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RESIDENTIAL STANDARDS 1980

For Use by Canada Mortgage and Housing Corporation

**Issued by the
Associate Committee on the National Building Code
National Research Council of Canada
Ottawa**

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RESIDENTIAL STANDARDS

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**Associate Committee on the National Building Code
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***These Sections apply to all buildings of residential occupancy, regardless of size. The remaining Sections apply to residential buildings of not more than 600 m² in building area and of not more than 3 storeys in building height unless otherwise specifically indicated in the Section.**

PREFACE

This edition of Residential Standards replaces the 1977 edition. It has been prepared by the Standing Committee on Housing and Small Buildings, which is responsible to the Associate Committee on the National Building Code, under whose auspices this document was published.

Residential Standards contains the requirements for buildings of residential occupancy from Part 9 of the National Building Code of Canada 1980, which appear in bold-face type. It also contains requirements (in light-face type) going beyond the scope of the National Building Code, which are considered necessary to regulate residential construction under the National Housing Act. Where it has been necessary to change the wording of Part 9 requirements to reflect the broader scope of this document, this wording is shown in light-face type. Thus the document is not intended to be used to regulate construction under a municipal bylaw, and where the Part 9 requirements only are to be applied, reference should always be made to the National Building Code itself.

In general, the requirements in these Standards apply only to buildings up to 3 storeys in building height having a building area on any storey not exceeding 600 m². For buildings exceeding these limits, the appropriate requirements in the National Building Code should be applied. There are exceptions, however, and these are stated at the beginning of each Section where applicable. For example, the requirements for room dimensions and sound resistance apply to all buildings, regardless of size.

The requirements in this document apply only to residential occupancies. Where buildings contain a major occupancy in addition to residential, the relevant requirements in the National Building Code for such combinations should be applied.

Where changes or additions to the requirements of the previous edition of this document have been made, the paragraphs affected have been indicated by vertical lines in the margin.

This edition of the Residential Standards is in metric units. Imperial equivalents have been included in the appendices as an interim measure, until the user becomes more familiar with the metric values. The imperial values are provided for informational purposes only, and are provided to the degree of accuracy considered to be appropriate for the particular requirements.

Comments, criticisms and suggestions for the improvement of these Standards are welcomed by the Associate Committee and should be addressed to: The Secretary, Associate Committee on the National Building Code, National Research Council of Canada, Ottawa, Ontario K1A 0R6.

Ce document est disponible en français.

LIST OF ABBREVIATIONS

Abbreviations of metric words and phrases in this document have the following meanings:

cm.....	centimetre(s)
°C	degree(s) Celsius
h.....	hour(s)
kg	kilogram(s)
kN.....	kilonewton(s)
kPa.....	kilopascal(s)
kW	kilowatt(s)
L.....	litre(s)
lx	lux
m	metre(s)
min.....	minute(s)
mm.....	millimetre(s)
MPa	megapascal(s)
N	newton(s)
ng	nanogram(s)
Pa	pascal(s)
s	second(s)
W.....	watt(s)

SECTION 1. GENERAL

A. GENERAL

- (1) This Standard applies to buildings classified as residential occupancy which, unless otherwise indicated herein, are 3 storeys or less in building height, and have a building area not exceeding 600 m². (The following Sections of this Standard apply to all buildings of residential occupancy, regardless of size: Nos. 2, 5 to 8, 11, 13, 14, 18, 19, 22, 26 to 33, 35, and 37 to 40.) Where a building contains a mixed occupancy, the requirements of the National Building Code of Canada 1980 shall apply. This Standard applies both to site-assembled and factory-made buildings. (Children's custodial homes and convalescent homes for ambulatory occupants living as a single housekeeping unit in a dwelling unit with sleeping accommodation for not more than 10 persons may also be classified as residential occupancy (Group C).)
- (2) Measures to ensure the safety of the public during construction shall conform to the appropriate requirements in Part 8 of the National Building Code of Canada 1980.
- (3) Buildings other than those described in Sentence (1) are regulated by the appropriate provisions contained in the National Building Code of Canada 1980.
- (4) Where a building or a component of a building is assembled off the building site in such a way that it cannot be inspected on site, approved off-site inspection shall be provided when required by the authority having jurisdiction to ensure compliance with this Standard.
- (5) Workmanship of a standard equal to good building practice shall be provided.
- (6) Where buildings are designed to accommodate handicapped persons, the requirements in the ACNBC document, "Building Standards for the Handicapped 1980" shall be used as a guide in addition to the requirements contained in this Standard.

SECTION 2. DEFINITIONS

A. GENERAL

In this Standard

Acceptable means acceptable to the authority having jurisdiction.

Accepted means accepted by the authority having jurisdiction.

Authority having jurisdiction means the governmental body responsible for the enforcement of any part of this Code or the official or agency designated by that body to exercise such a function.

Bachelor dwelling unit means a dwelling unit for 1 or 2 adults with or without 1 bedroom.

Building means any structure used or intended for supporting or sheltering any use or occupancy.

Building area means the greatest horizontal area of a building above grade within the outside surface of exterior walls, or within the outside surface of exterior walls and the centre line of firewalls.

Building height (in storeys) means the number of storeys contained between the roof and the floor of the first storey.

Closure means a device or assembly for closing an opening through a fire separation, such as a door, a shutter, wired glass or glass block, and includes all components such as hardware, closing devices, frames and anchors.

Dead load means the weight of all permanent structural and nonstructural components of a building.

Dwelling unit means a suite operated as a housekeeping unit, used or intended to be used as a domicile by 1 or more persons and usually containing cooking, eating, living, sleeping and sanitary facilities.

Exit means that part of a means of egress that leads from the floor area it serves, including any doorway leading directly from a floor area, to a public thoroughfare or to an acceptable open space.

Exit, access to means that part of a means of egress within a floor area that provides access to an exit serving the floor area.

Exit, horizontal means that type of exit connecting 2 floor areas at substantially the same level by means of a doorway, vestibule, bridge or balcony, such floor areas being located either in different buildings or located in the same building and fully separated from each other by a firewall.

Exposing building face means that part of the exterior wall of a building which faces one direction and is located between ground level and the ceiling of its top storey, or where a building is divided into fire compartments, the exterior wall of a fire compartment which faces one direction.

Fire compartment means an enclosed space in a building that is separated from all other parts of the building by enclosing construction providing a fire separation having a required fire-resistance rating.

Fire-protection rating means the time in hours or fraction thereof that a closure will withstand the passage of flame when exposed to fire under specified conditions of test and performance criteria or as otherwise prescribed in this Standard.

Fire-resistance rating means the time in hours or fraction thereof that a material or assembly of materials will withstand the passage of flame and the transmission of heat when exposed to fire under specified conditions of test and performance criteria, or as determined by extension or interpretation of information derived therefrom as prescribed in this Standard.

Fire separation means a construction assembly that acts as a barrier against the spread of fire and may not be required to have a fire-resistance rating or a fire-protection rating.

Fire stop means a draft-tight barrier within or between construction assemblies that acts to retard the passage of smoke and flame.

Fire stop flap means a device intended for use in horizontal assemblies required to have a fire-resistance rating and incorporating protective ceiling membranes, which operates to close off a duct opening through the membrane in the event of a fire.

Firewall means a type of fire separation of noncombustible construction which subdivides a building or separates adjoining buildings to resist the spread of fire and which has a fire-resistance rating as prescribed in this Standard and has structural stability to remain intact under fire conditions for the required fire-rated time.

Flame-spread rating means an index or classification indicating the extent of spread-of-flame on the surface of a material or an assembly of materials as determined in a standard fire test as prescribed in this Standard.

Floor area means the space on any storey of a building between exterior walls and required firewalls, including the space occupied by interior walls and partitions, but not including exits and vertical service spaces that pierce the storey.

Garage, storage means a building or part thereof intended for the storage or parking of motor vehicles and which contains no provision for the repair or servicing of such vehicles.

Gas vent means that portion of a venting system designed to convey vent gases from the vent connector of a gas-fired appliance, or directly from the appliance when a vent connector is not used, to the outdoors.

Grade (as applying to the determination of building height) means the lowest of the average levels of finished ground adjoining each exterior wall of a building, except that localized depressions such as for vehicle or pedestrian entrances need not be considered in the determination of average levels of finished ground. (See Storey, first.)

Guard means a protective barrier around openings in floors or at the open sides of stairs, landings, balconies, mezzanines, galleries, raised walkways, or other locations to prevent accidental falls from one level to another. Such barrier may or may not have openings through it.

Heavy timber construction means that type of combustible construction in which a degree of fire safety is attained by placing limitations on the sizes of wood structural members and on thickness and composition of wood floors and roofs, by avoidance of concealed spaces under floors and roofs.

Horizontal service space means a space such as an attic, duct, ceiling, roof or crawl space oriented essentially in a horizontal plane, concealed and generally inaccessible, through which building service facilities such as pipes, ducts and wiring may pass.

Limiting distance means the distance from an exposing building face to a property line, the centre line of a street, lane, public thoroughfare or an imaginary line between 2 buildings on the same property, measured at right angles to the exposing building face.

Live load means the load other than dead load to be assumed in the design of the structural members of a building. It includes loads resulting from snow, rain, wind, earthquake and those due to occupancy.

Loadbearing (as applying to a building element) means subjected to or designed to carry loads in addition to its own dead load, excepting a wall element subjected only to wind or earthquake loads in addition to its own dead load.

Means of egress means a continuous path of travel provided by a doorway, hallway, corridor, exterior passageway, balcony, lobby, stair, ramp or other egress facility or combination thereof, for the escape of persons from any point in a building, floor area, room or contained open space to a public thoroughfare or other acceptable open space. (Means of egress includes exits and access to exits.)

Noncombustible (as applying to an elementary building material) means that such material conforms to CAN4-S114-78, "Standard Method of Test for Determination of Non-Combustibility in Building Materials."

Noncombustible construction means that type of construction in which a degree of fire safety is attained by the use of noncombustible materials for structural members and other building assemblies.

Occupancy means the use or intended use of a building or part thereof for the shelter or support of persons, animals or property.

Occupancy, major means the principal occupancy for which a building or part thereof is used or intended to be used, and shall be deemed to include the subsidiary occupancies which are an integral part of the principal occupancy.

Occupant load means the number of persons for which a building or part thereof is designed.

Partition means an interior wall, 1 storey or part-storey in height, that is not loadbearing.

Public building means a building to which the public is admitted, but does not include apartment buildings, houses or boarding houses.

Public corridor means a corridor that provides access to exit from more than 1 suite.

Residential occupancy means the occupancy or use of a building or part thereof by persons for whom sleeping accommodation is provided but who are not harboured or detained to receive medical care or treatment or are not involuntarily detained.

Service room means a room or space provided in a building to accommodate building service equipment such as air-conditioning or heating appliances, electrical services, pumps, compressors and incinerators.

Service space means space provided in a building to facilitate or conceal the installation of building service facilities such as chutes, ducts, pipes, shafts or wires.

Service water heater means a device for heating water for plumbing services.

Smoke alarm means a combined smoke detector and audible alarm device designed to sound an alarm within the room or suite in which it is located upon the detection of smoke within that room or suite.

Sprinklered (as applying to a building or part thereof) means that the building or part thereof is equipped with a system of automatic sprinklers.

Storey means that portion of a building which is situated between the top of any floor and the top of the floor next above it, and if there is no floor above it, that portion between the top of such floor and the ceiling above it.

Storey, first means the uppermost storey having its floor level not more than 2 m above grade.

Suite means a single room or series of rooms of complementary use, operated under a single tenancy, and includes dwelling units, individual guest rooms in motels, hotels, boarding houses, rooming houses and dormitories as well as individual stores and individual or complementary rooms for business and personal service occupancies. (See Appendix.)

Unprotected opening (as applying to exposing building face) means a doorway, window or opening other than one equipped with a closure having the required fire-protection rating, or any part of a wall forming part of the exposing building face that has a fire-resistance rating less than required for the exposing building face.

Wall, party means a wall jointly owned and jointly used by 2 parties under easement agreement or by right in law and erected at or upon a line separating 2 parcels of land each of which is, or is capable of being, a separate real-estate entity.

B. OTHER DEFINITIONS

For words not defined in Subsection A, the definitions in Part 1 of the National Building Code of Canada 1980 shall apply.

SECTION 3. MATERIALS, SYSTEMS AND EQUIPMENT

A. GENERAL

- (1) Materials, systems and equipment shall possess the essential properties to perform their intended functions.
- (2) When required by the authority having jurisdiction, materials, systems or equipment shall be tested to determine the suitability for the intended use.
- (3) Except as provided in (5), the test method used to determine the suitability of materials, systems or equipment shall be one that is published by a recognized agency.
- (4) Materials, systems and equipment not specifically described herein, or which vary from the specific requirements in this Standard, or for which no recognized test procedure has been established, may be used if it can be shown that the material, system or equipment is suitable on the basis of past performance, or good engineering practice or on the basis of tests described in Sentence (5).
- (5) Where no published test method exists, the tests shall be designed to simulate or exceed anticipated service conditions or shall be designed to compare the performance of the material, system or equipment with similar material, system or equipment that is known to be acceptable.

- (6) Every test shall be carried out by an acceptable testing laboratory.
- (7) When a specification or reference document listed herein contains requirements that conflict with specific requirements in this Standard, the requirements in this Standard shall govern.
- (8) Unless otherwise specified herein, the documents referenced in this Standard shall refer to those current as of 30 June, 1979 together with all relevant amendments, revisions and supplements effective to that date.

B. CONCRETE

- (1) Concrete shall be designed, mixed, placed and cured in accordance with CAN3-A23.1-M77, "Concrete Materials and Methods of Concrete Construction" and tested in accordance with CAN3-A23.2-M77, "Methods of Test for Concrete."
- (2) Cement shall meet the requirements of CAN3-A5-M77, "Portland Cements." Sulphate-resisting cement shall be used for concrete in contact with sulphate soil deleterious to normal cement. Such concrete shall conform to the requirements in Section 25 of CAN3-A23.1-M77, "Concrete Materials and Methods of Concrete Construction."
- (3) Aggregates shall consist of sand, gravel, crushed rock, crushed air-cooled blast furnace slag, expanded shale or expanded clay, conforming to CAN3-A23.1-M77, "Concrete Materials and Methods of Concrete Construction." Aggregate shall be clean, well-graded and free of injurious amounts of organic and other deleterious material.
- (4) Water shall be clean and free of injurious amounts of oil, organic matter, sediment or any other deleterious material.
- (5) Unless otherwise specifically required elsewhere in this Standard, the compressive strength of unreinforced concrete shall be not less than 14 MPa after 28 days.
- (6) When concrete is used for garage and carport floors and exterior steps, it shall have a minimum compressive strength of 20 MPa after 28 days and shall have air entrainment of 5 to 7 per cent.
- (7) The concrete mixes described in Table 3A shall be considered acceptable if the slump does not exceed 100 mm when measured according to the slump test described in CAN3-A23.2-M77, "Methods of Test for Concrete." Aggregate shall not exceed 50 mm in size.

TABLE 3A—CONCRETE MIXES BY VOLUME

Concrete Strength, MPa	Cement, part	Sand, parts	Coarse Aggregate
14	1	2	4 parts
	1	—	6 parts pit run gravel
17	1	2	3½ parts up to 40 mm in size
	1	—	5½ parts pit run gravel
Column 1	2	3	4

- (8) The use of admixtures other than those for air entrainment shall conform to CAN3-A266.1-M78, "Air-Entraining Admixtures for Concrete" or CAN3-A266.2-M78, "Chemical Admixtures for Concrete" as applicable.
- (9) Reinforced concrete shall be designed to conform to the requirements of Part 4 of the National Building Code of Canada 1980.

- (10) When the air temperature is below 5°C, concrete shall be kept at a temperature of not less than 10°C or more than 25°C while being mixed and placed, and maintained at a temperature of not less than 10°C for 72 h after placing. No frozen material or ice shall be used in the mix.

C. LUMBER AND WOOD PRODUCTS

- (1) Lumber for joists, rafters, trusses and beams and for the uses listed in Table 3B shall be identified by a grade stamp to indicate its grade as determined by the 1978 NLGA Grading Rules for Canadian lumber. (See Appendix A.)
- (2) Except for joists, rafters, trusses and beams, visually graded lumber shall conform to the grades in Table 3B. (See 23D(1) for joists, rafters and beams and 23M(15) for trusses).

TABLE 3B—MINIMUM LUMBER GRADES FOR SPECIFIC END USES

Use	BOARDS ⁽¹⁾			FRAMING
	Paragraph in the 1978 NLGA grading rules under which boards are graded			All species
	All species		Eastern White Pine & Red Pine	
	Para 113	Para 114	Para 118	
Stud wall framing (loadbearing members)	—	—	—	Standard, Stud, No. 2
Stud wall framing (non-loadbearing members)	—	—	—	Stud, Utility, No. 3
Plank frame construction (loadbearing members)	No. 3 Common	—	No. 3 Common	No. 2
Plank frame construction (non-loadbearing members)	No. 5 Common	—	No. 5 Common	Economy, No. 3
Posts and beams less than 114 mm in thickness	—	—	—	Standard, No. 2
Posts and beams at least 114 mm in thickness	—	—	—	Standard
Roof sheathing	No. 3 Common	Standard	No. 4 Common	—
Subflooring	No. 3 Common	Standard	No. 3 Common	—
Wall sheathing when required as a nailing base	No. 4 Common	Utility	No. 4	—
Wall sheathing not required as a nailing base	No. 5 Common	Economy	No. 5	—
Column 1	2	3	4	5

Note to Table 3B:

⁽¹⁾ See Appendix A.

- (3) Machine stress rated lumber shall conform to the requirements of Section 4.3 of the National Building Code of Canada 1980.
- (4) On site cross-cutting of a piece of lumber shall not be considered to affect the grade.
- (5) Waferboard and plywood used for roof sheathing, wall sheathing and subflooring shall be legibly identified on the face of the material indicating the manufacturer of the material, the standard to which it is produced and that the material is of exterior type.
- (6) Moisture content of lumber shall be not greater than 19 per cent at the time of installation.
- (7) Lumber dimensions referred to in this Standard are actual dimensions determined in conformance with CSA O141-1970, "Softwood Lumber."
- (8) The thicknesses specified in this Standard for plywood, hardboard, particleboard and waferboard shall be subject to the tolerances permitted in the standards referenced for these products, unless otherwise specifically indicated herein.
- (9) Joist, rafter, lintel and beam members up to 5 per cent less than the actual Canadian standard sizes may be used provided the allowable spans for the grade and species of lumber under consideration are reduced 5 per cent from those shown in the span tables for full size members.
- (10) Where wood is pressure treated to resist termites, such treatment shall be in accordance with the requirements of one of the following standards:
CSA O80.1-1974, "Preservative Treatment of All Timber Products by Pressure Processes,"
CSA O80.2-1974, "Preservative Treatment of Lumber, Timber, Bridge Ties and Mine Ties by Pressure Processes,"
CSA O80.9-1974, "Preservative Treatment of Plywood by Pressure Processes," or
CSA O80.15-1974, "Preservative Treatment of Wood for Building Foundation Systems, Basements and Crawl Spaces by Pressure Processes."

D. METAL

- (1) Minimum thicknesses for sheet metal material given in this Standard refer to the actual minimum thicknesses measured at any point of the material, and in the case of galvanized steel, includes the thickness of the coating unless otherwise indicated.
- (2) Where galvanized sheet metal is intended for use in locations exposed to the weather or as a flashing material, it shall have a zinc coating at least equal to the G90 coating designation in ASTM A525-79, "Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process, General Requirements."

SECTION 4. LOADS

A. GENERAL

When the size of structural members and their connections are not given in this standard, the members and their connections shall conform to Part 4 of the National Building Code of Canada 1980, except that design live loads and deflection limits shall conform to Subsections B to F.

B. FLOOR LOADS

- (1) The minimum design live load on a floor area is the load listed in Table 4A and (2) to (4) applied uniformly over the entire area, or the load listed in Table 4B applied over an area 750 mm by 750 mm located so as to cause maximum effects, whichever causes the greater stresses.

TABLE 4A—UNIFORM DESIGN LOADS FOR FLOORS

Use of Area of Floor	Minimum Design Live Load, kN/m ²
Corridors	(1)
Balconies, residential, not used as passage ways	1.9 ⁽²⁾
Balconies, other types	4.8
Equipment rooms	3.6 ⁽³⁾
Exits	4.8
Garages	
for passenger cars	2.4
for unloaded buses and light trucks	6.0
for loaded trucks and buses and all trucking spaces	12.0
Kitchens	
other than domestic type	4.8
Residential occupancies	
attics not accessible by a stairway	0.5
attics accessible by a stairway	1.4
bedrooms	1.4
all other rooms	1.9
stairs within <i>dwelling units</i>	1.9
Driveways not supported by the ground	12.0
Sidewalks not supported by the ground and adjacent to driveways that may be subject to loads from cars or trucks	12.0
Walks not supported by the ground and not subject to loads from cars or trucks	4.8
Storage areas	4.8 ⁽³⁾
Column 1	2

Notes to Table 4A:

(1) See 4B(3).

(2) See 4B(4).

(3) See 4B(2).

- (2) Floors in equipment rooms, factories and storage areas shall be designed to carry the loads due to their intended use, but not less than the loads shown in Table 4A.
- (3) Corridors, lobbies and aisles shall be designed to carry not less than the design live load required for the occupancies they serve.
- (4) Residential balconies not used as passageways shall be designed to carry the design roof snow load or the load shown in Table 4A, whichever is greater.

TABLE 4B—CONCENTRATED DESIGN LOADS FOR FLOORS

Use of Area of Floor	Minimum Concentrated Design Load, kN
Floors and areas used by passenger cars	11
Floors and areas used by vehicles not exceeding 3 600 kg gross mass and walks not subject to vehicular traffic over basements, cellars or other open areas	18
Floors and areas used by vehicles exceeding 3 600 kg but not exceeding 9 000 kg gross mass	36
Floors and areas used by vehicles exceeding 9 000 kg gross mass	54
Driveways or sidewalks adjacent to driveways over basements, cellars, or other open areas	54
Column 1	2

C. SNOW LOADS

- (1) Except as provided in (2), (3) and (4), design snow loads shall be not less than 60 per cent of the appropriate ground snow load listed in Chapter 1 of the Supplement to the National Building Code 1980, but in no case shall the snow load be considered less than 1 kN/m² of horizontal roof projection.
- (2) Where the entire width of a roof does not exceed 4.3 m, the design snow load shall not be less than 50 per cent of the appropriate ground snow load listed in Chapter 1 of the Supplement to the National Building Code 1980, but in no case less than 1 kN/m² of horizontal roof projection.
- (3) Bow string, arch or semi-circular roof trusses having an unsupported span greater than 6 m, steel or wood roof framing members having an unsupported span greater than 12 m or a spacing greater than 600 mm and reinforced concrete roof slabs shall be designed in conformance with the snow load requirements in Section 4.1 of the National Building Code of Canada 1980.
- (4) Except for roofs of wood-frame construction, roofs of buildings shall be designed in conformance with the snow-load requirements in Section 4.1 of the National Building Code of Canada 1980 where the greatest horizontal area of the building above grade, measured within the exterior surfaces of the exterior walls, notwithstanding the presence of firewalls, exceeds 600 m².

D. WIND LOADS

Design wind loads shall conform to the appropriate requirements in Section 4.1 of the National Building Code of Canada 1980.

E. DEFLECTIONS

The maximum deflection of structural members shall conform to Table 4C. Dead loads need not be considered in computing such deflections.

TABLE 4C—MAXIMUM DEFLECTIONS

Structural Members	Type of Ceiling Supported	Maximum Allowable Deflection Expressed as a Ratio of the Clear Span
Roof rafters, roof joists, roof beams and roof decking of plank and beam construction	No ceiling	1/180
	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Ceiling joists	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Floor beams, floor joists and floor decking of plank and beam construction for floor areas other than bedrooms in dwelling units	No ceiling	1/360
	Other than plaster or gypsum board	1/360
	Plaster or gypsum board	1/360
Floor beams, floor joists and floor decking of plank and beam construction for floor areas of bedrooms in dwelling units	No ceiling	1/240
	Other than plaster or gypsum board	1/240
	Plaster or gypsum board	1/360
Column 1	2	3

F. EARTHQUAKE LOADS

- (1) Except for buildings of wood-frame construction, buildings shall be designed for the earthquake loads in Section 4.1 of the National Building Code of Canada 1980 where the greatest horizontal area of the building above grade, measured within the exterior surfaces of the exterior walls, exceeds 600 m².
- (2) Except as provided in (3) to (5), 2- and 3-storey buildings in seismic Zone 3 and 3-storey buildings in seismic Zone 2 shall be designed for the earthquake loads in Section 4.1 of the National Building Code of Canada 1980 where the greatest horizontal area of the building above grade, measured within the exterior surfaces of the exterior walls, does not exceed 600 m².
- (3) Buildings with structural loadbearing precast concrete elements (normal or light-weight) shall have connections designed for the earthquake loads in Section 4.1 of the National Building Code of Canada 1980.
- (4) Buildings constructed with loadbearing masonry walls which are required to resist the earthquake loads in (1) and (2) may in lieu of engineered design be reinforced as required in Subsection 20 R.
- (5) Buildings with structural systems of wood frame construction need not be designed for the earthquake loads in Section 4.1 of the National Building Code of Canada 1980.

G. BEARING CAPACITY FOR SOIL AND ROCK

- (1) Except as provided in (2) to (4) and Section 15, where the footing width does not exceed 1 m, the allowable bearing pressure for soil or rock shall be determined in conformance with ASTM D1194-72 (1977), "Bearing Capacity of Soil for Static Load on Spread Footings" provided the bearing plate used in the test is at least 300 mm by 300 mm and the allowable bearing pressure does not exceed $\frac{1}{3}$ the ultimate bearing capacity of the soil or rock and does not exceed $\frac{1}{3}$ the pressure that would cause the plate to settle 25 mm.
- (2) Where allowable bearing pressures for soil or rock are not established in conformance with Article (1), or on the basis of the requirements of Subsection 4.2 of the National Building Code of Canada 1980, the values in Table 4D may be used.

TABLE 4D—ALLOWABLE BEARING PRESSURES FOR SOIL AND ROCK

Type and Condition of Soil or Rock	Maximum Allowable Bearing Pressure, kN/m ²
Dense or compact sand or gravel ⁽¹⁾	150
Loose sand or gravel ⁽¹⁾	50
Dense or compact silt ⁽¹⁾	100
Stiff clay ⁽¹⁾	150
Firm clay ⁽¹⁾	75
Soft clay ⁽¹⁾	40
Till	200
Clay shale	300
Sound rock	500
Column 1	2

Note to Table 4D:

⁽¹⁾ See Appendix A.

- (3) Where a soil or rock within a distance equal to twice the footing width below the bearing surface has a lower allowable bearing pressure than that at the bearing surface as shown in (2), the design capacity of the foundation shall not be greater than would cause the weakest soil or rock to be stressed beyond its allowable bearing pressure. In calculating such subsurface pressures, the loads from the footings shall be assumed to be distributed uniformly over a horizontal plane within a frustrum extending downward from the footing at an angle of 60° to the horizontal.
- (4) Where a foundation bears on gravel, sand or silt and where the water table is within a distance below the bearing surface equal to the width of the foundation, the allowable bearing pressure shall be 50 per cent of that determined in (1) and (2).
- (5) The design procedures described in Section 4.2 of the National Building Code of Canada 1980 may be used in lieu of the design procedures in this Subsection, and shall be used where deep foundations are used, or if the footing size falls outside the scope of this Section, or if the foundation is constructed on peat or on filled ground.
- (6) Where a foundation is located in an area in which soil movement caused by changes in soil moisture content is known to occur to the extent that it will cause significant damage to a building, measures shall be taken to minimize the effect of such movement on the building.
- (7) Walls shall be designed to resist the lateral pressure of the retained material. Walls supporting drained earth may be designed for pressure equivalent to that exerted by a fluid weighing not less than 480 kg/m³ and having a depth equal to that of the retained earth. Any surcharge shall be in addition to the equivalent fluid pressure.

SECTION 5. ROOM AND SPACE DIMENSIONS

A. GENERAL

- (1) This Section applies to all buildings regardless of size.
- (2) Unless otherwise specifically indicated, this Section applies only to dwelling units that are intended for use on a continuing or year-round basis as the principal residence of the occupant.
- (3) Unless otherwise indicated herein, the areas, dimensions and heights of rooms or spaces shall be measured between finished wall surfaces and between finished floor and ceiling surfaces.
- (4) Minimum dimensions listed for rooms or spaces in combination with other rooms or spaces refer to the minimum dimension of the combined space.
- (5) Minimum floor areas specified in this Section do not include closets or built-in bedroom cabinets unless otherwise indicated.
- (6) Two or more areas are considered as a combination room if the dividing wall occupies less than 60 per cent of the separating plane.
- (7) Areas and dimensions of rooms or spaces may be less than required in this Section provided it can be shown that the rooms or spaces are adequate for their intended use, such as by the provision of built-in furniture to compensate for the reduced sizes.

B. CEILING HEIGHTS

- (1) Heights of rooms or spaces shall conform to Table 5A.

TABLE 5A—ROOM HEIGHTS

Room or Space	Minimum Heights
Living room or space Dining room or space Kitchen or kitchen space	2.3 m over at least 75 per cent of the required floor area with a clear height of 2.1 m at any point over the required area
Bedroom or bedroom space	2.3 m over at least 50 per cent of the required floor area or 2.1 m over all of the required floor area. Any part of the floor having a clear height of less than 1.4 m shall not be considered in computing the required floor area
Unfinished basement or cellar including laundry area therein	1.95 m under beams in laundry areas and in any location that would normally be used for passage to laundry and required storage areas
Bathroom, water-closet room or laundry area above grade	2.1 m in any area where a person would normally be in a standing position
Passage, hall or main entrance vestibule and finished rooms not specifically mentioned above	2.1 m
Column 1	2

- (2) The clear height above and below a mezzanine floor assembly shall be not less than 2.15 m.
- (3) The clear height in a storage garage shall be not less than 2 m.

C. LIVING ROOMS OR SPACES WITHIN DWELLING UNITS

Living areas within dwelling units, either as separate rooms or in combination with other spaces, shall have at least 13.5 m² of floor area and shall have no dimension less than 3 m within the required area. Where the area of a living space is combined with a kitchen and dining area, the living area alone in a bachelor dwelling unit shall be at least 11 m².

D. DINING ROOMS OR SPACES WITHIN DWELLING UNITS

- (1) A dining space in combination with other space shall have a minimum floor area of 3.25 m². Dining rooms not combined with other space shall have a minimum area of 7 m².
- (2) Except as permitted in (3), a dining room or space combined with other space shall have no dimension less than 2.3 m within the required area measured between wall faces or a wall face and a built-in cabinet or appliance.
- (3) When a required dining area is provided in a kitchen or serves a bachelor dwelling unit, the minimum dimension of such space may be reduced to 1.7 m.

E. KITCHENS WITHIN DWELLING UNITS

- (1) Kitchen areas within dwelling units, either separate from or in combination with other space, shall have at least 4.2 m² of floor area including the area occupied by the base cabinets, except that in bachelor dwelling units the minimum floor area shall be 3.7 m².
- (2) At least 900 mm clearance shall be provided in front of base cabinets, work surfaces, counter tops and appliances.
- (3) Except as provided in (4), every dwelling unit shall have a kitchen counter at least 550 mm in depth providing at least 1.35 m² of work surface, including the area occupied by the sink, and 1.8 lineal metres of cabinet front. Counter work surface depth greater than 550 mm shall not be included in calculating the required area.
- (4) Every bachelor dwelling unit shall have a kitchen counter at least 550 mm in depth providing at least 1.0 m² of work surface, including the area occupied by the sink, and 900 lineal millimetres of cabinet front. Counter work surface depth greater than 550 mm shall not be included in calculating the required area.
- (5) In bachelor dwelling units, the shelf area required in (6) may be reduced to 1.5 m², with 1.1 m² of this area to be at least 280 mm in depth, and with at least 210 mm min. clearance between shelves.
- (6) In addition to the base cabinets described in (3), at least 2 m² of shelf area not more than 2 m above the floor shall be provided. Of this area, 1.5 m² shall be at least 280 mm in depth with at least 210 mm clearance above the shelves. The remaining 0.55 m² shall have a depth of at least 130 mm with at least 130 mm clearance above the shelf. The maximum depth for computing shelf areas shall be 280 mm.

F. BEDROOMS OR SPACES IN DWELLING UNITS AND DORMITORIES

- (1) Except as provided in (2) and (3), bedrooms in dwelling units shall have at least 7 m² of floor area where built-in cabinets are not provided and 6 m² of floor area where built-in cabinets are provided. The minimum dimension within the required area shall be 2 m.
- (2) Except as provided in (3), at least 1 bedroom in every dwelling unit shall have at least 9.8 m² of floor area where built-in cabinets are not provided and 8.8 m² of floor area where built-in cabinets are provided. The minimum dimension within the required area shall be 2.7 m.
- (3) Bedroom spaces in combination with other spaces in dwelling units shall have at least 4.2 m² of floor area and have no dimension less than 2 m within the required area.

- (4) **Sleeping rooms other than in dwelling units shall have at least 7 m² of floor area per person for single occupancy and 4.6 m² per person for multiple occupancy. The minimum dimension within the required area shall be 2 m.**

G. BUILT-IN BEDROOM CABINETS

- (1) A built-in cabinet in the first bedroom shall provide at least 0.75 m³ of storage within 1.5 m of the floor when the bedroom is less than 9.8 m².
- (2) A built-in cabinet in other than the first bedroom shall provide at least 0.35 m³ of storage within 1.5 m of the floor when the bedroom area is less than 7 m².
- (3) Built-in cabinets shall consist of shelves with door fronts or drawers.
- (4) When required cabinet storage is by means of shelves, at least 2.5 m² shall be provided for the first bedroom and 1.25 m² for additional bedrooms. Shelves shall be at least 300 mm but not more than 450 mm in depth. The distance between shelves shall be not less than ½ the depth.
- (5) When required cabinet storage is provided by drawers, the drawers shall be not more than 1.2 m wide, not more than 300 mm in height and not more than 600 mm in depth.

H. COAT AND CLOTHES CLOSETS

- (1) At least 1 clothes closet shall be provided in each bedroom.
- (2) At least 1 coat closet shall be provided convenient to an entrance.
- (3) Coat and clothes closets shall have at least 0.55 m² of floor area. At least 50 per cent of the required area shall be horizontal and not more than 300 mm above the room floor level. Such closets shall have a minimum height of 2 m over the required floor area.
- (4) Walk-in closets shall have at least 2 m head room over the required area.
- (5) Coat and clothes closets shall be at least 550 mm deep when the width of the opening is at least 530 mm, and at least 350 mm deep when the opening is 1.2 m wide or more.
- (6) A shelf not less than 280 mm deep with a clearance of not less than 200 mm above it shall be provided in coat and clothes closets.

I. LINEN CLOSETS

- (1) A linen closet shall be provided in each dwelling unit and shall have a shelf area of not less than 0.55 m² for 1- and 2-bedroom dwelling units. Additional shelf area of 0.2 m² shall be provided for each additional bedroom.
- (2) The maximum depth of shelf to be used in calculating the shelf area shall be 600 mm.
- (3) Shelves shall have not less than 350 mm depth, 450 mm width and 300 mm clearance above shelves.

J. BATHROOM AND WATER-CLOSET ROOMS

- (1) **In every dwelling unit, an enclosed space of sufficient size shall be provided to accommodate a bathtub, water closet and lavatory.**
- (2) A janitor's toilet room shall be provided adjacent to the boiler room (or other work room) in an apartment building when a dwelling unit is not provided for the janitor.
- (3) At least 530 mm clearance shall be provided in front of the tub or shower stall to an opposite wall face or 450 mm in front to another fixture, over at least a 600 mm length of the bathtub or shower.
- (4) The centreline of the water closet shall be at least 380 mm away from an adjacent side wall and from a vanity. At least 450 mm clearance shall be provided in front of the water closet to the opposite wall or another fixture.

