

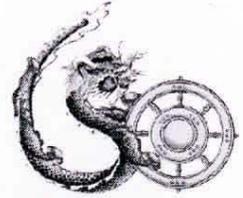


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BUILDING CODE OF BHUTAN 2018



དཔལ་ལྷན་འགྲུག་གཞུང་། འབས་ཏོག་ལྷན་ཁག།
ROYAL GOVERNMENT OF BHUTAN
MINISTRY OF WORKS & HUMAN SETTLEMENT
THIMPHU: BHUTAN



Foreword

April 30, 2018

The *Building Code of Bhutan 2018* has been framed as part of Bhutan Building Regulations 2018 and it sets out technical requirements, standards and design considerations which shall apply to construction of buildings in Bhutan. The Code ensures safety of buildings, protect public health and general welfare related to building constructions and its occupancy.

The Code consists of three chapters. The first chapter which is the main part sets out all technical requirements such as building dimensions, floor area, circulation space, lighting and ventilation, water supply and sanitary control, electrical, fire safety, access, telephone and vehicular parking. The Chapter also details out references to other structural design codes, standards and specifications to ascertain structural integrity and safety of buildings. Chapter 2 contains standards and other technical requirement applicable specifically for rural areas. Chapter 3 set out design consideration for differently-abled persons to ensure that buildings and in particular institutions and public spaces are accessible and can be used by all people.

The adoption of the Code will ensure effective implementation of Bhutan Building Regulations 2018. The code will be periodically reviewed and updated in keeping with the emerging trends. I request and advocate the adoption and implementation of the Code by all stakeholders in keeping with the intention of its content.

Dorji Choden
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Building Code of Bhutan

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Building Code of Bhutan

This Code sets out requirements which apply to the construction of a building in Bhutan. It should be read in conjunction with the Building Regulation 2018.

Chapter 1 – Introduction

Defined terms

1. In this Code, words and expressions have the same meaning as they would if used in the Building Regulation 2018, unless the context requires otherwise.
2. The following expressions have the meanings indicated, unless the contrary intention requires:

Clustered village means an existing village settlement with traditional housing constructed in close proximity to one another with distinct form and character;

Group housing means a housing scheme in which two or more independent dwelling units or buildings are constructed in an undivided parcel of land;

Local government means a local government under the *Local Government Act 2009*;

Regulation means the Building Regulation 2018;

Residential building means a building used for human habitation, including a garage and out house.

Set-back means the distance between the plot boundary and building or the distance between the buildings;

Water course means:

- a) a natural channel; or
- b) an artificial channel formed by draining or diversion of a natural channel for the purpose of carrying storm and waste water.

Chapter 2 – Requirements applying to all buildings

Part 1 — Environmental Context

Compliance with Green Building Design Guidelines

3. It is an objective of this Code that buildings shall be designed and constructed consistently with the *Bhutan Green Design Guidelines 2013* (published by the Ministry).

Earthquake resistance

4. If a building is constructed using stone masonry, the construction must comply with *Earthquake Resistant Construction Training Manual (Stone Masonry) 2014* (published by the Ministry).

Part 2 — Building dimensions

Minimum floor area and width, residential buildings

5. A room in a residential building shall not:
 - a) have less than the minimum floor area indicated in column A of the table at the foot of this clause;
 - b) have a width less than the minimum width indicated in column B of the table at the foot of this clause.

Table

Room function	Column A Minimum floor area	Column B Minimum width
Living:		
Combined living/dining room.	12 m ²	3,000 mm
Only living – primary room when separate dining is provided.	9 m ²	3,000 mm
Dining/Family room – secondary room when living room is provided separately.	7.5 m ²	2,500 mm
Bedroom:		
Primary bedroom – when only one bedroom is provided.	12 m ²	3,000 mm
Secondary bedroom – when more than one bed is provided.	9 m ²	3,000 mm
Additional/other bedroom	7.5 m ²	2,500 mm

Room function	Column A Minimum floor area	Column B Minimum width
Kitchen:		
Kitchen with store, when no separate store is provided.	9 m ²	2,000 mm
Kitchen, if a separate store is provided.	7.32 m ²	2,000 mm
Store	1.44 m ²	1,200 mm
Bathroom:		
Toilet	2.16 m ²	1,200 mm
Toilet with internal partition wall.	2.16 m ²	1,400 mm (see clause 6).
Bathroom	1.82 m ²	1,300 mm
Separate WC	1.08 m ²	900 mm
Balcony:		
Balcony	1.35 m ²	900 mm

6. The minimum width for a water closet in a toilet with internal partition wall is 900 mm.

Circulation space requirements

7. Any part of building shall not be farther than 22.5 meters from the nearest staircase.
8. A building shall comply with the dimensions set out in the table at the foot of this clause.

