

# **MUNICIPALITY OF WINDHOEK**

## **BUILDING REGULATIONS**

PROMULGATED BY G/N 57 OF 1969

Official Gazette No 2992 of 28.4.1969

1. Regulations
2. Schedules I and II
3. Tables I to IX

# MUNICIPALITY OF WINDHOEK.

## BUILDING REGULATIONS.

### CHAPTER I.

#### GENERAL.

1. In these regulations, unless the context otherwise indicates -
  - (i) "Council" means the Council of the Municipality of Windhoek;
  - (ii) "erf" means an erf as defined in section 1 (iv) of the Townships and Division of Land Ordinance, 1963 (Ordinance 11 of 1963).

\*Reg 1(ii) substituted by GN 62/70
  - (iii) "municipal area" means the municipal area of the Municipality of Windhoek;
  - (iv) "Municipality" means the Municipality of Windhoek;
  - (v) "ordinance" means the Municipal Ordinance, 1963 (Ordinance 13 of 1963);
  - (vi) "these regulations" mean the Building Regulations of the Municipality promulgated herewith;
  - (vii) "town clerk" means the town clerk of the Municipality or his duly authorised deputy;
  - (viii) "town engineer" means the town engineer of the Municipality or his duly authorised deputy;

and other words and expressions have the same meanings as those assigned to them in the ordinance.

#### DELEGATION OF DISCRETION TO SKILLED OFFICIAL.

2. Wherever in these regulations a discretion is vested in the Council to permit or approve of any matter or it is provided that the Council shall be satisfied or its opinion is made decisive then it shall be competent for the Council by resolution to delegate the exercise of such discretion to an employee who is in the opinion of the Council skilled in the matter in question.

#### RESPONSIBILITY.

3. Neither the granting of approval by the Council to erect a building or other structure, nor any inspections made by the Council prior to, or during, or after the erection of a building or other structure, nor anything done or omitted to be done

by the Council or any employee thereof in the execution of its or his duties or the exercise of his or its powers under these regulations shall relieve the owner of such building or structure from full responsibility for ensuring that such building or other structure is safe and in accordance with these regulations and all other laws applicable thereto.

3bis. In these regulations -

- (a) "S.A.B.S." followed by a number and title or only a number or no number or title, means the specifications (including any amendment thereof) drafted and published by the Council of the South African Bureau of Standards; and
- (b) "C.K.S." means the Co-ordinating Specifications drafted and published by the Council of the South African Bureau of Standards.

which lie during office hours open to inspection at the office of the town engineer.

\*Reg 3bis substituted by GN 128/85

## CHAPTER II.

### REPEAL OF EXISTING REGULATIONS.

4. The following paragraphs of the Building Regulations of the Municipality of Windhoek promulgated by Government Notice 3 of 1927 as amended, are repealed herewith.

Subparagraphs (6), (9), (10) of paragraph 1; Paragraphs 2, 3, 4, 5, 6, 7 and 8;  
Subparagraph (a) of paragraph 9, paragraphs 10, 11, 13, 14, 15, 16, 17, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99 and 100.

## CHAPTER III.

### ADMINISTRATION.

5. In this chapter, unless the context otherwise indicates:
- (i) "erection" in relation to a building, without in any way limiting the ordinary meaning of the word, includes -
    - (a) the alteration, subdivision or conversion for another use of, or addition to a building, and
    - (b) the re-erection of a building which has been demolished down to or to below the ground floor, irrespective of whether a framework has been left standing or not, and "erect" has a

corresponding meaning.

- (ii) "Person erecting or intending to erect any building or doing or intending to do certain other work," in relation to the erection of any building or the doing of any work involving the repair or taking down of any building means the person upon whom ultimately rests the obligation to pay for the erection of such building or the doing of such work, and the owner of the site upon which such building is or is to be erected or such work is to be done, shall be deemed to be such person unless he proves the contrary.

#### SUBMISSION OF PLANS AND PARTICULARS.

6. (a) Every person intending to erect any building within the municipal area, shall apply in writing for the approval of the Council on a form prescribed by the town engineer which form shall be accompanied by plans (in duplicate) drawn in accordance with subregulation (b) and by such further details as the Council may require for the purpose of giving effect to these regulations.

(b) All plans mentioned in subregulation (a) shall be submitted in duplicate to the town engineer and shall consist of: A block plan drawn to a scale of not less than 1 in 1,000 and showing the relation of the building to any other existing structures, or any street, together with plans, sections and elevations, also drawn to scale of not less than 1 in 100, and showing the height and thickness of the foundations and the walls and the level of the ground floor and the positions of the damp-course, the dimensions and position of rooms and passages, the position, form and dimensions of all windows, doors, chimneys, and ventilating openings and the sanitary conveniences and intended mode of drainage, also a schedule of specifications describing the materials and methods of construction, and a computation proving sufficient strength of structures and materials used therefor to the satisfaction of the Council, and other particulars of the several parts of the proposed buildings. All plans shall have the signature of the owner of the proposed building and/or the person who will carry out the building work shown on such plans.

#### "FEES FOR BUILDING PLANS AND INSPECTIONS

7. The following fees shall be payable for the consideration of building plans submitted to the Council for approval or for the reconsideration of plans previously approved but which approval has expired in terms of regulation 9 and for inspections carried out by the Council:

(1) **BUILDING PLANS:**

(a) **Dwellings:**

In respect of buildings, other than dwellings under a development scheme referred to in subparagraph (b) or dwellings under a self-help scheme referred to in subparagraph (c):

Buildings not exceeding 30m<sup>2</sup>

N\$150,00

Buildings exceeding 30m <sup>2</sup> but not exceeding 70m <sup>2</sup>	N\$200,00
Buildings exceeding 70m <sup>2</sup> but not exceeding 130m <sup>2</sup>	N\$600,00
Buildings exceeding 130m <sup>2</sup> but not exceeding 400m <sup>2</sup>	N\$800,00
Buildings exceeding 400m <sup>2</sup>	N\$1400,00
(b) Buildings:	
Buildings not exceeding 70m <sup>2</sup>	N\$ 600,00
Buildings exceeding 70m <sup>2</sup> but not exceeding 90m <sup>2</sup> 770.00	N\$
Buildings exceeding 90m <sup>2</sup> but not exceeding 110m <sup>2</sup>	N\$ 940,00
Buildings exceeding 110m <sup>2</sup> but not exceeding 130m <sup>2</sup>	N\$1110,00
Buildings exceeding 130m <sup>2</sup> but not exceeding 180m <sup>2</sup>	N\$1530.00
Buildings exceeding 180 m <sup>2</sup> but not exceeding 230 m <sup>2</sup>	N\$1960.00
Buildings exceeding 230 m <sup>2</sup> but not exceeding 300 m <sup>2</sup>	N\$2550.00
Buildings exceeding 300 m <sup>2</sup> but not exceeding 400 m <sup>2</sup>	N\$3400.00
Buildings exceeding 400 m <sup>2</sup> but not exceeding 500 m <sup>2</sup>	N\$4250.00
Buildings exceeding 500 m <sup>2</sup> but not exceeding 1000 m <sup>2</sup> (single storey)	N\$8500.00
Buildings exceeding 1000m <sup>2</sup> but not exceeding 2000 m <sup>2</sup> and comprising less than three storeys	N\$10000.00
Buildings exceeding 1 000m <sup>2</sup> but not exceeding 2 000 m <sup>2</sup> and comprising more than three storeys	N\$16000,00

Buildings exceeding 2000 m<sup>2</sup> and comprising three or more storeys N\$35000.00

(c) Development schemes -

In case of dwellings under development scheme in the same township comprising more than 30 dwellings, none of which exceeds 70m<sup>2</sup>, and to be erected exclusively on erven zoned as "residential", with a density of not less than 250m<sup>2</sup> area per dwelling and to which no building value restriction is applicable:

Per dwelling N\$200,00

(d) Dwellings under a self-help scheme:

In the case of a dwelling not exceeding 60m<sup>2</sup> under a self-help scheme to be erected on an erf zoned as "residential" with a density of not less than 250m<sup>2</sup> area per dwelling and to which no building value restriction is applicable:

For a dwelling not exceeding 40m<sup>2</sup> N\$70,00

For a dwelling exceeding 40m<sup>2</sup> but not exceeding 70m<sup>2</sup> N\$200,00

In this subparagraph, "self-help scheme" means a scheme provided by government or an institution to assist people who do not qualify for an ordinary housing loan from a bank or building society.

(e) Boundary wall or swimming pool: N\$200,00

(2) INSPECTIONS:

(a) The fees prescribed under paragraph (1) include fees for a first inspection of every stage of the building operations required to be inspected and for the final inspection upon completion of the building: Provided that where, in relation to dwellings under a development scheme referred to in paragraph (1)(b), any such inspection is called for, not less than 10 dwellings are presented ready for inspection per attendance of the stage required to be inspected, failing which an inspection fee of N\$200,00 shall be payable for the inspection called for.

(b) If for any reason not attributable to the employee of Council charged with the function of carrying out inspections, any stage of building operations required to be inspected for approval is not approved upon the first inspection, a fee of N\$200,00 shall be payable for each subsequent occasion such employee is required to attend at the building

for inspecting that stage for approval.

(3) RE-APPROVAL OF PLANS:

- (a) That Council charges a re-approval fee of N\$50,00 when previously approved plans are resubmitted after expiring of the original approval

\*Reg 7(a)(i) substituted by GN 138/71; 5/82; 119/85; 196/89; 153/92; Reg 7 wholly subd by 329/95; 274/97; Gen/N 207/98; Gen/N 88/2002

8. APPROVAL OF PLANS.

The Council shall signify its approval or disapproval of the plans submitted in accordance with regulation 6 or as regards the material to be used in connection therewith within twenty-eight days from the receipt of same unless any public holidays intervene, in which case the time shall be extended to thirty-five days.

\*Reg 8 amended by GN 62/70

9. The approval by the Council of any plans for the construction of a building shall expire if such erection shall not have been commenced within twelve months after the date of such sanction: Provided that an extension of the period during which building operations must be commenced with, may be granted if the Council is satisfied that it was for some sound reasons not possible to do so before the period of one year had expired.

