Kiribati Building Code

(under Building Act 2024)

2024 Edition
Approved by Cabinet on February 21, 2025

Final draft for Cabinet Approval

Revision	Status - Action	Date	Reviewed by:
DRAFT – Ver1	Draft issued to Internal Stakeholders to review	12 Jun 2023	Rhys Gwilliam
DRAFT – Ver2	Draft issued for MISE – PRIF Development Partners review and public consultation	15 Jun 2023	Rhys Gwilliam
FINAL – Ver 3	Final Technical Draft– for TWG endorsement followed by final quality control check and graphic design input	21 Feb 2025	Rhys Gwilliam / Mikael Gartner
DRAFT – Ver 4	Deleted ref to B5, Added A11 and updated B2.4 for Asbestos in coordination with Pacwaste	20 Feb 2025	Mikael Gartner

NF6 Sanitary Plumbing and Drainage
NF7 Roof Drainage

NG ANCILLARY PROVISIONS

Performance Requirements
Deemed-to-Satisfy Provisions
NG1 Minor Structures and Components
NG2 Gas appliances, Fireplaces, Chimneys and Flues

Part 4: Class 1 to 10
ALL BUILDINGS
High Complexity

PREFACE

2024 Version

The National Building Code of the Republic of Kiribati (KBC) is adopted under the Building Act 2024.

The Kiribati Building Code applies to all NEW and Existing buildings in the Republic of Kiribati, Refer to Clause A1.1 Scope of NBC

unless exempted under clause A1.5 Minor repairs and Exempt Structures

The KBC is accompanied by the Kiribati Building Manual (KBM) which covers new simple, single-story IL1 and IL2 buildings such as houses and small commercial buildings. Using the KBM as a "deemed-to-satisfy" solution ensures compliance with various KBC Performance Requirements.

The KBC and KBM are freely available via the Ministry of Infrastructure and Sustainable Energy (MISE) website:

www.mise.gov.ki

PO Box 498, MISE Headquarter Office, Betio, Tarawa. KIRIBAT

"Striving for Quality and Efficient Service Delivery Through Teamwork, Respect, and Good Leadership"

ACKNOWLEDGEMENTS

Development of the ‘Kiribati Building Code - 2024’ was carried out under the auspices of the Kiribati Government, specifically the Ministry of Infrastructure Sustainable Energy, with technical assistance funded by the Pacific Region Infrastructure Facility.

This version of the Kiribati Building Code builds upon the original Code published in 2012 and incorporates appropriate advances in practice and knowledge. Accordingly, the Ministry acknowledges the excellent work of the many stakeholders who contributed to the creation of the original 2012 version.

This version also incorporates recent work undertaken to update similar building codes in Solomon Islands (The Solomon Islands Ministry of Infrastructure and Development supported by the Australian Department of Foreign Affairs and Trade), Tuvalu (Ministry of Public Works, Infrastructure, Environment, Labour, Meteorology and Disaster supported by the World Bank) and Cook Islands (Infrastructure Cook Islands supported by the Pacific Community and the European Union).

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, building industry professionals and government agencies.

A thorough, inclusive consultation process was carried out by the Ministry on South Tarawa, Kiritimati, Butaritari and Onotoa during mid 2023 wherein over 200 stakeholders from more than 20 separate organisations were invited to 7 group consultation meetings to discuss and provide feedback on the draft legislation and Kiribati Building Code. Of the 250 participants, 53 were female and 197 male.

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

The Kiribati Government is grateful to Pacific Region Infrastructure Facility for supporting this project.

Thank You

Hon. Tekeeua Tarati

Minister for the Ministry of Infrastructure and Sustainable Energy

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 Kiribati Building Code is divided into **4 Parts:**

PART 1: GENERAL PROVISIONS AND STRUCTURE FOR ALL BUILDINGS

Covers to Sections A and B

PART 2: NORMAL COMPLEXITY CLASS 1 AND 10 BUILDINGS AND STRUCTURES

Covers Single and Small Dwelling Buildings & Non-habitable outbuildings or structures

PART 3: NORMAL COMPLEXITY CLASS 2 TO 9 BUILDINGS

Covers Public Buildings and Group Dwellings of normal complexity

PART 4: HIGH COMPLEXITY CLASS 1 TO 10 BUILDINGS AND STRUCTURES

Covers Public Buildings and Group Dwellings of high complexity

(not covered by the Deemed-to-Satisfy provisions of the KNBC)

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 KBC 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.

ADMINISTRATIVE ARRANGEMENTS

The enabling legislation is the Buildings Act.

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.

PART 1

GENERAL PROVISIONS AND STRUCTURE FOR ALL BUILDINGS

ALL BUILDINGS

SECTION **A**

GENERAL PROVISIONS

SECTION A - GENERAL PROVISION

THIS SECTION APPLIES TO ALL BUILDINGS

CONTENTS

A1 INTERPRETING THE KBC

Introduction to this Section

This section explains how the KBC must be interpreted and applied; the scope of each KBC part; and how specific terms are used to understand the technical and legal requirements of the KBC.

A1.1 Scope of KBC

(1) The KBC applies to all new buildings and structures in accordance with the Act.
(2) The KBC does not apply to existing buildings and structures unless the following is applicable:
    a. Existing buildings and structures that are designated as Importance Level 4 shall be assessed and upgraded to the degree necessary to comply with all KBC Performance Requirements by the year 2033.
    b. Existing buildings and structures shall comply with all KBC Performance Requirements when one or more of the following occurs:
        i. Change in Building Class.
        ii. Change in Importance Level.
        iii. Change in Building Complexity
        iv. *Significant alteration* of the structure (refer Schedule 1: Definitions to determine what a significant alteration comprises).

A1.2 Scope of KBC: Part 2: Normal Complexity Class 1 and 10

The KBC Part 2 contains the requirements for

a) All Normal Building Complexity buildings in Building Class 1 and 10a; and
b) Certain Normal Building Complexity structures in Building Class 10b.

A1.3 Scope of KBC: Part 3: Normal Complexity Class 2 to 9

The KBC Part 3 contains the requirements for

a) All Normal Building Complexity buildings in Building Class 2 to 9; and
b) Certain Normal Building Complexity structures in Building Class 10b.

A1.4 Scope of KBC – Part 4: High Complexity Class 1 to 10

The KBC Part 4 contains the requirements for

a) All High Building Complexity buildings in Building Class 1 to 10; and
b) All High Building Complexity buildings in Building Class 2 to 9.

Buildings classified under this Part are not covered by the Deemed-to-Satisfy provisions of the KBC.

A1.5 Minor Repairs and Exempt Structures

This **Kiribati Building Code does NOT cover** minor repairs and exempt structures as defined in Part IV of the building regulations under the Kiribati Building Act. This includes:

(a) Minor repairs as defined under Schedule 1 - Definitions

(b) Dwellings built using traditional methods and constructed substantially from traditional materials where not more than 12 people will be ordinarily resident with preference for use of the te buia design that is of sufficient elevation from ocean inundation and storm-related flooding. These dwellings shall not injury or cause death.

(b) Horizontal infrastructure – including sea walls, bridges, wharves, jetties and pipework infrastructure. Guidance on the design of these types of structure are covered by other Ministry of Infrastructure and Sustainable Energy Standards, Specifications and Guidelines and other Government of Kiribati ministries and jurisdictions:

(c) Stand-alone plant and machinery systems and their supporting structures if they are bespoke and supplied with the machinery or plant.
(d) A mast, pole or radio or television aerial that does not exceed 6 metres in height.
(e) Any other exclusions designated by the Approval Authority

A1.6 Safety and Protection of Users and the Public

Regardless of whether a building or structure is within the Scope of the Kiribati Building Code, under clause A1.1, or is considered a minor repair or exempt structure, under clause A1.5, all buildings and structures constructed in Kiribati shall adhere to the principles of the Kiribati Building Code – namely that they be designed, constructed, maintained, altered, repaired, and/or demolished in such a manner as to ensure the safety, health, and protection of users and the public and prevent injury and death.

A1.7 Interpretation

(1) The following components of the KBC are mandatory for all buildings and structures:
    a. Section A; and
    b. Performance requirements stated at the beginning of all other Sections.
(2) The following components of the KBC are non-mandatory and informative elements:
    a. "Introduction" information.
(3) Terms in italics must be interpreted in accordance with definitions provided in Section A - Schedule 1, unless otherwise noted, and any additional definitions in national and local laws.
(4) To "the degree necessary" means that consideration of all criteria in the Performance Requirement will determine the outcome appropriate to the circumstances; and that in certain cases it may not be necessary to incorporate specific measures.
(5) Figures are for illustrative purposes and should not be interpreted as containing all required design information.

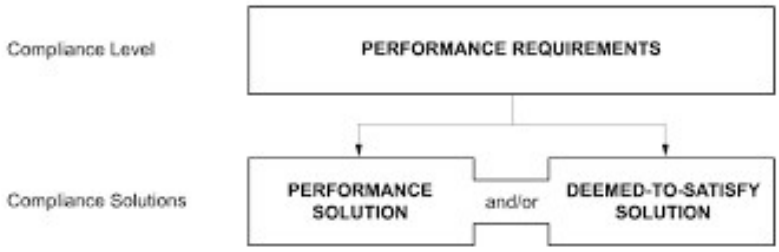
A2 COMPLIANCE WITH THE KBC

Introduction to this Section

This section explains the various compliance pathways within the KBC and the appropriate steps that must be taken to demonstrate compliance with the KBC.

A2.1 Compliance

(1) Compliance with the KBC is achieved by complying with the General Provisions of the KBC and the Performance Requirements.
(2) Performance Requirements are satisfied through a Performance Solution, a Deemed-to-Satisfy Solution, or a combination of both.



A2.2 Deemed-to-Satisfy Solution

(1) A Deemed-to-Satisfy Solution that complies with the Deemed-to-Satisfy Provisions is deemed to have met the Performance Requirements.
(2) Deemed-to-Satisfy Assessment Methods to demonstrate compliance of the Deemed-to-Satisfy Solution with the Deemed-to-Satisfy Provision include one or more of the following:
    a. Evidence of Suitability in accordance with section A5.
    b. Expert Judgement.

A2.3 Performance Solution

(1) A Performance Solution must demonstrate compliance with all relevant Performance Requirements; OR the solution must be at least equivalent to the Deemed-to-Satisfy Provisions.
(2) Performance Solution Assessment Methods to demonstrate compliance with the relevant Performance Requirements include one or a combination of the following:
    a. Comparison with the Deemed-to-Satisfy Provisions.
    b. Evidence of Suitability in accordance with Part A5.
    c. Expert Judgement.
    d. Verification Methods provided in the KBC.
    e. Verification Methods, accepted by the authority.
(3) A Performance Solution must clearly identify which Performance Requirement(s) the solution demonstrates compliance with AND if there are any other Performance Requirement(s) that are relevant or are affected by the Performance Solution.
(4) When a Performance Solution is proposed, the following steps must be taken:
    a. Prepare a performance-based design brief in consultation with stakeholders.
    b. Prepare a report that presents the assessment methods, acceptance criteria, analysis, results, details of conditions or limitations, and confirmation that Performance Requirement has been met.

A2.4 A Combination of Solutions

(1) Compliance with Performance Requirements can be achieved using a combination of Deemed-to-Satisfy Solutions and Performance Solutions in accordance with the assessment methods listed in Section A2.2 and A2.3.

A3 APPLICATION OF THE KBC

A3.1 National Compliance

(1) Compliance with the KBC is required for all buildings and structures in The Republic of Kiribati.
(2) Other national legislation and regulations that are more stringent than the KBC shall be used provided that all Performance Requirements listed in the KBC are complied with or exceeded.

A4 REFERENCED DOCUMENTS

A4.1 Referenced Documents

(1) Documents referenced in the KBC shall refer to primary referenced documents with the edition listed in Section A -Schedule 2.
(2) Documents referenced in primary referenced documents is a reference to secondary referenced documents as it existed at the time of publication of the primary referenced document.
(3) Documents referenced in the KBC and listed in Section A Schedule 2 are only applicable in the context in which they are quoted; and are mandatory to Deemed-to-Satisfy Provisions, Specifications and Verification Methods.
(4) Building materials, products, forms of construction and design methods not covered by referenced documents shall provide a Performance Solution. Performance Solutions can use

any element or edition of any document and are not required to use documents listed in Section A - Schedule 2. Documents published by Standards New Zealand and Standards Australia shall be the primary source, with documents published by other internationally recognized standards organisations serving as secondary sources when no New Zealand or Australian document exists.

A4.2 Differences between referenced documents and the KBC

(1) The KBC requirements shall take precedence when differences arise between the KBC, primary referenced documents, and secondary referenced documents.
(2) When referenced documents require compliance with laws and regulations of another country, the laws and regulations of The Republic of Kiribati shall take precedence. If laws and regulations of Kiribati do not exist for the subject area, the relevant Authority shall be notified, and guidance sought.

A4.3 Adoption of referenced documents

(1) The KBC does not require compliance with contractual matters or clauses relating to rights, responsibilities or obligations between parties, submission requirements, and/or departure from the KBC that may be contained within referenced documents. This includes but is not limited to:

a. The respective rights, responsibilities or obligations between the manufacturer, supplier or purchaser.
b. The responsibilities of any tradesperson or other building operative, architect, engineer, authority, or other person or body.
c. The submission for approval of any material, building component, form or method of construction, to any person, authority or other body.
d. The submission of a material, building component, form or method of construction, or design to any person, authority or body for opinion.
e. Departure from the KBC, rule, specification or provision at the sole discretion of the manufacturer or purchaser, or by arrangement or agreement between the manufacturer and purchaser.

A5 DOCUMENTATION OF DESIGN AND CONSTRUCTION

A5.1 Suitability

(1) Every part of a building installed must be constructed to achieve the KBC requirements using appropriate materials, products, forms of construction and design methods that are fit for their intended purposes considering strength, durability, and the operations & maintenance context.
(2) Materials, products, forms of construction or design are fit for purposes when they satisfy the following:
    a. Are supported by evidence of suitability as per A5.2, and
    b. Are constructed or installed in an appropriate manner.

A5.2 Evidence of Suitability

(1) Evidence of Suitability to support the use of a material, product, form of construction or design method satisfies a Performance Requirement or Deemed-to-Satisfy Provision may be in the form of any one or combination of the following:
    a. A current BRANZ or ABCB CodeMark *Certificate of Conformity.*
    b. A current *Certificate of Accreditation.*
    c. A current certificate issued by a *certification body*.
    d. A report issued by an *Accredited Testing Laboratory*.
    e. A report issued by a *Local Testing laboratory* recognized by the national authority having jurisdiction.
    f. A certificate or report from a *professional engineer* or other *appropriately qualified person*
    g. A *Product Technical Statements*

h. Another form of documentary evidence

(2) Evidence of suitability for any product that is in contact with drinking water must comply with AS/NZS 4020 and have a weighted average lead content of not more than 0.25% verified in accordance with NSF/ANSI/CAN 372, and may be in the form of any one or combination of the following:
   a. A report issued by an *Accredited Testing Laboratory*.
   b. A *WaterMark licence*.

(3) Evidence of suitability shall clearly demonstrate that it fulfills the specific requirements of the KBC; and provides as required all necessary results of tests, methodologies, protocols, basis, calculations, and relevant standards, specifications, rules, codes or practices, and other publications used to demonstrate compliance with the KBC requirements.

(4) Evidence must be a complete copy of the original certificate, report, or document.

A5.3 Fire Hazard Properties

Where a Deemed-to-Satisfy Provision requires a fire hazard property, it must be determined as follows:

(1) The Fire Resistance Level (FRL) of a *structural member* or other building element must be determined in accordance with Section A - Specification A5.3 – Fire Resistance of Building elements. Any relevant testing report or certification must be published by an appropriately qualified *professional engineer* or other *appropriately qualified person or Accredited Testing Laboratory.*

(2) Early Fire Hazard Tests of a component or assembly must be determined in accordance with Section A - Specification A5.4 – Early Fire Hazard Test for Assemblies. Any relevant testing or certification must be published by an appropriately qualified *professional engineer* or other *appropriately qualified person or Accredited Testing Laboratory.*

(3) References to Fire Resistance Rating (FRR) in reference documents issued by Standards Australia and Standards New Zealand shall mean Fire Resistance Level (FRL).

A5.4 Documentation

All submitted documents shall be:

(1) In English

(2) In metric units

(3) Of sufficient clarity to indicate the location, nature and extent of work proposed and with sufficient detail to show that the performance requirements and provisions of the KBC, laws, ordinances, rules, and regulations have been satisfied.

(4) Of sufficient clarity to indicate the code, standards, occupancy, importance level, fire resistance levels, material strengths, and design actions.

A6 CLASSIFICATION OF BUILDINGS & STRUCTURES

Introduction to this Part

The KBC groups buildings and structures by the purpose for which they are designed, constructed or adapted to be used, assigning each type of building or structure with a classification. This Part explains how each building classification is defined and used in the KBC. A building may have parts that have been designed, constructed or adapted for different purposes. In most cases, each of these parts is a separate classification. A building (or part of a building) may also have more than one such purpose and may be assigned more than one classification.

A6.1 Determining a Building Classification

(1) 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.

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

(3) 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.
(4) 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.

Explanatory Information

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

A6.2 Class 1 buildings

(1) A Class 1 Building is a dwelling comprising
   a. one or more buildings, which together form a single dwelling being a detached house or one of a group of two or more attached dwellings, each being a building, separated by a fire-resisting wall.

Explanatory information

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

A6.3 Class 2 Buildings

(1) A Class 2 building is a building containing two or more sole-occupancy units (such as apartment and multi-unit residential buildings).
(2) Each sole-occupancy unit in a Class 2 building must be a separate dwelling.

Explanatory information

Class 2 buildings can also be single storey attached dwelling where there is a common space below.

A6.4 Class 3 Buildings

(1) A Class 3 building is a residential building providing long-term or transient accommodation for a number of unrelated persons.
(2) Class 3 buildings include the following: a boarding house, guest house, hostel or backpacker accommodation; residential part of a hotel or motel; residential part of a school; accommodation for the aged, children or people with disability; a residential part of a health-care building which accommodates members of staff; a residential part of a detention centre; a residential care building.

A6.5 Class 4 Buildings

(1) A Class 4 building is a dwelling in a Class 5, 6, 7, 8, or 9 building if it is the only dwelling in the building.

A6.6 Class 5 Buildings

(1) A Class 5 building is an office building used for professional or commercial purposes.

A6.7 Class 6 Buildings

(1) A Class 6 buildings is a shop or other building used for the sale of goods by retail or the supply of services direct to the public.
(2) Class 6 buildings include the following: A eating room, café, restaurant, bar; a dining room, bar area that is not an assembly building, shop or kiosk part of a hotel or motel; a hairdresser or barber shop, public laundry, funeral parlour; a supermarket or showroom or service station.

A6.8 Class 7 Buildings

(1) A Class 7 building is a storage-type building.
(2) Class 7 has two sub-classifications:

a. Class 7a – a carpark building
b. Class 7b – a building that is used for storage, or display of goods or produce for sale by wholesale

A6.9 Class 8 Buildings

(1) A Class 8 building is a process-type building / factory
(2) Class 8 buildings include the following: a laboratory; a building in which activities such production, assembling, altering, repairing, packing, finishing, or cleaning of goods or produce for sale talks place.

A6.10 Class 9 Buildings

(1) A Class 9 building is a building of a public nature.
(2) Class 9 includes the following sub-classifications:
    a. Class 9a – a health-care building including any parts of the building set aside as laboratories and includes health-care building used as a residential care building.
    b. Class 9b – an assembly building 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.
    c. Class 9c - a 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

A6.11 Class 10 Buildings

(1) A Class 10 building is a non-habitable building or structures such as
(2) sheds, carports, and private garages or the like.

A6.12 Multiple Classifications

(1) A building (or part of a building) may be designed, constructed or adapted for multiple purposes and have more than one classification.
(2) a building (or part of a building) must comply with all the relevant requirements that apply to each of the classifications for that building (or part of a building).

A7 UNITED BUILDINGS

A7.1 United Buildings

(a) Two or more buildings adjoining each other are considered to form one united building if they are connected through openings in the walls dividing them and used as one building.

(b) United buildings shall comply with all the requirements of the KBC as though they are a single building.

(c) In the case of a united building comprised of buildings of different classes, the most restrictive fire resistance requirements of pertinent classes of the individual building shall apply.

A7.2 Alterations in a United Building

If, after alterations or any other building work, two or more of the buildings in a United Building cease to be connected through openings in the dividing walls, each of those buildings not now connected must comply with all the requirements for a single building.

A8 BUILDING IMPORTANCE LEVEL

A8.1 Building Importance Level

(1) The Importance Level of a building or structure shall be determined in accordance with its occupancy and uses, as given in Tables A8.1 and A8.2.
(2) Buildings and structures that have multiple uses shall be assigned the highest importance level applicable for any of those uses.
(3) Where an adjacent structure provides access to another structure with higher importance level, then the structure providing access shall be designated the same importance level as the structure to which it provides access.
(4) Buildings or structures that supply infrastructure services to higher importance level buildings or structures shall be designated the same importance level as the structure to which it provides services to.
(5) Buildings and structures that are isolated, have low accessibility to resources for maintenance, and/or will be challenged to recover rapidly following a post-disaster event shall be designated a Building Importance Level 3 or 4 depending on its consequence of failure within that community.
(6) The Approval Authority shall make all final determinations on Importance Level based on information submitted.

Table A8.1 Consequences of Failure for Importance Levels-Kiribati

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. High difficulties for community to recover post-disaster and high difficulties to maintain.	3	Major Structures (affecting crowds) & Essential services.
		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)

Table A8.2 Importance Levels for Building Types – Kiribati Structures

Importance level	Description of Building Type	Specific Structure Examples
1	Buildings posing low risk to human life or the environment, or a low economic cost, should the building fail. These are typically small non-habitable buildings, such as sheds, barns, and the like, that are not normally occupied, though they	Ancillary buildings not for human habitation Minor storage facilities

Importance level	Description of Building Type	Specific Structure Examples
	may have occupants from time to time.	
2	Buildings posing normal risk to human life or the environment, or a normal economic cost, should the building fail. These are typical residential, commercial, and industrial buildings.	Buildings not included in Importance Levels 1, 3 or 4 Single family dwellings Car parking buildings
3	Buildings of a higher level of societal benefit or importance, or with higher levels of risk-significant factors to building occupants. These buildings have increased performance requirements because they may house large numbers of people, vulnerable populations, or occupants with other risk factors, or fulfil a role of increased importance to the local community or to society in general.	Buildings and structures that are isolated, have low accessibility to resources for maintenance, and/or will be challenged to recover rapidly following a hazard event. Buildings where more than 300 people can congregate in one area. Any building with a capacity of 1000 or more people. Daycare facilities with a capacity greater than 150. Primary school or secondary school facilities with a capacity greater than 250 Colleges or adult education facilities with a capacity greater than 500 Health care facilities with a capacity of 50 or more resident patients but not having surgery or emergency treatment facilities Airport terminals, principal railway stations with a capacity greater than 250. Jails, detention facilities, and correctional institutions. Public assembly buildings, theatres and cinemas of greater than 1000 m2 Emergency medical and other emergency facilities not designated as post-disaster Power-generating facilities, water treatment and wastewater treatment facilities and other public utilities not included in Importance Level 4 nor designated as post-disaster.. Bank and cash distribution facilities and structures. Food distribution and warehouse facilities larger than 50m2. Buildings not included in importance Level 4 containing enough highly toxic or explosive materials capable of causing acutely hazardous conditions that do not extend beyond the property boundaries
4	Buildings that are essential to post-disaster recovery or associated with hazardous facilities.	Buildings and facilities with special post-disaster or recovery function and/or designated as essential facilities or critical infrastructure.

Importance level	Description of Building Type	Specific Structure Examples
		Hospitals and health care facilities having surgery or emergency treatment. Emergency services facilities such as fire, rescue, police stations, warehouses/storage, garages and other supporting buildings having an emergency, recovery, and/or national defence function. Buildings and facilities owned by government that provide essential services. Buildings intended by the owner to contribute to emergency preparedness, or to be used for communication, and operation centres in an emergency, and other facilities required for emergency response. Designated emergency shelters, designated emergency centres and ancillary facilities. Power generating stations, water treatment facilities, and other utilities required as emergency backup facilities for importance level 4 structures. Buildings and structures that are highly isolated, have very low accessibility to resources for maintenance, and/or will be highly challenged to recover rapidly following a hazard event. Aviation and port buildings, warehouses, and hangers. Ancillary buildings (including, but not limited to, communication towers, fuel storage tanks or other structures) required for operation of importance level 4 structures during an emergency. Buildings housing highly toxic gas or explosive materials capable of causing acutely hazardous conditions that extend beyond property boundaries
5	Special structures (For structures outside the scope of the building code acceptable probability of failure to be determined by special study)	Structures that have special functions or whose failure poses catastrophic risk to a large area (e.g. 100 km^2) or a large number of people (e.g., 100 000) Major dams, extreme hazard facilities

A9 BUILDING COMPLEXITY LEVEL

Introduction to this Section

The Building Complexity level shall be determined for each building or structure. Based on the complexity level the appropriate Part of the KBC can be used.

A9.1 Building Complexity Criteria

The following building complexity criteria are used to determine the building complexity level:

(1) Attributes – the building or structure is designed with any of the following sub-criteria:
   a. an effective height of more than 12m and/or
   b. More than 3 stories and/or

(2) Occupant numbers – the building is to be occupied by more than 100 people
(3) Importance Level 3 or 4,
(4) Other hazard, risks, and complexities not covered by (1) to (3) as determined by the Approval Authority.

A9.2 Building Complexity Level

(1) The Building Complexity Level of all or part of a building or structure shall be in accordance with Table A9.1.
(2) A building or structure classified as Normal Building Complexity Level requires compliance with KBC Part 1 and Part 2 or Part 3.
(3) A building or structures classified as High Building Complexity Level requires compliance with KBC Part 4.
(4) The Approval Authority shall make all final determinations on Complexity Level and shall retain the right to increase the Complexity Level based on information submitted.

Table A9.1 Consequences of Failure for importance Levels

Building Complexity Level	Criteria
Normal	The building does not have any of the building complexity criteria listed in A9.1
High	The building has one or more of the building complexity criteria listed in A9.1.

