or changes direction.
 - (e) If more than one corridor, hallway, or other similarly defined internal path of travel connects *required exits*, the measurement is along the path of travel through the point at which travel in different directions to those *exits* is available.
 - (f) If a wall (including a demountable *internal wall*) that does not bound -
 - (i) a room; or
 - (ii) a corridor, hallway or the like.causes a change of direction in proceeding to a *required exit*, the distance is measured along the path of travel past that wall.
 - (g) If permanent fixed seating is provided, the distance is measured along the path of travel between the rows of seats.
-

ND2 CONSTRUCTION OF EXITS

ND2.1 Application of Part

Except for ND2.13 and ND2.16, this Part does not apply to the internal parts of a *sole-occupancy unit* in a Class 2 or Class 3 building or a Class 4 part.

ND2.2 Fire-isolated Stairways and Ramps

A stairway or ramp (including any landings) that is *required* to be within a *fire-resisting shaft* must be constructed:

- (a) of *non-combustible* materials; and
- (b) so that if there is local failure, it will not cause structural damage to, or impair the fire-resistance of the *shaft*.

ND2.3 Non-fire-isolated Stairways and Ramps

In a building having a rise of more than two *storeys*, *required* stairs and ramps (including landings and any supporting *structural members*) which are not *required* to be within a *fire-resisting shaft*, must be constructed according to ND2.2, or only of:

- (a) reinforced or prestressed concrete
- (b) steel in no part less than 6 mm thick; or
- (c) timber that -
 - (i) has a finished thickness of not less than 40 mm
 - (ii) has an average density of not less than 800 kg/m³ at a moisture content of 12%; and
 - (iii) has not been joined by means of glue unless it has been laminated and glued with resorcinol formaldehyde or resorcinol phenol formaldehyde glue.

ND2.4 Separation of Rising and Descending Stair Flights

If a stairway serving as an *exit* is *required* to be fire-isolated:

- (a) there must be no direct connection between a flight of stairs rising from a *storey* below the lowest level of access to a road or *open space*; and a flight of stairs descending from a *storey* above that level; and
- (b) any construction that separates or is common to the rising and descending flights of stairs must be *non-combustible* and have a FRL of not less than 60/60/60.

ND2.5 Open Access Ramps and Balconies

A *required* open access ramp or balcony must:

- (a) have ventilation openings to the outside air which -
 - (i) have a total unobstructed area not less than the *floor area* of the ramp or balcony; and
 - (ii) are evenly distributed along the open sides of the ramp or balcony; and
- (b) not be enclosed on its open sides above a height of 1 m except by an open grille or the like having a free air space of not less than 75% of its area.

ND2.6 Smoke Lobbies

A smoke lobby *required* by ND1.7 must:

- (a) have a *floor area* not less than 6 m²
- (b) be separated from the occupied areas in the *storey* by walls which are impervious to smoke, and -

- (i) have a FRL of not less than 30/30/- (which may be plasterboard, face brickwork, glass blocks or glazing)
 - (ii) extend from floor to floor, or to the underside of a ceiling with a *resistance to the incipient spread of fire* of 60 minutes which covers the lobby
 - (iii) construction joints between the top of the walls and the floor, roof or ceiling must be smoke sealed with intumescent putty or other suitable material
- (c) at any opening from the occupied areas, have smoke doors to Specification NC3.4, which are *self-closing* or held open by a fail-safe *automatic* magnetic release device; and
- (d) be pressurised to NE2.7 as part of the *exit* if the *exit* is *required* to be pressurised.

ND2.7 Installations in Exits and Paths of Travel

- (a) Access to service *shafts* and services other than to fire-fighting or detection equipment as permitted in Section NE, must not be provided from a *fire-isolated stairway, passageway or ramp*.
- (b) An opening to any chute or duct conveying hot products of combustion must not be located in any part of a *required exit* or any corridor, hallway, lobby or the like leading to a *required exit*.
- (c) Gas or other fuel services must not be installed in a *required exit*.
- (d) Services or equipment must not be installed in a *required exit* or in any corridor, hallway, lobby or the like leading to a *required exit* if it comprises -
- (i) electricity meters, distribution boards or duds
 - (ii) central telecommunications distribution boards or equipment; or
 - (iii) electrical motors or other motors serving equipment in the building
- (e) unless it is enclosed by *non-combustible* construction or a fire protective covering.

ND2.8 Enclosure of Space Under Fire-isolated Stairs and Ramps

- (a) **Fire-isolated stairways and ramps:** If the space below a *required fire-isolated stairway or ramp* is within the fire-isolated *shaft*, it must not be enclosed to form a cupboard or similar enclosed space.
- (b) **Non-fire-isolated stairways and ramps:** The space below a *required non-fire-isolated stairway* (including an external stairway) or *ramp* must not be enclosed to form a cupboard or other enclosed space unless -
- (i) the enclosing walls and ceilings have a FRL of not less than 60/60/60; and
 - (ii) any access doorway to the enclosed space is fitted with a *self-closing* -/60/30 fire door.

ND2.9 Width of Stairways

- (a) The *required* width of a stairway must -
- (i) be measured clear of all obstructions such as handrails, projecting parts of balustrades, columns, beams, and the like; and
 - (ii) extend without interruption, except for ceiling cornices, to a height not less than 2 m vertically above a line along the nosings of the treads or the floor of the landing.
- (b) A *required* stairway that exceeds 2 m in width is counted as having a width of only 2 m unless it is divided by a balustrade or handrail continuous between landings and each division is less than 2 m wide.

ND2.10 Ramps

ND2.10.1 Pedestrian ramps

- (a) A *fire-isolated ramp* may be substituted for a *fire-isolated stairway* if the construction enclosing the ramp and the width and ceiling height comply with the requirements for a *fire-isolated stairway*.
- (b) A ramp serving as a *required exit* must have a gradient of not more than -
- (i) 1:12 in areas used by patients in a Class 9a building; or
 - (ii) 1:14 if *required* by Part ND3
 - (iii) 1:10 if subject to wetting; or
 - (iv) 1:8 in any other case
- (c) The floor surface of a ramp must have a non-slip finish.

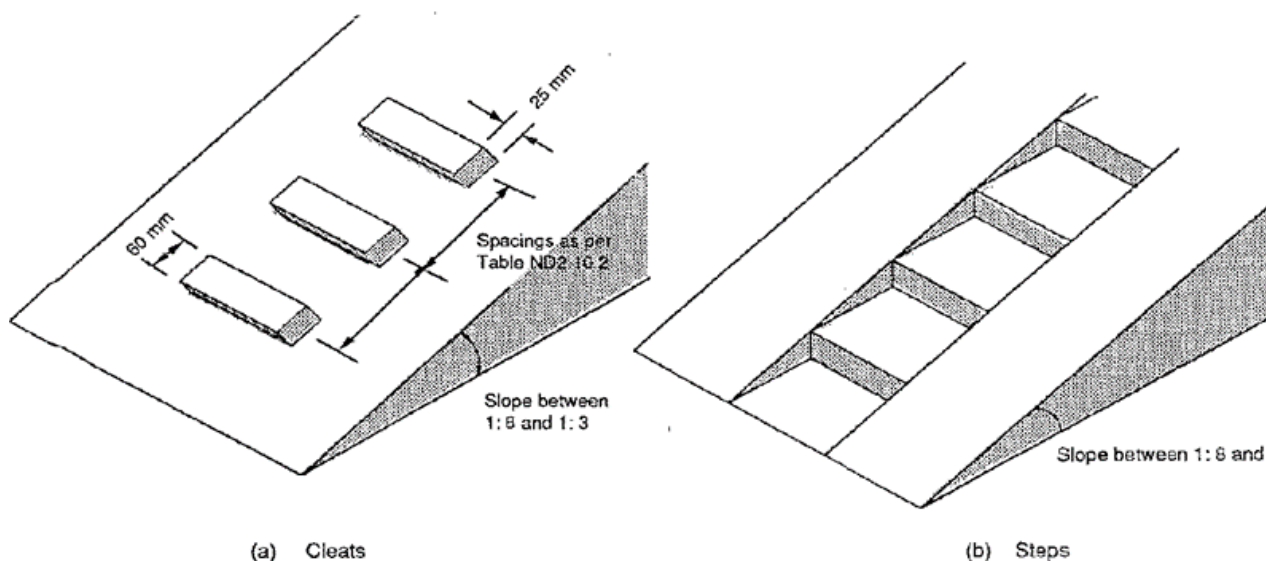
ND2.10.2 Service ramps

Service ramps must not be steeper than 1:3. Where they are steeper than 1:8 cleats must be provided at the spacing shown in Table ND2.10.2. Two examples are shown in figure ND2.10.2.

Table ND2.10.2 - Spacing of Cleats for Service Ramps

Ramp slope not more than	Cleat spacing (mm)	
	Goods carried	No goods carried
1:6	360	460
1:5	330	430
1:4	300	400
1:3	280	380

Figure ND2.10.1 - Examples of Service Ramps With Cleats



ND2.11 Fire-isolated Passageways

A *fire-isolated passageway* must be enclosed by walls, floors, and ceilings of *non-combustible* construction with a FRL of:

- (a) not less than that *required* for the stairway or ramp *shaft* if the passageway discharges from a *fire-isolated stairway or ramp*; or
- (b) in any other case - not less than 60/60/60.

ND2.12 Roof as Open Space

If an *exit* discharges to a roof of a building, the roof must:

- (a) have a FRL of not less than 120/120/120; and
- (b) not have any roof lights or other openings within 3 m of the path of travel of persons using the *exit* to reach a road or *open space*.

ND2.13 Treads and Risers

ND2.13.1 Straight Flights

- (a) A stairway must be suitable to provide safe passage in relation to the nature, volume and frequency of likely usage.
- (b) A stairway in any building (including a *sole-occupancy unit* in a Class 2 or 3 building or Class 4 part) satisfies (a) if it has -
 - (i) not more than 18 nor less than 2 risers in each flight, except in a Class 9 building subject to ND1.7(d)
 - (ii) subject to (ix), going and riser dimensions in accordance with Figure ND2.13.1 and Table ND2.13.1 that are constant throughout each flight
 - (iii) risers which do not have any openings that would allow a 100 mm sphere to pass through between the treads
 - (iv) treads which have a non-slip finish or a suitable non-skid strip near the edge of the nosings
 - (v) treads of solid construction (not mesh mother perforated material) if the stairway is more than 10 m high or connects more than three *storeys*
 - (vi) in a Class 9 building - not more than 36 successive risers and landings without a change in direction of at least 30°; and
 - (vii) across fall of between 1:100 and 1:50 where the stairway is subject to wetting
 - (viii) treads not exceed the goings by more than 30 mm; and
 - (ix) in a sole occupancy unit in a class 2 building or class 4 part, or where it is not part of a *required exit* and to which there is no normal access to the public, going and riser dimensions to Table DD1.1.

Figure ND2.13.1 - Measurement of Riser Going and Tread

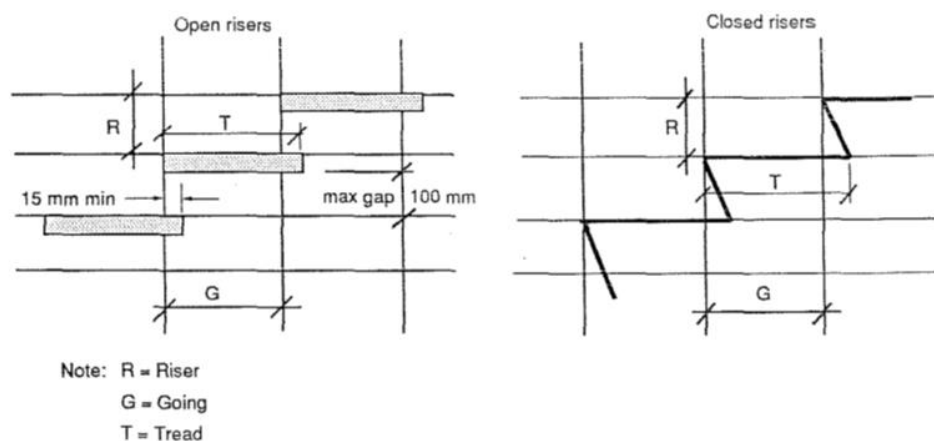


Table ND2.13.1 - Riser Dimensions (mm) to Match Going

Pitch	GOING (mm)								
	250	260	270	280	290	300	310	320	330
37°	188								
36°	182	188							
35°	175	182	189						
34°	168	175	182	188					
33°	162	169	175	181	188				
32°	156	162	168	174	181	187			
31°	150	156	162	167	174	180	186		
30°		150	156	161	167	173	179	185	
29°			150	155	161	167	173	179	183
28°				150	155	160	165	170	175
27°					148	153	158	163	168
26°						146	151	156	161
25°								149	154
24°									147

Notes:

- (c) Actual riser dimension may be selected to suit the inter-landing height. However the value of the riser dimension must not be outside the maximum or minimum dimensions shown for each value of going.
- (d) The dimensions shown within the outlined box are preferred because they are less strenuous for individuals on crutches or with minor disabilities.

ND2.13.2 Curved Stairs

Curved stairs must comply with the relevant requirements of ND2.13.1 as well as the following:

- (a) For the purposes of satisfying Table ND2.13.1 or Table DD1.1 in the case of stairs in ND2.13.1 (ix), the going must be measured -
- along half way across the width of the stair where the clear width is less than 900 mm; and
 - 300 mm from each side of the stair where the clear width is 900 mm or more
- (b) All steps must have the same uniform taper
- (c) The going at the narrow end of the steps must be not less than 75 mm
- (d) Winders are not permitted.

ND2.14 Landings

In a stairway:

- (a) landings having a maximum slope of 1:50 may be used in any building to limit the number of risers in each flight and each landing must -
- be not less than 750 mm long measured 500 mm from the inside edge of the landing; and
 - have a non-slip finish throughout or a suitable non-skid strip near the edge of the landing where it leads to a flight of stairs below; and

- (b) in a Class 9a building -
 - (i) the area of any landing must be sufficient to move a stretcher, 2 m long and 600 mm wide, at an incline not more than the slope of the stairs, with at least one end of the stretcher on the landing while changing direction between flights; or
 - (ii) the stair must have a change of direction of 180°, and the landing a clear width of not less than 1.6 m and a clear length of not less than 2.7 m.

ND2.15 Thresholds

The threshold of a doorway must not incorporate a step or ramp at any point closer to the doorway than the width of the door leaf unless:

- (a) in patient-care areas in a Class 9a building, the door sill is not more than 25 mm above the finished surface of the ground, balcony or the like to which the doorway opens
- (b) in other cases -
 - (i) the doorway opens to a road, *open space* or external balcony; and
 - (ii) the door sill is not more than 190 mm above the finished surface of the ground, balcony, or the like, to which the doorway opens.

ND2.16 Balustrades

- (a) in a Class 2, 3, 4, 5, 6 or 9 building and a Class 7 building used as a *public carpark*, a continuous balustrade must be provided along the side of any stairway or ramp, or any corridor, hallway, balcony, bridge or the like, if -
 - (iii) it is not bounded by a wall; and
 - (iv) the change in level is more than 1 mexcept at the perimeter of a *stage*, rigging loft, loading dock, an area accessible only to maintenance staff, or the like.
- (b) A balustrade *required* by (a) must prevent, as far as practicable -
 - (i) children climbing over or through it
 - (ii) persons accidentally falling from the floor; and
 - (iii) objects which might strike a person at a lower level accidentally falling from the floor surface.
- (c) in low risk areas such as *fire-isolated stairways*, *fire-isolated ramps* or external stairways that are provided instead of *fire-isolated stairways*, other areas used exclusively for emergency purposes and other stairways and ramps (including access bridges and landings), where the change in level is not more than 2 m a balustrade satisfies (b) if -
 - (i) the balustrade has a height of not less than 865 mm above the nosings of the stair treads and the floor of the landing, access bridge or the like; and
 - (ii) the space between balusters or the width of any opening in the balustrade (including any openable *window* or panel) is not more than 100 mm except where the space between rails or the height of any opening is not more than 100 mm.
- (d) At balconies a balustrade satisfies (b) if -
 - (i) it has a height of not less than 930 mm above the balcony floor
 - (ii) the space between balusters or the width of any opening in the balustrade is not more than 100 mm except where the space between rails or the height of the opening is not more than 100 mm
 - (iii) all parts of the balustrade more than 150 mm and less than 760 mm from the floor or nosings are vertical or otherwise do not provide a toe-hold; and

- (e) In stairways and ramps (including access bridges and landings) where the change in level is more than 2 m, a balustrade satisfies (b) if -
- (i) it has a height of not less than 865 mm above the nosings of the stair treads and the floor of the landing, balcony, corridor, hallway, access bridge or the like
 - (ii) the space between balusters or the width of any opening in the balustrade (including any openable *window* or panel) is not more than 100 mm except where the space between rails or the height of the opening is not more than 100 mm; and
 - (iii) all parts of the balustrade more than 150 mm and less than 760 mm from the floor or nosings are vertical or otherwise do not provide a toe-hold.
- (f) A balustrade or other barrier in front of fixed seating in a *mezzanine floor* or balcony in a Class 9b building satisfies (b) if it complies with (d), or -
- (i) it is not less than 700 mm in height above the *mezzanine floor* or balcony floor and a horizontal projection extends not less than 1 m outwards from the top of the balustrade; and
 - (ii) the space between balusters or the width of any opening in the balustrade is not more than 100 mm except where the space between rails or the height of the opening is not more than 100 mm.

ND2.17 Handrails

- (a) Except in a Class 7 or 8 building other than a *public carpark*, suitable handrails must be provided where necessary to assist and provide stability to persons using a ramp or stairway.
- (b) Handrails satisfy (a) if they are -
- (i) located along at least one side of the ramp or flight of stairs
 - (ii) located along each side if it is a Class 9b building that is used as an *early childhood centre* or as a primary *school*, or if the total width of the stairway or ramp is 2 m or more
 - (iii) not more than 2 m apart in the case of intermediate handrails; fixed at a height of not less than 700 mm above the nosings of stair treads in a Class 9b building that is used as a primary *school*
 - (iv) in any other case fixed at a height of not less than 865 mm above the nosings of stair treads and the floor surface of the ramp, landing, or the like; and
 - (v) continuous between stair flight landings and have no obstruction on or above them that will tend to break a hand-hold.
- (c) Handrails in a Class 9a building must be provided along at least one side of every passageway or corridor used by patients, and must be -
- (vi) fixed not less than 50 mm clear of the wall; and
 - (vii) where practicable, continuous for their full length.

ND2.18 Fixed Platforms, Walkways and Ladders

Fixed platforms, walkways, non-*required* stairways, handrails, balustrades and ladders must comply with AS 1657 in:

- (a) a Class 7 or Class 8 building, or part of a building; and
- (b) lift motor rooms, plant rooms, and the like.

ND2.19 Doorways and Doors

A doorway serving as a *required exit*, forming part of a *required exit*, or in a patient-care area of a Class 9a building:

- (a) must not be fitted with a revolving door
- (b) must not be fitted with a roller shutter or tilt-up door unless -

- (i) it serves a Class 6, 7 or 8 building or part with a *floor area* not more than 200 m²
 - (ii) the doorway is the only *required exit* from the building or part; and
 - (iii) it is held in the open position while the building or part is lawfully occupied
- (c) must not be fitted with a sliding door unless -
- (i) it leads directly to a road or *open space*; and
 - (ii) the door can be opened manually under a force of not more than 10 kg; and
- (d) if fitted with a door which is power-operated -
- (i) it must be able to be opened by hand under a force of not more than 10 kg if there is a malfunction or failure of the power source; or
 - (ii) it must open automatically if there is a power failure or on the activation of a fire or smoke alarm anywhere in the part served by the door.

ND2.20 Swinging Doors

A swinging door in a *required exit* or forming part of a *required exit*:

- (a) must not encroach -
- (i) at any part of its swing by more than 500 mm on the *required* width of a *required* stairway, passageway or ramp, including the landings; and
 - (ii) when fully open, by more than 100 mm on the *required* width of the *required exit*, and
- (b) the measurement of encroachment in each case is to include door handles or other furniture or attachments to the door
- (c) must swing in the direction of egress unless -
- (i) it serves a building or part with a *floor area* not more than 200m², it is the only *required exit* from the building or part and it is fitted with advice for holding it in the open position; or
 - (ii) it serves a *sanitary compartment* or airlock (in which case it may swing in either direction); and
- (d) must not otherwise impede the path or direction of egress.