10. The erection of any building must be completed within twelve months after the commencement of building operations. If for any reasons a building cannot be completed within a period of twelve months authority for extension of the period shall be obtained from the Council before the twelve months have elapsed.

BUILDER'S SHEDS.

11. (a) Notwithstanding anything to the contrary contained in these regulations, any person executing or preparing to execute any work (hereinafter referred to as "the work" in this regulation), in connection with the erection of any building which has been approved by the Council, may erect such temporary buildings or structures commonly known as builders sheds, as may in the opinion of the Council, be necessary for the execution of the work.

(b) No builder's shed shall be erected unless the Council has approved its location and construction in writing. No fees shall be payable.

(c) Builder's sheds shall be maintained in good order and condition.

(d) Builder's sheds shall be used solely in connection with the execution of the work, and shall be removed by the person owning them within thirty days after the completion or cessation of the work.

(e) Any person who contravenes subsections (a), (b), (c) or (d) shall be guilty of an offence.

## SANITARY ACCOMMODATION FOR WORKMEN.

12. (a) Every person erecting any building or doing any work involving the repair or taking down of any building shall, before commencing, provide or make available sanitary accommodation for the use of the personnel employed upon such erection or such work and shall at all times maintain such sanitary accommodation in a hygienic condition.

Any such sanitary accommodation which has been specially provided for the personnel aforesaid shall be removed within thirty days after the erection of such building or the doing of such work has been completed and the site upon which it was provided shall be left clean.

All such sanitary accommodation shall be so screened that the requirements of public decency are complied with.

(b) Any person who contravenes any of the provisions of this regulation shall be guilty of an offence.

## USE OF FOOTWAYS, SIDEWALKS AND STREETS.

13. (a) Every person intending to erect any building or to do any work involving the repair or taking down of any building and for any of such purposes to convey across any sidewalk or footway forming part of a street in such manner as may cause damage thereto, any materials to or from the site of such building or work shall, before commencing, give notice of such intention to the Council. Such person shall deposit with the Council a sum of money estimated by the town engineer as representing the cost of repairing any such damage to such sidewalk or footway likely, in the opinion of the town engineer, to be caused by the erection of such building or by the doing of such work or anything incidental thereto.

(b) When the activities mentioned in subregulation (a) encroach or are likely to encroach upon any street, such person shall, before the commencement of such building or work, apply to the Council for a permit which may be refused or granted in the discretion of the Council subject to such conditions as the Council may deem fit to impose in the public interest.

(c) When the erection of such building or the doing of such work has been completed, the Council shall repair any damage which may have been caused to the street, sidewalk or footway concerned, and if the cost of such repair is less than the deposit made in terms of sub-regulation (a) or of any condition imposed under sub-regulation (b) hereof, the balance shall forthwith be repaid to such person, but if such cost is greater, the shortfall shall upon demand be paid to the Council by such person.

(d) Any person who contravenes the provisions of subregulation (a), (b) or (c) of this regulation shall be guilty of an offence.

## STREETLEVELS.

14. (a) If the portion of the street abutting the site on which any building is to be erected has not been constructed, the person intending to erect such building shall apply to the Council for the levels at which such portion of the street will ultimately be constructed.
- (b) The Council shall where it is in his opinion practicable for him to do so, and within a reasonable time after receipt of such application, supply the required levels.
- (c) Such person shall ensure that the levels of all portions of such building and of all structures and services appurtenant thereto including the levels of the foundation, floors, walls, drains, sewers, surface channels, gates, paths, driveways, steps and of all other things of a like nature which might be effected by the levels supplied by the Council, shall be in conformity with the levels so supplied.
- (d) Any person who contravenes subregulation (c) shall be guilty of an offence.

#### NOTICE OF INTENTION TO COMMENCE BUILDING.

15. (a) Before commencing to erect any building, the person intending to erect such building or his duly authorised agent shall notify the Council thereof on the form prescribed by the Council and in such notice shall specify the date upon which the erection of such building is to be commenced.
- (b) Before commencing to construct the foundations or any portion thereof of such building such person or agent shall give notice to the Council on a form prescribed by the Council of the fact that the excavations for such foundations or any portion thereof, as the case may be, will be ready for inspection on a date specified in such notice.
- (c) Before commencing to construct anything upon the foundations or any portion thereof of such building, such person or agent shall give notice to the Council on a form prescribed by the Council of the fact that such foundations or any portion thereof, as the case may be, will be ready for inspection on a date specified in such notice.
- (d) Before commencing to backfill any excavation made for stormwater drainage or sewerage work or any portion of such excavation, and before enclosing such stormwater drainage or sewerage work or any portion thereof, such person or agent shall give notice to the Council on a form prescribed by the Council stating the fact that such drainage or sewerage work or portion thereof, as the case may be, will be ready for inspection on a date to be specified in such notice.
- (e) Each of the notices referred to in subregulations (a), (b), (c) and (d) of this regulation shall reach the town engineer at least two clear days before the date specified in each such notice.

- (f) Any person who contravenes any of the provisions of this regulation shall be guilty of an offence.

#### TREATMENT AGAINST TERMITES

- 15bis. (a) Before the casting of foundations, the base of all foundation trenches shall be treated against termites.
- (b) The ground surface on which the hard core under a floorslab has to be laid shall, after it has been levelled off, be treated against termites and allowed to dry out before the hard core is laid.
- (c) In the case of suspended floors, all foundations, foundation walls, sleeper walls and piers shall be treated against termites, as well as the surface of the crawl space after the suspended floors have been laid.
- (d) Only a soil insecticide which has been registered in terms of the Fertilizers, Farm Feeds, Agricultural Remedies and Stock Remedies Act, 1947 (Act 36 of 1947), may be used for treatment against termites.
- (e) The soil insecticide which is used for treatment against termites shall be suitable for the extermination of the termites *Psammotermes allocerus*, *Macrotermes natalensis*, *Macrotermes bellicosus* and *Termes badius*, and shall furthermore comply with the relevant C.K.S. or S.A.B.S. specifications.
- (f) The provisions of subregulations (a) to (e) shall not be applicable to low cost housing projects of Representative Authorities and the National Building and Investment Corporation of South West Africa, Limited

\*Reg 15bis inserted by GN 128/85

#### INSPECTIONS.

- 16. (a) No person shall commence or cause or suffer to be commenced the construction of the foundations or any portion thereof of any building which is being erected until the excavations for such foundations or portion thereof as the case may be, shall have been inspected by the town engineer or by some other employee of the Council, generally or specially authorised by the Council for that purpose.
- (b) No person shall commence or cause or suffer to be commenced the construction of anything upon the foundations or upon any portion of the foundations of any building which is being erected until the foundations or portion thereof, as the case may be, shall have been inspected by the town engineer or other employee as aforesaid.

- (c) No person shall commence or cause or suffer to be commenced the backfilling or enclosing referred to in regulation 15 (d) until the work referred to in the said paragraph has been inspected and tested by the town engineer or other employee as aforesaid.
- (d) Any person who contravenes any of the provisions of this regulation shall be guilty of an offence.

#### BOUNDARY BEACONS.

- 17. (a) Any person who erects or who intends to erect a building, shall point out the boundary beacons of the erf or site to an authorised employee of the Council and if such person is not capable to do it, or if the said authorised employee has any doubt as to the correctness of such beacons, the person who erects the building, or intends doing so, shall employ a registered land surveyor to do it and to replace the beacons where necessary.
- (b) Any person who contravenes subregulation (a) shall be guilty of an offence.

#### POWER OF ENTRY.

- 18. (a) The Council shall, through its councillors, employees and contractors, together with any assistants or advisers that may be necessary have access to or over any property by the shortest and most practicable route reasonable in the circumstances for the purpose of
  - (i) doing anything authorised or required to be done by the Council under these regulations;
  - (ii) inspecting and examining any water main, and anything connected thereto, or any sewer or public drain and anything discharging thereinto;
  - (iii) ascertaining whether there exists any nuisance or whether there is or has been a contravention of these regulations.
- (b) Any person who -
  - (i) threatens, hinders or obstructs, or uses foul, abusive or insulting language towards or at an employee or contractor of the Council in the exercise of his powers or execution of his duties, or
  - (ii) falsely holds himself out to be an employee or contractor or member of the Council,

shall be guilty of an offence.

#### COPIES OF FORMS, PLANS AND DRAWINGS TO BE KEPT ON BUILDING

## SITE.

19. The person erecting any building shall ensure that copies of all forms, plans, details and drawings which the Council has approved in accordance with regulation 6, are kept upon the site of such building during normal working hours and that such copies are maintained in a legible condition, and any person who contravenes the provisions of this regulation, shall be guilty of an offence.

## TEMPORARY BUILDINGS AND BUILDINGS OF WOOD OR WOOD AND IRON.

20. (a) Subject to the further provisions of this regulation, regulation 21 and 21A, no temporary building and no building of iron or of any other materials deemed by the Council to fall into the same categories as iron shall be erected without a permit issued by the Council.

Reg 20(a) amended by Gen/N 243/95

- (b) Such permit shall endure for a period not exceeding 12 months, from the date when such permit was issued.
- (c) Such permit may be renewed by the Council from time to time for further periods not exceeding in each case a period of 12 months.
- (d) At the termination of any period referred to in paragraphs (b) or (c) of this regulation, the Council may refuse to renew such permit.
- (e) The Council may withdraw such permit at any time during its currency after giving 3 months' prior notice of its intention so to do.
- (f) Where any such building is erected without a permit or where the renewal of such permit has been refused or where such permit has been withdrawn, the owner of the land upon which such building has been erected shall demolish the same within sixty days after notice to this effect has been given to him by the Council.
- (g) There shall be payable in respect of every such permit and every renewal thereof, a fee of R1,00 in addition to the fees payable in terms of regulation 6.
- (h) Any person who erects any such building without such permit shall be guilty of an offence.