A10 UXO SURVEY AND DISPOSAL

A10.1 UXO Definition

(1) For the purposes of the KBC, 'UXO' refers to all unexploded 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.

A10.2 UXO Risk Assessment, Surveys, and Clearance

(1) Prior to any geotechnical investigation, earthmoving, or building construction, a UXO risk assessment shall be undertaken by a technically competent UXO survey and remediation organisation to determine whether a UXO Survey is required (based on the history of the site) and what type of survey is appropriate.
(2) The UXO Survey shall clearly identify location, type of UXO, and recommended method of isolation, neutralization, and/or removal. If a UXO is found during the survey, the location shall be appropriately isolated, local populations informed, and local authorities and government agencies responsible for UXO clearance shall be immediately notified.

UXO shall be cleared before any geotechnical investigation or construction activities take place.

A11 Prevention and Control of Asbestos

A11.1 Asbestos Definitions

For the purposes of the VNBC, the following definitions shall be used when referring to asbestos:

'asbestos' - means any of the following asbestiform varieties: (a) asbestos actinolite; (b) asbestos grunerite (amosite) (brown asbestos) (cummingtonite-grunerite); (c) asbestos anthophyllite; (d) asbestos chrysotile (white asbestos) (serpentine); (e) asbestos crocidolite (blue asbestos) (riebeckite); (f) asbestos tremolite; (g) a mixture that contains one or more of the above.

'Asbestos Management Code of Practice' - means the Kiribati Asbestos Management Code of Practice (including amendments or supplementary guidance documents).

'asbestos containing material' - means any goods, material or thing, including waste material and soil, that contains asbestos.

'asbestos waste' - means any waste that contains asbestos or asbestos containing material.

'recycling' - means any operation by which asbestos waste is reprocessed into products, materials or substances whether for the original or other purposes.

're-use' - means any operation by which asbestos waste is used again for the same purpose for which that asbestos or asbestos containing material was originally intended.

A11.2 Prohibition and Prevention of Asbestos

Asbestos or asbestos containing materials shall not be imported, used, re-used, fabricated or recycled for use in any building, facility, or part in Kiribati.

A11.3 Removal and Disposal of Asbestos and Asbestos Containing Materials

Removal of asbestos and asbestos containing material shall be considered asbestos waste and shall be removed and disposed of in accordance with the Kiribati Laws, Regulations, and the Kiribati Asbestos Management Code of Practice, or other approved code of practice or standard, and in accordance with the requirements of the Approval Authority and other Authorities.

SECTION A – SCHEDULE 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 - means the Minister and a person or body appointed under section 34 of the Building Act.

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,* pre*school*, 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 - means a structure on or attached to land, the lagoon bed or the sea bed, including additions to a building, a structure attached to a building, a sanitation system and part of a building. However, this Code does not apply to exempt building work – that is, construction of, maintenance to or repair of an exempt structure. Exempt structures are set out in the Building Regulations.

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 Kiribati 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 legally binding set of requirements issued by the Government of Kiribati Islands under the Kiribati Building Act 2024 setting out details of the development process including procedures, exemptions, fees and charges and infringement penalties.

Building work – means work of a structural nature to a building, including excavations for foundations, sanitary installations or plumbing. However, this Code does not apply to exempt building work (that is, construction of, maintenance to or repair of an exempt structure).

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 Kiribati.

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 pre*school*, 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 piaster 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 A5.3, 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 wails, 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 an 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 an 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 NC1.4.

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 m^2, 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:
(a) affects the structural adequacy of the building including underpinning of foundations; or
(b) 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);
(c) 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
(d) affects the requirements necessary to avoid the spread of fire to or from any adjoining building; or
(e) is over any third-party services or easements; or
(f) impacts on the protection of any adjoining property; or
(g) will adversely affect the safety, health or amenity of people using the building; or
(h) negatively impacts on the functioning of any existing 'Code-required' building elements; or
(i) would trigger a change in the building's occupancy permit; or
(j) involves a change of use or a change in the classification of the existing building or of the part being repaired; or,
(k) 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.

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 Kiribati 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.

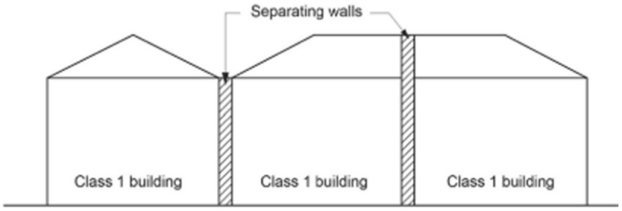
Sarking-type Material - a material such as a reflective toil or other flexible membrane of a type normally used for a purpose such as water-proofing, vapour-proofing or thermal reflectance.

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.



Elevation

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 - Dwelling house built using traditional methods and substantially from traditional materials where not more than 12 people will be ordinarily resident.

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.

SCHEDULE 2

STANDARDS ADOPTED BY REFERENCE

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	B1.2, B1.3
AS/NZS 1170.1	Structural design actions, Part 1: Permanent, imposed and other actions	B1.3, B1.6
AS/NZS 1170.2	Structural design actions, Part 2: Wind actions	B1.3
AS/NZS 1221	Fire hose reels	NE1.4
AS 1288	Glass in buildings – Selection and Installation	B1.4
AS 1530.1	Methods for fire tests on building materials, components and structures - Part 1: Combustibility test for materials	Spec A5.3
AS 1530.2	Methods for fire tests on building materials, components and structures - Part 2: Test for flammability of materials	Spec A5.3
AS/NZS 1530.3	Methods for fire tests on building materials, components and structures - Part 3: Simultaneous determination of ignitability, flame propagation, heat release and smoke	Spec A5.4,
AS 1530.4	Methods for fire tests on building materials, components and structures, Part 4: Fire-resistance tests for elements of construction	Spec A5.4, Spec NC3.15
AS/NZS 1546.1	On-site Domestic Wastewater Treatment Units – Part 1: Septic Tanks	DF7.2
AS/NZS 1547	On-site domestic wastewater management	DF7.6
AS 1562.1	Design and Installation of metal roof and wall cladding, Part 1: Metal	B1.4
AS 1657	Fixed platforms, walkways, stairways and ladders - Design, construction and installation	ND2.18
AS/NZS 1664.1	Aluminium structures, Part 1: Limit state design	B14

No	Title	Code clause
AS/NZS 1664.2	Aluminium structures, Part 2: Allowable stress design	B1.4
AS 1668.2	The use of ventilation and airconditioning in buildings, Part 2: Mechanical ventilation in buildings	DF4.5, NF4.5, NF4.17
AS 1670.1	Fire detection, warning, control and intercom systems – System design, installation and commissioning, Part 1: Fire	NE1.6, NE 4.2
AS 1684.2	Residential timber-framed construction, Part 2: Non-cyclonic areas	B1.4
AS 1684.4	Residential timber-framed construction, Part 4: Simplified — Non-Cyclonic Areas	B1.4
AS 1720.1	Timber structures, Part 1: Design methods	B1.4
AS 1720.3	Timber structures, Part 3: Design criteria for timber-framed residential buildings	B1.4
AS 1720.5	Timber structures, Part 5: Nail plated timber roof trusses	B1.4
AS/NZS 1720.4	Timber structures, Part 4: Fire resistance of timber elements	B1.4, Spec A5.3
AS/NZS 1860.1	Particleboard Flooring, Part 1: Specifications	B1.4
AS 1860.2	Particleboard Flooring, Part 2: Installation	B1.4
AS 1905.1	Components for the protection of openings in fire-resistant walls, Part 1: Fire-resistant doorsets	Spec NC1.6, NC3.6
AS 1926.1	Swimming pool safety – Part 1: Safety barriers for swimming pools	NG 1.1
AS 1926.2	Swimming pool safety – Part 2: Location of safety barriers for swimming pools	NG 1.1
AS 1926.3	Swimming pool safety – Part 3: Water recirculation systems	NG 1.1
AS 2047	Windows and external glazed doors in buildings	B1.4
AS 2050	Installtion of Roof Tiles	B1.4
AS 2159	Piling - Design and installation	B1.4
AS/NZS 2179.1	Specifications for rainwater goods, accessories and fasteners, Part 1: Metal shape or sheet rainwater goods, and metal accessories and fasteners	NF7.2
AS/NZS 2293.1	Emergency lighting and exit signs for buildings, Part 1: System design, installation and operation	NE3.5, NE3.8

No	Title	Code clause
AS/NZS 2312.1	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 1: Paint coatings	B4.2
AS.NZS 2312.2	Guide to the protection of structural steel against atmospheric corrosion by the use of protective coatings - Part 2: Hot dip galvanizing	B4.2
AS/NZS 2327	Composite structures—Composite steel-concrete construction in buildings	Spec A5.3
AS/NZS 2588	Gypsum plasterboard	Section A – Schedule 1 - Definitions
AS 2601	The demolition of structures	B2.2
AS/NZS 2269.0	Plywood – Structural, Part 0: Specifications	B1.4
AS/NZS 2712	Solar and Heat pump Water Heaters – Design and Construction	NF5.4
AS/NZS 2728	Prefinished/prepainted sheet metal products for interior/exterior building applications - Performance requirements	B4.2
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	B1.4, 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, NE5.1
NZS 3101.1&2	Concrete structures standard	B1.4
NZS 3109	Concrete construction	B1.4
NZS 3124	Specification for concrete construction for minor works	B1.4
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, 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,
AS/NZS 3500.4	Plumbing and drainage, Part 4: Heated water services	DF5.2, NF5.3, NF5.4, NF5.2.
AS 3600	Concrete structures	B1.4, Spec A5.3

No	Title	Code clause
AS 5216	Design of post-installed and cast-in fastenings in concrete	B1.4
NZS 3603	Timber Structures Standard	B1.4
NZS 3604	Timber-framed buildings	B1.4, B3.3, B4.2
AS 3660.1	Termite management, Part 1: New building work	B1.4
AS 3660.2	Termite management, Part 2: In and around existing buildings and structures	B1.4
AS 3660.3	Termite management, Part 3: Assessment criteria for termite management systems	B1.4
AS/NZS 3666.1	Air-handling and water systems of buildings - Microbial control – Part 1: Design, installation and commissioning	NE 4.17
AS 3700	Masonry structures	B1.4, Spec A5.3
AS 3972	General purpose and blended cements	B4.3
AS/NZS 4020	Testing of products for use in contact with drinking water	A5.2
AS 4100	Steel structures	B1.4, Spec A5.3
AS 4597	Installation of roof slates and shingles (non-interlocking type)	B1.4
AS/NZS 4600	Cold-Formed Steel Structures	B1.4
AS/NZS 4200.1	Pliable building membranes and underlays, Part 1: Materials	DF1.5, NF1.5
NZS 4210	Masonry construction: Materials and workmanship	B1.4, Spec A5.3
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	B1.4,
NZS 4229	Concrete masonry buildings not requiring specific engineering design	B1.4
NZS 4230	Design of reinforced concrete masonry structures	B1.4
NZS 4503	Hand operated fire-fighting equipment	NE1.4, NE1.5
NZS 4512	Fire Detection and alarm systems in buildings	Spec NE1.8, NE2.5
AS/NZS 5033	Installation and Safety Requirements for photovoltaic (PV) arrays	DE1.3

No	Title	Code clause
ASCE 7	Minimum Design Loads and Associated Criteria for Buildings and Other Structures	B1.3, B1.6
ASCE 24	Flood Resistant Design and Construction	B1.6
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
ISO 9223	Corrosion of metals and alloys — Corrosivity of atmospheres — Classification, determination and estimation	B4.2
DFAT	Accessibility Design Guide: Universal Design principles for Australia's Aid Program (Available free of charge DFAT website)	ND3.2, ND3.3, NF2.5
ABCB	ABCB Standard for Construction of Buildings in Flood Hazard Areas	B1.6
NASH	NASH Standard – Residential and Low-rise Steel Framing Part 1 or Part 2	B1.4
NCC	National Construction Code of Australia	
	New Zealand Building Code	

SPECIFICATION A5.3 FIRE-RESISTANCE OF BUILDING ELEMENTS

1. Scope

This Specification sets out the procedure for determining the Fire Resistance Level, 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 Section;
(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 AISC 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 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.
(f) for fire-protected timber, it complies with Specification __ where applicable.

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 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 load;

(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 load of the building element in comparison with 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.

1. Columns covered with lightweight construction

(a) A column protected by lightweight construction to achieve an FRL which passes through a *building element* that is required to have an FRL or a resistance to the incipient spread of fire, must be installed using a method and materials identical with a prototype assembly of the construction which has achieved the required FRL or resistance to the incipient spread of fire.

(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.

(c) 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 1.2m above the floor level to prevent indenting, if the covering is not in continuous contact with column; and

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

Building	**Thickness of principle material (mm)**				
Element	**60/60/60**	**90/90/90**	**120/120/120**	**180/180/180**	**240/240/240**
WALL					
Masonry					
Ashlar	-	-	-	-	300
Calcium silicate	Refer AS 3700				
Concrete	Refer AS 3700				

Building	Thickness of principle material (mm)				
Element	**60/60/60**	**90/90/90**	**120/120/120**	**180/180/180**	**240/240/240**
Fired clay (inc terracotta)	Refer AS 3700				
Concrete					
No-fines	-	-	-	150	300
Prestressed	Refer AS 3600				
Reinforced	Refer AS 3600				
Plain	-	-	-	150	170
Solid gypsum blocks	75	90	100	110	125
Gypsum — perlite or Gypsum vermiculite - plaster on metal lath and channel (non-loadbearing walls only)	50	50	65	-	-
CONCRETE COLUMN					
Prestressed	Refer AS 3600				
Reinforced	Refer AS 3600				
HOT-ROLLED STEEL COLUMN					
(Including a fabricated column) exposed on no more than 3 sides: Fire protection of					
Concrete — Cast in-situ— loadbearing	25	30	40	55	75
Concrete — Cast in-situ— non-loadbearing unplastered	25	30	40	50	60
Concrete — Cast in-situ— plastered 13mm—	25	25	30	40	50
Gypsum — Cast in-situ—	-	-	-	-	50
Gypsum — perlite or Gypsum-vermiculite plaster sprayed to contour	20	25	35	50	55
Gypsum — perlite or Gypsum-vermiculite	20	20	25	35	45

Building	Thickness of principle material (mm)				
Element	**60/60/60**	**90/90/90**	**120/120/120**	**180/180/180**	**240/240/240**
plaster sprayed on metal lath					
HOT-ROLLED STEEL COLUMN					
(Including a fabricated column) exposed on no more than 3 sides and **with column spaces filled**: Fire protection of					
Solid calcium-silicate masonry	50	50	50	50	65
Solid clay masonry	50	50	50	65	90
Solid concrete masonry	50	50	50	65	90
Solid gypsum blocks	50	50	50	50	65
Hollow terracotta blocks—					
plastered 13mm	50	50	50	65	90
HOT-ROLLED STEEL COLUMN					
(Including a fabricated column) exposed on no more than 3 sides and **with column spaces unfilled**: Fire protection of					
Solid calcium-silicate masonry	50	50	50	-	-
Solid clay masonry	50	50	65	-	-
Solid concrete masonry	50	50	65	-	-
Solid gypsum blocks	50	50	50	-	-
Hollow terracotta blocks—					
plastered 13mm	50	50	65	-	-
HOT-ROLLED STEEL COLUMN					
(Including a fabricated column) exposed on 4 sides: Fire protection of					
Concrete — Cast in-situ— loadbearing	25	40	45	65	90
Concrete — Cast in-situ— non-loadbearing – unplastered	25	30	40	50	65
Concrete — Cast in-situ— plastered 13mm—	25	25	30	40	50

Building	Thickness of principle material (mm)				
Element	**60/60/60**	**90/90/90**	**120/120/120**	**180/180/180**	**240/240/240**
Gypsum — Cast in-situ—	-	-	-	-	50
Gypsum — perlite or Gypsum-vermiculite plaster sprayed to contour	25	30	40	55	65
Gypsum — perlite or Gypsum-vermiculite plaster sprayed on metal lath	20	20	30	40	50
HOT-ROLLED STEEL COLUMN					
(Including. a fabricated column) exposed on 4 sides and with column spaces filled: Fire protection of					
Solid calcium-silicate masonry here	50	50	50	65	75
Solid clay masonry	50	50	50	75	100
Solid concrete masonry	50	50	50	75	100
Solid gypsum blocks	50	50	50	65	75
Hollow terracotta blocks— plastered 13mm	50	50	50	75	100
HOT-ROLLED STEEL COLUMN					
(Including a fabricated column) exposed on 4 sides and with column spaces unfilled: Fire protection of					
Solid calcium-silicate masonry here	50	50	50	-	-
Solid clay masonry	50	50	65	-	-
Solid concrete masonry	50	50	65	-	-
Solid gypsum blocks	50	50	50	-	-
Hollow terracotta blocks— plastered 13mm	50	50	65	-	-
BEAM					
Concrete —					

Building	Thickness of principle material (mm)				
Element	**60/60/60**	**90/90/90**	**120/120/120**	**180/180/180**	**240/240/240**
Prestressed	Refer AS 3600				
Reinforced	Refer AS 3600				
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	50	65
Gypsum — perlite or Gypsum-vermiculite plaster sprayed to contour	20	25	35	50	55
Gypsum — perlite or Gypsum-vermiculite plaster sprayed on metal lath	20	20	25	35	45
Hot-rolled Steel (inc. an open-web joist girder truss etc) exposed on 4 sides: Fire protection of					
Concrete — Cast in-situ—	25	40	45	60	90
Gypsum — perlite or Gypsum-vermiculite plaster sprayed to contour	25	30	40	55	65
Gypsum — perlite or Gypsum-vermiculite plaster sprayed on metal lath	20	20	30	40	50
FLOOR, ROOF OR CEILING					
Concrete —					
Prestressed	Refer AS 3600				
Reinforced	Refer AS 3600				

Annexure to Table 1

1. Scope

This Specification sets out the descriptions of elements referred to in Specification A5.3, Table 1.

2. Mortar for masonry

Masonry units of ashlar, calcium silicate, concrete or fired clay (including terracotta blocks) must be laid in cement mortar or composition mortar complying with the relevant provisions of AS 3700.

3. Gypsum blocks

Gypsum blocks must be laid in gypsum-sand mortar or lime mortar.

4. Gypsum-sand mortar and plaster

Gypsum-sand mortar and gypsum-sand plaster must consist of either—

(a) not more than 3 parts by volume of sand to 1 part by volume of gypsum; or
(b) if lime putty is added, not more than 2.5 parts by volume of sand to 1 part by volume of gypsum and not more than 5% of lime putty by volume of the mixed ingredients.

5. 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 $1m^3$ of perlite or vermiculite to 640 kg of gypsum if the required thickness of the plaster is not more than 25 mm; and
(b) in 2 coats if the required thickness is more than 25 mm, the first in the proportion of $1m^3$ of perlite or vermiculite to 800 kg of gypsum and the second in the proportion of $1m^3$ perlite or vermiculite to 530 kg of gypsum.

6. 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.

7. Plaster Reinforcement

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

(a) it must be reinforced with expanded metal lathe that:
  (i) has a mass per unit area of not less than 1.84 kg/m;
  (ii) has not fewer than 98 meshes/m; and
  (iii) is protected against corrosion by galvanising or other suitable method; or
(b) 13mm x 13mm x 0.710 mm galvanised steel wire mesh; and
(c) 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.

8. Ashlar stone masonry

Ashlar masonry must not be used in a part of the building containing more than 2 storeys, and must not be of—

(a) aplite, granite, granodiorite, quartz dacite, quartz diorite, quartz porphyrite or
(b) quartz porphyry, conglomerate, quartzite or sandstone; or
(c) chert or flint; or

(d) limestone or marble

9. Dimensions of masonry

The thickness of concrete masonry is calculated as follows:

a. 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.

b. 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.

c. Equivalent thickness

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

d. Cavity Walls

The thickness of a cavity wall is the sum of the thicknesses of the leaves determined in accordance with 9.a and/or 9.b as appropriate.

e. 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).

10. Height-to-thickness ratio of certain walls

The ratio of height between lateral supports to overall thickness of a wall of ashlar, no-fines concrete, unreinforced concrete, solid gypsum blocks, gypsum-perlite or gypsum-vermiculite plaster on metal lath and channel, must not exceed—

(a) 20 for a loadbearing wall; or
(b) 27 for a non-loadbearing wall.

11. Slenderness ratio of masonry

11.1 Maximum Value

The slenderness ratio of a masonry wall must not exceed the appropriate value in Table AX.1.

11.2 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 **Error! Reference source not found.**.

Table 11.1 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

Type of unit	60/60/60	90/90/90	120/120/120
Flexure with super-imposed axial forces less than 5% of load capacity	36	36	36

12. 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;

13. Increase in Thickness by Plastering

13.1 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.

13.2 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** 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/m^2: 100%
(b) For concrete masonry in which the aggregate is of a density between 1600 and 1800 kg/m^2: 85%
(c) For concrete masonry in which the aggregate is of a density less than 1800kg/m^2 : 75%

14. 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.

14.1 Structural Adequacy Criterion

Table 14.1A 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 beat 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 14.1B

(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 14.1 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	15	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 slab 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 To tendon	20 30	20 30	30 30	40 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 14.1 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.	

14.2 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.

14.3 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 14.3 Minimum Effective Thickness for Insulation

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

15. Gypsum-Perlite Or Gypsum-Vermiculite Plaster On Metal Lath

15.1 Walls

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

(a) 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
(b) the gypsum-perlite or gypsum-vermiculite plaster must be applied symmetrically to each exposed side of the lath.

15.2 Columns

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

(a) 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.

15.3 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.

16. Exposure of Columns and Beams

16.1 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.

16.2 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

17 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.

18. Reinforcement for Column and Beam Protection

18.1 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.

18.2 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.

18.3 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 18.3 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	

19 Thickness of Column and Beam Protection

19.1 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 A5.4: 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 surf ace 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

This Specification sets out the procedures for determining the Early Fire Hazard indices of components and assemblies. Form of test

Tests must be carried out in accordance with—

(a) for the determination of the Spread-of-Flame Index and Smoke-Developed Index — AS/NZS 1530.3; and
(b) for the determination of the ability to prevent ignition and to screen its core material from free air — 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

SECTION B

THIS SECTION APPLIES TO ALL BUILDINGS

CONTENTS

PERFORMANCE REQUIREMENTS

BP1 STRUCTURAL PROVISIONS

Objectives

The Objective of this section is to

a. Safeguard people from injury caused by structural failure; and

b. Safeguard people from loss of amenity caused by structural behaviour; and

c. Protect other property from physical damage caused by structural failure; and

d. Safeguard people and property from flood hazards.

Required Performance

BP1.1 General Requirements

(1) Buildings, building elements and sitework shall have a low probability of rupturing, becoming unstable, losing equilibrium, or collapsing during construction or alteration and throughout their lives.
(2) Buildings, building elements and sitework shall have a low probability of causing loss of amenity through undue deformation, vibratory response, degradation, or other physical characteristics throughout their lives, or during construction or alteration when the building is in use.

BP1.2 Physical Conditions / Loads

Account shall be taken of all physical conditions likely to affect the stability of building, building elements and sitework, including:

(a) Self-weight,
(b) Imposed gravity loads arising from use,
(c) Temperature,
(d) Earth pressure,
(e) Water and other liquids,
(f) Wind,
(g) Fire,
(h) Impact,
(i) Explosion,
(j) Reversing and fluctuating effects,
(k) Differential movement,
(l) Ground movement caused by swelling, shrinkage, landslip or subsidence, and site works
(m) Construction activity,
(n) Termites,
(o) Vegetation,
(p) Adverse effects due to insufficient separation from other buildings,
(q) Influence of equipment, services, non-structural elements and contents,
(r) Time dependent effects including creep and shrinkage,
(s) Effects on physical conditions and loads due to climate change.

BP1.3 Design and Construction Requirements

Due allowance shall be made for:

(a) The consequence of failure,
(b) The intended use of the building,
(c) Effects of uncertainties resulting from construction activities, or the sequence in which construction activities occur,
(d) The quality of workmanship available
(e) The quality of materials available

(f) The availability of appropriate construction equipment
(g) Variation in the properties of materials and the characteristics of the site,
(h) Changes in the characteristics of the site due to climate change,
(i) Corrosion and durability
(j) Accuracy limitations inherent in the methods used to predict the stability of buildings.

BP1.4 Sitework and Excavation

(1) Sitework, where necessary, shall be carried out to:
    a. Provide stability for construction on the site, and
    b. Avoid the likelihood of damage to other property.
(2) Any sitework and associated supports shall take account of the effects of:
    a. Changes in ground water level,
    b. Water, weather and vegetation, and
    c. Ground loss and slumping
(3) Any excavation shall be carried out to:
    a. Ensure the stability of the excavation from collapse, and
    b. Avoid the likelihood of damage to other property

BP1.5 Buildings in Flood Areas

(1) A building in a flood hazard area, must be designed and constructed, to the degree necessary, to the design flood level (DFL) throughout its design working life
    a. to resist flotation, collapse or significant permanent movement resulting from action of hydrostatic, hydrodynamic, erosion and scour, wind and other actions during the design flood event (integrating sea level rise and climate change) throughout its design working life considering flood height and maximum flow velocity.
    b. Safeguard occupants and other people against illness and injury caused by flood water affecting the building.
(2) The actions and requirements to be considered to satisfy (1) include but are not limited to
    a. Flood actions; and
    b. Elevation requirements; and
    c. Foundation and footing requirements; and
    d. Requirements for enclosures below the flood hazard level; and
    e. Requirements for structural connections; and
    f. Material requirements; and
    g. Requirements for utilities; and
    h. Requirements for occupant egress
    i. Requirements for mould, mildew, and corrosion.
(3) Utilities and supporting infrastructure associated with a building must be designed to reduce the effects of flood water on utilities and supporting infrastructure in the event of a flood up to the Design Flood Level (DFL)
(4) Sanitation systems and sanitary drains must be protected from backflow so that in the event of a flood up to the Design Flood Level the effects of flood water on the building are reduced.
(5) Electrical and Mechanical systems must be designed and located so that its ability to function effectively is not affected by a flood event up to the Design Flood Level (DFL)
(6) Water storage and collection systems must be designed and located so that its ability to function effectively is not affected by a flood event up to the Design Flood Level (DFL)

BP2 DEMOLITION PROVISIONS

Objectives

The Objective of this section is to

a. Safeguard people from injury caused by demolition; and

b. Protect other property from physical damage caused by demolition.