ND2.21 Operation of Latch

A door in a *required exit*, forming part of a *required exit* or in the path of travel to a *required exit* must be readily openable without a key from the side that faces a person seeking egress, by a single-hand downward or horizontal pushing action on a single device which is located between 900 mm and 1200 mm from the floor, unless:

- (a) it serves a vault, strong room, *sanitary compartment*, or the like; or
- (b) it serves only, or is within -
- (i) a *sole-occupancy unit* in a Class 2 building or a Class 4 part
 - (ii) a *sole-occupancy unit* in a Class 5, 6, 7 or 8 building with a *floor area* not more than 200 m²; or
 - (iii) a space which is otherwise inaccessible to persons at all times when the door is locked; or
- (c) it serves a bank or other occupancy where special arrangements for security are necessary and it can be immediately unlocked -
- (i) by operating a fail-safe control switch, not contained within a protective enclosure, to actuate a device to unlock the door; or
 - (ii) by hand by a person or persons, specifically nominated by the owner, properly instructed as to the duties and responsibilities involved and available at all times when the building is lawfully occupied so that persons in the building or part may immediately escape if there is a fire or other emergency; or

- (d) it is fitted with a fail-safe device which automatically unlocks the door upon the activation of any *sprinkler system* or smoke or thermal detector system installed throughout the building.

ND2.22 Re-entry from Fire-isolated Exits

Doors must not be locked from inside a *fire-isolated stairway*, *fire-isolated ramp* or *fire-isolated passageway* enclosure to prevent re-entry to the *storey* or room it serves in:

- (a) a Class 9a building; or
 - (b) a building more than 25 m in *effective height* unless all the doors are automatically unlocked by a fail-safe device upon the activation of a fire alarm, and at least at every fourth *storey* the doors are not able to be locked and a sign is fixed on it stating that re-entry is available.
-

ND3 ACCESS FOR PEOPLE WITH DISABILITIES

ND3.1 Application of Part

This Part applies to all Class 3, 5, 6, 7, 8 and 9 buildings. For Class 1, 2, 4 and 10 buildings refer DD 2.1.

ND3.2 Access to Buildings

Access for people with disabilities must be provided to all buildings as set out in Table ND 3.2 by means of a continuous path of travel as described in the Australian Department of Foreign Affairs (DFAT): Accessibility Design Guide: Universal Design principles for Australia's Aid Program - Annex A – Built Environment - (Available free of charge DFAT website):

- (a) from the boundary of the allotment
- (b) from any carpark space on the allotment (whether within or outside the building):
 - (i) that is set aside for people with disabilities using the building; or
 - (ii) if there are no carpark spaces set aside for people with disabilities, from any carpark area that serves the building; and
- (c) from any other building on the allotment to which access for people with disabilities is *required*.

Table ND3.2 - Requirements for Access for People With Disabilities

Class of building	Access requirements
Class 3 (a) If the building contains: <ul style="list-style-type: none"> more than 10 units up to 49 units more than 49 but not more than 99 more than 99 units .. (b) If accommodation is provided for more than 10 persons other than in <i>sole-occupancy units</i> : <ul style="list-style-type: none"> up to 49 beds more than 49 but not more than 99 more than 99. (c) Common areas of buildings that are <i>required</i> to be accessible	To and within: <ul style="list-style-type: none"> 1 sole-occupancy unit. 2 sole-occupancy units. 3 sole-occupancy units. To and within: <ul style="list-style-type: none"> 2 beds. 4 beds. 6 beds. The entrance floor and to all public areas on that floor.
Class 5 and 6	To and within the entrance floor if its <i>floor area</i> is more than 500 m ² .
Class 7	To and within the entrance floor if the total <i>floor area</i> of the building is more than 3000 m ²
Class 8	To and within the entrance floor if the total <i>floor area</i> of the building is more than 3000 m ²
Class 5, 6, 7 and 8	To and within any floor if irrespective of <i>floor area</i> , the floor is not more than 190 mm at the point of entrance above or below the adjacent finished ground level; and within any other floor to which vertical access by way of a ramp, step or kerb ramp, or passenger lift is provided.

Class of building	Access requirements
Class9a	To and within all areas normally accessible to the public, patients or staff.
Class9b- An assembly building not being a school or an early childhood centre.	To and within every room that accommodates more than 100 persons, and if fixed seating is provided, not less than 1 wheelchair space for each 200 seats, or part, with a minimum of 2 spaces; and within any other floor to which vertical access by way of a ramp, step or kerb ramp, or passenger lift is provided. To and within every room used by children.
Notes The calculation of <i>floor area</i> and the number of persons accommodated are in accordance with ND1.13. For the purposes of this Table, a double/queen/king bed counts as 1 bed. A kerb ramp is a plastic or rubber ramp with a maximum 1:10 slope that is designed to provide easy access over or up a kerb for wheel chairs, pedestrians or vehicles.	

ND3.3 Parts of Buildings to be Accessible

- (a) Access for people with disabilities, in particular those with a physical or visual impairment, must be provided -
- (i) from the doorway at the entrance floor providing access to any *sanitary compartment required* for the use of people with disabilities; and
 - (ii) to areas normally used by the occupants, including emergency exits **but** excluding any plantroom, commercial kitchen, cleaners' store room, maintenance accessway, rigging loft, or the like.
- (b) A path of travel providing *required* access must not include a stairway, turnstile, revolving door, escalator or other impediment which would prevent a person in a wheelchair using it.
- (c) Access, finishes and fittings, including passageways, ramps, step or kerb ramps, passenger lifts, signs, doorways and other parts of the building *required* by this Part must comply at least with the provisions set out in the Australian Department of Foreign Affairs (DFAT): Accessibility Design Guide: Universal Design principles for Australia's Aid Program - (Available free of charge DFAT website).

ND3.4 Common Building Elements

Common building elements for accessibility include:

- (a) Controls and operating mechanism – e.g. vending machines, electrical switches, wall sockets etc.
- (b) Colour contrast – persons with vision impairment need colours to contrast sharply against background for them to successfully identify the objects, walls and obstacles
- (c) Flooring
- (d) Lighting – good lighting and contrasting environmental features to highlight them against their background
- (e) Tactile pathway – tactile guiding blocks (line type) indicate correct path/route to follow and tactile warning blocks (dot-type) to indicate an approaching hazard or change in direction
- (f) Signage – for: direction, information, identification, instructive, health and safety.

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION NE

SERVICES & EQUIPMENT

Performance Requirements

Deemed-to-Satisfy Provisions

NE1 Fire-Fighting Equipment

NE2 Smoke Control

NE3 Lift Installations

NE4 Emergency Lighting and Exit Signs

NE5 Maintenance of Safety Installations

NE6 Electricity

SECTION NE – SERVICES AND EQUIPMENT

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

NE1	Fire Fighting Equipment	NE4	Emergency Lighting, Exit Signs and Warning Systems
NE1.1	Application of Part	NE4.1	Application of Part
NE1.2	Fire mains and water supply	NE4.2	Emergency lighting requirements
NE1.3	Riser main system	NE4.3	Measurement of distance
NE1.4	Where hydrants are required	NE4.4	Design and operation of emergency lighting
NE1.5	Hose reels	NE4.5	Exit signs
NE1.6	Sprinklers	NE4.6	Direction signs
NE1.7	Portable fire extinguishers	NE4.7	Class 2,3 and 4 buildings: Exemptions
NE1.8	Fire and smoke alarms	NE4.8	Design and operation of exit signs
NE1.9	Fire control centres		
NE1.10	Fire precautions during construction	NE5	Maintenance of Safety Installations
NE1.11	Provision for special hazards	NE5.1	Application
		NE5.2	Maintenance requirements
NE2	Smoke Control	NE6	Electrical Work
NE2.1	Smoke venting	NE6.1	Safety
NE2.2	Exclusion of smoke from fire-isolated exits	NE6.2	Amenity
NE2.3	Natural smoke venting		
NE2.4	Air-handling systems		
NE2.5	Roof vents	Specifications	
NE2.6	Smoke exhaust systems	NE1.2	Fire mains and water supply services
NE2.7	Pressurisation	NE1.6	Fire sprinkler systems
		NE1.8	Fire detection and alarm systems
NE3	Lift Installations	NE1.9	Fire emergency control centres
NE3.1	Application of Part	NE2.4	Air handling systems in buildings
NE3.2	Stretcher facility in lifts	NE1.9	Fire emergency control centres
NE3.3	Warning against use of lifts in fire or earthquake	NE2.6	Smoke exhaust systems
NE3.4	Emergency lifts	NE4.4	Design and operation of emergency lighting

PERFORMANCE REQUIREMENTS

OBJECTIVES

A building must be so designed and constructed that the following objectives are fulfilled:

NEP1 Fire-fighting Equipment

Having regard to the size and use of the building and its Type of construction, adequate in-built and external fire protection services must be provided to:

- (a) restrict the growth to the compartment of origin
- (b) prevent fire spread to adjoining buildings or allotments; and
- (c) facilitate the fighting of fire to minimize damage to the building and its contents.

NEP2 Smoke Control

Air-handling systems installed in a building must:

- (a) provide suitable air for the health and safety of the occupants; and
- (b) incorporate reasonable measures to minimize the spread of smoke in the event of fire to escape paths from the building, to other compartments and to enable access by fire fighters.

NEP3 Lift Installations

Lifts where provided must have regard to the nature of any emergency:

- (a) to assist in the evacuation of the occupants; and
- (b) to facilitate access by fire-fighting and emergency personnel.

NEP4 Emergency Lighting and Exit Signs

- (a) Emergency lighting and *exit* signs must be provided where necessary to facilitate safe egress in an emergency upon failure of the normal lighting.
- (b) Suitable alarm systems must be provided to alert occupants of an emergency, initiate *automatic* counter measures and summon emergency personnel.

NEP5 Maintenance of Safety Installations

Equipment, installations and components critical to the safety of the building or the occupants must be adequately maintained in such condition that will enable their proper performance.

NEP6 Electrical Work

All electrical work must meet the following objectives:

- (a) It must prevent electrocution, burns or fire
- (b) It must satisfy the reasonable expectations of the users by ensuring that it is adequate for their intended use, both current and anticipated.

REQUIRED PERFORMANCE

NEP1.1 Active Fire Fighting

In determining the type and extent of active fire-fighting systems that must be provided for a building, the following must be taken into account:

- (a) the class of occupancy
- (b) proximity to fire-source features
- (c) Type of construction in relation to fire resistance
- (d) size of fire compartments
- (e) effective height
- (f) the flow rate and pressure of available water supply
- (g) the capacity of the Fire Brigade or other firefighting organisation that serves the area where the building is located; and
- (h) the technical resources available locally to satisfactorily install and regularly test and maintain the active fire-fighting system.

NEP1.2 Fire and Smoke Alarms

Reliable detection and warning systems must be installed for *automatic* operation in the event of a fire or generation of unacceptable levels of smoke. In the case of:

- (a) all tall buildings
- (b) buildings of medium size or larger, frequented by the public and where flammable and consumer goods are displayed; and
- (c) occupancies of excessive hazard of moderate size or larger,

the detection systems on initiation must automatically activate suitable fire-fighting systems.

NEP2.1 Smoke Control

Air handling systems in buildings must be no more complex than what is given in the Deemed-to-Satisfy Provisions unless satisfactory evidence is produced to show that the level of expertise available on an on-going basis would be adequate to keep them regularly tested serviced and maintained in a sound condition. Air handling systems must be such that smoke is not transported from the compartment or locality of origin to escape paths and other *fire compartments or storeys* to a concentration that might affect the safety of the occupants or hinder the work of fire fighters.

NEP3.1 Lift Installations

Lift installations in tall buildings must be capable of transporting stretchers without discomfort. Effective warning must be displayed against the use of lifts during fires or earthquakes. In very tall buildings at least one lift must be such that it can be safely operated. During emergencies such as fires and be switched during the emergency for operation by only emergency personnel such as fire fighters.

NEP4.1 Emergency Lighting

In moderately tall or higher residential buildings, in other than small buildings where the occupants are transient, and in all other buildings emergency lighting must be provided to clearly indicate, *exits* and the doors guarding such *exits* must be identifiably marked. Such buildings must also have emergency lighting available to facilitate the occupants to reach the *exits* without confusion and to safely negotiate the *exits* until they can be in a road or *open space*. The route to the *exits* must be identifiably marked. In hospitals and in areas where emergency personnel operate, there must be adequate emergency lighting to avoid patient trauma or 'hardship and to permit the staff to carry out emergency functions.

All emergency lighting must automatically operate in the event of any failure of normal lighting for a period long enough for the evacuation of all the occupants, plus a margin. Such lighting must give an adequate level of illumination to allow evacuation without hindrance.

NEP5.1 Electrical Safety

The supply system must:

- (a) have suitable devices of adequate interruptive duty to automatically shut off the supply in the event of a fault-or overload. Such devices must allow easy reinstatement of the supply after interruption.

- (b) have devices which are clearly identified and easily reached to isolate live parts from the incoming supply.
- (c) be constructed and installed to ensure that no part of the system can be subjected to a voltage higher than that for which the system was designed.
- (d) when the neutral of the supply is earthed, have socket outlet or plug - socket adaptor construction -which would ensure that the live, neutral and earth conductors can only be connected to the corresponding live, neutral and earth conductors of the plug.
- (e) where it is a common simply system be so compatible that the safety features of the system itself are not impaired.
- (f) where it has a multiple earthed neutral system, have an adequate connection between the neutral conductor and earth at each consumer's premises.
- (g) be adequately protected against damage arising from exposure to weather, water or excessive dampness mechanical loads and other such agents expected under normal conditions of use; and
- (h) ensure that the main switch is normally accessible only to the occupants.

NEP6.1 Amenity

The supply system must have an adequate capacity to serve the reasonable anticipated needs of the users.

DEEMED-TO-SATISFY PROVISIONS

NE1 FIRE-FIGHTING EQUIPMENT

NE1.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8 and 9 buildings.

NE1.2 Fire mains and Water Supply

- (a) Where a permanently charged *fire main* and water supply system are available, these must provide a continuous supply of water at sufficient pressures and rates of flow to enable effective firefighting on any adjoining building. The system must in addition have *hydrants* located free of obstructions at appropriate intervals. The location of the *hydrants* must be suitably marked for ease of identification by the fire service.
- (b) In the case of buildings with a *rise of 5 storeys or more* where an adjoining permanently charged *fire main* and water supply system is not available, adequate on *site* water storage and suitable fire pumps must be provided to give the rates and pressures of flow for firefighting, as per NZS 4510. The system provided may in addition serve any *required sprinkler system* or other *required* water type in-built fire protection system.
- (c) A *fire main* and water supply system must comply with Specification NE1.2.

NE1.3 Riser Main System

Riser mains to NZS 4510 must be provided in buildings with a *rise of 5 storeys or more*. In buildings with a *rise of up to 8 storeys*, a *charged dry riser main system* is allowable; for taller buildings, a *wet riser main system* is *required*. Any *wet riser main system* must be connected to a permanently-charged *fire main*. In buildings with a *rise of more than 8 storeys*, a dedicated *automatic* starting fire-pump or pumps in accordance with NZS 4510 must be installed in the system to boost the pressure and/or the rates of flow to the values *required* by the Standard.

NE1.4 Where Hydrants are Required

(a) General

One or more *hydrants* must be provided -

- (i) in each *storey* with a *floor area* of more than 750 m²
- (ii) in every *storey* if the building contains 5 *storeys* or more; and
- (iii) on the roof if the building has a *rise of more than 8 storeys* except on -
 - a roof having a *pitch* of more than 10°; or
 - a roof of a plant room or other subsidiary structure on the main roof.

(b) External *hydrants*

The configuration and location of a building and of adjacent external *hydrants* must be such that the farthest point on the *storeys* to which direct access from a street is available for the fire service, must be within reach of a 6 m spray from the nozzle of a 120 m fire hose.

External *hydrants* must be located:

- (i) not closer than 6 m from a building unless protected from it with a wall having a FRL of not less than 60/60/30 extending at least 2 m each side and 3 m above the *hydrant* outlets; and
- (ii) not more than 20 m unobstructed distance from hard-standing access for a fire-pump appliance.

(c) Internal hydrants

The *riser* main system must provide for sufficient number and disposition of internal *hydrants* such that any point on any *storey* is within reach of a 6 m spray from the nozzle of a 45 m fire hose.

Internal *hydrants* must be located on the floor not more than 4 m from a *required exit*, or in a *required* stairway, passageway or ramp so as not to encroach on the *required* width of the *exit*.

(d) Hydrants for the ground floor of a building may be external hydrants.

NE1.5 Hose Reels

Hose reels must be installed in buildings as listed in Table NE1.5 and must:

(a) not be located -

- (i) within a fire-isolated *exit*, or
- (ii) so that the hose will need to pass through the doorway fitted with a fire or smoke door; except a door to a *sole-occupancy unit* in a class 2, 3 or 4 building

(b) be located -

- (i) not more than 4 m from a *required exit* on each floor of the building (including the ground floor and adjacent to any *hydrants* required within the building; and
- (ii) so that the nozzle end of a fully-extended fire hose fitted to the reel and laid to avoid any partitions or other physical barriers will reach every part of the floor

(c) serve only the floor on which they are located except that a hose reel may serve a *sole-occupancy unit* of not more than 2 *storeys*, or a unit with a *mezzanine floor*, if the hose reel is located at the level of egress from that unit; and

(d) comply with AS/NZS 1221 and NZS 4503.

Table NE1.5 - Requirements for Firehose Reels

Occupancy	Fire hose reels required
Class 2	if more than 4 residential storeys contained
Class 3	if more than 2 residential storeys contained
Class 5,6,7,8 or 9b	any storey if floor area of storey more than 750 m ² or if more than 3 storeys contained.
Class 9a	all buildings
AND All Classes	where an internal hydrant is required,

NE1.6 Sprinklers

A required sprinkler system must:

- (a) comply with Specification NE1.6; and
- (b) be installed in buildings as listed in Table NE1.6.

NE1.7 Portable Fire Extinguishers

Portable fire extinguishers containing an extinguishing agent suitable for the risk being protected must be installed in accordance with NZS 4503 in all buildings except:

- (a) a Class 2 or 3 building; or
- (b) in the case of water-type extinguishers, a building or part of a building served by a fire hose reel.

Table NE1.6 - Requirements for Sprinklers

Occupancy	When sprinklers are required
Occupancies of excessive hazard	in fire compartments with: (a) a <i>floor area</i> of more than 2000 m ² , or (b) a volume more than 10,000 m ³ .
Class 6	in fire compartments with: (a) a <i>floor area</i> of more than 2000 m ² , or (b) a volume more than 12,000 m ³ .
All Classes except open-deck car park	in buildings more than 25 m in <i>effective height</i> or with a rise in excess of 6 <i>storeys</i> . The water supply for the <i>sprinkler system</i> must be to Class A.
Carparks other than <i>open-deck car parks</i>	(a) if accommodating more than 40 vehicles: (b) if incorporating structural steel members with a FRL less than 60/-/-
Note: (a) Occupancies of excessive fire hazard are listed in the annexure to Specification NE1.6. (b) See NC 2.3 for requirements for sprinklers in large, isolated buildings.	

Table NE1.7 shows the commonly available portable extinguishers and their selection for appropriate class and type of fires.

Table NE1.7 - Portable Fire Extinguisher Selection Chart

		Contents of Extinguisher are			
		Electrically conductive		Electrically non-conductive	
Class	Type of Extinguisher	WATER	FOAM	DRY CHEMICAL	CARBON DIOXIDE
	Type of Fire				
A	Ordinary combustibles (wood, paper, etc)	✓ YES MOST SUITABLE	✓ YES	✓ YES	✓ YES
B	Flammable liquids	X NO	✓ YES SPECIAL FOAM REQUIRED FOR ALCOLHOL- TYPE FIRE	✓ YES	✓ YES
C	Flammable gases	X NO	X NO	✓ YES	✓ YES
D	Combustible metals	X NO	X NO	X NO	X NO
USE SPECIAL PURPOSE EXTINGUISHERS ONLY					
E	Fire involving live electrical equipment	X NO	X NO	✓ YES	✓ YES

NE1.8 Fire and Smoke Alarms

NE1.8.1 A suitable *automatic* fire and smoke alarm system complying with Specification NE1.8 must be installed in:

- (a) each *storey* if the building has a rise of 5 to 8 *storeys*
- (b) a Class 3 building -
 - (i) if rooms for residential use are above a height of 2 *storeys*; or
 - (ii) in a special accommodation house or home for the aged, children, sick or physically or mentally disabled persons or the like; and
- (c) a Class 9a building -
 - (i) if more than 20 patients are accommodated in wards or bedrooms; or
 - (ii) in a clinic or day surgery, having areas where surgical procedures are performed at a height of 3 *storeys* or more.