## BUILDING METHODS UNDER AGREEMENT CERTIFICATES AND PERMANENT BUILDINGS OF WOOD OR IRON.

21. Notwithstanding anything to the contrary in these regulations contained, the Council may grant exemption from the compliance of any of these regulations so as to allow -

- (a) on any erf within any area the erection of permanent buildings in accordance with a building method which has been approved by the Agreement Board and in respect of which such board has issued an Agreement Certificate;

- (b) on the erven and in the areas described in Schedule I the erection of permanent buildings of wood or iron or of any other material which, in the opinion of the Council, falls in the same category as wood or iron: Provided that in the case of wood such buildings shall comply with the provisions of Chapter IV.

\*Reg 21 substituted by GN 148/80; 225/87

21A (1) Notwithstanding anything to the contrary contained in regulations 20, 21 or 34, the Council may allow on any erf the erection of a permanent building constructed of wood in accordance with the provisions of Chapter IV of these regulations.

(2) Building plans for the purpose of subregulation (1) shall only be approved by the Council after a professional engineer has certified that the design of the building concerned is sound and complies with the provisions of Chapter IV of these regulations.

(3) The certificate contemplated in regulation 24 shall only be issued only after a professional engineer has certified that the building concerned is stable and complies with the design certified in accordance with subregulation (2).

(4) For the purpose of this regulation, "professional engineer" means a person registered as such under section 11(2) of the Engineering Profession Act, 1986 (Act 18 of 1986).

Reg 21A inserted by Gen/N 243/95;

#### LOADING OF BUILDINGS.

22. (a) The owner or any occupier of any building who subjects such building or any portion of such building, or suffers such building or such portion to be subjected to a superimposed load greater than that stated on the work drawings of such portion shall be guilty of an offence.
- (b) Where required by the Council, there shall be exhibited by the owner of any building on every storey of such building in a conspicuous position, a notice in the form of an embossed or stamped metal plate clearly stating the superimposed loading for which the floor of such storey has been designed, and in the case of any such storey being subdivided into portions each designed for different superimposed loading, such a notice shall, where required, be so exhibited in each such portion. Any person who contravenes the provisions of this regulation shall be guilty of an offence.

#### OBJECTIONABLE AND DANGEROUS BUILDINGS AND THEIR REPAIR.

23 (1) No person shall erect any building which is unsightly, dangerous, unhealthy, insanitary, objectionable or calculated to cause annoyance to inhabitants of the neighbourhood.

(2) No person shall erect any building on a site which cannot easily be drained.

(3) No person shall erect any building on a contaminated or unhealthy site.

(4) No person shall do work in any building or on any land or put any building or land to uses calculated to depreciate or disfigure property or to interfere with the convenience or comfort of the neighbours or to become a source of danger.

(5) If a building is dangerous, unsightly, unhealthy, insanitary, objectionable, unsuitable or calculated to cause annoyance to the inhabitants of the neighbourhood, the Council may serve a written notice on the owner of such building requiring him to repair or alter, or, if the said building cannot be repaired or altered in the opinion of the Council to eliminate the above-mentioned defects, remove or demolish it within a reasonable period to be stated in such notice.

(6) Should such owner fail to comply with the terms of such notice the Council may give effect to the terms of such notice at the expense of such owner.

(7) The Council shall have a preferential right against the property upon which such buildings have been repaired, altered, removed or demolished with reference to a claim for the expenditure incurred in accordance with subregulation (6) and interest thereon calculated at a rate not exceeding 6 per cent per annum.

(8) Any person who contravenes the provisions of subregulations (1), (2), (3) or (4) shall be guilty of an offence.

\*Reg 23 substituted by GN 92/69; 16/72

#### USE AND OCCUPATION OF BUILDINGS.

24. (a) No person shall use or occupy or cause to be used or occupied, any new building or portion of a new building, until such building shall have been inspected by the officer of the Council appointed for the purpose, and a written certificate given to the owner of such building to the effect that the said building or portion of the building has been erected in accordance with plans approved of by the Council, and in conformity with these regulations which certificate shall be signed by the officer appointed by the Council for the purpose and shall be endorsed by the Town Clerk.

(b) No person shall use or occupy or cause or permit to be used or occupied any building which has been erected in contravention of plans and specifications approved by the Council or which does not comply with the regulations of the Council in force when such building was erected.

(c) Any person who contravenes a provision of this regulation shall be guilty of an offence.

#### BUILDING WITHOUT APPROVAL OF PLANS.

25. (a) Any person who erects a building -

- (i) without the plans or the material of the building having been approved by the Council, in accordance with regulation 8; or
- (ii) in respect of which the approval of the plans by the Council has lapsed in terms of regulation 9, shall be guilty of an offence.

\*Reg 25(a)(i) and (ii) amended by GN 62/70

- (b) The Council may under any of the circumstances mentioned in subregulation (a) serve upon the owner of any building referred to in the said subregulation as the case may be, an order requiring such owner forthwith to begin to demolish such building and to complete such demolition by or on a date to be specified in such order which date may be extended by the Council.
- (c) If before the date for completion of the demolishing required by such order such owner satisfies the Council that he has complied with its regulations the Council may withdraw such demolition order.
- (d) If any owner fails to comply with an order referred to in subregulation (b) of this regulation, the Council shall be entitled to give effect to the terms of such order at the expense of such owner.

\*Reg 25(e) deleted by GN 62/70

#### DEVIATION FROM PLANS.

- 26. (a) No person having obtained the approval required under regulation 8 shall do anything in relation to a building which is in contravention of any approved form, plan, structural detailed drawing or specification approved by the Council.

\*Reg 26(a) amended by GN 62/70

- (b) The Council may serve an order upon the owner of the building referred to in sub-regulation (a), requiring him forthwith either to alter the matter referred to in subregulation (a) to comply with such form, plan, structural detail drawing or specification or to demolish the said building or matter and to complete such alteration or demolition by a date to be specified in such order which date may be extended by the Council as it may deem fit.
- (c) If before the date of alteration or demolition required by such order, such owner satisfies the Council that he has complied with its regulations, the Council shall withdraw such order.
- (d) Any owner who disregards to obey any order referred to in subregulation (b) shall be guilty of an offence and the Council itself shall be entitled to give effect to the terms of such order at the expense of such owner.

#### MISCELLANEOUS.

## CLEANING OF SITE.

27. (a) No person shall erect a building on a site or portion of a site on made ground containing street sweepings, refuse, faecal or animal matter, or other matter liable to decomposition, or on ground of which any offensive or unhealthy waste or refuse or faecal or animal matter has been deposited, unless he shall first have had all such unhealthy waste matter and any soil rendered unhealthy thereby, removed from such site or treated so as to render it healthy to the satisfaction of the chief health inspector who shall then issue a certificate to that effect.
- (b) Before commencing to construct the foundations of a building the person erecting such building shall clear the area comprised by such foundations of all vegetation debris or refuse.
- (c) As soon as the erection of a building has been completed or if at any time during the construction of the building in the opinion of the Council a public nuisance is being created and he gives written notice thereof, the person erecting such building shall remove all rubbish refuse or debris which has resulted from such work from any land or street adjoining such site.
- (d) Any person who contravenes any of the provisions of this regulation shall be guilty of an offence.

## BUILDING MATERIALS.

28. (a) The Council shall have the right to test or to have tested any material or thing used or to be used in the erection of any building, in order to determine whether such material or thing complies with the provisions of these regulations and any employee of the Council duly authorised for that purpose may at any time and as often as it is reasonably necessary for the purpose of so testing the material or thing, without prior notice to the person erecting such building, remove from the building site concerned so much of such material or thing as is reasonably necessary to serve as a sample.
- (b) If any material or thing so tested does not comply with the requirements of these regulations, the town engineer may serve a notice on the person erecting the building concerned stating the respects in which such material or thing does not comply with such requirements and prohibiting such person from making any further use of such material or thing for the purpose for which it was or is to be used in the erection of such building. Except where in such notice the town engineer permits the use of such material or thing in the erection of such building for some different purpose permitted under these regulations such person shall forthwith on receipt of such notice remove such material or thing from such building site.
- (c) No person erecting a building shall use any second hand material,

unless such material complies with the requirements of these regulations, and unless such material has been thoroughly cleaned of all adhering material which would interfere with its intended function.

- (d) Any person who contravenes this regulation shall be guilty of an offence.

#### BULK FACTOR.

- 29A. (a) Where a bulk factor is applicable to an area, mentioned in subregulation (c), no building which exceeds the bulk factor prescribed for such area, in subregulation (c) may be erected on any erf in such area, except a building for the exclusive or predominant purpose of providing parking for motor vehicles in which case the bulk factor will be prescribed by Council, if and when such building is being erected.
- (b) For the purposes of these regulations, "bulk factor" shall mean the ratio of the total floor area to the area of the erf concerned, and "total floor area" shall mean the sum of the areas of all the floors at all floor levels of all buildings on such erf, including the area of all wall thicknesses, corridors, passageways, external and internal balconies or galleries, all lift and service wells, at each floor level, but excluding any floor area exclusively provided for the parking of motor vehicles.
- (c) The following bulk factors are hereby laid down for the areas described immediately below each bulk factor:
  - (i) Bulk Factor 5.6.  
The area bordered by:  
John Meinert Street in the north, Kaiser Street in the east, Post Street in the South, Stuebel Street in the west.
  - (ii) Bulk Factor 4.2.  
The area bordered by:  
Bahnhof Street in the north, Leutwein Street in the east, Peter Muller Street in the south, Tal Street in the west.
  - (iii) Bulk Factor 3.5.  
The area bordered by:  
Uhland Street in the north, Bahnhof Street in the south, Leutwein Street in the east, Kaiser Street in the west.
  - (iv) Bulk Factor 3.5.  
The area bordered by:  
Peter Muller Street in the north, Kaiser Street in the east up to Garten Street, Garten Street in the north up to Nesper Street, Nesper Street in the east up to Kalk Street, Kalk Street in the south up to Jan Jonker Road, Jan Jonker Road in the east up to Gutenberg Street, Gutenberg Street in the south, Marconi Street in the south up to Trift Street, Trift Street in the west.