- (5) The centreline of a lavatory shall be at least 380 mm from an adjacent side wall. At least 530 mm clearance shall be provided in front of the lavatory to an opposite wall or 450 mm clearance in front to another fixture.
- (6) A mirror not less than 300 mm by 450 mm in size shall be installed over each lavatory in bathrooms and wash rooms. Such mirrors shall conform to Type 1B-polished plate or float glass for high-humidity use in CAN2-12.5-M76, "Mirrors, Silvered," and shall be so labelled.
- (7) Wall cabinets shall be at least 230 mm in height or width and be at least 0.15 m² in overall size. Cabinets shall be equipped with shelves. Where wall cabinets are not provided, equivalent shelf space shall be provided in a lockable vanity.
- (8) Except for bachelor dwelling units, at least 1 bathroom access that does not enter through a bedroom shall be provided to the required bathroom.

K. HALLWAYS

- (1) **The width of a hallway within a dwelling unit shall be at least 860 mm, except that in buildings not exceeding 4.3 m in width, the hallway width may be 710 mm where a second exit is provided near the end of the hallway farthest from the living area.**
- (2) The width of a main vestibule shall be at least 1.1 m.

L. LAUNDRY AND LAUNDRY SPACE

- (1) A clearance of at least 900 mm shall be provided at the front of an automatic washer or dryer.
- (2) Where an automatic washer or dryer is not provided, a space to accommodate such equipment shall be provided. Each automatic washer or dryer shall be assumed to occupy a space of at least 760 mm in width and 710 mm in depth, with a clear space of at least 900 mm in front of the equipment.
- (3) Where laundry facilities are shared, the laundry space described in Sentence (2) shall be provided for each 20 dwelling units or fraction thereof.

M. GENERAL STORAGE

- (1) Except as provided in (2) and (3), every dwelling unit shall have at least 5.65 m³ of storage plus at least 2.12 m³ for each bedroom. Such storage space shall have at least 1.8 m height over at least 50 per cent of the required space and at least 1.2 m height over the remainder of the required space. Required storage space shall be separate from finished areas, and access to such storage space shall be independent from other dwelling units.
- (2) In a building equipped with an elevator, at least 5.65 m³ of storage conforming to the requirements in (1) shall be provided for each dwelling unit.
- (3) Where a portion of the required storage space consists of communal storage as described in (4), the required independent storage space for each dwelling unit may be reduced to 4.25 m³ for a dwelling unit with not more than 1 bedroom plus 0.85 m³ for each additional bedroom. Such storage space shall be at least 1.8 m in height and at least 600 mm in depth. When located within a dwelling unit such storage shall be separated from other space. When located outside a dwelling unit the storage space for each dwelling unit shall be in a separate lockable enclosure with direct and convenient access.
- (4) Communal storage referred to in (3) shall consist of at least 5.5 m² when such storage serves not more than 10 dwelling units plus an additional 0.55 m² for each dwelling unit in excess of 10, except that such storage need not exceed 22 m².

SECTION 6. DOORS

A. GENERAL

- (1) This Section applies to all buildings regardless of size.
- (2) Requirements relating to doors in fire separations and means of egress shall conform to the appropriate requirements in Sections 9 and 10.
- (3) Thresholds in the access routes required in Subsection 9B to be constructed to accommodate physically handicapped persons shall be not greater than 13 mm in height, and shall be sloped to facilitate the passage of wheelchairs.

B. REQUIRED DOORS

- (1) A door shall be provided at each entrance to a dwelling unit, bathroom, water-closet room, shower room and room containing a boiler or furnace.
- (2) In buildings containing more than 1 dwelling unit, doors shall be provided at the exterior entrances, laundry or drying rooms, storage rooms, public water-closet rooms, garbage and incinerator rooms, furnace rooms, recreation rooms and any other locations required by Section 10.
- (3) A door shall be provided at each entrance to a bedroom and a room containing a water pump.

C. DOORWAY SIZES

- (1) Doorway openings within dwelling units shall be designed to accommodate not less than the door sizes in Table 6A for swing-type doors. Where folding doors are to be provided, the same openings apply.

TABLE 6A—MINIMUM SIZE OF DOORS

At Entrance to	Width, mm	Height, mm
Dwelling unit (required entrance) Vestibule or entrance hall	810	1 980
Stairs to a floor level that contains a finished space All doors in at least 1 line of passage from the exterior to the basement Utility rooms	810	1 980
Walk-in closet	610	1 980
Bathroom, water-closet room, shower room	610	1 980
Rooms located off hallways that are permitted to be 710 mm wide	610	1 980
Rooms not mentioned above, exterior balconies	760	1 980
Column 1	2	3

- (2) Doors to public water-closet rooms shall be not less than 810 mm in width and 2 030 mm in height.
- (3) Doorways through which access is required in Subsection 9B to facilitate the passage of wheelchairs and doorways to bathrooms, water-closet rooms and shower rooms in

dwelling units required to accommodate physically handicapped persons shall provide a clear opening with the door in the open position of at least 760 mm in width.

D. INTERIOR WOOD DOORS

- (1) The construction of interior doors shall conform to CSA O132.2-M 1977, "Wood Doors."
- (2) Interior wood doors in dwelling units other than closet doors or cupboard doors shall be at least 35 mm thick.
- (3) Interior wood doors to rooms or spaces used for storage, laundry, drying, vestibules, recreation or water closets in apartment buildings but not within dwelling units shall be at least 45 mm thick.

E. EXTERIOR DOORS

- (1) Exterior wood doors shall be exterior type conforming to CSA O132.2-M 1977, "Wood Doors."
- (2) Aluminum frame sliding glass doors shall conform to the appropriate requirements in CGSB 82-GP-1M (1977), "Doors, Glass, Aluminum Frame, Sliding Standard-Duty" or to CGSB 82-GP-2M (1977), "Doors, Glass, Aluminum Frame, Sliding, Medium-Duty."
- (3) Exterior wood doors shall be at least 45 mm thick, except that doors for secondary entrances serving single dwelling units or balconies may be 35 mm thick if of solid wood, solid core or stile and rail construction.
- (4) Storm or combination doors shall be at least 35 mm thick for wood doors and 25 mm for metal doors.
- (5) Weatherstripping of metal, plastic, rubber, wood or fabric or combination of these materials shall be installed at the perimeter of all exterior door openings.
- (6) Where an exterior door opening is not completely protected from wind blown snow or rain, it shall be provided with a sill that slopes to the exterior and the sill caulked with suitable caulking to prevent the entry of water.
- (7) Wood door frames shall be one of the species indicated in Clause 3.1.1. of CSA O132.1-M 1977, "Wood Windows." Allowable defects shall not exceed those described in Clause 3.2.1. of the same Standard. Such frames shall be treated with preservatives in accordance with Clauses 5.2 and 5.3 of CSA O132.1-M 1977, "Wood Windows."
- (8) Steel frames for exterior doors shall be painted with a rust inhibitive paint or otherwise treated before erection to prevent corrosion. Such frames shall incorporate a thermal break to prevent a through metal path from the interior to the exterior.

F. GLASS

- (1) Except for tempered glass, glass thickness and the size of glass for doors shall conform to Table 6B.
- (2) Glass side lights greater than 500 mm in width that could be mistaken for doors, glass in storm doors and glass in sliding doors within or at every entrance to a dwelling unit and in public areas shall be safety glass of the laminated or tempered type conforming to CAN2-12.1-M79, "Glass, Safety, Tempered or Laminated," or shall be of wired glass conforming to CAN2-12.11-M76, "Glass, Wired, Safety."
- (3) Glass in entrance doors to dwelling units and in public areas, other than the entrance doors described in (2), shall be safety glass or wired glass of the type described in (2) where the glass area exceeds 0.5 m² and extends to less than 900 mm from the bottom of the door.

- (4) Mirrored glass doors may be used only at the entrance to clothes closets. Such doors shall be reinforced with hardboard, plywood or particleboard securely fastened to the back of the mirror unless the glass is safety glass of the laminated or tempered type.

TABLE 6B—GLASS SIZE FOR DOORS

Minimum Glass Thickness	Maximum Area, m ²
2 mm	0.25
3 mm	0.50
4 mm	1.00
5 mm	1.25
6 mm	Not limited
Column 1	2

- (5) Except as provided in Article 7 F (3), every glass or transparent door accessible to and used by the public shall be equipped with hardware, bars or other permanent fixtures designed so that the existence and position of such door will be readily apparent.
- (6) Glass, other than safety glass, shall not be used for a shower or bathtub enclosure.
- (7) A thermal break shall be incorporated in metal door frames where 2 doors are provided, or in the metal double glazing frame where a single door is provided, to reduce the risk of surface condensation on the frame.

G. GARAGE DOORS

- (1) Garage doors shall be not less than 2.44 m wide for 1-car width and 4.27 m wide for 2-car width. The height of the clear opening with the door in the open position shall be not less than 1.93 m. For parking garages, garage doors shall be not less than 3.05 m wide for 1-way traffic and 4.88 m for 2-way traffic. Hardware associated with the operation of garage doors shall not project more than 100 mm into the garage door opening.
- (2) Wood doors shall be at least 44 mm thick in side hinged or 1-piece overhead and not less than 35 mm thick if sectional overhead.
- (3) Steel and aluminum doors shall be made with suitably braced frames clad with not less than 0.61 mm galvanized steel prepared for paint or 0.81 mm thick aluminum.
- (4) Overhead doors shall have suitable springs or counterbalances and weather stops.
- (5) Side hinged doors shall be equipped with hinges to carry without sagging the weight of the door.
- (6) Garage doors shall be equipped with locks.

H. HARDWARE

- (1) Hinges for exterior doors shall consist of "18-8" stainless steel; or brass or bronze of a type conforming to CGSB 69-GP-1M(1977), "Hinges, Hardware, Builders," equipped with ball bearings; or steel, electroplated with 0.013 mm zinc or cadmium and chromate treated; or steel, pretreated and primed for painting in accordance with CGSB 69-GP-1M(1977), "Hinges, Hardware, Builders."
- (2) Except as provided in (4), all doors shall be hung with at least three 89 mm by 89 mm solid butt hinges at least 2.5 mm thick.
- (3) Hinges for interior doors shall be the same as required in (1), except that bronze or brass hinges need not be ball-bearing type or they may be of steel, plated with chrome, brass, bronze, nickel or cadmium in accordance with CGSB 69-GP-1M(1977), "Hinges, Hardware, Builders."

- (4) Interior swing type doors within dwelling units shall be hung with at least two 76 mm by 76 mm solid butt hinges at least 2 0 mm thick
- (5) Screws, bolts and other fastening devices for use with door hinges shall be made from materials compatible with and having the same finish as the door hinges
- (6) All exterior doors to a dwelling unit shall be fitted with devices capable of locking the door from either side and capable of being unlocked from the inside without the use of a key, except that exterior doors in addition to the required doors need not be capable of being locked from the outside Exterior doors to balconies more than 1 8 m above grade shall be designed not to lock automatically
- (7) Additional requirements for exit door hardware shall be as described in Subsection 9F
- (8) Door stops shall be provided wherever necessary to prevent damage to interior wall finish

SECTION 7. WINDOWS

A. SCOPE

- (1) This Section applies to installation of windows and to the requirements for natural lighting to be provided by windows in all buildings regardless of size.
- (2) Requirements for windows in relation to fire protection are described in Section 10.
- (3) Requirements for ventilation are described in Section 33.
- (4) Window frames shall be constructed to permit the installation of screens and storm sash, except that where double glazing is provided, provisions may be made for the installation of screens only
- (5) A thermal break shall be incorporated in metal window frames to reduce the risk of surface condensation on the frame (See Section 6 for door side lights)

TABLE 7A—MINIMUM GLASS AREAS FOR ROOMS OF RESIDENTIAL OCCUPANCY

Location	Unobstructed Glass Area	
	With No Electric Lighting	With Electric Lighting
Laundry, basement recreation room, unfinished basement or cellar	4 per cent of area served	Windows not required
Water-closet room	0.37 m ²	Windows not required
Kitchen, kitchen space, kitchen alcove	10 per cent of area served	Windows not required
Living rooms, dining rooms	10 per cent of area served	10 per cent of area served
Bedrooms and other finished rooms not mentioned above	5 per cent of area served with at least 1 window having a minimum area of 0.55 m ² and a minimum dimension of 600 mm	5 per cent of area served with at least 1 window having a minimum area of 0.55 m ² and a minimum dimension of 600 mm
Column 1	2	3

B. GENERAL

- (1) Windows shall be designed and installed so that they shed water.
- (2) The minimum window glass area for rooms shall conform to Table 7A. The unobstructed glass area of a door or skylight is considered equivalent to that of a window.
- (3) Wherever practicable, windows shall be provided to light corridors, stairways and similar public spaces in buildings.

C. WINDOW STANDARDS

Unless otherwise specified in this Section, windows shall conform to one of the following:

- CSA O132.1-M 1977, "Wood Windows,"
- CAN 2-12.8-M76, "Insulating Glass Units,"
- CGSB 63-GP-2M(1976), "Windows, Extruded Aluminum, Vertical and Horizontal Sliding, Medium Duty,"
- CGSB 63-GP-3M(1976), "Windows, Extruded Aluminum, Vertical and Horizontal Sliding, Standard Duty,"
- CGSB 63-GP-5M(1976), "Windows, Steel, Vertical and Horizontal Sliding, Standard Duty," or
- CGSB 63-GP-6M(1976), "Windows, Steel, Vertical and Horizontal Sliding, Medium Duty."

(Windows manufactured in conformance with CGSB window standards may be either Grade 1 or Grade 2, regardless of height above grade.)

D. GLASS

- (1) Glass shall conform to one of the following:
 - CAN2-12.1-M79, "Glass, Safety, Tempered or Laminated,"
 - CAN2-12.2-M76, "Glass, Sheet, Flat, Clear," or
 - CAN2-12.3-M76, "Glass, Polished Plate or Float, Flat, Clear."
- (2) Thickness of glass in windows shall conform to Table 7B.

TABLE 7B—MAXIMUM GLASS PERIMETER FOR VARIOUS THICKNESSES, mm

Minimum Glass Thickness of Inner and Outer Panes, mm	Sash Type or Fixed Glazing	Factory-Sealed Double Glazing	
		Fused Edges	Other than Fused Edges
2	3 050	4 575	3 810
3	4 270	6 405	5 340
4	6 100	9 150	7 625
5	7 120	10 680	8 900
6	8 620	12 930	10 775
8	No limit	No limit	No limit
Column 1	2	3	4

E. CAULKING AND GLAZING

- (1) Sealing compound used in the glazing of factory-sealed double-glazed units shall be compatible with the material used to edge seal the units.
- (2) Caulking shall be provided between window frames or trim and the exterior siding or masonry in conformance with Subsection 28D.

F. WINDOWS IN PUBLIC AREAS

- (1) Except as provided in (3), transparent panels that could be mistaken as a means of egress shall be protected by barriers or railings.
- (2) Windows in exit stairways that extend to less than 1 070 mm above the landing shall be protected by barriers or railings located approximately 1 070 mm above such landings.
- (3) Sliding glass partitions which separate a public corridor from an adjacent occupancy and which are open during normal working hours need not conform to (1) and Article 6 F (3), except that such partitions shall be suitably marked to indicate their existence and position.
- (4) Windows in public areas that extend to less than 1 m from the floor and are located above the second storey in buildings of residential occupancy shall be protected by barriers or railings 1 m above the floor, or the windows shall be non-openable and designed to withstand the lateral design loads for balcony guards in Part 4 of the National Building Code of Canada 1980.

G. HARDWARE

- (1) Material for window hinges shall conform to the requirements in Subsection 6H for door hinges.
- (2) Every openable window shall be equipped with corrosion-resistant locking devices controlled from the interior.
- (3) Either the upper or lower sash of vertical sliding wood sash windows shall be balanced. An unbalanced upper sash shall be fixed in position by means of a block or other sash holding device.
- (4) Corrosion-resistant sash lifts shall be provided for vertical sliding sash.
- (5) Hinged sash in other than unfinished basements shall be equipped with devices to hold the sash in any position.

SECTION 8. STAIRS, RAMPS, HANDRAILS AND GUARDS**A. SCOPE**

- (1) This Section applies to the design and construction of interior and exterior stairs, steps, ramps, railings and guards.
- (2) Where the stair forms part of an exit, the appropriate requirements in Sections 9 and 10 shall also apply.
- (3) Where stairs are located within dwelling units, this Section shall apply to all buildings, regardless of size.

B. GENERAL

- (1) Treads and risers shall have uniform rise and run in any one flight.
- (2) Except for interior stairs within a dwelling unit, at least 3 risers shall be provided for interior stairs.
- (3) Interior stairways extending through the roof of a building shall be protected from ice and snow.

C. STAIR DIMENSIONS

- (1) Interior stairs within dwelling units to areas used only for storage, laundry and mechanical equipment such as unfinished basements, cellars and attics, shall have a maxi-

mum rise of 230 mm, a minimum run of 200 mm and a minimum tread width of 230 mm.

- (2) Interior stairs within dwelling units other than those listed in (1) and exterior stairs serving dwelling units shall have a maximum rise of 200 mm, a minimum run of 210 mm and a minimum tread width of 235 mm.
- (3) Interior stairs not contained within dwelling units and exterior stairs for buildings, except those serving not more than 1 dwelling unit, shall have a maximum rise of 200 mm, a minimum rise of 125 mm, a minimum run of 230 mm and a minimum tread width of 250 mm. The product of the run and rise (expressed in millimetres) for such stairs shall be not less than 45 000 nor more than 48 500.
- (4) Where the run of any stair is less than 250 mm, a nosing of at least 25 mm shall be provided beyond the face of the riser, or an equivalent back slope on the risers shall be provided.
- (5) Except as required in Article 9 C (3), exit stairs and stairs used by the public shall have a width, measured between wall faces or guards, of at least 900 mm.
- (6) At least 1 stairway between each floor level in a dwelling unit shall have a minimum width between wall faces of at least 860 mm.
- (7) The head room measured vertically from a line drawn through the outer edges of the nosings shall be at least 1.95 m for stairs located in dwelling units and 2.05 m for all other stairs.

D. LANDINGS

- (1) Landings shall be at least as wide and as long as the width of stairs in which they occur, except that the length of landing for exterior stairs serving not more than 1 dwelling unit need not exceed 900 mm, and the length of landing for all other stairs in a straight run need not exceed 1 100 mm.
- (2) Where a door swings towards a stair, the full arc of its swing shall be over a landing. Except as provided in (3), a landing shall be provided at the top and bottom of each flight of interior stairs and where a doorway occurs in a stairway.
- (3) Where a door occurs at the top of the stair in a dwelling unit, no landing is required between the doorway and the stairs.
- (4) A landing shall be provided at the top of all exterior stairs, except that a landing may be omitted at a secondary entrance to a building containing a single dwelling unit provided the stair does not contain more than 3 risers.
- (5) The vertical height between any landings shall not exceed 3.6 m.
- (6) The clear height over landings shall be at least 1.95 m in dwelling units and 2.05 m for other landings.

E. CURVED STAIRS AND WINDERS

- (1) Curved stairs used in exits shall conform to the requirements for exit stairs in this Section.
- (2) Except as permitted in (3), a curved stair not required as an exit shall have a minimum average run of 200 mm and a minimum run of 150 mm and shall have risers conforming to 8 C (1) to 8 C (3).
- (3) Stairs within dwelling units may contain winders that converge to a centre point provided the winders turn through an angle of not more than 90° and individual treads turn through an angle of 30°. Only 1 set of such winders shall be permitted between floor levels.

F. PEDESTRIAN RAMPS

- (1) The maximum gradient for pedestrian ramps shall be 1 in 10.
- (2) Where a doorway or stairway opens onto the side of a ramp there shall be a level area extending across the full width of the ramp and for a distance of at least 300 mm on either side of the wall opening.
- (3) Where a doorway or stairway opens onto the end of a ramp, there shall be a level area extending across the full width of the ramp and along the ramp for at least 900 mm.
- (4) Where ramps are installed for use by persons in wheelchairs, such ramps shall be at least 900 mm in width and have nonslip surfaces.
- (5) Ramps described in (4) shall have a level area of at least 1.5 m by 1.5 m at the top and bottom of the ramp, except that where a doorway at the top of a ramp swings away from the ramp, the depth of the level area at the top of the ramp may be reduced to 900 mm. The level portion at the top of a ramp shall extend at least 300 mm beyond the latch edge of any door.
- (6) Where there is an abrupt change in the direction of a ramp described in (4), or where the ramp exceeds 9 m in length, it shall have a level landing at least 1.2 m long, and at least the same width as the ramp at intervals of not more than 9 m.

G. HANDRAILS

- (1) Except as permitted in (2) and (3), a handrail shall be provided on at least 1 side of stairs less than 1 100 mm in width, and on 2 sides of stairs 1 100 mm in width or greater.
- (2) Handrails are not required for stairs within dwelling units having not more than 2 risers, or for exterior stairs having not more than 3 risers and serving not more than 1 dwelling unit.
- (3) Only 1 handrail is required on exterior stairs having more than 3 risers provided such stairs serve not more than 1 dwelling unit.
- (4) Handrails on stairways shall be located between 800 and 900 mm measured vertically above a line drawn through the outside edges of the stair nosings.
- (5) A clearance of at least 40 mm shall be provided between each handrail and the wall to which it is fastened.
- (6) Handrails shall be so constructed that there will be no obstruction on or above them to break a handhold.
- (7) Handrails and stair stringers shall not project more than 100 mm into the required width of stairway.
- (8) Where ramps are required to provide access for persons in wheelchairs, a handrail shall be provided on at least 1 side of the ramp where the slope of the ramp exceeds 1 in 20, and on 2 sides where the slope exceeds 1 in 12. Such handrails shall conform to (4) to (7) and shall extend at least 300 mm beyond the top and bottom of the ramp in a manner that will not constitute a hazard.

H. GUARDS

- (1) Every exterior landing, porch and every balcony, mezzanine, gallery, raised walkway and roof to which access is provided for other than for maintenance purposes, shall be protected by guards on all open sides where the difference in elevation between adjacent levels exceeds 600 mm, and every exterior stair with more than 6 risers shall be protected with guards on all open sides where the difference in elevation between the adjacent ground level and the stair exceeds 600 mm.

- (2) When an interior stair has more than 2 risers, the sides of the stair and the landing or floor level around the stair well shall be enclosed by walls or be protected by guards, except that a stair to an unfinished basement or cellar in a dwelling unit may have 1 unprotected side.
- (3) Except as provided in (4) and (5), all guards including those for balconies shall be at least 1 070 mm in height.
- (4) Except as provided in (5), guards for stairs shall be at least 900 mm in height measured vertically from a line drawn through the outside edges of the stair nosings, and 1 070 mm in height at landings.
- (5) Guards for stairways within dwelling units and stairs serving not more than 1 dwelling unit shall be at least 800 mm measured vertically above a line drawn through the outside edges of stair nosings, and at least 900 mm above landings. All other required guards within dwelling units shall be at least 900 mm in height.
- (6) Except for floors of garages in Section 36, a continuous curb at least 150 mm in height and a guard not less than 1 070 mm above the floor level shall be provided at every opening through a garage floor and around the perimeter of such floor and ramps where the exterior walls are omitted where the top of the floor is 600 mm or more above an adjacent ground or floor level.
- (7) Openings through a guard on a balcony or an exit stair, except an exit stair serving not more than 1 dwelling unit, shall be of a size as to prevent the passage of a spherical object having a diameter of 100 mm, unless it can be shown that the location and size of such openings which exceed this limit do not represent a hazard.
- (8) Guards around exterior balconies shall be designed so that no member, attachment or opening located between 100 mm and 900 mm above the balcony floor will facilitate climbing.
- (9) Guards for ramps including vehicular ramps shall conform to the requirements for guards for stairs in (3), (4) and (7).

I. CONSTRUCTION

- (1) Exterior concrete stairs with more than 2 risers and 2 treads shall be supported on unit masonry or concrete walls or piers at least 150 mm by 150 mm, or shall be cantilevered from the main foundation wall. When such steps are cantilevered from the foundation wall, they shall be constructed and installed in conformance with Subsection 8 J. The depth below grade for foundations for exterior steps shall conform to the requirements in Section 12. Exterior wood steps shall not be in direct contact with the ground unless suitably treated with a wood preservative.
- (2) Wooden stair stringers shall have a minimum effective depth of 90 mm and an over-all depth of at least 235 mm. Stringers shall be supported and secured top and bottom. Stringers shall be at least 25 mm in actual thickness if supported along their length and 38 mm actual thickness if unsupported along their length. Stringers shall be spaced not more than 900 mm o.c. in dwelling units and 600 mm o.c. when located in other than dwelling units, except that in dwelling units where risers support the front portion of the tread, the space between stringers shall not exceed 1 200 mm unless the stringers are designed for wider spacings.
- (3) Lumber or plywood treads for stairs within dwelling units shall be at least 25 mm actual thickness, except that if open risers are used, and the distance between stringers exceeds 750 mm, the treads shall be at least 38 mm actual thickness.
- (4) The finish for treads and landings of interior stairs in dwelling units, other than stairs to unfinished basements and cellars, shall consist of hardwood, vertical grain softwood, resilient flooring or other material providing equivalent performance.

- (5) The finish for treads and landings of interior and exterior stairs, other than those in dwelling units, shall have a non-skid finish or shall be provided with non-skid strips.

J. CANTILEVERED PRECAST CONCRETE STEPS

- (1) Exterior concrete steps and their anchorage system that are cantilevered from a foundation wall shall be designed and installed to support the loads to which they may be subjected.
- (2) Cantilevered concrete steps in (1) shall be anchored to concrete foundation walls at least 200 mm thick.
- (3) Suitable precautions shall be taken during back-filling and grading operations to ensure that subsequent freezing of the soil will not cause uplift forces on the underside of cantilevered concrete steps to the extent that the steps or the walls to which they are attached will be damaged.

SECTION 9. MEANS OF EGRESS

A. SCOPE

- (1) This Section applies to requirements that are designed to permit the safe and convenient access to the exterior of a building, to a public thoroughfare or to acceptable open space.
- (2) Stairways, handrails and guards in a means of egress shall conform to the requirements in Section 8 as well as to the requirements in this Section.
- (3) Flame-spread ratings, fire-resistance ratings and fire-protection ratings shall conform to Section 10.

B. GENERAL

- (1) An access to exit shall be provided from every roof intended for occupancy and from every podium, terrace, platform or contained open space. Where a roof is intended for an occupant load of more than 60 persons, at least 2 separate means of egress shall be provided from the roof to stairs designed in conformance with the requirements for exit stairs and located remote from each other. Where a podium, terrace, platform or contained open space is provided, egress requirements shall conform to the appropriate requirements for rooms or suites in Article 9 G(4).
- (2) Exits may consist of doorways, passageways, ramps, stairways and horizontal exits. Fire escapes may be used as exits on existing buildings provided they are designed and installed in conformance with Part 3 of the National Building Code of Canada 1980.
- (3) Elevators, slide escapes or windows shall not be considered as being part of a required means of egress.
- (4) An exit shall be designed for no purpose other than for exiting, except that an exit may also serve as an access to a floor area.
- (5) Service rooms such as boiler rooms, furnace rooms or incinerator rooms and ancillary rooms such as storage rooms, washrooms, water-closet rooms, garbage rooms and laundry rooms shall not open directly into an exit.
- (6) Fire escapes shall not be installed on any new building.
- (7) Where a horizontal exit is used, it shall conform to Part 3 of the National Building Code of Canada 1980.
- (8) Every public building shall have at least 1 principal entrance designed in conformance with the ACNBC document, "Building Standards for the Handicapped 1980," for use

by physically handicapped persons, opening to the outdoors at sidewalk level or to a ramp leading to a sidewalk.

- (9) Every public building shall provide access for physically handicapped persons from the entrance described in (8) to public spaces on the entrance floor, and to at least 1 elevator when elevators are provided in conformance with the ACNBC document, "Building Standards for the Handicapped 1980."
- (10) Unless otherwise permitted by the authority having jurisdiction, every building required by Section 37 to have an elevator shall have an entrance designed for use by physically handicapped persons, opening to the outdoors at sidewalk level or to a ramp leading to a sidewalk or other approved space. The location of such entrance shall be clearly indicated by signs conforming to the ACNBC document, "Building Standards for the Handicapped 1980."
- (11) Unless otherwise permitted by the authority having jurisdiction, every building required by Section 37 to have an elevator shall provide access for physically handicapped persons from the entrance described in (10) to each dwelling unit, public space such as shared recreational facilities, shared laundry rooms, mail boxes and garbage disposal facilities, and to at least 1 elevator.
- (12) Access for physically handicapped persons described in (10) and (11) shall be constructed to facilitate the passage of wheelchairs, and any abrupt change in elevation in a floor area shall be provided with ramps conforming to the requirements in Subsection 8 F.
- (13) Vestibules that provide access for physically handicapped persons, including those in washrooms and water-closet rooms, shall be designed to permit movement of wheelchairs between the doors.

C. DIMENSIONS OF MEANS OF EGRESS

- (1) This Subsection applies to every means of egress except exits that serve not more than 1 dwelling unit and access to exits within dwelling units.
- (2) The occupant load of floor areas or part of floor areas used in determining the minimum required width of a means of egress shall be the number of persons for which such areas are designed, but not fewer than 2 persons per bedroom or sleeping area, except that in dormitories the maximum area to be assumed per person shall be 4.6 m² unless otherwise approved.
- (3) Except as provided in Subsection 9 F, the width of an exit corridor shall be at least 1 100 mm and the width of other exits at least 900 mm, unless greater widths are required because of the occupant load. In computing the exit width on the basis of occupant load, the minimum aggregate width of exterior exit doors shall be 1 unit (see (6)) per 90 persons, and the minimum aggregate width of other exits not at or near ground level shall be 1 unit per 30 persons. (See also Article 8 C (5).)
- (4) Except as provided in Subsection 9 F, the minimum width of a doorway, corridor or passageway in an access to exit shall be 1 unit (see (6)) per 90 persons, but in no case shall the minimum width of a public corridor or in a corridor used by the public be less than 1 100 mm.
- (5) Except as provided in Subsection 9 F, the minimum width of a stairway or ramp in an access to exit shall be 1 unit per 60 persons (see (6)).
- (6) The units of exit width in (3) to (5) shall be determined by dividing the width (in millimetres) of an exit by 55. Where the remainder is less than 300 mm, it shall not be considered as contributing to the number of units. Where the remainder is 300 mm or more, it shall be considered as contributing ¼ unit of exit width in the case of stairs and ½ unit of exit width in the case of other exit facilities.

- (7) Where an exit serves more than 1 floor area, the aggregate width of such exit need not be cumulative from floor to floor, except that where exits from above or below converge at an intermediate level, the width beyond the convergence in the direction of exit travel shall be not less than the aggregate required width of the converging exits.
- (8) Except as provided in Subsection 9 F and in Articles 8 C (7) and 8 D (6), the minimum height of exits and corridors which provide access to exits shall be 2.15 m.

D. FIRE PROTECTION OF EXITS

- (1) This Subsection applies to the fire protection of all exits except exits serving not more than 1 dwelling unit.
- (2) Except as provided in (3) and (6), every exit other than a doorway opening directly to the outdoors at ground level shall be separated from the remainder of the building or from another exit by a fire separation having a fire-resistance rating of at least $\frac{3}{4}$ h. A fire separation common to 2 exits shall be smoke tight and not be pierced by doorways, duct work, piping or any other opening that may affect the continuity of the separation.
- (3) The area of wired glass in a door or side light between an exit enclosure and the remainder of the building shall not exceed 0.8 m², except that greater glass areas are permitted when the door or sidelight is located in an enclosed vestibule or corridor constructed as a fire separation having at least a $\frac{3}{4}$ h fire-resistance rating.
- (4) Openings in the exterior wall of an exit shall be protected with wired glass or glass block installed in accordance with Articles 10 M (5) and 10 M (7), where openings may be exposed to the hazard of a fire in another fire compartment of the same building.
- (5) Where an exterior exit door may be exposed to the hazards of a fire from openings in a separate fire compartment located within 3 m horizontally of the exit, such openings shall be protected with wired glass in fixed steel frames conforming to 10 M (5) or glass block conforming to 10 M (7).
- (6) The requirements in (2) do not apply to an exterior passageway that is designed as an exit facility provided the passageway is open to the outside air and is served by an exit stair at each end of the passageway.

E. OBSTRUCTIONS AND HAZARDS IN MEANS OF EGRESS

- (1) This Subsection applies to obstructions and hazards in every means of egress except those within a dwelling unit or serving not more than 1 dwelling unit.
- (2) Where a public corridor or a corridor used by the public contains an occupancy, such occupancy shall not reduce the unobstructed width of the corridor to less than the required width of the corridor.
- (3) Except as permitted in Subsection 9 F and Article 8 G (7), no fixture, turnstile or construction shall project within the required width of exit.
- (4) No mirror shall be placed in or adjacent to any exit so as to confuse the direction of exit, and no mirror or draperies shall be placed on or over exit doors.
- (5) Fuel-fired appliances shall not be installed in an exit or a corridor serving as access to exit.
- (6) Service rooms containing equipment subject to possible explosion, such as boilers designed to operate at a pressure in excess of 100 kPa and certain types of refrigerating and transformer equipment, shall not be located under required exits.

F. DOORS IN A MEANS OF EGRESS

- (1) This Subsection applies to all doors in a means of egress except exterior doors serving not more than 1 dwelling unit unless otherwise stated herein.

- (2) Exit doors shall not decrease the required exit width by more than 50 mm for each full unit of exit width (550 mm), and where such doors lead out of stairs or ramps in the direction of exit travel, they shall not be less than $\frac{3}{4}$ of the width of such stairs or ramps.
- (3) Doors in their swing shall not reduce the effective width of exit stairs or landings to less than 750 mm, nor shall they reduce the effective width of an exit passageway to less than the required width.
- (4) No door closer or other device shall be installed in an exit in such a manner as to reduce the head room clearance to less than 1 980 mm.
- (5) An exit door or a door that opens to or is located in a public corridor or other facility providing access to exit from suites shall be not less than 2 030 mm in height. Except as required in Subsection 6 C and (2), such doors shall be at least 810 mm in width when only 1 door leaf is installed in an opening, and 600 mm in width where more than 1 door leaf is provided in the width of an opening. The width of an individual door leaf shall not exceed 1 200 mm in such openings.
- (6) Every door that opens onto a corridor or other facility that provides access to exit from a room or suite having an occupant load of more than 60 persons, and every door that is located within a corridor that is required to be separated from the remainder of the floor area by a fire separation shall swing on a vertical axis in the direction of exit travel and shall not open onto a step. This shall not be considered to prohibit acceptable sliding doors designed to swing on a vertical axis when pressure is applied provided such doors are identified as swinging doors by means of a sign or decal.
- (7) Except as permitted in (8), where an exit door opens onto a landing, the landing shall be not less than 300 mm wider and longer than the width of the door. Such doors either in the open or closed position shall be not closer than 300 mm to the nearest riser.
- (8) Where there is a danger of blockage from ice or snow, an exit may open onto not more than 1 step provided the rise of such step does not exceed 150 mm.
- (9) Except for a storage garage serving not more than 1 dwelling unit, and except for other accessory buildings where there is no danger to life safety, every required exit door, including an exit door serving a dwelling unit, shall swing on a vertical axis. Such door shall open in the direction of exit travel, except that a door serving not more than 1 dwelling unit is permitted to swing inward.
- (10) Revolving doors used as exits shall be of an acceptable collapsible type, and shall be permitted only at ground floor level away from the foot of any stairway. Not more than $\frac{1}{2}$ unit of exit width may be assumed for such doors. Swing doors shall be provided adjacent to such doors.
- (11) Exit doors and doors to dwelling units shall be openable from the inside without requiring keys, special devices or specialized knowledge of the door opening mechanism.
- (12) Except for hotels and motels, a door opening onto a public corridor which provides access to exit from suites shall be designed not to lock automatically when such doors are equipped with automatic self-closing devices.
- (13) Every exit door shall be designed and installed so that when the latch is released the door will open in the direction of exit travel under a force of not more than 90 N applied at the knob or other latch releasing device.