NE 1.8.2 A manually operated evacuation alarm system to the relevant provisions of Specification NE1.8 must be provided in any building of:

- (a) Class 3 containing more than 20 beds where the rooms for residential use are located up to a height of only 2 *storeys*
- (b) Class 5 with a rise of 3 or 4 *storeys* and a *storey floor area* of more than 500 m²
- (c) Class 6, 7 or 8 excluding a *public carpark* with a rise of up to 4 *storeys* and a *storey floor area* of more than 500 m²
- (d) Class 9(a) with a rise of up to 4 *storeys*; and
- (e) in the residential part of a *school* accommodating more than 20 persons at a level above or below the entrance level. Also in all other class 9b buildings (including *schools*) with a *rise* of up to 4 *storeys* and a *storey floor area* of more than 250 m²; and

Type A, B or C alarm systems are acceptable for Class 3 buildings, Type B or C for Class 6 and 9 other than *schools*, and a Type A system for Class 7 and 8 buildings and *schools*.

NE1.9 Fire Control Centres

A fire control centre facility in accordance with Specification NE1.9 must be provided in:

- (a) all buildings with an *effective height* of more than 25 m; and
- (b) a Class 6, 7, 8 or 9 building with a total *floor area* more than 18 000 m².

NE1.10 Fire Precautions During Construction

In a building under construction:

- (a) not less than one fire extinguisher to suit Class A, B and C fires and electrical fires must be provided at all times on each floor adjacent to each *required exit* or temporary stair or *exit* and
- (b) after the building has reached an *effective height* of 12 m -
 - (i) the *required hydrants* and hose reels must be operational in at least every *storey* that is covered, by the roof or the floor structure above, except the 2 uppermost *storeys*; and
 - (ii) any required fire brigade booster connection must be installed.

NE1.11 Provision for Special Hazards

Suitable additional provision must be made if special problems of fighting fire could arise because of:

- (a) the nature or quantity of materials stored, displayed or used in a building or on the allotment; or
- (b) the location of the building in relation to a water supply for fire-fighting purposes.

NE2 SMOKE CONTROL

NE2.1 Smoke Venting

Buildings must have a system to control smoke as listed in Table NE2.1.

Table NE2.1 - Requirements for Smoke Control

Building	System
Sole-occupancy units in Class 2, 3 or 4 buildings. Single-storey buildings where the floor area of a fire compartment or storey does not exceed 500 m ² and is not served by a central mechanical ventilation plant.	No requirement
Single-storey buildings, or the top storey of multistorey buildings	Either: (a) Windows; panels or the like in accordance with NE2.3 (b) Roof vents in accordance with NE2.5, or (c) Smoke exhaust systems in accordance with NE2.6.
Multistorey buildings excluding the top storey	Windows, panels or the like in accordance with NE2.3.
Class 6 buildings with enclosed malls exceeding 40 m in length.	Smoke exhaust systems in accordance with NE2.6

NE2.2 Exclusion of Smoke from Fire-isolated Exits

Smoke must be excluded from fire-isolated *exits* in accordance with Table NE2.2.

Table NE2.2 - Means of Excluding Smoke from Fire-isolated Exits

Exit type	Requirement
A required fire-isolated stairway serving any storey above an effective height of 25 m. A required fire-isolated stairway serving 3 or more below-ground storeys. A required fire-isolated ramp or fire-isolated passageway having a path of travel more than 60 m along it to a road or open space.	Either: (a) a pressurisation system in accordance with NE2.7; or (b) Open access ramps or balconies in accordance with ND2.5
Note: A below-ground storey is one where egress involves an upward vertical climb of more than 1.5 m.	

NE2.3 Natural Smoke Venting

Windows, doors, panels, or the like, provided to control the movement of smoke must:

- (a) be as evenly distributed as practicable; and
- (b) be readily openable, except that if windows and panels or the like are provided on the ground-level storey, they need only be shatterable.

NE2.4 Air-handling Systems

If an air-handling system is installed in a building it must operate in accordance with Specification NE2.4.

NE2.5 Roof Vents

Required roof vents must comply with AS 2665, except that:

- (a) smoke curtains may divide the space below the roof into compartments with area not more than 1500 m²
- (b) all roof vents within the same compartment must open at the same time; and
- (c) roof vents must be activated by -
 - (i) except in a Class 7 or 8 building, a *sprinkler system* if it is installed throughout the building; or
 - (ii) a fire detection and alarm system which complies with AS 1670 parts 1, 3, 4 & 5 or NZS 4512; or
 - (iii) smoke detectors spaced not more than 30 m apart and 15 m from any smoke curtain and with not less than one detector for each 500 m² of *floor area*; or
 - (iv) rate-of-rise heat detectors spaced not more than 15 m apart and 7.5 m from any smoke curtain and with not less than one detector for each 250 m² of *floor area*.

NE2.6 Smoke Exhaust Systems

A *required* smoke exhaust system must comply with Specification NE2.6.

NE2.7 Pressurisation

A *required* pressurisation system must:

- (a) comply with AS 1668.1 except that, instead of the criterion of 50 Pa pressure differential across each door when all doors are closed, it must be 25 Pa
 - (b) not allow openable *windows* or other openable devices (other than necessary doorways, pressure-controlled relief louvres and *windows* openable by a key) in the stairway, ramp or passageway; and
 - (c) not serve more than one fire-isolated *exit* system and not form part of any other air-handling system.
-

NE3 LIFT INSTALLATIONS

NE3.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8 and 9 buildings.

Lift installations must comply with AS 1735 Parts 1 and 2.

NE3.2 Stretcher Facility in Lifts

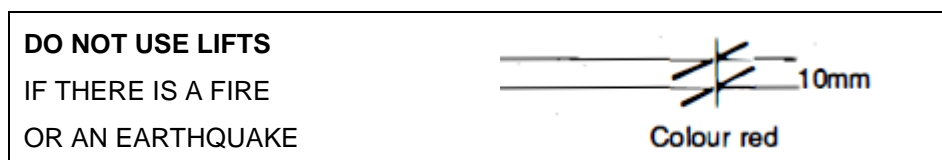
- (a) If passenger lifts are installed in any building with an *effective height* of more than 25 m, at least one lift serving all *storeys* of the building must have a stretcher facility in accordance with (b).
- (b) A lift *required* to comply with NE3.2(a) or NE3.4(b) must accommodate a raised stretcher with a patient lying on it horizontally by providing a clear space 600 mm wide x 2000 mm long x 1200 mm high above the floor level.

NE3.3 Warning Against Use of Lifts in Fire or Earthquake

A warning sign must:

- (a) be displayed where it can be readily seen -
 - (i) near every call button panel for a passenger lift or group of lifts throughout a building; except
 - (ii) a small lift such as a dumb-waiter or the like that is for the transport of goods only; and
- (b) comply with the details and dimensions of Figure NE3.3 and consist of -
 - (i) incised, inlaid or embossed letters on a metal, wood, plastic or similar plate securely and permanently attached to the wall; or
 - (ii) letters incised or inlaid directly into the surface of the material forming the wall.

Figure NE3.3 Warning Sign for Passenger Lifts



NE3.4 Emergency Lifts

- (a) Among the lifts serving every *storey* of a building with an *effective height* of 75 m or more, at least one must be capable of being used as an emergency lift.
- (b) An emergency lift *required* by (a) must -
 - (i) comply with AS 1735.2
 - (ii) be of sufficient size to take a stretcher facility in accordance with NE3.2(b), and
 - (iii) have a rating of at least 612 kg.

NE4 EMERGENCY LIGHTING, EXIT SIGNS AND WARNING SYSTEMS

NE4.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8 and 9 buildings.

NE4.2 Emergency Lighting Requirements

An emergency lighting system must be installed:

- (a) in every *fire-isolated stairway*, *fire-isolated ramp* or *fire-isolated passageway* located in Class 2 buildings of 5 *storeys* or more, Class 3 buildings containing 30 beds or more, a building with Class 4 parts located at or higher than 15 m *effective height*, and in all Class 5, 6, 7, 8 and 9 buildings
- (b) in every *storey* of a Class 5, 6, 7, 8 or 9 building where the *storey* has a *floor area* more than 500 m² -
 - (i) in every passageway, corridor, hallway, or the like, which is part of the path of travel to an *exit*
 - (ii) in any room having a *floor area* more than 250 m² if it does not open to a corridor or space which has emergency lighting.
- (c) in every passageway, corridor, hallway, or the like, having a length of more than 6 m from the entrance doorway of any *sole-occupancy unit* in a Class 2 building of 5 *storeys* or more, in a Class 3 building containing 30 beds or more, in a Class 4 part located at or above 15 m *effective height*, to the nearest doorway opening directly to -
 - (i) a fire-isolated stairway, fire-isolated ramp or fire-isolated passageway
 - (ii) an external stairway serving instead of a smoke or *fire-isolated stairway* under ND1.8
 - (iii) an external balcony leading to a fire-isolated stairway, fire-isolated ramp or fire-isolated passageway; or
 - (iv) a road or *open space*
- (d) in every *required non-fire isolated stairway*, ramp or passageway connecting more than 3 consecutive *storeys* in other than Class 2 buildings
- (e) in a *sole-occupancy unit* in a Class 5, 6, or 9 building if -
 - (i) the *floor area* of the unit is more than 500 m²; and
 - (ii) an *exit* from the unit does not open to a road or *open space* or to an external stairway, passageway, balcony or ramp, leading directly to a road or *open space*
- (f) in every room or space to which there is public access in every *storey* in a Class 6 or 9b building where -
 - (i) the *floor area* in that *storey* is more than 1000 m²
 - (ii) any point on the floor of that *storey* is more than 30 m from the nearest doorway opening directly to a stairway, ramp, passageway, road or *open space*
 - (iii) egress from that *storey* involves a vertical upward climb within the building of more than 1.5 m, or
 - (iv) the *storey* provides a path of travel from any other *storey* required by (i), (ii), or (iii) to have emergency lighting
- (g) in a Class 9a building -
 - (i) in every passageway, corridor, hallway, or the like, serving a *ward area* or patient treatment room; and
 - (ii) in every *ward area* or patient treatment room having a *floor area* of more than 200 m², and
- (h) in every *required* fire control centre.

NE4.3 Measurement of Distance

Distances, other than vertical *rise*, must be the shortest measurement along the corridor or the path of travel whether by straight lines, curves or a combination of both.

NE4.4 Design and Operation of Emergency Lighting

- (a) Emergency lighting systems must -
- (i) be *automatic* in operation
 - (ii) provide sufficient illumination without undue delay for safe evacuation of all areas of the building where it is *required*
 - (iii) if it is a central system, be suitably protected from damage by fire; and
 - (iv) operate without interruption for a minimum of 1 hour.
- (b) Emergency lighting in accordance with AS/NZS 2293.1 satisfies (a).

NE4.5 Exit Signs

Exit signs must be installed and be clearly visible to persons approaching the *exit*, on or near:

- (a) every door providing direct egress from a *storey* to -
- (i) an enclosed stairway, passageway or ramp serving as a *required exit*
 - (ii) an external stairway, passageway or ramp serving as a *required exit*, and
 - (iii) an external access balcony leading to a *required exit*
- (b) every door from an enclosed stairway, passageway or ramp at every level of discharge to a road or *open space*
- (c) every horizontal exit, and
- (d) every door serving as, or forming part of, a *required exit*.

NE4.6 Direction Signs

If the *exits* will not otherwise be readily apparent to persons occupying or visiting the building, *exit* signs with directional arrows must be installed in appropriate positions in corridors, hallways, lobbies, and the like, indicating the direction to a *required exit*.

NE4.7 Class 2, 3 and 4 buildings: Exemptions

NE4.5 does not apply to:

- (a) a Class 2 building in which every door referred to is clearly and legibly labelled on the side remote from the *exit* or balcony -
- (i) with the word "*EXIT*" in capital letters 25 mm high in a colour contrasting with that of the background, or
 - (ii) by some other suitable method, and
- (b) an entrance door of a Class 2, 3 or 4 *sole-occupancy unit*.

NE4.8 Design and Operation of Exit Signs

- (a) Every *required exit* sign must -
- (i) be clear and legible and have letters and symbols of adequate size
 - (ii) be illuminated at a level sufficient for it to be clearly visible at all times when the building is occupied by any person having the right of legal entry to the building
 - (iii) be installed so that if the normal power
 - (iv) supply fails, emergency illumination is provided to the sign in the case of those buildings covered by NE4.2, and

- (v) if illuminated by an emergency lighting
 - (vi) system incorporating wiring and a power source, comply with NE4.4.
 - (b) Exit signs in accordance with AS/NZS 2293.1 satisfy (a).
-

NE5 MAINTENANCE OF SAFETY INSTALLATIONS

NE5.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8, and 9 buildings.

NE5.2 Maintenance Requirements

Safety installations in buildings must be adequately maintained to the requirements of Table NE5.2.

Table NE5.2 - Schedule of Maintenance

Item to be inspected or tested	Nature of inspection and/or test, and frequency
1.Opening protection	
A <i>required</i> fire door, fire <i>window</i> , fire shutter or smoke door	Operate and inspect for compliance with the provisions of part NC3 and specification NC3.4 Monthly
2.Means of egress	Inspect to ensure compliance with section ND
(a) Exits and paths of travel including doors, doorways and exit signs	Monthly
(b) Required handrails and balustrades	Annually
(c) Arrangements for safe egress in buildings with special security provisions	Monthly
3.Signs	
(a) Signs concerning use of lifts in the event of fire	Inspect for legibility and installation in compliance with part ne4 Annually
(b) <i>Exit</i> sign illumination: internally-illuminated signs	Check that the lamp matches the approved lamp rating marked on the sign fitting Monthly
externally-illuminated signs	Check that the illumination is adequate Monthly
4 Emergency lighting	
<i>Required</i> emergency lighting	(a) Operate in conditions of simulated failure of power to the distribution board concerned and check for compliance with the provisions of part ne4 Monthly (b) Where batteries are involved: Test and inspect as prescribed in AS 1670 as though they are installed pursuant to the provisions of- that standard or where AS 1670 is not relevant, test or inspect as appropriate Monthly (c) Check battery charger for correct operation Monthly

Item to be inspected or tested	Nature of inspection and/or test, and frequency
5. Fire-fighting services & equipment	
(a) <i>Required</i> portable fire extinguishers (b) <i>Required</i> fire hose reels (c) <i>Required hydrants</i> and riser main system	As prescribed in NZS 4503 As prescribed in NZS 4503 As prescribed in NZS 4503
6. Sprinklers	
(a) Required sprinkler system (b) Plans containing reference information	As prescribed in NZS 4541 Inspect for presence and legibility to comply with NZS 4541
7. Air-handling systems	
(a) Simulate activation of detectors	Operate and check for correct operation in accordance with specification NE2.4 and NE2.6. Ensure that the system is left in correct operating condition all as in NZS 4512
(b) Detectors Associated batteries	Test and inspect as though they are prescribed for installations under NZS 4512 Check battery charger for correct operation all as in NZS 4512
(c) Fire situations	Check to ensure compliance with as 1668.1 Annually
(d) Fire-control panels	Test and inspect as though the panel is installed as a fire indicator board under NZS 4512
(e) Pressurising of stairs, ramps and passageways	Operate, test and inspect to ensure compliance with as 1668.1 Monthly
8. Manual fire alarms	
9. Automatic fire alarms	
(a) Required automatic alarms (b) Special situations and precautions and outdoor applications	As prescribed in NZS 4512 Inspect for compliance with NZS 4512
10. Lifts	
Lifts and associated equipment for operation in event of emergency	Operate under simulated emergency conditions and check for compliance with the provisions of NE3 Quarterly
11. Structural fire protection	
Compartmentation and fire protection of <i>structural members</i>	Ascertain that any work performed or any occurrence, accidental or otherwise, has not resulted in any reduction in the FRL or other fire protection provision of any part of the building installed as <i>required</i> Annually

NE6 ELECTRICAL WORK

NE6.1 Safety

NE6.1.1 General Requirements

All electrical wiring and installations in or on any Class 2 to 9 building must ensure safety from electric shock and fire. This requirement is satisfied if all electrical work associated with the building is done to comply with AS 3000 - Electrical installations-buildings, structures and premises (known as the SAA Wiring Rules). The capacity of the system must allow for the long-term anticipated requirements of the occupants.

NE6.1.2 Plug and Power Sockets

Plug and power sockets must:

- (a) have their individual switch
- (b) be located so that -
 - (i) cords and cables need not be taken across doorways
 - (ii) trailing cords and cables do not have to cross circulation routes
 - (iii) not be located behind door-swings; and
 - (iv) in the kitchen in Class 2, 3 and 4 buildings be located 250 mm above worktops at the back of benches or on a return wall where it exists.

NE6.1.3 Meter and Distribution Board

The meter must be located in a position from which it can easily be read. If the main switches and circuit breakers/fuses are not located with the meter, they must be located at a height of not less than 1.8 m from the floor where they can be found easily in the dark.

NE6.2 Amenity

NE6.2.1 Light-switch Layout

- (a) The layout of light switches in Class 2, 3 or 4 buildings must follow the main night-time circulation routes such as from the entrance hall to the living area to the bed-rooms to the bathroom and toilet. Crossing any major space in the dark must be avoided. The switches must be located close to door openings.
- (b) All stairs must have two-way switching at the top and the bottom.

SPECIFICATION NE 1.2 FIRE MAINS AND WATER SUPPLY SERVICES

1. Scope

This Specification refers to *fire mains* and water supply services for fire-fighting equipment in buildings.

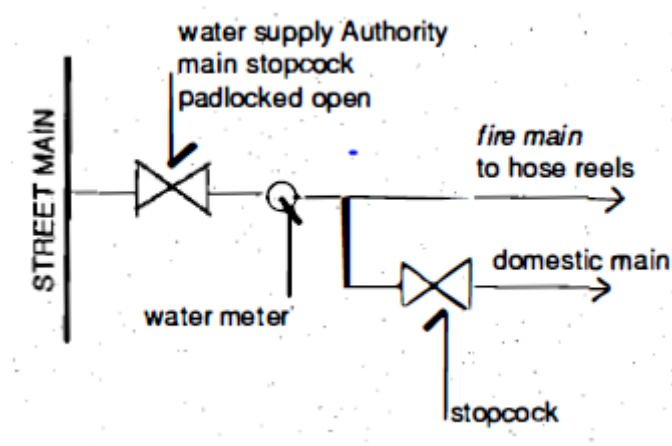
2. General Requirements

A fire main must:

- (a) be capable of supplying water at the flow rates and pressures necessary for the satisfactory operation of the *required* fire-fighting equipment
- (b) not incorporate plastic pipes above ground, and
- (c) not be used for other than fire-fighting purposes except a *fire main* serving only hose reels may be connected to a metered supply if -
 - (i) the *required* flow rate and pressure can be maintained at the most hydraulically-disadvantaged hose reel
 - (ii) the water meter and street supply to the allotment have a nominal diameter of not less than 32 mm
 - (iii) water supply pipework reticulation arrangements comply with Figure 2 or a similar arrangement, and
 - (iv) any system valve which can isolate flow in the *fire main* is secured in the open position by a padlocked metal strap.

In buildings with a *sprinkler system* with a dual-supply to Clast A of NZS 4541, the water supply to any *wet riser main system* and/or hose reels may be taken from one of those supplies provided the rates of flow and pressures are adequate for both or all three purposes.

Figure 2 - Water Supply Reticulation: Combined Services



3. Water Supplies for Sprinkler Systems

All water supplies for *sprinkler systems* must satisfy the requirements of NZS 4541. Further:

- (a) a Class C single supply system must comprise -
 - (i) a street main which may be boosted by a diesel fire pump unit
 - (ii) on-site storage or any source allowed by the Standard, or
 - (iii) a combined supply from two street mains which individually are inadequate, and
- (b) a Class A dual supply system must include -

- (i) a street main which may be boosted by a diesel fire pump or, any other primary source, and
- (ii) a separate on-*site* storage or other source allowed by the Standard, with an independent electric or diesel fire pump.