- (v) Bulk Factor 3.5.  
The area bordered by:  
Bahnhof Street in the north, Tal Street in the east. John Meinert Street in the south, and the Railway Reserve in the west.
- (vi) Bulk Factor 2.0.  
The area bordered by Uhland Street in the north and north-east, Schanzen Road in the south up to Crohn Street, Crohn Street in the east up to Bahnhof Street, Bahnhof Street in the north up to Werth Crescent, Werth Crescent in the north to Sinclair Road, Sinclair Road in the east to Anderson Street, Anderson Street in the east to the most northern corner beacon of erf 579, the northern border of erf 579 in the south up to Love Street, Love Street in the east up to Lindequist Street, Lindequist Street in the south and south west up to Leutwein Street, Leutwein Street in the west.

(d) Any person who contravenes subregulation (a), shall be guilty of an offence.

\*Reg 29 renumbered by GN 62/70

#### COVERAGE:

- 29B (1) In this regulation, unless the context otherwise indicates:
- (a) 'basement storey' or 'cellar' shall mean any storey of a building which is under the ground storey.
  - (b) 'coverage' shall mean the total percentage of the area of an erf that may be covered by buildings in accordance with subregulation (2);
  - (c) 'ground storey' shall mean that storey of a building to which there is an entrance from outside on or near the level of the ground, and, where there are two such storeys then the lower of the two: Provided that no storey, of which the upper surface of the floor is more than four feet below the level of the adjoining pavement, shall be deemed to be the ground storey.
- (2) (a) The Council shall refuse permission for the erection of any building on any erf if the proposed building or the proposed building together with any existing building covers more than fifty percent of the total area of such erf: Provided that the Council may in each and every case and in its sole discretion, on application received, increase the area of an erf which may be covered by a building to seventy-five percent (75%) of the area of the erf or its subdivision: Provided further that in respect of an erf or its subdivision situated at the corner of two streets the total maximum area permissible to be covered by buildings shall be seventy-five percent of such erf.
- (b) Notwithstanding the preceding paragraph and subject to the further

provisions of this regulation the council may, when the owner of an erf has transferred a portion or portions of such erf to the Council free of charge for the purposes of a street or public place, on application by the owner, increase the coverage of such erf to not more than 75% of the area of the said erf plus the portion or portions transferred to the Council.

- (c) Subject to subregulation (3) the area of an erf which may not be covered by buildings shall have no buildings or structures on it nor shall any building or portion of a building be allowed to project over it: Provided that those parts of a building which are not included in the calculation of the coverage in terms of subparagraph (d) may be erected on or may project over the aforementioned open area, but shall in no way exceed the building lines applicable to the erf except where the Council has granted its permission for it in accordance with section 186 of the ordinance.
- (d) In calculating the coverage of an erf the surfaces of the following shall not be included.
  - (i) canopies over sidewalks;
  - (ii) any staircase, fire escape or motor ramp where the space above the parapet is entirely open and the area of such opening is not less than 50% of the floor area of such staircase, fire escape or motor ramp;
  - (iii) any other projection from a building of not more than 1.33 metres. Should such projection, however, be more than 1.33 metres the entire projection shall be included in the calculation of the coverage;
  - (iv) any wall or fence which is not higher than 1.33 metres whether it forms part of a building or not.
- (3) Notwithstanding any other provision a basement storey or a cellar may cover the total area of an erf: Provided that -
  - (a) the ceiling of such cellar or basement shall not be more than 1.33 metres above the ground level at any point;
  - (b) all water mains, public sewers and public drains above, under or next to such basement storey or cellar have been safeguarded to the satisfaction of the Council;
  - (c) the Council has been indemnified by the owner of the building against any claims that may arise out of the negligent damage of the aforementioned water mains, public sewers or public drains;
  - (d) provision has been made on the roof of the basement storey or cellar or elsewhere for the open space required by subregulation (5);

(e) the basement storey or cellar does not exceed the building lines applicable to the said erf, except where the Council has granted its permission for it in accordance with section 186 of the ordinance.

(4) Where the ceiling of a basement storey or cellar is not more than 1.33 metres above the ground level at any point the area covered by the ground storey together with any additional area to the area of the ground storey, covered by other storeys, not overlapping the ground storey, shall be used to calculate the coverage.

(5) Every building shall be provided in the rear or lateral side thereof with an open space of not less than 30 square metres free from any erections above the ground and situated within the building lines applicable to such an erf. Such open space shall communicate directly with the street by means of an open passage not less than three feet wide and the area of such passage shall not be included in the area of such open space.

(6) In any dispute in connection with the position of the ground level the decision of the Council shall be conclusive.

\*Reg 298 inserted by GN 62/70

#### REQUIREMENTS IN CONNECTION WITH SITES.

30. (a) No building shall be erected on an erf or its subdivision if such erf or subdivision is not provided with a direct means of access from a declared road or street.

(b) Where a vehicular access is demanded by the Council, such vehicular access shall be provided by the owner of such property and shall have a minimum width of 3.00 metres and a minimum height of 3 metres: Provided that such vehicular access shall only be demanded by the Council in respect of erven or sub-divisions of erven each exceeding 1500 square metres in area.

(c) Any person who contravenes subregulation (a) or (b) shall be guilty of an offence.

#### OFFENCES AND PENALTIES.

31. (a) Whenever any matter or act is by any order, direction, prohibition or notice issued under this chapter, directed or forbidden to be done, any person failing to comply therewith, shall be guilty of an offence.

(b) Any person convicted of an offence under this chapter shall on conviction be liable in respect of each such offence to a fine not exceeding one thousand Namibia Dollar in the case of a first conviction or, in the case of a second or subsequent conviction, for the same offence, a fine not exceeding two thousand Namibia Dollar, or in default of payment of any fine in either case, imprisonment for a period

not exceeding six months, and, in the case of a continuing offence to an additional fine not exceeding one hundred Namibia Dollar for each day the offence continues.

Reg 31(b) amended by Gen/N 108/97

- (c) Any person who continues to commit an offence after notice has been served on him by the Council to cease committing such offence or after he has been convicted of such offence, shall be guilty of a continuous offence.

#### CHAPTER IV.

#### STRUCTURAL TIMBER.

32. DEFINITIONS. In this chapter, unless the context otherwise indicates -  
"batten" means a roof member directly supporting tiles, slates or shingles;

"beam" means a structural member which supports load primarily by its internal resistance to bending;

"bearer" means a beam supported at two or more points and provided for the purpose of carrying other members;

"butt" means the thick end of a pile or other tapered member;

"flat roof" means a roof having an angle of inclination to the horizontal not greater than 15 degrees;

"heavy roof construction" means any roof-framing together with roof-covering material such as slates, clay tiles or concrete tiles, but excluding ceilings having a total weight of more than 7 lbs. per sq. feet but less than 17 lbs. per sq. ft.;

"joist" means a beam other than a batten, purlin or rafter directly supporting floor, ceiling or roof-covering material;

"light roof construction" means any roof-framing together with roof-covering material such as galvanised steel, aluminium, or asbestos-cement sheets but excluding ceilings, having a total weight not exceeding 7 lbs. per sq. ft.;

"moisture content" means the amount of moisture in timber expressed as a percentage of its oven-dry weight;

"normal conditions of use and loading" as applied to structural timber, means use in positions where the timber is permanently protected from rain damp and direct sunlight, and is under conditions of continuous static loading;

"partition wall" means an internal wall which is employed solely for the purpose of sub-dividing any storey of a building into sections and which supports no load other than its own weight;

"pile" means a structural member inserted into the sub-soil and which transmits a load to the sub-soil through friction or end bearing or some combination of both;

"plate" means a horizontal member supported throughout its length and employed for the purpose of distributing a series of loads such as that from the bearings of joists;

"purlin" means a longitudinal roof member directly supporting a sheeted roof-covering;

"rafter" means a roof beam which supports purlins, battens or roof bearding;

"sloping roof" means a roof having an angle of inclination to the horizontal greater than 15 degrees;

"span" means the clear distance between supports in the case of single, freely supported beams and the distance centre-to-centre of supporters, or points of fixity, in the case of continuous beams, or beams fixed at the ends;

"stress"

"basic stress" means a stress which is derived directly from mechanical tests and is the stress which can be permanently sustained with safety by a clear specimen having a moisture content of 12 percent;

"working stress" means a stress which is derived from the basic stress and is one which can be sustained with safety by timber of a particular grade and at a particular moisture content;

"design stress" means a stress which is derived from the working stress and is one which can be safely sustained under the particular conditions of use and loading;

"structural timber" means timber used or intended for use in a loadbearing capacity in buildings where the strength of the timber is the primary consideration;

"stud construction" means a form of wall construction consisting of framing to which sheets or boards are attached;

"tip" means the thin end of a pile or other tapered member;

"wall-plate" means a plate which rests directly upon a wall or off-set to a wall to receive and provide fixing for the ends of joists, rafters, or trusses;

#### INTERPRETATION OF UNSPECIFIED REFERENCES.

33. References in this chapter to tables shall, unless otherwise stated, be deemed to be references to the tables in this chapter.

#### GENERAL REQUIREMENTS.

34. APPLICATION. The regulations contained in this chapter apply to all structural timbers other than glued laminated timber and plywood for which the

requirements are as stated in regulations 22 and 73 respectively.  
This chapter shall be applicable to the erven and areas described in Schedule 1 only.

35. **QUALITY OF TIMBER.** All timber used for structural purposes including flooring shall comply with the requirements of S.A.B.S. 563 "Structural timber" or with S.A.B.S. 629 "Softwood flooring boards".

Timber used for beams shall not have any defects having an aggregate cross-sectional area exceeding 10 percent of the cross-sectional area of the beam within the following limits:

- (i) In the case of a simply supported beam, within the middle half of the span,
- (ii) In the case of a beam with fixed ends, within a distance from each end of one-fifth of the span or within the middle one-third of the span.