Table

Area or feature	Residential building	Institutional or commercial building
Clear width of private corridor or staircase (internal stair serving one residence only)	Not less than 900 mm	n/a
Clear width of common corridor or staircase	Not less than 1,100 mm	Not less than 1,500 mm (calculated to be greater under fire escape rules).
Height of staircase handrail above pitch line of staircase	Not less than 900 mm	Not less than 900 mm
Staircase riser	Not more than 190 mm	Not more than 190 mm
Staircase tread	Not less than 250 mm	Not less than 280 mm
Height of doors	Not less than 2,100	Not less than 2,100 mm

Area or feature	Residential building	Institutional or commercial building
	mm	
Width of door to habitable room	Not less than 850 mm	Not less than 900 mm
Width of door to main entrance	Not less than 900 mm	Not less than 1,000 mm
Width of other doors	Not less than 700 mm	Not less than 850 mm
Habitable room floor to ceiling height in high altitude	Not less than 2,450 mm	Not less than 2,450 mm
Water closet, bathroom or store floor to ceiling height	Not less than 2,100 mm	Not less than 2,300 mm
Mezzanine floor to ceiling height	Not less than 2,100 mm	Not less than 2,300 mm

Analysis of building structure

9. The following standards apply in Bhutan:
- a) IS 1893 – 1984: Criteria for earthquake resistant design of structures;
 - b) IS 875 – 1987: Code of Practice for Design Loads (other than an earthquake);
 - c) NUDC/007/1985 – Timber Roof Trusses;
 - d) NUDC/002/1985 -Manual for Timber Engineering Design.

Design of Structures (buildings)

10. The following standards apply in Bhutan:
- a) PWD structure design standards;
 - b) IS 4326 – Earthquake resistant design and construction of building;
 - c) IS 456 – Code of Practice for plain and reinforced concrete;
 - d) NUDC/007/1985 – Timber Roof Trusses;
 - e) NUDC/002/1985 – Manual for Timber Engineering Design;
 - f) IS 800 – Design of Steel Structures;
 - g) IS 806 – Design of Tubular Truss;
 - h) IS 1904 – 1978: Code of practice for structural safety of buildings (Shallow foundation).

Detailing of Structures (buildings)

11. The following standards apply in Bhutan:

- a) IS 1392 – 1993: Ductile detailing of concrete structures subjected to seismic forces;
- b) IS 4326 – Earthquake resistant design and construction of building;
- c) IS 456 – Code of practice for plain and reinforced concrete;
- d) NUDC/007/1985 – Timber Roof Trusses;
- e) NUDC/002/1985 – Manual for Timber Engineering Design;
- f) IS 800 – Design of Steel Structures;
- g) IS 806 – Design of Tubular Truss.

Floors

- 12. The ground floor shall be so constructed as to prevent dampness rising by capillary action into the floor.
- 13. Kitchen flooring shall be of impervious and fire proof materials.
- 14. Toilets and bathrooms shall have floors of impervious materials;
- 15. The internal walls of a water closet shall be finished with an impervious material up to a minimum height of 90 cm from the floor.
- 16. The floors and walls of basement floors shall be provided with damp proofing treatment.

Part 3 – Light and Ventilation Requirements

Habitable room

- 17. A habitable room shall have windows or other apertures with a total openable area of not less than $1/6^{\text{th}}$ of the floor area of the room.
- 18. The openings shall face directly onto an external space.

Kitchen

- 19. A kitchen shall be provided with ventilation through windows or ventilators having a minimum area of $1/6^{\text{th}}$ of the floor area of the kitchen.

Water closet

- 20. A water closet located against an external wall shall be provided with an opening or glazed window, not less than 0.2 m^2 , for lighting and ventilation.

Store rooms and the like

- 21. A storeroom shall have ventilation through windows, ventilators or other apertures.
- 22. A window in a storeroom shall be not less $1/10^{\text{th}}$ of the floor area.

Basement floor

- 23. A basement shall have ventilation through windows, ventilators or other apertures, the area of which shall be not less than 1/10th of the floor area.