G. ACCESS TO EXITS

- (1) This Subsection applies to access to exits within floor areas except within suites unless otherwise stated herein.
- (2) Except as permitted in (4) and Subsection I, each suite on a floor area occupied by more than 1 suite shall have an exterior doorway at or near ground level or a doorway leading to an exterior passageway open to the outdoors or to a public corridor. From the

point where such doorway enters the exterior passageway or interior corridor, it shall be possible to go in opposite directions to each of 2 separate exits, except as otherwise permitted in this Section.

- (3) A dead-end public corridor is acceptable provided it does not exceed 6 m in length, measured from the end of the corridor to the nearest exit. Such dead-ends shall contain no door openings except entrance doors to suites. Such doors shall be located so that it shall not be necessary to pass more than 2 doors in travelling to the nearest exit. The area of wired glass in such doors shall not exceed 645 cm².
- (4) Except as provided in Subsection I, at least 2 egress doors shall be provided when the area of a suite exceeds 100 m², or the distance measured from any point within the room or suite to the nearest door opening directly into a public corridor exceeds 15 m. Such doors shall be spaced so that in the event that one doorway is made inaccessible by fire within such room or suite, the other doorway will provide safe egress.
- (5) Required access to exit from suites shall not be through any other dwelling unit, service room or other occupancy.

H. EXITS FROM FLOOR AREAS

- (1) For the purposes of this Subsection, travel distance means the distance from any point in the floor area to an exit measured along the path of exit travel, except that where a room or suite is separated from the remainder of the floor area by a fire separation having a fire-resistance rating of at least $\frac{3}{4} h$, the travel distance may be measured from an egress door of the room or suite to the nearest exit.
- (2) Except as provided in Subsection I, at least 2 exits shall be provided from every floor area spaced so that the travel distance to the nearest exit shall be not greater than 30 m. Where the floor area is sprinklered and is subdivided into suites, the travel distance may be increased to 45 m. (See (1) for explanation of travel distance.)
- (3) Where more than 1 exit is required from a floor area, each exit shall be considered as contributing not more than $\frac{1}{2}$ the required units of exit width.
- (4) Where more than 1 exit is required from a floor area, at least 2 exits shall be independent of each other and be placed remote from each other along the path of travel between them.
- (5) Not more than 1 exit from a floor area above or below the main entrance lobby shall lead through the lobby. Such lobby shall be not more than 5 m above grade and the path of travel through the lobby shall not exceed 15 m. The lobby shall conform in all respects with the requirements for exits, except that rooms other than garbage rooms, boiler rooms, furnace rooms, incinerator rooms, storage rooms and rooms containing a residential occupancy may open directly onto such lobby. Where the lobby and adjacent occupancies that are permitted to open into the lobby are sprinklered, the fire separation between such occupancies and the lobby need not have a fire-resistance rating.
- (6) A mezzanine shall be provided with exits on the same basis as required for a floor area where a mezzanine is considered to be a storey in 10 G (8) or is of a size required to have more than one exit.

I. EGRESS FROM DWELLING UNITS

- (1) Except as provided in Articles (2) and (3), every dwelling unit shall have a sufficient number of exits or egress doors so that it shall not be necessary to travel up or down more than 1 storey to reach a level served by an exit or egress door to a public corridor or exterior passageway.
- (2) Where there is no dwelling unit above another dwelling unit, the travel limit from a floor level in a dwelling unit to an exit or egress door may exceed 1 storey where that floor level is served by an openable window providing an unobstructed opening of not

less than 1 m in height and 0.55 m in width, located so that the sill is not more than 1 m above the floor and not more than 7 m above adjacent ground level.

- (3) The travel limit from a floor level in a dwelling unit to an exit or egress door may exceed 1 storey where that floor level has direct access to a balcony.
- (4) Except as provided in 9 G (3), where an egress door from a dwelling unit opens onto a public corridor or exterior passageway, it shall be possible from the location where the egress door opens onto the corridor or exterior passageway to go in opposite directions to 2 separate exits unless the dwelling unit has a second and separate means of egress.
- (5) Where an egress door from a dwelling unit opens onto an enclosed exit stairway that serves more than 1 dwelling unit, the dwelling unit shall be provided with a second and separate means of egress.

J. EXIT SIGNS

- (1) This Subsection applies to all exits except those serving not more than 1 dwelling unit.
- (2) Exits shall be located so as to be clearly visible or their location shall be clearly indicated.
- (3) Except for the main entrance door to a building, every exit door in a 3-storey building, or a building having an occupant load greater than 150, shall have an exit sign over it.
- (4) Exit direction signs shall be placed in corridors and passageways where necessary to indicate the direction of exit travel.
- (5) Exit signs shall be installed so as to be visible from the exit approach. Such signs shall have the word "EXIT" in red letters on a contrasting background or white letters on a red background when the sign is internally lighted, and white letters on a red background or red letters on a white background when the sign is externally lighted. Lettering shall be made with at least 20 mm wide strokes and be at least 150 mm high when the signs are externally lighted, and at least 115 mm high if the sign is internally lighted.
- (6) Provisions shall be made to illuminate exit signs required in (3) by an electrical circuit separate from other electrical circuits.
- (7) In 3-storey buildings any part of an exit ramp or stair that continues past the exit door at ground level shall be clearly marked to indicate that it does not lead to an exit where there is a possibility that the portion below ground level may be mistaken as the direction of exit travel.

K. LIGHTING

- (1) This Subsection applies to the lighting of all exits except those serving not more than 1 dwelling unit.
- (2) Every exit and public corridor shall be provided with lighting in accordance with the requirements in Article 35 B (9).
- (3) Emergency lighting shall be provided in exits, corridors used by the public and principal routes providing access to exit in an open floor area where such exits, corridors and access routes are below grade, are windowless or are required in buildings in Subsection 10 Q to have a fire alarm system.
- (4) Emergency lighting required in (3) shall be provided from a source of energy separate from the electrical supply for the building. Such lighting shall be designed to be automatically actuated when the electric lighting in the affected area is interrupted. Illumination from such lighting shall be at least 10 lx for a period of at least ½ h. Where incandescent lighting is provided, lighting equal to 1 W/m² of floor area shall be considered to meet this requirement.

- (5) Where self-contained emergency lighting units are used, they shall conform to CSA C22.2 No. 141-1972, "Unit Equipment for Emergency Lighting."

SECTION 10. FIRE PROTECTION

A. SCOPE

This Section contains requirements to protect the lives of the occupants by resisting the collapse of buildings in the event of fire and by resisting the spread of fire throughout the buildings or to other buildings.

B. GENERAL

- (1) Except as provided in (2), a construction required to have a fire-resistance rating shall be supported by construction having at least the same fire-resistance rating.
- (2) Floors over crawl spaces that are not required by Article 10 G (4) to have a fire-resistance rating and construction supporting a service room need not conform to (1).
- (3) An assembly required to be of noncombustible construction shall be supported by non-combustible construction.
- (4) Where a firewall divides a building, each portion of the building so divided may be considered as a separate building. Such firewalls shall be constructed to conform to J (3) to J (12).
- (5) For the purposes of this Section, a basement or cellar means any storey located below the first storey.
- (6) For the purposes of this Section, roofs with slopes at 60° or more to the horizontal and which are adjacent to a room or space intended for occupancy shall be considered as a wall.
- (7) Facilities for the dispensing of gasoline shall not be installed in or above any space intended for occupancy or in any building, except that this requirement does not apply to a canopy which is open on at least 75 per cent of its perimeter.
- (8) In kitchens containing commercial cooking equipment used in processes producing grease-laden vapours, the equipment shall be designed and installed in conformance with Part 6 of the National Building Code of Canada 1980.
- (9) The finish of every garage floor shall be of noncombustible material or asphalt.
- (10) Transformer vaults, covered malls, walkways, elevators and escalators shall conform to Part 3 of the National Building Code of Canada 1980. (See also Section 37.)
- (11) Openings through floors that are not protected by shafts or closures shall be protected in conformance with Subsection 3.2.9. of the National Building Code of Canada 1980.
- (12) Where rooms or spaces are intended for an assembly occupancy, or for the storage, manufacture or use of hazardous or explosive material, such rooms or spaces shall conform to Part 3 of the National Building Code of Canada 1980.
- (13) Where fuel-fired appliances are installed on a roof, such appliances shall be installed in conformance with Part 6 of the National Building Code of Canada 1980.
- (14) Where sprinkler, standpipe and hose systems or fire alarm and detection systems are installed, they shall be installed to conform to Part 3 of the National Building Code of Canada 1980.

C. RATINGS

- (1) Where a fire-resistance rating or a fire-protection rating is required in this Section for an element of a building, such rating shall be determined in conformance with Tables 11A and 11B, Chapter 2 of the Supplement to the NBC 1980, or in conformance with the test methods described in Part 3 of the National Building Code of Canada 1980.
- (2) Where a flame-spread rating is required in this Section for an element of a building, such rating shall be determined in accordance with the test methods described in Part 3 of the National Building Code of Canada 1980, or in accordance with Chapter 2 of the Supplement to the NBC 1980. Unless such rating is referred to herein as a "surface flame-spread rating," it shall apply to any surface of the element being considered that would be exposed by cutting through it as well as to the exposed surface of the element.
- (3) Floor and roof assemblies shall be rated for exposure to fire on the underside.
- (4) Exterior walls shall be rated for exposure to fire from inside the building. Such walls need not comply with the temperature rise limitations required by the standard tests referred to in (1) if such walls have a limiting distance of at least 1.2 m and due allowance is made for the effects of heat radiation in accordance with the requirements in Part 3 of the National Building Code of Canada 1980.
- (5) Firewalls and interior vertical fire separations required to have fire-resistance ratings shall be rated for exposure to fire on each side.
- (6) Where a ceiling construction has a suspended membrane ceiling with lay-in panels or tiles which contribute to the required fire-resistance rating, hold down clips or other means shall be provided to prevent the lifting of such panels or tiles in the event of a fire.

D. PERMITTED OPENINGS IN WALL AND CEILING MEMBRANES

- (1) Except as permitted in (2) and (3), a membrane forming part of an assembly required to have a fire-resisting rating shall not be pierced by openings into the assembly unless the assembly has been tested and rated for such openings.
- (2) A wall or ceiling membrane forming part of an assembly required to have a fire-resistance rating may be pierced by openings for electrical and similar service outlet boxes provided such outlet boxes are tightly fitted. Where such boxes are located on both sides of walls required to provide a fire-resistance rating, they shall be offset where necessary to maintain the integrity of the fire separation.
- (3) A membrane ceiling forming part of an assembly required to have a fire-resistance rating may be pierced by openings into noncombustible ducts within the ceiling space provided such openings are located not less than 2 m apart and do not constitute more than 1 per cent of the ceiling area within a fire compartment. Individual openings shall not exceed 900 cm² in area, and if greater than 130 cm² shall be protected by a fire stop flap as described in M (14).

E. CONSTRUCTION TYPES

- (1) Where a wall, floor or roof assembly is required to be of noncombustible construction, combustible elements shall be limited in conformance with the requirements in Article 3.1.4.5. of the National Building Code of Canada 1980.
- (2) Heavy timber construction shall be considered to have $\frac{3}{4}$ h fire-resistance rating when it is constructed in accordance with the requirements for heavy timber construction in Part 3 of the National Building Code of Canada 1980.

F. PROTECTION OF STEEL MEMBERS

- (1) Except as permitted in (2) to (8), structural steel members used in construction required to have a fire-resistance rating shall be protected to provide the required fire resistance.
- (2) Steel lintels in loadbearing walls spanning not more than 2 m and steel lintels in non-loadbearing walls spanning not more than 3 m need not be protected.
- (3) The bottom flanges of shelf angles and plates that are not part of the structural frame need not be protected as required in (1).
- (4) Steel members around elevator shaft doorways or supporting elevator and dumbwaiter guides, counterweights and other such equipment when entirely enclosed in a shaft and not forming part of the structural frame of the building, need not be protected.
- (5) Steel members for stairways and escalators that are not part of the structural frame of the building need not be protected.
- (6) Steel members of porches, balconies, stairways, fire escapes, cornices, marquees and other similar constructions need not be protected provided they are outside of the building.
- (7) Steel members not less than 3 m from a property line or a centreline of a public thoroughfare and which are at least 1 m away from an unprotected opening need not be protected.
- (8) Loadbearing steel or concrete members such as columns, beams and arches at least 3 m from a property line or centreline of a public thoroughfare and which are shielded from a possible fire within the building by construction having a fire-resistance rating at least equivalent to that required for the loadbearing walls, columns and arches in Subsection G need not be protected provided such members are located so that they are not closer to an unprotected opening than the maximum horizontal projection of the member from the wall face.

G. FIRE RESISTANCE IN RELATION TO OCCUPANCY AND HEIGHT

- (1) Fire-resistance ratings of floors, roofs, walls, columns, arches and mezzanines shall conform to (2) to (5) and B (1), except that where there are more restrictive requirements elsewhere in this Standard, the more restrictive requirements shall apply.
- (2) Except as provided in (3) and (4), every floor shall have a fire-resistance rating of at least $\frac{3}{4}$ h.
- (3) Floors within dwelling units in which there is no dwelling unit above another dwelling unit need not have a fire-resistance rating.
- (4) Except as provided in (3), where a crawl space exceeds 1.8 m in height or is used for any occupancy or as a plenum in combustible construction or for the passage of flue pipes, the floor above it shall have a fire-resistance rating of at least $\frac{3}{4}$ h.
- (5) Except as provided in (3), interior mezzanines shall have a fire-resistance rating of at least $\frac{3}{4}$ h or shall be of noncombustible construction.
- (6) Where a building contains more than 1 major occupancy, the requirements in the National Building Code of Canada 1980 shall apply.
- (7) Elevator machine rooms, stairway bulkheads and penthouse service rooms need not be considered as a storey in determining building height and need not be constructed in conformance with (1) and (2).
- (8) Mezzanines shall not be considered as storeys for the purpose of determining building height if they occupy a total area of less than 10 per cent of the floor area of the storey in which they are located. Mezzanines shall not be considered as storeys where they occupy a total area of less than 40 per cent of the floor area of the storey provided the

space above the mezzanine floors and the floor below them have no visual obstructions more than 1 070 mm above such floors. Where more than one tier of mezzanine is provided in a storey, each tier additional to the first shall be considered as a storey.

- (9) Basements and cellars containing more than one storey or exceeding 600 m² in area shall conform to the requirements contained in Part 3 of the National Building Code of Canada 1980.
- (10) Where a basement is used primarily as a storage garage, the basement may be considered as a separate building for the purpose of this Section provided the floor above the basement is constructed as a fire separation of reinforced concrete having a fire-resistance rating of at least 2 h.

H. FIRE SEPARATIONS BETWEEN ROOMS AND SPACES WITHIN BUILDINGS

- (1) This Subsection applies to fire separations required between rooms and spaces in buildings except between rooms and spaces within a dwelling unit.
- (2) Except as permitted in (6) and (7), a wall, partition or floor assembly required to be a fire separation shall be constructed as a continuous element of a fire compartment.
- (3) Except as permitted in (6) and (7), openings in required fire separations shall be protected with closures conforming to Subsection M.
- (4) Except as permitted in (5), all floor assemblies except those contained within dwelling units shall be constructed as fire separations.
- (5) Except as required in G(4), the floor above a crawl space need not be constructed as a fire separation.
- (6) Pipes and ducts that penetrate through a required fire separation shall be tightly fitted or fire stopped to prevent the passage of smoke and flame if such pipes or ducts are not enclosed in a shaft. Unenclosed ducts that penetrate through a required fire separation shall be provided with fire dampers installed to conform to Part 6 of the National Building Code of Canada 1980. (See also Subsection D.)
- (7) Every pipe, duct, electrical conduit, electrical outlet box or other similar service equipment that partly or wholly penetrates a required fire separation shall be noncombustible unless the separation has been tested incorporating such equipment, except that electrical or other similar wiring not exceeding 25 mm in overall diameter or enclosed in a noncombustible conduit, and combustible electrical outlet boxes that have a face area of not more than 160 cm² shall be permitted without such tests. Where wires are grouped together, the 25 mm diam shall apply to the group.
- (8) Where a fire separation required to be of noncombustible construction terminates on the exterior wall or roof surface, no combustible material shall extend across the end of the fire separation to form a bridge where fire could cross.
- (9) Combustible construction that abuts on or is supported by a noncombustible fire separation shall be constructed so that its collapse under fire conditions will not cause collapse of the fire separation.
- (10) Except as provided in (11), a horizontal service space or other concealed space located above a required vertical fire separation shall be divided at the fire separation by an equivalent fire separation within the space.
- (11) Where a horizontal service space or other concealed space is located above a required vertical fire separation other than a vertical shaft, such space need not be divided as required in (10) provided the construction between such space and the space below is constructed as a fire separation having a fire-resistance rating at least equivalent to that required for the vertical fire separation, except that where the vertical fire separation is

not required to have a fire-resistance rating greater than $\frac{3}{4}$ h, the fire-resistance rating of the ceiling may be reduced to 30 min.

- (12) Except as provided in Articles (13) and (14), suites in residential occupancies shall be separated from adjacent rooms and suites by a fire separation having a fire-resistance rating of at least $\frac{3}{4}$ h.
- (13) Sleeping rooms in boarding and lodging houses where sleeping accommodation is provided for not more than 8 boarders or lodgers need not be separated from the remainder of the floor area as required in Article (12) where the sleeping rooms form part of the proprietor's residence.
- (14) Dwelling units which contain 2 or more storeys including basements or cellars shall be separated from adjacent dwelling units and from other parts of the building by a fire separation having a fire-resistance rating of not less than 1 h.
- (15) Except as provided in (16) and (17), a storage garage shall be separated from other occupancies by a fire separation having not less than a $1\frac{1}{2}$ h fire-resistance rating. A repair garage shall be separated from other occupancies by a fire separation having not less than a 2 h fire-resistance rating.
- (16) Except as permitted in (17), storage garages containing 5 cars or fewer shall be separated from other occupancies by a fire separation of not less than 1 h.
- (17) Where a storage garage serves only the dwelling unit to which it is attached or built in, it shall be considered as part of that dwelling unit, and the fire-resistance rating required in (16) need not be provided for the separation between the garage and the dwelling unit where the construction between the garage and the dwelling unit provides an effective barrier to gas and exhaust fumes, and every door between the garage and dwelling unit conforms to M (17). Where an attic space is common to 2 dwelling units and to the garage, the attic space adjacent to the garage shall be separated from such common attic space by a membrane at least equivalent to Type B, C or D finishes in Table 11A, or the ceiling of the garage shall be protected with a similar membrane.
- (18) The fire separation requirements for vertical shafts and chutes shall comply with Subsection K; boiler, furnace, incinerator and service rooms shall comply with Subsection I; and firewalls shall comply with Subsection J.
- (19) Combustible drain, waste and vent piping shall not be used in a plumbing system within a building where part of the system is located within or passes through a fire separation, except that where drain, waste and vent piping penetrates through a vertical fire separation, the piping on one side of the separation may be combustible provided the combustible piping is not located in a vertical shaft or in a fire separation.
- (20) Public corridors shall be separated from the remainder of the building by a fire separation having at least a $\frac{3}{4}$ h fire-resistance rating.

I. SERVICE ROOMS

- (1) This Subsection applies to service rooms in all buildings except rooms located within a dwelling unit.
- (2) Except as required in (3), (6) and (10), service rooms shall be separated from the remainder of the building by a fire separation having a fire-resistance rating of at least 1 h when the floor area containing the service room is not sprinklered.
- (3) Where a room contains a limited quantity of service equipment and the service equipment does not constitute a fire hazard, the requirements in (2) shall not apply.
- (4) Except as provided in (5) and (6), fuel-fired appliances other than fireplaces shall be located in a service room or service space designed for this purpose, and separated from the remainder of the building by a fire separation having not less than a 1 h fire-resistance rating.

- (5) Fuel-fired space-heating appliances, space-cooling appliances and service water heaters that serve only a room or suite, or serve a building having a building area of not more than 400 m² and not more than 2 storeys in building height, need not be separated from the remainder of the building as required in (4) where the equipment has been accepted for such use.
- (6) Service rooms containing incinerators shall be separated from the remainder of the building by a fire separation having a fire-resistance rating of not less than 2 h.
- (7) The design, construction, installation and alteration of each indoor incinerator shall conform to NFPA 82-1977, "Incinerators, Waste and Linen Handling Systems and Equipment."
- (8) Every incinerator shall be connected to a chimney flue conforming to the requirements in Section 21. Such chimney flue shall serve no other appliance.
- (9) An incinerator shall not be located in a room with other fuel-fired appliances.
- (10) Rooms for the temporary storage of combustible refuse or for public storage shall be separated from the remainder of the building by a fire separation having not less than a 1 h fire-resistance rating, except that a ¾ h fire separation is permitted where the fire-resistance rating of the floor assembly is not required to exceed ¾ h, or where such rooms are sprinklered.

J. FIREWALLS

- (1) Except as provided in (2), a party wall on a property line shall be constructed as a fire-wall.
- (2) In a building in which there is no dwelling unit above another dwelling unit, a party wall on a property line between dwelling units need not be constructed as a firewall provided it is constructed as a fire separation having not less than a 1 h fire-resistance rating. Such wall shall provide continuous protection from the top of the footings to the underside of the roof deck. Any space between the top of such wall and the roof deck shall be tightly sealed by caulking with mineral wool or noncombustible material.
- (3) A required firewall (see B (4) and (1)) shall be constructed as a fire separation of non-combustible construction having a fire-resistance rating of not less than 2 h. Except for closures, the required fire-resistance rating of every firewall shall be provided by masonry or concrete.
- (4) Except as permitted in (5), where structural framing members are connected to or supported on a firewall, and such members have fire-resistance ratings less than that required for the firewall, the connections and supports for such members shall be designed so that the collapse of the framing members during a fire will not cause the collapse of the firewall.
- (5) The requirements in (4) do not apply when a firewall consists of 2 separate wall assemblies each tied to its respective building frame but not to each other provided each wall assembly is constructed as a fire separation having ½ the fire-resistance rating required for the firewall in (3), and designed so that the collapse of one wall will not cause the collapse of the other.
- (6) Piping and conduit shall be installed so that the collapse of such piping or conduit will not cause the collapse of the firewall.
- (7) Except as provided in (8) and (9), every firewall shall extend from the top of the footings continuously through all storeys and not less than 150 mm above the roof surface where the firewall is required to have a 2 h fire-resistance rating. Where a firewall separates 2 buildings with roofs at different elevations, the firewall need not extend above the upper roof surface to form a parapet where the difference in elevation between the 2 roofs so separated is greater than 3 m.

- (8) In buildings of noncombustible construction, a firewall need not extend above the roof provided the roof assembly on both sides of the firewall has not less than a 1 h fire-resistance rating where the firewall is required to have a 2 h fire-resistance rating. Such firewall shall terminate at the underside of a solid roof slab or deck with a smoketight joint, and there shall be no concealed spaces within the roof slab in that portion directly above the firewall.
- (9) Firewalls located above a basement used primarily as a storage garage that is separated from the remainder of the building by a fire separation as described in G 10 may terminate at the floor assembly immediately above the storage garage.
- (10) Openings in a firewall shall be protected with closures in conformance with Subsection M, and the temperature rise on the unexposed face of such closures shall not exceed 250°C after ½ h when a 2 h firewall is required when tested in conformance with the test method described in Part 3 for closures. Wired glass in doors located in 2 h firewalls shall not exceed 645 cm² in area.
- (11) Openings in firewalls shall conform to M (8), except that the aggregate width of all openings shall not exceed 25 per cent of the length of the firewall.
- (12) Where the external walls of 2 buildings meet at a firewall at an external angle of 135° or less, the requirements of N (11) shall apply.

K. CHUTES AND VERTICAL SHAFTS

- (1) This Subsection applies to shafts and chutes in all buildings except where such shafts and chutes are entirely contained within a dwelling unit.
- (2) Refuse chutes shall be located in shafts in which there are no other building services.
- (3) Except as provided in (5), where building services are enclosed in shafts, the shaft walls shall be constructed as fire separations having a fire-resistance rating at least equal to that required for the floor assemblies through which it passes.
- (4) Where the top of a shaft does not extend through the roof of the building, or where the bottom of the shaft does not extend to the bottom of the building, the top or bottom of the shaft shall be separated from the remainder of the building by a fire separation having a fire-resistance rating not less than that required for the shaft walls, except that a service shaft may terminate in a service room provided the service room is separated from the remainder of the building by a fire separation having a fire-resistance rating at least equal to that required for the shaft.
- (5) Linen and refuse chutes shall be enclosed in a shaft constructed of noncombustible materials. Such shafts shall have a fire-resistance rating of not less than 1 h where the chute outlet is protected with an acceptable automatic self-latching closure held open by a fusible link. Where such closure is not provided, the shaft shall have not less than a 2 h fire-resistance rating.
- (6) Linen and refuse chutes shall be lined with not less than 0.41 mm thick copper-bearing galvanized steel, or 0.48 mm thick aluminum.
- (7) The intake openings for refuse and linen chutes shall be located in a compartment having no dimension less than 750 mm, separated from the remainder of the building by a fire separation having a fire-resistance rating of not less than ¼ h. Such compartment shall be used only as a facility for separating the intake opening from the remainder of the floor area, and shall not open into an exit. The intake openings for such chutes shall be not greater in area than 60 per cent of the cross-sectional area of the chutes. Such openings shall be fitted with closures designed to close automatically after use.
- (8) A refuse or linen chute shall discharge into a room or bin separated from the remainder of the building by a fire separation. Such separations shall have a fire-resistance rating

of not less than 1 h in the case of linen chutes and not less than 2 h in the case of refuse chutes. Doors into such rooms shall not be located in an exit.

- (9) The room or bin into which a refuse chute discharges shall be of sufficient size to contain the refuse between normal intervals of emptying. Such room or bin shall be impervious to moisture and shall have wash water supply and floor drains. Chute discharge rooms shall contain no service equipment other than that associated with garbage handling and disposal.
- (10) Automatic sprinklers shall be installed at the top of each refuse or linen chute and in the room or bin into which the chute discharges.
- (11) Every refuse chute shall be equipped at the top with spray equipment for washing the chute.
- (12) Refuse and linen chutes exceeding 1 000 cm² in cross-sectional area shall be provided with a vent equal in cross-section to the area of the chute and extending at least 1 m above the roof. Such vents shall be equipped with a closure that can be opened in the event of fire in the chute.
- (13) At least 1 refuse chute shall be provided in every building exceeding 3 storeys in building height.

L. PREVENTION OF FIRE SPREAD AT EXTERIOR WALLS AND BETWEEN STOREYS

- (1) Except as provided in (2) and B (10), the portions of a floor area or mezzanine that do not terminate at an exterior wall, a firewall or a vertical shaft, shall terminate at a vertical fire separation having a fire-resistance rating at least equal to that required for the floor assembly that terminates at the separation.
- (2) A mezzanine need not terminate at a vertical fire separation where the mezzanine is not required to be considered as a storey in G (8).
- (3) Where a wall in a building is exposed to a fire hazard from an adjoining roof of a separate unsprinklered fire compartment in the same building, the roof shall contain no skylights within a horizontal distance of 5 m of the windows in the exposed wall.
- (4) Except as provided in N (11), where exterior walls of a building meet at an external angle of 135° or less, the horizontal distance from an opening in one wall to another opening in the other wall shall be not less than 1.2 m where the openings are in different fire compartments.

M. DOORS, DAMPERS AND OTHER CLOSURES IN FIRE SEPARATIONS

- (1) Except as provided in (2), openings in required fire separations shall be protected with a closure conforming to Table 10B and shall be installed in conformance with Chapters 2 to 13 of NFPA 80-1979, "Fire Doors and Windows" unless otherwise specified herein. (See also C (1).)
- (2) A 45 mm thick solid core wood door conforming to CSA O132.2-M 1977, "Wood Doors" may be used where a minimum fire-protection rating of ½ h is permitted, or between a public corridor and a suite. Such door shall have not more than 6 mm clearance beneath and not more than 3 mm at the sides and top.
- (3) Doors required to provide a ½ h fire-protection rating or permitted to be 45 mm solid core wood shall be mounted in a wood frame of at least 38 mm thickness where the frame has not been tested and rated.
- (4) Doors forming part of an exit or a public means of egress shall conform to Subsection 9 F in addition to this Subsection.

- (5) Wired glass which has not been tested in accordance with (1) is permitted as a closure in a fire separation required to have a fire-resistance rating of not more than 1 h provided such glass is not less than 6 mm thick and conforms to CAN2-12.11-M76, "Glass, Wired, Safety." Such glass shall be mounted in fixed steel frames having a minimum metal thickness of 1.35 mm and providing a glazing stop of at least 20 mm on each side of the glass.
- (6) Steel door frames forming part of a closure in a fire separation, including anchorage requirements, shall conform to CAN4-S105-79, "Standard Specification for Fire Door Frames Meeting the Performance Required By CAN4-S104-77."

TABLE 10B—FIRE PROTECTION RATINGS FOR CLOSURES

Required Fire-Resistance Rating of Fire Separation, h	Required Fire-Protection Rating of Closure, h
½ or ¾	⅓ ⁽¹⁾
1	¾ ⁽¹⁾
1½	1
2	1½
3	2
4	3
Column 1	2

Note to Table 10B:

⁽¹⁾ See 10M(2) and (3).

- (7) Glass block that has not been tested in accordance with C (1) is permitted as a closure in a fire separation required to have a fire-resistance rating of not more than 1 h provided each horizontal joint is reinforced with metal.
- (8) Closures in fire separations shall not exceed 11 m² in area and 3.7 m in height or width.
- (9) Every swing type door in a fire separation shall be equipped with a latch.
- (10) Every door in a fire separation shall have an acceptable self-closing device.
- (11) Hold-open devices may be installed on exit doors provided they are designed to release the door upon a signal from a smoke detector located as described in NFPA 80-1979, "Fire Doors and Windows" and by a signal from the building alarm system if an alarm system is provided.
- (12) Swing-type doors to service rooms such as boiler, furnace or incinerator rooms shall swing into such rooms where such doors lead to public corridors or rooms used for assembly. Such doors shall swing outward from such rooms in all other cases. (See also 9 B (5).)
- (13) Except as permitted in B (7), D (3) and (15) and (16), ducts that connect 2 fire compartments shall be equipped with a fire damper installed in conformance with Article 6.2.3.9. of the National Building Code of Canada 1980 to prevent the spread of fire from one fire compartment to the other.
- (14) Fire stop flaps in ceiling membranes required in D (3) shall be constructed of not less than 1.47 mm thick sheet steel with 1.59 mm thick asbestos on the unexposed side and be equipped with corrosion-resistant pins and hinges. Such flaps shall be designed to close automatically at a temperature 30°C above the maximum temperature that will normally be encountered in the system.
- (15) A fire damper is not required where a noncombustible branch duct pierces a required fire separation provided the duct has a melting point of at least 760°C, a cross-sectional

area less than 130 cm² and supplies only air-conditioning units or combined air-conditioning and heating units discharging air at not more than 1.2 m above the floor.

- (16) A fire damper is not required where a noncombustible branch duct pierces a required fire separation around an exhaust duct riser in which the air flow is upward provided the branch duct has a melting point of at least 760°C, the branch duct is carried up inside the riser at least 500 mm and the exhaust duct is under negative pressure as described in 33 D (4).
- (17) A door between an attached or built-in garage and a dwelling unit shall be tight fitting and weather-stripped to provide an effective barrier against the passage of gas and exhaust fumes and shall be fitted with a self-closing device. A doorway between an attached or built-in garage and a dwelling unit shall not be located in a room intended for sleeping.
- (18) Where a 45 mm thick solid core wood door is permitted in a required fire separation, the requirement for a noncombustible sill in NFPA 80-1979, "Fire Doors and Windows" shall not apply.
- (19) Where a door is installed so that it may damage the integrity of a fire separation if its swing is unrestricted, door stops shall be installed to prevent such damage.

N. SPATIAL SEPARATIONS BETWEEN BUILDINGS

- (1) Except as provided in (2) to (6), the maximum percentage of unprotected openings in an exposing building face shall conform to Table 10C or to Subsection 3.2.3. of the National Building Code of Canada 1980, whichever is the least restrictive.

TABLE 10C—MAXIMUM PERCENTAGE OF UNPROTECTED OPENINGS IN EXTERIOR WALLS

Maximum Area of Exposing Building Face, m ²	Limiting Distance											
	Less than 1.2 m	1.2 m	1.5 m	2.0 m	4.0 m	6.0 m	8.0 m	10.0 m	12.0 m	16.0 m	20.0 m	25.0 m
30	0	7	9	12	39	88	100	—	—	—	—	—
40	0	7	8	11	32	69	100	—	—	—	—	—
50	0	7	8	10	28	57	100	—	—	—	—	—
100	0	7	8	9	18	34	56	84	100	—	—	—
Over 100	0	7	7	8	12	19	28	40	55	92	100	—
Column 1	2	3	4	5	6	7	8	9	10	11	12	13

- (2) Where there is no fire department or where a fire department is not organized, trained and equipped to meet the needs of the community, the limiting distance determined from Article (1) shall be doubled.
- (3) The limiting distance shown in Table 10C may be reduced provided it is not less than the square root of the aggregate area of unprotected openings in an exposing building face.
- (4) The maximum area of unprotected openings may be doubled where the building is sprinklered, or where the unprotected openings are glazed with wired glass in steel frames or glass blocks as described in M (5) and M (7).
- (5) An exposing building face is permitted to have unlimited unprotected openings in the first storey when the exposing building face faces a street and has a limiting distance of at least 9 m.

- (6) Except as permitted in (7) to (9), each exposing building face and any exterior wall located above an exposing building face that encloses an attic or roof space shall be constructed in conformance with Table 10D and Subsection G.

TABLE 10D—MINIMUM CONSTRUCTION REQUIREMENTS FOR EXPOSING BUILDING FACE

Maximum Percentage of Unprotected Openings Permitted, per cent	Minimum Required Fire-Resistance Rating, h	Type of Construction Required	Type of Cladding Required
0 – 10	1	Noncombustible	Noncombustible
11 – 25	1	Combustible or noncombustible	Noncombustible
26 – 100	$\frac{3}{4}$	Combustible or noncombustible	Combustible or noncombustible
Column 1	2	3	4

- (7) Except as required in (11), in buildings containing only dwelling units in which there is no dwelling unit above another dwelling unit, the requirements of (6) do not apply provided that the exposing building face has a fire-resistance rating of at least $\frac{3}{4}$ h where the limiting distance is less than 1.2 m, and when the limiting distance is less than 0.6 m, the exposing building face is clad with noncombustible material. Window openings in such exposing building face shall not be permitted if the limiting distance is less than 1.2 m, and shall be limited in conformance with the requirements for unprotected openings in (1) where the limiting distance is 1.2 m or greater.
- (8) Except as required in (11), the exposing building face of a detached garage that serves 1 dwelling unit only shall have a fire-resistance rating of at least $\frac{3}{4}$ h, except that no fire-resistance rating is required where the limiting distance is 0.6 m or greater. The exterior cladding of such detached garages is not required to be noncombustible regardless of the limiting distance. The percentage of window openings permitted in the exposing building face of such detached garages shall conform to the requirements for unprotected openings in (1). Where a detached garage serves only 1 dwelling unit and is located on the same property as that dwelling unit, then the requirements for limiting distance shall not apply between the garage and the dwelling unit.
- (9) Heavy timber and steel columns need not conform to the requirements of Table 10D provided the limiting distance is at least 3 m.
- (10) Where a paid or volunteer fire department is not available, the limiting distances required in (7) and (8) shall be doubled.
- (11) Where 2 exterior walls meet at a firewall at an external angle of 135° or less, the construction of each exterior wall adjacent to the intersection and the unprotected openings in each exterior wall adjacent to the intersection shall conform to Article 3.2.3.10. of the National Building Code of Canada 1980.