36. **PRESERVATION OF TIMBER.** In buildings other than wood frame buildings all hardwood structural timber comprising a suspended ground floor which is not over a basement, and all timber which directly or indirectly supports a ground floor which is not over a basement, shall be impregnated with a preservative described in schedule II so as to attain the penetration and retention of preservative specified in that appendix for the timber concerned.

37. The space between the floor joists and the ground of any building shall be provided with ventilation openings (not more than 8 ft. apart) through internal foundation walls and external walls. The total area of all such openings, in external walls shall be not less than  $\frac{1}{2}$  sq. inch of unobstructed air passage per sq. ft. of ground floor area and shall be equally distributed between such walls. At least one opening shall be placed within 2 ft. 6 inch from each corner of each room. Ducts or pipes shall be inserted to provide such ventilation where filling occurs between foundation walls.

38. The minimum clearance between the under surface of floor joists and the ground beneath shall be 18 inches and between bearers and the ground beneath shall be 12 inches, and access to the space so provided shall be made available for inspection purposes.

39. **TIMBER DIMENSIONS.** For structural timber dimensions shall be of nominal sizes within the tolerances specified in S.A.B.S. 563 for "Structural timber" unless net dimensions (actual sizes) are specified.

40. **CALCULATION OF SAFE LOAD.** In calculating the safe load or the size of a member, the following provisions shall apply:

- (a) Where the tolerances specified in regulation 39 are not exceeded the full nominal dimensions of the member shall be used.
- (b) Where the tolerances exceed the values specified in regulation 39 or where wrought timber is used, the net dimensions (actual sizes) and not

the nominal dimensions shall be used.

41. **LOADING.** All structural timber members, or assemblies, or the framework of building in combination with floors and walls, and other structural parts of the building, shall be capable of sustaining without exceeding the permissible stresses and limits of deflection hereinafter stated, the whole dead and superimposed loads acting on such members, assemblies or framework.

**PERMISSIBLE STRESSES.**

42. **GENERAL.** The working stresses in structural timber under normal conditions of use and loading, as defined, shall not exceed the values given for the relevant strength group in Table I; these values shall be adjusted in terms of regulations 43 to 46 (inclusive) and regulations 55 to obtain the permissible design stresses for each strength group.

Timber shall be classified into strength groups according to its density, measured at 15 percent moisture content, as follows:

When the density is (lbs. per cu. ft.)	group.	Strength
Not less than 25, but less than 30		A
Not less than 30, but less than 35		B
Equal to or greater than 35		C

43. **ADJUSTMENTS TO WORKING STRESSES.**

The working stresses set out in regulation 42 shall be subject to the decreases and increases laid down in regulations 45 and 46 respectively in order to obtain the design stresses.

44. **ALLOWANCE FOR IMPACT.**

Impact on timber members shall be allowed for by their being designed to sustain the equivalent static loads at the working stresses set forth in Table 1 and adjusted in accordance with regulation 42.

45. **DECREASE OF WORKING STRESSES.**

(1) The working stresses for timber that may be exposed to intermittent wetting shall be reduced to 85 percent of the stresses listed in Table 1;

(2) To allow for accidental overloading and errors in design assumptions and workmanship, the working stresses for bending, and for shear parallel to the grain and compression parallel to the grain, as set forth in Table 1, shall be multiplied by 0.80.

46. **INCREASE OF WORKING STRESSES.**

(1) In members designed for loads of infrequent occurrence (other than impact loads) having a duration of less than 1 hour, the working stresses adjusted as required by regulation 42 for bending and for compression parallel to the grain set forth in Table 1 may be increased 25 percent.

(2) The working stresses set forth in Table 1 may be exceeded by not more than 33 1/3 percent when such excess is due entirely to wind forces.

#### 47. AXIAL LOADING COMBINED WITH BENDING.

Members subjected to both bending and axial compression shall be so proportioned that

$$\frac{P}{A.c} + \frac{M}{Z.f} \text{ does not exceed unity,}$$

and members subjected to both bending and axial tension shall be so proportioned that

$$\frac{P}{A.t} + \frac{M}{Z.f} \text{ does not exceed unity}$$

where

P = total axial load in pounds,

A = area of cross-section of member in square inches,

c = stress in compression as set forth in Table I for the ratio of L/b of the member under consideration,

f = extreme fibre stress in bending as given in Table I and adjusted in accordance with regulation 11,

t = stress in tension in the direction of grain as set forth in Table I.

M = total bending moment in inch-pounds, and

Z = section modulus concerned in inches cubed.

#### 48. LENGTH OF BEARING.

(1) For any bearing resisting compression perpendicular to the grain of the member, the working stress adjusted in accordance with regulation 42 shall apply for a length of bearing not less than 6 inches. For a bearing having a length less than 6 inches and located not less than 3 inches from the end of the member, the design stress may be multiplied by the appropriate factor in Table II; for bearings closer to the end of the member than 3 inches; the design stresses may not be so increased.

For bearing stress under a washer or small plate, the same factors may be taken for a bearing having a length equal to the diameter of the washer or the width of the plate.

(2) Where the direction of the load is inclined to the direction of the grain of a member, the design stress shall be computed from the following formula:

$$N = \frac{P \cdot Q}{P \sin^2 \theta + Q \cos^2 \theta}$$

where

N = design stress in the direction of the line of action of the load, in lb. per sq. inch,

P = design stress in compression parallel to the grain, and

Q = design stress in compression perpendicular to grain,

$\theta$  = angle between the direction of the load and the direction of the grain, in degrees.

## COLUMNS AND OTHER COMPRESSION MEMBERS.

### 49. GENERAL.

(1) The design stress in structural timber compression members axially loaded shall not exceed the value given in Table I for any given ratio of unsupported length L to least net dimension b or for the corresponding slenderness ratio L/r, where r is the minimum radius of gyration of the member, adjusted in terms of subregulation (1) of regulation 45 and regulation 46. Intermediate values may be determined by linear interpolation and the value of L shall be adjusted for other conditions of restraint at the ends by multiplication by the "Minimum effective length factor", K, in Table III.

(2) The ratio of unsupported length to least net dimension, or the corresponding slenderness ratio of any timber strut, shall in no case exceed the maximum value given in Table I.

### 50. ROUND COLUMNS.

The safe load on a column of circular cross-section shall not exceed that permitted for a square column of the same cross-sectional area.

### 51. TAPERED COLUMNS.

For the determination of the L/b ratio of a tapered column in accordance with subregulation (1) of regulation 49, its least net dimension shall be measured at a point one-third of the length from the tip but shall not be taken as more than one and a half times the least dimension at the tip. The stress induced at the tip shall not exceed the design stress in compression parallel to the grain.

### 52. BUILT-UP COLUMNS.

(1) The components of built-up columns shall be screwed, glued, or bolted together with or without spacing blocks.

(2) The compressive strength of spaced columns which consist of two or more parallel members with spacing blocks as separators shall be taken as the sum of

the compressive strength of the individual compression members each being considered an independent solid column, where the length L is as set forth in subregulation (1) of regulation 49.

### 53. DETAILED REQUIREMENTS.

(1) Compression members shall not be notched. When it is necessary to provide services through such a member, this shall be effected by means of a bored hole not larger in diameter than one-quarter the width of the face through which the hole is bored: Provided that the local stress is calculated and found to be within working stress.

The distance from the edge of the hole to the edge of the member shall be not less than one-quarter the width of the face.

(2) Columns shall be provided with true end bearings of a design that holds them securely in position.

(3) Columns resting upon concrete or masonry that is in contact with the ground shall be separated from such concrete or masonry by a seal in order to prevent moisture from reaching the column by capillary action.

(4) Where it is deemed necessary by the Council to provide protection against dampness, columns in contact with the ground shall be impregnated for at least 2 ft. from the lower end with one of the preservatives complying with the requirements of S.A.B.S. 538 for high temperature wood preserving creosoted so as to attain the penetration and retention of preservative specified in Schedule II.

### BEAMS AND OTHER FLEXURAL MEMBERS.

#### 54. GENERAL.

The bending stresses in flexural members due to dead and superimposed loading shall not exceed the working stress set forth in Table I read in conjunction with regulations 43 to 46 (inclusive).

#### 55. DEPTH FACTOR.

For beams having a rectangular cross-section and a depth d exceeding 2 inches the working stress in Table I shall be multiplied by a factor F with value

$$F = 0.625 \left( \frac{d^2 + 143}{d^2 + 88} \right)$$

e.g. when d = 3 inches, F = 0.98  
when d = 4½ inches, F = 0.94  
when d = 6 inches, F = 0.90  
when d = 9 inches, F = 0.83  
and when d = 12 inches, F = 0.77

56. DEFLECTION LIMITATIONS.

(1) The dimensions of flexural members shall be such as to restrict deflections resulting from the actual loads to 1/240 of the span in the case of beams and joists, and to 1/150 of the free length in the case of cantilevers: Provided that the deflection limit for beams, joists, purlins, battons and other flexural members supporting brittle materials including plaster ceilings, slates, tiles, and asbestos, shall be 1/360 of the span.

(2) If the superimposed loads are to be continuous or applied frequently, the value of the modulus of elasticity given in Table I shall be reduced by 50 percent when the amount of deflection is calculated.

57. LATERAL STIFFNESS.

Any flexural member having a depth exceeding three times its breadth and a span exceeding fifty times its breadth shall be laterally restrained from twisting or buckling and the distance between such restraints shall not exceed fifty times the breadth of such flexural member.

58. HORIZONTAL SHEAR.

(1) The horizontal shear in members subjected to bending shall not exceed the shear parallel to the grain as set forth in Table I.

(2) The maximum horizontal shear stress in beams of rectangular cross-section and of uniform depth shall be computed by use of the following formula:

$$H = 1.5 \frac{V}{bd}$$

where

H = horizontal shear stress in pounds per square inch,

V = vertical shear force in pounds,

b = breadth of beam in inches, and

d = depth of beam in inches.