Required Performance

BP2.1 Demolition General Requirements

The demolition of buildings shall be carried out.

a) In a way that avoids the likelihood of premature collapse,
b) In a planned and controlled manner,
c) In a way that minimizes dust, vibrations, noise, water, fire, smoke and fumes
d) In a way that identifies hazardous materials and appropriately removes them
e) Using means and methods to prevent damage to utilities, roads, and adjacent properties.

BP3 FOUNDATIONS AND GROUND CONDITIONS

Objectives

The Objective of this Part is to

a. Safeguard people from injury caused by foundation and ground failure; and

b. Safeguard people from loss of amenity caused by foundation and ground behaviour; and

c. Protect other property from physical damage caused by foundation failure.

REQUIRED PERFORMANCE

BP3.1 Foundation Requirements

Foundations shall be designed, and ground conditions verified to prevent building damage, partial or total building collapse, and unacceptable building movements.

BP4 DURABILITY

Objective

The Objective of this section is to:

a) ensure that a building will throughout its life continue to satisfy the other objectives of the KBC.

b) Building materials, components and construction methods shall be sufficiently durable to ensure that the building, without reconstruction or major renovation, satisfies the other functional statements in the KBC throughout the life of the building.

Required Performance

BP4.1 Durability of Building Elements

(1) Building elements must, with only normal maintenance, continue to satisfy the performance requirements of this code for the lesser of the specified intended life of the building, if stated, or:
    a. the life of the building, being not less than 50 years, if:
        i. those building elements (including floors, walls, and fixings) provide structural stability to the building, or
        ii. those building elements are difficult to access or replace, or
        iii. failure of those building elements to comply with the building code would go undetected during both normal use and maintenance of the building.
(2) 15 years if:
    a. those building elements (including the building envelope, exposed plumbing in the subfloor space, and in-built chimneys and flues) are moderately difficult to access or replace, or
    b. failure of those building elements to comply with the building code would go undetected during normal use of the building but would be easily detected during normal maintenance.
(3) 5 years if:

a. the building elements (including services, linings, renewable protective coatings, and fixtures) are easy to access and replace, and
b. failure of those building elements to comply with the building code would be easily detected during normal use of the building.

BP4.2 Durability of Building System Components

(1) Individual building elements which are components of a building system and are difficult to access or replace must either:
   a. all have the same durability, or
   b. be installed in a manner that permits the replacement of building elements of lesser durability without removing building elements that have greater durability and are not specifically designed for removal and replacement

BP4.4 Durability of Elements embedded in Concrete

(1) Steel reinforcement and metallic elements embedded in concrete shall how a low rate of corrosion and shall not damage nor compromise the strength and stability of the concrete element during the intended life of the building.

BP4.5 Durability of Architectural, Electrical, Mechanical, and Fire Equipment and Systems

(1) The durability of architectural, electrical and mechanical elements, components, systems, fittings and equipment, including those for fire protection systems, should be fit for purpose in the local environment. System design and materials specifications must account for the corrosive conditions created by very humid climates and airborne salt from the nearby marine environment. Specific attention should be paid to selection of materials for reduced susceptibility to corrosion such as:
   a. Non-ferrous metals like stainless steel;
   b. Non-metallic materials such as PVC, fiberglass, and similar materials;
   c. Special coatings for corrosion resistance such as hot-dip or electroplated zinc, epoxy-based coatings, cold galvanizing paint, and other corrosion inhibiting coating as may be appropriate for any specific application.
   d. Watertight enclosures
(2) Galvanic corrosion shall be avoided.

DEEMED-TO-SATISFY PROVISIONS

B1.1 General Requirements

(1) Deemed-to-Satisfy Solutions presented below satisfy the Performance requirements BP1.1 to BP1.5.
(2) Where a Performance solution is proposed, the relevant Performance requirements must be determined in accordance with Part A2

B1.2 Resistance to Actions

The resistance of a building or structure must be greater than the most critical action effect resulting from the different combinations of actions where:

a. The most critical action effect on a building or structure is determined in accordance with BD1.3 and the general design procedures contained in AS/NZS 1170.0; and
b. The resistance of a building or structure is determined in accordance with B1D4.

B1.3 Determination of Individual Actions

The magnitude of individual actions must be determined in accordance with the following:

(1) Permanent actions per AS/NZS 1170.1
(2) Imposed actions per AS/NZS 1170.1
(3) Wind actions per AS/NZS 1170.2
    a. Determining Importance Level as per Table A8.1 and A8.2
    b. Determining the corresponding annual probability of exceedance in accordance with Table B1.3A.
    c. Determining the Regional Wind Speed in accordance with Table B1.3B
    d. Using a Wind Direction Multiplier M_d = 1.0;
    e. Using a Terrain Category 1 or 2;
    f. Using a Climate Change Multiplier M_c = 1.10

(4) Coastal flood, storm surge, wave action, and tsunami Actions per AS/NZS 1170.1 and/or ASCE 7 considering sea level rise.
(5) Actions not covered above shall utilize AS/NZS 1170.1 and any other AS/NZS standard approved by the local authority.

Table B1.3A

Importance Level	Permanent Structures (design working life between 5 and 50 yrs) Annual probability of exceedance (1/R) for non-cyclonic wind (ultimate limit state)	Temporary Structures (design working life of 5 years or less) Annual probability of exceedance (1/R) for non-cyclonic wind (ultimate limit state)
1	1 / 100	1 / 25
2	1 /500	1 / 250
3	1 / 1000	1 / 500
4	1 / 2500	1 / 1000

Table B1.3B

Annual probability of exceedance (1/R)	Regional Wind Speed 3s gust, 10m height, open country terrain, non-cyclonic
1 / 25	V_{25} = 30 m/s
1 / 50	V_{50} = 32 m/s
1 / 100	V_{100} = 35 m/s
1 / 500	V_{500} = 40 m/s
1 / 1000	V_{1000} = 42 m/s
1 / 2500	V_{2500} = 44.5 m/s

B1.4 Determination of Structural Resistance of Materials and Forms of Construction

The structural resistance of materials and forms of construction must be determined in accordance with the following, as appropriate:

(a) Masonry: AS 3700 / NZS 4210 / NZS 4229 / NZS 4230
(b) Concrete:
  i) Concrete Construction: AS 3600 / NZS 3101 / NZS 3109 / NZS 3124
  ii) Post-installed and cast-in fastenings: AS 5216
  iii) Residential slabs and footings: AS 2870
(c) Steel Construction:
  i) Steel Structures: AS 4100
  ii) Cold-formed steel structures: AS/NZS 4600
  iii) Residential and low-rise steel framing: NASH Standard – Residential and Low-Rise Steel Framing Part 1 or Part 2
(d) Composite steel and concrete structures: AS/NZS 4600
(e) Aluminum construction: AS/NZS 1664.1 or AS/NZS 1664.2
(f) Timber construction:
  i) Timber Structures Standard: NZS 3603
  ii) Design of timber structures: AS 1720.1 or NZS 3604
  iii) Timber structures: AS 1684.2, or AS 1684.4
  iv) Nail plated timber roof trusses: AS 1720.5
  v) Particle board flooring: AS 1860
  vi) Plywood: AS/NZS 2904, AS/NZS 2269
(g) Piling: AS 2159
(h) Glazing construction
  i) Glazed assemblies: AS 2047 and AS 1288
  ii) Glazing Standards NZS 4223
(i) Termite Risk Management: AS 3660.1
(j) Roof Construction:
  i) Terracota: AS 4597
  ii) Roof Tiling: AS 2050
  iii) Metal Roofing: AS 1562.1

B1.5 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 local authority.

B1.6 Construction of buildings in flood hazard areas

(a) A building or structure in a flood hazard area must comply with the Australian Building Codes Board Standard for Construction of Buildings in Flood Hazard Areas dated 2012.3. and as amended as follows:

(b) A Building or structure in a flood hazard area subjected to storm surge, coastal wave action, and tsunami must comply with AS/NZS 1170.1 and/or ASCE 7 and ASCE 24 considering sea level rise and debris action.

(c) The Design Flood Events (DFEs) shall be based on an annual probability of exceedance of not more than 1/100, 1/50, 1/25 and/or a maximum recorded/historical flood with record length of not less than 100 years, 50 years, and 25 years.

(d) The design flood level (DFL) and Maximum flow velocity (MFV) for the Design Flood Events (DFE) for design shall be determined through an approved hazard study, approved site-specific study, historical documentation, through a formal and documented consultation process that is approved by the Authority, or as dictated by the Authority. The design flood level shall include wave height.

(e) The flood hazard level (FHL) shall be equal to the Design flood level (DFL) for the maximum DFE plus the freeboard (300mm minimum for IL2 and 600mm minimum for IL3 and IL 4) plus the sea level rise for a median high emissions (SSP3-7.0) projection to the year of the design working life.

B2 DEMOLITION

B2.1 General Requirements

All dangerous buildings as detailed in B2.3 must either be stabilized, 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 BP2.1 are satisfied if demolition is planned and carried out in accordance with 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 will be demolished or partially demolished, asbestos shall be removed in accordance with an Asbestos Removal Control Plan prior to demolition works and disposed of in accordance with the Kiribati Laws, Regulations, and the Kiribati Asbestos Management Code of Practice, or other approved code of practice or standard; and in accordance with the requirements of the Approval Authority and other Authorities.

Where refurbishment or maintenance site activities require the removal of asbestos containing material or require other work activities that involve the disturbance of any asbestos containing materials, such work shall be done consistent with the Kiribati Asbestos Management Code of Practice and complied with by the contractor responsible.

Asbestos shall be removed in accordance with the Asbestos Removal Control Plan by an asbestos removal contractor approved by the Approval Authority."

"B 3 FOUNDATION AND GROUND CONDITIONS

B3.1 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.

B3.2 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.

B3.3 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

B3.4 Water Table Rise due to Climate Change

The existing water table depth, projections of future water table depth due to climate change/sea level rise and other factors, and the current and future salinity of the water shall be determined. The adequacy of foundations shall be assessed, and investigations performed as required to determine if the ultimate and allowable bearing capacity will change over time, if heave/buoyancy will occur, and if there are any soil corrosivity conditions that will trigger durability requirements of the material standards during the design working life of the building or structure.

B4 DURABILITY

B4.1 General Requirements

(1) Deemed-to-Satisfy Solutions presented below satisfy the Performance requirements BP4.1 to BP4.4.
(2) Where a Performance solution is proposed, the relevant Performance requirements must be determined in accordance with section A2.

B4.2 Corrosivity Classification

The selection and specification of appropriate materials and protective measures shall use the following minimum corrosivity classifications in conjunction with the exposure and location requirements of these standards. The more rigorous requirements of these standards and other referenced standards shall be used

a. ISO 9223 Environmental Severity Classification: C5 – very high
b. AS/NZS 2728: 6
c. AS/NZS 2312.1: C5
d. AS/NZS 2312.2: C5
e. NZS 3604: D
f. New Zealand Building Code E2/AS1: Zone E

B4.3 Concrete Reinforcing Steel & Cement

(1) Concrete reinforcing steel shall be galvanized, epoxy coated, or stainless when
    a. concrete masonry blocks, mortar, or concrete mix design uses coral aggregate, coral sand (regardless if washed), and/or salt water.
    b. Concrete masonry walls are unplastered.
(2) Normal Building Complexity Class 1 and 10 buildings and structures no greater than 1 storey in height must protect normal concrete reinforcing steel bars with a galvanized protective coating in accordance with the standards listed in BD4.2 of a sufficient quality and thickness as authorized by the Authority

having jurisdiction; while maintaining the concrete cover requirements of the standard as if the bars were uncoated.
(3) All structures shall use cement Type SR in compliance with AS 3972.
(4) Concrete spacers, tie wires, and form ties shall be stainless or non-metallic.

B4.4 Electrical

(1) All electrical conduit and junction boxes shall be non-metallic.
(2) All electrical enclosures whether interior or exterior shall be corrosion, waterproof, and UV resistant using either coated aluminium or plastic.

B4.5 Mechanical Equipment and Air Conditioners

(1) Mechanical Equipment and HVAC units used in Normal Complexity Buildings are allowed to coat their coils and fan blades using an epoxy coating system approved by the Authority having jurisdiction prior to placing in operation and during routine maintenance.
(2) All exteriorly located mechanical equipment, pumps, and pipes shall be appropriately located, protected, and/or have the appropriate material specifications for its design life considering its environmental exposure and corrosivity.

B4.6 Window Frames

All metallic window frames and components shall be anodized aluminium. Connections shall be corrosion resistant.

B4.7 Water Storage Tanks

All water storage tanks and associated piping shall be UV resistant.

B4.8 Wall Paint Systems

All interior and exterior surfaces shall be painted with a mould-mildew, and UV resistant paint system that has low toxicity and low volatile organic compounds in compliance with national environmental legislation.

PART 2:

NORMAL COMPLEXITY CLASS 1 AND 10 BUILDINGS AND STRUCTURES

Covers Single and Small Dwelling Buildings & Non-habitable Outbuildings or Structures

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

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 -

- the spread of fire and the generation of smoke and toxic gases will be minimised;
- stability will be maintained for a period at least sufficient for the occupants to escape and to ensure the safety of fire-fighters; and
- 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:

(c) 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;
(d) 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 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:

(e) 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;
(f) 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
(g) 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 unit*s, 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

OBJECTIVES

The design, construction, alteration, operation, maintenance and demolition of buildings, and construction sites must:

(a) safeguard people from injury during movement into, within, and out of buildings and sites
(b) safeguard people from injury resulting from the movement of vehicles on the site
(c) ensure that a person with disability is able to approach a building and site, enter it and adequately carry out activities and functions where required to be accessible.

REQUIRED PERFORMANCE

DDP1 Stairways, Ramps and Exits

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.

DDP2 Access for People with Disabilities

For Class 1, 2 and 10 buildings, it is not mandatory to provide access for people with disabilities.

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.

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

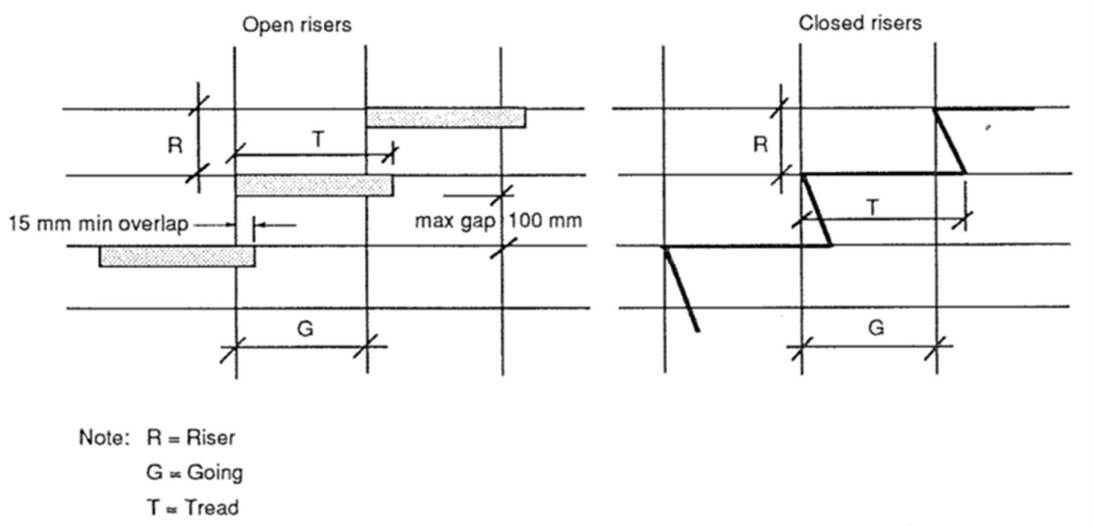


Table DD1.1 Riser Dimensions (mm) to Match Going

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 *exit*s. At least one of these *exit*s must provide an easy means of egress in case of any emergency without reducing security to the building. Such emergency *exit*s may take the form of a trap door on an elevated floor or some such arrangement. *Window*s and other such openings used as emergency *exit*s must have a minimum clear dimension of 560 mm and a minimum clear area of opening of 0.6 m^2. 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

OBJECTIVES

All electrical work associated with a Class 1 or 10 building must align with the requirements of PART VIII of the Kiribati Energy Act 2022 and any other Kiribati Public Utilities Board (PUB) initiatives and 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 livening of any electrical system, the systems shall be reviewed and certified as being compliant with the relevant standards by a suitablyqualified person holding an Electricians License(issued by the Public Utilities Board).

Domestic and commercial/industrial fixed appliances (fridges, freezers, clothes washers, dryers, dishwashers, permanent home theatre systems, computers, imaging equipment, and heat pumps/solar water heaters/air conditioning units) must:

(a) be sized appropriate to the use, function and occupancy

(b) be located to minimise energy consumption or solar heat gain

(c) have operational controls that promote energy saving potential such as timers, on/off switches

(d) be easy to maintain

in accordance with PART VIII of the Kiribati Energy Act 2022 noting that the appliances must have an acceptable energy use performance as indicated by ENERGY EFFICIENCY labels acceptable to the Government of Kiribati.

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.

DE3 ENERGY CONSUMPTION REDUCTION TECHNIQUES

Domestic and commercial/industrial fixed appliances (fridges, freezers, clothes washers, dryers, dishwashers, permanent home theatre systems, computers, imaging equipment, and heat pumps/solar water heaters/air conditioning units) must:

(a) be sized appropriate to the use, function and occupancy
(b) be located to minimise energy consumption or solar heat gain
(c) have operational controls that promote energy saving potential such as timers, on/off switches
(d) be easy to maintain

in accordance with PART VIII of the Kiribati Energy Act 2022.

The appliances must have an acceptable energy use performance as indicated by any of the following ENERGY EFFICIENCY labels acceptable to the Government of Kiribati:

(a) MEPS Minimum Energy Performance Standards, and/or
(b)Energy Rating Labels (www.energyrating.gov.au) measuring the annual energy consumption, and/or
(c) Energy Star, and/or
(d) other recognized energy rating system acceptable to the Government of Kiribati.

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DF**

HEALTH AND AMENITY

SECTION DF HEALTH AND AMENITY

CONTENTS

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 *site*d 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.

Buildings must be constructed to provide adequately controlled interior temperatures at a level appropriate to occupancy and use.

Habitable rooms within buildings must be provided with air that contains sufficient oxygen and limits contaminants to levels consistent with good health, safety and comfort.

Air conditioning of interior spaces must provide sufficient air movement and adequate temperature to create a comfortable living environment appropriate to the number of occupants.

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. Potable and non-potable water supply systems must not be interconnected. 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 and disposal

Sanitary plumbing must be laid to self-cleansing grades consistent with their discharge loading. The size of *drains* and the layout of their connections must reasonably ensure the current and anticipated needs of the users. Retaining separate wastewater streams in the plumbing within buildings is encouraged to enable greater flexibility for hygienic disposal. Connections to sanitary installations must ensure that foul gases are not allowed to produce unhygienic conditions and are suitably vented.

DFP1.7 Sanitary disposal

Sanitation disposal facilities must be designed to ensure no discharge of wastewater of any kind to open lands or surface waters. Soil based sanitary disposal systems shall be designed to minimise the risks to groundwater drinking sources. Plumbing shall be designed to limit the volume of wastewater that is combined with faecal waste to be treated by soil based sanitary disposal systems.

DFP1.8 Roof drainage

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

i. Eaves gutters and downpipes - a 20 year return intensity.

ii. 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.

DFP1.9 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 Floor levels and Site Drainage

Floor levels of all new buildings must be a minimum of 1000mm above the natural ground level and, where possible, the ground around the building must slope away from the buildingat a minimum fall of 1 in 100 for two metres.

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 or flooding

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

(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.

(d) The building or structure floor level shall not be less than 1000mm above the known flood level at the site plus sea level rise for a median high emissions (SSP3-7.0) projection to the design working life or the flood hazard level as per B1.6.

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.

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

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

DF1.7 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 2.1

TABLE DF2.1 PROVISION OF COOKING AND SANITARY PROVISIONS

MINIMUM FACITIES 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:

(i) Habitable room – average 2.4 and minimum of 2.1, and
(ii) 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

(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 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.

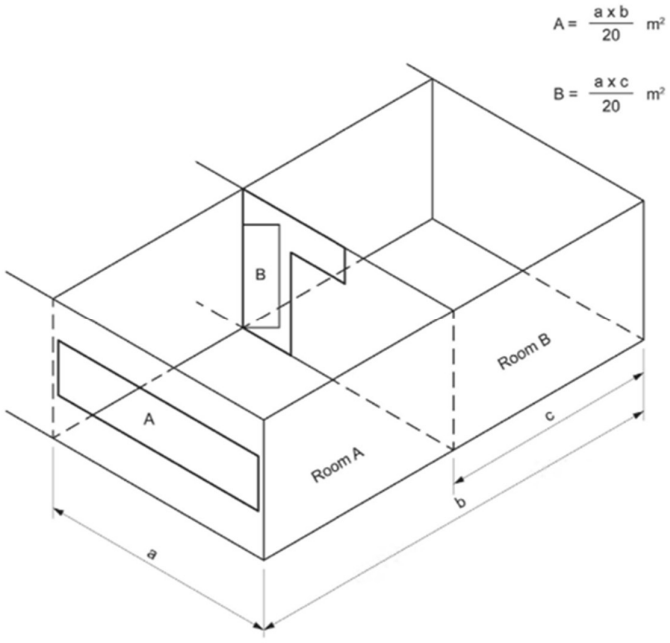


Figure 4.7 Method of determining areas of openings for borrowed ventilation

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, halfway 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.

DF 4.11 Indoor Air Quality

Buildings must have a means of collecting and/or removing the following from the rooms in which they are generated:

(a) cooking fumes and odours

(b) excessive water vapor from laundering, utensil washing, bathing and showering

(c) odours from sanitary and waste storage spaces

(d) gaseous by-products and excessive moisture from Commercial or Industrial processes

(e) poisonous fumes and gases

(f) air-borne particles

(g) products of combustion

Contaminated air must be disposed of in a way that avoids creating a nuisance or hazard to people and other property.

DF 4.12 Room Temperature

Achieving a comfortable indoor temperature may be achieved through any, some, or all of the following:

(a) insulation in walls, ceilings, floors, attic spaces to prevent heat, electricity, or sound from passing into or out of a room or structure.

(b) high performance window glazing

(c) natural ventilation

(d) external shading of windows and proper window coverings

(e) high-efficiency fans in living and attic spaces

(f) energy efficient mechanical air conditioning system

Release of heated air to the outside must be provided by the use of any, some or all of the following natural ventilation techniques, unless the building is fully air-conditioned by a mechanical system:

(a) high ceilings (greater than 2.2 m)

(b) windows/vents within 250 mm of the ceiling

DF 4.13 Ventilation

Ventilation systems in non-residential buildings must be equipped with:

(a) exhaust outlets and plumbing vents a minimum of 6.0 m away from outdoor air intakes

(b) outdoor air intakes located at least 9.0 m away from sources of pollution including dumpsters, parking areas, driveways, loading docks, natural gas lines, wet cooling towers and garage doors / exhaust outlets

(c) outdoor air intakes must be protected with suitable mesh screens and filters

(d) roof drainage that slopes away from outdoor air intakes

and must:

(e) account for the demands of any fixed combustion appliances

(f) be sized and configured to accommodate future expansion of the building

Natural ventilation must consist of permanent openings, windows, doors or other devices which can be opened and are of sufficient size and appropriately placed to provide effective air circulation.

Openings must be placed on all façades, where appropriate to the function and use of the rooms, building, and must be must be screened to prevent entry of birds, rodents, leaves, and other similar objects.

Larger openings must be placed on the downwind, or leeward, facade, and smaller openings on the breeze, or windward, facade to promote air circulation within the building.

Non-air-conditioned buildings must have the majority of windows consist of louvred panels or other openable panels to promote air flow, as appropriate to occupancy and use.

Enclosed attic spaces and cathedral ceilings must have adequate ventilation that:

(a) provides adequate cross-ventilation of enclosed attic spaces and enclosed cathedral ceilings

(b) provides exhaust fans where needed

DF4.14 Air Conditioning

A mechanical air-handling system installed in a building must control:

(a) the circulation of objectionable odours

(b) the accumulation of harmful contamination by micro-organisms and pathogens

(c) be in accordance with AS 1668.2 and AS/NZS 3666.1

Air conditioning units must have an appropriate energy-savings certificate from a recognised agency, such as Energy Star and must have suitable corrosion protection for the environment it is located in.

Ducts must be appropriately sized for room-to-room cooling requirements and to maximise efficiency, with the layout designed to reduce duct length as much as possible.

Ducts must be properly sealed with low volatile organic compound (VOC) mastic so that ductwork is airtight, duct tape is not permitted.

Rooms must have adequately sized return ducts or doors that are undercut sufficiently to allow air flow to avoid any situation of negative pressure.

Effective delivery of clean supply air must be sufficiently provided to reduce the impact of pollutants generated in the interior spaces.

Mechanical air conditioning systems must have any or all of the following energy-saving equipment to control the volume of cooled air produced daily and promote energy efficiency:

(a) variable speed controls

(b) timer-switches for rooms to control air temperature according to time of day and use of the building

(c) demand-controlled ventilation that adjusts outdoor air intake to maintain optimal indoor air quality

(d) isolate fan motors from supply air streams

Mechanical air handling equipment must have:

(a) air filtration suitable for the application required

All air conditioning systems are to undergo a commissioning process to ensure the functional and environmental performance.

DF4.15 Mould Prevention

Cross-ventilation through the building interior must be provided through appropriate layout of rooms, and placement and size of doors, windows and vents.

Buildings with air conditioning must have positive air pressure to promote proper air circulation.

Methods for prevention of water accumulation listed in DF1 above must be followed.

Stand-alone sanitary compartments not connected to a bathroom, laundry or other sanitary room must provide ventilation through either:

(a) a window

(b) mechanical ventilation (see Section DF4.5)

DF5 WATER SUPPLY 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

(g) that the installation of hot water systems provide safe and adequate service, and

(h) the conservation of water through water efficiency measures

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 Pipe Materials

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

Non-metallic materials shall be used instead of metallic materials if design conditions permit. Otherwise, 316 or 316L stainless steel is the preferred metal of choice for exterior applications. The minimum pressure rating for plastic pipes and fittings in all applications is PN 12. Plastic pipes and fittings of materials other than ABS, PVC or black PE shall be protected from direct sunlight.