4. Fire Pump Enclosures

Fire pumps must be located in a room or enclosure which has a FRL of not less than 60/60/30 and is:

- (a) within the building; or
- (b) external but not within 6 m of the building and any *fire-source feature*:

5. Booster and *Charged Dry Riser* Main Connections and Cabinets

- (a) Each *fire brigade booster connection* and the fire service inlet connection for a *charged dry riser main system* must be in locked cabinets accessible only to the fire service. If the system is fitted with a pressure gauge, the gauge must comply with AS 1271, and have a full-scale reading of not less than 25% more than the pressure to which the system has been hydrostatically tested.
- (b) Cabinets may be located -
 - (i) at the *external wall* of a building if they are within sight of the main entrance and for Class 6, 7, 8 or 9b buildings, separated from the building by construction having a FRL of not less than 60/60/30 for not less than 2 m each side of and above the top of the cabinet
 - (ii) remote from the building if they are at the boundary of the allotment, within sight of the main entrance to the building, adjacent to the principal vehicular access to the allotment and located not less than 10 m. from the *external wall* of any building; or
 - (iii) in any other suitable position.
- (c) A permanent fade and water-resistant plan, equal to photo-engraved anodized aluminium, must be displayed in a prominent position within the cabinet, showing the following information -
 - (i) the layout of the building and adjacent streets
 - (ii) the layout of the fire-*hydrant* system
 - (iii) reticulation, with supply authority street mains and size, location of street and allotment *hydrants*, fire hose reels, booster connections, street and allotment isolating -and non-return valves, pumps and tanks
 - (iv) the operational discharge pressure and pressure at zero flow of any pump installed in the system
 - (v) the capacity of any tank connected to the system
 - (vi) the height of the highest *hydrant* outlet above the lowest booster inlet connection, and
 - (vii) the year of installation of the system.
- (d) Suitable provision must be made for the drainage of water from within a booster or *charged dry riser main system* cabinet.

SPECIFICATION NE1.6 FIRE SPRINKLER SYSTEMS

1. Scope

This specification sets out requirements for the design and installation of *automatic fire sprinkler systems*.

2. Adoption of NZS 4541

An *automatic fire sprinkler system* and associated water supply must comply with NZS 4541 subject to this Specification. For further details of water-supply requirements, see Specification NE1.2.

3. Interpretation

A reference to FRR in NZS 4541 means FRL as defined in this code.

4. Definition of a Sprinklered Building

Notwithstanding NZS 4541, a building or a part of a building is deemed to be sprinklered if:

- (a) in the case of a whole building, the building complies with Section NC of this Code and is sprinklered throughout, or
- (b) in the case of a part of a building -
 - (i) the part is sprinklered throughout and fire- separated from the unsprinklered part in accordance with Part NC2, and
 - (ii) any opening in the fire separating construction between the sprinklered and unsprinklered parts is protected in accordance with Part NC3.

5. Exceptions

Where a building or part of a building is *required* to be sprinklered throughout, the exceptions nominated in clause 207 of NZS 4541 apply except that a fire door in accordance with Part NC3 must be used for protection of openings.

6. Sprinkler Valve Enclosures

Sprinkler alarm valves must be located in a secure enclosure or room of adequate size, and where the valves are located within a building, the enclosure and *required* access to it must be suitable for the Fire Service.

7. Connection to Evacuation Alarm

The *sprinkler system* must be appropriately connected to any evacuation alarm system in the building to initiate the alarm in the event of activation of any sprinkler head.

ANNEXURE TO SPECIFICATION NE1.6

Occupancies of Excessive Fire Hazard

This annexure contains a graded list of examples of excessive fire hazard. The examples do not cover all possibilities and therefore there could be many other occupancies of excessive fire hazard. The Fire Authority having jurisdiction must be consulted in case of any doubt about occupancies not included in this Annexure.

Ordinary Hazard Occupancies

Group III Special

Flash fires are likely to occur in these occupancies. These include the following:

Chemical works and chemists (manufacturing or analytical) producing or using flammable solids, liquids, dusts and the like	Fibre glass products manufactures
Copra kilns-	Film and television studios
Cork factories	Flax. and hemp scutch mills
Cotton mills (preparatory processes)	Flax, jute and hemp mills (preparatory processes)
Distilleries (stillhouses)	Match factories
Exhibitions	Oil mills (crushing and solvent extraction)

Extra High Hazard Occupancies

Process risks

Examples of extra high hazard process risks are as follows:

Aircraft hangars	Foam rubber and foam rubber goods manufacturers and warehouses
Celluloid manufacturers and celluloid goods manufacturers	LPG bulk storage
Fire lighter manufacturers	Paint, colour and varnish works
Fireworks manufacturers	Resin, lamp black and turpentine manufacturers
Floor cloth and linoleum manufacturers	Rubber substitute manufacturers
Foam plastics and foam plastics goods manufacturers and warehouses	Tar distillers
	Woodwool manufacturers

High Piled Storage Risks

Extra high hazard high piled storage risks are subdivided into four categories. Fires in materials belonging to categories II, III and IV produce exceptionally intense fires with a high rate of heat release. The four categories are:

- (a) **Category I.** Category I comprises ordinary *combustible* materials and *non-combustible* materials in *combustible* wrappings, excluding those items specified under Categories II, III and IV, stored in bulk, in pallets or on racking, to heights exceeding 4 m. Examples of Category I storage are as follows:

Carpets	Groceries (items not packaged)
Clothing	Metal goods (in cartons)
Electrical appliances	Textiles
Fibreboard (high-density Hardboard)	All forms of paper storage other than those specified under Categories II and III
Glassware and crockery (in cartons)	

- (b) **Category II** - Examples of Category II storage are as follows:

Aerosol packs with flammable contents	Linoleum products.
Baled cork	Palletised whisky stocks
Baled waste paper	Plastics (non-foamed) other than celluloid (horizontal storage)
Cartons and carton flats	Rolled pulp and paper (horizontal storage)
Cartons containing alcohols in cans or bottles	Rolled asphalt paper (horizontal storage)
Cartons of canned lacquers which dry by solvent evaporation	Veneer sheets
Chipboard	Wood patterns
Fibreboard (low density soft board)	Wooden furniture

- (c) **Category III** - Examples of Category III storage are as follows:

Bitumen coated or wax coated paper	Rubber goods
Celluloid	Ventilated wood <i>stacks</i>
Esparto (loose)	Waxed or asphalt-coated paper and containers in cartons
Flammable liquids in <i>combustible</i> containers	Woodwool
Foamed plastics and foamed rubber products (with or without cartons) other than those specified in Category IV	Wooden pallets and wooden flats (idle)
Rolled pulp and paper (vertical storage)	All materials having wrappings or preformed containers of foamed plastics
Rolled asphalt paper (vertical storage)	

- (d) **Category IV** – Examples of Category IV storage are as follows:

Rolls of sheet foamed plastics or foamed rubber	Off-cuts and random pieces of foamed plastics or foamed rubber
---	--

SPECIFICATION NE1.8 FIRE DETECTION AND ALARM SYSTEMS

1. Scope

This Specification describes the installation and operation of automatic fire detection and alarm systems, and manually operated evacuation alarm systems. The *automatic* systems may also be used to operate a smoke control system within a building.

2. Automatic Systems

An *automatic* fire detection and alarm system must comply with AS 1670 parts 1, 3, 4 & 5 or NZS 4512 subject to this Specification.

2.1 Purpose

The purpose of a fire detection and alarm system is to:

- (a) warn the occupants of any fire within the building
- (b) alert the local Fire Service, and
- (c) activate any installed *automatic* smoke control system, and
- (d) provide for manual operation as an evacuation system.

2.2 Connection to Extinguishing Systems

Systems designed to AS 1670 parts 1, 3, 4 & 5 or NZS 4512 for the actuation of any fire extinguishing system must operate on a dual circuit to permit *automatic* operation of an evacuation alarm.

2.3 Location of Smoke Detectors

Smoke detectors must be:

- (a) wherever possible, surface mounted and external to air conditioning and ventilation ducts, unless a point-sampling system with maximum sensitivity level of 0.5% smoke obscuration is used
- (b) located at natural collection points for hot smoke having regard to the ceiling geometry and its effects on the migratory path
- (c) situated no closer than 3 m from smoke doors or fire doors, and
- (d) of the 'photo-electric' type if installed within ducts or atmospheres contaminated with sub-micron dust and other particles likely to set off an ionisation-type detector.

2.4 Threshold Levels

- (a) Sampling systems must comply with AS1670, with response times and alarm thresholds maintained at minimum levels and no alarm delay permitted on the highest alarm threshold.
- (b) The setting of alarm threshold levels for addressable detectors used within intelligent systems must not exceed the sensitivity levels nominated in -
 - (i) AS 1668.1, and
 - (ii) AS 1670 parts 1, 3, 4 & 5 or NZS 4512

3. Manually-operated Evacuation, Fire Alarm Systems

- (a) *Required* manually operated evacuation alarm systems must comply with AS 1670 parts 1, 3, 4 & 5 or NZS 4512 for installation, operation and maintenance. The three systems considered are -

Type A: Simple mechanical means

Type B: Simple electrical system, not monitored, and

Type C: Electrical systems continuously monitored by connection to the fire service station.

- (b) When Type B systems are installed, the following warning notice must be clearly marked near each manual call point: **NOT CONNECTED TO A FIRE SERVICE IN CASE OF FIRE PHONE**

showing the telephone number of the fire authority in the locality.

Type B systems may be substituted with a self-contained battery-operated system, provided care is taken to ensure that the battery has sufficient charge available at all times.

- (c) Location

Manual call points must be located not more than -

- (i) for Class 3 buildings, 20 m from the doorway of any *sole-occupancy unit*
 - (ii) for Class 5,6,7, 8 and 9b buildings, 20 m travel distance from any point on the floor, and
 - (iii) for Class 9a buildings:
 - 12 m from any point of the floor of a *ward area*, or
 - 6 m from the entrance doorway of any room which may be occupied by a, sleeping, sedated or dependent patient.
-

SPECIFICATION 1.9 FIRE EMERGENCY CONTROL CENTRES

1. Scope

This Specification describes the Construction and contents of *required* fire-control centres or rooms.

2. Purpose and Content

A fire-control centre or room must:

- (a) provide an area from which fire-fighting operations or other emergency procedures can be directed or controlled
- (b) contain controls, panels, telephones, furniture, equipment and the like associated with the *required* fire services in the building, and
- (c) not be used for any purpose other than the control of -
 - (i) fire-fighting activities, and
 - (ii) other measures concerning the safety or security of the building occupants.

3. Location of Fire-control Centre or Room

A fire-control centre or room must be so located in a building that egress from any part of its floor, to a public road or *open space*, does not involve changes in level which in aggregate exceed 300 mm.

4. Construction

A fire-control centre in a building more than 50 m in *effective height* must be in a separate room where:

- (a) the enclosing construction is, of concrete, masonry or the like, sufficiently impact-resistant to withstand the impact of any likely falling debris, and with a FRL of not less than 120/120/120
- (b) any material used as a finish, surface, lining or the like within the room complies with the requirements for *fire-isolated stairways* in Specification NC1.6
- (c) services, pipes, ducts and the like that are not directly *required* for the proper functioning of the fire-control room do not pass through it, and
- (d) openings in the walls, floors or ceiling which separate the room from the interior of the building are confined to necessary doorways, ventilation and other openings for services, necessary for the proper functioning of the facility.

5. Protection of Openings

Openings permitted by clause 4 must be protected as follows:

- (a) Openings for *windows*, doorways, ventilation, service pipes, conduits and the like, in an *external wall* of the building that faces a public road or *open space*, must be protected in accordance with Part NC3 as applicable.
- (b) Openings in the floors; ceilings and *internal walls* enclosing a fire-control room must, except for doorways, be protected in accordance with Part NC3, as appropriate.
- (c) A door opening in the *internal walls* enclosing a fire-control room, must be fitted with a *self-closing* 120/ 120/30 smoke-sealed fire door.
- (d) Openings associated with natural or mechanical ventilation must -
 - (i) not be made in any ceiling or floor immediately above or below the fire-control room, and
 - (ii) be protected by a 120/120/- fire damper if the opening is for a duct through a wall *required* to have a FRL, other than an *external wall*.

6. Exit Doors

- (a) *Required* doors to a fire-control room must open into the room, be lockable and located so that persons using escape routes from the building will not obstruct or hinder access to the room.
- (b) The fire-control room must be accessible via two paths of travel -
 - (i) one from the front entrance of the building, and
 - (ii) one direct from a public place or *fire-isolated passageway* which leads to a public place and has a FRL of not less than 120/120/120.

7. Size and contents

A fire-control room must contain not less than:

- (a) a Fire Indicator Panel and necessary control switches and visual status indication for all required fire pumps, smoke control fans and other required fire-safety equipment installed in the building
- (b) a telephone directly connected to an external telephone exchange
- (c) a blackboard or whiteboard not less than 1200 mm wide and 1000 mm high
- (d) a pin-up board not less than 1200 mm wide x 1000 mm high; and
- (e) a raked plan layout table of size not less than the plans to be laid out upon the table, and plans of the structural, architectural, electrical, mechanical, lift and fire service details Which may be stored beneath the plan layout table or within other suitable storage facility located in the room.

In addition, a fire-control room may contain:

- (a) master emergency control panels, lift annunciator panels, remote switching controls for gas or electrical supplies and emergency generator backup, and
- (b) building security, surveillance and management systems if they are completely segregated from all other systems.
- (c) A fire-control room must -
 - (i) have a gross area of not less than 10 m² and the length of any internal side must be not less than 2.5 m
 - (ii) if only the minimum prescribed equipment is installed- have a net *floor area* of not less than 8 m² with a clear space of not less than 1.5 m² in front of the Fire Indicator Panel, and
 - (iii) if additional equipment is installed, have an additional area of not less than 2 m² net *floor area* for each additional facility and a clear space of not less than 1.5 m² in front of each additional control or indicator panel,

and the area *required*, for any path of travel through the room to other areas must be provided in addition to the requirements of (ii) and (iii).

8. Ventilation and Power Supply

A fire-control room must be ventilated by:

- (a) natural ventilation from a *window* or doorway in *external wall* of the building which opens directly into the fire-control room from a roadway or *open space*, or
- (b) a pressurising system that only serves the fire-control room, and -
 - (i) is installed in accordance with AS 1668.1 as though the room is a *fire-isolated stairway*
 - (ii) is activated automatically by operation of the fire alarm or *sprinkler system* installed in the building and manually by an over-riding control in the room
 - (iii) provides a flow of fresh air through the room of not less than 30 air changes per hour when the system is operating and any door to the room is open
 - (iv) has fans, motors and ductwork that form part of the system but not contained within the fire-control room protected by enclosing construction with a FRL of not less than 120/120/120, and

- (v) has any electrical supply to the fire-control room or equipment necessary for its operation connected to the supply side of the main disconnection switch for the building and electrical service cables of copper-sheathed mineral-insulated cable with copper conductors,

and, no openable *window* or other openable device other than necessary doorways, pressure-controlled relief louvres and *windows* operable by a key, must be provided in the fire-control room.

9. Sign

The external face of the door to the fire-control room must have a sign with the words:

FIRE CONTROL ROOM

in letters not less than 50 mm high and colour which contrasts with that of the background.

10. Lighting

Emergency lighting in accordance with Part NE4 must be -provided in a fire-control room, except that an illumination level of not less than 400 Lux must be maintained at the surface of the plan table.

11. Equipment Not Permitted Within a Fire-control Centre or Room

An internal combustion engine, pumps, sprinkler control valves, pipes and ancillary fittings must not be located in a fire-control centre or room but may be located in rooms accessed through the fire-control centre or room.

12. Ambient Sound Level

The ambient sound level within the fire-control centre or room measured when all fire safety equipment is operating in the manner in which it operates in an emergency, must not exceed 65 dB(A), when determined in accordance with AS 2107.

SPECIFICATION NE 2.4 AIR HANDLING SYSTEMS IN BUILDINGS

1. Scope

This Specification outlines the performance and operation of mechanical ventilation and air conditioning systems as they relate to smoke control in buildings.

2. Commonly Used Systems

The following commonly used systems may be installed:

- (a) small stand-alone or *window* units without ducting;
- (b) central chilled water systems with fan coil units located in each *storey* without any ducting;
- (c) central chilled water systems with separate air handling plants in each *storey* or *fire compartment* and associated independent ducting for the *storey* or *fire compartment*;
- (d) individual packaged plants and associated ducting for each *storey*; or
- (e) central plant where all the conditioning is done and with the ducting system connecting several *fire compartments* or *storeys*.

3. Action on Detection of Smoke Fire or Flame

In the case of small units the power supply to the units must be switched off manually. With all other systems immediately on activation of any of the detection units:

- (a) the total system for the whole building must shut down;
- (b) any *required exit* pressurisation system must operate; and
- (c) any *required* smoke exhaust system or smoke-and heat vent must operate.

4. Compliance

The action *required* under 3(a), (b) or (c) must be *automatic* and be activated by:

- (a) smoke detectors located in each *storey* or *fire compartment* in accordance with Specification NE1.8 and with ducted systems, located just upstream of the supply fan as well as in the main return air duct; or
 - (b) by any other suitable fire alarm system, including a *sprinkler system*, installed within the building.
-

SPECIFICATION NE 2.6 SMOKE EXHAUST SYSTEMS

1. Scope

This Specification describes the performance and method of operation of smoke exhaust systems in buildings which are designed to:

- (c) remove smoke from within the building using ducted or roof mounted exhaust fans; or
- (d) in a shopping centre complex or mall, remove smoke from within pedestrian malls to maintain for as long as possible a tenable escape path for the occupants.

2. Fan Capacity

Fan systems must have an exhaust capacity in accordance with the height of the building as specified in Figure 3.

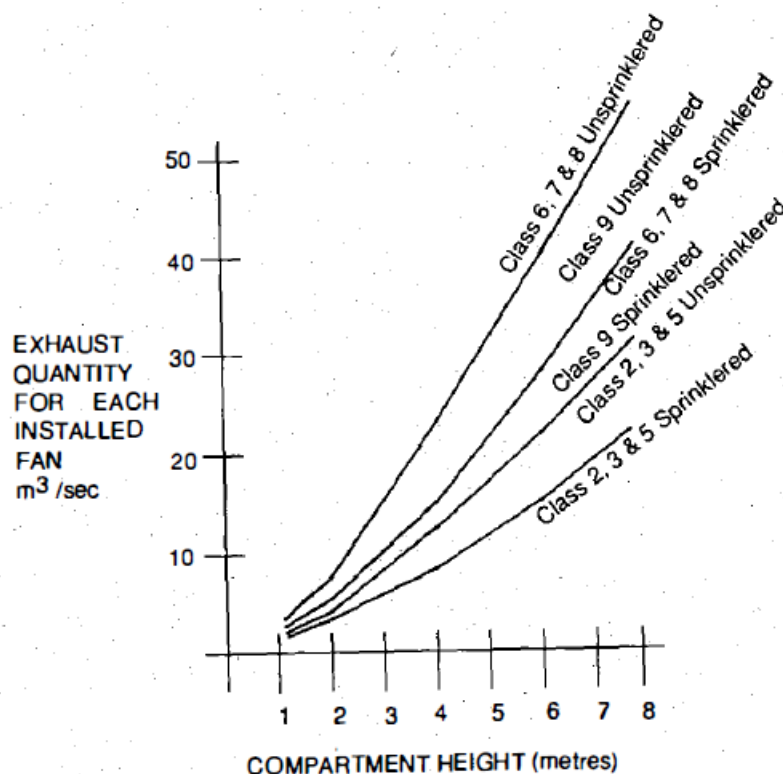


Figure 3 – Exhaust Capacity of Fans

3. Compartmentation at Ceiling Level

The storey or room at ceiling level:

- (a) must be divided into compartments not more than 1500 m² in area by smoke curtains in accordance with AS 2665, or
- (b) in a shopping centre complex or mall, must have -
 - (i) smoke curtains or, toughened or wired glass or *non-combustible* bulkheads, which extend not less than 1 m beneath an imperforate ceiling, or
 - (ii) ceiling coffers not less than 500 mm deep, each containing a smoke exhaust fan,

across the full width of the mall to divide it into lengths of not more than 40 m.