O. FIRE STOPPING

- (1) Fire stops shall be provided at floor, ceiling and roof levels as well as the space between the upper and lower portions of a mansard style roof to cut off all concealed draft openings occurring between storeys and between the top storey and roof space, including spaces filled with batt, loose fill or foamed plastic insulation. (See also 19 B (4).)

- (2) Fire stops shall be provided at the ceiling and floor level of furred walls and partitions. The vertical dimension of any concealed space in a wall or partition of combustible construction shall not exceed 3 m.
- (3) Fire stops shall be provided at the top and bottom of each run of stairs where they pass through a floor containing concealed space.
- (4) In unsprinklered buildings of combustible construction, every concealed space created by a suspended ceiling, roof space or unoccupied attic space shall be separated by fire stops into draft-tight compartments not more than 300 m² in area where such space contains materials having a flame-spread rating greater than 25. No dimension of such space shall exceed 20 m.
- (5) Concealed spaces in mansard roofs, exterior cornices, balconies and canopies of combustible construction shall have vertical fire stops at intervals of not more than 20 m and at each required fire separation.
- (6) Fire stops shall consist of not less than 0.91 mm sheet steel, 6 mm asbestos board, 12.7 mm gypsum board, 12 mm plywood or waferboard with joints backed with similar material, 2 layers of 19 mm lumber with joints staggered or 38 mm lumber.
- (7) Where fire stops are pierced by pipes, ducts or other elements, the effectiveness of the fire stops shall be maintained around such elements.

P. INTERIOR FINISH FLAME-SPREAD LIMITS

- (1) Except as provided in (2) to (7), the exposed surface of every wall and ceiling shall have a surface flame-spread rating of not more than 150.
- (2) Not less than 90 per cent of the exposed surface of every ceiling in an exit or unsprinklered ceiling in a public corridor shall have a surface flame-spread rating of not more than 25.
- (3) Not less than 90 per cent of the exposed surfaces of every wall of an exit, exclusive of doors, shall have a surface flame-spread rating of not more than 25, except that 25 per cent of the wall surface of a lobby at or near grade used as an exit may have a surface flame-spread rating of not more than 150.
- (4) At least 90 per cent of the total wall surface, exclusive of doors, in any unsprinklered public corridor shall have a surface flame-spread rating of not more than 75, or not less than 90 per cent of the upper half of such walls, exclusive of doors, shall have a surface flame-spread rating of not more than 25.
- (5) Where a public corridor or a corridor used by the public contains an occupancy, the interior finish materials used on the walls or ceiling of such occupancy shall have a flame-spread rating in conformance with that required for public corridors.
- (6) Where transparent or translucent lighting elements such as light diffusers and lenses are used which have flame-spread ratings that exceed those permitted for the ceiling finish, such elements shall conform to the requirements of Article 3.1.11.1. of the National Building Code of Canada 1980.
- (7) The interior finish of walls and ceilings in bathrooms within suites of residential occupancy shall have a flame-spread rating of not more than 200.
- (8) Where a covering or a lining is used with a duct, such lining or covering shall have a flame-spread rating conforming to Part 6 of the National Building Code of Canada 1980.

Q. ALARM AND DETECTION SYSTEMS

- (1) Except as provided in (2) and (3), an acceptable fire alarm system shall be installed in every building that contains more than 3 storeys including storeys below the first storey.

- (2) No fire alarm system is required in a residential occupancy where an exit or public corridor serves not more than 4 suites, or where each suite has direct access to outdoors by a door near ground level, or to a balcony with an exit stair to ground level.
- (3) No fire alarm system is required in a residential occupancy where sleeping accommodation is provided for not more than 10 persons.
- (4) Where a fire alarm system is required, every public corridor in buildings of residential occupancy and every exit stair shaft shall be provided with smoke detectors.
- (5) Except for sprinklered buildings in which the sprinkler system is electrically supervised and equipped with a water flow alarm, buildings required to have a fire alarm system in (1) shall be equipped with heat detectors or smoke detectors in storage rooms, storage locker rooms, service rooms, including furnace rooms and incinerator rooms, elevator shafts, chutes, storage rooms and any other rooms where hazardous substances are intended to be used or stored.
- (6) Except for a recirculating air system serving not more than 1 dwelling unit, where a fire alarm system is required to be installed, every recirculating air handling system shall be designed to prevent the circulation of smoke upon a signal from a duct-type smoke detector where such system supplies more than 1 suite on the same floor or serves more than 1 storey.
- (7) Where a vertical fire separation having a fire-resistance rating of at least 1 h separates a portion of a building from the remainder of the building and there is no access to the remainder of the building, the requirements for fire alarm and detection systems may be applied to each portion so separated as if it were a separate building.
- (8) Fire alarm, fire detection and smoke detection devices and their installation shall conform to Part 3 of the National Building Code of Canada 1980.

R. SMOKE ALARMS

- (1) Smoke alarms conforming to ULC-S531-1978, "Standard for Smoke Alarms" shall be installed in each dwelling unit and in each sleeping room not within a dwelling unit.
- (2) Smoke alarms within dwelling units shall be installed between each sleeping area and the remainder of the dwelling unit; and where the sleeping areas are served by hallways, the smoke alarms shall be installed in the hallway.
- (3) Smoke alarms in (1) and (2) shall be installed on or near the ceiling in conformance with acceptable installation instructions.
- (4) Smoke alarms shall be installed by permanent connections to an electrical circuit and shall have no disconnect switch between the overcurrent device and the smoke alarm. Where the building is not supplied with electrical power, smoke alarms may be battery operated.
- (5) Where more than 1 smoke alarm is required in a dwelling unit, the smoke alarms shall be wired so that the activation of 1 alarm will cause all alarms within the dwelling unit to sound.
- (6) Where instructions are necessary to describe the maintenance and care required for smoke alarms to ensure continuing satisfactory performance, they shall be posted in a location where they will be readily available to the occupants for reference.

S. FIRE FIGHTING

- (1) Except as provided in (2), a window or access panel providing an opening not less than 100 mm high and 550 mm wide and having a sill height of not more than 900 mm above the floor shall be provided on the second and third storey of every building in at least 1 wall facing on a street if such storeys are not sprinklered. Such access panels shall be readily openable from both inside and outside or be glazed with plain glass.

- (2) Access panels as described in (1) need not be provided in buildings containing only dwelling units where there is no dwelling unit above another dwelling unit.
- (3) Except in basements serving not more than 1 dwelling unit, each unsprinklered basement or cellar exceeding 25 m in length or width shall be provided with direct access to the outdoors to at least 1 street. Such access may be provided by a door, window or other means that provide an opening not less than 1 100 mm high and 550 mm wide, the sill height of which shall not be more than 900 mm above the floor. Access may also be provided by an interior stair accessible from the outdoors.
- (4) Access for fire department equipment shall be provided to each building by means of a street, private roadway or yard.
- (5) Where access to a building as required in (4) is provided by means of a private roadway or yard, the design and location of such roadway or yard shall be acceptable, taking into account connection with public thoroughfares, weight of firefighting equipment, width of roadway, radius of curves, overhead clearance, location of fire hydrants, location of fire department connections and vehicular parking.

SECTION 11. SOUND CONTROL

A. SOUND TRANSMISSION CLASS RATING (AIRBORNE SOUND)

- (1) This Section applies to all buildings, regardless of size.
- (2) Sound transmission class ratings for construction shall be determined in accordance with ASTM E90-75, "Laboratory Measurement of Airborne-Sound Transmission Loss of Building Partitions" or with ASTM E336-77, "Measurement of Airborne Sound Insulation in Buildings."

B. REQUIRED SOUND CONTROL LOCATIONS (AIRBORNE SOUND)

- (1) Except as provided in (2), every dwelling unit shall be separated from every other space in a building in which noise may be generated by construction providing a sound transmission class rating of at least 45, or shall have a sound rating of I or II as described in Tables 11A and 11B.
- (2) Where a dwelling unit is adjacent to an elevator shaft or a refuse chute, the separating construction shall have a sound transmission class rating of at least 50, or shall have a sound rating of I as described in Table 11A.
- (3) Building services located in an assembly required to have a sound transmission class rating shall be installed in a manner that will not decrease the required rating of the assembly.

TABLE 11A—FIRE AND SOUND RESISTANCE OF WALLS

Type of Wall	No.	Description	Finish on Each Side ⁽¹⁾	Fire-Resistance Rating, h	Sound Rating ⁽³⁾
Solid brick	1	90 mm thick walls of shale, clay, concrete or sand-lime brick	None	1	II ⁽²⁾
	2	140 mm thick walls of shale, clay, concrete or sand-lime brick	None	2½	II ⁽²⁾
	3	190 mm thick walls of shale, clay, concrete or sand-lime brick	None	4	I ⁽²⁾
Hollow concrete block (Normal weight aggregate)	4	90 mm	None	¾	III
	5	Same as 4	A or B	1½	III
	6	Same as 4	C or D	2	II
	7	140 mm	None	1	II ⁽²⁾
	8	Same as 7	A	1½	II
	9	Same as 7	B, C or D	2	II
	10	Same as 7 with mineral fibre between resilient channels on at least 1 side	A	1½	I
	11	190 mm	None	1½	II ⁽²⁾
	12	Same as 11	A or B	2	I
	13	Same as 11	C or D	3	I
Concrete	14	150 mm	None	3	I ⁽²⁾
	15	200 mm	None	4	I ⁽²⁾
Interior wood stud, single row	16	38 mm x 89 mm studs 400 mm o.c.	C or D	1	III
	17	38 mm x 89 mm studs 400 mm o.c., mineral fibre with a mass of at least 1.2 kg/m ² in cavity	A	¾	III
	18	Same as 17 with resilient metal channels on at least 1 side	A	¾	II
Column 1	2	3	4	5	6

TABLE 11A—FIRE AND SOUND RESISTANCE OF WALLS (Cont'd)

Type of Wall	No.	Description	Finish on Each Side (1)	Fire-Resistance Rating, h	Sound Rating (3)
Interior stud, 2 rows staggered on 38 mm x 140 mm plate	19	Two rows 38 mm x 89 mm studs, each set 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate, mineral fibre on each side	C or D	1 ⁽⁴⁾	II
	20	Two rows 38 mm x 89 mm studs, each set 400 mm or 600 mm o.c. staggered on common 38 mm x 140 mm plate, mineral fibre with a mass of at least 1.2 kg/m ² on each side	A	¾	II
Interior wood, 2 rows on separate plates	21	Two rows 38 mm x 89 mm studs, each set 400 mm or 600 mm o.c. on 38 mm x 89 mm plates set 25 mm apart, mineral fibre on 1 side	C or D	1 ⁽⁴⁾	II
	22	Two rows 38 mm x 89 mm studs, each set 400 mm or 600 mm o.c. on 38 mm x 89 mm plates set 25 mm apart, mineral fibre with a mass of at least 1.2 kg/m ² on 1 side	A	¾	II
Exterior, wood stud	23	38 mm x 89 mm or 38 mm x 140 mm studs spaced up to 600 mm o.c., mineral fibre with a mass of at least 1.2 kg/m ² , wall sheathing and siding	A (interior side)	¾	—
	24	Same as 23	C or D (Interior side)	1	—
Column 1	2	3	4	5	6

TABLE 11A—FIRE AND SOUND RESISTANCE OF WALLS (Cont'd)

Type of Wall	No.	Description	Finish on Each Side ⁽¹⁾	Fire-Resistance Rating, h	Sound Rating ⁽³⁾
Non-load-bearing steel stud	25	90 mm steel studs spaced up to 600 mm o.c.	C	¾	III
	26	Same as 25	D	1	III
	27	Same as 25 with mineral fibre filling cavity	C	1	II
	28	Same as 25 with mineral fibre filling cavity	D	1 ⁽⁴⁾	II
Column 1	2	3	4	5	6

Addendum to Table 11A:

⁽¹⁾ The finishes designated by letter refer to the following:

A = 12.7 mm gypsum board, taped joints,

B = 12.7 mm gypsum-sand plaster,

C = 15.9 mm special fire-resistant Type X gypsum board conforming to CSA A82.27-M1977, "Gypsum Board Products," and

D = 19 mm gypsum-sand plaster on 9.5 mm gypsum lath or metal lath.

⁽²⁾ Sound ratings listed assume that walls have their surfaces sealed by at least 2 coats of paint or other surface finish described in Section 30 to prevent airborne sound leakage.

⁽³⁾ Rating I signifies constructions with sound transmission class ratings of 50 or more.

Rating II signifies constructions with sound transmission class ratings of 45 to 50.

Rating III signifies constructions with sound transmission class ratings of less than 45.

⁽⁴⁾ Mineral fibre is required for sound resistance only and need not be provided to achieve the fire-resistance rating. Mineral fibre includes fibre processed from rock, slag or glass.

TABLE 11B—FIRE AND SOUND RESISTANCE OF FLOORS, CEILINGS AND ROOFS⁽²⁾

Type of Assembly	No.	Description	Ceiling Finish ⁽¹⁾	Fire-Resistance Rating, h	Sound Rating ⁽³⁾
Concrete slabs	1	90 mm reinforced concrete with 19 mm minimum cover over reinforcing steel	None	1	II
	2	130 mm reinforced concrete with 25 mm minimum cover over reinforcing steel	None	2	I
Open web steel joists	3	Open web steel joists with minimum 50 mm thick concrete deck, ceiling secured to furring channels spaced not more than 600 mm o.c. wired to underside of joists	C or D	1	I
Column 1	2	3	4	5	6

TABLE 11B—FIRE AND SOUND RESISTANCE OF FLOORS, CEILINGS AND ROOFS⁽²⁾
(Cont'd)

Type of Assembly	No.	Description	Ceiling Finish (1)	Fire-Resistance Rating, h	Sound Rating (3)
Wood floor joists	4	19 mm T&G lumber or 15.5 mm plywood or waferboard subfloor with mineral fibre between joists spaced 400 mm o.c. Ceiling finish attached to resilient channels	C	¾	II
	5	Same as 4	D	1	II
	6	19 mm T&G lumber or 15.5 mm plywood or waferboard subfloor over joists spaced 400 mm o.c., 50 mm concrete topping	C	¾	II
	7	Same as 6	D	1	II
	8	Same as 6 with mineral fibre between joists and ceiling finish attached to resilient channels	C	¾	II
	9	Same as 6 with mineral fibre between joists and ceiling finish attached to resilient channels	D	1	I
Wood ceiling joists or roof trusses	10	38 mm thick framing members spaced not more than 600 mm o.c.	C	½	—
	11	Same as 10	C (2 layers)	1	—
Column 1	2	3	4	5	6

Addendum to Table 11B:

(1) The finishes designated by letter refer to the following:

C = 15.9 mm special fire-resistant Type X gypsum board conforming to CSA A82.27-M1977, "Gypsum Board Products," and

D = 19 mm gypsum-sand plaster on 9.5 mm gypsum lath or metal lath.

(2) Fire-resistance ratings for floor assemblies may be applied to roof assemblies having the same ceiling finish provided that, where wood joists are used, the roof sheathing consists of not less than 12.5 mm plywood or waferboard or 19 mm lumber. Where steel joists are used, the ratings are based on the assumption that the roof deck is at least equivalent in fire resistance to 50 mm concrete.

(3) Rating I signifies constructions with sound transmission class ratings of 50 or more.

Rating II signifies constructions with sound transmission class ratings of 45 to 50.

Rating III signifies constructions with sound transmission class ratings of less than 45.

SECTION 12. EXCAVATION

A. GENERAL

- (1) The top soil and vegetable matter in all unexcavated areas under a building shall be removed. In localities where termites are known to occur, all stumps, roots and other wood debris shall be removed from the soil to a minimum depth of 300 mm in unexcavated areas under a building.
- (2) The bottom of every excavation shall be free of all organic material.
- (3) Excavations shall be kept free of standing water.
- (4) The bottom of excavations shall be kept from freezing throughout the entire construction period.

B. DEPTH

- (1) Excavations for foundations shall extend to undisturbed soil.
- (2) Except as provided in (4) and (5), the minimum depth of foundations below finished ground level shall conform to Table 12A.

TABLE 12A—MINIMUM DEPTHS OF FOUNDATIONS

Type of Soil ⁽¹⁾	Foundation Containing Heated Basement, Cellar or Crawl Space		Foundation Containing No Heated Space	
	Good Soil Drainage to at Least the Depth of Frost Penetration	Poor Soil Drainage	Good Soil Drainage to at Least the Depth of Frost Penetration	Poor Soil Drainage
Rock	No limit	No limit	No limit	No limit
Coarse grained soils	No limit	No limit	No limit	Below the depth of frost penetration
Silt	No limit	No limit	Below the depth of frost penetration	Below the depth of frost penetration
Clay or soils not clearly defined	1.2 m	1.2 m	1.2 m but not less than the depth of frost penetration	1.2 m but not less than the depth of frost penetration
Column 1	2	3	4	5

Note to Table 12A:

⁽¹⁾ See Appendix A.

- (3) The minimum depth of foundations for exterior concrete steps with more than 2 risers shall conform to (2). Concrete steps with 1 and 2 risers may be laid on ground level.
- (4) The foundation depths required in (2) may be decreased where experience with local soil conditions shows that lesser depths are satisfactory, or where the foundation is designed for lesser depths.
- (5) The foundation depths required in (2) do not apply to foundations for buildings whose superstructure will not be damaged by differential soil movement caused by frost ac-

tion, or for accessory buildings of not more than 1 storey in building height and not more than 50 m² in building area.

C. BACKFILL

- (1) Backfill shall be placed to avoid damaging the drainage tile or the waterproofing of walls.
- (2) Backfill shall be graded to prevent drainage towards the foundation after settling.
- (3) Backfill within 600 mm of the foundation shall be free of deleterious debris and boulders larger than 250 mm diam.

D. TRENCHES BENEATH FOOTINGS

The soil in trenches beneath footings for sewers and watermains shall be compacted by tamping up to the level of the footing base or shall be filled with concrete having a strength not less than 10 MPa to support the footing.

SECTION 13. WATERPROOFING AND DAMPPROOFING

A. GENERAL

- (1) This Section applies to all buildings regardless of size.
- (2) Where hydrostatic pressure occurs, floors on ground and exterior surfaces of walls below ground level shall be waterproofed.
- (3) Where hydrostatic pressure does not occur and the exterior finished ground level is at a higher elevation than the ground level inside the foundation walls, exterior surfaces of foundation walls below ground level shall be dampproofed.
- (4) Except as provided in (5), when hydrostatic pressure does not occur, slabs on ground in other than garages shall be dampproofed.
- (5) When hydrostatic pressure does not occur, floor slabs in unfinished basements or cellars need not be dampproofed when the slab is supported on a base of granular fill as described in Subsection 16 B.
- (6) Roofs of underground structures shall be waterproofed to prevent the entry of water into the structure.
- (7) The method of application of all bituminous waterproofing and dampproofing materials shall conform to one of the following:
 CGSB 37-GP-3M (1976), "Application of Emulsified Asphalts for Dampproofing or Waterproofing,"
 CGSB 37-GP-12M (1976), "Application of Unfilled Cutback Asphalt for Dampproofing," or
 CGSB 37-GP-22M (1976), "Application of Unfilled Cutback Tar Foundation Coating for Dampproofing."

B. MATERIAL

Bituminous materials used for dampproofing or waterproofing shall conform to one of the following:

- CGSB 37-GP-2M (1976), "Asphalt, Emulsified, Mineral Colloid Type, Unfilled, for Dampproofing and Waterproofing, and for Roof Coatings,"
 CGSB 37-GP-6M (1976), "Asphalt, Cutback, Unfilled, for Dampproofing,"
 CGSB 37-GP-16M(1976), "Asphalt, Cutback, Filled, for Dampproofing and Waterproofing,"
 CGSB 37-GP-18M(1976), "Tar, Cutback, Unfilled, for Dampproofing," or

CSA A123.7-1973, "Asphalt for Use in Constructing Built-Up Roof Coverings and Damp-proofing and Waterproofing Systems."

C. WATERPROOFING OF WALLS

- (1) Unit masonry walls to be waterproofed shall be parged on exterior surfaces below ground level with not less than 6 mm of mortar conforming to Section 20. Concrete walls shall have all holes and recesses resulting from removal of form ties sealed with mortar or waterproofing material.
- (2) Concrete or unit masonry walls to be waterproofed shall be covered with not less than 2 layers of bitumen-saturated membrane, with each layer being cemented in place with bitumen and coated over-all with a heavy coating of bitumen.

D. WATERPROOFING OF FLOORS

Basement floors to be waterproofed shall have a system of membrane waterproofing provided between 2 layers of concrete each of which shall be not less than 75 mm thick. The floor membrane shall be mopped to the wall membrane to form a complete seal.

E. DAMPPROOFING OF WALLS

- (1) Unit masonry walls to be dampproofed shall be parged on the exterior face below ground level with not less than 6 mm of mortar conforming to Section 20 and shall be covered over the footing when the first course of block is laid. Concrete walls shall have any holes and recesses resulting from the removal of form ties sealed with cement mortar or dampproofing material.
- (2) A heavy coat of bituminous or other dampproofing material shall be applied over the parging or concrete below ground level.
- (3) Where a separate interior cladding is applied to a concrete or unit masonry wall which is in contact with the soil, or where wood members are applied to such walls for the installation of insulation or finish, the interior surface of the foundation wall below ground level shall be dampproofed. The dampproofing shall extend from the basement floor and shall terminate at ground level. No membrane shall be applied above ground level between the insulation and the foundation wall. Dampproofing shall consist of at least 0.05 mm polyethylene lapped 100 mm at the joints, or a material providing equivalent performance.

F. DAMPPROOFING OF SLABS

- (1) When slabs are dampproofed, the dampproofing shall be installed below the slab, except that where a separate floor is provided over the slab, the dampproofing may be applied to the top of the slab.
- (2) When installed below the slab, dampproofing shall consist of 0.15 mm polyethylene or Type S roll roofing. Dampproofing shall be lapped not less than 100 mm at the joints.
- (3) When installed above the slab, dampproofing shall consist of at least 2 mopped-on coats of bitumen, 0.05 mm polyethylene or other material providing equivalent performance.

SECTION 14. DRAINAGE

A SCOPE

- (1) This Section applies to subsurface drainage and to surface drainage for all buildings, regardless of size.
- (2) Drainage for crawl spaces shall conform to Section 18.

- (3) Drainage requirements beneath floor slabs shall conform to Section 16.

B. GENERAL

Unless it can be shown to be unnecessary, the bottom of every exterior foundation wall shall be drained by drainage tile or pipe laid around the exterior of the foundation in conformance with Subsection C or by a layer of gravel or crushed rock in conformance with Subsection D.

C. DRAINAGE TILE AND PIPE

- (1) Drain tile and drain pipe used for foundation drainage shall conform to the following:
ASTM A444-78, "Steel Sheet, Zinc Coated, (Galvanized) by the Hot-Dip Process for Culverts and Underdrains,"
ASTM C4-62(1975), "Clay Drain Tile,"
ASTM C700-78a, "Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated,"
ASTM C412-78, "Concrete Drain Tile,"
ASTM C444-77, "Perforated Concrete Pipe,"
CGSB 34-GP-22M(1976), "Pipe, Asbestos Cement, Drain,"
CGSB 41-GP-29M(1976), "Tubing, Drainage, Corrugated, Plastic," or
CSA B182.1-M(1977), "Plastic Drain and Sewer Pipe and Pipe Fittings."
- (2) Drain tile or pipe used for foundation drainage shall have at least a 100 mm diam.
- (3) Drain tile or pipe shall be laid on undisturbed or well-compacted soil so that the top of the tile or pipe is below the bottom of the floor slab or crawl space.
- (4) Drain tile or pipe with butt joints shall be laid with 6 mm to 10 mm open joints. The top half of such joints shall be covered with sheathing paper, 0.10 mm polyethylene or No. 15 asphalt or tar-saturated felt.
- (5) The top and sides of drain pipe or tile shall be covered with not less than 150 mm of crushed stone or other coarse clean granular material containing not more than 10 per cent of material that will pass a 4 mm sieve.

D. GRANULAR DRAINAGE LAYER

- (1) Granular material used to drain the bottom of a foundation shall consist of a continuous layer of crushed stone or other coarse clean granular material containing not more than 10 per cent of material that will pass a 4 mm sieve.
- (2) Granular material in (1) shall be laid on undisturbed or compacted soil to a minimum depth of at least 125 mm beneath the building and extend at least 300 mm beyond the outside edge of the footings.
- (3) The bottom of an excavation drained by a granular layer shall be graded so that the entire area described in (2) is drained to a sump conforming to E(2).
- (4) Where because of wet site conditions soil becomes mixed with the granular drainage material, sufficient additional granular material shall be provided so that the top 125 mm are kept free of soil.

E. DRAINAGE DISPOSAL

- (1) Drain pipe or tile shall drain to a sewer, drainage ditch or dry well.
- (2) Where a sump pit is provided, it shall be at least 750 mm in depth and have an area of at least 0.25 m² and be provided with a cover. Where gravity drainage is not practical, an automatic sump pump shall be provided to discharge the water into a sewer, drainage ditch or dry well.

- (3) Dry wells may be used only when located in areas where the natural groundwater level is below the bottom of the dry well. Dry wells shall be not less than 5 m from the building foundation and located so that drainage is away from the building.

F. SURFACE DRAINAGE

- (1) The building shall be located or the building site graded so that water will not accumulate at or near the building.
- (2) Surface drainage shall be directed away from the location of a water supply well or septic tank disposal bed.
- (3) Where runoff water from a driveway is likely to accumulate or enter a garage, a catch basin shall be installed to provide adequate drainage.
- (4) Where downspouts are provided and are not connected to a sewer, provisions shall be made to prevent soil erosion.
- (5) Adequate surface water drainage shall be provided over the entire building site.
- (6) Where the grading will result in the collection of surface water on the site, catch basins to carry such surface water from the site shall be installed, or other acceptable methods of drainage used to dispose of surface water without soil erosion. Surface drainage shall be directed away from the location of a water supply, well or septic tank disposal bed.
- (7) Driveways, walks, terraces, retaining walls or other construction shall not be constructed to interfere with the flow of surface drainage.

SECTION 15. FOOTINGS AND FOUNDATIONS

A. SCOPE

- (1) Except as provided in G, this Section applies to foundations of cast-in-place concrete or unit masonry foundation walls and cast-in-place footings constructed on soils other than those described in (2), and where the building is of other than concrete or steel frame construction. Where the foundation consists of other materials such as precast concrete, steel or wood, the foundation shall be designed in conformance with the appropriate provisions of Part 4 of the National Building Code of Canada 1980, except as provided in Article 36 C (3).
- (2) Where a foundation is erected on soft clay, very soft clay, loose sand, very loose sand, loose sand and gravel or very loose sand and gravel, the footing sizes shall be designed in conformance with Subsection 4 G. Where a foundation is erected on filled ground or peat, the footing sizes shall be designed in conformance with Section 4.2 of the National Building Code of Canada 1980.

B. GENERAL

- (1) Concrete shall conform to Section 3. Concrete for unreinforced footings and foundation walls shall have a minimum compressive strength of 14 MPa after 28 days.
- (2) Concrete block shall be loadbearing type conforming to CSA A165.1-M1977, "Concrete Masonry Units," and shall have a compressive strength over the gross area of the block of at least 7.5 MPa for hollow units and 12.5 MPa for solid units.
- (3) Mortar, mortar joints, corbelling and protection for unit masonry shall conform to Section 20.
- (4) Where pier type foundations are used, the piers shall be designed to support the applied loads from the superstructure.

- (5) Where piers are used as a foundation system in a building of 1 storey in building height, the piers shall be installed to support the principal framing members, and shall be spaced not more than 3.5 m apart along the framing, unless the piers and their footings are designed for larger spacings. The height of such piers shall not exceed 3 times their least dimension at the base of the pier. Where concrete block piers are used, they shall be laid with cores placed vertically, and when the width of the building is 4.3 m or less, placed with their longest dimension at right angles to the longest dimension of the building.

C. FOOTINGS

- (1) Footings shall be provided under walls, pilasters, columns, piers, fireplaces and chimneys that bear on soil or rock, except that footings may be omitted under piers or monolithic concrete walls if the safe loadbearing capacity of the soil or rock is not exceeded.
- (2) Footings shall rest on undisturbed soil, rock or compacted granular fill.
- (3) Footings shall be of a size to support adequately all superimposed loads. Except as provided in (5) to (8), the minimum footing size shall be as shown in Table 15A provided the length of supported joists does not exceed 4.9 m and the design live load on any floor supported by the footing does not exceed 2.4 kN/m² (Table 4A). Where the design live load exceeds 2.4 kN/m², or the length of the supported joists exceeds 4.9 m, footings shall be designed in accordance with Section 4.2 of the National Building Code of Canada 1980.
- (4) Where a foundation rests on gravel, sand or silt in which the water table level is less than the width of the footings below the bearing surface, the footing width shall not be less than twice the width shown in Table 15A.

TABLE 15A—MINIMUM FOOTING SIZES

No. of Floors Supported	Minimum Widths of Strip Footings, mm		Minimum Footing Area for Columns Spaced 3 m o.c. ⁽¹⁾ , m ²
	Supporting Exterior Walls	Supporting Interior Walls	
1	250 ⁽²⁾	200 ⁽³⁾	0.4
2	350 ⁽²⁾	350 ⁽³⁾	0.75
3	450 ⁽²⁾	500 ⁽³⁾	1.0
Column 1	2	3	4

Notes to Table 15A:

⁽¹⁾ See 15C(8).

⁽²⁾ See 15C(5) and (6).

⁽³⁾ See 15C(7).

- (5) The strip footing sizes for exterior walls shown in Column 2 of Table 15A shall be increased by 65 mm for each storey of masonry veneer over wood frame construction supported by the foundation wall.
- (6) The strip footing sizes for exterior walls shown in Column 2 of Table 15A shall be increased by 130 mm for each storey of masonry construction supported by the foundation wall.
- (7) The minimum strip footing sizes for interior walls shown in Column 3 of Table 15A shall be increased by 100 mm for each storey of masonry construction supported by the footing.

- (8) The footing area for column spacings other than shown in Table 15A shall be adjusted in proportion to the distance between columns.
- (9) Footings for non-loadbearing masonry partitions shall be at least 200 mm wide for partitions up to 5.5 m high and shall be increased by 100 mm for each additional 2.7 m of height.
- (10) Footings shall be at least 100 mm in thickness except when greater thicknesses are required because of the projection of the footing beyond the supported element.
- (11) The projection of an unreinforced footing beyond the supported element shall be not greater than the thickness of the footing.

D. FOUNDATION WALLS

- (1) Where average stable soils are encountered, the thickness of foundation walls subject to lateral earth pressure shall conform to Table 15B for walls not exceeding 2.5 m in unsupported height.

TABLE 15B—THICKNESS OF FOUNDATION WALLS

Type of Foundation Wall	Minimum Wall Thickness, mm	Maximum Height of Finish Grade Above Basement Floor or Inside Grade	
		Foundation Wall Laterally Unsupported At the Top, ⁽¹⁾ m	Foundation Wall Laterally Supported At the Top, ⁽¹⁾ m
Solid concrete (14 MPa min. strength)	150	0.76	1.52
	200	1.22	2.13
	250	1.37	2.29
	300	1.52	2.29
Solid concrete (20 MPa min. strength)	150	0.76	1.83
	200	1.22	2.29
	250	1.37	2.29
	300	1.52	2.29
Unit masonry	140	0.61	0.61
	190	0.91	1.22
	240	1.22	1.83
	290	1.37	2.13
Column 1	2	3	4

Note to Table 15B:

⁽¹⁾ See 15D(2).

- (2) For the purposes of Article (1), foundation walls shall be considered laterally supported at the top if such walls support solid masonry superstructure, or if the floor joists are embedded in the top of the foundation walls. Foundation walls shall also be considered to be supported at the top if the floor system is anchored to the top of the foundation walls with anchor bolts, in which case the joists may run either parallel or perpendicular to the foundation wall. When a foundation wall contains an opening more than 1.2 m in length or contains openings in more than 25 per cent of its length, that portion of the wall beneath such openings shall be considered laterally unsupported, unless the wall around the opening is reinforced to withstand the earth pressure. When the length

of solid wall between windows is less than the average length of the windows, the combined length of such windows shall be considered as a single opening.

- (3) Exterior foundation walls shall extend not less than 150 mm above finished ground level.
- (4) Where the top of a foundation wall is reduced in thickness to permit the installation of floor joists, the reduced section shall be not higher than 350 mm and not less than 90 mm thick.
- (5) Where the top of a foundation wall is reduced in thickness to permit the installation of a masonry exterior facing, the reduced section shall be not less than 90 mm thick and tied to the facing material with metal ties conforming to Article 20 I (5) spaced not more than 200 mm o.c. vertically and 900 mm o.c. horizontally. The space between wall and facing shall be filled with mortar.
- (6) Corbelling of foundation walls supporting cavity walls shall conform to Article 20 L (2).
- (7) Crack control joints shall be provided in foundation walls exceeding 25 m in length at intervals of not more than 15 m. Such joints shall be designed to resist moisture penetration, and shall be keyed to prevent relative displacement of the wall portions adjacent to the joint.
- (8) Interior masonry foundation walls not subject to lateral earth pressure shall conform to Section 20.

E. JOIST AND BEAM SUPPORT

- (1) Foundation walls of hollow unit masonry supporting floor joists shall be capped with at least 50 mm of solid masonry or concrete or have the top course filled with mortar or concrete, except that such capping may be omitted in localities where termites are not known to occur when the joists are supported on a wood plate not less than 38 mm by 89 mm where the siding overlaps the foundation wall not less than 12 mm.
- (2) Not less than a 190 mm depth of solid masonry shall be provided beneath beams supported on masonry. Where the beam is supported below the top of the foundation walls, the ends of such beams shall be protected from the weather.
- (3) Pilasters shall be provided under beams that frame into 140 mm unit masonry foundation walls. Pilasters shall be not less than 90 mm by 290 mm and shall be bonded or tied into the wall. The top 200 mm of pilasters shall be solid.

F. PARGING AND FINISHING

- (1) Concrete block foundation walls shall be parged on the exterior face below ground level as required in Section 13.
- (2) All form ties shall be removed at least flush with the concrete surface.
- (3) Exterior surfaces of concrete block foundation walls above ground level shall have tooled joints, or shall be rendered, parged or otherwise suitably finished.

G. FOUNDATIONS ON PERMAFROST

- (1) Where the permafrost condition of the supporting soil or rock is such that the material is unstable upon thawing, the foundation shall be designed in accordance with the requirements of this Subsection.
- (2) Foundations erected on permafrost, soil or rock shall be designed to maintain the permafrost in a frozen condition at and below the load carrying level, unless it can be shown that the design and the construction procedure are such that thawing of the permafrost will not result in settlement that will be detrimental to the building.