(3) The maximum horizontal shear stress in beams of rectangular cross-section, notched at the supports, shall be computed by means of the following formula:

$$H = 1.5 \frac{Vd}{B(d')^2}$$

where

d' = depth of the beam at the notch in inches,

H = horizontal shear stress in pounds per square inch,

V = vertical shear force in pounds,  
b = breadth of beam in inches, and  
d = depth of beam in inches.

(4) When calculating the value of the horizontal shear stress H, all loads within a distance from the edge of the support equal to the depth of the beam shall be neglected in determining the vertical shear force V.

#### 59. CUTTING AND NOTCHING.

Unless the local stress in flexural members after cutting and notching is calculated and found to be within the working stress set forth in regulation 42, flexural members shall be cut, notched or bored only as follows:

- (a) Notches may be cut in the top or bottom not deeper than one-fifth of the depth of the beam and not farther from the edge of the support at a simply supported end than one-sixth of the span, and in the case of an end restrained in direction, not closer to the edge of the support than 1/8 of the span nor farther from it than 1/3 of the span.
- (b) The distance from the edge of any hole to the edge of another hole or of a notch shall be not less than d, and the distance from the edge of any hole to the edge of the member shall be not less than  $d_6$  where d is the depth of the beam in inches. Holes not larger in diameter than one-quarter of the depth may be bored in the middle third of the depth and length of the span. Elsewhere, their diameter shall not exceed one-fifth of the depth of the beam.
- (c) If holes or notches occur at a distance greater than three times the depth of the beam from the edge of the nearest support, the net depth shall be used in determining the bending strength.
- (d) Before assembly, chemically impregnated timber which is notched or bored shall have the notched or bored surfaces brush-coated with the preservative originally employed.

#### 60. BUILT-UP BEAMS.

The components of built-up beams shall be bolted or bonded together. The type of adhesive, where used, shall be appropriate to the intended use of the member as set forth in subregulation (2) of regulation 69.

Web stiffeners shall be provided at supports and where concentrated loads occur. They shall also be provided elsewhere at distances, centre to centre, not exceeding the depth of the beam.

#### 61. DETAILED REQUIREMENTS.

(1) Where the ends of flexural members are carried on masonry walls they shall be supported in recesses which provide adequate ventilation. Flexural members, except roof timbers that are supported directly on masonry or concrete, shall have a

length of bearing of not less than 3/4 inch. Members supported on masonry corbels and on offsets, and roof timbers supported on a wall, shall bear immediately on and be fixed to wall-plates not less than 3 x 1½ inches in cross-section, or be secured to masonry pads built into the wall.

(2) Timber joists shall not be supported on the bottom flange of steel beams unless the stress produced in the timber calculated on the net bearing area as shaped to fit the beam, is not greater than the working stress in compression perpendicular to the grain as set forth in regulation 42 read with Table I.

(3) Where camber is provided in flexural members it shall be at least twice the calculated amount of deflection under dead load.

## FLOOR AND ROOF CONSTRUCTION, AND FRAMING DETAILS.

### 62. FLOOR CONSTRUCTION.

(1) Thickness of timber. No timber floor beams or floor joists shall be less than 1½ inches in nominal thickness.

(2) Spacing of joists. When tongue and groove boarding is used, the maximum spacing of joists centre to centre, shall be twenty-four times the net finished thickness of the board and when other boarding is used, such spacing shall not exceed twenty times such thickness.

(3) Strutting. Timber strutting between joists, where required by Regulation 57, shall be not less than 2 sq. inches net cross-section and where superimposed load is greater than 50 lbs. per sq. ft., not less than 4 sq. inches.

\*Reg 62(3) amended by GN 62/70

(4) Double Joists. Joists doubled under partitions shall be securely fastened together, or be separated by solid strutting spaced at not more than 4 ft. centres where required to allow the passage of pipes and heating ducts.

### 63. ROOF CONSTRUCTION.

(1) Thickness of Timber. Roof timbers shall be not less than 1½ inches in thickness: Provided that -

- (a) purlins carrying corrugated iron or asbestos sheeting shall be not less than 2 inches thick;
- (b) Timber used in latticed construction, e.g. Belfast trusses, shall be not less than 1 inch thick;

(2) Detailed Requirements.

- (a) Timber trusses and roof framing shall have all joints accurately cut and so fitted that the parts are drawn tightly together.

- (b) Rafters and trimmers shall be doubled around all dormers and other large roof openings.
- (c) Purlins shall be continuous over at least two spans unless the roof extends for only one span.
- (d) Where purlins have a ratio of depth to width exceeding two, they shall be restrained from twisting by the use of blocks on all trusses.
- (e) All joints in adjacent purlins shall be staggered.
- (f) Roof trusses or beams shall be secured as set forth in regulation 71.

#### 64. FRAMING DETAILS.

##### (1) GENERAL.

- (a) Vertical compression members in timber frames other than roof trusses shall be squared at the ends.
- (b) Vertical compression members in timber frames in basements shall be supported by masonry or concrete footings projecting at least 2 inches above the finished floor.
- (c) Vertical compression members in timber frames when enclosed in solid masonry or concrete walls shall have a ventilation space of at least 1/2, inch between the timber and the masonry or concrete.
- (d) The ends of horizontal members resting on external masonry walls shall be suitably waterproofed by asphalt saturated felt, building paper or corrosion resistant metal bearing plate.
- (e) Where horizontal members in timber frames meet at columns, anchorage to such columns shall be provided by means of cleats or bolts.

##### (2) STUD CONSTRUCTION WALL FRAMES.

- (a) In two-storey buildings with heavy or light roof construction and in single-storey buildings with heavy roof construction, external wall frames and internal loadbearing wall frames that support floors, floor loads, or roofs, or ceilings or superimposed partitions and the material in the wall frame itself which are of vertical stud construction, shall employ a minimum size of 4½ x 1½ inches stud members at not more than 16 inch centres. In single-storey buildings with light roof construction such frames of vertical stud construction shall employ either 4½ x 1½ inches stud members at not more than 24 inch centres or 3 x 1½ inches members at not more than 16 inch centres. Where the weight of the roof construction exceeds 17 lbs. per sq. ft. wall frames shall be specially designed to carry all loads to which they are to be subjected.

- (b) Partition walls of vertical stud construction shall employ a minimum size of 3 x 1½ inches stud members at not more than 24 inch centres.

All stud members shall be set with the greater cross-sectional dimension at right angles to the length of the wall.

- (c) Load-bearing stud frames shall not exceed two storeys in height above a basement, if any, nor in any case a total of 35 feet from the level of the lowest framed floor to the level of the upper storey ceiling. The expression "lowest floor" shall include a basement, if any.

Partitions having the minimum stud construction given in paragraph (b) above shall not exceed one storey in height or 12 ft. from floor to ceiling.

- (d) Underneath stud frames a plate not less than 1½ inches thick and of a width at least equal to that of the studding shall be provided on concrete or masonry foundation walling and bolted thereto.

### (3) OTHER TYPES OF TIMBER WALLING.

If the quality of the materials used in other types of timber walling complies with the relevant provisions of these regulations and if the working stresses are not exceeded, the following types of framing may also be used:

- (a) Post and beam, in which vertical wall members of dimensions and spacings exceeding those in subregulation (2) of this regulation are used as direct supports for beams which carry the roof or upper floor systems.
- (b) Plank wall, in which timber planks at least 2 inches thick are secured to framing and the planks are either tongued-and-grooved, rebated or otherwise made resistant to rain penetration.
- (c) Flat panels, in which plywood covers or covers of similar stressed-skin material are glued to both sides of vertical members of size and spacing such that the combined section will resist without buckling the forces to which it may be subjected.

## JOINTS AND FASTENINGS.

### 65. BOLTED JOINTS.

#### (1) GENERAL.

The loads on bolts used to transmit loads between structural members shall not exceed the values laid down in subregulation (2) of this regulation, and are subject to the provisions of subregulation (2) of regulation 45.

(2) PERMISSIBLE LOADS ON BOLTS.

Black bolts and nuts in timber joints, shall comply with S.A.B.S. 61 "Black bolts and nuts, (hexagon and square)", and the maximum permissible loads thereon shall be as follows:

- (a) (i) In three-member joints in which the side members are parallel and share a load between them the loads on bolts shall be those given in Table IV for the main member in the joint, or for a main member of twice the thickness of the thinner side member, whichever is the thinner.
- (ii) When metal plates are used for such side members the tabulated values for loads parallel to the grain may be exceeded by 25 percent.
- (b) The loads on bolts in two-member joints shall be half the values given in Table IV for a main member of twice the thickness of the thinner member in the two member joint.
- (c) Any other type of joint shall be designed as if each member were part of a two-member joint: Provided that the load transmitted by a bolt at any one shear plane shall not exceed half the greatest load for a bolt of that diameter given in Table IV.

(3) LOADS AT ANGLE TO GRAIN.

The permissible load on bolts acting in a direction inclined to the grain shall be determined in accordance with the formula set forth in subregulation (2) of regulation 48 where

- N = permissible load on bolts acting at an inclination to the grain,
- P = permissible load on bolts parallel to the grain (Table IV),
- Q = permissible load on bolts perpendicular to the grain (Table IV), and
- $\theta$  = angle between the direction of the load and the direction of the grain.

(4) BOLT HOLES.

Bolt holes in timber joints shall be at least 1/32 inch greater than the nominal diameter of the bolts but not more than 1/16 inch greater.

(5) BOLT SPACING.

For the purpose of this subregulation a row of bolts shall mean a number of bolts spaced in a line parallel to the direction of load, and the following provisions shall apply:

- (a) minimum centre-to-centre spacing of bolts in any row for full design loads shall be four and a half times the bolt diameter.
- (b) Spacing centre-to-centre between rows of bolts for loads perpendicular to the grain shall be not less than two and a half times the bolt diameter

for an L/d ratio of 2, and not less than five times the bolt diameter for L/d ratios of 6 or more, where L/d is the length of the bolt within the main member divided by its diameter. Intermediate values shall be obtained by linear interpolation.