4. Location of Fans and Discharge

Exhaust fans must be located so as not to cause undue turbulence, and:

- (a) in a shopping centre complex or mall -

- (i) be spaced no more than 40 m apart and not more than 20 m from the end of the mall
 - (ii) not be at a mall intersection unless there is an open area where the ceiling is raised not less than 2 m above the ceiling in the mall, and
 - (iii) be located at natural collection points for the hot smoky gases within each smoke compartment having regard to the ceiling geometry and its effects on the migratory path of the smoke.
- (b) in other buildings be located so that each fan must serve not more than one 1500 m² roof compartment; and
- (c) discharge directly to the outside and in a manner that will not spread fire or smoke to adjacent fire compartments or buildings.

5. Make-up Air

Low-level fresh-air inlet openings or doors must be sized to provide adequate low-velocity fresh air make-up to satisfy the exhaust performance of the installed smoke exhaust fans, care being exercised in the number and location of such openings and their disturbance of the smoke layer due to turbulence created by the incoming air.

6. Operation of Fans

All smoke exhaust fans must start sequentially and be activated by the operation in the area served by the fan of:

- (a) a sprinkler system
- (b) a fire detection and alarm system which complies with Specification NE1.9
- (c) a detector system comprising -
 - (i) smoke detectors spaced not more than 30 m apart and 15 m from any curtain, bulkhead or wall and with not less than one detector for each 500 m² of *floor area*, or
 - (ii) rate-of-rise heat detectors spaced not more than 15m apart and 7.5m from any curtain, bulkhead or wall and with not less than one detector for each 250m² of *floor area*,

and not less than 2 detectors located on opposite sides of each fan inlet, or

- (d) in a shopping centre complex or mall -
 - (i) optical smoke detectors in each smoke compartment with at least one detector for each 150m² of *floor area*, arranged in at least 2 groups so that on activation of an alarm group in the respective smoke compartment full exhaust is initiated, and on activation of a second group and following a 30 second check period, an alarm is transmitted to the fire *service station*, and
 - (ii) a manual break-glass alarm at each *exit* from a shop with a *floor area* of more than 1000m² arranged to activate the exhaust system and transmit an alarm to the Fire Brigade.

7. Protection of Wiring

Power supply wiring for roof-mounted exhaust fans must be MIMS (copper) cable or otherwise suitably fire-protected where it passes through other *storeys* and might be affected by fire remote from the floor served by the plant.

8. Resistance to High Temperatures

If not adequately shielded from the airflow:

- (a) all parts of exhaust fans and other equipment *required* to operate in a smoke-laden environment; and
- (b) parts of the building *required* to be smoke-resisting,

must be capable of withstanding a temperature of 200°C for a period of not less than 1 hour.

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION NF

HEALTH AND AMENITY

Performance Requirements

Deemed to-Satisfy Provisions

NF1 Damp and Weatherproofing

NF2 Sanitary Facilities

NF3 Room Sizes

NF4 Light and Ventilation

NF5 Water Supply Plumbing

NF6 Sanitary Plumbing and Drainage

NF7 Roof Drainage

SECTION NF – HEALTH AND AMENITY

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

NF1	Damp and Weatherproofing	NF4.5	Ventilation of rooms
NF1.1	Site drainage	NF4.6	Natural ventilation
NF1.2	Building on land subject to dampness	NF4.7	Ventilation borrowed from adjoining room
NF1.3	Drainage of land external to building	NF4.8	Restriction on position of WCs and urinals
NF1.4	Weatherproofing of roofs and walls	NF4.9	Airlocks
NF1.5	Pliable roof sarking	NF4.10	Sub-floor ventilation
NF1.6	Water proofing of wet areas in buildings	NF4.11	Public carparks
NF1.7	Damp-proof courses	NF4.12	Uncovered space for Class 4 parts
NF1.8	Acceptable damp-proof courses		
NF1.9	Damp-proofing of floors on the ground	NF5	Water Supply Plumbing
		NF5.1	General requirements
NF2	Sanitary Facilities	NF5.2	Means of compliance
NF2.1	Facilities in residential buildings other than Class 1 and 10	NF5.3	Pipes which are not easy to access
NF2.2	Calculations of number of occupants and fixtures	NF5.4	Access to domestic-type water heaters
NF2.3	Facilities in Class 3 to 9 buildings	NF6	Sanitary Plumbing and Drainage
NF2.4	Facilities for people with disabilities	NF6.1	General requirements
NF2.5	Construction of sanitary compartments	NF6.2	Means of compliance
NF2.6	Interpretation: Urinals and washbasins	NF6.3	Certain floors to be drained
		NF6.4	Grease trap
NF3	Room Sizes	NF6.5	Toxic wastes
NF3.1	Height of rooms	NF6.6	Small treatment plants
NF3.2	Reduced height permissible		
NF3.3	Ceiling fans	NF7	Roof Drainage
		NF7.1	General requirements
NF4	Light and Ventilation	NF7.2	Means of compliance
NF4.1	Provision of natural light		
NF4.2	Methods and extent of natural lighting		
NF4.3	Natural light borrowed from adjoining room	Specifications	
NF4.4	Artificial lighting	Spec NF7.2	Sizing of Gutters and Downpipes

PERFORMANCE REQUIREMENTS

OBJECTIVES

A building must be designed and constructed to meet the following objectives:

NFP1 Damp and Weatherproofing

Suitable damp and weatherproofing must be provided where necessary to prevent:

- (a) moisture or damp affecting the stability of the building
- (b) the creation of any unhealthy or dangerous condition; or
- (c) causing damage to adjoining property.

NFP2 Cooking and Sanitary Facilities

Adequate toilet and washing facilities must be provided for the occupants of a building, having regard to its use and size. In residential buildings other than those meant for transient occupants suitable facilities must also be available for the preparation and cooking of food, the cleaning of utensils and the laundering of clothes.

NFP3 Room Sizes

The *floor area*, plan dimensions and ceiling heights of rooms and other spaces within a building must be adequate for their use or purpose.

NFP4 Light and Ventilation

The standard of light and ventilation within a building must be adequate for the occupants, having regard to the use or purpose of the building.

NFP5 Water Supply Plumbing

An appropriate safe and hygienic system of plumbing for the supply of water for domestic needs must be provided.

NFP6 Sanitary Plumbing

An appropriate system of drainage for the hygienic waterborne conveyance of *waste water* must be provided.

NFP7 Roof Drainage

Where a roof drainage system is provided, it must give reasonable protection against the overflow of rainwater into the building.

NFP9 Site Drainage

Unhealthy ponding of water in the allotment must not be allowed and the erection of the building or any *alteration* to it must not adversely affect the drainage of other allotments or of any public land.

REQUIRED PERFORMANCE

NFP1.1 Damp and Weatherproofing

Water and damp conditions must not be allowed to:

- (a) affect the stability of buildings
- (b) create ill health or discomfort for the occupants

- (c) damage or deface buildings as a result of moisture present at the completion of construction; or
- (d) cause damage to adjacent property.

NFP2.1 Cooking and Sanitary facilities

Any cooking facility provided must not spread smoke which may affect health or create a nuisance to the occupants or neighbours. Washing and clothes laundering facilities provided in residential buildings must be consistent with the size and occupancy of the building. The standard of toilet and washing facilities provided must in any building not create a nuisance or lead to ill health to the occupants or neighbours. These facilities must be located conveniently and the number of units provided must be consistent with the size and class of occupancy. Smoke extraction units from kitchens and other process operations in Class 6, 8 or 9 buildings must ensure that the progressive build-up of soot, grease and the like does not lead to a fire or unhealthy conditions.

NFP3.1 Room Sizes

The size and disposition of rooms in a building must be consistent with the requirements of health and hygiene.

NFP4.1 Light and Ventilation

Lighting via artificial or natural means shall be adequate for occupants at day or night. Where no mechanical ventilation is provided natural ventilation openings shall be adequate for the intended occupancy of the building.

Where air-handling systems are provided in a building there must be adequate provision for natural ventilation to cater for any prolonged failure of the system.

NFP5.1 Water Supply Plumbing

Plumbing for potable water supply must use materials which do not react with the water and thereby make it unsuitable. Suitable precautions must be taken to ensure that unsafe or unhygienic materials have no chance of entering the supply system. The installation of hot water systems must not impair the safety of the users. All concealed and difficult-to-access plumbing work must be suitably protected so that there is no likelihood of damage and leakage. The plumbing must take into account the current and anticipated needs of the user and allow for the simultaneous use of the connected system by others.

NFP6.1 Sanitary Plumbing and Drainage

Sanitary plumbing must be laid to self-cleansing grades consistent with their discharge loading, unless other suitable arrangements are made to ensure that the system is kept free of the accretion of *sewage* and other waste matter. The size of *drains* and the layout of their connections must reasonably ensure the current and anticipated needs of the users. The connections to sanitary installations must ensure that foul gases are not allowed to produce unhygienic conditions nor create any nuisance to anyone and are suitably vented.

NFP7.1 Roof Drainage

The roof drainage system must be capable of handling peak intensities of rainfall as follows:

- (a) Eaves gutters and downpipes - a 20-year return intensity.
- (b) Internal box gutters, valley gutters and downpipes - a 100-year return intensity.

Any known local variation in rainfall intensity must be taken into account. Sufficient allowance must be made for the possibility of overflow into the building due to ripples and turbulence in the flowing water during cyclonic winds.

NFP8.1 Site Drainage

The immediate *site* around the building must have suitable drainage so that no ponding results. Visible water must not be allowed to remain under or around for more than 1 hour after 10 minutes of maximum

rainfall resulting from a storm with a return period of 5 years. Flood waters or waves resulting from a storm or cyclone with a return period of 30 years must not be allowed to enter a building.

DEEMED-TO-SATISFY PROVISIONS

NF1 DAMP AND WEATHERPROOFING

NF1.1 Site Drainage

The construction of a *site* drainage system and the position and manner of discharge of a stormwater *drain* must not:

- (a) result in the entry of water into any building or other allotment
- (b) affect the stability of any building; or
- (c) create any unhealthy or dangerous condition within or around any building.

NF1.2 Building on Land Subject to Dampness

One or more of the following measures must be carried out if it is warranted by the dampness of the building *site*:

- (a) The subsoil must be adequately drained.
- (b) The ground under the building must be regraded or filled and provided with outlets to prevent accumulation of water.
- (c) The surface of the ground under the building must be covered with a suitable damp-resisting material.

NF1.3 Drainage of Land External to Building

A suitable system of drainage must be provided if paving, excavation or any other work on an allotment will cause undue interference with the existing drainage of rainwater falling on the allotment whether the existing drainage is natural or otherwise.

NF1.4 Weatherproofing of Roofs and Walls

Roofs and *external walls* (including openings for *windows* doors and the like) must be constructed to prevent rain or dampness penetrating to the inner parts of a building, unless it is:

- (a) a Class 7, 8 or 10 building and in the particular case there is no necessity for compliance
- (b) a garage, tool shed, *sanitary compartment*, or the like, forming part of a building used for other purposes; or
- (c) an *open spectator stand* or open deck carpark.

NF1.5 Pliable Roof Sarking

Pliable roof *sarking-type material* used under roof or wall coverings must comply with AS/NZS 4200.1.

NF1.6 Water Proofing of Wet Areas in Buildings

The following parts of a building must be impervious to water:

- (a) In any building - the floor surface or substrate in a shower enclosure, or within 1.5 m measured horizontally from a point vertically below the shower fitting, if there is no enclosure.
- (b) In a Class 3, 5, 6, 7, 8 or 9 building the floor surface or substrate in a bathroom or shower room, slop sink compartment, laundry or *sanitary compartment* which is used in common by the occupants.
- (c) The wall surface or substrate -

- (i) of a shower enclosure, or if the shower is not enclosed, within 1.5 m and exposed to a shower fitting, to a height of 1.8 m above the floor
 - (ii) immediately adjacent or behind a bath, trough, basin, sink, or similar fixture, to a height of 300 mm above the fixture if it is within 75 mm of the wall.
- (d) The junction between the floor and wall if the wall and floor are *required* to be impervious to water.
- (e) The junction between the wall and fixture if the wall is *required* to be impervious to water.

NF1.7 Damp-proof Courses

Except in a building that is exempt from weatherproofing under NF1.4, moisture from the ground must be prevented from reaching:

- (a) the lowest floor timbers and the walls above the lowest floor joists
- (b) the walls above the damp-proof course; and
- (c) the underside of a suspended floor constructed of a material other than timber, and the supporting beams or girders.

NF1.8 Acceptable Damp-proof Courses

A damp-proof course must consist of:

- (a) a material that complies with AS/NZS 2904
- (b) suitable termite shields placed on piers; or
- (c) other suitable material.

NF1.9 Damp-proofing of Floors on the Ground

If a floor of a room is laid on the ground or on filling:

- (a) moisture from the ground must be prevented from reaching the upper surface of the floor and adjacent walls by -
 - (i) the insertion of a vapour barrier in accordance with AS 2870; or
 - (ii) other suitable means; and
 - (b) damp-proofing need not be provided if the building is exempt from weatherproofing under NF1.4.
-

NF2 SANITARY AND OTHER FACILITIES

NF2.1 Facilities for Residential Buildings Other Than Class 1 and 10

Sanitary and other facilities for Class 2 and 3 buildings, and Class 4 parts of buildings, must be provided in accordance with Table NF2.1.

Table NF2.1 Provision of Sanitary and Other Facilities

CLASS OF BUILDING AND MINIMUM FACILITIES REQUIRED
<p><i>Class 2 Within each sole-occupancy unit</i></p> <ul style="list-style-type: none"> (a) A kitchen sink and facilities for the preparation and cooking of food (b) A shower; and (c) A closet pan and facilities for washing hands. <p><i>Class 2 For each building</i></p> <ul style="list-style-type: none"> (a) A separate laundry for each 4 <i>sole-occupancy units</i>, or part without its own clothes washing facilities, comprising at least one washtub and space for a washing machine (b) Clothes drying facilities comprising - <ul style="list-style-type: none"> (i) Lines or clothes hoists with not less than 7.5 m of line per <i>sole-occupancy unit</i>; or (ii) One heat-operated drying cabinet or appliance for each 4 <i>sole-occupancy units</i>, or part, without its own drying facilities. <p><i>Class 2 Facilities for employees</i></p> <ul style="list-style-type: none"> (a) If the building contains more than 32 <i>sole-occupancy units</i>, or if a group of Class 2 buildings on the one allotment contains in total, more than 32 <i>sole-occupancy units</i> (b) A closet pan and washbasin in a compartment or room at or near ground level and accessible to employees without having to entering a <i>sole-occupancy unit</i>.
<p><i>Class 3 Facilities for residents</i></p> <p>For each 10 residents for whom private facilities are not provided:</p> <ul style="list-style-type: none"> (a) A shower; and (b) A closet pan and washbasin, except that if one urinal is provided for each 25 males up to 50 and one additional urinal for each additional 50 males or part thereof, one closet pan for each 12 males may be provided. <p>If these facilities are situated outside the building, they should be conveniently accessible.</p>
<p><i>Class 4 For each sole-occupancy unit</i></p> <ul style="list-style-type: none"> (a) A kitchen sink and facilities for the preparation and cooking of food (b) A shower (c) A closet pan and washbasin (d) Clothes washing facilities, comprising a washtub and space in the same room for a washing machine; and (e) A clothes line or hoist, or space for a heat-operated drying cabinet or similar appliance for the exclusive use of the occupants.

NF2.2 Calculation of Number of Occupants and Fixtures

- (a) The number of persons accommodated must be calculated according to Table ND1.13 if it cannot be more accurately determined by other means.
- (b) Unless the premises are predominantly used by one sex or numbers of male and female users are known, sanitary facilities must be provided equally for both sexes.

In addition where the nature of employment of an employee is such that a shower is highly desirable at the end of the work (e.g. cooks and kitchen hands), showers must be provided for each 10 such male or female employee in any one shift.

NF2.3 Facilities in Class 3 to 9 Buildings

Sanitary facilities must be provided in Class 3, 5, 6, 7, 8 and 9 buildings in accordance with Table NF2.3

Table NF2.3 - Sanitary and Other Facilities

Class of building	User	Max number served by:								
		Closet fixture(s)			Urinal(s)			Washbasin(s)		
		1 Up to	2 Up to	Each extra	1 Up to	2 Up to	Each extra	1 Up to	2 Up to	Each extra
3, 5, 6 and 9 other than schools	Employees									
	Males	20	40	20	25	50	50	60	120	60
	Females	15	30	15	-	-	-	60	120	60
7 and 8	Employees									
	Males	20	40	20	25	50	50	30	60	30
	Females	15	30	15	-	-	-	30	60	30
6. Department stores, shopping centres and, individual shops in excess of 900 m ² total floor area	Patrons									
	Males	500	2400	1200	600	1200	1200	1000	4000	2000
	Females	300	600	1200	-	-	-	1000	4000	2000
6. Restaurants, cafes, bars, public halls, function rooms and 9a. Out patients	Patrons									
	Males	50	200	250	50	200	100	50	200	250
	Females	30	70	80	-	-	-	50	200	250
9a. Health-care buildings (Other than for out-patients)	Resident patients									
	Males	-	20	10	-	-	-	16	32	16
	Females	-	20	10	-	-	-	16	32	16
	Other facilities – provide 1 shower and 1 laundry point for every 40 inpatients plus and 1 hand washing facility at every toilet block and treatment area. For further guidance refer to the section on health facility design in the RWASH Technical Standards .									

9b. Schools not being early childhood centres	Staff and employees									
	Males	20	40	20	25	50	50	30	60	30
	Females	20	40	20	-	-	-	30	60	30
	Students at day schools									
	Males	40	80	40	30	70	40	100	200	100
	Females	30	60	30	-	-	-	100	200	100
	Other facilities – Provide 1 tap stand for drinking water for every 50 students.									
	Students at boarding schools									
	Males	35	70	35				100	200	100
	Females	25	50	25				100	200	100
	Other facilities – Provide 1 tap stand for drinking water for every 50 students, 1 shower for up to 40 students (separated by gender) and 1 laundry facility for every 50 students. For urban boarding schools allow 1 urinal for every 50 male students. For further guidance refer to the SI National Standards for School WASH facilities .									
9b. Early childhood centres	Children	-	30	15	-	-	-	-	30	15
	Other facilities – One shower must be provided.									
9b. Sporting venues, theatres, cinemas, art galleries or the like and churches, chapels or the like	Participants at sporting venues, theatres or the like									
	Males	20	40	20	10	20	10	20	40	20
	Females	15	30	15	-	-	-	20	40	20
	Other facilities: One shower for each 10 or part, participants.									
	Spectators or patrons									
	Males	250	500	500	100	200	100	250	500	500
	Females	75	250	250	-	-	-	250	500	500

NF2.4 Facilities for People with Disabilities

Sanitary facilities must be provided in accordance with Table NF2.4 in every Class 3, 5, 6, 7 and 9 building that is *required* by Part ND3 to be accessible to people with disabilities.

Table NF2.4 - Sanitary Facilities for People with Disabilities

Class of building and minimum facility for use by people with disabilities	
Class 3 – In every <i>sole-occupancy unit</i> to which access for people with disabilities is <i>required</i> : (a) One closet pan and washbasin; and (b) One shower.	
Class 5, 6, 7 and 9 buildings with <i>floor area</i> more than 1000 m ² and Class 3 if accommodation is other than in <i>sole-occupancy units</i> , or other parts of the building are <i>required</i> to be accessible.	
Number of persons for whom total facilities normally required	Minimum number for use by people with disabilities
Closet pans plus urinals	
1-100	(a) One unisex facility; or

	(b) One closet pan and washbasin for each sex
101-200	(c) Two unisex facilities; or (d) One closet pan and washbasin for each sex and one unisex facility
More than 200	(e) Two unisex facilities or one closet pan and washbasin for each sex and one unisex facility; and (f) One additional unisex facility or one closet pan and washbasin for each sex for each additional 100 person.
In all cases, facilities for females must include adequate means for the disposal of sanitary towels	
Bath or shower	One shower or shower-bath for each 10 or part thereof normally <i>required</i> , but not less than one for use by both sexes.