- (3) Provision shall be made to maintain the permafrost beneath a foundation by a ventilated foundation space or by insulation between the underside of the building and the ground surface or by a combination of these. Where a vented foundation space is included to protect the permafrost, it shall provide at least 600 mm clear height under the entire building to ensure free air movement beneath the building to minimize heat transfer from the building to the permafrost.
- (4) Buildings with unusual thermal or structural loading conditions shall have foundations designed by a designer competent in this field in accordance with the appropriate requirements of Part 4 of the National Building Code of Canada 1980.
- (5) Buildings not more than 1 storey in height and 50 m² in area, without external plumbing or heating connections, may be supported directly on a layer of coarse granular material at least 150 mm thick.
- (6) Buildings with basements or cellars shall be permitted only where the design is such that detrimental settlement will not develop due to thawing of permafrost.
- (7) The natural ground cover and trees over a construction area shall not be removed without permission of the authority having jurisdiction.
- (8) Prior to the start of construction, a layer of coarse granular fill at least 150 mm thick shall be placed over the entire working area, except that where such material is not available, alternative measures shall be taken to protect the permafrost during construction.
- (9) All low areas beneath or adjacent to the building shall be graded to ensure proper drainage. Grading for proper drainage shall be by fill only.
- (10) Except as provided in (5), surface foundations shall be placed on coarse granular fill having a maximum particle size of 75 mm, and shall be at least 600 mm above existing ground level, except that for buildings over 150 m² in building area, the fill shall be at least 1 m above ground level. The top surface of the fill shall extend a minimum of 1 m beyond the edge of the supporting footings and at least 300 mm from the exterior wall of the building. The fill shall be placed in compacted layers not exceeding 300 mm in thickness.
- (11) Every buried foundation shall be embedded in permafrost a sufficient depth to ensure firm anchorage or shall be otherwise protected from possible damage by frost action. Where embedment of the foundation in permafrost is required to resist frost action, the foundations shall not be loaded until sufficient adfreezing has occurred to develop adequate anchorage against frost heaving and sufficient strength to support the design load.
- (12) Piles used for the support of a building shall be embedded in the permafrost to a depth of at least twice the thickness of the depth of soil subject to seasonal thawing, or to a minimum of 3 m. Where such piles are placed with the use of heat, the heating shall be controlled to keep disturbance of the permafrost to a minimum.
- (13) Wood piles shall meet the requirements of CAN3-O56-M79, "Round Wood Piles." Wood piles shall be treated with an acceptable preservative applied to the portion of pile that may be exposed to soil that is subject to seasonal thawing to a point at least 300 mm above adjacent ground level.
- (14) Wood exposed to soil shall be at least 140 mm by 140 mm.
- (15) Untreated timber may be used for surface foundations described in (5) and (10) providing the timber is exposed to free circulation of air.

SECTION 16. SLABS-ON-GROUND

A. SCOPE

- (1) This Section applies to basement and cellar slabs and to floor slabs-on-grade with perimeter foundation walls that support the superstructure.
- (2) Floor slabs-on-grade without foundation walls to support the superstructure shall be designed for the existing soil conditions in accordance with good engineering practice and past practice in the area in which the slab is to be built.

B. SLAB SUPPORTS

- (1) When granular fill is used beneath basement and cellar slabs (see Article 13 A (4)), it shall consist of not less than 125 mm of coarse clean granular material containing not more than 15 per cent by weight of material passing a 2 mm sieve. Where damp-proofing or waterproofing is provided, such fill is not required.
- (2) The soil beneath concrete slabs-on-grade shall be compacted. Not less than 125 mm of coarse, clean, granular material containing not more than 15 per cent by weight of material passing a 2 mm sieve shall be provided beneath the slab and shall be compacted.

C. DAMPPROOFING AND WATERPROOFING

Dampproofing and waterproofing of basement and cellar slabs and slabs-on-grade shall conform to Section 13.

D. DRAINAGE

- (1) Where groundwater levels may cause uplift pressures against the bottom of a slab-below-grade, lateral drains shall be installed under the slab, or the slab shall be designed to resist such uplift pressures.
- (2) The accumulation of water underneath a slab-on-grade shall be prevented by grading, drainage or other method.
- (3) When floor drains are installed (see Section 32), the floor surface shall be so sloped that no water will accumulate.

E. CONCRETE

- (1) Concrete for floor slabs shall conform to Section 3 and shall have a maximum slump of 75 mm.
- (2) The finished surface of concrete floor slabs shall be trowelled smooth and even. Dry cement shall not be added to the floor surfaces to absorb surplus water.
- (3) When a topping course is provided for concrete floor slabs, it shall consist of 1 part cement to 2½ parts clean well-graded sand by volume with a water cement ratio approximately equal to that of the base slab.

F. THICKNESS AND HEIGHT

- (1) Concrete slabs-on-ground shall be not less than 75 mm thick exclusive of concrete topping. When concrete topping is provided it shall be not less than 20 mm thick.
- (2) The top of every slab-on-grade shall be not less than 150 mm above exterior finished ground level.

G. PIPES AND DUCTS

- (1) Metal pipes in contact with cinders or other corrosive material shall be protected by a heavy coating of bitumen or other corrosion protection.

- (2) Ducts in slabs shall be completely encased with not less than 50 mm of concrete, and installed so that water will not accumulate in the ducts (see also Section 34).

H. JOINTS

In localities where termites are known to occur, joints between slabs-on-ground and foundation walls and spaces around pipes, conduit or ducts that penetrate such slabs shall be filled with bitumen.

SECTION 17. COLUMNS

A. SCOPE

- (1) This Section applies to columns used to support carport roofs (see Section 36), and beams carrying loads from not more than 2 wood-frame floors, where the length of joists carried by such beams does not exceed 5 m, and the live load on any floor does not exceed 2.4 kN/m² (see Table 4A).
- (2) Columns for applications other than as described in (1) shall be designed in accordance with Part 4 of the National Building Code of Canada 1980.

B. GENERAL

- (1) Columns shall be centrally located on a footing conforming to Section 15.
- (2) Columns shall be securely fastened to the supported member to prevent lateral movement.

C. STEEL COLUMNS

- (1) Except as permitted in (2), steel pipe columns shall have a minimum outside diameter of 73 mm and a minimum wall thickness of 4.76 mm.
- (2) Columns of sizes other than as specified in (1) may be used where the loadbearing capacities are shown to be adequate.
- (3) Except as permitted in (4), steel columns shall be fitted with not less than 100 mm by 100 mm by 6.35 mm thick steel plates at each end, and where the column supports a wooden beam, the top plate shall extend across the full width of the beam.
- (4) The top plate required in (3) may be omitted where a column supports a steel beam and provision is made for the attachment of the column to the beam.
- (5) Steel columns shall be treated on the outside surface with at least 1 coat of rust-inhibitive paint.
- (6) Adjustable steel columns shall conform to CGSB 115-GP-1 (1974), "Columns, Adjustable, Metal."

D. WOOD COLUMNS

- (1) The width or diameter of a wood column shall be not less than the width of the supported member. Except as provided in Article 36 E (2), columns shall be not less than 184 mm for round columns and 140 mm by 140 mm for rectangular columns, unless calculations are provided to show that lesser sizes are adequate.
- (2) Wood columns shall be either solid, glued-laminated or built-up. Built-up columns shall consist of not less than 38 mm thick full-length members bolted together with not less than 9.52 mm diam bolts spaced not more than 450 mm o.c., or nailed together with not less than 76 mm nails spaced not more than 300 mm o.c. Glued-laminated columns shall conform to Section 4.3 of the National Building Code of Canada 1980.

- (3) Wood columns shall be separated from concrete in contact with the ground by 0.05 mm polyethylene film or Type S roll roofing.

E. UNIT MASONRY COLUMNS

- (1) Unit masonry columns shall be built of loadbearing masonry units.
- (2) Unit masonry columns shall be at least 290 mm by 290 mm or 240 mm by 380 mm in size.

F. SOLID CONCRETE COLUMNS

- (1) Concrete shall conform to Section 3.
- (2) Concrete columns shall be not less than 200 mm by 200 mm for rectangular columns and 230 mm diam for circular columns.

SECTION 18. CRAWL SPACES

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) This Section applies to crawl spaces whose exterior walls have less than 25 per cent of their total area above exterior ground level open to the outdoors.
- (3) Foundations enclosing crawl spaces shall conform to Section 15.
- (4) Insulation shall conform to Section 26.
- (5) Heating of crawl spaces shall conform to Section 34.

B. ACCESS

- (1) An access opening of not less than 500 mm by 700 mm shall be provided to each crawl space where the crawl space serves a single dwelling unit, and not less than 550 mm by 900 mm for other crawl spaces.
- (2) Access openings shall be fitted with a door or hatch, except when the access opening into the crawl space is from the adjacent basement and provides ventilation to the crawl space.

C. VENTILATION

- (1) Crawl spaces shall be ventilated by natural or mechanical means.
- (2) Except as otherwise permitted in (5), natural ventilation for crawl spaces shall be provided to the outside air by not less than 0.1 m² of unobstructed vent area for every 50 m² of floor area.
- (3) Vents for crawl spaces shall be designed to prevent the entry of snow, rain and insects and shall be provided with tight-fitting covers to prevent air leakage in winter if the crawl space is heated.
- (4) Vents for crawl spaces shall be uniformly distributed on opposite sides of the building.
- (5) Ventilation to the outside air is not required when the crawl space is used as a warm air plenum, or if the crawl space is vented to an adjacent basement or cellar with an opening conforming to (2).

D. CLEARANCE

- (1) The ground level in a crawl space shall be not less than 300 mm below the level of all joists and beams, except that in localities where termites are known to occur, the clear-

ance shall be not less than 450 mm, unless the joists are pressure treated with a chemical that is toxic to termites.

- (2) Where equipment requiring service such as plumbing cleanouts, traps and burners is located in crawl spaces, an access way with a minimum height and width of 600 mm shall be provided from the access door to the equipment and for a distance of 900 mm on the side or sides of the equipment to be serviced.

E. DRAINAGE

- (1) Unless groundwater levels and site conditions are such that water will not accumulate in the crawl space, the crawl space floor and access trenches shall be sloped to drain to a sewer, ditch or dry well.
- (2) Drains shall conform to Section 14.

F. GROUND COVER

A ground cover consisting of not less than 50 mm of asphalt or 10 MPa portland cement concrete, of Type S roll roofing or 0.10 mm polyethylene shall be provided in every crawl space. Joints in sheet-type ground cover shall be lapped not less than 100 mm and weighted down.

G. FIRE PROTECTION

Crawl spaces used as warm-air plenums shall be restricted to 1-storey portions of dwelling units. Enclosing material, including insulation, shall have a surface flame-spread rating not greater than 150. Combustible ground cover shall be covered with noncombustible material or have noncombustible receptacles beneath the register openings.

SECTION 19. ROOF SPACES

A. SCOPE

This Section applies to all buildings, regardless of size.

B. VENTILATION

- (1) Except as provided in (2) and (3), every roof space or attic above an insulated ceiling shall be ventilated with openings to the exterior to provide unobstructed vent area of not less than 1/300 of the insulated ceiling area. Vents may be roof type, eave type, gable-end type or any combination thereof, and shall be uniformly distributed on opposite sides of the building. Vents shall be designed to prevent the entry of rain, snow and insects. The unobstructed vent area shall be determined in conformance with CSA A93-1965, "Vents for Buildings."
- (2) A roof space in a building containing not more than 1 storey need not be vented provided the vapour barrier protecting the ceiling insulation is Type 1 (see Article 26 C (4)), and is applied as a single continuous sheet without openings over the entire ceiling area. Openings such as for plumbing vents may be cut in such vapour barrier provided the perimeters of such openings are sealed in a manner that will maintain the effectiveness of the vapour barrier.
- (3) Where insulation is placed below the roof sheathing and the roof slope is less than 1 in 6 or the roof incorporates no attic space, the unobstructed vent area shall be not less than 1/150 of the insulated ceiling area, uniformly distributed on all sides of the building. Cross purlins at least 38 mm by 38 mm shall be applied to the top of the roof joists where the roof does not incorporate an attic space, and the top of the insulation shall be at least 25 mm below the top of the roof joists.

- (4) The lower portion of a mansard style roof need not be ventilated. The upper portion of such roofs shall be ventilated in conformance with the requirements in Articles (1) to (3), except that at least 50 per cent of the required vent opening shall be provided near the junction of the upper and lower portions.

C. ACCESS

Every attic space more than 600 mm in height at the highest point shall be provided with an access stair or shall have a hatchway of not less than 550 mm by 900 mm, except that where such hatchway serves not more than 1 dwelling unit, the hatchway may be reduced to 500 mm by 700 mm. Hatchways shall be fitted with doors or covers.

SECTION 20. ABOVE-GRADE MASONRY

A. SCOPE

- (1) This Section applies to unreinforced masonry and masonry veneer in which the wall height above the foundation wall does not exceed 11 m, and in which the roof or floor system above the first storey is not of concrete construction.
- (2) For buildings other than those described in (1), or where the masonry is designed on the basis of design loads and allowable stresses, Section 4.4 of the National Building Code of Canada 1980 shall apply.
- (3) In seismic Zone 3, loadbearing elements of masonry buildings more than 1 storey in height shall be reinforced with at least the minimum amount of reinforcement as required in Subsection R.
- (4) In seismic Zone 2, loadbearing masonry elements of 3-storey masonry buildings shall be reinforced with at least the minimum amount of reinforcement as required in Subsection R.

B. MASONRY UNITS

- (1) Masonry units shall comply with one of the following:
 - CSA A82.1M-1977, "Burned Clay Brick,"
 - CSA A82.3-M1978, "Calcium Silicate (Sand-Lime) Building Brick,"
 - CSA A82.4-M1978, "Structural Clay Load-Bearing Wall Tile,"
 - CSA A82.5-M1978, "Structural Clay Non-Load-Bearing Tile,"
 - CSA A165.1-M1977, "Concrete Masonry Units,"
 - CSA A165.2-M1977, "Concrete Brick Masonry Units,"
 - CSA A165.3-M1977, "Prefaced Concrete Masonry Units,"
 - CSA A165.4-M1977, "Autoclaved Cellular Units,"
 - ASTM C126-76, "Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units," or
 - ASTM C212-60(1975), "Structural Clay Facing Tile."
- (2) Used bricks shall be free of old mortar, soot or other surface coating and shall conform to (1).
- (3) Glass blocks and gypsum masonry shall not be used as loadbearing units or in the construction of fireplaces or chimneys. Gypsum block shall not be exposed to soil, weather or dampness. Masonry made with foamed concrete shall not be used in contact with the soil or exposed to the weather.
- (4) Stone shall be sound and durable.
- (5) Loadbearing concrete units or non-loadbearing concrete units exposed to the weather shall have weight and water absorption characteristics conforming to Classes A, B or C, described in CSA A165.1-M1977, "Concrete Masonry Units." Where cellular concrete

blocks are used, allowance shall be made in the design for the shrinkage characteristics of the units to be used.

- (6) Clay brick masonry units exposed to the weather shall have an average saturation coefficient not greater than 0.88 when measured in conformance with CAN3-A82.2-M78, "Methods of Sampling and Testing Brick."
- (7) The compressive strength of masonry units shall conform to Table 20A.

TABLE 20A—COMPRESSIVE STRENGTH OF MASONRY

Type of Masonry Unit	Minimum Compressive Strength over Gross Area, MPa	
	Masonry Unit Exposed to Weather	Masonry Unit not Exposed to Weather
Hollow loadbearing concrete units	7	5
Solid loadbearing concrete units	12.5	8
Hollow non-loadbearing concrete units	7	2.5
Solid non-loadbearing concrete units	12.5	8
Solid loadbearing cellular units	Not permitted	5
Solid non-loadbearing cellular units	Not permitted	2
Column 1	2	3

C. MORTAR

- (1) Cementitious materials and aggregates for mortar shall comply with the following:
CAN 3-A5-M77, "Portland Cements,"
CAN 3-A8-M77, "Masonry Cement,"
CSA A82.22-M1977, "Gypsum Plasters,"
CSA A82.42-1950, "Quicklime for Structural Purposes,"
CSA A82.43-1950, "Hydrated Lime for Masonry Purposes,"
CSA A82.56M-1976, "Aggregate for Masonry Mortar."
- (2) Water and aggregate shall be clean and free of significant amounts of deleterious materials.
- (3) Lime used in mortar shall be hydrated.
- (4) If lime putty is used in mortar, it shall be made by slaking quicklime in water for not less than 24 h (see Appendix to CSA Standard A82.42-1950, "Quicklime for Structural Purposes") or by soaking hydrated lime in water for not less than 12 h.
- (5) Except as provided in (6) to (8), mortar mixes shall conform to Table 20B. Mortar containing portland cement shall not be used later than 2½ h after mixing.
- (6) Mortar for sand-lime brick and concrete brick may consist of 1 part of masonry cement to not less than 3 parts of aggregate by volume in addition to those mixes permitted in Table 20B.
- (7) Mortar for gypsum units shall consist of 1 part gypsum and not more than 3 parts aggregate by weight.

- (8) Mortar for glass block shall consist of 1 part portland cement, 1 part hydrated lime to not more than 4 parts aggregate by volume.

TABLE 20B—MORTAR MIX PROPORTIONS
(by volume)

Permissible Use of Mortar	Portland Cement	Masonry Cement (Type H)	Lime	Aggregate
All locations but not for use with sand-lime or concrete brick	$\frac{1}{2}$ to 1 1	1 —	— $\frac{1}{4}$ to $\frac{1}{2}$	Not less than $2\frac{1}{4}$ and not more than 3 times the sum of the volumes of the cement and lime
All locations except foundation walls and piers, but not for use with sand-lime or concrete brick	— 1	1 —	— $\frac{1}{2}$ to $1\frac{1}{4}$	
All locations except loadbearing walls of hollow units, parapet walls and chimneys	1	—	$1\frac{1}{4}$ to $2\frac{1}{2}$	
All non-loadbearing partitions and all loadbearing walls of solid units, except foundation walls, parapet walls and chimneys	1 —	— —	$2\frac{1}{4}$ to 4 1	
Column 1	2	3	4	5

D. MORTAR JOINTS

- (1) Maximum average joint thickness shall be 12 mm. Maximum thickness of an individual joint shall be 20 mm.
- (2) Solid masonry units shall be laid with full head and bed joints.
- (3) Hollow masonry units shall be laid with mortar applied to head and bed joints of both inner and outer face shells.

E. MASONRY SUPPORT

- (1) All masonry shall be supported on masonry, concrete or steel.
- (2) Masonry over openings shall be supported by steel, reinforced concrete or masonry lintels or arches designed to support the imposed load.
- (3) Steel angle lintels supporting masonry veneer above openings shall conform to Table 20C.
- (4) Every masonry wall shall be at least as thick as the wall it supports, except as otherwise permitted in L (2).

TABLE 20C—MAXIMUM ALLOWABLE SPANS FOR STEEL
LINTELS SUPPORTING MASONRY VENEER, m

Minimum Angle Size, mm			75 mm Brick	90 mm Brick	100 mm Stone
Vert. Leg	Horiz. Leg	Thickness			
90	75	6	2.55	—	—
90	90	6	2.59	2.47	2.30
100	90	6	2.79	2.66	2.48
125	90	8	3.47	3.31	3.08
125	90	10	3.64	3.48	3.24
Column 1	2	3	4	5	6

F. THICKNESS AND HEIGHT

- (1) Masonry exterior walls, other than cavity walls, in 1-storey buildings and the top storeys of 2-storey buildings shall be not less than 140 mm thick provided the walls are not more than 2.8 m high at the eaves and 4.6 m high at the peaks of gable ends. The exterior walls of the bottom storeys of 2-storey buildings and all walls of 3-storey buildings shall be not less than 190 mm thick. In walls composed of more than 1 wythe, each wythe shall be not less than 90 mm thick.
- (2) Cavity walls shall be made with not less than 90 mm wide units if the joints are raked and not less than 75 mm wide units if the joints are not raked. Wythes shall be separated by a cavity of not less than 50 mm nor more than 75 mm, except that where the wythes are bonded together with masonry units, the cavity shall be not less than 75 mm and not more than 100 mm. The minimum thickness of cavity walls above the supporting base shall be 230 mm for the top 7.6 m and 330 mm for the remaining portion, except that where 75 mm wide units are used the wall height above the top of the foundation wall shall not exceed 6 m.
- (3) The thickness of loadbearing interior walls shall be determined on the basis of J (1).
- (4) Interior non-loadbearing partitions shall be not less than 65 mm thick (see J (1)).
- (5) Masonry veneer resting on a bearing support shall be of solid units not less than 75 mm thick for wall heights up to 11 m. Such veneer over wood-frame walls shall have not less than a 25 mm air space behind the veneer. Masonry veneer less than 90 mm thick shall have unraked joints.
- (6) Masonry veneer individually supported by the back-up material shall conform to the appropriate requirements contained in Section 4.4 of the National Building Code of Canada 1980.
- (7) The height of parapet walls above the adjacent roof surface shall be not more than 3 times the parapet wall thickness. Parapet walls shall be solid from the top of the parapet to not less than 300 mm below the adjacent roof level.
- (8) Limestone slab facings and precast concrete panel facings shall conform to the appropriate requirements of Section 4.4 of the National Building Code of Canada 1980.

G. CHASES AND RECESSES

- (1) Except as permitted in (3) and (5), the depth of any chase or recess shall not exceed $\frac{1}{3}$ the thickness of the wall, and the horizontal projection of the chase or recess shall not exceed 500 mm.

- (2) Except as permitted in (3) and (5), no chase or recess shall be constructed in any wall 190 mm or less in thickness.
- (3) Recesses may be constructed in 190 mm walls provided they do not exceed 100 mm in depth, 750 mm in height and the horizontal projection of the recess does not exceed 500 mm.
- (4) Chases and recesses shall be not less than 4 times the wall thickness apart and not less than 600 mm away from any pilaster, cross wall, buttress or other vertical element providing required lateral support for the wall.
- (5) Chases or recesses that do not conform to the limits specified in (1) to (4) shall be considered as openings, and any masonry supported above such a chase or recess shall be supported by a lintel or arch.
- (6) Chases and recesses shall not be cut into walls made with hollow units after the masonry units are in place.

H. SUPPORT OF LOADS

- (1) Loadbearing walls of hollow masonry units supporting roof or floor framing members shall be capped with not less than 50 mm of solid masonry, or have the top course filled with concrete. Capping may be omitted where the roof framing is supported on a wood plate not less than 38 mm thick, the same width as the masonry wall.
- (2) Floor joists supported on cavity walls shall be supported on solid units not less than 57 mm in height. Floor joists shall not project into the cavity. Roof and ceiling framing members bearing on cavity walls shall be supported on not less than 57 mm of solid masonry, bridging the full thickness of the wall, or a wood plate not less than 38 mm thick, bearing not less than 50 mm on each wythe.
- (3) The bearing area under beams and joists shall be sufficient to carry the supported load. In no case shall the minimum length of end bearing of beams supported on masonry be less than 90 mm. The minimum length of end bearing of floor, roof or ceiling joists supported on masonry shall be not less than 40 mm.
- (4) Beams and columns supported on masonry walls shall be supported on pilasters where the thicknesses of the masonry walls or wythes are less than 190 mm. Not less than 190 mm in depth of solid masonry or concrete shall be provided under the beams or columns. Pilasters shall be bonded or tied to masonry walls. Concrete pilasters shall be not less than 50 mm by 300 mm; unit masonry pilasters shall be not less than 100 mm by 290 mm.
- (5) The distance from the face of a wall to the edge of a supporting member attached to the structure, such as a shelf angle or the flange of a beam, shall not exceed 30 mm, except as otherwise permitted in Section 4.4 of the National Building Code of Canada 1980.

I. BONDING AND TYING

- (1) Vertical joints in adjacent courses of walls and partitions shall be offset unless each wythe of masonry is reinforced with the equivalent of not fewer than 2 corrosion-resistant steel bars of 3.76 mm diam placed in the horizontal joints at vertical intervals not exceeding 460 mm. Where joints in the reinforcing occur, the bars shall be lapped not less than 150 mm.
- (2) Masonry walls that consist of 2 or more wythes shall have the wythes bonded or tied together with masonry bonding units as described in (3) or with metal ties as described in (4) to (6).
- (3) Where wythes are bonded together with masonry units, the bonding units shall comprise not less than 4 per cent of the wall surface area. Bonding units shall be spaced not more than 600 mm o.c. vertically and horizontally in the case of brick masonry and

900 mm o.c. in the case of block or tile. Such units shall extend not less than 90 mm into adjacent wythes.

- (4) Where 2 or more wythes are bonded together with metal ties of the individual rod type, the ties shall conform to the requirements in (5) to (8). Other metal bonding ties may be used where it can be shown that such ties provide walls that are at least as strong and as durable as those made with the individual rod type.
- (5) Metal ties of the individual rod type shall be corrosion-resistant and shall have a minimum cross-sectional area of not less than 17.8 mm^2 . Such ties shall have not less than a 50 mm portion bent at right angles at each end.
- (6) Metal ties of the individual rod type shall extend from within 25 mm of the outer face of the wall to within 25 mm of the inner face of the wall and shall be completely embedded in mortar, except for the portion exposed in cavity walls. Such ties shall be staggered from course to course.
- (7) Where 2 or more wythes in walls, other than cavity walls, are bonded together with metal ties of the individual rod type, the space between wythes shall be completely filled with mortar. Such ties shall be located within 300 mm of openings and spaced not more than 900 mm apart around openings. Ties at other locations shall be spaced not more than 900 mm apart horizontally and 460 mm apart vertically.
- (8) Where the inner and outer wythes of cavity walls are bonded together with metal ties of the individual rod type, the ties shall be shaped to provide a drip near their centres. Such ties shall be spaced not more than 600 mm apart horizontally within 100 mm of the bottom of each floor or roof assembly where the cavity extends below the assembly and not more than 900 mm apart around openings within 300 mm of the openings. At other locations, the ties shall be spaced not more than 900 mm apart horizontally and 460 mm apart vertically.
- (9) Masonry veneer 75 mm or more in thickness and resting on a bearing support shall be tied to masonry back-up or to wood framing members with not less than 0.41 mm thick, 22 mm wide corrosion-resistant straps spaced in accordance with Table 20D and shaped to provide a key with the mortar.
- (10) Masonry veneer individually supported by masonry or wood-frame back-up shall be secured to the back-up in conformance with Section 4.4 of the National Building Code of Canada 1980.

TABLE 20D—VENEER TIE SPACING

Maximum Vertical Spacing, mm	Maximum Horizontal Spacing, mm
400	800
500	600
600	400
Column 1	2

- (11) Glass block shall have horizontal joint reinforcement of 2 corrosion-resistant bars of not less than 3.76 mm diam or expanded metal strips not less than 75 mm wide spaced at vertical intervals not exceeding 600 mm for units 190 mm or less in height and in every horizontal joint for units higher than 190 mm. Reinforcement shall be lapped not less than 150 mm.

J. LATERAL SUPPORT

- (1) Masonry walls and partitions shall be supported at right angles to the wall by floor or roof construction or by intersecting masonry walls or buttresses. The spacing of such supports shall conform to Table 20E.

TABLE 20E—MAXIMUM DISTANCE BETWEEN LATERAL WALL SUPPORTS

Type of Wall	Maximum Spacing of Supports
Loadbearing walls of solid units	20 times the wall thickness
Loadbearing walls of hollow units or cavity walls	18 times the wall thickness
Non-loadbearing walls or partitions	36 times the wall thickness
Column 1	2

- (2) Floor and roof constructions providing required lateral support for walls as required in (1) shall be constructed to transfer lateral loads to walls or buttresses approximately at right angles to the laterally supported walls.

K. ANCHORAGE OF ROOFS, FLOORS AND INTERSECTING WALLS

- (1) Where required to provide lateral support (see Subsection J), masonry walls shall be anchored to each floor or roof assembly at maximum intervals of 2 m, except that anchorage of floor joists not more than 1 m above grade may be omitted. Ties shall be corrosion-resistant and be not less than the equivalent of 40 mm by 4.76 mm thick steel straps. Such anchors shall be shaped to provide a mechanical key with the masonry and shall be securely fastened to the horizontal support to develop the full strength of the tie. When joists are parallel to the wall, such ties shall extend across at least 3 joists.
- (2) Where required to provide lateral support, intersecting walls or partitions shall be bonded or tied together. Fifty per cent of the adjacent masonry units in the intersecting wall shall be embedded in the laterally supported wall, or corrosion-resistant metal ties equivalent to not less than 4.76 mm by 40 mm steel strapping shall be provided. Such ties shall be spaced not more than 800 mm o.c. vertically and shaped at both ends to provide sufficient mechanical key to develop the strength of the ties.
- (3) Wood-frame walls or partitions shall be tied to intersecting masonry walls with not less than 4.76 mm diam corrosion-resistant steel rods spaced not more than 900 mm o.c. vertically. The ties shall be anchored to the wood framing at one end and shaped to provide a mechanical key at the other end to develop the strength of the tie.
- (4) Roof systems of wood-frame construction shall be tied to exterior walls by not less than 12.7 mm diam anchor bolts, spaced not more than 2.4 m apart, embedded not less than 90 mm into the masonry and fastened to a rafter plate of not less than 38 mm thick lumber. Alternatively, the roof system may be anchored by nailing the wall furring strips to the side of the rafter plate.
- (5) Cornices, sills or other trim of masonry material which project beyond the wall face shall have not less than 65 per cent of their mass but not less than 90 mm within the wall or shall be adequately anchored to the wall with corrosion-resistant anchors.
- (6) Where anchor bolts are to be placed in the top of a pier, the pier shall be capped with concrete or reinforced masonry not less than 300 mm thick.

L. CORBELLING

- (1) All corbelling shall consist of solid units. The units shall be corbelled so that the horizontal projection of any unit does not exceed 25 mm and the total projection does not exceed $\frac{1}{3}$ the total wall thickness.

- (2) Cavity walls of greater thickness than the foundation wall on which they rest shall not be corbelled but may project 25 mm over the outer face of the foundation wall disregarding parging. The unit masonry foundation wall may be corbelled to meet flush with the inner face of a cavity wall provided the individual corbel does not exceed $\frac{1}{2}$ the height or $\frac{1}{3}$ the width of the corbelled unit and the total corbel does not exceed $\frac{1}{3}$ the foundation wall thickness.
- (3) Masonry veneer resting on a bearing support shall not project more than 25 mm beyond the supporting base where the veneer is at least 90 mm thick and 12 mm beyond the supporting base where the veneer is less than 90 mm thick. In the case of rough stone veneer, the projection, measured as the average projection of the stone units, shall not exceed $\frac{1}{3}$ the bed width beyond the supporting base.

M. FLASHING

- (1) Exposed flashing shall consist of not less than 1.73 mm sheet lead, 0.33 mm galvanized steel, 0.36 mm copper, 0.46 mm zinc or 0.48 mm thick aluminum. Aluminum flashing in contact with masonry or concrete shall be effectively coated or separated from the masonry or concrete by an impervious membrane.
- (2) Concealed flashing shall consist of not less than 1.73 mm sheet lead, 0.33 mm galvanized steel, 0.36 mm copper, 0.46 mm zinc, Type S roll roofing, 0.15 mm polyethylene or 0.05 mm copper or aluminum laminated to felt or kraft paper.
- (3) Fastening devices for flashing shall be corrosion-resistant and compatible with the flashing with respect to galvanic action.
- (4) Flashing shall be installed in masonry and masonry veneer walls beneath jointed masonry window sills, over the back and top of parapet walls, over the heads of glass block panels, beneath weep holes and over the heads of window or door openings in exterior walls when the vertical distance between the top of a window or door trim and the bottom edge of the eave exceeds $\frac{1}{4}$ of the horizontal eave overhang.
- (5) When installed beneath jointed masonry window sills or over the heads of openings, flashing shall extend from the front edge of the masonry up behind the sill or lintel.
- (6) Flashing beneath weep holes in cavity walls shall be installed so that it is bedded in both wythes and slopes toward the outside wythe. Such flashing shall be bedded not less than 25 mm in the inside wythe and shall extend to the outside of the outer wythe.
- (7) Flashing beneath weep holes in masonry veneer over wood-frame walls shall be installed so that it extends from the front edge of the masonry to 150 mm up behind the sheathing paper.

N. WEEP HOLES

Weep holes spaced not more than 600 mm apart shall be provided at the bottom of the cavity in cavity wall and masonry veneer wall construction including the cavity above lintels over window and door openings required to be flashed in conformance with M(4).

O. DAMPPROOFING

- (1) Where the interior finish of the exterior walls of a building is a type which may be damaged by moisture, exterior masonry walls, other than cavity walls or walls that are protected for their full height by a roof of a carport or porch, shall be parged on the interior surface and covered with No. 15 breather-type asphalt-saturated paper or felt conforming to CAN2-51.32-M77, "Sheathing, Membrane, Breather Type," lapped at least 100 mm at the joints. Where the insulation effectively limits the passage of water vapour and is applied by a waterproof adhesive or by mortar directly to the masonry, the requirements for sheathing paper do not apply.

- (2) Cavity walls shall be constructed so that mortar droppings are prevented from forming a bridge to allow the passage of rain water across the cavity.
- (3) The junction between door and window frames with masonry shall be caulked in conformance with Subsection 28 D.
- (4) Where no flashing is installed beneath window sills, such sills shall be provided with a drip not less than 25 mm from the wall surface.

P. EXTERIOR FINISH

Above-grade exterior walls of concrete block shall be stuccoed, painted or otherwise finished to provide breather-type water repellency.

Q. PROTECTION

- (1) Mortar and masonry shall be maintained at a temperature of not less than 5°C during installation and for not less than 48 h after installation. No frozen material shall be used in the mix.
- (2) The top surface of uncompleted masonry exposed to the weather shall be completely covered with a waterproofing material when construction is not in progress.

R. REINFORCEMENT FOR EARTHQUAKE RESISTANCE

- (1) Where reinforcement is required in this Section, masonry walls shall be reinforced horizontally and vertically with steel having a total cross-sectional area of not less than 0.002 times the cross-sectional area of the wall, so that not less than $\frac{1}{3}$ of the required steel area is installed either horizontally or vertically and the remainder in the other direction.
- (2) Where reinforcement for masonry is required in this Section, it shall be installed in conformance with the requirements for reinforced masonry as contained in CAN3-S304-M1978, "Masonry Design and Construction for Buildings."

SECTION 21. CHIMNEYS AND FLUES

A. GENERAL

- (1) Where a chimney exceeds 12 m in height or where the cross-sectional area of a flue exceeds 813 cm² or where the capacity of an appliance connected to a flue has a rated input exceeding 120 kW, the requirements in Part 6 of the National Building Code of Canada 1980 shall apply.
- (2) Metal chimneys consisting of a single thickness of metal shall conform to the requirements in Part 6 of the National Building Code of Canada 1980.
- (3) Factory-built chimneys shall conform to CAN4-S604-78, "Standard for Factory-Built Type A Chimneys."
- (4) Where a metal gas vent is used for venting of gas-burning appliances, such appliances shall be vented in accordance with CAN1-B149.1-78, "Installation Code for Natural Gas Burning Appliances and Equipment" or CAN1-B149.2-78, "Installation Code for Propane Burning Appliances and Equipment."
- (5) Dampers and draft regulators in flue pipes serving oil-fired appliances shall conform to CSA B139-1976, "Installation Code for Oil Burning Equipment."
- (6) Chimneys or gas vents for gas appliances that are not suitable for solid- or liquid-fuel-fired appliances shall be plainly and permanently marked to that effect.

- (7) The walls of any chimney, gas vent or flue pipe shall be constructed to be gas-tight, smoke-tight and flame tight.

B. CHIMNEY FLUES

- (1) A chimney flue serving a fireplace or incinerator shall not serve any other appliance.
- (2) Except as required in Article (1), 2 or more fuel-burning appliances may be connected to the same chimney flue provided adequate draft is maintained for the connected appliances and the connections are made at different elevations unless otherwise permitted by the installation requirements in 34 B(3).
- (3) Chimney flues shall not be inclined more than 45° to the vertical.
- (4) The size of a chimney flue serving 1 or more appliances having a maximum rated input shall conform to Table 21A unless calculations are provided to show that smaller sizes can be justified.

TABLE 21A—FLUE SIZES

Maximum Rated Input of One or More Appliances, kW	Minimum Size of Flue, mm	
	Round	Rectangular
30	150	200 x 200
50	175	200 x 200
80	200	200 x 200
120	225	200 x 300
Column 1	2	3

- (5) The minimum size of a chimney flue serving a masonry fireplace shall be 225 mm in diameter for round flues and 200 mm by 300 mm for rectangular flues.
- (6) Where a chimney flue serves only 1 appliance, the flue area shall be at least equal to that of the flue pipe connected to it.
- (7) The width of an oval chimney flue shall not be less than $\frac{2}{3}$ its breadth.
- (8) A chimney flue serving a factory-built fireplace, including the free-standing type, shall be designed to vent the fireplace in an acceptable manner.