DF5.4 Potable Water Services

All properties should be furnished with a potable water service. The minimum working pressure at the furthermost outlet should not be less than 20 kPa (2 m head) and the maximum hydrostatic pressure should not exceed 200 kPa (20 m head).

The efficient use of potable water can be achieved by limiting water usage from:

- a tap or outlet for a shower to a flow rate of not more than 9 l/m
- a dual flush toilet cistern of not more than 6 litres and 3 litres.

Long runs of pipework in locations exposed to heat gain should be avoided to reduce the likelihood of unintentional heating of potable water services.

Potable water services may be accessed via:

1. Networked water sources
2. Tankered water sources
3. Rainwater sources
4. Groundwater sources

and may be cross connected with other potable water sources provided the criteria detailed from DF5.4.1 to DF5.4.4 are met.

DF5.4.1 Networked water services

A bulk water treatment, storage and networked distribution system shall be considered potable if the water service is:

- delivered to the property free of chemical and biological contaminants (with a free chlorine residual greater than 0.2 mg/L)

- continuously pressurised at a minimum pressure of 50 kPa or delivered to a break tank with a float valve and a vertical air gap (between the inlet and the highest possible level in the tank) of a minimum of twice the outlet diameter

- delivered to a property with plumbing compliant with AS/NZS 3500.1 Section 5 (plus Sections 2,3 & 4)

DF5.4.2 Tankered water services

A tankered water supply may be deemed potable if the water service is delivered to a storage tank:

- free of chemical contaminants with a free chlorine residual greater than 0.2 mg/L

- fitted with a cover designed to prevent the entry of dust, bird or animal life

- accessible for inspection, repairs, maintenance and replacement

- fitted with a sludge removal system (where capacity exceeds 500 litres)

- compliant with AS/NZS 3500.1 Section 8 (plus Sections 2,3,4 & 5)

DF5.4.3 Rainwater services

A rainwater collection, storage and distribution system shall be considered potable if:

- Fitted with a first flush system that diverts the first flow of rainwater, along with any sediment on the roof, away from the rainwater storage system
- Fitted with a removeable cover designed to prevent the entry of leaves and debris into the tank
- Connected to a storage tank fitted with a sludge removal system or manholes for the manual removal of sludge
- Compliant with AS/NZS 3500.1 Section 15
- Sized to provide a continued supply of water as detailed in Specification DF8.4

DF5.4.4 Groundwater services

A groundwater collection, storage and distribution system shall be deemed potable if:

- sourced from groundwater that is free of chemical contaminants with an electrical conductivity (EC) of less than 2,000 uS/cm.

- accessed via a well that is covered (i.e. prevents the entry of any foreign matter, bird or animal life)

- accessed via a well that is protected (i.e. prevents the entry of any surface water above the groundwater level)

- located more than 15 metres from any cesspit, soakaway or animal enclosure

Groundwater sources may be equipped with an electric suction pump (lifting to an elevated tank or connected to a pressure vessel) providing a continuously pressurised potable water supply so long as the continued abstraction does not significantly increase the salinity of the groundwater (i.e. an EC increase in excess of 1,000 uS/cm)

DF5.5 Non-potable Water Services

Water supply systems that do not meet the above criteria shall be deemed non-potable. Water services deemed non-potable (above) shall not have a cross connection with a potable water service.

Non-potable water services may be purified for human consumption on a case-by-case basis through the deployment of household treatment technologies that may include chlorination, filtration or boiling.

Non-potable water services may be pressurised and prioritised for non-human consumption including:

- Toilet flushing
- Laundry
- Bathing
- Gardening

Non-potable water sources must be compliant with AS 3500.1 Section 9

DF5.6 Networked saltwater flush services

The provision of saltwater to premises for the purposes of flushing toilets that are connected to the saltwater sewer system shall not be used for any other purposes. The reticulated saltwater supply system may be directly connected to toilet cisterns provided that:

- All of the piping components are non-metallic
- The saltwater supply pipework is not connected to any other appliances

DF5.7 Access to domestic-type water heaters

A household water heater shall comply with AS 3500 – Part 4 and must:

(a) be supported by a structure 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.

DF6 SANITARY PLUMBING AND DRAINAGE

DF6.1 General

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

DF6.2 Means of compliance

The requirements of DF6.1 are satisfied if all sanitary plumbing and drainage works are carried out to the relevant provisions of

AS/NZS 3500 Part 2 Sanitary plumbing and drainage and its amendments

as well as this part of the Code.

Where feasible, the wastewater plumbing will retain the separation of the wastewater from water closets, from kitchen sinks, from laundry / bathrooms within the building. This enables the wastewater streams discharged from a building to be treated separately:

- Water closet wastewater can be discharged to a cesspit (or a saltwater sewerage network)
- Kitchen sink wastewater can be discharged to a grease trap and a soakage pit
- Laundry/bathroom wastewater can be discharged to a soakage pit

The separate wastewater streams discharged from a building can still be combined and treated together in a septic tank with an engineered soakaway. See DF7 for details.

DF6.3 Size and length of drains

The size of a drain shall be determined by the number and the types of fixture units discharging into it as defined in Table 3.3.1 in AS 3500.2 with the following provisos.

- The minimum size of a branch drain shall be DN 65 and a main drain shall be at least DN100.
- The *fixture unit* ratings shown in Table DF6.3 must be used for the sizing of drains.
- 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	DN30 or DN4O	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	DN5O	0
– with fixture	DN40 or DN 50	as per fixture rating

Fixture	Nominal size of trap outlet and fixture discharge pipe	Fixture unit rating
Laundry trough	DN40 or DN 50	5
Shower	DN4O or DN5O	2
Sink		
– less than 45 litres	DN4O	2
– more than 45 litres	DN5O	3
Water closet pan	DN8O or DN100	5
* When a clothes/dish washing machine connects to a trough/sink trap, only the trough/sink unit fixture 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 DF6.5.1MINIMUM GRADES OF DISCHARGE PIPES

Nominal size	Minimum grade
DN65	1 in 40
DN80	1 in 60
DN100	1 in 60
DN150	1 in 100

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 45^{O} or *sweep junction* fittings

(b) 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

(c) 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.

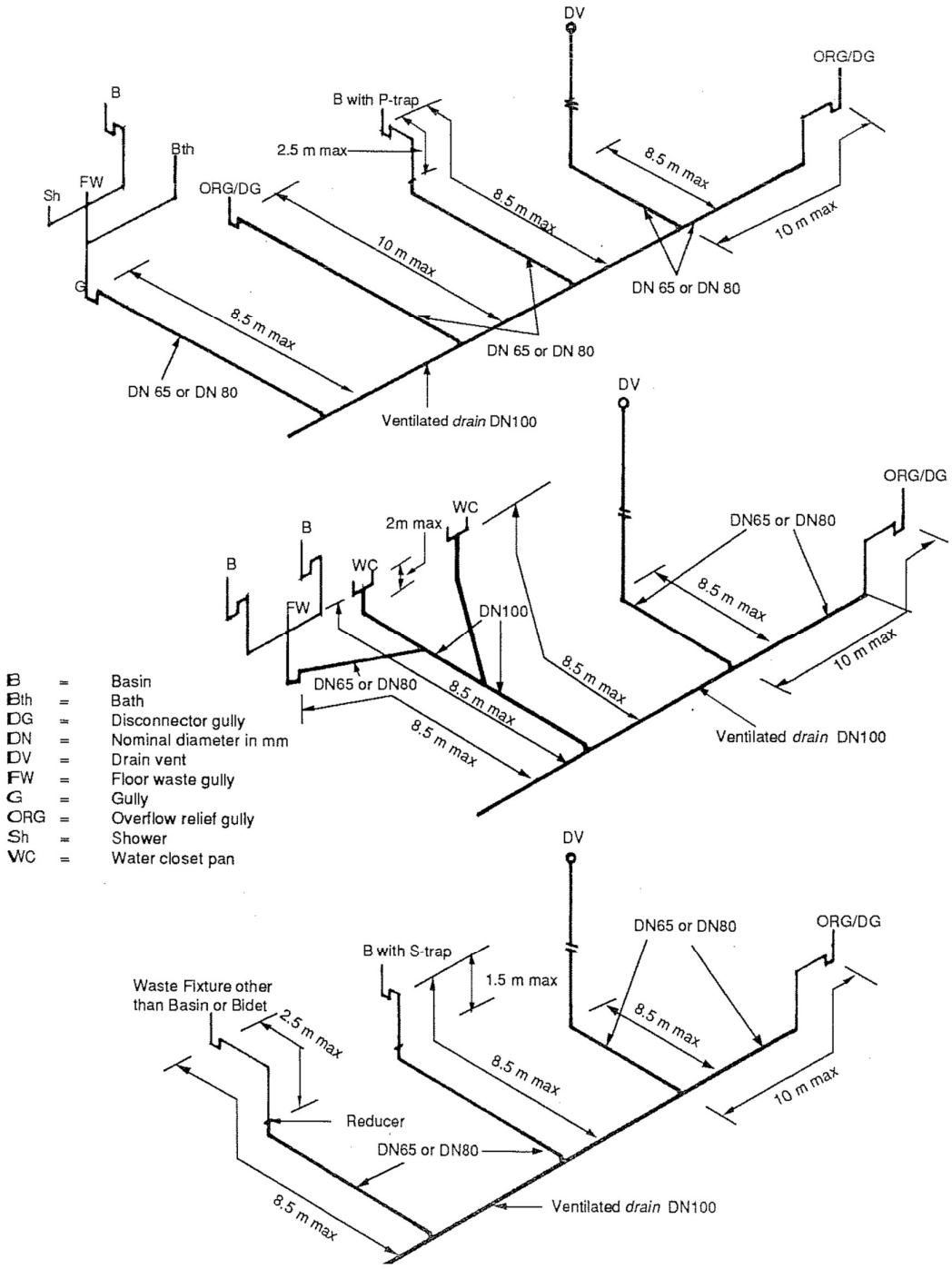
DF6.5.3 Cleaning eyes

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 detailed in DF6.3 must be met in such cases.

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 fixture*s, it must connect to a gully An unvented *drain* other than in (b) must connect to a disconnector gully

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 DF6.6.2 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 pans connected)

(a) 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*.

(b) 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.

(c) 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

Except for fixtures discharging to disconnector gullies, a trap vent or air admittance valve shall be provided. 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 DN4O	DN32
DN50 to DN100	DN4O

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:

i) as a vertical vent to the open air; or

ii) 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*.

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 fixture*s 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 2 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 DF8.3) discharging into the *drain*.

(a) Normal grades
The minimum normal grade of *drains* must be as give in Table DF6.8.2A.

TABLE DF6.8.2 A 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 DF6.8.2 C. 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 DF6.8.2C MINIMUM FIXTURE UNIT LOADINGS FOR REDUCED GRADE DRAINS

Reduced grade	Nominal pipe size (mm)			
	40	65	80	100
	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.

(d) 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 450 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 450 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.

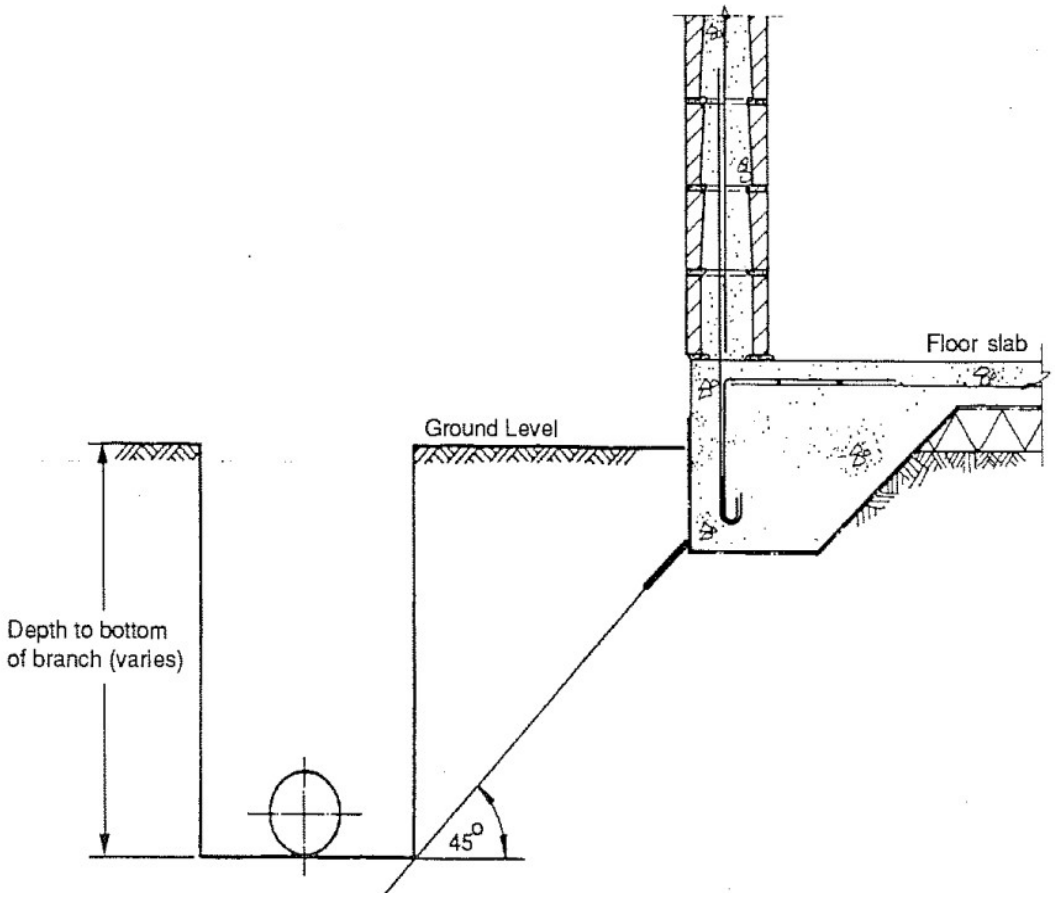


FIGURE DF6.8.4

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 (disconnector 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:

  i) from any *soil fixture*; and

  ii) 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 Disconnector 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 unit*s 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 seal to floor level (mm)	
	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 *junction*s; 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*.

DF 6.11.3 Size

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 DN150for larger drains

DF6.11.4 Access for inspection branches and square junctions

Inspection branches and square *junction*s 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 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 60º

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 SANITARY DISPOSAL

DF7.1 General

Sanitation disposal from water closets must ensure:

(a) no discharge of wastewater of any kind to open lands or surface waters[1]

(b) no discharge to soil that is either:

  i) less than 1.5 metres above the maximum groundwater level, or

  ii) less than 15 metres from a downstream (coastward) drinking groundwater source

(c) a maximum wastewater design loading to the surface area of the soil that shall not exceed 50 mm/day if located above a freshwater lens (or 500 mm/day otherwise)

(d) uniform effluent distribution at, or less than, the maximum design loading rates

DF7.2 Means of compliance

The requirements of DF7.1 are satisfied if all sanitary disposal works are carried out to the relevant provisions of

AS/NZS 1546.1 Part 1 On-Site Domestic Wastewater Management Units (Septic Tanks)

AS/NZS 1547:2012 On-Site Domestic Wastewater Management

AS/NZS 3500 Part 2 Sanitary plumbing and drainage and its amendments

as well as this part of the Code.

DF7.3 Disposal Requirements

All wastewater shall be discharged to soil absorption systems. Wastewater from:

a) - kitchens may discharge to a grease trap and soakage area

b) - laundries and bathrooms may be discharge to a soakage area

c) - water closets shall discharge to:

- a saltwater sewer where a sewerage connection and saltwater flush is available
- a cesspit where septage removal facilities are not available
- a septic tank with a soakaway when all wastewater streams have been combined

DF7.3.1 Alternate Sanitary Technology Options

Alternate sanitation technology options for the containment of faecal waste may be pursued. Due to the higher risks of failure and limited scope for application in Kiribati, such sanitation options are either not included in the Building Code and/or require more stringent regulation.

DF7.3.1.1 Dry aerobic sanitation technology options

Dry aerobic sanitation technology options such as dry pit, urine diverting, composting and dry desiccating toilets have not been specified for Type 1 buildings in the Building Code due to the cultural preference for water-based technology options, the social stigma associated with the handling of faecal waste and the environmental risks to aerobic processes from excessive moisture. These options may be pursued in settings where the Building Code is not applicable (i.e. rural areas without access to water for flushing or temporary toilet facilities on construction sites) and where the social, cultural and environmental argument for a dry aerobic sanitation technology option can be made.

[1] Unless the minimum conditions detailed at NF6.6.2.1 for operation, maintenance and regulation can be achieved.

DF7.3.1.2 Wet aerobic sanitation technology options

Wet aerobic sanitation technology options such as aerobic septic tanks, evapotranspiration beds, trickling filters, constructed wetlands, package wastewater treatment units have not been specified for Type 1 buildings in the Building Code due to the higher risks of failure associated with the higher operation and maintenance requirements for these systems. Where these options are pursued, the sanitation disposal system shall be required to comply with the environmental impact and monitoring requirements for 'wastewater treatment units' as specified in NF6.6.

DF7.3.2 Minimum Safe Distances

Wherever a soil absorption system is deployed for the disposal of wastewater from a water closet, the WHO recommended minimum safe distances (MSD) between the soil absorption system and a drinking ground water source of:

- 1.5 metres vertical separation above the maximum ground water level, or
- 15 metres horizontal separation if located upstream (inland) within the groundwater

shall be sought at a maximum wastewater loading rate to the soil absorption system of 50 mm/day.
Under no conditions shall wastewater originating from a water closet be discharged to open land or surface waters.

However, as the prevailing conditions in Kiribati both:

- decrease the anticipated survival time of pathogens (due to the high ambient temperatures of the soil, dry soil with high moisture holding capacity, soil with high exposure to sun, air and evaporation, soil low in soluble organics but rich in micro-flora)
- decrease the likely migration of pathogens (due to the saline environment, aerobic state of the groundwater, low lateral groundwater velocities, high groundwater temperature)

these maximum loading rates of soil absorption systems and minimum safe distances to a drinking ground water source may be relaxed with appropriate consideration to:

- the direction of groundwater flow (typically from the centre of atolls towards the coast)
- the velocity induced by any pumping of the groundwater
- the design of the wastewater soil absorption system

While soil absorption systems are effective in the attenuation of pathogens within the setback distances detailed above, they are generally not effective in the attenuation of nutrients, primarily nitrogen. Where the nutrients pose a major environmental health risk, there is a need to consider other treatment options.

***DF7.3.3* Biological treatment of wastewater**

Wastewater treatment systems deploy biological processes for treatment that naturally occur in the presence of air (aerobic digestion) or in absence of air (anaerobic digestion). Whereas anaerobic processes are more efficient in reducing the volume of solids (i.e. BoD & CoD), aerobic processes are more efficient in the reduction of pathogens (i.e. bacteria, viruses & parasites). Most biological wastewater treatment systems deploy both anaerobic and aerobic digestion processes, aerobic processes are much more effective in reducing pathogens when the solids have been removed from liquids, and the liquids have been removed from solids.

In the application of onsite sanitation systems:

- the major reduction in pathogens in the effluent occurs in the aerobic zone established below the soil absorption system
- the major reduction in pathogens in the sludge occurs when exposed to aerobic processes as the sludge is allowed to dry

The exposure of dry sludge and clear effluent to aerobic processes is generally a precondition to the natural neutralization of pathogens.

Onsite sanitation systems shall be comprised of two components designed to:

1. store accumulated sludge, and
2. discharge effluent into the soil

which may be achieved through the appropriate design of cesspits or septic tanks with soakaways as further detailed.

DF7.4 Cesspits

The major advantage of cesspits is that the contents of the pit can be safely managed (through the construction of a second cesspit) in settings without access to sludge tanker trucks. Taking the first pit 'off-line' enables aerobic bacteria to enter the pit and after resting covered for a period of at least one year, the contents can safely be dug out and turned into the soil. Other advantages of cesspits are that:

- they fill ≈10 times slower than a septic tank for a given volume (because cesspits operate at sludge moisture content of ≈80% as compared to septic tanks that operate at a sludge density of ≈98%)
- their modular design enables expansion as required in series or parallel. In dense soil, the effluent absorption area can be increased by placing rocks around the perimeter of the cesspit.
- there are multiple options for resting, switching or emptying when they fill-up
- they do not pose a flotation risk as compared to septic tanks

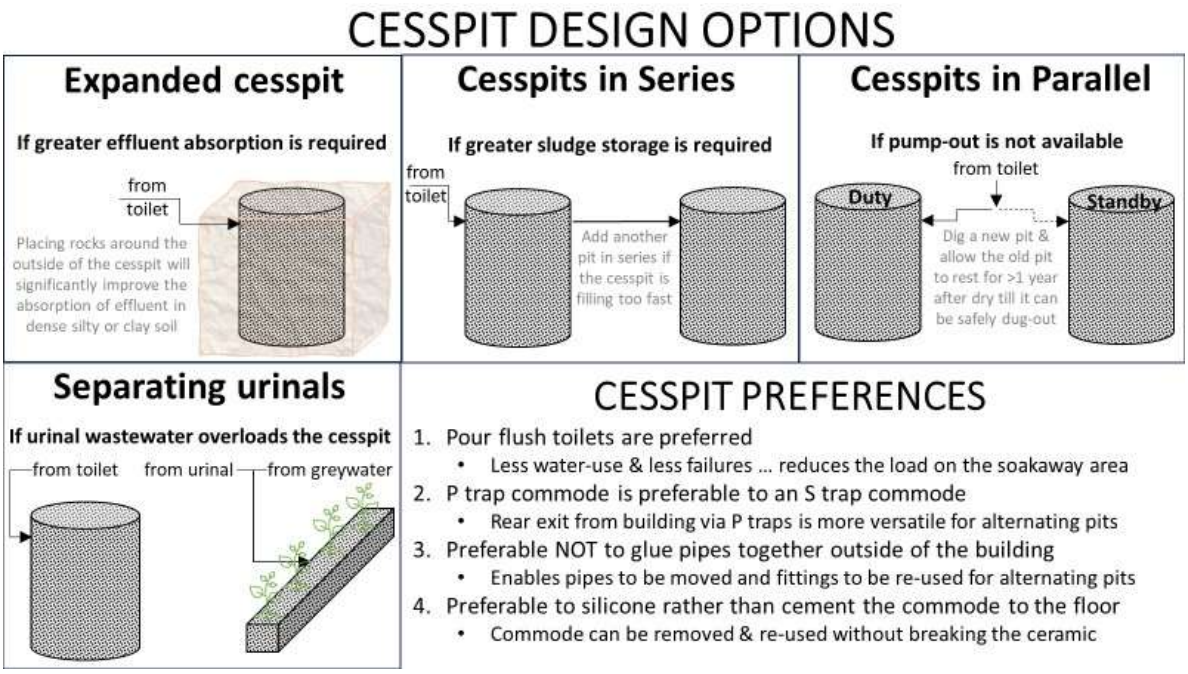
As a consequence, appropriately designed, deployed and sized cesspits can be more that 10 times cheaper than septic tanks with soakaways to install, operate and maintain. See Figure 7.4

Cesspits shall not be connected to other sources of wastewater other than the water closet. This is because:
- the fats, oil and grease (FOGs) associated with kitchen wastewater tends to seal the pores of the soil on the sides and bottom leading to the premature failure of the cesspit
- the volume of the wastewater associated with the laundry and bathrooms tends to overload the effluent handling capacity of the cesspit

DF7.4.1 Construction

Cesspits shall be designed to enable the leaching of effluent from the bottom and the side walls.
Pipes located outside the building connecting the water closet to the cesspit should not be glued (as switching between cesspits generally involves the re-use of pipes and fittings) and therefore these pipes and fittings should be buried.

Figure DF7.4 Cesspit Design Options



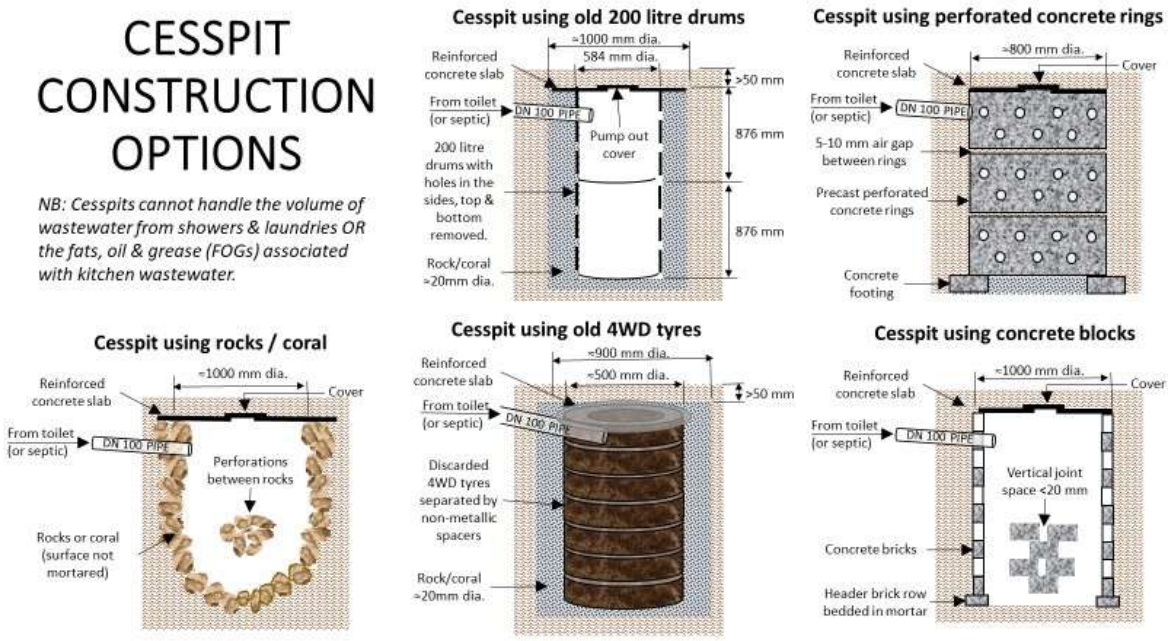
Cesspits shall be open at the bottom with perforated reinforcing materials on the sidewalls made of:

- clay or concrete bricks laid in a honeycomb pattern
- perforated concrete rings
- rocks or coral firmly bound together (but not sealed)

- oil drums (with an open bottom and holes punched in the sides)
- truck tyres (with non-metallic spacers between each layer of tyres)
    - Typical construction criteria for cesspits (see Figure DF 7.4.1) are:

- diameter greater than 0.5 m and less than 1.0 m (to minimise the size of the slab)
- depth greater than 1.0 m and less than 1.5m (to enable the pit contents to be dug out)
- topped with a reinforced slab less than 1.0 metre diameter (to enable lifting for emptying) with an inspection cover (enabling pump-outs)
- separated by a distance of at least 1.0 metre between multiple cesspits.

figure 7.4.1.1.: Cesspit construction options



The placing of large rocks/coral around the outside perimeter of the cesspit is an effective means of increasing the absorption capacity in dense or silty soil. The rocks/coral should be surrounded by geotextile fabric on the sidewalls and covered with plastic on top to limit soil being washed in between the rocks/coral reducing the soil absorption area.