- (c) The spacing centre-to-centre between rows of bolts for loads parallel to the grain shall be such that the net tension area remaining at any section shall be not less than 80 percent of the total area of the section.
  - (d) The distance from the end of a bolted member to the centre of the bolt nearest to the end shall be not less than seven times the bolt diameter for a member in tension and shall be not less than four times the bolt diameter, or 2 inches whichever is the greater, for a member in compression.
  - (e) The distance from the edge of a bolted member to the centre of the nearest bolt shall be at least four times the bolt diameter for members loaded perpendicularly to the grain or at an angle to the grain and shall be at least one and a half times the bolt diameter for members loaded parallel to the grain.
- (6) WASHERS.

All bolts in direct tension shall be provided with steel plate washers under heads and nuts. The thickness of washers shall not be less than  $d/4$ , and the length of the side of a square washer shall not be less than  $4d$ , where  $d$  is the diameter of the bolt, while a circular washer shall have the same area as a square washer for the same value of  $d$ .

## 66. CONNECTOR JOINTS.

### (1) GENERAL.

The material and dimensions of connectors shall comply with the requirements of BS 1579 for "Connectors for timber" and the bolts and nuts shall comply with the requirements of S.A.B.S. 61 for "Black bolts and nuts (hexagon and square)". Washers shall be used except where the nut or bolt head bears on a metal plate.

For split-ring and shear-plate connectors, pre-cut grooves shall be made in the timber, of the correct diameter to fit the connector flanges.

For split-ring connectors, the timber shall be not less than 1 inch thick if the pre-cut groove is on one face only and not less than  $1 \frac{5}{8}$  inches thick if the grooves are on both faces.

For shear-plate connectors, the timber shall be not less than  $1 \frac{3}{8}$  inches thick if the pre-cut groove is on one face only and  $1 \frac{5}{8}$  inches thick if the grooves are on both faces for plates  $2 \frac{5}{8}$  inches diameter, and  $1 \frac{5}{8}$  inches thick and  $1 \frac{3}{4}$  inches thick respectively for plates of 4 inches diameter.

### (2) DESIGN LOADS.

Design loads per connector are set forth in Table V for split-ring and shear-plate connector joints having the type and size of connector tabulated.

The maximum load permissible is that value shown for the appropriate conditions given in the table, one loaded face occurring in each member of a two-member joint and two loaded faces occurring in the internal member(s) of a joint having three (or more) members.

When the direction of the load is neither parallel nor perpendicular to the grain, the formula referred to in subregulation (3) of regulation 75 shall be applied.

(3) SPACING OF CONNECTORS.

The minimum spacings of connectors and the minimum end and edge distances shall be in accordance with Table VI.

The end and edge distances shall be measured from the centre of the bolt to the edge of the timber.

67. WOOD SCREW JOINTS.

(1) PENETRATION AND LENGTH.

The length of a wood screw shall never be less than seven times its shank diameter and in any case when it is used to connect two or more members it shall penetrate into the farthest member to a distance of at least six-tenths of the thickness of that member.

(2) SHEAR CONNECTIONS.

Wood screws shall not be subjected to a load causing shear and bending greater than the safe lateral strength of the wood screw as determined from Table VII.

(3) TENSION CONNECTIONS.

A wood screw inserted perpendicular to the grain of the wood shall not be subjected to a load tending to cause withdrawal greater than the safe resistance of the screw to withdrawal as determined from Table VIII.

A wood screw inserted parallel to the grain of the wood shall not be assumed to resist any tensile stress.

68. NAILED JOINTS.

(1) GENERAL.

In structural members the holding power of wire nails shall comply with the requirements of subregulation (3) of this regulation.

Nails inserted perpendicular or parallel to the grain shall not be permitted to resist any tensile stresses.

(2) LENGTH OF NAILS.

Nails shall be of such length that, when joining one timber to another, the penetration of the nail into the second or farther timber shall be not less than one-half the length of the nail and if such nail penetrates through the second or farther member it shall be firmly clinched.

(3) SAFE LATERAL STRENGTH.

(a) A wire nail driven perpendicular to the grain of the wood without pre-drilling or with a pre-drilled hole which does not exceed 0.8 times the diameter of the nail shall not be subjected to a load causing shear and bending greater than its safe lateral strength as determined from Table IX.

(b) A wire nail driven parallel to the grain of the wood shall not be subjected to a load greater than two-thirds of the value set forth in Table IX.

(4) SPACING OF NAILS.

Where no pre-drilling of holes has been done, the minimum values for the spacing of nails and edge and end distances shall be as follows:

Distance between nail and end of timber	20D
Distance between nail and edge of timber	5D
Side spacing between lines of nails	10D
Spacing (along grain) between nails	20D

where

D = diameter of nail in inches,

except for edge distance, the above values may be halved if the nails are driven into pre-drilled holes with a diameter between 0.5 and 0.8 times the diameter of the nail.

69. GLUED CONNECTIONS.

(1) GENERAL.

The induced stress in a plan of glued surfaces in a glued connection shall be not greater than the working stress for shear in the direction of the grain set forth in Table I for the timber used in the connection.

(2) GLUE.

The adhesive shall be of a type suitable for the conditions to which the member is to be exposed, i.e. whether for interior or exterior purposes, subject to dry or wet conditions, and whether or not exposed to chemically polluted atmosphere.

(3) GLUE BOND.

Surfaces to be glued shall be flat, clean and free from oil or any other contaminating substance. The entire surface to be glued shall be well bonded with glue and pressure on the joint shall be maintained until the glue has set and a further curing period shall be allowed to ensure that maximum strength has been obtained before use.

70. FRAMING ANCHORS.

Corrosion-resistant metal plates bent in the form of cleats and holed for nailing are permitted as connections between structural timber members if their overall dimensions, gauge of metal, and number and size of nails as specified by the manufacturers are sufficient to transmit the required load between the members so connected.

71. FASTENINGS.

(1) GENERAL.

All timber framework shall be securely connected together by means of nails or bolts or other method as set forth in regulations 65 to 70 (inclusive).

\*Reg 71(1) amended by GN 62/70

(2) ON MASONRY WALLS.

Where supported on masonry walls, roof trusses and rafters shall be fastened to wall plates by means of galvanised steel or other corrosion-resistant metal straps not less than 1 ¼ inch wide and of 18 B.G. nailed to the edges of the timbers.

The wall plates shall be secured to the walls by means of steel bolts, or screwed steel rods and plates, or corrosion-resistant metal straps at least 1 ¼ inches wide and of 18 B.G., embedded in the masonry courses to a depth of at least 3 ft. and at distances apart, centre-to-centre, not exceeding 4 ft. 6 inches.

Galvanised wire may be used if it is not less than No. 8 S.W.G. and is built in at least 3 ft. down from the wall-plate and anchored in the masonry at its lower end.

(3) ON TIMBER WALL-FRAMING.

Where supported on timber-framing the top plate of the wall shall be skew-nailed to the studs and where roof trusses or rafters occur these must be secured to the side framing by means of corrosion-resistant metal straps, at least 1 ¼ inches wide and 18 B.G. thick nailed to the edges of the top plate and to the studs.

(4) EAVES PURLINS.

Eaves purlins shall be wired down to each rafter with galvanised wire, not less than No. 10 S.W.G. in size. Where a purlin occurs immediately above a wall plate, it shall be secured to the wall plate at intervals not exceeding 4 ft. 6 inches.

(5) SUPPORTS FOR BEARERS AND BEAMS.

(a) Timber plates (other than roof wall-plates) supported on masonry or concrete walls and timber joists or beams adjacent and parallel to masonry or concrete walls shall be anchored thereto at intervals not exceeding 6 ft. This provision, however, shall not apply to wall-plates at ground floor level.

(b) Nailing strips for the support of joists and wooden members on a steel beam shall be bolted or clipped to the beam at intervals not exceeding 3 ft. and shall rest upon the flanges or upon shelf angles attached to the web.

(6) FLOORING, ROOF BOARDS AND CLADDING.

(a) Floor and roof boards (other than tongue and groove), of 3 to 7 inches in width, shall be fastened with two nails or screws at each intersection with a joist at points not less than 1/2, and not more than 1 inch from the edges of the boards.

(b) Floor and roof boards (other than tongue and groove) over 7 inches wide shall be fastened with three nails or screws at each intersection with a joist, the outer nails or screws being not less than 1/2 inch and not more than 1 inch from the edges of the board.

(c) Tongue and groove floor and roof boards over 4 inches in width shall be fastened with two nails or screws at each intersection with a joist, and heading joints shall be made over the supporting joists.

(d) Tongue and groove floor and roof boards not more than 4 inches in width shall be fastened by one nail or screw at each intersection with a joist and heading joints shall be made over the supporting joist. In the case of end-matched strip flooring, heading joints may be between joists but all lengths shall be nailed to at least two joists and such heading joints shall be staggered in adjoining strips.

(e) Nails used in floor and roof boards shall have a length not less than 2½ inches.

(f) Where screws are used in floor and roof boards, they shall be not less than No. 8 screw gauge in size and not less than twice the thickness of the floor and roof boards in length.

(g) Cladding, i.e. external wood siding, shall be secured with corrosion-resistant nails, two nails being used at each connection to the framing.

GLUED LAMINATED TIMBER.

72. GENERAL.

Structural members consisting of four or more timber laminates glued together so that the grain direction is parallel to the longitudinal axis of the member may be used if the Council approves.

PLYWOOD.

73. (1) GENERAL.

The use of plywood in the construction of structural units is permissible if -

- (a) the grain of the face plies is parallel to the longitudinal axis of the member, and the adhesives used are appropriate to the conditions of use which the member will have to withstand, and
- (b) the Council approves.

(2) BUILT-UP MEMBERS.

Where plywood is used as the web component in a built-up structural member, it shall be provided with web stiffeners to prevent buckling at reaction points, and where concentrated loads occur. They shall also be provided elsewhere so spaced as to ensure strength and to prevent buckling.

TIMBER PILING.

74. GENERAL.

Where practicable timber piles shall be driven to a solid bearing. The method of driving shall be one which does not damage the piles and does not impair their strength.