C. CHIMNEY LINING

- (1) Every masonry or concrete chimney shall have a lining of clay, firebrick or asbestos-cement.
- (2) Clay liners shall conform to ASTM C315-78b, "Clay Flue Linings." Such liners shall be not less than 15.9 mm thick and shall be capable of resisting, without softening or cracking, a temperature of 1 100°C.
- (3) Firebrick liners shall conform to ASTM C64-72 (1977), "Refractories for Incinerators and Boilers." Such firebrick shall be laid with high temperature cement mortar conforming to CGSB 10-GP-3M(1976), "Mortar, Refractory, Air Setting."
- (4) Chimney liners shall be installed when the surrounding masonry or concrete is placed. Spaces between the liner and surrounding masonry shall not be filled with mortar where the chimney walls are less than 190 mm in thickness.
- (5) Every clay chimney liner shall be laid in a full bed of mortar consisting of 1 part portland cement to approximately 3 parts of sand by volume.

- (6) Chimney liners shall extend from a point not less than 200 mm below the lowest flue pipe connection to a point not less than 50 mm above the chimney cap.

D. MASONRY AND CONCRETE CHIMNEY CONSTRUCTION

- (1) Unit masonry shall conform to Section 20.
- (2) Concrete shall conform to Section 3.
- (3) Footings for masonry chimneys and concrete chimneys shall conform to the requirements in Section 15.
- (4) A chimney flue shall extend not less than 900 mm above the highest point at which the chimney comes in contact with the roof and not less than 600 mm above the highest roof surface or structure within 3 m of the chimney. Not more than 200 mm of chimney flue above the top of the chimney cap may be considered in computing this height. Chimneys shall be braced when necessary to provide lateral stability.
- (5) The top of a chimney shall have a waterproof cap of concrete, masonry or metal. The cap shall slope from the lining and be provided with a drip not less than 25 mm from the chimney wall. Jointed masonry chimney caps shall have flashing installed beneath the cap extending from the liner to the drip edge.
- (6) A cleanout opening equipped with a metal frame and a tight-fitting metal door shall be installed near the base of the chimney flue.
- (7) The walls of a masonry chimney shall be built of solid units not less than 75 mm thick.
- (8) Flue liners in the same chimney shall be separated by not less than 75 mm of masonry or concrete exclusive of liners where clay liners are used, or 90 mm of firebrick where firebrick liners are used. Such flue liners shall be installed to prevent significant lateral movement.
- (9) Junctions with adjacent materials shall be adequately flashed to shed water.

E. FLUE PIPES

- (1) Flue pipes connecting a solid fuel-burning appliance to a chimney flue shall be made of metal conforming to Table 21B.

TABLE 21B—WALL THICKNESS OF FLUE PIPES

Diameter of Flue Pipe, mm	Minimum Thickness of Metal, mm	
	Uncoated Steel	Galvanized Steel
Below 152	0.41	0.41
152 to 203	0.53	0.48
Over 203	0.69	0.61
Column 1	2	3

- (2) Flue pipes connecting a gas-burning appliance to a chimney flue shall be installed in conformance with appropriate provincial regulations or, in the absence of such regulations, in conformance with CAN1-B149.1-78, "Installation Code for Natural Gas Burning Appliances and Equipment" or CAN1-B149.2-78, "Installation Code for Propane Burning Appliances and Equipment." Flue Pipes connecting an oil-burning appliance to a chimney flue shall be installed in conformance with appropriate provincial regulations or, in the absence of such regulations, in conformance with CSA B139-1976, "Installation Code for Oil Burning Equipment."
- (3) Flue pipes shall be as short and as straight as possible.

- (4) The cross-sectional area of the flue pipe shall not be less than the area of the flue outlet of the appliance, except that a tapered reduction in the section of the flue adjacent to the chimney is permitted provided adequate draft is maintained.
- (5) The flue pipe connection with the chimney shall be made by a metal thimble or masonry flue ring. The connection shall be tight and made so that the flue pipe does not extend into the chimney flue.
- (6) A flue pipe shall be supported by metal or other noncombustible supports.
- (7) No flue pipe shall pass through an attic, closet, concealed space or floor.

F. CLEARANCE FROM COMBUSTIBLE CONSTRUCTION

- (1) The clearance between masonry or concrete chimneys and combustible framing shall be not less than 50 mm for interior chimneys and 12 mm for exterior chimneys.
- (2) A clearance of not less than 150 mm shall be provided between a cleanout opening and combustible material.
- (3) All spaces between masonry or concrete chimneys and combustible framing shall be sealed top or bottom with noncombustible material.

TABLE 21C—CLEARANCE BETWEEN A FLUE PIPE AND PROTECTED COMBUSTIBLE MATERIAL

Type of Protection Applied to the Combustible Material Unless Otherwise Specified and Covering All Surfaces Within 450 mm of the Flue Pipe	Clearance Between Flue Pipe and Combustible Material, mm
6 mm asbestos millboard spaced out 25 mm by noncombustible material	300
0.33 mm sheet metal on 6 mm asbestos millboard	300
0.33 mm sheet metal spaced out 25 mm by noncombustible material	230
0.33 mm sheet metal on 3.2 mm asbestos millboard spaced out 25 mm by noncombustible material	230
40 mm asbestos-cement covering on flue pipe	230
0.68 mm sheet metal on 25 mm mineral wool batts reinforced with wire mesh or equivalent	75
Column 1	2

- (4) Flooring shall have not less than a 12 mm clearance from masonry or concrete chimneys.
- (5) The clearance between flue pipes and unprotected combustible material shall be not less than 450 mm, except that where the flue gas temperature does not exceed 400°C, the clearance may be reduced to 230 mm. Where a 450 mm clearance is required, it may be reduced to the values shown in Table 21C where combustible material is protected.
- (6) Joists or beams may be supported on masonry walls which enclose chimney flues provided the combustible members are separated from the flue by a minimum of 290 mm of solid masonry.

SECTION 22. FIREPLACES

A. GENERAL

- (1) The requirements in Subsections B to I apply to all buildings, regardless of size.
- (2) Except as otherwise stated in this Section, unit masonry shall conform to Section 20 and concrete to Section 3.
- (3) Footings for masonry and concrete fireplaces shall conform to Section 15.
- (4) Except when otherwise specifically stated herein, this Section applies to masonry fireplaces constructed on-site.

B. FIREPLACE LINERS

- (1) Except where a fireplace is equipped with an acceptable steel liner, every fireplace shall have a firebrick liner not less than 50 mm thick for the sides and back and not less than 25 mm thick for the floor.
- (2) Firebrick liners shall be laid with high temperature cement mortar conforming to CGSB 10-GP-3M(1976), "Mortar, Refractory, Air Setting."

C. WALL THICKNESS

- (1) Except as provided in (2), the back and sides of a fireplace shall be at least 190 mm thick where a metal liner or a 50 mm thick firebrick liner is used, including the thickness of the masonry liner. Portions of the back exposed to the outside may be 140 mm thick. Joints between a firebrick liner and the adjacent back-up masonry shall be offset.
- (2) When a steel fireplace liner is used with an air circulating chamber surrounding the firebox, the back and sides of the fireplace shall consist of not less than 90 mm thickness of solid masonry units or 190 mm thickness of hollow masonry units.

D. OPENINGS

Masonry above openings shall be supported by steel lintels conforming to Article 20 E (3), by reinforced concrete or by a masonry arch.

E. HEARTH

- (1) Fireplaces shall have a noncombustible hearth extending not less than 400 mm in front of the fireplace opening and not less than 200 mm beyond each side of the fireplace opening.
- (2) The hearth shall be supported on not less than a 140 mm thick trimmer arch of solid masonry units or not less than a 100 mm thick reinforced concrete trimmer.

F. DAMPER

The throat of every fireplace shall be equipped with a metal damper sufficiently large to cover the full area of the throat opening.

G. SMOKE CHAMBER

- (1) The sides of the smoke chamber connecting a fireplace throat with a flue shall not be sloped at an angle greater than 45° to the vertical.
- (2) The thickness of masonry walls surrounding the smoke chamber shall be at least 190 mm at the sides, front and back, except that the portions of the back exposed to the outside may be 140 mm thick.

H. FACTORY-BUILT FIREPLACES

- (1) Factory-built fireplaces shall conform to ULC S610-1978, "Standard for Factory-Built Fireplaces" or to ULC S611-1979, "Standard for Factory-Built Free-Standing Fireplaces."
- (2) Unless otherwise accepted, the minimum clearance requirements around factory-built fireplaces shall conform to Article 34 I (2).
- (3) Unless otherwise accepted, combustible floor material beneath factory-built fireplaces shall be protected in conformance with Article 34 I (4).

I. CLEARANCE OF COMBUSTIBLE MATERIAL

- (1) Combustible material shall not be placed on or near the face of a fireplace within 150 mm of the fireplace opening, except that where the combustible material projects more than 38 mm out from the face of the fireplace above the opening, such material shall be at least 300 mm above the top of the opening.
- (2) Metal exposed to the interior of a fireplace, such as the damper control mechanism, shall have at least a 50 mm clearance from any combustible material on the face of the fireplace where such metal penetrates through the face of the fireplace.
- (3) At least a 100 mm clearance shall be provided between the back and sides of a fireplace and combustible framing, except that a 50 mm clearance is permitted where the fireplace is located in an exterior wall.
- (4) At least a 50 mm clearance shall be provided between the back and sides of the smoke chamber of a fireplace and combustible framing, except that a 25 mm clearance is permitted where the fireplace is located in an exterior wall.

SECTION 23. WOOD-FRAME CONSTRUCTION

A. SCOPE

- (1) This Section applies to conventional wood-frame construction in which the framing members are spaced not more than 600 mm o.c.
- (2) The requirements in this Section with regard to floor framing, subflooring and their fastenings apply to floors for which the design live load does not exceed 2.4 kN/m².
- (3) The requirements in this Section with regard to wall framing and its fastenings apply to walls which support floors for which the design live load does not exceed 2.4 kN/m² on any floor.
- (4) Where the conditions in (2) or (3) are exceeded, the design of the framing and fastening shall conform to Section 4.3 of the National Building Code of Canada 1980.
- (5) Post, beam and plank construction and plank frame wall construction shall conform to Section 24 of this Standard.

B. GENERAL

- (1) All members shall be so framed, anchored, fastened, tied and braced to provide the necessary strength and rigidity.
- (2) Ends of wood joists or beams and other members framing into masonry or concrete shall be treated to prevent decay where the bottom of the member is at or below ground level, or a 12 mm air space shall be provided at the end and sides of the member.

TABLE 23A—NAILING FOR FRAMING

Construction Detail	Minimum Length of Nails, mm	Minimum Number or Maximum Spacing of Nails
Floor joist to plate — toe nail	82	2
Wood or metal strapping to underside of floor joists	57	2
Cross bridging to joists	57	2 each end
Doubled header or trimmer joists	76	300 mm (o.c.)
Floor joist to stud (balloon construction)	76	2
Ledger strip to wood beam	82	2 per joist
Joist to joist splice (see also Table 23F)	76	2 at each end
Tail joist to adjacent header joist (end nailed) around openings	{ 82 101	{ 5 3
Each header joist to adjacent trimmer joist (end nailed) around openings	{ 82 101	{ 5 3
Stud to wall plate (each end) toe nail	63	4
or end nail	82	2
Doubled studs at openings, or studs at partition or wall intersections and corners	76	750 mm (o.c.)
Doubled top wall plates	76	600 mm (o.c.)
Bottom wall plate or sole plate to joists or blocking (exterior walls) ⁽¹⁾	82	400 mm (o.c.)
Interior partitions to framing or subflooring	82	600 mm (o.c.)
Horizontal member over openings in non-loadbearing partitions — each end	82	2
Lintels to studs	82	2 at each end
Ceiling joist to plate — toe nail each end	82	2
Roof rafter, roof truss or roof joist to plate — toe nail	82	3
Rafter plate to each ceiling joist	101	2
Rafter to joist (with ridge supported)	76	3
Rafter to joist (with ridge unsupported)	76	see Table 23F
Gusset plate to each rafter at peak	57	4
Rafter to ridge board — toe nail	57	4
— end nail	82	3
Collar tie to rafter — each end	76	3
Collar tie lateral support to each collar tie	57	2
Jack rafter to hip or valley rafter	82	2
Roof strut to rafter	76	3
Roof strut to bearing partition — toe nail	82	2
38 mm by 140 mm or less plank decking to support	82	2
Plank decking wider than 38 mm by 140 mm to support	82	3
38 mm edge laid plank decking to support (toe nail)	76	1
38 mm edge laid plank to each other	76	450 mm (o.c.)
Column 1	2	3

Note to Table 23A:

⁽¹⁾ See 23C(4).

- (3) Wood framing members that are not pressure treated with a wood preservative and which are supported on concrete in contact with the ground or fill shall be separated from the concrete by at least 0.05 mm polyethylene film or Type S roll roofing, except that such dampproofing material is not required where the wood member is at least 150 mm above the ground.
- (4) Lumber shall conform to the appropriate requirements in Subsection 3 C.

C. NAILS AND STAPLES

- (1) Nails specified in this Section shall be common steel wire nails or common spiral nails conforming to CSA B111-1974, "Wire Nails, Spikes and Staples," unless otherwise indicated.
- (2) All nails shall be long enough so that not less than $\frac{1}{2}$ their length penetrates into the second member. Splitting of wood members shall be minimized by staggering the nails in the direction of the grain and by keeping nails well in from the edges.
- (3) Except as provided in (4), nailing of framing shall conform to Table 23A.
- (4) Where the bottom wall plate or sole plate of an exterior wall is not nailed to joists or blocking in conformance with Table 23A, the exterior wall may be fastened to the floor framing by having plywood or waferboard sheathing extend down over floor framing and fastened to the floor framing by nails or staples conforming to (5), or by tying the wall framing to the floor framing by 50 mm wide galvanized-metal strips of at least 0.41 mm in thickness, spaced not more than 1.2 m apart, and fastened at each end with at least two 63 mm nails.

TABLE 23B—SHEATHING AND SUBFLOOR ATTACHMENT

Element	Minimum Length of Fasteners for Sheathing and Subfloor Attachment, mm				Min. No. or Max. Spacing of Fasteners
	Common or Spiral Nails	Ring Thread Nails	Roofing Nails	Staples	
Plywood or waferboard up to 10 mm thick	51	45	N/A	38	150 mm (o.c.) along edges and 300 mm (o.c.) along intermediate supports
Plywood or waferboard from 10 mm to 20 mm thick	51	45	N/A	51	
Plywood or waferboard over 20 mm thick	57	45	N/A	N/A	
Fibreboard sheathing up to 13 mm thick	N/A	N/A	44	38	
Gypsum sheathing up to 13 mm thick	N/A	N/A	44	N/A	
Board lumber 184 mm or less wide	51	N/A	N/A	51	2 per support
Board lumber more than 184 mm wide	51	N/A	N/A	51	3 per support
Column 1	2	3	4	5	6

- (5) Fastening of sheathing and subflooring shall conform to Table 23B. Staples shall not be less than 1.6 mm in diameter or thickness, with not less than a 9.5 mm crown driven with the crown parallel to framing. Roofing nails for the attachment of fibreboard or gypsum sheathing shall not be less than 3.2 mm in diameter with a minimum head diameter of 11.1 mm.

D. ALLOWABLE SPANS

- (1) Except as required in (3), the spans for wood joists, rafters and beams shall conform to the spans shown in Tables A-1 to A-11 for the uniform live loads shown in the tables. (See Appendix A.)
- (2) The spans for steel beams with laterally supported top flanges that support floors in 1- and 2-storey houses shall conform to Table 23C, and such beams shall be constructed of steel having a strength at least equal to Grade 300W steel in CSA G40.21-M1978, "Structural Quality Steels." (See Appendix A.)

TABLE 23C—MAXIMUM SPANS FOR STEEL BEAMS
SUPPORTING FLOORS IN DWELLINGS, m

No. of Storeys Supported	Beam Type	Supported Joist Length (Half the Sum of Joist Spans on Both Sides of the Beam)				
		2.4 m	3.0 m	3.6 m	4.2 m	4.8 m
1	S100 x 11	4.20	3.77	3.44	3.19	2.98
	S130 x 15	5.33	4.78	4.38	4.06	3.80
	S150 x 19	6.47	5.80	5.31	4.92	4.61
	W150 x 22	6.95	6.23	5.71	5.29	4.96
	W200 x 27	9.18	8.24	7.54	7.00	6.56
	S200 x 27	9.05	8.13	7.45	6.91	6.55
2	S100 x 11	3.18	2.84	2.60	2.41	2.25
	S130 x 15	4.04	3.62	3.31	3.06	2.87
	S150 x 19	4.91	4.40	4.02	3.72	3.49
	W150 x 22	5.27	4.73	4.32	4.00	3.75
	W200 x 27	6.97	6.25	5.72	5.30	4.96
	S200 x 27	6.88	6.17	5.65	5.23	4.90
Column 1	2	3	4	5	6	7

- (3) Where a floor is required to be designed to support a concentrated load as specified in Table 4B or to support a uniform live load in excess of those shown in the span tables, such spans shall be determined in conformance with Section 4.3 of the National Building Code of Canada 1980.

E. NOTCHING AND DRILLING

- (1) Holes drilled in roof, floor or ceiling framing members shall be not larger than $\frac{1}{4}$ the depth of the member and shall be located not less than 50 mm from the edges unless the depth of the member is increased by the size of the hole.
- (2) Floor, roof and ceiling framing members may be notched provided the notch is located on the top of the member within $\frac{1}{2}$ the joist depth from the edge of bearing and is not deeper than $\frac{1}{3}$ the joist depth unless the depth of the member is increased by the size of the notch.
- (3) Wall studs shall not be notched, drilled or otherwise damaged so that the undamaged portion of the stud is less than $\frac{2}{3}$ the depth of the stud if the stud is loadbearing or 40 mm if the stud is non-loadbearing unless the weakened studs are suitably reinforced.

- (4) The top plates in loadbearing walls and partitions shall not be notched, drilled or otherwise weakened to reduce the undamaged width to less than 50 mm unless the weakened plates are suitably reinforced.
- (5) Roof truss members shall not be notched, drilled or otherwise weakened unless such notching or drilling is allowed for in the design of the truss.

F. ANCHORAGE

- (1) Building frames shall be anchored to the foundation unless a structural analysis of wind and earth pressures shows anchorage is not required.
- (2) Except as provided in (4), anchorage shall be provided by embedding the ends of the first floor joists in concrete or fastening the sill plate to the foundation with not less than 12.7 mm diam anchor bolts spaced not more than 2.4 m o.c. Such anchor bolts shall be embedded not less than 100 mm in the foundation and so designed that they may be tightened without withdrawing them from the foundation.
- (3) Exterior columns and posts shall be anchored to resist uplift and lateral movement.
- (4) Buildings not more than 4.3 m in width and not more than 1 storey in building height may be anchored by means of corrosion-resistant steel rods or cables of at least 12.7 mm diam, attached to the building frame near each corner of the building in a manner that will develop the full strength of the rod or cable. Each rod or cable shall be anchored to the ground by means of ground anchors having a withdrawal resistance of not less than 500 N/m length of the building.

G. SILL PLATES

- (1) Where sill plates provide bearing for the floor system, they shall be not less than 38 mm by 89 mm material.
- (2) Sill plates shall be levelled by setting them on a full bed of mortar, except that where the top of the foundation is level, they may be laid directly on the foundation provided the junction between foundation and sill plate is caulked or the sill plate is placed on a layer of mineral wool at least 25 mm thick before being compressed.

H. BEAMS TO SUPPORT FLOORS

- (1) Beams shall have even and level bearing. Beams shall have not less than 89 mm length of bearing at end supports.
- (2) Steel beams shall be shop primed.
- (3) Where a beam is made up of individual pieces of lumber that are nailed together, the individual members shall be 38 mm or greater in thickness and installed on edge.
- (4) Where the individual members of a beam described in (3) are butted together to form a joint, each joint shall occur over a support, except that where beams are continuous over more than 1 span, the joints may be located at or within 150 mm of the end quarter points of the clear span of the beam.
- (5) Joints in individual members of beams that are located at or near the end quarter points described in (4) shall not occur in adjacent members at the same quarter point and shall not reduce the effective beam width by more than half. Members joined at quarter points shall be continuous over the adjacent supports.
- (6) Except as provided in (7), where 38 mm members are laid on edge to form a built-up beam, individual members shall be nailed together with a double row of nails at least 89 mm in length, spaced not more than 450 mm apart in each row, with the end nails located 100 to 150 mm from the end of each piece.

- (7) Where 38 mm members in built-up wood beams are not nailed together as provided in (6), they shall be bolted together with at least 12.7 mm diam bolts equipped with washers and spaced not more than 1.2 m o.c., with the end bolts located not more than 600 mm from the ends of the members.

I. FLOOR JOISTS

- (1) Except when supported on ribbon boards, floor joists shall have not less than 38 mm length of end bearing. Ribbon boards shall be not less than 19 mm by 89 mm lumber let into the studs.
- (2) Floor joists may be supported on the top of beams or may be framed into the sides of beams.
- (3) When framed into the side of a wooden beam, the joists shall be supported on joist hangers or other acceptable mechanical connectors or on not less than 38 mm by 64 mm ledger strips nailed to the side of the beam, except that 38 mm by 38 mm ledger strips may be used provided each joist is nailed to the beam by at least four 89 mm nails, in addition to the nailing for the ledger strip required in Table 23A.
- (4) When framed into the side of steel beams, the joists shall be supported on the bottom flange of the beam or on not less than 38 mm by 38 mm lumber bolted to the web with not less than 6.3 mm diam bolts spaced not more than 600 mm apart. Such joists shall be spliced above the beam with not less than 38 mm by 38 mm lumber at least 600 mm long to support the flooring. Not less than a 12 mm space shall be provided between the splice and the beam to allow for shrinkage of the wood joists.
- (5) Unless ceiling furring or plywood cladding is installed on the underside of floor joists, floor joists shall be restrained from twisting at the end supports and at intervals between supports not exceeding 2.1 m. Such restraint may be provided at end supports by toe nailing to the support or by end nailing the joists to the header joist. Restraint at the intermediate locations or at the ends may be provided by not less than 19 mm by 64 mm or 38 mm by 38 mm cross bridging or 25 mm by 3.2 mm steel strapping or 19 mm by 89 mm continuous wood strapping nailed to each joist and fastened at each end to the header or sill to prevent over-all movement. Blocking tightly fitted between joists and securely nailed in place is also acceptable for restraining joist twisting.
- (6) Header joists around floor openings shall be doubled when they exceed 1.2 m in length. The size of header joists exceeding 3.2 m in length shall be determined by calculations.
- (7) Trimmer joists around floor openings shall be doubled when the length of the header joist exceeds 800 mm. When the header joist exceeds 2.0 m in length, the size of the trimmer joists shall be determined by calculations.
- (8) When tail joists and header joists are supported by the floor framing, they shall be supported by suitable joist hangers or nailing.
- (9) Non-loadbearing partitions parallel to floor joists shall be supported on beams, loadbearing walls or doubled joists where the partition is over 1.8 m in length and contains openings that are not full ceiling height. Where such partitions contain no openings or openings that are full ceiling height, the joists need not be doubled. Non-loadbearing partitions less than 1.8 m in length need not be supported on framing but may be supported by the subfloor. Doubled joists may be separated not more than 200 mm by blocking if the blocking is not less than 38 mm by 89 mm lumber spaced not more than 1.2 m apart.
- (10) Non-loadbearing partitions at right angles to the floor joists are not restricted as to location.
- (11) Loadbearing interior walls parallel to floor joists shall be supported by beams or walls of sufficient strength to transfer safely the design loads to the vertical supports.

- (12) Loadbearing interior walls at right angles to floor joists shall be located not more than 900 mm from the joist support when the wall does not support a floor, and not more than 600 mm from the joist support when the wall supports 1 or more floors, unless the joist size is designed to support such loads.
- (13) Floor joists supporting roof loads shall not be cantilevered more than 400 mm beyond their supports where 38 x 184 mm joists are used and not more than 600 mm beyond their supports where 38 x 235 mm or larger joists are used. The cantilevered portions shall not support floor loads from other storeys unless calculations are provided to show that the allowable design stresses of the cantilevered joists are not exceeded.
- (14) Where cantilevered floor joists described in (13) are at right angles to the main floor joists, the tail joists in the cantilevered portion shall extend inward away from the cantilever support a distance equal to at least 6 times the length of the cantilever and end nailed to an interior doubled header joist in conformance with Table 23A.

J. WALL STUDS

- (1) The size and spacing of studs shall conform to Table 23D.
- (2) Wall studs shall be placed at right angles to the wall face, except that studs on the flat may be used in gable ends of roofs that contain only unfinished space or in non-loadbearing partitions within the limits described in (1). Wall studs that support only a load from an attic not accessible by a stairway may also be placed on the flat within the limits permitted in (1) provided the studs are clad on at least 1 side with plywood or waferboard sheathing fastened to the face of the studs with an acceptable adhesive and the portion of the roof supported by the studs does not exceed 2.1 m in width.
- (3) Wall studs shall be continuous for the full storey height except at openings and shall not be spliced except by acceptable types of glued joints.
- (4) Corners and intersections shall be designed to provide adequate support for the vertical edges of interior and exterior cladding materials, and in no instance shall exterior corners be framed with less than the equivalent of 2 studs. Where the vertical edges of interior cladding at wall intersections are supported at vertical intervals by blocking or other acceptable method, the vertical distance between such supports shall not exceed the maximum distance between supports specified in Section 30.
- (5) Except as provided in (6), studs shall be doubled on each side of openings so that the inner studs extend from the lintel to the bottom wall plate and the outer studs extend from the top wall plates to the bottom wall plate.
- (6) Single studs may be used on either side of openings in non-loadbearing partitions not required to be fire separations with fire-resistance ratings provided the studs extend from the top wall plate to the bottom wall plate.

K. WALL PLATES

- (1) Wall plates shall be not less than 38 mm thick and shall be the same width as the wall studs, except that in non-loadbearing partitions and in loadbearing walls where the studs are located directly over framing members, the bottom wall plate may be 19 mm thick.
- (2) A bottom wall plate shall be provided in all cases. The bottom plate in exterior walls shall not project more than $\frac{1}{3}$ the plate width over the support.
- (3) Except as permitted in (4) to (6), no fewer than 2 top plates shall be provided in loadbearing walls and partitions.
- (4) A single top plate may be used in a section of a loadbearing wall containing a lintel providing the top plate forms a tie across the lintel.

TABLE 23D—SIZE AND SPACING OF STUDS

Type of Wall	Supported Loads (including dead loads)	Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Unsupported Height, m
Interior	No load	38 x 38 38 x 89 flat ⁽¹⁾	400 400	2.4 3.6
	Attic not accessible by a stairway	38 x 64 38 x 64 flat ⁽¹⁾ 38 x 89 38 x 89 flat ⁽¹⁾	600 400 600 400	3.0 2.4 3.6 2.4
	Attics accessible by a stairway plus 1 floor, Roof load plus 1 floor, Attic not accessible by stairway plus 2 floors	38 x 89	400	3.6
	Roof load, Attic accessible by a stairway, Attic not accessible by a stairway plus 1 floor	38 x 89 38 x 64	600 400	3.6 2.4
	Attic accessible by a stairway plus 2 floors, or roof load plus 2 floors	38 x 89 64 x 89 38 x 140	300 400 400	3.6 3.6 4.2
	Attic accessible by a stairway plus 3 floors, or roof load plus 3 floors	38 x 140	300	4.2
	Exterior	Roof with or without attic storage	38 x 64 38 x 89	400 600
Roof with or without attic storage plus 1 floor		38 x 89 38 x 140	400 600	3.0 3.0
Roof with or without attic storage plus 2 floors		38 x 89 64 x 89 38 x 140	300 400 400	3.0 3.0 3.6
Roof with or without attic storage plus 3 floors		38 x 140	300	1.8
Column 1	2	3	4	5

Note to Table 23D:

⁽¹⁾ See 23J(2).

- (5) A single top plate may be used in loadbearing walls where the concentrated loads from ceilings, floors and roofs are not more than 50 mm to one side of the supporting studs and in all non-loadbearing partitions.
- (6) The top plates may be omitted in a section of loadbearing wall containing a lintel providing the lintel is tied to the adjacent wall section with not less than 75 mm by 150 mm

0.91 mm thick galvanized steel or a 19 mm by 89 mm by 300 mm wood splice nailed to each wall section with no fewer than three 63 mm nails.

- (7) Joints in top plates of loadbearing walls shall be staggered at least 1 stud spacing.

TABLE 23E—WOOD LINTEL SPANS

Location of Lintels	Supported Loads Including Dead Loads and Ceiling	Nominal Depth of Lintels, mm	Maximum Allowable Spans, m
Interior walls	Limited attic storage	89	1.22
		140	1.83
		184	2.44
		235	3.05
		286	3.81
	Full attic storage or roof load or limited attic storage plus 1 floor	89	0.61
		140	0.91
		184	1.22
		235	1.52
		286	1.83
	Full attic storage plus 1 floor or roof load plus 1 floor or limited attic storage plus 2 or 3 floors	89	—
		140	0.76
		184	0.91
		235	1.22
		286	1.52
	Full attic storage plus 2 or 3 floors or roof load plus 2 or 3 floors	89	—
140		0.61	
184		0.91	
235		1.07	
286		1.22	
Exterior walls	Roof with or without attic storage	89	1.12
		140	1.68
		184	2.24
		235	2.79
		286	3.35
	Roof with or without attic storage plus 1 floor	89	0.56
		140	1.40
		184	1.96
		235	2.24
		286	2.51
	Roof with or without attic storage plus 2 or 3 floors	89	0.56
		140	1.12
		184	1.68
		235	1.96
		286	2.24
Column 1	2	3	4

- (8) The top plates in loadbearing walls shall be lapped or otherwise suitably tied at corners and intersecting walls. Joints in single top plates used with loadbearing walls shall be suitably tied. Such ties shall be the equivalent of at least 75 mm by 150 mm 0.91 mm

thick galvanized steel nailed to each wall with at least the equivalent of three 63 mm nails.

L. FRAMING OVER OPENINGS

- (1) Except as provided in (2), openings in non-loadbearing walls shall be framed with not less than 38 mm material the same width as the studs securely nailed to adjacent studs.
- (2) Openings for doors in non-loadbearing walls required to be fire separations with a fire-resistance rating shall be framed with the equivalent of at least two 38 mm thick members that are the same width as the wall plates.
- (3) Openings in loadbearing walls shall be framed with lintels designed to carry the superimposed loads to adjacent studs. Except as provided in (5), where 2 or more members are used in lintels, they shall be fastened together with not less than 82 mm nails in a double row, with nails not more than 450 mm apart in each row. The lintel members may be separated by filler pieces.
- (4) In buildings of residential occupancy where the wall studs exceed 38 mm by 64 mm in size, and where the spans of supported joists do not exceed 4.9 m and the spans of trusses do not exceed 9.8 m, the spans for wood lintels shown in Table 23E may be used. Such lintels shall consist of a single piece of lumber 89 mm thick or 2 pieces of 38 mm thick lumber on edge.
- (5) In loadbearing exterior and interior walls of 38 mm by 64 mm framing members, lintels shall consist of solid 64 mm thick members on edge or 38 mm thick and 19 mm thick members securely nailed together. Such lintels shall be at least 38 mm greater in depth than those shown in Table 23E for the allowable spans and shall not exceed 2.4 m in length.

M. ROOF AND CEILING FRAMING

- (1) Roof rafters, joists and ceiling joists shall be continuous or shall be spliced over vertical supports that extend to suitable bearing.
- (2) Roof and ceiling framing members shall be doubled on each side of openings greater than 2 rafter or joist spacings in width.
- (3) The length of end bearing of joists and rafters shall be not less than 38 mm.
- (4) Rafters shall be located directly opposite each other and tied together at the peak or may be offset by their own thickness if nailed to a ridge board not less than 17.5 mm thick. Framing members shall be connected by gusset plates or nailing at the peak in conformance with Table 23A, except that where the roof framing on opposite sides of the peak is assembled separately, such as in the case of factory built houses, the roof framing on opposite sides may be fastened together with galvanized steel strips at least 200 mm by 75 mm by 0.41 mm thick, spaced not more than 1.2 m apart and nailed at each end to the framing by at least two 63 mm nails.
- (5) Rafters shall be shaped at supports to provide even bearing surfaces and supported directly above the exterior walls.
- (6) Hip and valley rafters shall be not less than 50 mm greater in depth than the common rafters and not less than 38 mm thick, actual dimension.
- (7) Ceiling joists and collar ties of not less than 38 mm by 89 mm lumber may be assumed to provide intermediate support to reduce the span for rafters and joists where the roof slope is 1 in 3 or greater. Such collar ties more than 2.4 m in length shall be laterally supported near their centres by not less than 19 mm by 89 mm continuous members at right angles to the collar ties.
- (8) Dwarf walls and struts may be used to provide intermediate support to reduce the span for rafters and joists. When struts are used they shall be not less than 38 mm by 89 mm

material extending from each rafter to a loadbearing wall at an angle of not less than 45° to the horizontal.

- (9) When dwarf walls are used for rafter support, they shall be framed in the same manner as loadbearing walls and securely fastened top and bottom to the roof and ceiling framing to prevent over-all movement. Solid blocking shall be installed between floor joists beneath dwarf walls that enclose finished rooms.
- (10) Except as provided in (11), the ridge of the roof shall be supported by a loadbearing wall extending from the ridge to suitable bearing or by a ridge beam of not less than 38 mm by 140 mm material. Such ridge beam shall be supported at intervals not exceeding 1.2 m by not less than 38 mm by 89 mm members extending vertically from the ridge to suitable bearing.
- (11) When the roof slope is 1 in 3 or more, ridge support may be omitted provided the lower ends of the rafters are adequately tied to prevent outward movement. These ties may consist of tie rods or ceiling joists forming a continuous tie for opposing rafters and nailed in accordance with Table 23F. Ceiling joists shall be fastened together with at least 1 more nail per joist splice than required for the rafter to joist connection shown in the Table. Members may be fastened together either directly or through a gusset plate.

TABLE 23F—MINIMUM RAFTER-TO-JOIST NAILING
(Minimum Number of Nails at Least 76 mm Long)
(Unsupported Ridge)

Roof Slope	Rafter Spacing, mm	Rafter Tied to Every Joist						Rafter Tied to Joist Every 1.2 m					
		Building Width up to 8 m			Building Width up to 9.8 m			Building Width up to 8 m			Building Width up to 9.8 m		
		Roof Snow Load, kN/m ²											
		1 or less	1.5	2.0 or more	1 or less	1.5	2.0 or more	1 or less	1.5	2.0 or more	1 or less	1.5	2.0 or more
1 in 3	400	4	5	6	5	7	8	11	—	—	—	—	—
	600	6	8	9	8	—	—	11	—	—	—	—	—
1 in 2.4	400	4	4	5	5	6	7	7	10	—	9	—	—
	600	5	7	8	7	9	11	7	10	—	—	—	—
1 in 2	400	4	4	4	4	4	5	6	8	9	8	—	—
	600	4	5	6	5	7	8	6	8	9	8	—	—
1 in 1.71	400	4	4	4	4	4	4	5	6	8	7	9	11
	600	4	4	5	5	6	7	5	6	8	7	9	11
1 in 1.33	400	4	4	4	4	4	4	4	5	6	5	6	7
	600	4	4	4	4	4	5	4	5	6	5	6	7
1 in 1	400	4	4	4	4	4	4	4	4	4	4	4	5
	600	4	4	4	4	4	4	4	4	4	4	4	5
Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14

- (12) Roof joists supporting a finished ceiling other than plywood shall be restrained from twisting along the bottom edges by means of furring, blocking, cross bridging or strapping conforming to I (5).
- (13) Ceiling joists supporting part of the roof load from the rafters shall be not less than 25 mm greater in depth than required for ceiling joists not supporting part of the roof load, except that when the roof slope is 1 in 4 or less, the ceiling joist sizes shall be determined from the span tables for roof joists.