DF7.5 Septic Tanks

The major advantage of septic tanks is that they can receive all forms of wastewater including the fats, oil and grease (FOGs). This is the primary reason why septic tanks should be fitted with tees at the inlet and outlet (to allow methane gas and effluent to enter the soil absorption area and prevent the FOGs from blocking the pipes or the soil absorption area) and sealed around the bottom (to maintain a constant liquid level at the invert level of the outlet pipe where the FOGs are trapped).

The other major advantages of septic tanks are that they separate and contain the sludge & effluent. This enables different treatment process (other than soil absorption systems) to be deployed for the removal of the nutrients and pathogens from the solids and liquids. This also enables effluent to be discharged closer to the soil surface where the efficiency of the attenuation of pathogens by aerobic bacteria is higher.

DF7.5.1 General

Septic tanks may be of reinforced concrete or of reinforced block masonry walls over a reinforced concrete base. Tanks of precast concrete construction may be made from rectangular slabs which are assembled on the *site*, or be of cylindrical construction, either as a single cylinder open at the top, or a *stack* of short, open-

ended cylinders. There are also prefabricated septic tanks made of fibre glass or rotomolded from high density polyethylene.

Septic tanks are designed to be emptied before the sludge fills to a level where the effluent retention time decreases below 24 hours. The timing of the emptying of the septic tank can be calculated based on the following AS 1547: 2012 design figures, the number of users and the size of the tank.

AS/NZS 1547 (Design Rates)	All wastewater	Blackwater only
Wastewater flow rate (litres per capita per day)	150 lpcd	50 lpcd
Sludge accumulation rate (litres per capita per year)	80 lpcy	50 lpcy

As a rule of thumb, allow 0.2 m^3 per user for 'blackwater only' septic tanks with a 6-year emptying frequency noting that:

- 'blackwater only' septic tanks will be half the size of 'all wastewater' septic tanks for the same emptying frequency
- 'blackwater only' soakaways will be one third the area of an 'all wastewater' soakaway for a given soil condition

DF7.5.2 Impervious to water

Whatever form of construction or materials are used for the sides and bottoms of septic tanks the resulting work must be impervious to water. For tanks of rectangular section, it is important that all internal angles be well-rounded, so as to minimize shrinkage cracking. Provisions shall be made to prevent sealed septic tanks from floating in high water table areas when emptied.

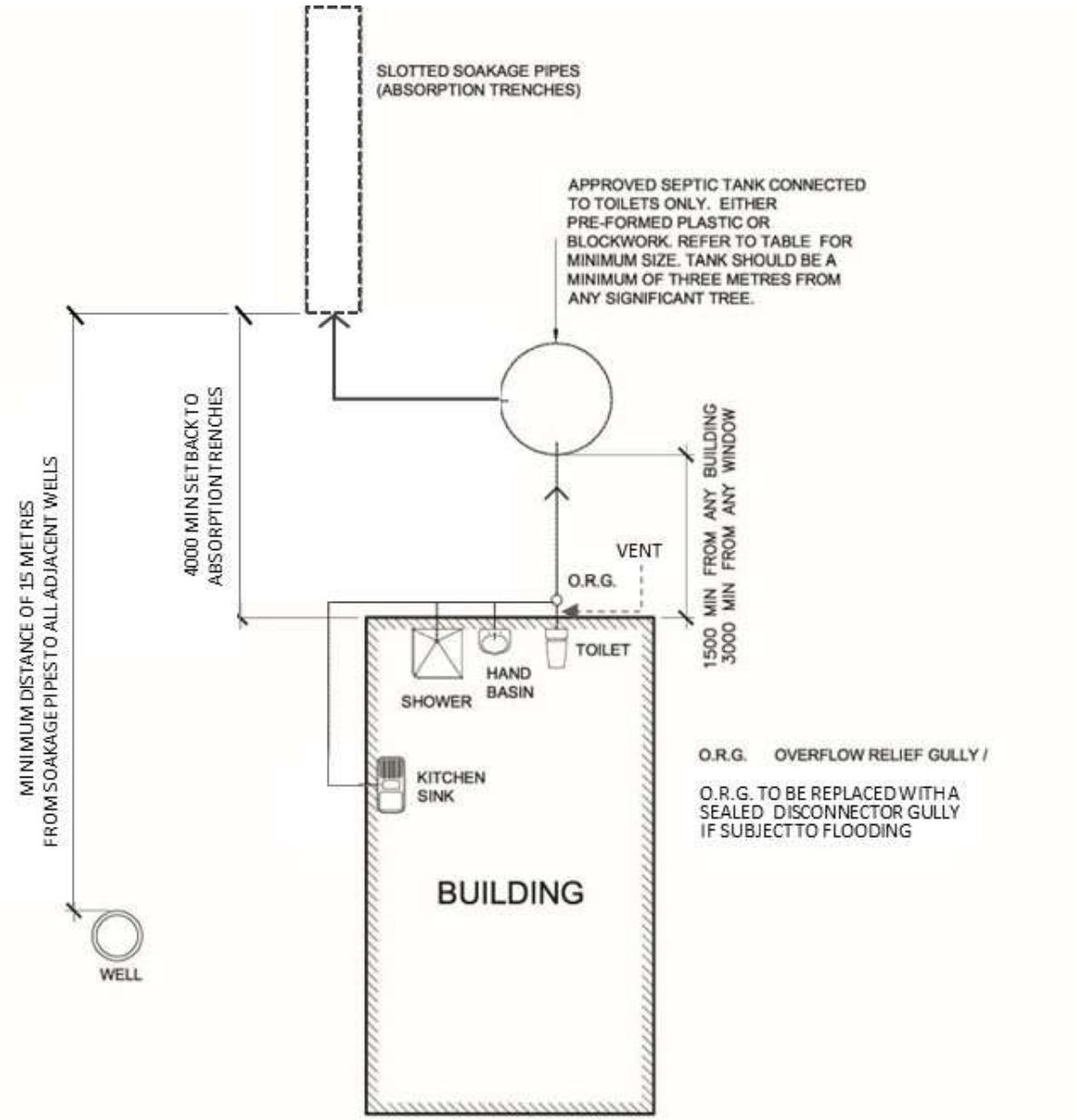
DF5.7.3 Inlet and Outlet

Every septic tank of block masonry or concrete construction must be covered with reinforced concrete slabs and removable manhole covers over the inlet and outlet square *junctions* for inspection and emptying. The inlet and the outlet pipes from every septic tank shall fitted with tee pieces and shall be at least DN 100 mm.

DF5.7.4 Design details

The design of the type of septic tank system is to be governed by the results of the investigations of the *site* and locality. Where the soil is of a suitable type and where the absorption area is sufficient to dispose of the final effluent, a septic tank system may be suitable.

Details DFS2.1, 2.1A, 2.2, 2.3 & 2.4 give details of the construction and dimensions required of built-in-situ septic tanks.



NOTE:
KITCHEN SINK WASTES FROM COMMERCIAL KITCHENS OR CATERING OPERATORS MUST PASS THROUGH AN APPROVED GREASE TRAP PRIOR TO BEEN DISCHARGED INTO THE DISTRIBUTION PIT.
GREASE PITS ARE NOT COMPULSORY FOR HOUSES.

REFER TO DFS2.2 FOR APPROVED DISTRIBUTION PIT DETAILS.
REFER TO DFS2.3 FOR APPROVED SEPTIC TANK DETAILS.
REFER TO DFS2.4 FOR APPROVED GREASE TRAP DETAILS.

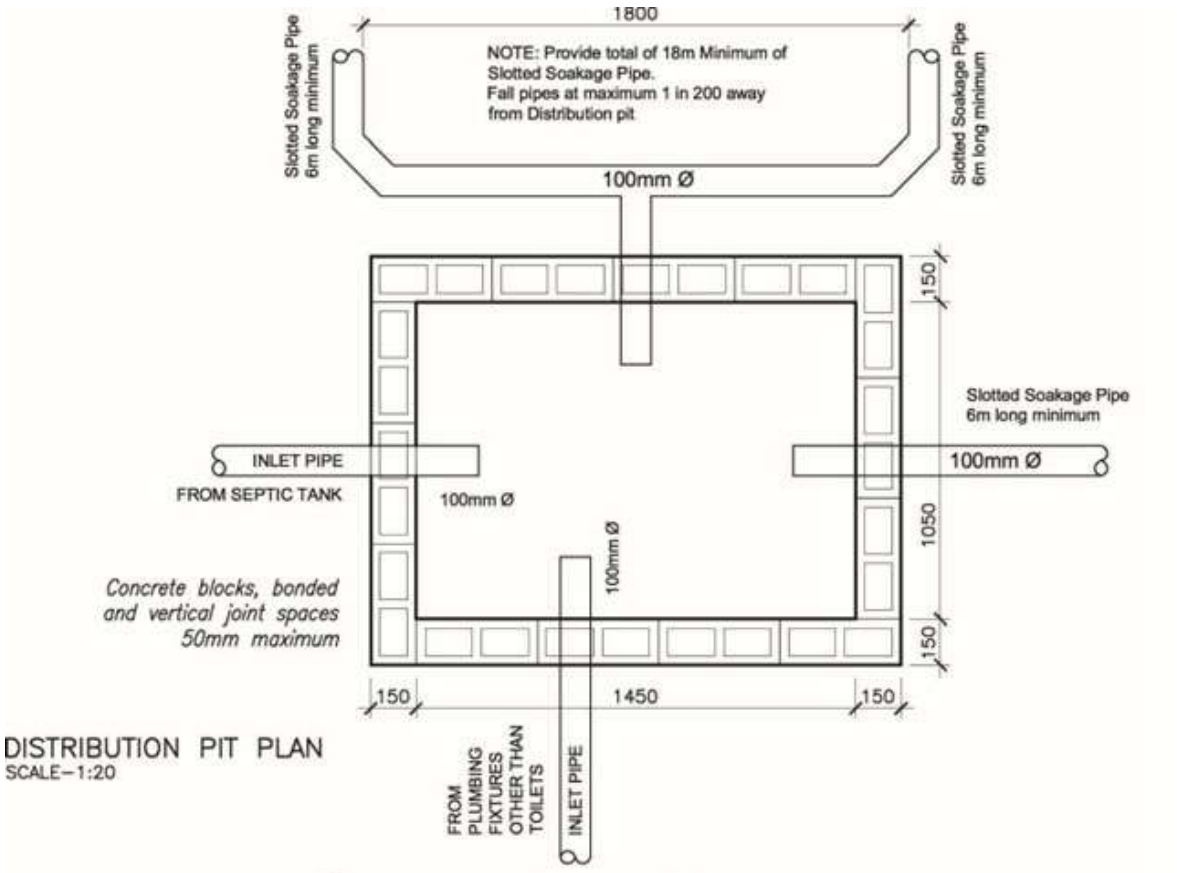
NATIONAL BUILDING CODE OF KIRIBATI
STANDARD DETAIL
DFS2.1 A
SEPTIC TANK LAYOUT & SETBACK PLAN
SCALE-1:100

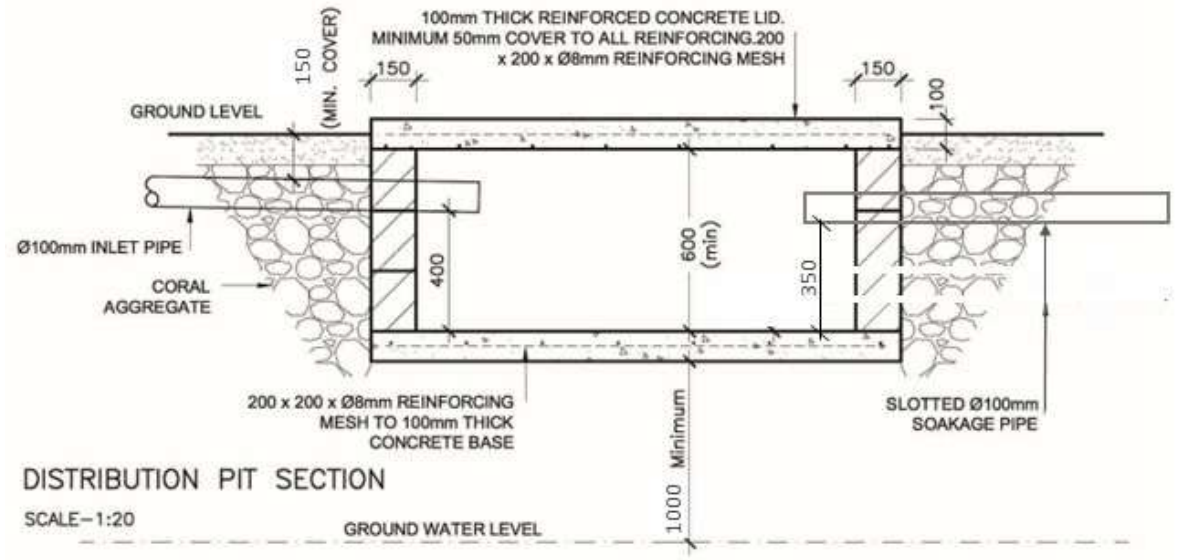
SEPTIC TANK & ABSORPTION TRENCH SIZES

SEPTIC TANK VOLUME BASED ON A 3 YEAR EMPTYING CYCLE

USAGE	TANK VOLUME	TRENCHES
No. of people	kL (cubic metres)	length in metres
6	1.0	18
8	1.5	18
10	2.0	18
20	3.3	30
40	5.3	45
100	13.5	100

SEPTIC TANKS MAY BE CONSTRUCTED FROM EITHER PRE-FORMED PLASTIC, REINFORCED CONCRETE OR REINFORCED CONCRETE BLOCKWORK





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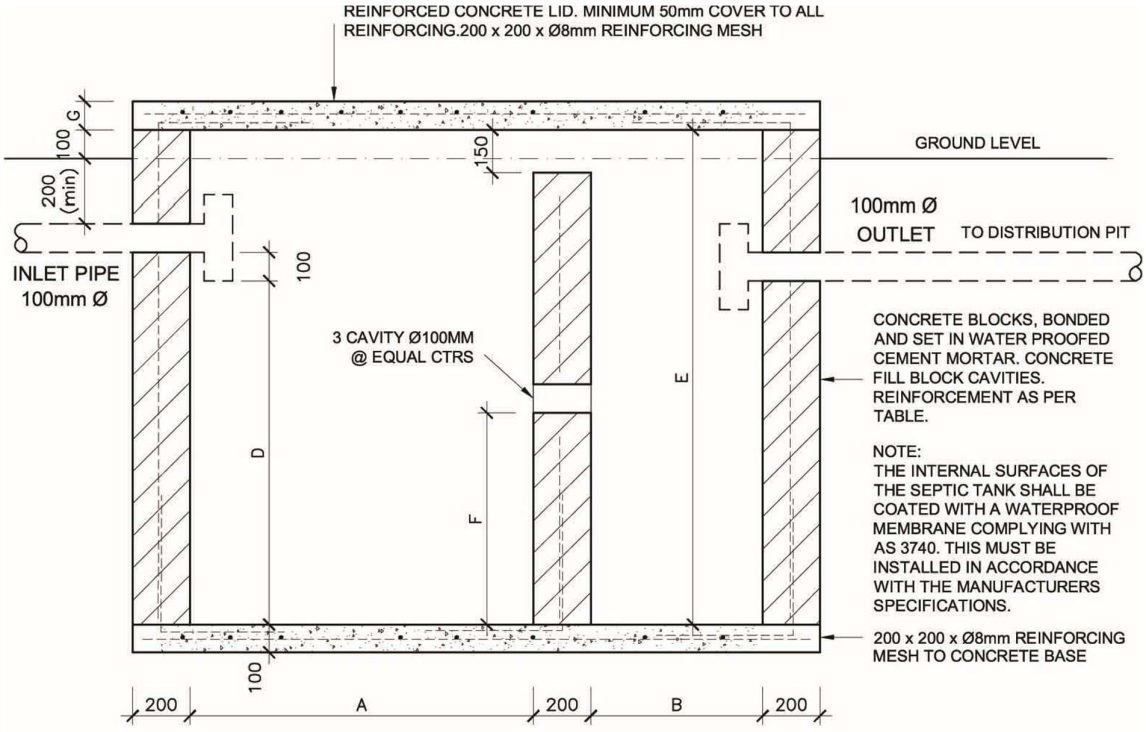
STANDARD DETAIL

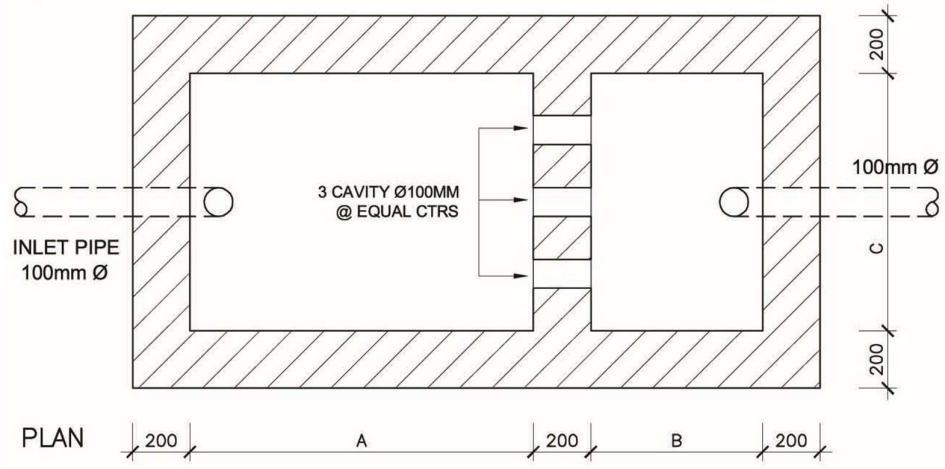
DFS2.2

DISTRIBUTION PIT

SCALE-1:20



SECTION



SEPTIC TANK SIZING TABLE

NO. OF USERS	DIMENSIONS IN MM							VOLUME	REINFORCEMENT	
	A	B	C	D	E	F	G	kL (m3)	Vertical Bars	Horiz. Bars
10	1200	0600	0900	1200	1675	740	100	2.04	D12 @ 400	D12 @ 600
15	1370	0760	0900	1200	1675	740	100	2.38	D12 @ 400	D12 @ 600
25	1675	0900	1065	1370	1830	835	100	3.74	D16 @ 600	D12 @ 600
40	2130	1065	1200	1370	1830	825	100	5.35	D16 @ 600	D12 @ 600
60	2430	1200	1370	1370	1830	825	150	6.94	D16 @ 600	D12 @ 600
75	2590	1370	1525	1525	1980	900	150	9.21	D16 @ 400	D16 @ 600
100	3150	1525	1830	1525	1980	900	150	13.59	D16 @ 400	D16 @ 600
150	3660	1830	2730	1525	1980	900	150	17.84	D16 @ 400	D16 @ 600
200	3810	2730	2430	1525	1980	900	150	21.52	D16 @ 400	D16 @ 600

NATIONAL BUILDING CODE OF KIRIBATI
STANDARD DETAIL

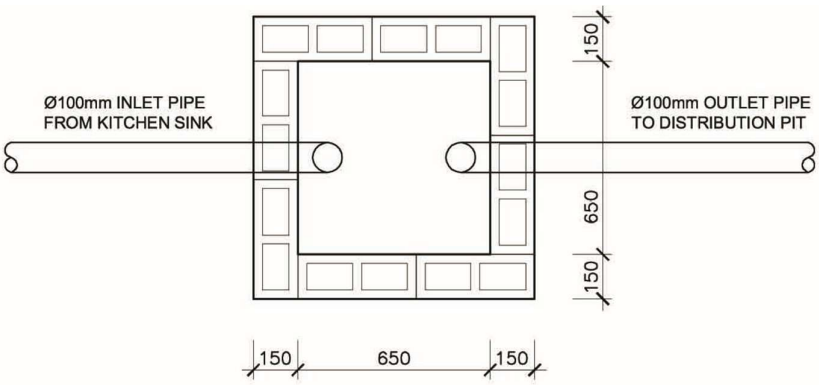
DFS2.3

REINFORCED CONCRETE SEPTIC TANK

SCALE-1:20

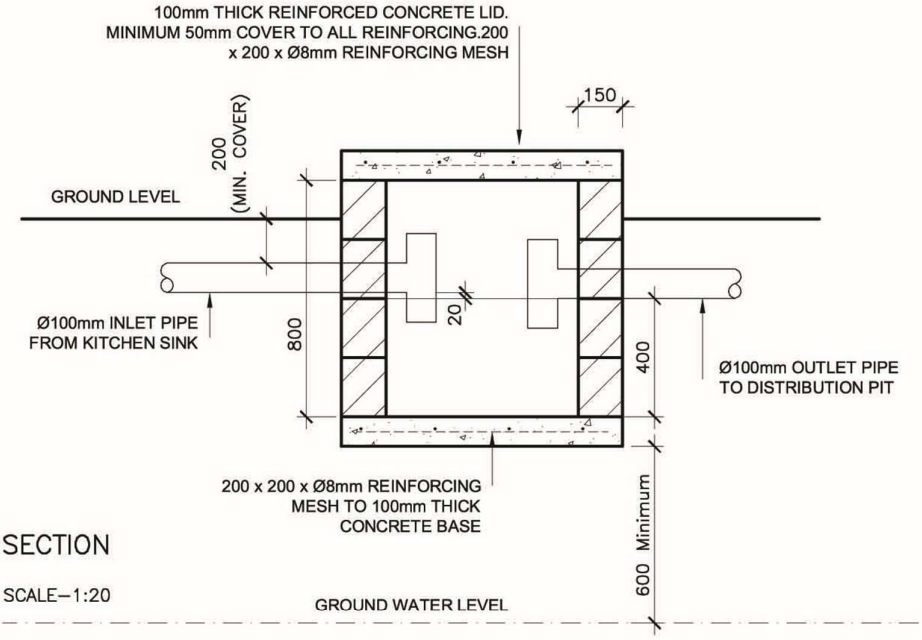
SIZES ARE BASED ON SEPTIC TANK BEING ONLY CONNECTED TO THE TOILET

SIZES AND REINFORCING CAN BE USED FOR EITHER REINFORCED CONCRETE OR REINFORCED CONCRETE BLOCKWORK



BLOCKWORK GREASE TRAP
PLAN

SCALE–1:20



SECTION

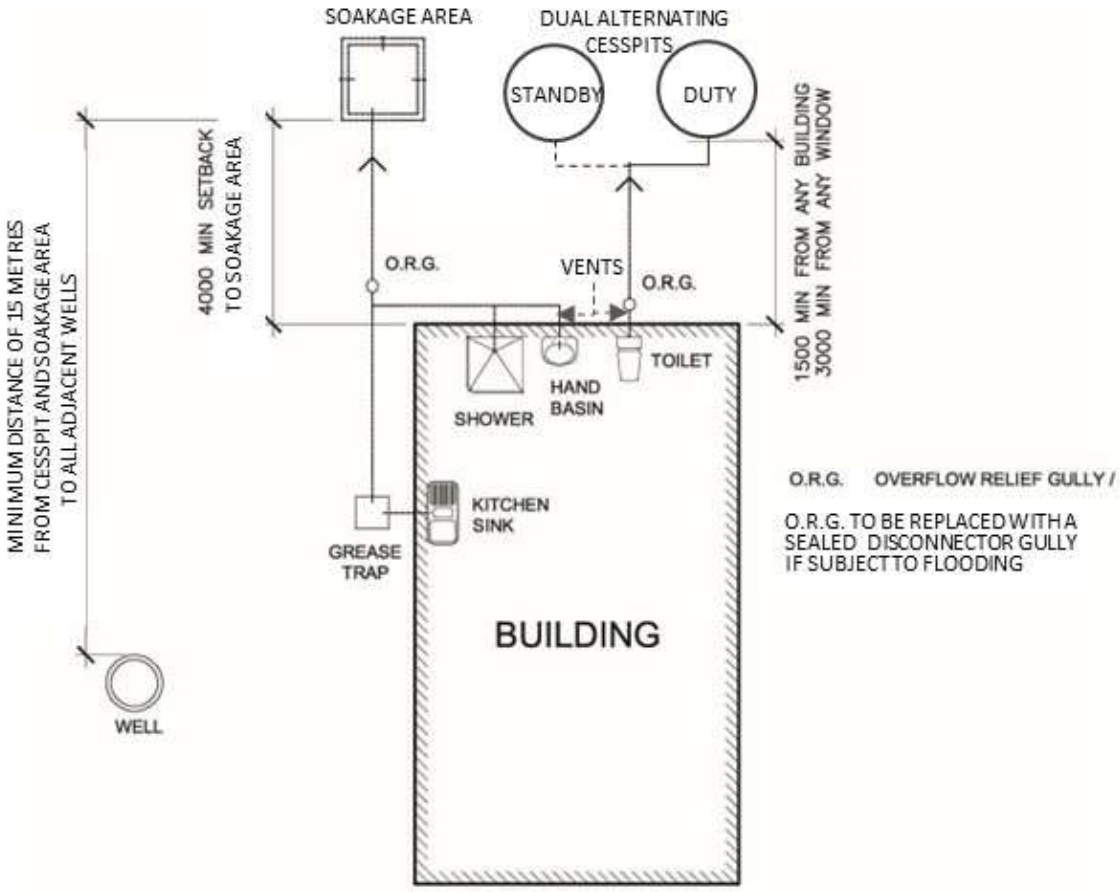
SCALE–1:20

NATIONAL BUILDING CODE OF KIRIBATI
STANDARD DETAIL

DFS2.4

GREASE TRAP

SCALE-1:20



NOTE:
KITCHEN SINK WASTES FROM COMMERCIAL KITCHENS OR CATERING OPERATORS MUST PASS THROUGH AN APPROVED GREASE TRAP PRIOR TO BEEN DISCHARGED INTO THE SOAKAGE AREA
GREASE TRAPS ARE RECOMMENDED FOR HOUSES

CESSPITS SHALL BE:
- 0.5 M TO 1.0 M DIAMETER & OPEN AT THE BOTTOM
- 1.0 M TO 1.5 M DEEP & PERFORATED ON THE SIDES
- TOPPED WITH A REINFORCED SLAB AND 100 MM OF SOIL
- CONNECTED WITH UNGLUED DWV PIPES OUTSIDE BUILDING

NATIONAL BUILDING CODE OF KIRIBATI
STANDARD DETAIL
DFS2.5
CESSPIT LAYOUT AND SETBACK PLAN
SCALE-1:100

DF7.6 Effluent Absorption System

The appropriate design and sizing of the soil absorption system is the most significant component in the neutralization of the pathogens from a septic tank system. The design and sizing of the effluent absorption system is largely dependent on the absorption capacity of the soil. Effluent from domestic household septic tanks shall be piped and discharged into a properly designed soakway. The soakaway may be designed of trenches, pits or be integrated with the septic tank.