75. MATERIAL.

(1) Timber which complies with the requirements for the higher density groups II and III of S.A.B.S. 5 for "Graded South African softwood timber" and their equivalents, or hardwoods of approved quality, shall be used for piling.

(2) Timber piles shall be treated by a pressure process to resist fungi and borer attack, a high temperature wood preserving creosote complying with the requirements of S.A.B.S. 538 "High temperature wood preserving creosotes", being used. If piles are to be located permanently and completely below water-level and will not be subject to borer attack, the pressure treatment may be omitted.

(3) The centre line of a pile shall not deviate from the straight by more than 1 inch in 10 feet.

(4) The ends of the piles shall be protected by means of metal shoes and caps.

(5) If piles are not of one length, joints shall be formed by square cutting of the butting surfaces and splicing with metal tubes or plates to develop the full length of the pile at that point.

Sections of reinforced concrete may be added to provide additional length but the timber and concrete length shall be correctly aligned and spliced to form a composite structural member.

## 76. DESIGN.

The stress produced in a pile at mid-length shall not exceed 80 percent of the working stress given in Table 1 read in conjunction with regulation 42 for compression parallel to the grain for a ratio of L/b equal to 42. Partially exposed piles shall be designed as columns with respect to the exposed portion.

## 77. SPACING.

The distance between centres of piles shall be not less than 30 inches and not less than two-and-a-half times the butt diameter.

## 78. FIELD TREATMENT OF PILES.

(1) All cuts made after the timber has been treated shall be given two coats of hot creosote. Bolt holes bored in the field shall be filled with hot creosote before bolts are driven.

(2) Where piles are to support a timber structure the heads shall be suitably cut and shaped to take the capping pieces or sills.

Where piles are to support masonry, steel or concrete structures, the heads shall be given a brush coat of hot creosote after driving and trimming and shall have a reinforced concrete or metal cap of a design which ensures that the foundation loads are adequately and evenly transmitted to the piles.

## 79. SUPERVISION AND LOADING TESTS.

The provisions of the chapter of these regulations on Foundations shall apply.

80. (a) Whenever any matter or thing is directed or forbidden to be done by this chapter any person failing to comply therewith shall be guilty of an offence.

(b) Any person who continues to commit an offence after notice has been served on him by the Council, to cease committing such offence or after he has been convicted of such offence shall be guilty of a continuing offence.

(c) Any person convicted of an offence under this chapter shall on conviction be liable in respect of each such offence to a fine not exceeding one hundred rand or in default of payment of the fine imprisonment for a period not exceeding three months, and in the case of a continuing offence to an additional fine not exceeding two rand for each day the offence continues.

## CHAPTER V

\*Chapter V repealed by GN 15/88

## SCHEDULE I

Erven and areas where permanent buildings of wood or iron or of any other

material which, in the opinion of the Council, falls in the same category as wood or iron may be erected:

(a) Windhoek Extension 3 (Northern Industrial area)

(b) Windhoek Extension 13

(c) Windhoek Extension 14

(d) Lafrenz Township.

\*Schedule I substituted by GN 148/80  
SCHEDULE III

\*Schedule III repealed by GN 15/88  
TABLE I.

WORKING STRESS IN STRUCTURAL TIMBER  
(MOISTURE CONTENT 15 PERCENT)  
(TO BE USED TO DETERMINE DESIGN STRESS).

Nature of stress	Value for strength group, lbs. per sq. inch.		
	A	B	C
Maximum fibre stress in bending, and tension parallel to grain	1,070	1,350	1,500
Shear parallel to grain	130	190	230
Compression perpendicular to grain*	330	400	760
Compression parallel to grain	750	910	1,200
Modulus of elasticity	1,300,000	1,800,000	2,000,000

Compressive stress in solid struts, with hinged ends, allowance being made for the factor required in Regulation 14 (2)

Length to least dimension, L/b	Slenderness ratio, L/r			
11	40	600	730	1250
15	52	585	715	1220
20	70	560	690	1170
25	88	500	635	1050
30	100	400	550	850
35	120	290	400	625
40	140	225	310	480
45	157	175	245	380
50	175	145	200	300

\* If wane, checks, splits or pitch pockets are present at the point of application of the load, use 50 percent of these values.

TABLE II.  
MODIFICATION FACTORS.

1	2	3	4	5	6	7	8
Length of bearing, inch	½	1	1½	2	3	4	6 or more
Factor	1.75	1.38	1.25	1.19	1.13	1.10	1

TABLE III  
LENGTH FACTORS FOR COLUMNS.

Degree of End Restraint of Compression Member	Minimum effective length Factor K	Symbol
Effectively held in position and restrained against rotation at both ends	0.70	
Effectively held in position at both ends, restrained against rotation at one end	0.85	
Effectively held in position at both ends but not restrained against rotation		
Effectively held in position and restrained against rotation at one end, and at the other restrained against rotation but not held in position	1.00	
Effectively held in position and restrained against rotation at one end, and at the other partially restrained against rotation but not held in position	1.20	
Effectively held in position at one end but not restrained against rotation, and at the other end restrained against rotation but not held in position		
Effectively held in position and restrained against rotation at one end but not held in position nor restrained against rotation at the other end.	1.50	
	2.00	
	2.00	

TABLE IV.

PERMISSIBLE LOAD PER BOLT IN THREE-MEMBER  
TIMBER JOINTS IN POUNDS.

Length of bolt in main member, inches	Diameter of bolt, inches	Strength Group A		Strength Group B		Strength Group C	
		Parallel to grain (P)	Perpen- dicular to grain (Q)	Parallel to grain (P)	Perpen- dicular to grain (Q)	Parallel to grain (P)	Perpen- dicular to grain (Q)
1½	1/2	450	190	680	250	780	350
	5/8	560	215	840	280	975	390
	3/4	675	240	980	320	1,170	435
	7/8	790	260	1,190	350	1,360	480
	1	900	290	1,350	385	1,560	525
2	1/2	595	250	890	335	1,010	460
	5/8	750	280	1,025	370	1,300	525
	3/4	900	320	1,340	425	1,560	585
	7/8	1,050	350	1,580	470	1,820	640
	1	1,200	380	1,800	510	2,080	700
3	1/2	770	380	1,060	505	1,180	695
	5/8	1,100	430	1,640	570	1,880	785
	3/4	1,350	475	2,020	635	2,280	875
	7/8	1,570	525	2,460	700	2,720	960
	1	1,800	570	2,700	765	3,120	1,050
4	1/2	770	505	1,165	675	1,180	890
	5/8	1,290	570	1,800	760	1,820	1,050
	3/4	1,580	635	2,380	845	2,570	1,170
	7/8	2,040	700	3,050	935	3,380	1,285
	1	2,380	760	3,580	1,015	4,050	1,395
4½	1/2	770	540	1,165	720	1,190	900
	5/8	1,200	640	1,800	850	1,840	1,175
	3/4	1,720	715	2,580	955	2,660	1,320
	7/8	2,140	785	3,210	1,040	3,580	1,450
	1	2,630	860	3,945	1,140	4,360	1,570
1 1/8	3,030	935	4,550	1,250	5,150	1,720	
6	5/8	1,200	850	1,800	1,130	1,840	1,255
	3/4	1,720	950	2,580	1,270	2,660	1,680
	7/8	2,300	1,050	3,400	1,400	3,640	1,925
	1	3,080	1,140	4,600	1,520	4,750	2,090
	1 1/8	3,720	1,240	5,580	1,660	5,750	2,280

TABLE V.  
MAXIMUM LOADS ON TIMBER CONNECTORS IN POUNDS.

Type of connector	Bolt diam. inches	Timber thick- ness inches	Number of loaded faces	Design load per connector			
				Parallel to grain (P)			Perpend- icular (Q)
				Group A	Group B	Group A	Group B
Split-ring 2½ inch diam.	1/2	1	1	2,100	2,500	1,450	1,750
		1 5/8	2				
		1 5/8	1	2,500	2,960	1,750	2,100
		2	2				
Split-ring 4 inch diam.	¾	1	1	3,200	3,800	2,240	2,750
		1 5/8	2	3,340	4,000	2,330	2,800
		2	2	3,850	4,600	2,700	3,200
		1 5/8	1	4,800	5,700	3,320	4,000
Shear plate 2 5/8 inch diam.	¾	1 5/8	2	2,050	2,450	1,420	1,700
		1 5/8	1	2,640	3,100	1,840	2,200
		2 5/8	2				
Shear plate 4 inch diam.	¾	2	2	2,950	3,550	2,080	2,480
		1 5/8	1	3,700	4,450	2,600	3,100
		1 3/4	1	3,960	4,750	2,780	3,340



TABLE VII.

SAFE LATERAL RESISTANCE OF WOOD SCREWS, IN POUNDS.

Strength group of timber (see regulation 11)	Size of screw (screw gauge)						
	12	14	16	18	20	22	24
A	100	125	150	180	215	255	290
B	125	160	195	235	275	325	375
C	155	195	235	285	340	400	455

TABLE VIII.

SAFE WITHDRAWAL RESISTANCE OF WOOD SCREWS INSERTED  
AT RIGHT ANGLES TO GRAIN, IN POUNDS.

Strength group of timber (see regulation 11)	Size of screw (screw gauge)						
	12	14	16	18	20	22	24
A	95	105	120	130	140	155	165
B	100	115	125	140	150	165	175
C	105	120	130	145	160	170	185

TABLE IX.

SAFE LATERAL LOADS FOR WIRE NAILS PERPENDICULAR  
TO GRAIN, IN POUNDS.

Size of nail		Timber, minimum thickness, inches		Lateral load per nail		
Length inches	S.W.G gauge	Head end of nail	Point end of nail	up A	up B	up C
				Gro	Gro	Gro
2	12	3/4	1	30	40	50
2 1/2	11	1	1 1/4	35	45	55
3	9	1 1/8	1 1/2	50	60	75
3 1/2	8	1 5/16	1 3/4	60	70	90
4	7	1 1/2	2	65	85	100
5	6	1 15/16	2 1/2	75	95	115
6	5	2 1/4	3	90	110	135