- (14) Roof trusses shall be designed in accordance with the appropriate requirements in Part 4 of the National Building Code of Canada 1980, except that where the span of a roof truss does not exceed 12.19 m and the roof truss spacing does not exceed 600 mm o.c., roof trusses are acceptable provided they conform to the requirements in (15) to (18).
- (15) Except for roof trusses constructed of Poplar, Eastern White Pine, Western White Pine, Red Pine, Western Red Cedar and Eastern White Cedar, the member sizes for Howe or Fink type wood roof trusses spaced not more than 600 mm o.c. which are to be supported at or near their ends may be determined in conformance with Tables A-12 and A-13 provided such trusses conform to the requirements of (17) and (18). The joint connections used in such trusses shall be designed in conformance with the requirements in Section 4.3 of the National Building Code of Canada 1980.
(See Appendix A.)
- (16) Where a roof truss in (15) supports a ceiling, and the unsupported length of the bottom chord between the truss panel points exceeds 3.05 m, the bottom chord shall be at least 38 mm by 114 mm in size. Where the unsupported length of the bottom chord exceeds 3.66 m between panel points, the bottom chord shall be at least 38 mm by 140 mm in size.
- (17) Where the length of compression web members in roof trusses in (15) exceeds 1.83 m, such web members shall be provided with continuous bracing to prevent buckling. Such bracing shall consist of not less than 19 mm by 89 mm lumber nailed at right angles to the web members near their centres with at least two 63 mm nails for each member. Web members shall be at least 38 mm by 89 mm lumber of not less than No. 2 grade.
- (18) Roof trusses that are not designed in conformance with (14) or (15) shall be capable of supporting a load at least equal to the ceiling load plus $2\frac{2}{3}$ the design roof load for 24 h, and shall not exceed the deflections shown in Table 23G when loaded with the ceiling load plus $1\frac{1}{3}$ the design roof snow load for 1 h. Testing of lumber roof trusses shall be in conformance with CSA S307-1977, "Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings."

TABLE 23G—MAXIMUM ROOF TRUSS DEFLECTIONS

Truss Span	Type of Ceiling	Maximum Deflection
4.3 m or less	Plaster or gypsum board	$\frac{1}{360}$ of the span
	Other than plaster or gypsum board	$\frac{1}{180}$ of the span
over 4.3 m	Plaster or gypsum board	$\frac{1}{360}$ of the span
	Other than plaster or gypsum board	$\frac{1}{240}$ of the span
Column 1	2	3

N. SUBFLOORING

- (1) Subflooring shall be provided beneath finish flooring where the finish flooring does not have adequate strength to support the design loads (see Subsection 31 C).
- (2) Plywood for subfloors shall be exterior type conforming to CSA O121-M1978, "Douglas Fir Plywood," CSA O151-M1978, "Canadian Softwood Plywood" or CSA O153-1976, "Poplar Plywood." Waferboard subflooring shall conform to CAN3-O188.2-M78, "Waferboard."

- (3) Particleboard subflooring may be used only where a building is constructed in a factory so that the subfloor will not be exposed to the weather. Such subflooring shall conform to grade N-1 or N-2 in CAN3-O188.1-M78, "Interior Mat-Formed Wood Particleboard." Such subflooring shall have its upper surface and all edges treated to restrict water absorption where the subfloor is used in bathrooms, kitchens, laundry rooms or other areas subject to periodic wetting. (See Appendix A.)
- (4) Where the edges of panel-type subflooring are required to be supported (see 31B(2)), such support shall consist of tongue-and-groove panel edges or not less than 38 mm by 38 mm blocking securely nailed between framing members.
- (5) Plywood subflooring shall be installed with the surface grain at right angles to the joists and with joints parallel to floor joists staggered.
- (6) Except as provided in Article (7), subfloors shall conform to Table 23H.

TABLE 23H—THICKNESS OF SUBFLOORING

Maximum Joist Spacing, mm	Minimum Plywood Thickness, mm	Minimum Waferboard or Particleboard Thickness, mm	Minimum Lumber Thickness, mm
400	15.5	15.9	17.0
500	15.5	19.0	19.0
600	18.5	25.4	19.0
Column 1	2	3	4

- (7) Where the finished flooring consists of not less than 19 mm matched wood strip flooring laid at right angles to the joists, 12.5 mm thick plywood or 12.7 mm thick waferboard shall be permitted for joists up to 600 mm o.c. Where a separate panel-type underlay or concrete topping is applied to a subfloor, the subfloor may consist of 12.5 mm thick plywood for joists up to 400 mm o.c.
- (8) When resilient flooring is applied directly to a waferboard, particleboard or plywood subfloor, the subfloor shall be fastened to the supports with annular grooved nails.
- (9) Lumber subflooring shall be laid at an angle of not less than 45° to the joists. Lumber subflooring shall be fully supported at the ends on solid bearing. Lumber shall be of uniform thickness and not more than 184 mm wide.

O. ROOF SHEATHING

- (1) Plywood used for roof sheathing shall be exterior type plywood conforming to CSA O121-M1978, "Douglas Fir Plywood," CSA O151-M1978, "Canadian Softwood Plywood" or CSA O153-1976, "Poplar Plywood." Waferboard for roof sheathing shall conform to CAN3-O188.2-M78, "Waferboard."
- (2) Plywood roof sheathing shall be installed with the surface grain at right angles to the roof framing.
- (3) Waferboard and plywood roof sheathing shall be installed with at least a 2 mm gap between sheets.
- (4) Lumber roof sheathing shall not be more than 286 mm wide and shall be applied so that all ends are supported with end joints staggered.
- (5) Where panel-type roof sheathing requires edge support, the support shall consist of metal H clips or not less than 38 mm by 38 mm blocking securely nailed between framing members.

- (6) The thickness of roof sheathing on a flat roof used as a walking deck shall conform to the requirements in Table 23H for subfloors. The thickness of roof sheathing on a roof not used as a walking deck shall conform to Table 23I.

TABLE 23I—THICKNESS OF ROOF SHEATHING

Joist or Rafter Spacing, mm	Minimum Plywood Thickness, mm		Minimum Waferboard Thickness, mm		Minimum Lumber Thickness, mm
	Edges Supported	Edges Unsupported	Edges Supported	Edges Unsupported	
300	7.5	7.5	9.5	9.5	17.0
400	7.5	9.5	9.5	11.1	17.0
500	9.5	12.5	11.1	12.7	19.0
600	9.5	12.5	11.1	12.7	19.0
Column 1	2	3	4	5	6

- (7) Asphalt-coated or asphalt-impregnated fibreboard at least 11.1 mm thick conforming to CSA A247-M1978, "Insulating Fibreboard" may be used as a roof sheathing over supports spaced not more than 400 mm o.c. provided the roofing consists of a continuous sheet of galvanized steel of at least 0.33 mm in thickness or a continuous sheet of aluminum of at least 0.61 mm in thickness. All edges of such sheathing shall be supported by blocking or framing.

P. WALL SHEATHING

- (1) Exterior walls and gable ends shall be sheathed when the exterior cladding requires intermediate fastening between supports or if the exterior cladding requires solid backing.
- (2) Where wall sheathing is required, it shall conform to Table 23J.

TABLE 23J—WALL SHEATHING THICKNESS AND SPECIFICATIONS

Type of Sheathing	Minimum Thickness, mm ⁽¹⁾		Material Standards
	With Supports 400 mm o.c.	With Supports 600 mm o.c.	
Lumber	17.5	17.5	See Table 3B
Fibreboard (insulating)	9.5	11.1	CSA A247-M1978
Gypsum board	9.5	12.7	CSA A82.27-M1977
Plywood (exterior type)	6.0	7.5	CSA O121-M1978 CSA O151-M1978 CSA O153-1976
Waferboard	6.35	7.9	CAN3-O188.2-M78
Column 1	2	3	4

Note to Table 23J:

⁽¹⁾ See 28E(4) to 28E(6).

- (3) Gypsum board and fibreboard shall not be used for the attachment of siding materials. Nails used in attaching gypsum board or fibreboard shall be not less than 3.2 mm diam with a minimum head diameter of 11.1 mm.

- (4) Lumber wall sheathing shall be applied so that all ends are supported with end joints staggered.
- (5) Panel-type sheathing board shall be applied so that vertical joints are staggered if the sheathing is applied horizontally. A gap of not less than 2 mm shall be left between sheets of plywood, waferboard or fibreboard.

Q. WALL SHEATHING PAPER

- (1) Sheathing paper shall conform to CAN2-51.32-M77, "Sheathing, Membrane, Breather Type."
- (2) Sheathing paper beneath stucco shall be asphalt type.
- (3) Except as provided in (5) and (6), at least 1 layer of sheathing paper shall be applied beneath siding, stucco or masonry veneer.
- (4) Sheathing paper shall be applied so that joints are lapped at least 100 mm, and if applied horizontally, the upper sheets shall overlap the lower sheets.
- (5) Except as provided in (6), where no sheathing is used with masonry veneer or other siding, at least 2 layers of sheathing paper shall be applied beneath the veneer or siding. All joints in the sheathing paper shall occur over framing, and the paper shall be fastened to the framing with roofing nails or staples spaced not more than 150 mm along the edges of the outer layer of sheathing paper. Wall sheathing may be used in lieu of 1 layer of sheathing paper, and the thickness need not conform to Table 23J.
- (6) Sheathing paper may be omitted beneath siding when the joints in the siding are formed to effectively prevent the passage of wind and rain in conformance with (7) or (8), as applicable.
- (7) Siding consisting of sheets of plywood, hardboard, waferboard or asbestos cement is considered to meet the requirements of (6) provided the siding is applied so that all edges are directly supported by framing and the vertical joints between adjacent sheets covered with battens or shiplapped or otherwise matched to provide weather tight joints. Vertical joints between sheets shall be caulked.
- (8) Metal siding consisting of sheets of metal are considered to meet the requirements of (6) where the joints between sheets are of the locked seam type.

R. BRACING

- (1) Except as provided in (2), each exterior wall in each storey shall be braced with at least 1 diagonal brace conforming to (3).
- (2) Bracing is not required where walls have an interior finish conforming to the requirements in Section 30, or if the walls are clad with diagonal lumber, panel type sheathing or panel type siding.
- (3) Where bracing is required, it shall consist of at least 19 mm by 89 mm wood members applied diagonally to the studs at an angle of approximately 45° to the horizontal extending the full height of the wall on each storey. Such bracing shall be nailed to each stud and wall plate by at least two 63 mm nails.

SECTION 24. POST, BEAM AND PLANK CONSTRUCTION

A. SCOPE

This Section applies to wood-frame construction with the framing members spaced more than 600 mm apart.

B. GENERAL

- (1) The size and spacing of posts and beams and the span and thickness of floor and roof-decking shall be calculated in conformance with Section 4.3 of the National Building Code of Canada 1980, except when specific dimensions are provided in this Section.
- (2) Requirements for nails, lumber, notching and drilling, anchorage and sill plates shall conform to Section 23.
- (3) Lumber shall conform to the appropriate requirements in Subsection 3 C.

C. DECKING

- (1) Floor and roof decking shall consist of not less than 38 mm lumber laid on the flat or on edge or exterior type plywood conforming to CSA O121-M1978, "Douglas Fir Plywood," CSA O151-M1978, "Canadian Softwood Plywood" or CSA O153-1976, "Poplar Plywood" or waferboard conforming to CAN3-O188.2-M78, "Waferboard."
- (2) Plank floor decking laid on the flat shall not be more than 200 mm wide. Such decking shall be tongued-and-grooved or splined, unless a separate underlay is installed or the flooring consists of wood strips laid at right angles to the decking.

D. LOADBEARING BEAMS

- (1) Loadbearing beams shall be solid, built-up, glued-laminated or plywood web beams. Where glued assemblies extend to the exterior, waterproof glue shall be used, except that water-resistant glue may be used where the exposed portion is adequately protected against wetting.
- (2) Loadbearing roof beams shall be securely connected to the exterior wall framing and the centre loadbearing wall or centre beams to resist adequately the uplift forces due to wind.
- (3) The length of end bearings for loadbearing beams shall be determined on the basis of the allowable design stress of the wood but shall not be less than 38 mm.
- (4) When loadbearing beams are supported by mechanical connectors, the connectors shall be capable of supporting the design loads.
- (5) Where joints in loadbearing beams do not occur over solid supports, joints shall be designed in conformance with Part 4 of the National Building Code of Canada 1980.
- (6) Opposing loadbearing beams shall be tied together at the joints by means of splices or suitable mechanical connectors.
- (7) Where secondary framing members span between floor beams, the members and connections shall be designed to support the required design loads.
- (8) Loads from loadbearing walls, columns or other concentrated loads shall be supported by framing members designed to carry such loads.

E. POSTS

- (1) Posts shall be solid, built-up or laminated.
- (2) Where wall sheathing does not provide suitable anchorage, exterior wall posts shall be anchored to the wall plate by not less than 1.19 mm thick steel angles.
- (3) Solid posts and individual members in built-up posts shall extend in 1 piece the full height of the wall storey. Built-up members shall be fastened together with nails spaced not more than 300 mm o.c. and at least twice as long as the individual member thickness or with not less than 9.5 mm diam bolts fitted with washers and spaced not more than 450 mm o.c.

- (4) Intermediate studs or blocking shall be provided between posts in post and beam walls for the support of exterior and interior cladding. Intermediate studs shall conform to Section 23 for non-loadbearing stud walls.

F. PLANK FRAME WALL CONSTRUCTION

- (1) Thickness of plank framing in plank frame walls shall conform to Table 24K. The unsupported height of 38 mm vertical plank non-loadbearing partitions shall not exceed 3.6 m.

TABLE 24K—NOMINAL THICKNESS OF PLANK FRAMING

Supported Load (Including dead load and ceiling)	Minimum Plank Thickness, mm
Roof with or without attic storage	38
Roof with or without attic storage plus 1 floor	38
Roof with or without attic storage plus 2 floors	64
Column 1	2

- (2) Vertical framing in plank frame walls shall consist of not less than 250 mm wide planks spaced not more than 2.4 m o.c.
- (3) Vertical framing in plank frame walls shall not bear on wood members with the grain at right angles to the vertical framing, except where bearing on sills.
- (4) Corners of plank frame walls shall be formed by butting and fastening together the face and edge of 2 planks.
- (5) Vertical framing in plank frame walls shall be provided on each side of every opening, except that a window opening not more than 750 mm in width may be supported on 1 side only by a vertical member. In such cases the opposite jamb of the window or short upright to which it is attached shall bear on the filler wall plank immediately below, which in turn shall be notched into the vertical structural members on each side.
- (6) Where horizontal planks act as loadbearing lintels or headers, they shall be framed into the vertical members by dovetailing so that not less than a 40 mm length of bearing is provided.

TABLE 24L—LINTEL SPANS

Nominal Lintel Size, mm	Maximum Span, m
38 by 184	1.55
38 by 235	1.96
38 by 286	2.23
64 by 184	1.96
64 by 235	2.23
Column 1	2

- (7) Openings in loadbearing plank frame walls shall be bridged with lintels designed to carry superimposed loads to adjacent vertical members.

- (8) Where the spans of supported joists do not exceed 4.9 m and the spans of trusses do not exceed 9.8 m, the spans for wood lintels shown in Table 24L may be used for plank frame walls.
- (9) Non-loadbearing horizontal members (fillers) in plank frame walls shall be securely fastened to the vertical framing.
- (10) Sheathing paper for plank frame walls shall be installed over the exterior of the planks when no sheathing is provided, or over the sheathing when sheathing is provided.
- (11) Sheathing paper shall conform to the requirements in Section 23.

SECTION 25. SHEET STEEL STUD WALL FRAMING

A. GENERAL

- (1) This Section applies to sheet steel studs for use in non-loadbearing exterior walls and interior partitions.
- (2) Where loadbearing steel studs are used, they shall be designed in conformance with Part 4 of the National Building Code of Canada 1980.
- (3) Steel studs and runners shall conform to ASTM C645-76, "Non-load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screws."
- (4) Screws for the application of cladding materials to steel studs, runners and furring channels shall conform to ASTM C646-78a, "Steel Drill Screws for the Application of Gypsum Sheet Material to Light Gauge Steel Studs."
- (5) Steel stud framing shall be clad on both sides with lath and plaster or sheet-type material, fastened with screws or other acceptable fasteners at the appropriate spacing as described in Section 30 for interior finishes. Screws used for attaching wall finishes shall penetrate at least 10 mm through the metal.

B. SIZE OF FRAMING

- (1) Except as required in (3) and (4), the size and spacing of steel studs for non-loadbearing partitions shall conform to Table 25A.

TABLE 25A—STEEL STUDS FOR NON-LOADBEARING PARTITIONS

Minimum Stud Size, mm	Maximum Stud Spacing, mm	Maximum Wall Height, m
31 x 40	400	3.0
	600	2.7
31 x 63	400	4.0
	600	3.6
31 x 91	400	5.2
	600	4.9
Column 1	2	3

- (2) Except as required in (4), steel studs in non-loadbearing partitions shall have a metal thickness of not less than 0.50 mm.
- (3) Runners for interior and exterior non-loadbearing walls shall have a thickness of at least 0.45 mm exclusive of coatings and shall have at least 25 mm flanges.

- (4) Where openings for doors in non-loadbearing fire separations required to have a fire-resistance rating do not exceed 1 200 mm in width, the width of steel studs shall be at least 63 mm, and have a metal thickness of at least 0.50 mm. Where openings exceed 1 200 mm in width, the stud width shall be at least 91 mm, and shall have a metal thickness of at least 0.85 mm.
- (5) The distance to the first stud beyond the jamb of any door opening in a fire separation required to have a fire-resistance rating shall not exceed 400 mm. Where the distance between the framing over the opening and the top runner exceeds 400 mm in such walls, intermediate support shall be installed at intervals of not more than 400 mm above the opening.
- (6) The size and spacing of non-loadbearing steel studs for exterior walls shall conform to Table 25B.

TABLE 25B—STEEL STUDS FOR NON-LOADBEARING EXTERIOR WALLS

Minimum Stud Size, mm	Minimum Metal Thickness, mm (excluding coating)	Maximum Stud Length, m		
		Spacing of Studs		
		300 mm (o.c.)	400 mm (o.c.)	600 mm (o.c.)
31 x 91	0.53	3.0	2.4	—
31 x 91	0.69	3.3	2.7	2.4
31 x 91	0.85	3.6	3.0	2.7
31 x 91	1.0	4.0	3.3	3.0
Column 1	2	3	4	5

C. INSTALLATION

- (1) Runners shall be provided at the top and bottom of walls and partitions. Such runners shall be securely attached to the building at approximately 50 mm from the end of the runner at intervals of not more than 600 mm o.c. for interior studs and 300 mm o.c. for exterior studs. Such fasteners shall consist of the equivalent of 63 mm nails or 25 mm screws.
- (2) Studs at openings and which are not full wall height shall be supported by a runner at the ends of the studs, securely fastened to the full length studs at the sides of the opening.
- (3) Steel studs used in walls required to have a fire-resistance rating shall be installed so that there is at least a 12 mm clearance between the top of the stud and the top of the runner to allow for expansion in the event of fire. Except as provided in (8), studs in such walls shall not be attached to the runners in a manner that will prevent such expansion.
- (4) Door openings in non-loadbearing fire separations required to have a fire-resistance rating shall be framed with 2 runner sections placed back to back.
- (5) Steel studs shall be installed with webs at right angles to the wall face and, except at openings, shall be continuous for the full wall height.
- (6) Corners and intersections of walls and partitions shall be constructed to provide support for the cladding materials.
- (7) Studs shall be doubled on each side of every opening where such openings involve more than 1 stud space and shall be tripled where the openings in exterior walls exceed 2.4 m

in width. Such studs shall be suitably tied together to act as a single structural unit in resisting transverse loads.

- (8) Studs shall be attached to runners by screws, crimping, welding or other suitable method around wall openings, and elsewhere where necessary to keep the studs in alignment during construction.

SECTION 26. THERMAL INSULATION AND VAPOUR BARRIERS

A. SCOPE

- (1) This Section applies to all buildings, regardless of size.
- (2) This Section applies to the thermal insulation of buildings of residential occupancy intended for use on a continuing basis during the winter months.

B. GENERAL

- (1) Buildings shall be provided with sufficient thermal insulation to prevent moisture condensation on the interior surfaces of walls, ceilings and floors during the winter and to ensure comfortable conditions for the occupants.
- (2) Insulation of heating and ventilating ducts shall conform to Sections 33 and 34.
- (3) Where insulation is installed so that there is a space between the insulation and the roof, the roof space or attic shall be ventilated according to Section 19.

C. MATERIALS

- (1) Insulation in contact with the ground shall be inert to the action of soil and water. The insulation properties shall not be significantly reduced by moisture.
- (2) Type I expanded polystyrene insulation as described in CGSB 51-GP-20M (1978), "Thermal Insulation, Expanded Polystyrene" shall not be used in contact with the ground or as roof insulation applied above the roofing membrane.
- (3) Insulating materials shall conform to the following:
 CSA A101-M1977, "Mineral Fibre Thermal Building Insulation,"
 CSA A247-M1978, "Insulating Fibreboard Sheathing,"
 CGSB 51-GP-20M(1978), "Thermal Insulation, Expanded Polystyrene," or
 CGSB 51-GP-21M(1978), "Thermal Insulation, Urethane and Isocyanurate, Un-faced."
- (4) Vapour barriers shall conform to CAN2-51.33-M77, "Vapor Barrier: Sheet, for Use in Above-Grade Building Construction." Type 1 vapour barriers shall be used where a high resistance to vapour movement is required such as in wall constructions that incorporate exterior cladding or sheathing having a low water vapour permeance. Type 2 vapour barriers may be used in all other locations.

D. INSTALLATION OF INSULATION

- (1) Insulation shall be installed so that there is a reasonably uniform insulating value over the entire face of the insulated area.
- (2) Insulation shall be applied to the full width and length of the space between furring or framing.
- (3) Batt-type insulation manufactured with no membrane on either face shall be installed so that at least 1 face is in full and continuous contact with cladding, sheathing or other membrane.

- (4) Loose-fill insulation may be used on horizontal surfaces only, except that acceptable water-repellent types may be used between the outer and inner wythes of cavity walls and in insulating the walls of existing buildings. Where soffit venting is used, measures shall be taken to prevent loosefill insulation from spilling over the top of the exterior wall and causing blockage of the soffit vents.
- (5) Insulation on the interior of foundation walls enclosing a crawl space shall be applied so that there is not less than a 50 mm clearance above the crawl space floor if the insulation is of a type that may be damaged by water.
- (6) Insulation around concrete slabs-on-grade shall be located so that heat from the building is not restricted from reaching the ground beneath the perimeter where exterior walls are not supported by footings extending below frost level.
- (7) Where insulation is exposed to the weather and subject to mechanical damage, it shall be protected with not less than 6 mm asbestos-cement board, or 12 mm cement parging on wire lath applied to the exposed face and edge.
- (8) Insulation located in an area where it may be subject to mechanical damage such as on walls of rooms, basements, cellars and garages shall be protected from mechanical damage by a covering of gypsum board, plywood, particleboard, hard-pressed fibreboard, waferboard or hardboard. (See Subsection 10 P for surface flame spread requirements.)
- (9) Thermal insulation in exterior steel stud walls shall be in contact with the exterior cladding or sheathing and the adjacent studs and runners. A space of at least 12 mm shall be provided between the insulation and the interior wall cladding where the exterior cladding or sheathing material has a thermal resistance of less than $0.18 \text{ m}^2 \cdot \text{C}/\text{W}$.
- (10) Insulation in factory-built buildings shall be installed so that it will not become dislodged during transportation.

E. MEASURES TO PREVENT CONDENSATION

- (1) Except as provided in (2), vapour barriers shall be installed on the warm side of insulation if the insulation is of a type which when installed has a vapour permeance greater than that required for vapour barriers in C (3).
- (2) Lightweight cellular plastic-type insulation may be used without additional vapour barrier protection provided such insulation has a permeance rating of not more than $6 \text{ ng}/\text{Pa}\cdot\text{s}\cdot\text{m}$ and is installed in continuous contact with masonry or concrete walls.
- (3) Every vapour barrier shall be installed to protect the entire wall surface including framing members, except that the vapour barrier need not extend across the framing members provided the interior finish consists of panel-type material attached to all framing members with an adhesive in addition to the nails or staples required elsewhere in Section 23.
- (4) Where an interior frame wall meets an exterior wall required to have vapour barrier protection, the vapour barrier protection shall extend between the exterior and interior walls to form continuous protection at the wall intersection.
- (5) Where an interior frame wall meets a ceiling required to have vapour barrier protection, the vapour barrier protection shall extend over the top of the wall or beneath the top wall plate to form continuous vapour protection for the ceiling.
- (6) Except as provided in (13), every vapour barrier joint shall lap not less than 25 mm when located over supporting members and shall be covered with a strip of vapour barrier which shall extend not less than 100 mm on both sides of the joint where not located over supporting members.
- (7) Openings such as for electrical boxes and registers shall be cut so that the vapour barrier fits snugly around them.

- (8) Access hatches into attics shall be weather stripped around the perimeters of the hatches.
- (9) Ductwork in attic or roof spaces shall have all joints taped or be otherwise sealed to ensure that the ducts are airtight throughout their length.
- (10) Clearances between chimneys or gas vents and the surrounding construction which would permit air leakage from within the building into an attic or roof space shall be sealed by noncombustible material to prevent such leakage.
- (11) Masonry walls of hollow units which penetrate through the ceiling shall be capped with masonry units without voids or be sealed with flashing material extending across the full width of the masonry at or near the ceiling adjacent to the roof space to prevent moisture within the voids from entering the roof or attic space.
- (12) Where insulation is placed below the roof sheathing, and the roof slope is less than 1 in 6, or the roof incorporates no attic space, the requirements in (13) and (14) shall apply in addition to the other requirements in this Section.
- (13) Insulation installed in ceilings described in (12) shall be protected by Type I vapour barriers, installed so that all joints occur at framing members, furring or blocking, and lapped at least 100 mm at all joints.
- (14) Holes through vapour barriers installed in ceilings described in (12) for the installation of electrical wiring, electrical boxes, piping or ductwork shall be effectively sealed with caulking, tape or other acceptable material to maintain the integrity of the vapour barrier over the entire ceiling.

SECTION 27. ROOFING

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) Roofs shall be protected with roofing, including flashing, installed to shed rain effectively and prevent water due to ice damming from entering the roof.

B. MATERIALS

- (1) Roofing materials shall conform to the following:
 - CAN2-51.32-M77, "Sheathing, Membrane, Breather Type,"
 - CGSB 37-GP-4M(1976), "Cement, Lap, Cutback, Asphalt, Fibrated, for Asphalt Roofing,"
 - CGSB 37-GP-5M(1976), "Cement, Plastic, Cutback Asphalt,"
 - CGSB 37-GP-8M(1976), "Asphalt, Cutback, Filled, for Roof Coating,"
 - CGSB 37-GP-9M(1976), "Primer, Asphalt, Unfilled, for Asphalt Roofing, Damp-proofing and Waterproofing,"
 - CGSB 37-GP-21M(1976), "Tar, Cutback, Fibrated, for Roof Coating,"
 - CGSB 41-GP-6M(1976), "Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced,"
 - CSA A123.1-1964, "Asphalt Shingles Surfaced with Mineral Granules,"
 - CSA A123.2-1966, "Asphalt Roofing Surfaced with Mineral Granules,"
 - CSA A123.3-1973, "Asphalt Roofing Surfaced with Fine Mineral Matter,"
 - CSA A123.4-1965, "Wide Selvage Asphalt Roofing Surfaced with Mineral Granules,"
 - CSA A123.6-1953, "Asphalt-Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-Up Roofs,"
 - CSA A123.7-1973, "Asphalt for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems,"
 - CSA A123.8-1953, "Coal-Tar Saturated Roofing Felt for Use in Waterproofing and in Constructing Built-Up Roofs,"

- CSA A123.9-1953, "Asphalt-Saturated Asbestos Felts for Use in Waterproofing and in Constructing Built-Up Roofs,"
- CSA A123.10-1953, "Coal-Tar Saturated Asbestos Felts for Use in Waterproofing and in Constructing Built-Up Roofs,"
- CSA A123.13-1953, "Coal-Tar Pitch for Roofing, Dampproofing, and Waterproofing,"
- CSA A123.17-1963, "Asphalt-Saturated Felted Glass-Fibre Mat for Use in Construction of Built-Up Roofs," or
- CSA O118-1960, "Western Red Cedar Shingles, Machine Grooved Shakes, and Hand-split Red Cedar Shakes."

- (2) Nails used for roofing shall be corrosion-resistant roofing or shingle nails conforming to CSA B111-1974, "Wire Nails, Spikes and Staples." Nails shall have sufficient length to penetrate through or 12 mm into roof sheathing. Nails used with asphalt roofing shall have a head diameter of not less than 9.5 mm and a shank thickness of not less than 2.95 mm. Nails used with wood shingles or shakes shall have a head diameter of not less than 4.8 mm and a shank thickness of not less than 2.0 mm and shall be stainless steel, aluminum or hot-dipped galvanized.
- (3) Staples used to apply asphalt or wood shingles shall be corrosion-resistant and shall be driven with the crown parallel to the eaves. Staples used with asphalt shingles shall be not less than 19 mm long, 1.6 mm diam or thickness, with not less than a 25 mm crown, except that an 11 mm crown may be used if the number of staples specified in G(4) is increased by $\frac{1}{2}$. Staples used with wood shingles shall be not less than 29 mm long, 1.6 mm diam or thickness, with not less than a 9.5 mm crown and shall be stainless steel or aluminum.

C. ROOF SLOPE

- (1) Except as provided in (2), the roof slopes on which roof coverings may be applied shall conform to Table 27A.
- (2) Asphalt and gravel or coal tar and gravel roofs may be constructed with lower slopes than required in (1) when effective drainage is provided by roof drains located at the lowest points on the roofs.

D. FLASHING AT INTERSECTIONS

- (1) Sheet metal flashing shall consist of not less than 1.73 mm thick sheet lead, 0.33 mm thick galvanized steel, 0.36 mm thick copper, 0.46 mm thick zinc or 0.48 mm thick aluminum.
- (2) Where sloping surfaces of shingled roofs intersect to form a valley, the valley shall be flashed. Closed valleys shall not be used with rigid shingles on slopes of less than 1 in 1.2.
- (3) Open valleys shall be flashed with not less than 1 layer of sheet metal not less than 600 mm wide or 2 layers of roll roofing. The bottom layer shall consist of not less than Type S smooth surface roll roofing or Type M mineral surface roll roofing (mineral surface down) not less than 457 mm wide, centred in the valley and fastened with nails spaced not more than 450 mm o.c. located 25 mm away from the edges. The top layer shall consist of not less than Type M mineral surface roll roofing (mineral surface up), 914 mm wide, centred in the valley, applied over a 100 mm wide strip of cement along each edge of the bottom layer, and fastened with a sufficient number of nails to hold it in place until the shingles are applied.

TABLE 27A—ROOFING TYPES AND SLOPE LIMITS OF ROOFS

Type of Roofing	Minimum Slope	Maximum Slope
Built-up Roofing		
Asphalt base (gravelled)	1 in 50 ⁽¹⁾	1 in 4
Asphalt base (without gravel)	1 in 25	1 in 2
Asphalt base (surfaced with wide selvage asphalt roofing)	1 in 6	no limit
Coal-tar base (gravelled)	1 in 50 ⁽¹⁾	1 in 25
Cold process	1 in 25	1 in 1.33
Asphalt Shingles		
Normal application	1 in 3	no limit
Low slope application	1 in 6	no limit
Roll Roofing		
Smooth and mineral surfaced	1 in 4	no limit
480 mm wide selvage asphalt roofing	1 in 6	no limit
Cold application felt	1 in 50	1 in 1.33
Wood Shingles	1 in 4	no limit
Handsplit Shakes	1 in 3	no limit
Asbestos-Cement Corrugated Sheets	1 in 4	no limit
Corrugated Metal Roofing	1 in 4	no limit
Sheet Metal Shingles	1 in 4	no limit
Slate Shingles	1 in 2	no limit
Clay Tile	1 in 2	no limit
Glass Fibre Reinforced Polyester Roofing Panels	1 in 4	no limit
Column 1	2	3

Note to Table 27A:

⁽¹⁾ See 27C(2).

- (4) The intersection of shingle roofs and masonry walls or chimneys shall be protected with flashing. Counter flashing embedded not less than 25 mm in the masonry shall extend not less than 150 mm down the masonry and lap the lower flashing not less than 100 mm. Flashing along the slopes of a roof shall be stepped so that there is not less than a 75 mm head lap in both the lower flashing and counter flashing. Where the roof slopes upwards from the masonry, the flashing shall extend up the roof slope to a point equal in height to the flashing on the masonry, but not less than 1½ times the shingle exposure.
- (5) The intersection of shingle roofs and walls clad with other than masonry shall be protected with flashing. Flashing shall be installed so that it extends up the wall not less than 75 mm behind the sheathing paper, and extends not less than 75 mm horizontally. Along the slope of the roof, the flashing shall be stepped with not less than a 75 mm head lap.
- (6) The intersection of built-up roofs with masonry walls or chimneys shall have a cant strip at the intersection, and a roofing membrane shall be mopped over the cant strip and not less than 150 mm up the wall. Counter flashing installed over the intersection shall be embedded not less than 25 mm in the masonry and shall be of sufficient length

to extend down not less than 150 mm, lapping the membrane on the masonry not less than 100 mm.

- (7) The intersection of built-up roofs with walls clad with other than masonry shall have a cant strip at the intersection. The roofing membrane shall be mopped over the cant strip. Flashing plies shall extend not less than 150 mm up the wall behind the sheathing paper.
- (8) Except as otherwise permitted in (9), chimney saddles shall be installed where the upper side of a chimney on a sloping roof is more than 750 mm wide. Chimney saddles shall be covered with sheet metal or roofing material of equivalent weight and quality as the roofing. Saddles shall be suitably flashed where they intersect the roof. The intersection of the saddle and the chimney shall be flashed and counterflashed as in (4).
- (9) A chimney saddle need not be installed if the intersection between the chimney and roof is protected by sheet metal flashing that extends up the chimney to a height equal to not less than 1/6 the width of the chimney, but not less than 150 mm, and up the roof slope to a point equal in height to the flashing on the chimney, but not less than 1½ times the shingle exposure. Such flashing at the chimney shall be counterflashed as required by (4).

E. EAVE PROTECTION FOR SHINGLES AND SHAKES

- (1) Except as provided in (3), eave protection shall be provided on shingle, shake or tile roofs extending from the edge of the roof a minimum distance of 914 mm up the roof slope to a line not less than 300 mm inside the inner face of the exterior wall.
- (2) Eave protection shall be laid beneath the starter strip and shall consist of not less than 0.15 mm polyethylene laid as a continuous sheet without the use of cement, or No. 15 asphalt-saturated felt laid in two plies lapped 480 mm and cemented together with lap cement, or Type S smooth surface roll roofing. Roll roofing shall be laid with not less than 100 mm head and end laps cemented together with lap cement.
- (3) Eave protection is not required over unheated garages, carports and porches, or where the roof overhang exceeds 900 mm measured along the roof slope from the edge of the roof to the inner face of the exterior wall, or where shingles for low slope roofs are used.

F. UNDERLAY BENEATH SHINGLES

- (1) When underlay is used beneath shingles, it shall be asphalt-saturated sheathing paper weighing not less than 0.195 kg/m², or No. 15 plain or perforated asphalt-saturated felt or 0.05 mm polyethylene, except that underlayment used beneath wood shingles shall be breather type.
- (2) When used with shingles, underlay shall be installed parallel to the eaves with head and end lap of not less than 50 mm. The top edge of each strip shall be fastened with sufficient roofing nails to hold it in place until the shingles are applied. The underlay shall overlap the eave protection by not less than 100 mm. (See J (2) for underlay beneath wood shakes.)