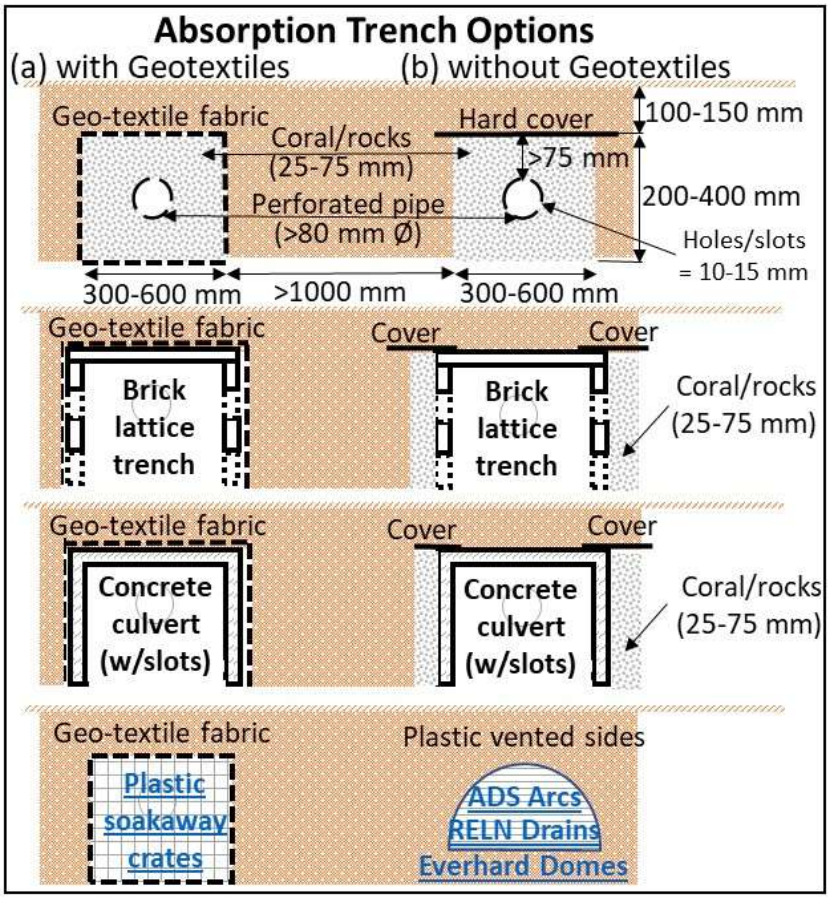
DF7.6.1 Absorption trenches

Typical dimensions of absorption trenches are 400 mm and a minimum depth of 500 mm, separated by at least 1 metre. The laying of a 2-metre-wide length of geo-textile fabric or a very fine mesh shade cloth in the trench is advisable to restrict the ingress of soil into the trench. Trenches are to be packed with 50 mm size hard stone, gravel or coral to a height of 150 mm, over which a line of perforated pipes is laid along the centre of the trench (commencing about 300 mm from the beginning of the trench and thereafter running the full length of the trench). The *drain* pipe conveying the effluent to the trench extends into the trench and butts against the first perforated pipe.

The joints between the pipes in the trench should not be sealed. The pipes should be surrounded and covered with 50 mm broken hard stone or hard coral to within 150 millimetres from the top of the trench, over which should be placed a protective covering of old iron or the like, before covering the trench with soil.

Absorption trenches may also be constructed of bricks laid in a honeycomb pattern covered with a concrete slab, or concrete culverts with perforated sides, or prefabricated plastic crates wrapped in geotextile fabric, or slotted arc chambers (as detailed in Fig. DF7.6.1).

Figure DF7.6.1 Absorption Trench Options



The absorption trench should be constructed along the general contour of the ground. Trenches should be laid at a maximum gradient of 1 in 100 and a minimum gradient of 1 in 400. Positioning the ground level above the trench lower than the invert of the outlet pipe from the septic tank is advisable to prevent effluent back-loading the septic tank. Excess greywater, rainwater and surface water should be excluded from absorption trenches to maintain their efficiency.

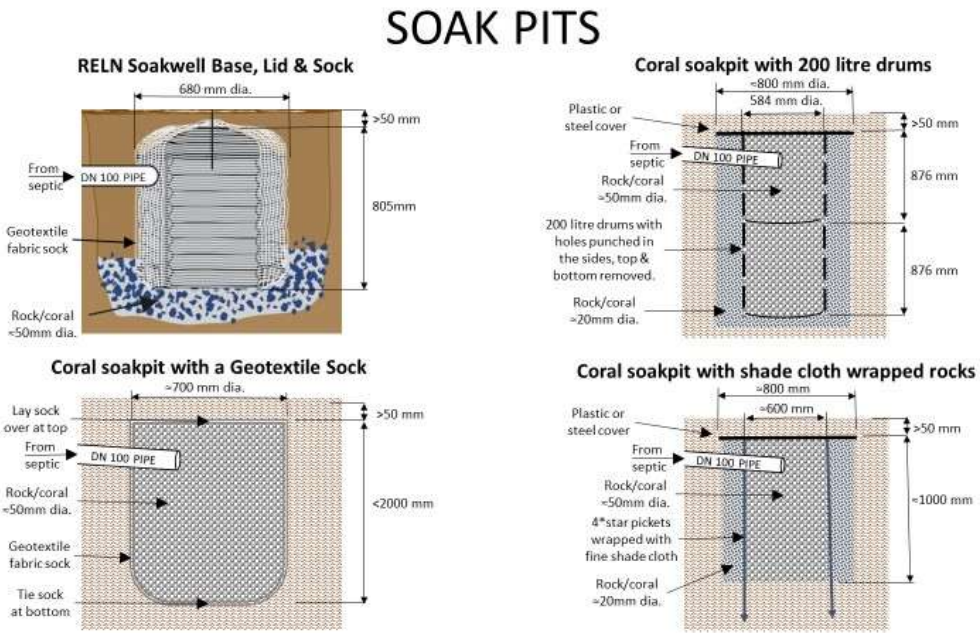
If proximate to a potable water source, the length of the trench is determined by AS 1547:2012 based on the effluent absorption area on the bottom of the soakaway. In the structureless gravels and weakly structured sands prevalent in Kiribati, the design loading rate for trenches proximate to potable ground water sources ranges from 20 mm/day (conservative) to 50 mm/day (maximum). With the integrity of the pore clogging interface (biofilm) below the absorption trench, these soils have high pathogen attenuation but low nutrient retention capacity.

For sites in Kiribati that are not proximate to potable groundwater sources, trench loading rates up to 500 mm/day may be acceptable. This equates to a minimum of 0.5 metres length of a 400 mm wide trench per all wastewater user of 100 lpcd or one third of this length for blackwater only users.

DF7.6.2 Soak pits

Where sufficient area for absorption trenches is not available soak pits may be used. A typical arrangement is shown in Figure 7.6.2.

Figure DF7.6.2.1 Soak pit options



The actual dimensions of the soak pit will depend on the nature of the soil and the volume of effluent. The depth, diameter and number of pits is determined by British Standards based on the effluent absorption area on the sidewalls of the soak pit. In Kiribati, the recommended design effluent absorption rate for sidewalls ranges from 50 l/m^2/day for weakly structured sands to 150 l/m^2/day for structureless gravel. In general, a soak pit is not as effective or as desirable as an absorption trench particularly if proximate to a freshwater lens where minimum setback distances to a drinking water source cannot be achieved.

The cesspits detailed in Figure 7.4.1 can also be used as soakpits however it is essential that a reinforced cover is installed over any cesspit design.

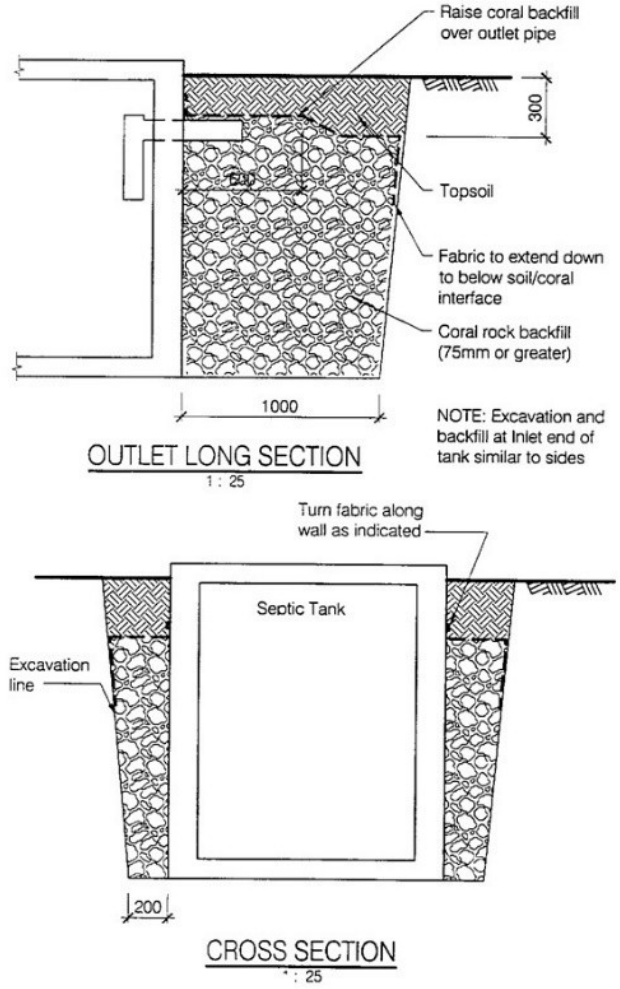
DF7.6.3 Integrated Soakaways

Alternately the soakaway may be integrated with the septic tank by constructing a soakaway around the septic tank as detailed in Figure DF 7.6.3.

In gravelly soil, this can be achieved by backfilling with coral or rocks wrapped in geotextile fabric to evenly disperse effluent around the perimeter of the tank In sandy soil, this may require the soakage area under the tank to be deployed. This can be achieved by excavating the septic tank pit 300 mm deeper than required that is backfilled with strong coral and covered with building plastic prior to the pouring of the concrete base slab of the septic tank.

Integrated soakaways are most effectively deployed in locations with a deep groundwater table or groundwater that is not used for drinking.

Figure DF7.6.3 Integrated Soakaway



DF7.7 Grease Traps

Grease traps are mandatory for kitchen wastewater that is discharged:

- from food preparation industries and commercial restaurants
- to soakage areas without the passage through a septic tank

Grease traps must be located near the kitchen through which all discharge from the kitchen must pass. For satisfactory operation, wastewater from the laundry and bathroom should be excluded from the grease trap. Grease traps are available as prefabricated plastic units or can be manufactured onsite as detailed in DFS2.4 with

- a capacity (i.e. volume below the invert level of the outlet) of not less than the total capacity of the sinks and dishwashers served.
- a removeable cover to facilitate the cleaning of the trap.

DF8 ROOF DRAINAGE

DF8.1 Design of roof gutters

Roof gutters where provided must be sized on the basis of the rainfall intensity using Figure DF8.1.

Table DF 8.1 Gutter Sizes

	Roof catchment area (m^2)			
	10	20	50	100
Type of gutter	Required cross sectional area of gutter (mm2)			
Eaves gutter	1400	2500	5180	9100
Internal Box valley or gutter	2800	5000	10360	18200

Notes:

i. The roof catchment area is the area of the roof drained by one downpipe. It is taken as the area of the roof from ridge to gutter between two adjacent downpipes.
ii. Values can be interpolated for catchment areas falling between the give figures.
iii. The gutter sizes do not include any allowance for freeboard. A freeboard of 25 mm for eaves gutters and 35 mm for internal box gutters must be added to the cross-sections derived from the table.
iv. Eaves gutters have been sized for a rainfall intensity corresponding to a 20 year return period whereas internal box and valley gutters have been sized to a 100 year return period intensity.

(b) Internal box gutters are not encouraged and should be avoided where possible.

(c) Gutters must have a minimum slope of:

i) 1 in 200 for eaves gutters; and

ii) 1 in 150 for internal box gutters.

These slopes must be increased where there is any material risk of clogging of the gutters and downpipes with leaves and other such matter.

(d) Gutters should be fixed and supported to manufacturer's specifications, or at least every 0.5m, with the appropriate gutter supports/clips.

(e) All gutters must be tested by filling gutters with water and ensuring that water fully drains to downpipes.

(f) Gutter outlets should be provided to connect gutters to downpipes.

DF8.2 Design of downpipes

The minimum area of cross-section of a downpipe must be at least half the area of cross-section of the gutter it serves.

DF8.3 Materials for gutters

The materials used should be of adequate strength and durability and:

(a) all gutter joints should remain watertight under working conditions;

(b) gutters and rainwater pipes should be firmly supported without restricting thermal movement;

(c) where different metals are used, they should be separated by a non-metallic material to prevent electrolytic corrosion;

(d) split PVC pipes should not be used as a substitute for specifically designed eaves gutters.

Rainwater storage tanks of appropriate size and construction must be provided to store run off from guttering system as per the specification (DF8.4)

DF8.4 Rainwater Storage

DF8.4.2 Roofing materials

Rainwater in general is very pure causing many metals to dissolve much faster than in ground or surface water.

- Lead flashing or lead-based paints must not be used on roofs or in tanks

- Galvanised iron sheets or zinc-aluminium coated sheets are safe.

DF8.4.3 Rainwater tank installation

Tanks must be designed specifically by the manufacturer for storing potable water. They may be metallic or non-metallic but plastic materials must be UV stabilised.

- Any coating on the inside of the tank must be compatible with potable water and shall not be painted with any ordinary paint.

- Ideally rainwater tanks should be installed in a shady location (particularly if translucent or plastic) but away from falling leaves.

- Rainwater tanks must be located on a suitable horizontal surface.

- Appropriate consideration needs to be given to the adequacy of the structure supporting the rainwater tank.

- The inlet and overflow of rainwater tanks must be fitted with mosquito proof, non-degradable screens to ensure rainwater tank water quality and ventilation.

- A removable inspection lid must be provided to allow access to undertake rainwater tank maintenance.

- Rainwater tanks must be fitted with overflow pipes for the disposal of excess rainwater inflow. The overflow pipes fitted to tanks must be adequate to prevent uncontrolled overflow. Overflow pipes shouldnot terminate near the rainwater tank support structure. Ideally, overflows should be routed to specifically designed soakaways or nearby wells.

DF8.4.4 Rainwater tank design

The quality of the water in the tank is contingent on managing the potential contamination routes by:

- minimising the accumulation of leaves on the roof reducing the potential growth of micro-organisms

- installing a regularly cleaned fly wire screen on the inlet to the tank reduces debris and the breeding of mosquitos

- installing and routinely emptying the first flush system installed to divert any chemical and biological debris collected on the roof away from the storage tank

- routinely cleaning the sludge out from the bottom of the tank either manually or through the fitting of an automatic vacuum valve

- bulk dosing the tank with chlorine tablets from time-to-time to remove resident pathogens

DF8.4.1 Rainwater tank sizing

The design charts (DF8.4.5A - H) for the Island groups of Kiribati are provided to determine the minimum required rainwater storage volume for a particular building based on the following assumptions:

(a) historic rainfall patterns

(b) roofed and guttered area

(c) daily rate of water consumption (i.e. 5 lpcd for households and 2 lpcd for communal buildings without permanent residents)

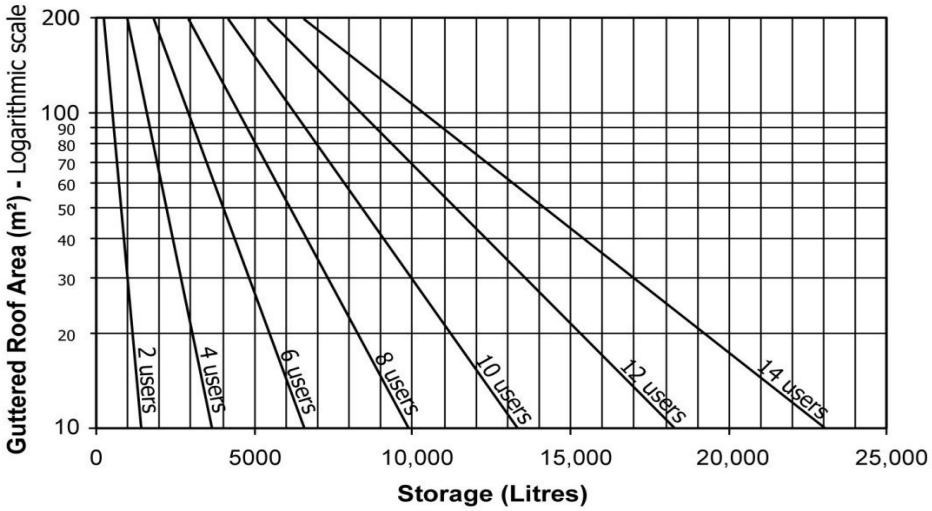
(d) the anticipated number of users

(e) a minimum storage volume (assuming a failure of no more than 1 month in every 10 years)

DF8.4.5 Sizing charts

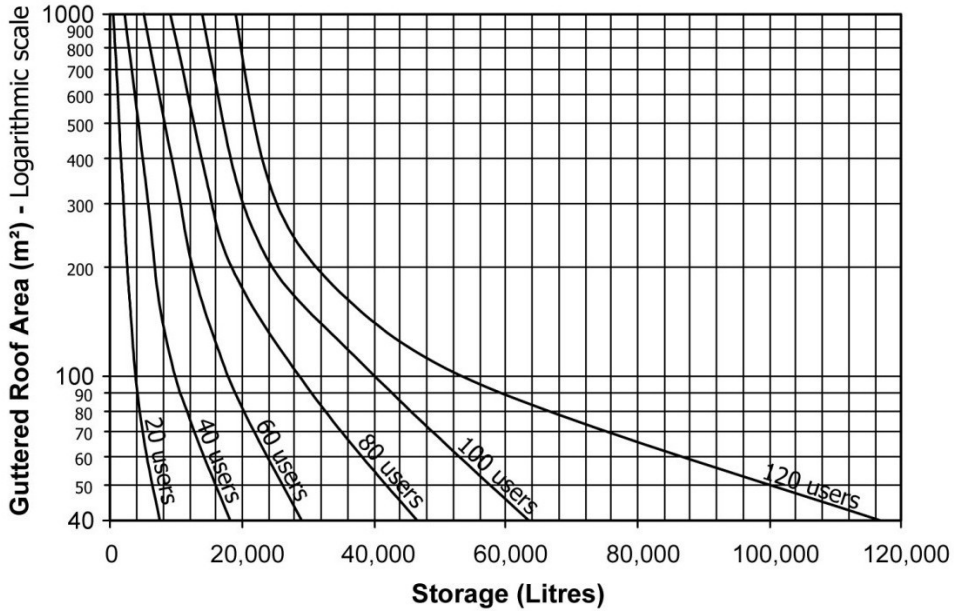
DF8.4.5A Tawara and Northern Gilbert Islands (Household Storage)

Required household storage, Tarawa and Northern Gilbert Islands

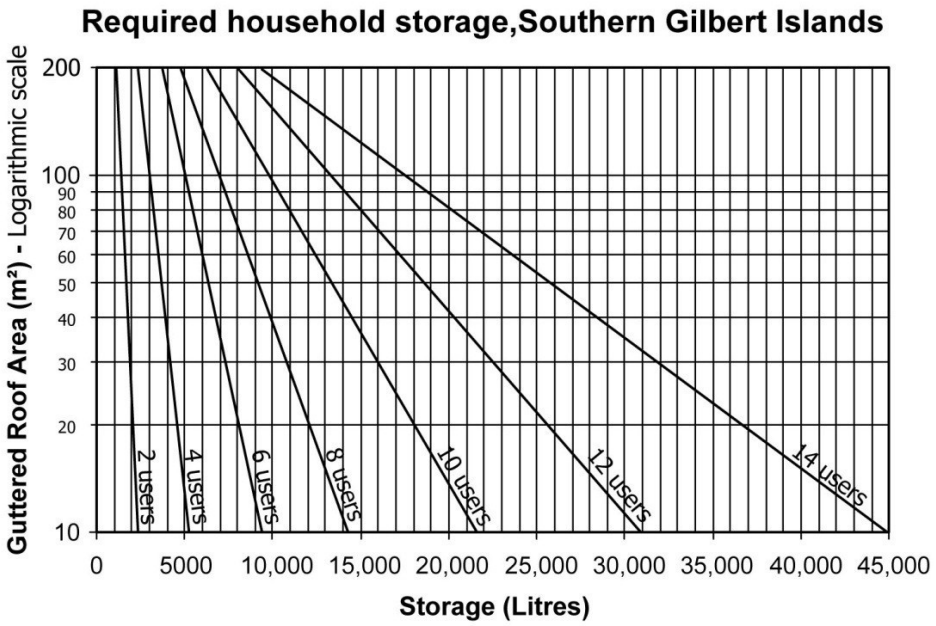


DF8.4.5B Tawara and Northern Gilbert Islands (Communal Storage)

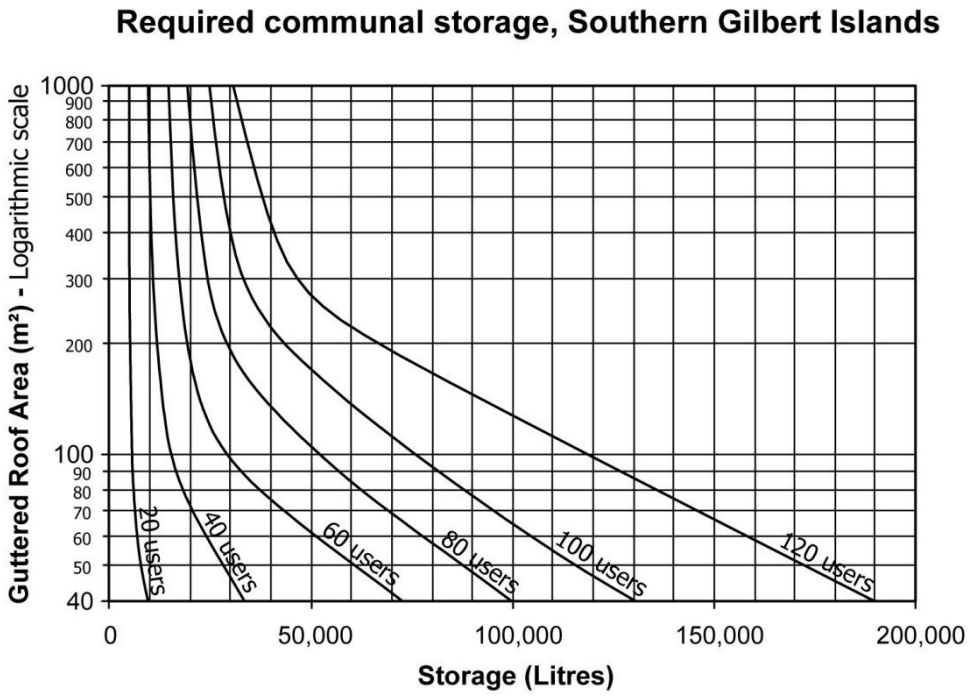
Required communal storage, Tarawa and Northern Gilbert Islands



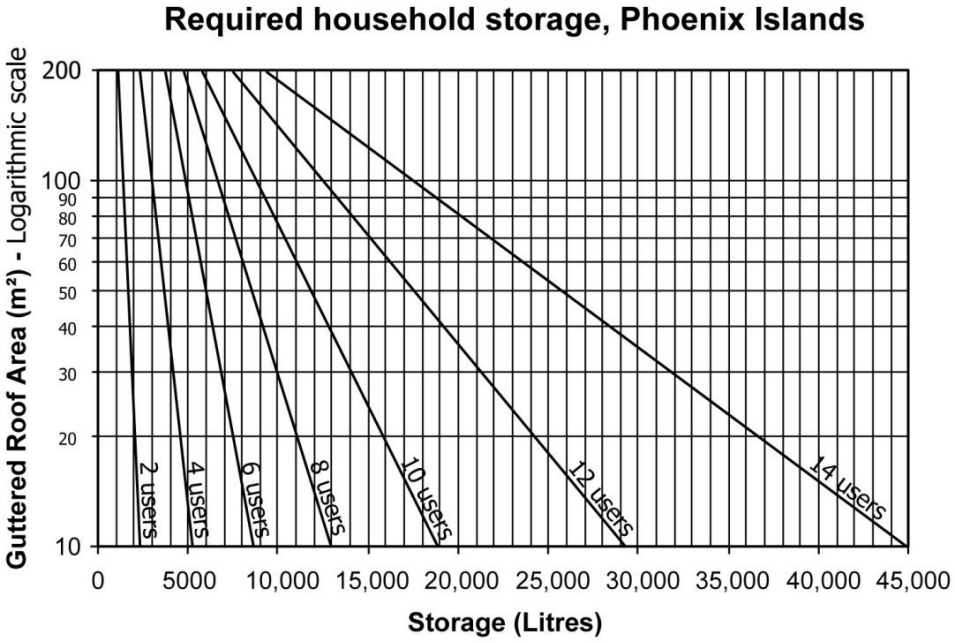
DF8.4.5C Southern Gilbert Islands (Household Storage)