NF2.5 Construction of Sanitary Compartments

- (a) Partitions - Other than in any *early childhood centre*, *sanitary compartments* must have doors and partitions must separate adjacent compartments and extend -
- (i) from floor level to the ceiling in the case of a unisex facility; or
 - (ii) to a height of not less than 1500 mm above the floor if primary *school* children are the principal users, or 1800 mm above the floor in all other cases.
- (b) Facilities for people with disabilities - The construction and layout of *sanitary compartments* for use by people with disabilities must comply with the guidelines set out in the Australian Department of Foreign Affairs (DFAT): Accessibility Design Guide: Universal Design principles for Australia's Aid Program - Annex A – Built Environment - (Available free of charge DFAT website).

NF2.6 Interpretation: Urinals and Washbasins

- (a) A urinal may be either -
- (i) an individual stall or wall hung urinal
 - (ii) each 600 mm length of a continuous urinal trough; or
 - (iii) a closet pan used in place of a urinal.
- (b) A washbasin may be either -
- (i) an individual basin; or
 - (ii) a part of a hand wash trough served by a single water tap.

NF3 ROOM SIZES

NF3.1 Height of Rooms

Minimum heights below the ceiling and any framing excluding minor projections such as cornices, are:

- (a) Class 2, or 3 buildings, or Class 4 parts -
 - (i) habitable room - 2.4 m
 - (ii) laundry or the like - 2.1 m; and
 - (iii) corridor or passageway - 2.1 m.
- (b) Class 5, 6, 7 and 8 buildings -
 - (i) areas other than in (ii) - 2.4 m; and
 - (ii) corridor, passageway, or the like - 2.1 m.
- (c) Class 9a building -
 - (i) ward area - 2.4 m
 - (ii) operating theatre or delivery room - 3.0 m; and
 - (iii) treatment room, clinic, waiting room, passageway, corridor, or the like - 2.4 m.
- (d) Class 9b buildings -
 - (i) *school* classroom or other *assembly building* or part that accommodates not more than 100 persons - 2.4 m; and
 - (ii) theatre, public hall or other *assembly building* or part that accommodates more than 100 persons - 3.0 m.
- (e) Ancillary and other spaces -
 - (i) bathroom, shower room, water closet, toilet room, airlock, tea preparation room, pantry, store room, garage, carparking area, or the like, in any class of building - 2.1 m.

NF3.2 Reduced Height Permissible

These heights may be reduced if the reduction does not unduly interfere with the proper functioning of the room in:

- (a) attic rooms
- (b) rooms with a sloping ceiling or projection below ceiling line; or
- (c) other rooms or spaces.

NF3.3 Ceiling Fans

Ceiling fans and other such appliances must be at a minimum vertical clearance of 2.1 m.

NF 4 LIGHT AND VENTILATION

NF4.1 Provision of Natural Light

Natural lighting must be provided in:

- (a) Class 2 buildings and Class 4 parts - to all *habitable rooms*
- (b) Class 3 buildings to all bedrooms and dormitories.
- (c) Class 9a buildings - to all rooms used for sleeping purposes.
- (d) Class 9b buildings - to all general purpose classrooms in primary or secondary *schools* and all playrooms or the like for the use of children in an *early childhood centre*.

NF4.2 Methods and Extent of Natural Lighting

Direct natural lighting must be provided by *windows* that:

- (a) have an aggregate light transmitting area measured excluding framing members, glazing bars or other obstructions of not less than 10% of the *floor area* of the room
- (b) face -
 - (i) a court or other space open to the sky; or
 - (ii) an open verandah, open carport, or the like
- (c) are not less than a horizontal distance from any adjoining allotment, or a wall of the same building or another building on the allotment that they face, that is the greater of -
 - (i) in a Class 2, 3 or 9 building or a Class 4 part - 1 m
 - (ii) in a *ward area* or other room used for sleeping purposes in a Class 9a building - 3 m; and
 - (iii) 50% of the square root of the height of the wall in which the *window* is located, measured in metres from its sill.

NF4.3 Natural Light Borrowed from Adjoining Room

Natural lighting to a room in a Class 2 or 4 building, or in a *sole-occupancy unit* of a Class 3 building may come through a glazed panel or opening from an adjoining room (including an enclosed verandah) if:

- (a) in a Class 2 or 3 building or Class 4 part, both rooms are within the same *sole-occupancy unit* or the enclosed verandah is on common property
- (b) the glazed panel or opening has an area of not less than 10% of the *floor area* of the room to which it provides light; and
- (c) the adjoining room has *windows* with an aggregate light transmitting area of not less than 10% of the combined *floor areas* of both rooms.

The areas specified in (b) and (c) may be reduced as appropriate if direct natural light is provided from another source.

NF4.4 Artificial Lighting

Artificial lighting must be provided:

- (a) in *required* stairways and ramps by means of separate electrical wiring circuits from the main switchboard for the exclusive use of the stairway or ramp; and
- (b) if natural lighting of a standard equivalent to that *required* by NF4.2 is not available and the periods of occupation, or use of the room or space will create undue hazard to occupants seeking egress in an emergency, in -
 - (i) Class 4 parts - to *sanitary compartments*, bathrooms, shower rooms, airlocks and laundries

- (ii) Class 2 buildings - to *sanitary compartments*, bathrooms, shower rooms, airlocks, laundries, common stairways and other spaces used in common by the occupants of the building; and
- (iii) Class 3, 5, 6 7 8 and 9 buildings to all rooms that are frequently occupied and all corridors, lobbies, internal stairways, other circulation spaces and paths of egress.

NF4.5 Ventilation of Rooms

- (a) A *habitable room*, office, shop, factory, workroom, *sanitary compartment* bathroom, shower room, laundry and any other room occupied by a person for any purpose must have adequate flow-through or cross-ventilation and air quality, including sufficient air-changes and fresh air quantities.
- (b) Provision of either -
 - (i) natural ventilation complying with NF4.6; or
 - (ii) a mechanical ventilation or air conditioning system complying with AS 1668.2, with provision for natural ventilation to NF4.6 for use in case of a lengthy failure of the mechanical system, satisfies (a).

Where the *required* ventilation relies on mechanical or air-conditioning systems, *habitable rooms*, offices, shops, factories, workrooms or commercial laundries must have alternate natural ventilation for use in case of a lengthy failure of the mechanical system. The extent of natural ventilation available must be not less than 25% of that *required* under NF4.6. Otherwise, the mechanical system must have a complete stand-by system including for power generation.

NF4.6 Natural Ventilation

Required natural ventilation must be provided by permanent *windows*, openings, doors or other devices:

- (a) with an aggregate opening or openable size not less than 10% of the *floor area* of the room *required* to be ventilated; and
- (b) which open to -
 - (i) a court, or space open to the sky; or
 - (ii) an open verandah, open carport, or the like.

NF4.7 Ventilation Borrowed from Adjoining Room

Natural ventilation to a room may come through a *window*, opening, ventilating door or other device from an adjoining room (including an enclosed verandah) if both rooms are within the same *sole-occupancy unit* or the enclosed verandah is common property, and:

- (a) in a Class 2 building, a *sole-occupancy unit* of a Class 3 building or a Class 4 part of a building -
 - (i) the room to be ventilated is not a *sanitary compartment*
 - (ii) ventilation is not borrowed from one bedroom to another or between a bedroom and the kitchen
 - (iii) the *window*, opening, door or other device has a ventilating area of not less than 10% of the *floor area* of the room to be ventilated; and
 - (iv) the adjoining room has a *window*, opening, door or other device with a ventilating area of not less than 10% of the combined *floor areas* of both rooms
- (b) in a Class 5, 6, 7, 8 or 9 building -
 - (i) the *window*, opening, door or other device has a ventilating area of not less than 10% of the *floor area* of the room to be ventilated, measured not more than 3.6 m above the floor; and
 - (ii) the adjoining room has a *window*, opening, door or other device with a ventilating area of not less than 10% of the combined *floor areas* of both rooms; and

- (c) the ventilating areas specified in (a) and (b) may be reduced as appropriate if direct natural ventilation is provided from another source.

NF4.8 Restriction on Position of WCs and Urinals

A room containing a closet pan or urinal must not open directly into:

- (a) a kitchen or pantry
- (b) a public dining room or restaurant
- (c) a dormitory in a Class 3 building
- (d) a room used for public assembly; or
- (e) a workplace normally occupied by more than one person.

NF4.9 Airlocks

If a room containing a closet pan or urinal is prohibited under NF4.8 from opening directly to another room:

- (a) in a *sole-occupancy unit* in a Class 2 or 3 building or in a Class 4 part -
 - (i) access must be by an airlock, hallway or other room; or
 - (ii) the room containing the closet pan or urinal must be provided with an exhaust fan; and
- (b) in a Class 5, 6, 7, 8 or 9 building (which is not an *early childhood centre*, *primary school* or *open spectator stand*) -
 - (i) access must be by an airlock, hallway or other room with a *floor area* of not less than 1.1 m² and fitted with *self-closing* doors at all access doorways; or
 - (ii) the room containing the closet pan or urinal must be provided with mechanical exhaust ventilation and the doorway to the room adequately screened from view.

NF4.10 Sub-floor Ventilation

- (a) Suitable provision must be made to prevent undue deterioration of the lowest floor of a building because of dampness, other conditions on the allotment or the design of the building.
- (b) The following would satisfy the requirements of (a):
 - (i) where timber is used, the floor framing must be suspended with an absolute minimum of 250 mm and an average minimum of 400 mm clearance from the ground underneath to the floor and the immediate surrounds of the building. The average clearance must be determined as the average of the clearances at the corners of a 3 m square grid covering the building. Subfloor ventilation must be provided with ventilation openings totalling not less than 3% of the peripheral vertical area between the ground and the boundary of the floor. These openings are to be spaced uniformly and at not more than 1.8 m apart.
 - (ii) where other than timber is used:
 - subfloor ventilation must be provided if the floor is suspended
 - an impervious cover provided over the ground surface beneath the building; or the floor members suitably treated.

NF4.11 Public Carparks

Every *storey* of a *public carpark* must have:

- (a) a mechanical ventilation system complying with AS 1668.2; or
- (b) a suitable system of permanent natural ventilation in accordance with NF4.6

NF4.12 Uncovered Space for Class 4 Parts

Class 4 parts of buildings must have sole access to a space open to the sky of 20 m² minimum area. Of this at least 5 m² must be at the same level as the Class 4 part and the rest may be at either 3 m above or 3 m below.

NF 5 WATERSUPPLY PLUMBING

NF5.1 General Requirements

The plumbing work for water supply must ensure:

- (a) the appropriateness of the materials and products-used
- (b) the correct sizing of water services for the intended use
- (c) the control of cross-connections and prevention of backflow
- (d) adequate care in the installation of the services
- (e) suitable provision of main and subsidiary storage as *required*
- (f) adequate connections to sanitary services without endangering health and hygiene; and
- (g) the installation of hot water systems to provide safe and adequate service.

NF5.2 Means of Compliance

The requirements of NF5.1 are satisfied if all plumbing for water supply is carried out to the relevant provisions of:

- (a) AS/NZS 3500 Part 1 - Water Services and its amendments
- (b) AS/NZS 3500 Part 4 – Heated Water Services and its amendments
- (c) AS/NZS 2845.1 Water Supply Backflow Prevention Devices – Part 1: Materials, Design and Performance Requirements and its amendments.

NF5.3 Pipes which are Not Easy to Access

Particular attention is drawn to the provisions in AS 3500 - Parts 1 and 4 which prohibit the installation of pipes and fittings of certain materials in locations which are concealed or difficult to access. These include pipes made of ABS, galvanised steel, polybutylene and UPVC. Pipes and fittings made of copper, copper alloy, stainless steel, ductile iron, cast iron and polyethylene when used in concealed or difficult to access locations must follow the special precautions specified in AS 3500 - Parts 1 and 4.

NF5.4 Access to Domestic-type Water Heaters

- (a) A household water heater which is installed in a building must -
 - (i) be supported on construction sufficient to carry its full capacity weight and any possible wind or earthquake loads
 - (ii) be positioned to enable adequate access for operation, maintenance and removal; and
 - (iii) provide suitably for any overflow, especially if installed in a concealed location.
 - (b) AS 3500 - Part 4 is the relevant standard for the installation of a household water heater.
 - (c) Solar thermal – solar thermal systems shall comply with AS/NZS 2712 and shall be sufficiently braced against any applicable wind or earthquake loadings. Consideration of additional gravity loads due to solar thermal systems shall be given during the structural design of the building.
-

NF6 SANITARY PLUMBING AND DRAINAGE

NF6.1 General Requirements

Sanitary plumbing and drainage must ensure:

- (a) the appropriateness of the products and materials used
- (b) the correct sizing of drainage services for the intended use
- (c) adequate care in the installation of the services including the provision of appropriate grades; and
- (d) that foul gases are not allowed to produce unhygienic conditions or any nuisance to anyone.

NF6.2 Means of Compliance

The requirements of NF6.1 are satisfied if all sanitary plumbing and drainage works are carried out to the relevant provisions of AS 3500 - Part 2 - Sanitary plumbing and sanitary drainage.

NF6.3 Certain Floors to be Drained

In a Class 2, 3 or 4 Part building the floor of each bathroom and laundry in a *sole-occupancy unit* which is located at other than the lowest level must be graded to permit drainage to a floor waste gully.

NF6.4 Grease Trap

Where the nature of the occupancy is such that the *waste water* contains grease, fats or oils to levels unacceptable to the Approval Authority - having jurisdiction, a suitable grease trap must be installed. The accumulated grease and oils must be removed at intervals sufficient to prevent their escape into the disposal system. After removal the grease and oils must be suitably disposed of.

NF6.5 Trade Wastes

Any trade waste unacceptable to the Approval Authority having jurisdiction must be pre-treated before it enters the disposal system.

NF6.6 Small Treatment Plants

Where there is no public sewerage and treatment system available one of the following methods may be used for the treatment of *sewage*:

- (a) Packaged treatment plants
- (b) Septic tanks
- (c) Any other suitable method.

The details given in Specification DF2.1 (or within the Solomon Islands Building Manual - Annexure for Septic Tanks for Domestic Use) may be used for the preliminary design of the main elements of a septic tank system if such a system is being considered.

NF7 ROOF DRAINAGE

NF7.1 General Requirements

Gutters and downpipes where provided must have sufficient capacity to reasonably prevent the overflow of rain water into the building. The peak intensities of rainfall that the gutters and associated downpipes must be able to handle are as follows:

- (a) Eaves gutters - a 20-year return intensity of 80 mm/hr
- (b) Box and valley gutters - a 100-year return intensity of 100 mm/hr
- (c) Gutters and downpipes for temporary buildings - a 5-year return intensity of rainfall of 63 mm/hr.

Eaves gutters other than for temporary buildings must have a designed free-board of 25 mm and box gutters, 35 mm.

NF7.2 Means of Compliance

The requirements of NF7.1 are satisfied if the requirements of AS/NZS 2179 - Metal rainwater goods - Specification and AS 3500 Parts 2 and 3 – Plumbing and Drainage: Stormwater Drainage, are met. Specification NF7.2 covers some of these requirements.

SPECIFICATION NF7.2 SIZING OF GUTTERS AND DOWNPIPES

1. Design Criteria

The design of a roof-drainage system is based on the following factors:

- (a) Rainfall intensity and risk of flooding
- (b) Catchment area of roof
- (c) Gutter efficiency
- (d) Spacing of downpipes.

1.1. Rainfall Intensity

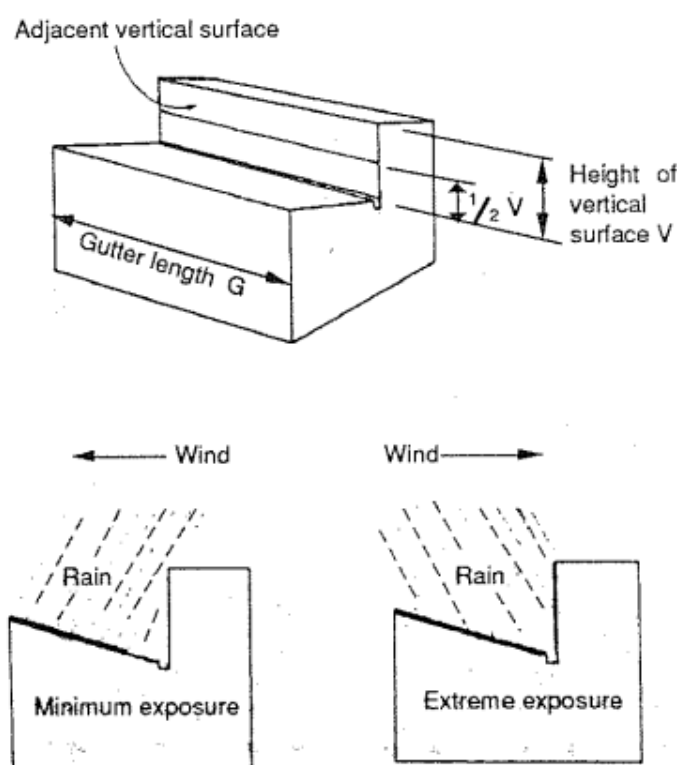
In rainstorms long periods of steady rainfall are interspersed with peak intensities for short periods. The roof-drainage system must be capable of handling the peak intensities without flooding or overflow.

The 5-year return intensity is used in the design of temporary structures of short life. The design of eaves gutters of permanent buildings must be based on the 20-year return intensity and of internal box gutters and valley gutters on the 100-year return intensity. The values of these intensities for representative areas in the country may be ascertained from the Meteorological Department. A freeboard of 25 mm for eaves gutters and of 35 mm for internal box gutters and valley gutters are *required* to provide against overflow into buildings.

2. Catchment

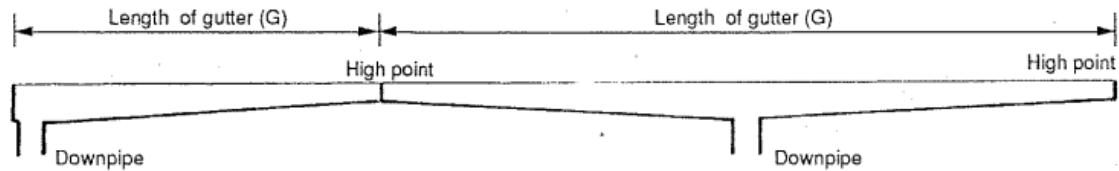
A roof drainage system is best analysed by dividing it into lengths of gutter each sloping down from a high point to an outlet with a downpipe. A long length of roof usually *drains* into several lengths of gutter separated by expansion joints that are also high points. The catchment area for a length of gutter is determined by multiplying the rafter length by the length of gutter (G) and adding a proportion of any vertical surface against which rain can be driven. A reasonable procedure is to add half the area of a very exposed vertical surface and smaller proportions for less extreme conditions (see Figure 2.1).

Figure 2.1 - Effect of Vertical Surface on Catchment



The length G of a gutter is measured as the distance from a high point in the gutter to the downpipe when the downpipe is at the end of the gutter and between high points when the downpipe is not at the end (see Figure 2.2).