Artificial light and mechanical ventilation

- 24. If daylight and natural ventilation are insufficient to meet the standard requirements of lighting and ventilation, those requirements shall be met through artificial lighting and mechanical ventilation.
- 25. Artificial lighting and mechanical ventilation shall be in accordance with BTS-012.

Ventilation shaft

- 26. A ventilation shaft shall be provided for any toilet, kitchen or store room which does not have adequate direct access to natural ventilation from an external open space.
- 27. A ventilation shaft:
 - a) shall be not less than the dimensions set out in the table at the foot of this clause;
 - b) shall be accessible from the ground floor, with a minimum opening size of 900 x 2,000 mm height.

Building	Minimum size
Building not more than 2 floors, including basement floors.	1.5 m ² in area, with a minimum width of 1.0 m.
Building of 3 or 4 floors, including basement floors.	2.8 m ² in area, with a minimum width of 1.2 m.
Building of 5 or 6 floors, including basement floors	4 m ² in area, with a minimum width of 1.5 m.

Plinth height

- 28. The plinth shall be not less than 150 mm in height.

Part 4 – Water Supply and Sanitary Control

Residences

- 29. Dwelling units with individual conveniences shall have at least the following fixtures:
 - a) one bathroom provided with a tap, either separate from or combined with other fixtures;
 - b) one water closet;
 - c) one sink in the kitchen or alternate arrangements for washing utensils.
- 30. Dwelling units without individual conveniences shall have the following fixtures:

- a) one water-tap with drainage arrangement in each tenement;
 - b) one water closet and one bathroom with tap for every two tenements.
31. Connection to the municipal water supply and sewer line shall be made with the approval of the implementing agency.
32. If there is no municipal water supply, one or more water storage tanks shall be installed.
33. A water storage tank:
- a) shall be installed in a location with adequate space and arrangements for cleaning of the tank;
 - b) shall be equipped with a float valve of overflow.
34. Gutters and down pipes shall be not less than 100 mm in diameter.

Part 5 – Electrical

Socket outlets

35. The minimum requirements for socket outlets are set out in the table at the foot of this clause.

Location	Number of 5 amp sockets	Number of 15 amp sockets
Bed room	1	1
Living room	1	2
Kitchen	-	1
Dining room	1	1
Living/dining combined	1	2
Bath room	-	1

Part 6 – Fire Safety

Bhutan Building Standard BTS-014

36. BTS-014 applies throughout Bhutan.

Provision of exits

37. Every building intended for human occupation shall be provided with exits sufficient to permit safe escape of occupants in case of fire or other emergency.
38. Compliance with clause 37 is not mandatory for a residential building having a single dwelling unit.

Escape routes and exits

39. Exits shall be free of obstructions and shall be clearly visible, with the routes to the exits clearly marked and sign posted.
40. Doors with a fire resistance of at least 30 minutes shall be provided along the escape routes to prevent spread of fire and smoke, particularly at the entrances to stairs.
41. All escape exits shall provide continuous means of egress to the exterior of the building or to an exterior open space leading to a street.
42. Exit routes shall be arranged so that they may be reached without passing through another occupied space.
43. Exits shall be located so that the travel distance to the exit on each floor does not exceed the distances set out in the table at the foot of this clause.

Building type	Travel distance
Residential	22.5 metres
Institutional	22.5 metres
Commercial/assembly	30 metres
Industrial	45 metres

44. The travel distance to an exit from the dead end of a corridor shall not exceed half the distance specified in the table at the foot of clause 43, except in institutional and commercial/assembly building types, in which case it shall not exceed 6 metres.
45. If more than one exit is required, exits shall be placed so that they are as remote from each other as possible, and shall be arranged to provide direct access in separate directions from any point in the area served.

Provision of fire escape staircases

46. The following buildings shall have at least one fire escape staircase:
 - a) an institutional building;
 - b) a commercial/assembly building.
47. The provision of additional alternative staircases is subject to the requirements of travel distances being complied with.

Design of fire escape staircases

48. A fire escape staircase shall be of a protected type, so that if there is a fire anywhere in the building, it cannot enter the staircase shaft.
49. At least one fire escape staircase in a building shall open directly into an exterior space or to an open place of safety.
50. No internal windows can be provided looking into a fire escape staircase.

51. Interior fire escape stairs must be constructed of a non-combustible material throughout, and as completely enclosed self-contained units with an external wall constituting at least one of the sides.
52. Doors onto fire escape staircases must have a fire resistance of at least one hour, should open in the direction of escape, and must not reduce the minimum width of the landing or staircase.