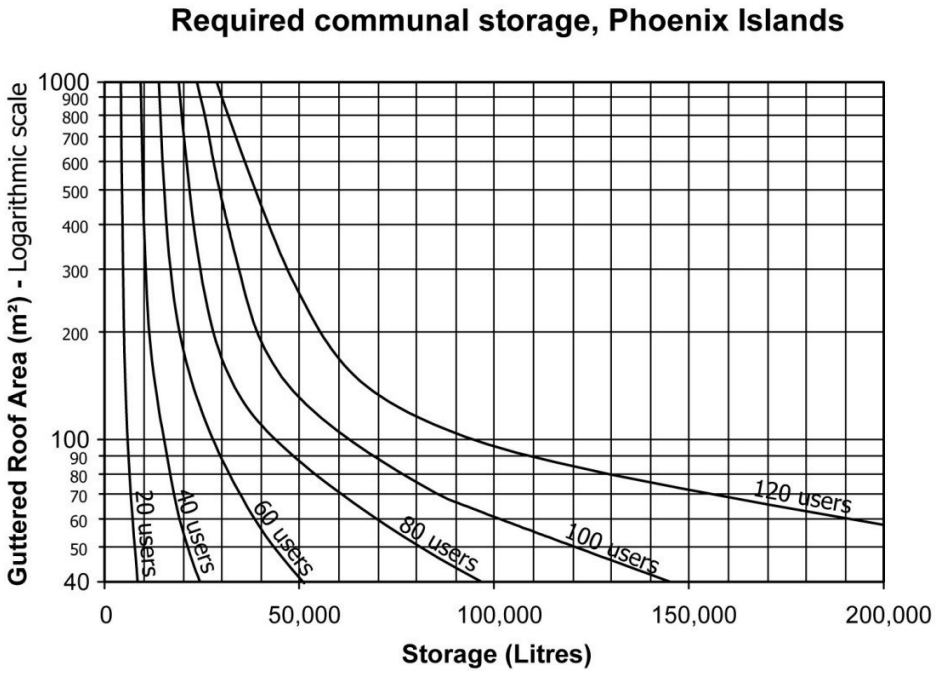
DF8.4.5D Southern Gilbert Islands (Communal Storage)



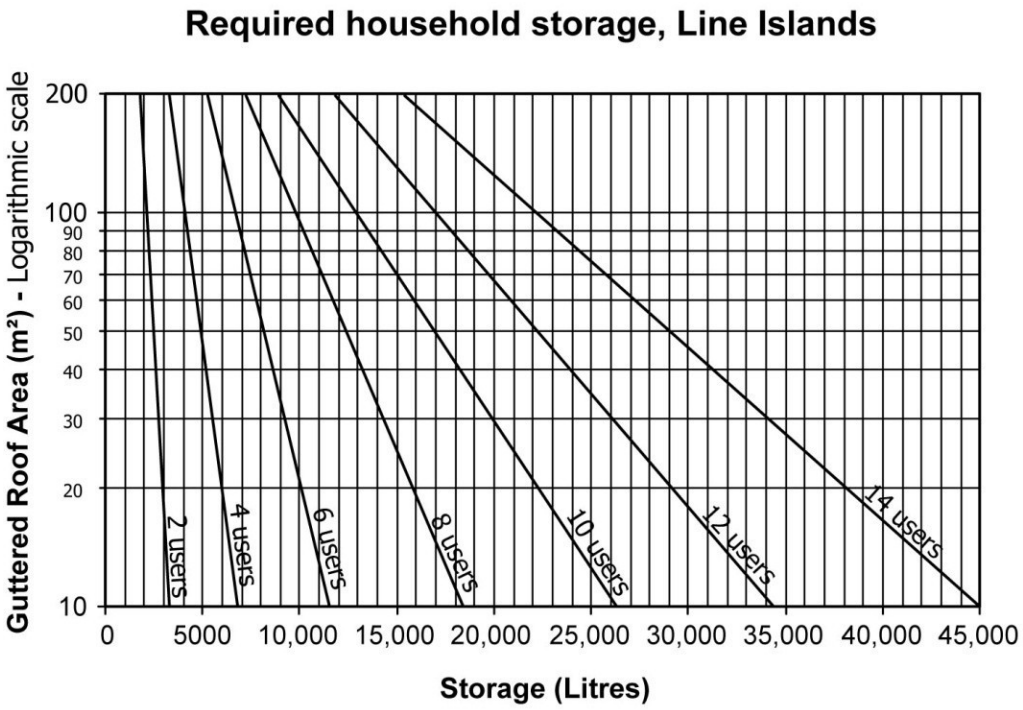
DF8.4.5E Phoenix Islands (Household Storage)

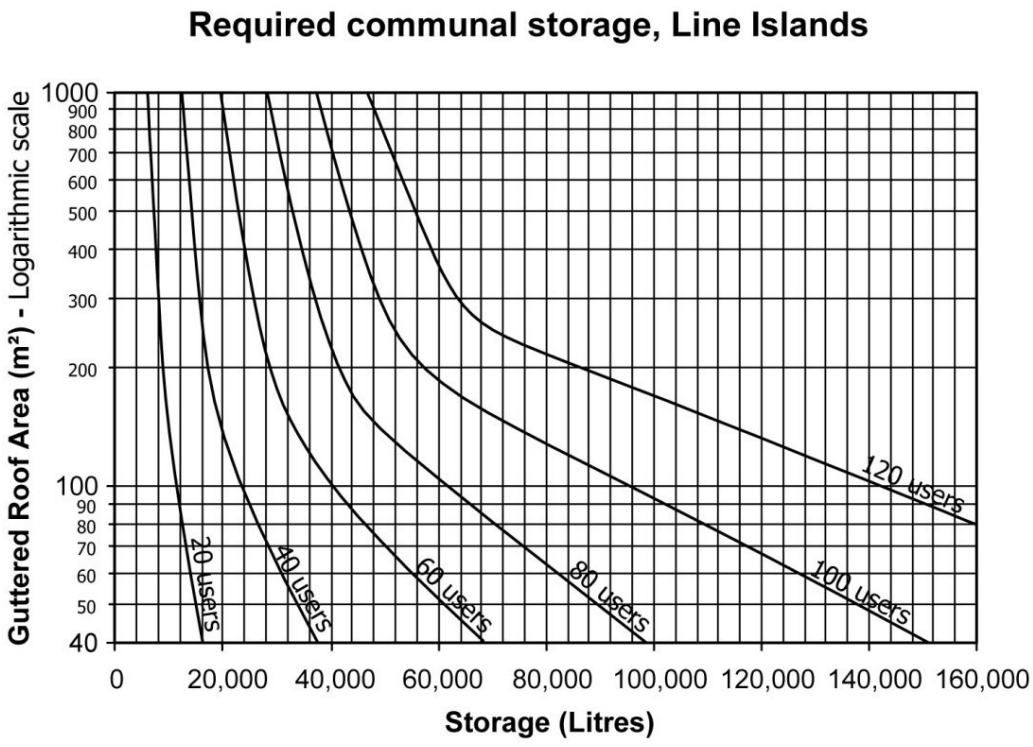


DF8.4.5F Phoenix Islands (Communal Storage)



DF8.4.5G Line Islands (Household Storage)





DF8.4.5H Line Islands (Communal

DWELLINGS AND OUTBUILDINGS (CLASS 1 AND 10)

SECTION **DG**

ANCILLARY PROVISIONS

SECTION DG ANCILLARY PROVISIONS

CONTENTS

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 Domestic-type water heaters

Household water heaters must be adequately supported, drained, and accessible.

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 Poultry and other Domestic Animal Houses

Accommodation for animals and poultry must not lead to insanitary conditions for the occupier or neighbours and the public.

DGP2 Gas Appliances

Gas Appliances must be adequately constructed or separated to prevent-

(a) ignition of nearby parts of the building; or

Pressure vessels located in a building are to be installed in a manner which will provide adequate safety for occupants.

When located in a building, a pressure vessel must be installed to avoid, during reasonable foreseeable condition, the likelihood of:

(a) leakage from the vessel which could cause damage to the building; and

(b) rupture or other mechanical damage of the vessel which could cause damage to the building or injury to occupants.

DEEMED-TO-SATISFY PROVISIONS

DG 1 MINOR STRUCTURES AND COMPONENTS

DG1.1 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 1529 is the relevant standard for the installation of a household water heater.

DG1.2 Aesthetics

Any fencing or free standing wall must be suited to the occupancy of the building within.

It must not detract from the general aesthetic appearance of the surroundings. If any barbed wire or other such is used it must be at a height of not less than 2 m above the finished level of any existing or intended adjacent footpath.

DG1.3 Poultry and other Domestic Animal Houses

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

(b) 20m from any other building or source of potable water and from any boundary adjoining a public road or other public space; or

(c) if the distances above are not achievable, provision should be made to ensure that neighbours are not affected by noise or odour, and adequate drainage should be supplied to an outlet location to comply with the restrictions of (a).

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.

DG2 GAS APPLIANCES

DG2.1 General requirements

Gas appliances are to be installed according to AG100

PART 3

NORMAL COMPLEXITY CLASS 2 TO 9 BUILDINGS

Covers Public Buildings and Group Dwellings of normal complexity

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

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:

(h) 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;
(i) the FRL of structural elements must be at least equal to that of other elements to which they provide support; and
(j) 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 -

(k) protect the occupants of one part of a building from the effects of fire elsewhere in the building;
(l) control the spread of fire or smoke to adjoining buildings; and
(m) 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 avow 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:

(n) allow the safe evacuation of all affected people; and
(o) 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

(p) 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 stand*s and indoor sports stadiums in NCI .4; and
  (ii) lightweight construction in NC1.5

(q) 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: 2, 3, 9	Class of building: 5, 6, 7, 8
4 or more	Requires specific design	Requires specific design
3	Type A	Type B
2	Type B	Type C
1	Type C	Type C

NC1.2 Calculation if Rise in Storeys

In calculating the rise in *storey*s:

(r) 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 *storey*s in any other case; and

(s) 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 NCS2.

NC1.7 Non-combustible building elements

(a) In a building *required* to be of Type A or B construction, the following building elements and their components must be *non-combustible*:
  (i) *External walls* and *common walls*, including all components incorporated in them including the facade covering, framing and insulation.
  (ii) The flooring and floor framing of lift pits.
  (iii) Non-loadbearing internal walls where they are required to be fire-resisting.

(b) A *shaft*, being a lift, ventilating, pipe, garbage, or similar *shaft* that is not for the discharge of hot products of combustion, that is non-*loadbearing*, must be of *non-combustible* construction in:

(i) a building *required* to be of Type A construction; and

(ii) a building is to be of Type B construction, subject to C2.10, in:
- a Class 2, 3 or 9 building; and
- a Class 5, 6, 7 or 8 building if the *shaft* connects more than 2 storeys.

(c) A *loadbearing internal wall* and a *loadbearing fire wall*, including those that are part of a *loadbearing shaft*, must comply with Specification NC4.1.

(d) The requirements of (a) and (b) do not apply to the following:
  (i) Gaskets.
  (ii) Caulking.
  (iii) Sealants.
  (iv) Termite management systems.
  (v) Glass, including laminated glass.
  (vi) Thermal breaks associated with glazing systems.
  (vii) Damp-proof courses.

(e) The following materials may be used wherever a *non-combustible* material is *required*:
  (i) Plasterboard.
  (ii) Perforated gypsum lath with a normal paper finish.
  (iii) Fibrous-plaster sheet.
  (iv) Fibre-reinforced cement sheeting.
  (v) Pre-finished metal sheeting having a *combustible* surface finish not exceeding 1 mm thickness and where the *Spread-of-Flame Index* of the product is not greater than 0.
  (vi) *Sarking-type materials* that do not exceed 1 mm in thickness and have a *Flammability Index* not greater than 5.
  (vii) Bonded laminated materials where:
    - each lamina, including any core, is *non-combustible*; and
    - each adhesive layer does not exceed 1 mm in thickness and the total thickness of the adhesive layers does not exceed 2 mm; and
    - the *Spread-of-Flame Index* and the *Smoke-Developed Index* of the bonded laminated material as a whole do not exceed 0 and 3 respectively.

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

(t) 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.

(u) A part of a building which contains only heating, ventilating, 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

(v)	(w) TYPE OF CONSTRUCTION OF BUILDING			
	(x)	(y) Type A	(z) Type B	(aa)Type C
(bb)CLASS 5, 6, 7, 8 or 9b	(cc) Max floor area	(dd)2000 m^2	(ee) 1500 m^2	(ff) 1000 m^2
	(gg)Max volume	(hh) 12000 m^2	(ii) 9000 m^2	(jj) 6000 m^2

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 m^2 if -

(i) the building is Class 7 or 8, it contains not more than 2 *storey*s and an *open space* complying with NC2.4(a) not less than 18 m wide is provided around the building.

(b) More than 18000 rn2 if -

(i) 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 vent*s and the space below the roof is divided into compartments in accordance with AS 2665; and

(ii) 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 m^2 and further:

(a) Ward areas must be subdivided with wails 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) an open deck car park; or
(b) of one or two *storey*s 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 *storey*s 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.

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 *storey*s and spaces in the nature of *storey*s 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 *storey*s 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 Equipment

A wall having a FRL of not less than 60/60/60 must bound a room housing equipment comprising:

(a) the main electrical switchboard in a building with an *effective height* of more than 25 m;
(b) *required* stair pressurizing equipment; or
(c) 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.

NC2.11 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 *window*s 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 mm^2 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, *window*s (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 0º to 45º	5 m
more than 45º to 90º	4 m
more than 90º to 135º	3 m
more than 135º to 160º	2 m

NC3.4 Acceptable Methods of Protection

(a) Where protection is *required*, doorways, *window*s, 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 *window*s (*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 –

(c) "WARNING - SLIDING FIRE DOOR"
(d) 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 *exit*s 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 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 wall*s which are *required* to have a FRL to inhibit the lateral spread of fire must not reduce the *fire-resisting* performance of the wall.

NC3.11 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 *shaft*s complying with Specification NC1.1 or protected in accordance with NC3.11.

NC3.12 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/-.

NC3.13 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.

NC3.14 Installation Deemed-to-Satisfy

Installation satisfies NC3.13 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 NC3.14 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 NC3.14 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 compartment*s 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 NC3.14 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 NC3.14.

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,

(e) 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) 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 *fire-source feature* to which it is exposed is -			
For *loadbearing* 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 non-*loadbearing* 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 *external wall*, where the distance from any *fire-source feature* 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			
Fire-resisting lift or stair *shaft*s -			
	Loadbearing	90/90/90	90/90/90
	Non-loadbearing	90/90/90	90/90/90
Bounding *public corridor*s, public hallways and the like -			
	Loadbearing	90/90/90	90/-/-
	Non-loadbearing	60/60/60	-/-/-
Between or bounding *sole-occupancy unit*s -			
	Loadbearing	90/90/90	90/-/-
	Non-loadbearing	60/60/60	-/-/-
Ventilating, pipe, garbage, and like *shaft*s 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 *storey*s 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 an 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 wall*s bounding the *sole-occupancy unit*s 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 an 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 wall*s which are not *fire wall*s, 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 (*structural adequacy*, *integrity* or *insulation*) relevant to the building element concerned.	

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,

(e) unless the wail bounds a sole-occupancy unit in the topmost (or only) storey and there is only one unit in that storey -
(f) 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;
(g) 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
(h) 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 *fire-source feature* to which it is exposed is -			
For *loadbearing* 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 non-*loadbearing* 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 *external wall*, where the distance from any *fire-source feature* 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			
Fire-resisting lift or stair shafts:			
	Loadbearing	60/60/60	60/60/60
	Non-loadbearing	60/60/60	60/60/60
Bounding *public corridor*s, public hallways and the like:			
	Loadbearing	60/60/60	60/-/-
	Non-loadbearing	60/60/60	-/-/-
Between or bounding *sole-occupancy unit*s:			
	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 Carparks: 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 *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	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/-/-

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,

(e) unless the wall bounds a *sole-occupancy unit* in the topmost (or only) *storey* and there is only one unit in that *storey*.

(f) 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 *fire-source feature* 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 *external wall*, where the distance from any *fire-source feature* 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 *public corridor*s, public hallways and the like:		30/30/30	60/60/60	-/-/-
Between or bounding *sole-occupancy unit*s		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 *fire- source feature* to which it is exposed	60/-/-
Wall: less than 1.5 m from a *fire-source feature* 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 *shaft*s 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 corridor*s, public hallways and the like, and between or bounding *sole-occupancy unit*s 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 *shaft*s, stair *shaft*s, *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 failing 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 *shaft*s or stair *shaft*s;
(b) external and *internal wall*s bounding *public corridor*s, 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).

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-isolates 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 wail 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 *sarking-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 fora *Spread-of-flame index*, *Smoke-developed index* or *Flammability Index* do not apply to:

(a) timber-framed *window*s;
(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 it -

(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 *window*s 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 lace 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 *exit*s 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.
(c)

SPECIFICATION NC 3.14 - 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 NC3.12.
(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 NC3.14(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 NC3.14(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 wail 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 afire- 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.
(v) 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

SECTION ND ACCESS AND EGRESS

CONTENTS

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 is 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 *exit*s must allow for the following optimum conditions during evacuation in any emergency:

(a) a density in the *exit* of 2.0 persons/ m^2 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 *exit*s.
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 *exit*s must be provided from each *storey* if the building has a rise of three or more *storey*s or an *effective height* of more than 10 m.

(c) **Basements**: In addition to any *horizontal exit,* not less than 2 *exit*s 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 *window*s 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 *window*s or openings must have one clear dimension of at least 600 mm and a minimum opening of 0.6 m^2. The *window*s 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 m^2 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 *exit*s 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 *exit*s.

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 *exit*s 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 *exit*s 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 *exit*s is available, in which case the maximum distance to one of those *exit*s must not exceed 40 m from the starting point.

(b) Class 5 to 9 buildings -

(c) 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 *exit*s is available, in which case the maximum distance to one of those *exit*s 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.

(d) 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 exit*s is available; and

(ii) the maximum distance to one of those *exit*s must not be more than 30 m from the starting point.

(e) 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.

(f) *Assembly buildings*: in a Class 9b building other than a *school* or *early childhood centre*, the distance to one of the *exit*s 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

*Exit*s 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 area*s – 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 ram 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 4 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 4 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 *exit*s 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 *exit*s 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 *exit*s 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 exit*s 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 m^2 per patient in a Class 9a building; and
(ii) 0.5 m^2 per person in any other case.

NDI.12 Non-required Stairways or Ramps

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 *storey*s 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 *storey*s 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 *storey*s, provided that one of those *storey*s 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) stairs, ramps, corridors, hallways, lobbies, and the like
(ii) service ducts and the like, *sanitary compartment*s 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	(d) Public	30
(e) Gymnasium		3
(f) Hospital *ward area*		10
(g) Hostel, hotel, motel, guest house		15
Indoor sports stadium arena		10
(h) Kiosk		1
(i) Kitchen, laundry (other than domestic) and laboratory		10
Library:	Reading space	2
	Storage space	30
(j) Office, including one for typewriting or document copying or with desk-top computers		10

Type of use		m^2 per person
Plant room for:	Ventilation, electrical or other service units	30
	Boilers or power plant	50
(k) Reading room		2
(l) 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	(m) 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 exit*s 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 exit*s is available.
(c) Subject to (d) and (f), the distance between *exit*s is measured in a straight line between the nearest parts of those *exit*s.
(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 exit*s, the measurement is along the path of travel through the point at which travel in different directions to those *exit*s 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.

(g) causes a change of direction in proceeding to a *required exit*, the distance is measured along the path of travel past that wall.
(h) If permanent fixed seating is provided, the distance is measured along the path of travel between the rows of seats.
(i)

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 *storey*s, *required* stairs and ramps (including landings and any supporting *structural member*s) 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/m^3 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 m^2
(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 than30/30/- (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 *shaft*s 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 cl ear 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.

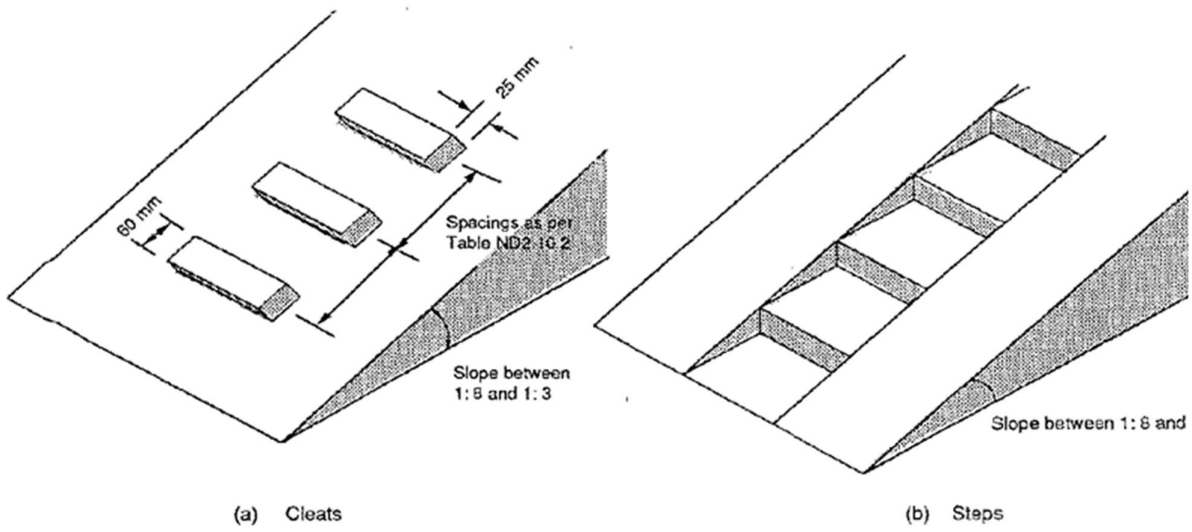
ND2.10.2 Service ramps

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 *storey*s
(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 do 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

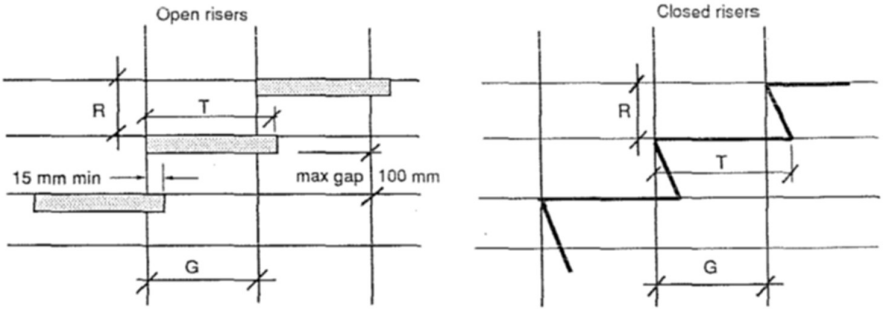


Table ND2.13.1 - Riser Dimensions (mm) to Match Going

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 -

  (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.

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 -

  (i) be not less than 750 mm long measured 500 mm from the inside edge of the landing; and

(ii) 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 m

(b) except at the perimeter of a *stage*, rigging loft, loading dock, an area accessible only to maintenance staff, or the like.

(c) 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.

(d) 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.

(e) 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

(f) 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.

(g) 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 wail; 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 m^2
(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 200m^2, 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 m^2; 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
Class3 (a) If the building contains: • 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 *sole-occupancy units:* • up to 49 beds • more than 49 but not more than 99 • more than 99. (c) Common areas of buildings that are *required* to be accessible	To and within: • 1 sole-occupancy unit. • 2 sole-occupancy units. • 3 sole-occupancy units. To and within: • 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 *floor area* is more than 500 m2.
Class 7	To and within the entrance floor if the total *floor area* of the building is more than 3000 m2
Class 8	To and within the entrance floor if the total *floor area* of the building is more than 3000 m2
Class 5, 6, 7 and 8	To and within any floor if irrespective of *floor area,* 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.
Class9a	To and within all areas normally accessible to the public, patients or staff.
Class9b- An assembly building not being a school or	To and within every room that accommodates more than 100 persons, and if fixed seating is provided, not

Class of building	Access requirements
an early childhood centre.	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 *floor area* 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 wheelchairs, 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

(d) 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

SECTION NE – SERVICES AND EQUIPMENT

CONTENTS

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 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.

NEP4 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.

NEP5 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:

(i) buildings of medium size or larger, frequented by the public and where flammable and consumer goods are displayed; and
(j) 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 Emergency Lighting

In three storey 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, *exit*s and the doors guarding such *exit*s must be identifiably marked. Such buildings must also have emergency lighting available to facilitate the occupants to reach the *exit*s without confusion and to safely negotiate the *exit*s until they can be in a road or *open space*. The route to the *exit*s 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.

NEP4.1 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.

NEP4.2 Electrical 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.

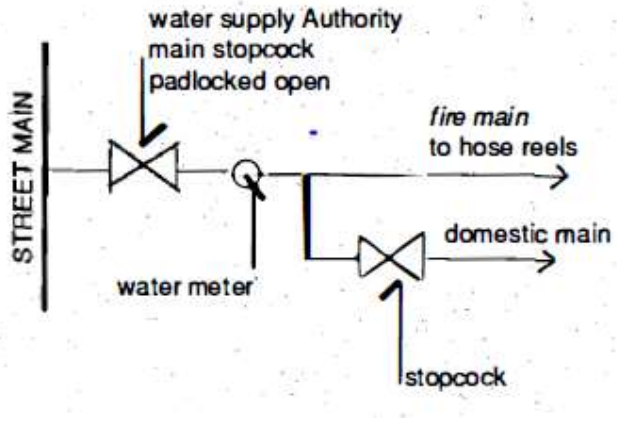
NE1.2 Fire mains and Water Supply

(i) 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.

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.
(v) Figure 2 - Water Supply Reticulation: Combined Services



NE1.3 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 m^2

(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.

NE1.4 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 NE1.4 - 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 *storey*s contained
Class 5,6,7,8 or 9b	any *storey* if *floor area* of *storey* more than 750 m^2
Class 9a	all buildings
AND All Classes	where an internal hydrant is required,

NE1.5 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 NE1.5shows the commonly available portable extinguishers and their selection for appropriate class and type of fires.