Figure 2.2 - Measuring Gutter Length



3. Eaves Gutter

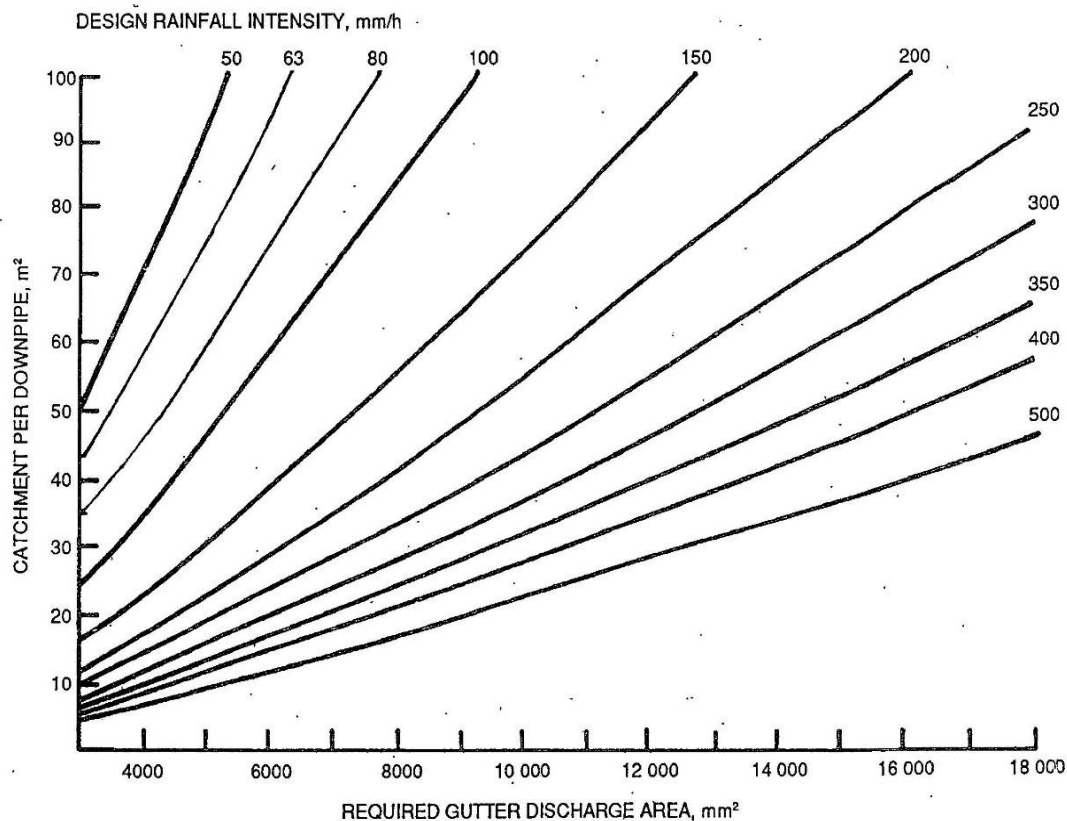
The procedure for the design of eaves gutters is as follows:

3.1 Size

Space the downpipes suitably and calculate the catchment area per downpipe. For eaves gutters of permanent buildings determine the gutter discharge area by matching - the catchment area against the 80 mm/hr intensity line in Figure 3.1. If the gutter discharge area obtained is more - than what is available from a standard gutter after allowing - for a 25 mm freeboard, either reduce the spacing of the downpipes and recalculate or proceed to specify a specially fabricated gutter. With rectangular fabricated gutters an additional allowance of 10 percent of area must be made in addition to the freeboard allowance.

The nett cross-sectional area of each vertical downpipe, including the nozzle must be not less than 50 per cent of the cutter discharge area.

Figure 3.1 - Eaves Gutter Sizing



3.2 Slope

The fall of an eaves gutter must never be less than 1 in 500 but in areas where dust or debris is likely to build up between rain periods the slope must be as steep as 1 in 50.

3.3 Leaf Guards and Overflows

Leaf guards must be fitted to prevent the nozzle to the downpipe from becoming blocked wherever leaves or other debris are likely to collect in the gutter. If the eaves gutter has a fascia front higher than the rear lip, an overflow must be fitted at a level below that of the lowest point in the rear lip.

3.4 Proportion

The proportions of a rectangular eaves gutter are ideal when its width is twice the maximum depth of water flowing in it. Although a narrow deep gutter will provide a greater head of water over the outlet with a consequent improvement in the discharge capacity of the outlet, a shallower gutter is usually easier to maintain.

4. Internal Box Gutters

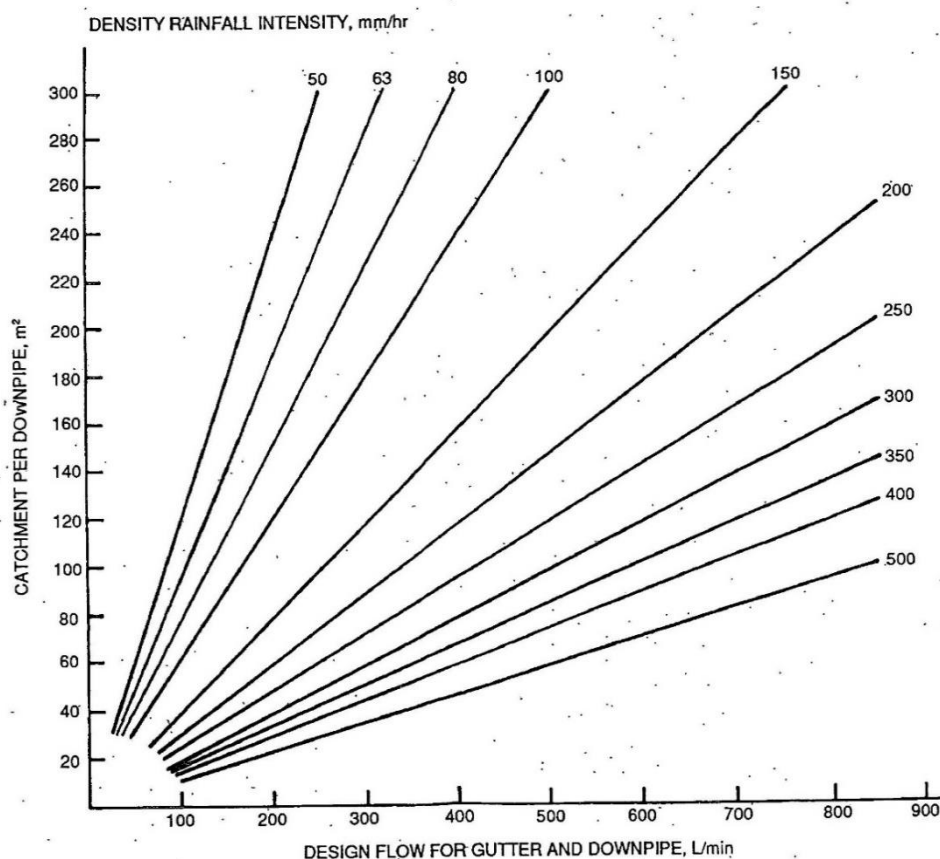
The procedure for the design of box gutters is as follows:

Ideally, box gutters must be straight, at least 300 mm wide, capable of supporting a workman, fixed at a slope of not less than 1 in 200, and provided with an overflow and adequate downpipe outlets not more than 18 m apart. The gutters must have sufficient slope to clear dust and debris and they might need leaf guards.

4.1 Size of Gutter

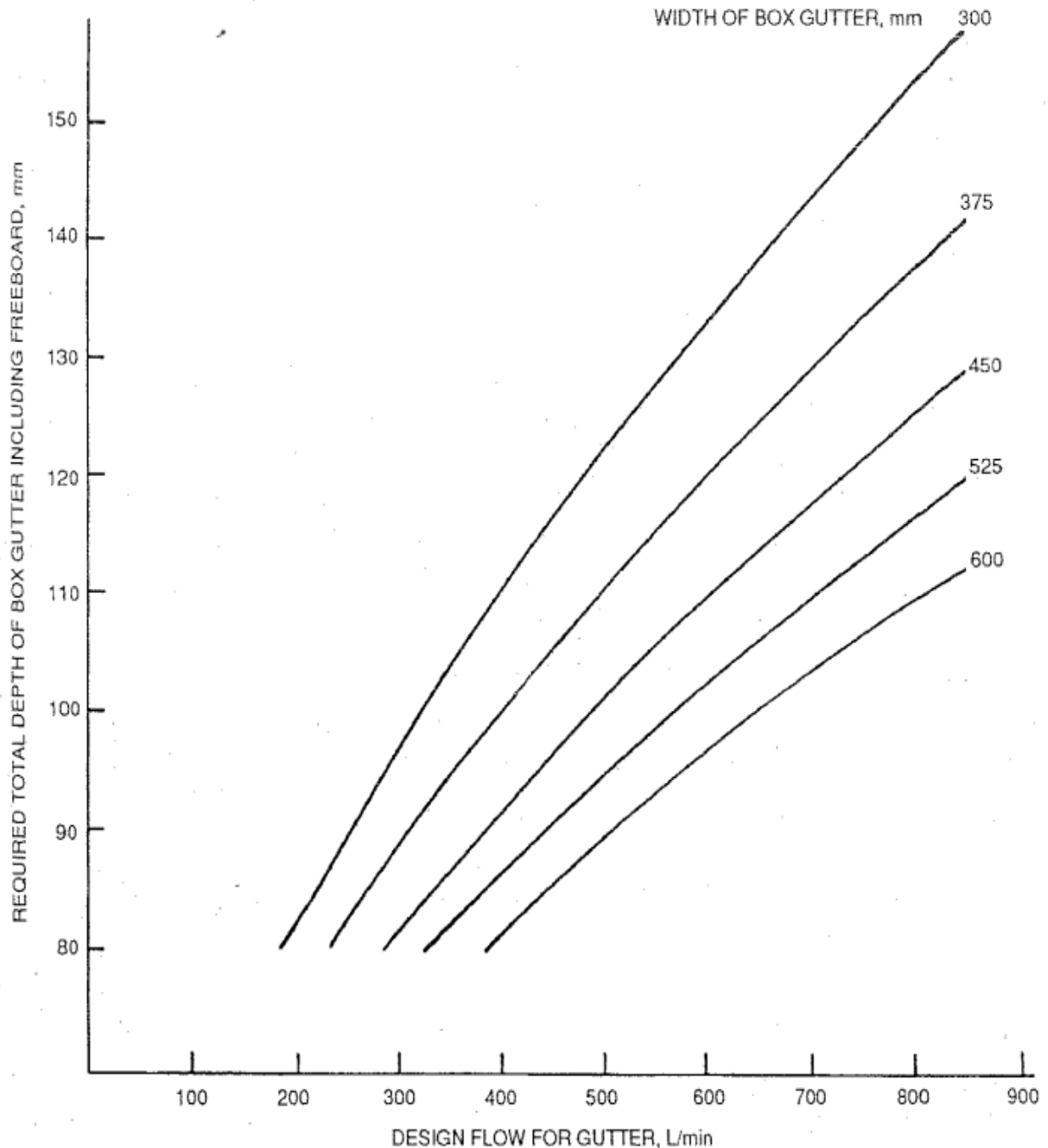
Space the downpipes suitably and calculate the catchment area per downpipe. From Figure 4.1.1 using the calculated catchment area and 100 mm/hr rain intensity, determine the design flow for the gutter and the downpipe. Select a width of not less than 300 mm for the box gutter.

Figure 4.1.1 - Internal Box Gutter Design Flow



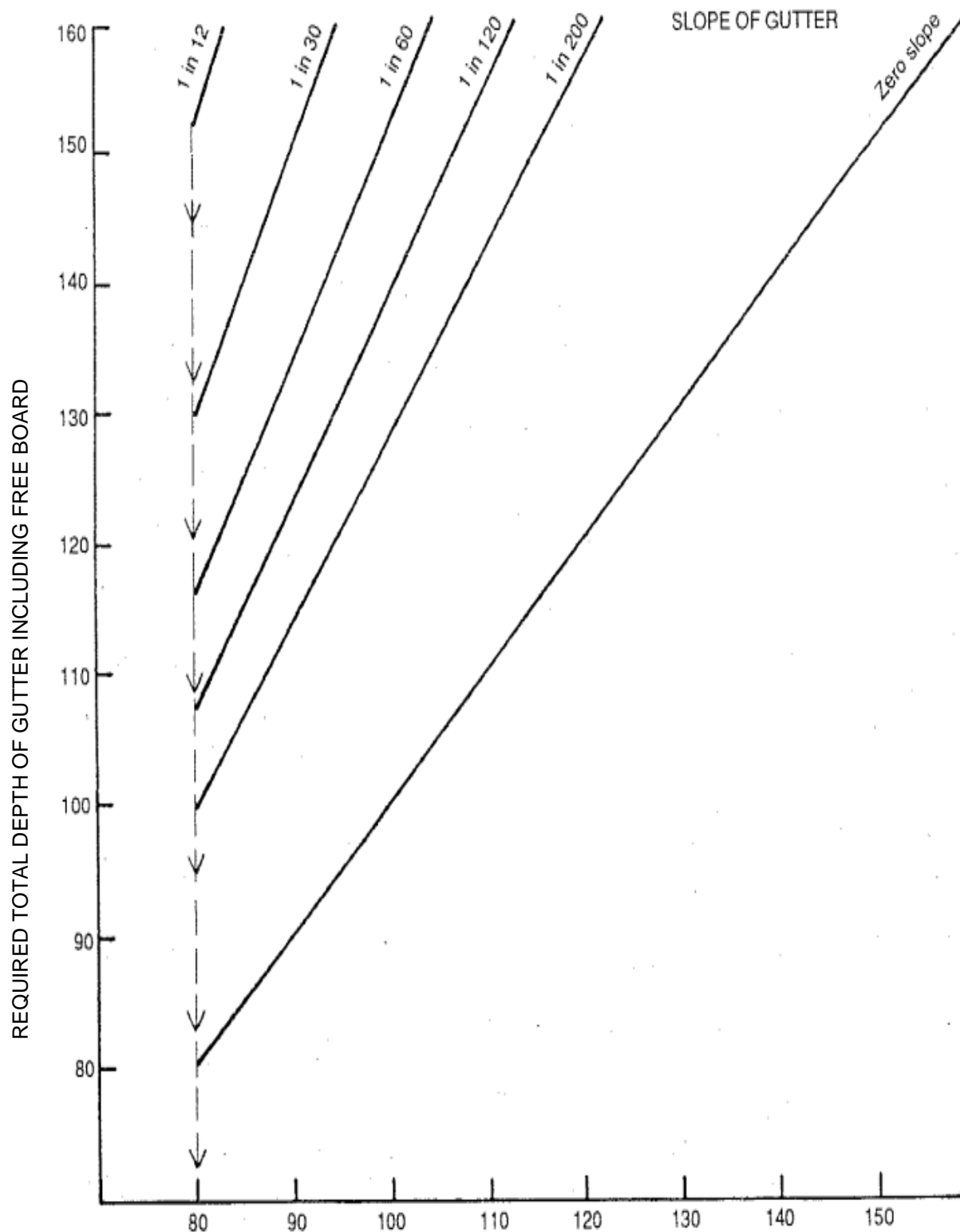
The required depth can then be read from Figure 4.1.2 by using the selected width and the design flow. The depth allows for a freeboard of 35 mm which will be necessary during cyclonic winds along with normal turbulence and ripples. The depth thus determined assumes that the gutter is laid to zero slope. To adjust for the slope, use the depth determined from Figure 4.1.2 in Figure 4.1.3 and read off the depth adjusted for slope against the appropriate slope line. The minimum depth must be 80 mm.

Figure 4.1.2 - Required Depth of Box Gutter for Design Flow

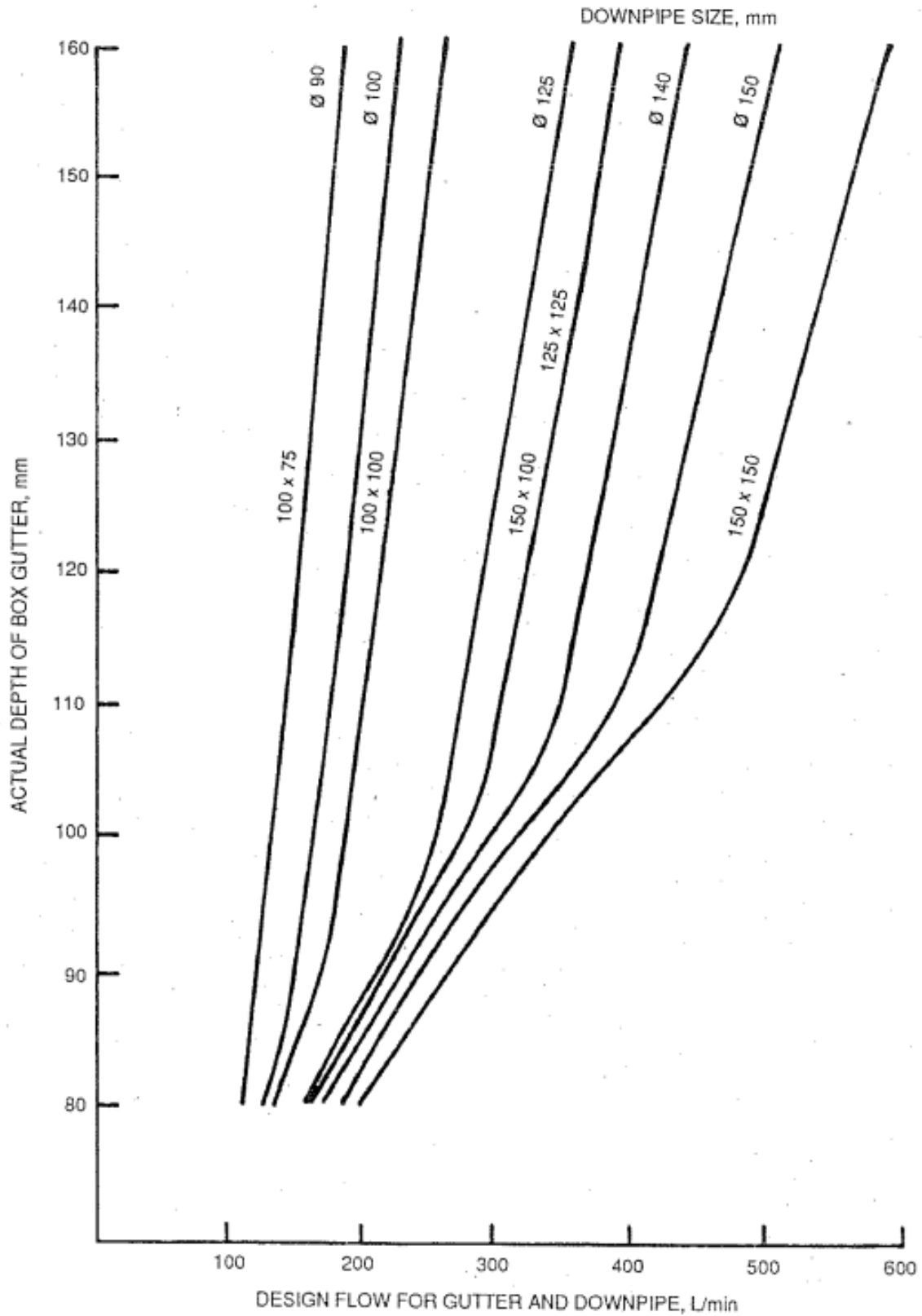


Notes:

- 1 Graph assumes zero slope. To take advantage of slope, see Fig. 4.1.3.
- 2 Graph assumes 35 mm freeboard.

Figure 4.1.3 - Box Gutter Depth: Adjusted for Slope**4.2 Size of Downpipe**

The size of the downpipe can be determined from figure 4.2 by reading against the design flow and the actual depth of the gutter determined from using figure 4.1.3. The downpipes can be round or rectangular.

Figure 4.2 - Required Size of Downpipe for Box Gutter (Rain head and Sump Not Considered)

4.3 Overflow

A box gutter discharging directly into a downpipe must have an overflow outlet to allow for blockage and to provide for rainfall intensities greater than those used for design. To cope only with peaks in rainfall it is sufficient for the overflow outlet to have a cross sectional area equal to 15 percent of the total cross-sectional area of the gutter that is an overflow area of $0.15 \text{ depth} \times \text{width}$ (see Figure 4.3.1).

Figure 4.3.1 - Overflow Outlet

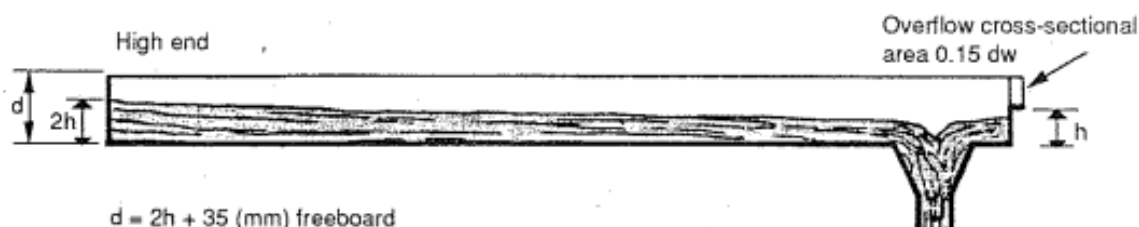
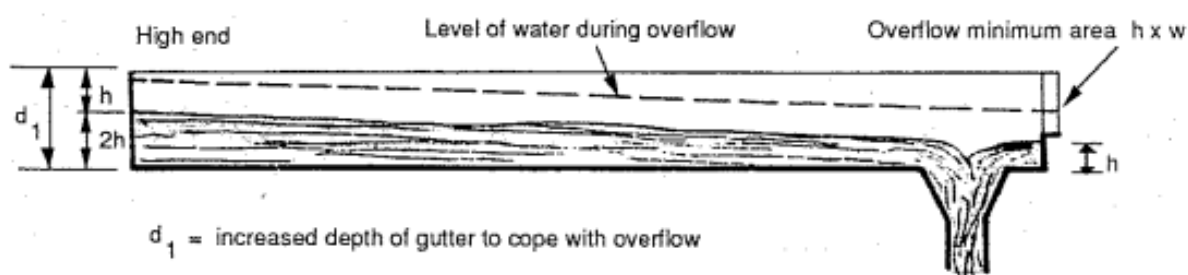


Figure 4.3.2 - Overflow with Blocked Downpipe



But if the overflow is intended to cope with the effect of a total blockage of the downpipe during a peak period then the cross-sectional area of the overflow outlet must equal the cross-sectional area of the water flow at the outlet of the gutter ($h \times w$ for minimum fall). The overflow should be slightly above level h and if it is the same width as the gutter, the depth of the gutter will have to be further increased by an amount equal to h in order to accommodate the flow of water in a crisis (see Figure 4.3.2). The slope factor must not be taken into account when determining the new depth for the gutter and the amount of freeboard added to the increased gutter depth will depend on the risk the designer wishes to take regarding the possibilities of failure of the roof-drainage system during a peak period. Other methods of preventing overflow due to blocked downpipes are the provision of rainheads and sumps.