Other requirements relating to fire safety

53. All commercial/institutional/assembly buildings shall:
 - a) be provided with at least one fire extinguisher on each floor;
 - b) have a plan showing:
 - i) location and number of fire extinguishers
 - ii) means of escape – location of internal and external fire escape stairs, fire exits and direction of escape.
54. Fireplaces must have a floor of concrete or similar fire proof material and shall be provided with a flue or chimney. Chimneys shall extend 600 mm or more from the highest point of the roof.

Part 7 - Access

Elevators: Bhutan Building Standard BTS-011

55. BTS-011 applies throughout Bhutan.

Provision of elevators

56. Except as provided in clause 57, a building shall have one or more elevators.
57. An elevator is not mandatory for a building with four floors or less, counted from the main entrance.
58. For the purposes of clause 57, an entrance is the main entrance if:
 - a) it is the primary entrance to the building; and
 - b) it has direct access to a vehicular road.
59. An elevator shall not be used for fire escape purposes.

Part 8 – Telephone

Telephone wiring

60. Telephone wiring to a point shall be standard 0.5 mm gauge single pair copper wire in a 25 mm PVC/MS conduit.
61. A telephone wiring conduit shall be located not less than 500 mm from an electrical cable route.
62. A proper bridge shall be provided where electrical and telephone routes cross.
63. Telephone terminal points shall be located at not less than 1,500 mm above the level of the floor, in an accessible area.
64. Not more than five pairs of telephone wires shall be drawn through a 25 mm conduit.

Part 9 - Vehicle Parking

Vehicle parking areas

65. Vehicle parking areas shall be provided in accordance with:
 - a) Planning Standards of Urban Centres in Bhutan; and
 - b) Guidelines for Urban Roads in Bhutan.
66. Notwithstanding clause 65, the number of parking spaces for a development described in the table at the foot of this clause shall be not less than the number set out in that table in respect of that development.

Description	Minimum requirement
Residential building with more than two bedrooms	1 light vehicle parking space per dwelling unit
Residential building with two bedrooms	1 light vehicle parking per dwelling unit (single occupant unit). In the case of two or more number of dwelling units, 50% parking may be allowed for two-wheeler parking
Residential building with fewer than two bedrooms	1 two-wheeler parking per dwelling unit
Hotel	1 parking space for every 30 m ²
Cinema hall	1 parking space for every 10 fixed seats

Chapter 3 –Design Considerations for Differently-Abled Persons

Part 1: Design Principles

Objective

67. It is an objective of this Building Code that the design, construction and maintenance of buildings should achieve result in obstruction-free, accessible and usable spaces.
68. In giving effect to this objective, it is desirable that:
- a) all public interior circulation routes, whether horizontal or vertical, should be wide enough to accommodate mobility aids;
 - b) differently-abled persons should have safe routes through indoor spaces, with no unexpected level changes or obstructions that are potentially hazardous;
 - c) all interior routes from accessible entrances to accessible exits should be safe and easy to use by differently-abled persons.

Guidelines for Differently Abled Friendly Construction

69. In the design, construction and maintenance of buildings, consideration should be given to the *Guidelines for Differently Abled Friendly Construction 2017* (published by the Ministry).

Part 2: Mandatory provisions

Access for disabled: institutional buildings

70. The ground floor of an institutional building must be accessible to disabled persons through at least one entrance.
71. If a ramp is provided for disabled access, it:
- a) shall have at least 1.8 metres straight clearance at the bottom;
 - b) shall not have a slope greater than 1 in 12;
 - c) shall have a handrail on at least one side, and preferably both sides;
 - d) shall have a non-slip surface; and
 - e) shall have:
 - i) level platforms at 9.5 metre horizontal intervals and at turns;
 - ii) a level platform at the top.
72. If a door swings out onto the level platform at the top:
- a) the platform shall have dimensions of at least 1.8 metres x 1.8 metres;

- b) the platform must extend at least 300 mm beyond each side of the doorway.,800 mm if a door swings onto it.

Access to toilets by disabled persons

- 73. Where toilets are generally provided an appropriate number of facilities (in accordance with the use and capacity of the building) must be made accessible to and be usable by disabled people.
- 74. Disabled toilets for wheelchair access must be at least 1520x1520mm square, have a door of 1000mm wide opening inwards and have appropriately designed and mounted handrails to provide support.
- 75. Disabled toilets should be designed to follow standard codes of good practice.