Table NE1.5 - Portable Fire Extinguisher Selection Chart

		Contents of Extinguisher are			
		Electrically conductive		Electrically non-conductive	
Type of Extinguisher / Class and Type of Fire		WATER	FOAM	DRY CHEMICAL	CARBON DIOXIDE
A	Ordinary *combustible*s (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

NE1.6 Fire and Smoke Alarms

A manually operated evacuation alarm system to the relevant provisions of clause 1.6.2 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 3 *storeys*
(b) Class 6, 7 or 8 excluding a *public carpark* with a rise of up to 3 *storeys* and a *storey floor area* of more than 500 m^2
(c) Class 9(a) with a rise of up to 3 *storey*s; and
(d) 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 3 *storeys* and a *storey floor* area of more than 250 m^2; 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*.

NE 6.1.2. Specification of Manually-operated Evacuation, Fire Alarm Systems

(e) *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.

(a) 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.

(b) Location

(c) 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.

NE1.7 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

NE1.8 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 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.

NE2.2 Smoke venting in theatres and stages

(c) The design of smoke control systems for theatres, stages and public halls must fulfil up-to-date and
(d) relevant fire engineering principles and practices.

NE3 EMERGENCY LIGHTING, EXIT SIGNS AND WARNING SYSTEMS

NE3.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8 and 9 buildings.

NE3.2 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 m^2 -

  (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 m^2 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 m^2; 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 m^2

  (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 m^2**,** and

(h) in every *required* fire control centre.

NE3.3 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.

NE3.4 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).

NE3.5 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*.

NE3.6 Direction Signs

If the *exit*s 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*.

NE3.7 Class 2, 3 and 4 buildings: Exemptions

NE3.5 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.*

NE3.8 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 NE3.2, and

(v) if illuminated by an emergency lighting
(vi) system incorporating wiring and a power source, comply with NE3.4.

(b) Exit signs in accordance with AS/NZS 2293.1 satisfy (a).

NE4 MAINTENANCE OF SAFETY INSTALLATIONS

NE4.1 Application of Part

This Part applies to Class 2, 3, 4, 5, 6, 7, 8, and 9 buildings.

NE4.2 Maintenance Requirements

Safety installations in buildings must be adequately maintained to the requirements of Table NE5.2.

Table NE4.2 - Schedule of Maintenance

Item to be inspected or tested	Nature of inspection and/or test, and frequency
1.Opening protection	
A *required* fire door, fire *window*, 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 (b) Required handrails and balustrades **(c)** Arrangements for safe egress in buildings with special security provisions	Monthly Annually Monthly
3.Signs	
(d) (e) *Exit* sign illumination: (f) internally-illuminated signs externally-illuminated signs	Inspect for legibility and installation in compliance with part ne4 Annually Check that the lamp matches the approved lamp rating marked on the sign fitting Monthly Check that the illumination is adequate Monthly
4 Emergency lighting	
Required 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 (b) Monthly (c) Where batteries are involved: (d) 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 (e) Monthly (f) Check battery charger for correct operation (g) Monthly
5. Fire-fighting services & equipment	

Item to be inspected or tested	Nature of inspection and/or test, and frequency
(a) *Required* portable fire extinguishers (b) *Required* fire hose reels **(c)** *Required hydrant*s and riser main system	As prescribed in NZS 4503 As prescribed in NZS 4503 As prescribed in NZS 4503
6. Manual fire alarms	Operate to see if in working order all as in NZS 4512
7. Structural fire protection	
Compartmentation and fire protection of *structural member*s	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 *required* Annually

NE5 ELECTRICITY

NE5.1 Safety

NE5.1.1 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), AS/NZS 3003 for health care buildings. The capacity of the system must allow for the long-term anticipated requirements of the occupants.

All Electrical works are carried out by a suitablyqualified person holding an Electricians License (issued by the Public Utilities Board).

NE5.1.2 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.

NE5.1.3 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.

NE5.2 Amenity

NE5.2.1 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.

NE5.3 Energy Consumption Reduction Techniques

Domestic and commercial/industrial fixed appliances (fridges, freezers, clothes washers, dryers, dishwashers, permanent home theatre systems, computers, imaging equipment, and heat pumps/solar water heaters/air conditioning units) must:

(a) be sized appropriate to the use, function and occupancy

(b) be located to minimise energy consumption or solar heat gain

(c) have operational controls that promote energy saving potential such as timers, on/off switches

(d) be easy to maintain

in accordance with PART VIII of the Kiribati Energy Act 2022.

The appliances must have an acceptable energy use performance as indicated by any of the following ENERGY EFFICIENCY labels acceptable to the Government of Kiribati:

(a) MEPS Minimum Energy Performance Standards, and/or

(b)Energy Rating Labels (www.energyrating.gov.au) measuring the annual energy consumption, and/or

(c) Energy Star, and/or

(d) other recognized energy rating system acceptable to the Government of Kiribati.

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PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION **NF**

HEALTH AND AMENITY

SECTION NF – HEALTH AND AMENITY

CONTENTS

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.
(e) pond surface water against buildings orbeneath the floor.

NFP2 Cooking and sanitary facilities

Washing and clothes laundering facilities provided in residential buildings must be consistent with the size and occupancy of thebuilding.

The number of toilet and washing facilities provided must be consistent with the size and class of occupancy.

Any cooking facility provided must not spreadsmoke which may affect health or create a nuisance to the occupants or neighbours.

The standard of toilet and washing facilities provided must, in any building, not create a nuisance or lead to ill health to the occupantsor neighbours.

Smoke extraction units from kitchens and otherprocess operations in class 3 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

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

Buildings must be constructed to provide adequately controlled interior temperatures at a level appropriate to occupancy and use.

Habitable rooms within buildings must be provided with air that contains sufficient oxygen and limits contaminants to levels consistent with good health, safety and comfort.

Air conditioning of interior spaces must provide sufficient air movement and adequate temperature to create a comfortable living environment appropriate to the number of occupants.

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 Floor levels and Site Drainage

Floor levels of all new buildings must be a minimum of 1000mm above the natural ground level and, where possible, the ground around the building must slope away from the buildingat a minimum fall of 1 in 100 for two metres.

The construction of the site drainage system and the position and manner of discharge of astormwater drain must not-

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

NF1.2 Building on land subject todampness or flooding

One or all of the following measures must be carried out if it is warranted by the dampness ofthe building site or proneness to flooding:

(a) The subsoil must be adequately drained.
(b) The ground under the building must be regraded or filled and provided with outletsto prevent accumulation of water.
(c) The surface of the ground under the building must be covered with a suitabledamp-resisting material.
(d) The building or structure floor level shall not be less than 1000mm above the known flood level at the site plus sea level rise for a median high emissions (SSP3-7.0) projection to the design working life or the flood hazard level as per B1.6.

NF1.3 Drainage of land external to building

A suitable system of drainage must be providedif paving, excavation or any other work on an allotment will cause undue interference with theexisting 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 *window*s 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 wail 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
Class 2 Within each sole-occupancy unit (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. ***Class 2 For each building*** (a) A separate laundry for each 4 *sole-occupancy unit*s, or part without its own clothes washing facilities, comprising at least one washtub and space for a washing machine (b) Clothes drying facilities comprising - (i) Lines or clothes hoists with not less than 7.5 m of line per *sole-occupancy unit*; or (ii) One heat-operated drying cabinet or appliance for each 4 *sole-occupancy unit*s, or part, without its own drying facilities. ***Class 2 Facilities for employees*** (a) If the building contains more than 32 *sole-occupancy unit*s, or if a group of Class 2 buildings on the one allotment contains in total, more than 32 *sole-occupancy unit*s (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 *sole-occupancy unit*.
Class 3 Facilities for residents For each 10 residents for whom private facilities are not provided: (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. If these facilities are situated outside the building, they should be conveniently accessible.
Class 4 For each sole-occupancy unit (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	**User**	**Max number served by:**								
building		**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 – provide1 shower and 1 laundry point for every 40 inpatients plus and 1 hand washing facility at every toilet block and treatment area.									

Class of building	User									
		Closet fixture(s)					building			
		1 Up to			1 Up to			1 Up to		
9b. Schools not being early child-hood 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.									
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 *sole-occupancy unit* to which access for people with disabilities is *required*: (a) One closet pan and washbasin; and (b) One shower.	
Class 5, 6, 7 and 9 buildings with *floor area* more than 1000 m^2 and **Class 3** if accommodation is other than in *sole-occupancy unit*s, or other parts of the building are *required* to be accessible.	
Number of persons for whom total facilities normally required	**Minimum number for use by people with disabilities**

Class of building and minimum facility 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 *required*, 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 compartment*s 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 compartment*s 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) Urinals shall be designed to minimise the exposure of concrete to urine[2] either through the sealing of the concrete and/or through the use of stainless steel, fibreglass and plastic materials. 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.

NF2.7 Disposal Requirements

As per DF7.3, all wastewater shall be discharged to soil absorption systems. Wastewater from:
- kitchens shall discharge to a grease trap and soakage area (or maybe a septic tank)
- laundries, bathrooms and handbasins shall discharge to a soakage area (or maybe a septic tank)
- water closets shall discharge to:
  - a saltwater sewer where a sewerage connection is available

[2] Concrete will absorb urine, locking it in as uric acid crystals that will emit a foul odour whenever moist.

- a cesspit where septage removal facilities are not available
- a septic tank with a soakaway when all wastewater streams have been combined

- urinals shall discharge to a soakage area preferably with the capacity for nutrient utilization

Where urinals are provided, urinal wastewater shall preferably be combined with the wastewater streams from the handbasins (and showers) being discharged to a soakage area. The diverting of urinal wastewater away from cesspits and septic soakaways not only improves the efficiency of their soil absorption system (given the sheer volume of wastewater typically discharged from urinals) but it also broadens the opportunity for safe systems designed for the uptake of the nutrient loading associated with urinal wastewater.

Where cesspits are provided, it is possible to have multiple water closets discharging to a single pit. This means that a public toilet could feasibly be fitted with 4 water closets discharging to one duty and one standby cesspit (or two duty and two standby cesspits). Cesspits shall be so sized to ensure adequate absorption area for the effluent and a volume sufficient to accommodate at least 3 years of sludge accumulation between the alternating of the duty and the standby pits.

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 room*s
(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 *school*s 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 *window*s 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 *window*s 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 compartment*s, bathrooms, shower rooms, airlocks and laundries

(ii) Class 2 buildings - to *sanitary compartment*s, 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.

(c) Including to and at external sanitation facilities.

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).

(iii) Where the *required* ventilation relies on mechanical or air-conditioning systems, *habitable room*s, 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 *window*s, 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 m 2 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.

NF4.13 Ventilation of Specialised Areas

Where the building contains areas or rooms that are not covered elsewhere in this section, systems shall be provided in compliance with AS 1668:2. This includes (but is not limited to) areas such as commercial kitchens, rubbish rooms, cleaners, cupboards, and healthcare rooms.

NF4.14 Indoor Air Quality

Buildings must have a means of collecting and/or removing the following from the rooms in which they are generated:

(a) cooking fumes and odours

(b) excessive water vapor from laundering, utensil washing, bathing and showering

(c) odours from sanitary and waste storage spaces

(d) gaseous by-products and excessive moisture from Commercial or Industrial processes

(e) poisonous fumes and gases

(f) air-borne particles

(g) products of combustion

Contaminated air must be disposed of in a way that avoids creating a nuisance or hazard to people and other property.

NF4.15 Room Temperature

Achieving a comfortable indoor temperature may be achieved through any, some, or all of the following:

(a) insulation in walls, ceilings, floors, attic spaces to prevent heat, electricity, or sound from passing into or out of a room or structure.

(b) high performance window glazing

(c) natural ventilation

(d) external shading of windows and proper window coverings

(e) high-efficiency fans in living and attic spaces

(f) energy efficient mechanical air conditioning system

Release of heated air to the outside must be provided by the use of any, some or all of the following natural ventilation techniques, unless the building is fully air-conditioned by a mechanical system:

(a) high ceilings (greater than 2.2 m)

(b) windows/vents within 250 mm of the ceiling.

NF4.16 Ventilation

Ventilation systems in non-residential buildings must be equipped with:

(a) exhaust outlets and plumbing vents a minimum of 6.0 m away from outdoor air intakes

(b) outdoor air intakes located at least 9.0 m away from sources of pollution including dumpsters, parking areas, driveways, loading docks, natural gas lines, wet cooling towers and garage doors / exhaust outlets

(c) outdoor air intakes must be protected with suitable mesh screens and filters

(d) roof drainage that slopes away from outdoor air intakes

and must:

(e) account for the demands of any fixed combustion appliances

(f) be sized and configured to accommodate future expansion of the building

Natural ventilation must consist of permanent openings, windows, doors or other devices which can be opened and are of sufficient size and appropriately placed to provide effective air circulation.

Openings must be placed on all façades, where appropriate to the function and use of the rooms, building, and must be must be screened to prevent entry of birds, rodents, leaves, and other similar objects.

Larger openings must be placed on the downwind, or leeward, facade, and smaller openings on the breeze, or windward, facade to promote air circulation within the building.

Non-air-conditioned buildings must have the majority of windows consist of louvred panels or other openable panels to promote air flow, as appropriate to occupancy and use.

Enclosed attic spaces and cathedral ceilings must have adequate ventilation that:

(a) provides adequate cross-ventilation of enclosed attic spaces and enclosed cathedral ceilings

(b) provides exhaust fans where needed

NF4.17 Air Conditioning

A mechanical air-handling system installed in a building must control:

(a) the circulation of objectionable odours

(b) the accumulation of harmful contamination by micro-organisms and pathogens

(c) be in accordance with AS 1668.2 and AS/NZS 3666.1

Air conditioning units must have an appropriate energy-savings certificate from a recognised agency, such as Energy Star and must have suitable corrosion protection for the environment it is located in.

Ducts must be appropriately sized for room-to-room cooling requirements and to maximise efficiency, with the layout designed to reduce duct length as much as possible.

Ducts must be properly sealed with low volatile organic compound (VOC) mastic so that ductwork is airtight, duct tape is not permitted.

Rooms must have adequately sized return ducts or doors that are undercut sufficiently to allow air flow to avoid any situation of negative pressure.

Effective delivery of clean supply air must be sufficiently provided to reduce the impact of pollutants generated in the interior spaces.

Mechanical air conditioning systems must have any or all of the following energy-saving equipment to control the volume of cooled air produced daily and promote energy efficiency:

(a) variable speed controls

(b) timer-switches for rooms to control air temperature according to time of day and use of the building

(c) demand-controlled ventilation that adjusts outdoor air intake to maintain optimal indoor air quality

(d) isolate fan motors from supply air streams

Mechanical air handling equipment must have:

(a) air filtration suitable for the application required

All air conditioning systems are to undergo a commissioning process to ensure the functional and environmental performance.

NF4.18 Mould Prevention

Cross-ventilation through the building interior must be provided through appropriate layout of rooms, and placement and size of doors, windows and vents.

Buildings with air conditioning must have positive air pressure to promote proper air circulation.

Methods for prevention of water accumulation listed in NF1 above must be followed.

Stand-alone sanitary compartments not connected to a bathroom, laundry or other sanitary room must provide ventilation through either:

(a) a window

(b) mechanical ventilation (see Section NF4.5).

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 pretreated before it enters the disposal system.

NF6.6 Commercial sewage/septage treatment

The installation of any commercial sewage treatment plant or septage treatment system requires the undertaking of an environmental impact assessment (EIA) and the preparation of an environmental management and monitoring plan (EMMP). Key considerations for the EIA and the EMMP for sewage treatment plants and septage disposal systems are further detailed below.

NF 6.6.1 Environmental Impact Assessment (EIA)

While activated sludge sewage treatment plants have the capability to achieve target biological oxygen demand (BoD), total suspended solids (TSS) and total nitrogen (TN) levels for effluent discharges, they cannot reliably achieve the minimum pathogen requirements for discharge to open (land or water). For this reason, treated effluent from sewage treatment plants must either discharge to a soil absorption system or an effluent disinfection system. The efficient operation of sewage treatment plants also necessitates the routine removal of sludge which will contain high pathogen counts and elevated nitrogen levels. Environmental impact assessments must therefore be applied to the effluent discharges and sludge removal from sewage treatment plants, as well as the sludge treatment and effluent discharges from septage disposal systems.

NF 6.6.1.1 Sewage treatment plants without a soil absorption system

The effluent from any activated sludge sewage treatment plant discharging to open MUST be filtered and disinfected (i.e. chlorine, ozone, UV[3] or micro-filtration) in order to reliably comply with the effluent

[3] UV may include multi-stage passive waste stabilization ponds, as well as electrical UV lamp systems.

standards specified in Table NF 6.6.2.1.[4]

NF 6.6.1.2 Sewage treatment plants with a soil absorption system

The effluent from any activated sludge sewage treatment plant discharging to a soil absorption system must comply with Section DF 7.6. Alternate effluent disposal options are possible, but their choice needs to be justified against a soil absorption system. Effluent that is pumped to the soil absorption system is not permitted to be designed to discharge to open (land/water) or storm water on failure.

NF 6.6.1.3 Septic tanks with a soil absorption system

The effluent from any commercial septic tank discharging to a soil absorption system must comply with DF 7.6. Sludge shall be designed to be routinely removed from the tank at least every 4 years to prevent effluent surcharge to open (land/water) on failure.

NF 6.6.1.4 Septage disposal systems

Defining the 'intent' of septage disposal systems forms the basis for the selection amongst the range of different technology options for the management of the septic sludge and the associated effluent. The 'intent' of septage disposal systems can be broadly broken down into three different typologies based on the management of the nutrient risks (primarily nitrogen):

- Option 1: Nutrients leached to the environment (with no intent to re-use the nutrients)
- Option 2: Nutrients concentrated in the sludge (with the intent to re-use the nutrients)
- Option 2: Nutrients contained within the effluent (with the intent to remove the nutrients)

As septage disposal systems are a non-networked solution, siting considerations at the pre-feasibility stage should precede the preparation of the EIA.

NF 6.6.1.4.1 Nutrients leached to the environment

Septage pits are a relatively low capital/O&M cost option designed to allow the leaching of nutrients. Septage pits may be deployed in locations where O&M capacities and nutrient risks to the environment are low. Septage pits are relatively small with the:

- permeable holding volume sized to accommodate dry sludge (>60% moisture content)
- wetted area sufficient to facilitate effluent leaching (i.e. soakage area under the pit as per DF7.6)
- pit to be covered with mounded soil when full to limit moisture ingress
- deployment in an area with sufficient space for new duty / standby pits to be dug

In some cases (with sufficient elevation) it may be possible to establish an anoxic zone with a carbon source, below the aerobic unsaturated soil zone, below the biofilm that will be established at the bottom of the pit, that may enable ammonification, nitrification and denitrification processes to naturally occur.

NF 6.6.1.4.2 Nutrients concentrated in the sludge

Septage ponds are a medium capital but high O&M cost option designed to concentrate nutrients in the sludge for potential re-use. Septage ponds may be deployed in locations where there is demand for sludge as a nutrient rich soil conditioner and where the nutrient risks to the environment are high. Septage ponds are relatively large with:

- a sealed holding volume sized to accommodate wet sludge (>95% moisture content)
- a soil absorption system designed to accommodate occasional pond overflows as per DF7.6
- the siting in low rainfall areas or fitted with covers to facilitate the drying of the sludge
- the deployment in a large area sufficient to accommodate multiple ponds in various stages of drying
- the capacity for the sludge from sealed ponds to be graded out, composted and tested before re-use

[4] Including proof of Sewage Treatment Plant accreditation to meet these effluent quality standards.

In some cases (where nutrient risks to the environment are high but O&M capacity is low), it may be desirable to deploy septage ponds with no intent to re-use the sludge as a soil conditioner. In such cases, the sludge may simply be graded-out and turned into the soil.

NF 6.6.1.4.3 Nutrients concentrated in the effluent

Septage treatment plants are a relatively high capital and high O&M cost option that mirror conventional sewage treatment plants by concentrating the nutrients in the effluent for removal (although there is probably a 1-2 log increase of nutrients in the sludge also). Such septage treatment plants may be deployed in locations where space is limited, O&M capacity is high and where the nutrient risks to the environment are moderate. Septage treatment plants are moderately sized with:

- a sealed holding volume sized to accommodate moist sludge (>80% moisture content) with sludge concentrated via an Imhoff tank, or an anaerobic baffled reactor, or a vertical flow wetlands
- an effluent nutrient removal system which may comprise of constructed wetlands (horizontal or vertical flow) or conventional nitrification and denitrification processes in the presence of carbon
- a soil absorption system designed to accommodate the effluent flow rates as per DF7.6
- provisions for the removal and drying of the sludge (and if composted must be tested before re-use).

NF 6.6.2 Environmental Management and Monitoring Plan (EMMP)

The EMMP shall detail the terms by which the owners of any sewage treatment system requiring an EIA shall engage suitably qualified professionals for:

- the testing of effluent, and/or
- the maintenance of mechanical equipment, and/or
- the removal of sludge,

as per the minimum operational requirements defined below.

NF 6.6.2.1 Sewage treatment plants without a soil absorption system

Owners of sewage treatment plants that discharge effluent to open (water or land) are required to have in place a minimum of three contracts for effluent testing (monthly), system maintenance (monthly) and sludge removal (quarterly). The effluent quality shall be such that any grab sample of effluent discharged to:

- ocean outfalls (or land with a low risk of human or livestock contact)
- coastal / river (or land where there is a risk of livestock contact)
- surface irrigation (or land where there is a risk of direct human contact)

shall conform to the standards detailed in Table NF 6.6.2.1.[5]

Table NF 6.6.2.1: EMMP Effluent Standards (to open)

EFFLUENT STANDARDS	BOD_5 (mg/l)	SS (mg/l)	E. Coli (cfu/100 ml)
Ocean outfall	<30	<50	<1000
Coastal/river	<20	<30	<100
Surface land	<10	<10	<10

NF 6.6.2.2 Sewage treatment plants with soil absorption system

Where nutrient removal is specified, the total nitrogen and phosphorous removal efficiency shall exceed 80% (i.e. TN<20 mg/L, TP<3 mg/L). In the event of a failure to meet the relevant effluent quality standard, the testing agency and owner are required to notify the Department of Environment.

[5] The classification of the effluent standard shall be defined within each EIA to avoid ambiguity (i.e. the classification of an ocean outfall as a discharge that is at least 100 metres offshore to open waters).

NF 6.6.2.2 Sewage treatment plants with a soil absorption system

Commercial septic tanks shall have a contract for sludge removal. Sludge removal from septic tanks within central business areas shall be undertaken at least every 4 years, and at least every 8 years elsewhere. Where more frequent emptying of septic sludge occurs, owners should seek to reduce the greywater / rainwater ingress to the septic tank or increase the size of the soil absorption system. Evidence of the surcharge of effluent to surface is considered a system failure necessitating the immediate rehabilitation of the soil absorption system.

NF 6.6.2.4 Septage disposal systems

The EMMP for the septage disposal systems will be tailored to reflect the technology choice and the context as further defined below.

NF 6.6.2.4.1 Nutrients leached to the environment

Septage pits shall be supplemented with boreholes for environmental monitoring against baseline conditions. Environmental monitoring shall include quarterly monitoring of nutrient levels and the occasional monitoring of pathogen levels in downstream groundwater.

NF 6.6.2.4.1 Nutrients concentrated in the sludge

Septage ponds require management plans that encompass the cycling, resting and emptying of sludge from the ponds, as well as the procedures for drying, treatment and testing against the intended re-use. Monitoring plans shall include the monitoring for the presence of the range of potential pathogens (i.e. parasites, bacteria and viruses) within any batch of sludge that is intended for re-use. Pathogen quality compliance standards for the sludge will need to be individually established against the proposed purpose of re-use. Environmental monitoring boreholes shall be established, although neither the nutrients or the pathogens from the sludge or the effluent are intended to be discharged to the environment.

NF 6.6.2.4.1 Nutrients concentrated in the effluent

Septage treatment plants require management plans that encompass the removal of sludge from the plant, as well as the procedures for drying, treating (and testing) the sludge against the intended disposal (or re-use). Septage treatment plant monitoring shall include the weekly monitoring of nutrient levels entering the soil absorption system. Environmental monitoring boreholes shall be established to ensure that nutrients or pathogens in the effluent are not adversely affecting environmental levels.

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.

NF7.3 Roof Drainage

Roof drainage where provided must comply with requirement s of Section DF8.

PUBLIC BUILDINGS AND GROUP DWELLINGS (CLASS 2 TO 9)

SECTION **NG**

ANCILLARY PROVISIONS

SECTION NG – ANCILLARY PROVISIONS

CONTENTS

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 pool*s 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 Gas Appliances

Gas Appliances must be adequately constructed or separated to prevent:

1. Ignition of nearby parts of the building; or

Pressure vessels located in a building are to be installed in a manner which will provide adequate safety for occupants.

When located in a building, a pressure vessel must be installed to avoid, during reasonable foreseeable condition, the likelihood of:

(a) leakage from the vessel which could cause damage to the building; and

(b) rupture or other mechanical damage of the vessel which could cause damage to the building or injury to occupants.

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 *window*s 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.

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 GAS APPLIANCES AND INCINERATOR ROOMS

NG2.1 Gas Appliances

Gas Appliances are to be installed according to AS/NZS 5601.1

NG2.2 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*.

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.

PART 4

HIGH COMPLEXITY CLASS 1 TO 10 BUILDINGS AND STRUCTURES

Covers Public Buildings and Group Dwellings of high complexity

(not covered by the Deemed-to-Satisfy provisions of the KNBC)

A building or structure classified as High Building Complexity as per A9:

1. Shall comply with the KBC Part 1.
2. Shall provide performance solutions to satisfy the performance requirements of Part 1, Part 2 and Part 3. The deemed-to-satisfy requirements of Parts 2 and 3 do not apply.
3. Shall be designed using performance solutions that are in alignment with the solutions presented in the latest edition of the Australian National Construction Code, New Zealand Building Code, Fiji National Building Code, Standards published by Standards Australia, Standards published by Standards New Zealand, and/or Fiji Standards.
4. Shall be designed by chartered architect(s) and engineer(s) that are also registered building practitioners as per the Building Act.