5. Rain heads and Sumps

5.1 Rain Heads

The rain head is a device used to increase the capacity of a downpipe at the end of a box gutter and to allow for overflow in case of a blocked downpipe. The discharge capacity of an outlet increases with the depth of water (head) over the outlet. The rain head is located at the far end of a box gutter and consists of a sump and overflow arrangements. The sump increases the flow through the downpipe by providing an additional head of water. The overflow provides safety against water spilling into the building if the downpipe is blocked. The detailed design of rain heads is given in AS 3500.3.

5.2 Sumps

Where a sump is fitted to the sole of a gutter it provides a local reservoir and the additional head increases the flow through the downpipe. The detailed design of sumps is given in AS 3500.3.

6. Downpipes

6.1 Location

Downpipes must be located externally, but where it is necessary to locate a downpipe internally the pipe must be accessible so that any blockage can be cleared. Access for cleaning must be provided at the base of all downpipes that are connected directly to a storm water *drain*. Downpipes are most efficient when located at the centre of a length of gutter.

6.2 Swirl

The performance of an outlet with the head of water more than 113 of its diameter will be reduced if swirl occurs at the outlet. This would generally happen only where rainheads or sumps are included in the system. Swirl can be eliminated if the centreline of the downpipe is kept no more than a distance equal to its diameter or the average of its cross-sectional dimensions, away from the nearest vertical side of the rainhead or the sump.

6.3 Gratings

Where a grating or strainer is fitted to a rain-water outlet the total area of the perforations in the grating must be at least 1.5 times the cross-sectional area of the outlet. Strainer gratings must project above the calculated level of flow at the outlet and must be cleared of accumulated debris regularly.

7. Incompatible Materials

Dissimilar metals must be separated by a non-conducting gasket or similar device to prevent electro-chemical corrosion. Water draining from copper components must not discharge onto non-copper components for the same reason. However, water can be safely drained from non-copper onto copper components. (The prevention of electro-chemical corrosion between metals will not necessarily prevent atmospheric corrosion of the individual metals).

8. Expansion Joints for Gutters

Metal gutters must be provided with expansion joints to prevent distortion and resulting damage and reduced flow. The maximum length between expansion joints is given in Table 8.

Table 8 - Maximum Distance Between Gutter Expansion Joints

Material	Estimated exposed temperature range (°C)	Distance between 20 mm expansion joints (m)
Aluminium	45	18
Copper	55	21
Stainless Steel	40	30
Steel	50	33
Zinc	50	15

9. Stormwater

9.1 Downpipe Discharges into a Storm Water Gully

Where a downpipe discharges into a storm water gully it must terminate below the gully grating, and where the connection is made directly to a stormwater pipe underground the internal diameter of the underground pipe must be greater than that of the downpipe. Underground stormwater pipes draining roof and paved catchments must be laid in straight lines at uniform gradients between sumps or

collection pits. Large paved areas and roadways must slope towards drainage points with a minimum cross-fall of 1 in 60 for bitumen or concrete surfaces and 1 in 120 for concrete kerb channels.

9.2 Pipe Sizes

Table 9.2 indicates the maximum total catchment area of roof and paving that can be drained by underground pipes laid at different gradients, of various diameters and running half full. Areas shown above the heavy line will have a flow velocity insufficient to flush out debris.

The table is for a rainfall intensity of 115 mm/h. For other rainfall intensities the horizontal area to be drained must be proportionally adjusted by multiplying the area by 115 and dividing by the *required* rainfall intensity. The proportionally adjusted area can be used in the Table to determine the pipe size.

Table 9.2 - Stormwater Drain Sizes to Take Flow from Downpipes and Pavements

Diameter of pipe (mm)	Maximum horizontal projected areas (m ²) that can be drained at various gradients when the rainfall intensity is 115 mm/h			
	1 in 50	1 in 100	1 in 150	1 in 200
100	220	150	130	110
150	6000	430	350	260
200	1300	950	780	650
250	2350	1650	1300	1130
300	3700	2600	2170	1910
375	6700	4700	3820	3130
450	8800	6950	5650	4600

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION NG

ANCILLARY PROVISIONS

Performance Requirements

Deemed-to-Satisfy Provisions

NG1 Minor Structures and Components

NG2 Fireplaces, Chimneys and Flues

NG3 Atrium Construction

SECTION NG – ANCILLARY PROVISIONS

CONTENTS

PERFORMANCE REQUIREMENTS

DEEMED-TO-SATISFY PROVISIONS

NG1	Minor Structures and Components	NG2	Fireplaces, Chimneys and Flues
NG1.1	Swimming pools	NG2.1	General requirements
NG1.2	Refrigerated chambers, strong rooms and vaults	NG2.2	Open fireplaces
NG1.3	Parapets on flat roofs	NG2.3	Incinerator rooms
NG1.4	Projections over public places		
NG1.5	Moveable awnings or sunshades over public places	NG3	Atrium Construction
NG1.6	Fences		

PERFORMANCE REQUIREMENTS

OBJECTIVES AND REQUIRED PERFORMANCE

This Section contains more specific requirements for particular parts of buildings or structures.

Parts of buildings and structures must be so designed and constructed that the following objectives, in addition to those listed for Sections B, NC, ND, NE and NF where relevant, are fulfilled:

NGP1 Minor structures and components

NGP1.1 Swimming Pools

- (a) Suitable means for the disposal of waste and drainage must be provided to a *swimming pool*.
- (b) Access by unsupervised young children to *swimming pools* must be restricted.

NGP1.2 Refrigerated Chambers, Strong Rooms and Vaults

Refrigerated or cooling chambers, strong rooms and vaults, or the like, which are capable of entry by a person must have adequate safety measures to facilitate escape and for alerting persons outside the chamber or vault in the event of an emergency.

NGP1.3 Safety at Elevated Places

Elevated places with regular access such as some flat roofs must have adequate protection to prevent anyone from falling.

NGP1.4 Use of the Air Space Over Public Places

Any use of the air space over public places such as footpaths and roads must be limited to ensure that normal public use of such places is not obstructed.

NGP1.5 Aesthetics

Any minor structure such as fencing, awnings and such like must be suited to the general surroundings and the occupancy of the buildings and the neighbourhood.

NGP2 Fireplaces, Chimneys and Flues

Fireplaces, chimneys and flues must be adequately constructed or separated to prevent:

- (a) ignition of nearby parts of the building; or
- (b) escape or discharge of smoke to the inside of the building or to adjacent *windows*, ventilation inlets, or the like.

NGP3 Atrium Construction

The construction of an *atrium* must not unduly increase the danger to occupants from fire or smoke.

DEEMED-TO-SATISFY PROVISIONS

NG1 MINOR STRUCTURES AND COMPONENTS

NG1.1 Swimming Pools

- (a) Drainage: A *swimming pool* must have suitable means of drainage.
- (b) Safety fencing: A *swimming pool* with a depth of water more than 300 mm must have suitable barriers or safety fencing in accordance with AS 1926.1 and AS1926.2 to restrict access by young children to the immediate pool surrounds if the *swimming pool* is associated with a Class 2 or 3 building or is a public pool.
- (c) Water recirculation systems: A *swimming pool* must have suitable means of water reticulation in accordance with AS 1926.3.

NG1.2 Refrigerated Chambers, Strong Rooms and Vaults

- (a) A refrigerated or cooling chamber which is of sufficient size for a person to enter must -
 - (i) have a door which is in an opening with a clear width of not less than 600 mm and a clear height of not less than 1.5 m; and
 - (ii) at all times, be able to be opened from inside without a key.
- (b) A strong room or a vault in a building must have -
 - (i) internal lighting controllable only from within the room; and
 - (ii) a pilot light located outside the room but controllable only by the switch for the internal lighting.
- (c) A refrigerated or cooling chamber, strong room or vault must have a suitable alarm device located outside but controllable only from within the chamber, room or vault.

NG1.3 Parapets on Flat Roofs

Where a flat roof or other elevated place has regular access a parapet or balustrade of not less than 1 m height above the surface of the roof or elevated place must be provided. The width of any opening in the parapet or balustrade must not exceed 100 mm.

NG1.4 Projections Over Public Places

Buildings must not project beyond the allotment boundary. Architectural features such as eaves cornices clocks lamps ventilating equipment trade signs hoardings flag poles bay or oriel *windows* and such like as well as a platform or balcony to provide additional means of egress from an existing building, may however project over public footpaths or roads with the following minimum clearances:

- (a) 3300 mm above existing or intended finished level of footpaths; and
- (b) the outer extremity of the feature must be set back 300 mm from the existing or intended kerb.

Any drainage from such architectural features (including drainage from air-conditioning and other ventilating equipment) must be suitably taken down to a *drain* with downpipes which must also satisfy the *required* clearances. NG1.5 Moveable Awnings or sunshades over public places

Any moveable awnings or sunshades must be firmly fixed so that they do not create any danger obstruction or inconvenience to pedestrians. They must provide the following minimum clearances if they project over public places:

- (a) 2300 mm above the finished levels of the footpath; and
- (b) their outer extremity must be set back 300 mm from the kerb.

NG1.6 Fences

Building and planning approvals are generally not required for a proposed front, side or rear boundary fence, if the fence is:

- less than two metres high;
- not part of a retaining wall; and
- not restricting water run-off from adjoining properties.

Any fence above 2m in height above natural ground surface requires building approval and shall be designed in accordance with this Code.

Solid fencing, barriers or walls constructed from earth, concrete or concrete blocks greater than 1.2m in height above natural ground surface requires building approval and shall be designed in accordance with this Code.

Common types of fencing and retaining walls less than 2m in height are detailed in the Solomon Islands Building Manual. SIBM compliant construction meets Deemed-to-Satisfy requirements.

Broken glass topping, metal spikes, barbed wire, razor wire or similar fence security materials must be located / fixed at a height of not less than 2 m above the finished level of any existing or intended adjacent footpath.

NG2 FIREPLACES, CHIMNEYS AND FLUES

NG2.1 General Requirements

A chimney or flue must be constructed:

- (a) to withstand the temperatures likely to be generated by the appliance to which it is connected
- (b) so that the temperature of the exposed faces will not exceed a level that would cause damage to nearby parts of the building
- (c) so that hot products of combustion will not -
 - (i) escape through the walls of the chimney or flue; or
 - (ii) discharge in a position that will cause fire to spread to nearby *combustible* materials or allow smoke to penetrate through nearby *windows*, ventilation inlets, or the like
- (d) in such a manner as to prevent rainwater penetrating to any part of the interior of the building
- (e) such that its termination is not less than -
 - (i) 600 mm above any point of penetration of or contact with the roof; and
 - (ii) 900 mm above any opening or openable part in any building, within 3 m horizontal distance of the chimney or flue; and
- (f) so that it is accessible for cleaning.

NG2.2 Open Fireplaces

An open fireplace, or solid-fuel burning appliance in which the fuel-burning compartment is not enclosed, satisfies NG2.1 if it has:

- (a) a hearth constructed of stone, concrete, masonry or similar *non-combustible* material so that -
 - (i) it extends not less than 300 mm beyond the front of the fireplace opening and not less than 150 mm beyond each side of that opening
 - (ii) it extends beyond the limits of the fireplace or appliance not less than 300 mm if the fireplace or appliance is free-standing from any wall of the room
 - (iii) its upper surface does not slope away from the grate or appliance; and
 - (iv) *combustible* material situated below the hearth (but not below that part *required* to extend beyond the fireplace opening or the limits of the fireplace) is not less than 155 mm from the upper surface of the hearth;
- (b) walls forming the sides and back of the fireplace up to not less than 300 mm above the underside of the arch or lintel which -
 - (i) are constructed in 2 separate leaves of solid masonry not less than 180 mm thick, excluding any cavity; and
 - (ii) do not consist of concrete block masonry in the construction of the inner leaf
- (c) walls of the chimney above the level referred to in (b) -
 - (i) constructed of masonry units with a net volume, excluding cored and similar holes, not less than 75% of their gross volume, measured on the overall rectangular shape of the units, and with an actual thickness of not less than 90 mm; and
 - (ii) lined internally to a thickness of not less than 12 mm with rendering consisting of 1 part cement, 3 parts lime, and 10 parts sand by volume, or other suitable material; and
- (d) suitable damp-proof courses or flashings to maintain weatherproofing.

NG2.3 Incinerator Rooms

- (a) If an incinerator is installed in a building any hopper giving access to a charging chute must be -

- (i) non-combustible
 - (ii) gastight when closed
 - (iii) designed to automatically return to the closed position after use
 - (iv) not attached to a chute that connects directly to a flue unless the hopper is located in the open air; and
 - (v) not located in a *required exit*.
- (b) If an incinerator is in a separate room, that room must be separated from other parts of the building by construction with a FAL of not less than 60/60/60.
-

NG3 ATRIUM CONSTRUCTION

NG3.1 Design

The design of an *atrium* along with the attendant life safety provisions such as fire prevention, firefighting, smoke exhaust systems, etc. must fulfil up-to-date and relevant fire engineering principles and practices.

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION NH

SPECIAL USE BUILDINGS

Performance Requirements

Deemed-to-Satisfy Provisions

NH1 Theatres, Stages and Public Halls

SECTION NH SPECIAL USE BUILDINGS

CONTENTS

OBJECTIVES

PERFORMANCE REQUIREMENTS

NH1 Theatres, Stages and Public Halls

NH1.1 Application of part

NH1.2 Separation and smoke control

NH1.3 Proscenium wall construction

NH1.4 Seating area

NH1.5

Exits from theatre stages

NH 1.6

Access to platforms and lofts

Specifications

Spec NH1.2

Construction of theatres with
proscenium walls

PERFORMANCE REQUIREMENTS

OBJECTIVES AND REQUIRED PERFORMANCE

This Section contains more specific requirements for particular special use buildings.

Special use buildings must be so designed and constructed that the following objectives, in addition to those listed for Sections B, NC, ND, NE, and NF where relevant, are fulfilled.

NHP1 Theatres, Stages and Public Halls

The audience seating area and egress routes of a Class 9b building used as a theatre, public hall, or the like, must be protected against fire and smoke from any fire occurring on *stage*, in *backstage* areas or in a rigging loft.

DEEMED-TO-SATISFY PROVISIONS

NH 1 THEATRES, STAGES AND PUBLIC HALLS

NH1.1 Application of Part

This Part applies to every enclosed Class 9b building which:

- (a) has a stage and any backstage area with a total floor area of more than 200 m²; or
- (b) has a stage with an associated rigging loft.

NH1.2 Separation and Smoke Control

The design of smoke control systems for theatres and public halls must fulfill up-to-date fire engineering principles and practices.

A theatre, public hall or the like must:

- (a) have a smoke control system in accordance with AS 1668.1 where relevant; or
- (b) have the stage, backstage area and accessible under-stage area, separated from the audience by a proscenium wall and have a mechanical exhaust system, both in accordance with Specification NH1.2.

NH1.3 Proscenium Wall Construction

A proscenium wall and mechanical exhaust system *required* by NH1.2(b) must comply with Specification NH1.2.

NH1.4 Seating Area

In a seating area in a Class 9b building or part of a building:

- (c) the slope of the floor surface must not exceed 1 : 8, or the floor must be stepped so that -
 - (i) the pitch does not exceed 30°
 - (ii) it has a riser height not more than 600 mm; and
 - (iii) the height of any opening in the riser is not more than 100 mm
- (d) if an aisle divides the stepped floor and the difference in level between any 2 consecutive steps -
 - (i) exceeds 230 mm but not 400 mm - an intermediate step must be provided in the aisle
 - (ii) exceeds 400 mm - 2 equally spaced steps must be provided in the aisle; and
 - (iii) the going of intermediate steps must be not less than 270 mm and such as to provide as nearly as practicable equal treads throughout the length of the aisle; and
- (e) the clearance between rows of fixed seats used for viewing performing arts, sport or recreational activities must be not less than -
 - (i) 300 mm if the distance to an aisle is not more than 3.5 m; or
 - (ii) 500 mm if the distance to an aisle is more than 3.5 m.

NH1.5 Exits from Theatre Stages

- (f) The path of travel to an exit from a stage or performing area must not pass through the proscenium wall if the stage area is separated from the audience area with a proscenium wall.
- (g) Required exits from backstage and under-stage areas must be independent of those provided for the audience area.

NH1.6 Access to Platforms and Lofts

A stairway that provides access to a service platform, rigging loft, or the like, must comply with AS 1657.

SPECIFICATION NH1.2: CONSTRUCTION OF THEATRES WITH PROSCENIUM WALLS

1. Scope

This Specification contains the requirements for the construction of proscenium walls and mechanical ventilation for theatres, public halls, or the like.

2. Separation of Stage Areas, etc.

- (a) Dressing rooms, scene docks, property rooms, workshops, associated store rooms and other ancillary areas must be -
 - (i) located on the stage side of the proscenium wall; and
 - (ii) separated from corridors and the like by construction having a FRL of not less than 60/60/60 and if of lightweight construction, comply with Specification NC1.5.
- (b) The stage and backstage must be separated from other parts of the building, other than the audience seating area, by construction having a FRL of not less than 60/60/60 and if of lightweight construction, comply with Specification NC1.5.
- (c) Any doorway in the construction referred to in paragraphs (a) and (b) must be protected by a self-closing - /60/30 fire door.

3. Proscenium Wall Construction

A proscenium wall must:

- (a) extend to the underside of the roof covering or the underside of the structural floor next above; and
- (b) have a FRL of 60/60/60 or more and if of lightweight construction, comply with Specification NC1.5.

4. Combustible, Materials Not to Cross Proscenium Wall

Timber purlins or other *combustible* material must not pass through or cross any proscenium wall.

5. Protection of Openings in Proscenium Wall

Every opening in a proscenium wall must be protected:

- (a) at the principal opening, by a curtain in accordance with Clause 6 which is -
 - (i) capable of closing the proscenium opening within 35 seconds either by gravity slide or motor assisted mechanisms
 - (ii) operated by a system of automatic heat activated devices, manually operated devices or push button emergency devices; and
 - (iii) able to be operated from either the stage side or the audience side of the curtain; and
- (b) at any doorway in the wall, by a self-closing - /60/30 fire door.

6. Proscenium Curtains

A curtain *required* by Clause 5 must be:

- (a) a fire safety curtain:
 - (i) made of non-combustible material
 - (ii) capable of withstanding a pressure differential of 0.5 kPa over its entire surface area; and
 - (iii) so fitted that when fully closed it inhibits the penetration of smoke around the perimeter of the opening, from the stage; or
- (b) a curtain:

- (i) having a Spread-of-flame index not greater than 0 and a Smoke-developed index not greater than 3; and
- (ii) protected by a deluge system of open sprinklers installed along the full width of the curtain.

7. Mechanical Ventilation

Every *stage* must have a system of mechanical ventilation with sufficient capacity to exhaust an amount of air whichever is the greater of:

- (a) 5,000 L/s; or
 - (b) the sum of:
 - (i) 10 L/s per m² of the performing area of the stage; 20 L/s per m² of the remaining area of the stage; and
 - (ii) 20 L/s per m² of the remaining area of the stage.
-