G. ASPHALT SHINGLES ON SLOPES OF 1 IN 3 OR GREATER

- (1) Coverage shall be not less than 2 thicknesses of shingle over the entire roof, disregarding cutouts.
- (2) A starter strip shall be installed along the lower edge of the roof so that it extends approximately 12 mm beyond the eaves and rake of the roof and is fastened along the bottom edge with nails spaced not more than 300 mm o.c. Such starter strips shall be not less than Type M mineral-surfaced roll roofing not less than 304 mm wide, or shingles of the same weight and quality as those used as a roof covering with tabs facing up the

roof slope. Starter strips may be omitted where eave protection of not less than Type M mineral-surfaced roll roofing is provided.

- (3) Shingles shall have a head lap of not less than 50 mm.
- (4) Shingles shall be fastened with at least 4 nails or staples for 1 metre wide shingles so that no nails or staples are exposed. Fasteners may be reduced for narrower shingles in proportion to the width of the shingle or when shingles incorporating acceptable interlocking devices are used.
- (5) Fasteners shall be located 25 mm to 40 mm from each end of each strip shingle with the other fasteners equally spaced between them. Such fasteners shall be located not less than 12 mm above the tops of the cutouts.
- (6) Shingle tabs shall be secured by a 25 mm diam spot of plastic cement under the centre of each tab, or by acceptable interlocking devices or selfsealing strips.
- (7) Shingles on hips and ridges shall be applied so they extend not less than 100 mm on either side of the hip or ridge and shall be lapped not less than 150 mm. Shingles shall be fastened with nails or staples on each side located not more than 25 mm from the edge and 25 mm above the butt of the overlying shingle.
- (8) Eave protection shall conform to Subsection E.
- (9) Flashing shall conform to Subsection D.

H. ASPHALT SHINGLES ON SLOPES OF LESS THAN 1 IN 3

- (1) Except for the first 2 courses, coverage shall be not less than 3 thicknesses of shingle over the entire roof, disregarding cutouts.
- (2) A starter strip shall be installed as in G (2). Such starter strip shall be laid in a continuous band of cement not less than 200 mm wide.
- (3) Shingle tabs shall be secured with cold application cement applied at the rate of not less than 0.5 L/m² of cemented area, or hot application asphalt applied at the rate of 1 kg/m² of cemented area.
- (4) The first course of shingles shall be secured by a continuous band of cement along the eaves applied so that the width of the band equals the shingle exposure plus 100 mm and the band is located not less than 50 mm above the lower edge of the starter strip.
- (5) The succeeding courses of shingles shall be secured by a continuous band of cement applied so that the width of the band equals the shingle exposure plus 50 mm. Such band shall be located not less than 25 mm nor more than 50 mm above the butt of the overlying course of shingles.
- (6) Shingles on hips and ridges shall be not less than 300 mm wide applied to provide triple coverage. Such shingles shall be cemented to the roof shingles and to each other with a coat of cement 25 mm from the edges of the shingles and fastened with nails or staples located 40 mm above the butt of the overlying shingle and 50 mm from each edge.
- (7) Flashing shall conform to Subsection D.
- (8) Shingles shall be fastened in accordance with G (4) and G (5).

I. WOOD ROOF SHINGLES

- (1) Decking for wood shingled roofs may be continuous or spaced.
- (2) Where underlayment is used beneath wood shingles it shall be of the breather type.
- (3) Shingles shall be not less than No. 2 grade.

- (4) Wood shingles shall be not less than 400 mm long and not less than 75 mm nor more than 350 mm wide.
- (5) Shingles shall be spaced approximately 6 mm apart and offset at the joints in adjacent courses not less than 38 mm so that joints in alternate courses are staggered.
- (6) Shingles shall be fastened with at least 2 nails or staples located approximately 19 mm from the sides of the shingle and 38 mm above the exposure line.
- (7) The exposure of wood roof shingles shall conform to Table 27B.

TABLE 27B—EXPOSURE OF WOOD ROOF SHINGLES

Roof Slope	Maximum Shingle Exposure, mm					
	No. 1 Grade			No. 2 Grade		
	Length of Shingle			Length of Shingle		
	400 mm	450 mm	600 mm	400 mm	450 mm	600 mm
1 in 3 or less	95	105	145	90	100	140
over 1 in 3	125	140	190	100	115	165
Column 1	2	3	4	5	6	7

- (8) Flashing shall conform to Subsection D.
- (9) Eave protection shall conform to Subsection E.

J. HANDSPLIT ROOF SHAKES

- (1) Shakes shall be not less than 450 mm long and not less than 100 mm nor more than 350 mm wide with a butt thickness of not more than 32 mm and not less than 9 mm.
- (2) A breather-type underlay shall be provided beneath roof shakes. Underlay shall be laid as a strip not less than 900 mm wide along eaves and 300 mm wide along hips and ridges. Underlay shall be laid as a strip not less than 450 mm wide between each course of shakes with the bottom edge of the underlay positioned above the butt line a distance equal to double the exposure of the shakes.
- (3) Shakes shall be spaced approximately 6 mm apart and offset at the joints in adjacent courses not less than 40 mm so that joints in alternate courses are staggered.
- (4) Shakes shall be fastened with nails located approximately 20 mm from the sides of the shakes and 40 mm above the exposure line.
- (5) The exposure of wood shakes shall not exceed 190 mm for shakes at least 450 mm long and 250 mm for shakes at least 600 mm long.
- (6) Flashing shall conform to Subsection D.
- (7) Eave protection shall conform to Subsection E.

K. BUILT-UP ROOFS

- (1) The quantities of bituminous materials used on built-up roofs shall conform to Table 27D.
- (2) Coal-tar products and asphalt products shall not be used together in built-up roof construction.
- (3) Bitumen roofing felts shall be not less than No. 15 felt.

- (4) Aggregate used for surfacing built-up roofs shall be clean, dry and durable and shall consist of particles of gravel, crushed stone or air-cooled blast furnace slag having a size of from 6 mm to 15 mm.
- (5) Flashing shall conform to Subsection D.

TABLE 27D—QUANTITIES OF BITUMEN FOR BUILT-UP ROOFS

Type of Roof	Amount of Bitumen per Square Metre of Roof Surface	
	Mopping Coats Between Layers	Flood Coat
Asphalt and aggregate	1 kg	3 kg
Coal-tar and aggregate	1.2 kg	3.6 kg
Cold process roofing	0.75 L cold process cement	2 L cold process top coating
Column 1	2	3

- (6) The minimum amount of aggregate surfacing per square meter of roof surface shall be 15 kg gravel or crushed stone or 10 kg crushed slag.
- (7) Built-up roofing shall consist of at least 3 mopped-down layers of roofing felt flood coated with bitumen.
- (8) In hot process applications each layer of bitumen-saturated felt shall be laid while the bitumen is hot, with each layer overlapping the previous one. The full width under each lap shall be coated with bitumen so that in no place does felt touch felt. Felt shall be laid free of wrinkles and shall be rolled directly into the hot bitumen and broomed forward and outward from the centre to ensure complete adhesion.
- (9) Except as permitted in (10), built-up roofing applied over wood, plywood or waferboard roof sheathing shall be laid over an additional base layer of felt laid dry over the entire roof deck with at least a 50 mm headlap and a 50 mm sidelap between each sheet.
- (10) Where plywood or waferboard roof sheathing is used, the dry layer of felt required in (9) may be omitted when the joints are taped and the sheathing is primed with asphalt.
- (11) Roofing shall be securely attached to the decking or where insulation is applied above the deck, the insulation shall be securely attached to the deck before the first layer of felt is fastened to the insulation.
- (12) Except as permitted in (13), a cant strip shall be provided at the edges of roofs. At least 2 plies of the roofing membrane shall be carried over the top of the cant strip. Flashing shall extend over the top of the cant strip and shaped to form a drip.
- (13) The cant strip required in (12) may be omitted where a gravel stop is provided at the edge of roofs. The roofing membranes shall be carried over the edge of the roof before the gravel stop is fastened and 2 plies of roofing membrane mopped to the top surface of the gravel stop before the flood coat is applied. The gravel stop shall extend over the edge of the roof to form a drip or shall be flashed so that the flashing extends over the edge to form a drip.

L. SELVAGE ROOFING

- (1) Wide selvage asphalt roofing shall provide double coverage over the entire roof surface.
- (2) Plies of selvage roofing shall be cemented together to ensure a water tight joint.

M. SHEET METAL ROOFING

Sheet metal roofing shall be not less than 0.33 mm thick galvanized steel, 0.35 mm thick copper, 0.46 mm thick zinc or 0.48 mm thick aluminum.

N. GLASS REINFORCED POLYESTER ROOFING

Where glass reinforced polyester roofing panels are not supported by roof decking but span between spaced supports, the panels shall be designed to support the design roof load in conformance with good engineering practice.

O. DOWNSPOUTS AND ROOF DRAINS

- (1) Where downspouts are provided and are not connected to a sewer, extensions shall be provided to carry rainwater away from the building in a manner which will prevent soil erosion.
- (2) When roof drains are provided, they shall conform to Part 7 of the National Building Code of Canada 1980.
- (3) Sheet metal eavestroughs shall be not less than 0.41 mm thick galvanized sheet steel, 0.43 mm thick copper or 0.51 mm thick aluminum. Sheet metal downspouts shall be not less than 0.36 mm thick galvanized sheet steel, 0.38 mm thick copper or 0.46 mm thick aluminum.
- (4) Rigid poly vinyl chloride (PVC) eavestroughs shall be not less than 1.9 mm in thickness. PVC downspouts shall be not less than 1.8 mm in thickness.
- (5) Wood gutters and downspouts shall be of durable species or treated with an acceptable wood preservative.

SECTION 28. SIDING**A. SCOPE**

- (1) This Section applies to all buildings, regardless of size.
- (2) This Section applies to exterior wall coverings of lumber, wood shingles, shakes, asbestos-cement shingles and sheets, plywood, waferboard, hard-pressed fibreboard, asphalt shingles, vinyl, aluminum and steel including trim, soffits and flashing.
- (3) Requirements for stucco shall conform to Section 29 and requirements for masonry veneer shall conform to Section 20.
- (4) Where asphalt shingles are used as siding, they shall conform to the requirements in Section 27 for asphalt roof shingles.

B. GENERAL

- (1) Exterior walls shall be protected with siding, including flashing, trim and other special purpose accessory pieces required for the siding system being used, to restrict the entry of rain and snow into the wall assembly.
- (2) Not less than a 200 mm clearance shall be provided between the finished ground level and siding that is adversely affected by moisture such as wood, plywood, waferboard and hardboard.
- (3) Not less than a 50 mm clearance shall be provided between a roof surface and siding that is adversely affected by moisture such as wood, plywood, waferboard and hardboard.
- (4) Insulating asphalt siding shall be ventilated by not less than a 10 mm air space behind the siding. (See 26 C (4).)

C. FLASHING

- (1) Flashing shall consist of not less than 1.73 mm thick sheet lead, 0.33 mm thick galvanized steel, 0.35 mm thick copper, 0.46 mm thick zinc, 0.48 mm thick aluminum or 1.02 mm thick vinyl.
- (2) Flashing shall be installed at every horizontal junction between 2 different exterior finishes, except where the upper finish overlaps the lower finish.
- (3) Except as provided in (5), flashing shall be applied over exterior wall openings where the vertical distance from the bottom of the eave to the top of the trim is more than $\frac{1}{4}$ of the horizontal overhang of the eave.
- (4) Flashing shall be installed so that it extends upwards not less than 50 mm behind the sheathing paper and forms a drip on the outside edge.
- (5) Where a window or exterior door is designed to be installed without head flashing, the exterior flange of the window or door frame shall be bedded into a non-hardening type caulking material and the exterior flange screwed down over the caulking material to the wall framing to form a waterproof joint.

D. CAULKING

- (1) Caulking shall be provided where required to prevent the entry of water into the structure.
- (2) Caulking shall be provided between masonry, siding or stucco and the adjacent door and window frames or trim, including sills unless such locations are completely protected from the entry of rain. Caulking shall also be provided at vertical joints between different cladding materials unless the joint is suitably lapped or flashed to prevent the entry of rain. (See Articles 7 E (2), 20 O (3) and 29 A (6).)
- (3) Caulking shall conform to one of the following:
 CGSB 19-GP-5M(1976), "Sealing Compound, One Component, Acrylic Base, Solvent Curing,"
 CGSB 19-GP-9Ma(1976), "Sealing Compound, One Component, Silicone Base, Chemical Curing,"
 CGSB 19-GP-13M(1976), "Sealing Compound, One Component, Polysulphide Base, Chemical Curing,"
 CGSB 19-GP-14M(1976), "Sealing Compound, One Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing,"
 CGSB 19-GP-16M(1977), "Sealing Compound, One Component, Polyurethane Base, Chemical Curing," or
 CGSB 19-GP-24M(1977), "Sealing Compound, Multi-Component, Chemical Curing."

E. ATTACHMENT OF SIDING

- (1) Except as permitted in (4) to (8), siding shall be nailed to the framing members, furring members or to blocking between the framing members.
- (2) Blocking for the attachment of siding shall be not less than 38 mm by 38 mm lumber securely nailed to the framing and spaced not more than 600 mm o.c.
- (3) Except as permitted in (7) and (8), furring for the attachment of siding shall be not less than 19 mm by 38 mm lumber when applied over sheathing. When applied without sheathing such furring shall be not less than 19 mm by 64 mm lumber on supports spaced not more than 400 mm o.c. and 19 mm by 89 mm on supports spaced not more than 600 mm o.c. Such furring shall be securely fastened to the framing and shall be spaced not more than 600 mm o.c.

- (4) Vertical lumber and stucco lath or reinforcing may be attached to sheathing only, where the sheathing consists of not less than 14.3 mm lumber, 12.5 mm plywood or 15.9 mm waferboard.
- (5) Vertically applied metal siding and wood shingles and shakes may be attached to the sheathing only, where the sheathing consists of not less than 14.3 mm lumber, 7.5 mm plywood or 7.9 mm waferboard.
- (6) Asbestos-cement shingles may be attached to the sheathing only, when the sheathing consists of not less than 14.3 mm lumber, 9.5 mm plywood or 11.1 mm waferboard.
- (7) Where wood shingles or shakes are applied to sheathing which is not suitable for attaching the shingles or shakes, the shingles or shakes may be attached to a wood lath not less than 38 mm by 9.5 mm thick securely nailed to the framing and applied as described in G (5).
- (8) Where asbestos-cement shingles are applied to sheathing that is not suitable for attaching the shingles, the shingles may be fastened to a wood lath not less than 89 mm by 9.5 mm thick securely nailed to the framing. Such lath shall be applied so that it overlaps the preceding shingle course by not less than 20 mm.
- (9) Nail or staple size and spacing for the attachment of siding and trim shall conform to Table 28A.

TABLE 28A—ATTACHMENT OF SIDING

Type of Siding	Min. Nail or Staple Length, mm	Min. No. of Nails or Staples	Maximum Nail or Staple Spacing
Wood trim	51	—	600 mm (o.c.)
Lumber siding or horizontal siding made from sheet material	51	—	600 mm (o.c.)
Metal siding	38	—	600 mm (o.c.) (nailed to framing) 400 mm (o.c.) (nailed to sheathing only)
Handsplit wood shakes up to 200 mm in width	51	2	—
Handsplit wood shakes over 200 mm in width	51	3	—
Wood shingles and machine grooved shakes up to 200 mm in width	32	2	—
Wood shingles and machine grooved shakes over 200 mm in width	32	3	—
Asbestos-cement shingles	32	2	—
Panel or sheet type siding up to 7 mm thick	38	—	150 mm (o.c.) along edges
Panel or sheet type siding greater than 7 mm thickness	51	—	300 mm (o.c.) along intermediate supports
Column 1	2	3	4

- (10) Nails or staples for the attachment of sidings and wood trim shall be corrosion-resistant and shall be compatible with the siding material. Fasteners for metal or vinyl siding shall be positioned to permit expansion and contraction of the siding.
- (11) Fasteners for shakes and shingles shall penetrate through the nail-holding base or not less than 19 mm into the framing. Fasteners for other types of siding shall penetrate through the nail-holding base or not less than 25 mm into the framing.

F. LUMBER SIDING

- (1) Lumber siding shall be sound, free of knot holes, loose knots, through checks or splits.
- (2) Drop, rustic, novelty, lapped board and vertical wood siding shall be not less than 14.3 mm thick and not more than 286 mm wide.
- (3) Bevel siding shall be not less than 5 mm thick at the top and 12 mm thick at the butt for sidings 184 mm or less in width and 14.3 mm thick at the butt for sidings wider than 184 mm. Bevel siding shall be not more than 286 mm wide.
- (4) Lumber siding shall prevent water from entering at the joints by the use of lapped or matched joints or by vertical wood battens. Siding shall overlap not less than 1 mm per 16 mm width of lumber but not less than 9.5 mm for matched siding, 25 mm for lapped bevel siding or 12 mm for vertical battens.

G. WOOD SHINGLES AND MACHINE GROOVED SHAKES

- (1) Shingles and shakes shall conform to CSA O118-1960, "Western Red Cedar Shingles, Machine Grooved Shakes, and Handsplit Red Cedar Shakes." Shakes shall be not less than No. 1 grade and shingles not less than No. 2 grade, except that No. 3 grade may be used for undercoursing.
- (2) Shingles and shakes shall be not less than 65 mm nor more than 350 mm wide.
- (3) Shingles or shakes shall be fastened with nails located approximately 20 mm from each edge and not less than 25 mm above the exposure line for single-course applications, or approximately 50 mm above the butt for double-course applications.
- (4) In single-course application, joints in succeeding courses shall be offset at least 40 mm, so that joints in any 2 of 3 consecutive courses are staggered. In double-course application joints in the outer course shall be offset from joints in the under-course by not less than 40 mm, and joints in succeeding courses shall be offset not less than 40 mm.

TABLE 28B—EXPOSURE AND THICKNESS OF WOOD SHINGLES AND MACHINE GROOVED SHAKES

Shake or Shingle Length, mm	Maximum Exposure		Minimum Butt Thickness, mm
	Single Coursing, mm	Double Coursing, mm	
400	190	305	10
450	216	356	11
600	292	406	13
Column 1	2	3	4

- (5) When lath is used with double-course application (see E (7)), it shall be spaced according to the exposure and securely fastened to the framing. The butts of the under-course shall rest on the top edge of the lath. The outer course shall be fastened to the lath with nails of sufficient length to penetrate through the lath. The butts of the shingles or

shakes shall be so located that they project not less than 12 mm below the bottom edge of the lath. If wood lath is not used, the butts of the under-course shingles or shakes shall be located 12 mm above the butts of the outer course.

- (6) The exposure and butt thickness of shingles and shakes shall conform to Table 28B.

H. ASBESTOS-CEMENT SHINGLES AND SHEETS

- (1) Asbestos-cement shingles and sheets shall conform to one of the following:
CGSB 34-GP-4M(1977), "Siding: Asbestos Cement, Shingles and Clapboards,"
CGSB 34-GP-5M(1977), "Sheets: Asbestos Cement, Corrugated,"
CGSB 34-GP-14M(1977), "Sheets: Asbestos Cement, Decorative,"
CAN2-34.16-M77, "Sheets: Asbestos Cement, Flat, Fully Compressed,"
CGSB 34-GP-17M(1977), "Sheets: Asbestos Cement, Flat Semicompressed," or
CGSB 34-GP-21M(1977), "Panels, Sandwich Asbestos Cement and Insulating Cores."
- (2) Asbestos-cement shingles shall weigh not less than 8.06 kg/m². Asbestos-cement sheet shall be not less than 4.75 mm thick where applied to studs spaced not more than 400 mm o.c. nor less than 6 mm thick where applied to studs spaced not more than 600 mm o.c. Where applied over sheathing, thickness shall be not less than 3.15 mm.
- (3) Asbestos-cement shingles shall be fastened with nails located not less than 25 mm above the exposure line.
- (4) Asbestos-cement shingles shall be installed so that vertical joints in succeeding courses are staggered. Asphalt-coated backer strips shall be installed behind each vertical joint. Shingles shall have not less than a 25 mm head lap.
- (5) Vertical joints of asbestos-cement panels shall be protected with batten strips, caulking or other suitable method.
- (6) Horizontal joints shall be lapped, flashed, caulked or otherwise suitably protected.

I. PLYWOOD

- (1) Plywood siding shall be exterior type conforming to CSA O115-1967, "Hardwood Plywood," CSA O121-M1978, "Douglas Fir Plywood," CSA O151-M1978, "Canadian Softwood Plywood" or CSA O153-1976, "Poplar Plywood."
- (2) Plywood siding shall be not less than 6 mm thick when applied directly to sheathing. When applied directly to framing or over furring strips, plywood thickness shall conform to Table 28C. The thickness of grooved or textured plywood shall be measured at the point of least thickness.

TABLE 28C—MINIMUM PLYWOOD THICKNESS, EXTERIOR WALL FINISH

Spacing of Supports, mm	Face Grain Parallel to Supports, mm	Face Grain Right Angles to Supports, mm
400	8	6
600	11	8
Column 1	2	3

- (3) The edges of plywood siding shall be treated with a suitable paint or sealer.
- (4) Plywood applied in panels shall have all edges supported. Not less than a 2 mm gap shall be provided between sheets. Vertical joints in such siding shall be protected with batten strips or caulking when the plywood joints are not matched. Horizontal joints shall be lapped not less than 25 mm or shall be suitably flashed.

- (5) Plywood applied in horizontal lapped strips shall have not less than a 2 mm gap provided at the butted ends which shall be caulked. The horizontal joints shall be lapped not less than 25 mm. Wedges shall be inserted under all vertical butt joints and at all corners when horizontal lapped plywood is applied without sheathing.

J. HARDBOARD

- (1) Factory-finished hardboard siding shall conform to CGSB 11-GP-5Ma(1978), "Pre-coated Hardboard for Exterior Use." Hard-pressed fibreboard siding which is not factory finished shall conform to Types 1, 2 or 5 in CGSB 11-GP-3M(1976), "Hardboard."
- (2) Type 1 or 2 hardboard siding shall be at least 6.0 mm thick when applied over sheathing that provides continuous support and at least 7.5 mm thick when applied to furring or framing members not more than 400 mm o.c. Type 5 hardboard siding shall be at least 9.0 mm thick when applied over sheathing that provides continuous support, and at least 10.5 mm thick when applied to furring or framing members not more than 400 mm o.c. Where hardboard siding is grooved, the grooves shall not extend more than 1.5 mm into the required thickness.
- (3) Hardboard siding applied in panels shall have all edges supported. Not less than a 5 mm gap shall be provided between sheets. Vertical joints in such siding shall be protected with batten strips or caulking when the joints are not matched. Horizontal joints shall be lapped not less than 25 mm or shall be suitably flashed.
- (4) Hardboard applied in horizontal lapped strips shall have not less than a 5 mm gap provided at the butted ends which shall be caulked or otherwise protected with suitable mouldings. The horizontal joints shall be lapped not less than 25 mm.
- (5) At least a 3 mm clearance shall be provided between hardboard siding and door or window frames.

K. WAFERBOARD

- (1) Waferboard siding shall conform to CAN3-O188.2-M78, "Waferboard."
- (2) Waferboard shall be not less than 7.9 mm thick where applied directly to sheathing. Where applied directly to framing or over furring strips, waferboard shall be not less than 9.5 mm thick on supports spaced not more than 400 mm o.c. and 12.7 mm thick on supports spaced not more than 600 mm o.c.
- (3) Waferboard applied in panels shall have all edges supported and treated with a primer or sealer. Not less than a 3 mm gap shall be provided between sheets. Vertical joints in such siding shall be protected with batten strips or caulking when the waferboard joints are not matched. Horizontal joints shall be lapped not less than 25 mm or shall be suitably flashed.
- (4) At least a 3 mm clearance shall be provided between waferboard siding and door or window frames.

L. METAL SIDING

- (1) Except as provided in (2), steel siding, including flashing and trim accessories, shall conform to CGSB 93-GP-4M(1978), "Siding, Soffits and Fascia: Steel, (Galvanized), Prefinished, Residential."
- (2) Steel siding which does not conform to (1) shall have a minimum thickness of 0.33 mm and conform to CGSB 93-GP-3M(1978), "Sheet Steel, Galvanized, Prefinished, Residential."

- (3) Except as provided in (4), aluminum siding, including flashing and trim accessories, shall conform to CGSB 93-GP-2M(1978), "Siding, Soffits and Facia: Aluminum, Prefinished, Residential."
- (4) Aluminum siding which does not conform to (3) shall conform to CGSB 93-GP-1M(1978), "Sheet, Aluminum Alloy, Prefinished, Residential" and shall have a minimum thickness of 0.58 mm, except that siding supported by backing or sheathing shall have a minimum thickness of 0.46 mm.
- (5) Aluminum siding in contact with masonry or concrete shall be effectively coated or separated from the masonry or concrete by an impervious membrane.

M. VINYL SIDING

- (1) Vinyl siding, including flashing and trim accessories, shall conform to CGSB 41-GP-24M(1976), "Siding, Soffits and Fascia, Rigid Vinyl."
- (2) The attachment of vinyl siding shall conform to the requirements in Subsection E for metal siding.
- (3) Vinyl siding shall be applied over sheathing or other backing that will provide continuous support for the siding.

N. EXTERIOR CEILINGS AND SOFFITS

- (1) Where provided, ceilings for carports, galleries and porches and eave soffits shall be at least 9.5 mm lumber, 6 mm plywood, 6 mm hardboard or 3.2 mm asbestos-cement board on supports spaced not more than 600 mm o.c. Waferboard used for soffits shall be at least 7.9 mm thick on supports spaced not more than 400 mm o.c. and 9.5 mm thick for supports spaced not more than 600 mm o.c. Other acceptable material may also be used.
- (2) Exterior ceilings and soffits shall be fastened with corrosion-resistant nails.

O. WOOD TRIM

- (1) Exterior wood trim shall be one of the species mentioned in Clause 3.1.1. of CSA O132.1-1975, "Wood Windows." The defects in the lumber shall not exceed those permitted in Clause 3.2.1. of CSA O132.1-1975, "Wood Windows."
- (2) Wood trim shall be fastened with corrosion-resistant casing or finishing nails.

SECTION 29. STUCCO

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) Sheathing shall be provided beneath stucco applied over wood-frame walls except as permitted in D (2). Where applied beneath stucco, sheathing shall conform to Subsection 23 P.
- (3) Stucco lath or reinforcing shall be used to attach stucco to wood-frame construction. Such lath or reinforcing shall also be used to attach stucco to masonry where the masonry is soft-burned tile or brick of less strength than the stucco or if the masonry surface is not sound, clean and sufficiently rough to provide a good key. Stucco applied over masonry chimneys shall be reinforced.
- (4) Stucco finish shall not be applied over concrete masonry units less than 1 month old unless the units have been cured by the autoclave process.
- (5) Stucco shall be not less than 200 mm above finished ground level except when it is applied over concrete or masonry.

- (6) Flashing and caulking used with stucco shall conform to Subsections 28 C and 28 D, except that if aluminum flashing is used, it shall be separated from the stucco by an impervious membrane or coating. (See Article 7 E (2) for caulking around window frames.)

B. STUCCO MATERIALS

- (1) Portland cement shall conform to CAN3-A5-M77, "Portland Cements."
- (2) Aggregate shall be clean, well-graded, natural sand or sand manufactured from crushed stone, gravel or air-cooled blast furnace slag and shall contain no significant amounts of deleterious material. Aggregate grading shall conform to Table 29A.
- (3) Hydrated lime shall conform to CSA A82.44-1950, "Normal Finishing Hydrated Lime."
- (4) Water shall be clean and free of significant amounts of deleterious material.

TABLE 29A—AGGREGATE GRADING FOR STUCCO

Sieve Sizes, mm	Per Cent Passing	
	Maximum	Minimum
4	—	100
2	—	90
1	90	60
0.5	60	45
0.25	30	10
0.125	5	—
Column 1	2	3

C. FASTENERS

- (1) Fasteners for stucco lath or reinforcing shall be corrosion-resistant and of a material other than aluminum.
- (2) Nails for stucco lath or reinforcing shall be not less than 3.2 mm diam with a head diameter of not less than 11.1 mm. Staples shall be not less than 1.98 mm diam or thickness.
- (3) Staples and nails for attaching stucco lath or reinforcing to vertical surfaces shall be of sufficient length to penetrate 25 mm into framing members or to the full depth of the sheathing where the sheathing is used for attachment. On horizontal surfaces nails shall be not less than 38 mm long.

D. STUCCO LATH

- (1) Rib lath or expanded metal stucco mesh shall be copper-alloy steel coated with rust-inhibitive paint after fabrication or shall be galvanized. Woven or welded wire mesh shall be galvanized.
- (2) Sheathing need not be provided beneath stucco where not less than 1.19 mm diam galvanized wire is applied horizontally to the framing at vertical intervals not exceeding 150 mm, or where acceptable paper-backed welded wire metal lath is used.
- (3) Stucco lath shall conform to Table 29B.
- (4) Stucco lath shall be held not less than 6 mm away from the backing by means of suitable self-furring devices.

- (5) Stucco lath shall be applied with the long dimension horizontal. Horizontal and vertical joints shall be lapped not less than 50 mm. End joints shall be staggered and shall occur over framing members. External corners shall be reinforced with a vertical strip of lath or reinforcing extending not less than 150 mm on both sides of the corner, or the lath or reinforcing shall extend around corners not less than 150 mm.
- (6) Stucco lath shall be fastened in conformance with Subsection 28E.
- (7) Fasteners on vertical surfaces shall be spaced not more than 150 mm o.c. vertically and 400 mm o.c. horizontally or 100 mm o.c. vertically and 600 mm o.c. horizontally. Other nailing patterns may be used provided there are not fewer than 20 fasteners per square metre of wall surface.

TABLE 29B—STUCCO LATH

Location	Type of Lath	Min. Diam of Wire, mm	Max. Mesh Opening	Min. Mass, kg/m ²
Vertical surfaces	Welded or woven wire	1.19	25 mm	—
		1.35	38 mm	—
1.60		51 mm	—	
	Stucco mesh reinforcing (expanded metal)	—	25.8 cm ²	0.98
Horizontal surfaces ⁽¹⁾	9.5 mm rib lath	—	—	1.84
	Cedar lath	—	—	—
Column 1	2	3	4	5

Note to Table 29B:

⁽¹⁾ See Appendix A.

- (8) Fasteners on horizontal surfaces shall be spaced not more than 150 mm o.c. along the framing members when members are spaced not more than 400 mm o.c., and 100 mm o.c. along members when members are spaced not more than 600 mm o.c.

E. STUCCO MIXES

- (1) Stucco mixes shall conform to Table 29C.

TABLE 29C—STUCCO MIXES
(by volume)

Portland Cement	Masonry Cement Type H	Lime	Aggregate
1	—	¾ to 1	¾ to 4 parts per part of cementitious material
1	1	—	
Column 1	2	3	4

- (2) Pigment if used shall consist of pure mineral oxides inert to the action of sun, lime or cement. Pigment shall not exceed 6 per cent of the portland cement by weight.
- (3) Materials shall be thoroughly mixed before and after water is added. Stucco shall be applied not later than 3 h after the initial mixing.

F. STUCCO APPLICATION

- (1) The base for stucco shall be maintained above freezing. Stucco shall be maintained at a temperature of not less than 10°C during application, and for not less than 48 h afterwards.
- (2) Stucco shall be applied with not less than 2 base coats and 1 finish coat providing a total thickness of at least 15 mm measured from the face of the lath or face of the masonry where no lath is used.
- (3) The first coat shall be not less than 6 mm thick measured from the face of the lath or masonry, fully embedding the lath. The surface shall be scored to provide a key with the second coat.
- (4) The second coat shall be not less than 6 mm thick. The surface shall be lightly roughened to provide a key with the finish coat if the finish coat is other than stone dash.
- (5) When the finish coat is other than stone dash, the base shall be dampened but not saturated before the finish coat is applied. The thickness of the finish coat shall be not less than 3 mm.
- (6) When a stone dash finish is used, the stone shall be partially embedded in the second coat before the second coat starts to set or stiffen.

SECTION 30. INTERIOR WALL AND CEILING FINISHES

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) The requirements for plastering in this Section apply to the application of plaster to gypsum or metal lath attached to wood furring or framing. Plastering applications and plaster mixes not described in this Section and requirements for metal framing and metal furring shall conform to CSA A82.30-1965, "Interior Furring, Lathing and Gypsum Plastering." Flame-spread requirements are contained in Subsection 10 P.
- (3) Where an assembly is permitted to be of combustible construction, foamed plastics shall not be used as an interior wall or ceiling finish or as a finish in vertical service shafts, but shall be protected on the interior surfaces by 1 of the finishes described in Subsections D to L.
- (4) In an assembly required to be non-combustible construction, foamed plastic shall be protected in conformance with Article 3.1.4.5. of the National Building Code of Canada 1980.
- (5) The requirements for wall and ceiling finishes in this Section are basic requirements. Where a wall or ceiling assembly is required to provide a certain fire-resistance rating, a flame-spread rating or a sound transmission class rating, the wall or ceiling finish shall be subject to the appropriate requirements in Sections 10 and 11 in addition to the requirements in this Section.

B. WATERPROOF WALL FINISH

- (1) Waterproof finish shall be provided to a height of not less than 1.8 m above the floor in shower stalls, 1.2 m above the rims of bathtubs equipped with showers, and 400 mm above the rims of bathtubs not equipped with showers.
- (2) Waterproof finish shall consist of ceramic, plastic or metal tile, sheet vinyl, tempered hardboard, laminated thermosetting decorative sheets or linoleum.

C. WOOD FURRING

- (1) Wood furring for the attachment of wall and ceiling finishes shall conform to Table 30A.
- (2) Furring shall be fastened to the framing or to wood blocks with not less than 51 mm nails.

TABLE 30A—MINIMUM SIZE OF FURRING, mm

Maximum Spacing of Furring, mm	Maximum Spacing of Furring Supports		
	Continuous Support	400 mm (o.c.)	600 mm (o.c.)
300	19 by 38	19 by 38	19 by 64
400	19 by 38	19 by 38	19 by 64
600	19 by 38	19 by 64	19 by 89
Column 1	2	3	4

D. GYPSUM LATH

- (1) Gypsum lath shall conform to CSA A82.27-M1977, "Gypsum Board Products."
- (2) Gypsum lath shall be not less than 9.5 mm thick on supports not more than 400 mm o.c., and 12.7 mm thick on supports not more than 600 mm o.c.
- (3) Gypsum lath shall be applied so that vertical joints do not occur at jamb studs above or below openings.
- (4) Gypsum lath shall be fastened at each support with not fewer than 4 uniformly spaced fasteners where 406 mm wide lath is used on vertical supports spaced not more than 400 mm o.c. Such lath shall be fastened with not fewer than 5 fasteners per support for all other conditions. Lath 610 mm wide shall be fastened with no fewer than 6 fasteners per support. Lath need not be nailed to the framing at inside corners.
- (5) Nails for fastening gypsum lath shall be blued steel wire nails not less than 32 mm long, with at least 2.29 mm shank diam and 7.5 mm head diam.
- (6) Staples for fastening gypsum lath shall be not less than 25 mm long for 9.5 mm thick lath and 28 mm long for 12.7 mm lath. Staples shall be not less than 1.6 mm diam or thickness with not less than a 19 mm crown.

E. METAL LATH

- (1) Metal lath shall consist of galvanized metal or copper-bearing steel treated with a suitable rust-inhibitive coating after manufacture.
- (2) The weight of metal lath shall conform to Table 30B.
- (3) Paper backed welded wire lath shall consist of wire not less than 1.6 mm in diameter, except that when applied to supports spaced more than 400 mm o.c., every third wire at right angles to the supports shall be not less than 2.9 mm in diameter.
- (4) Nails for the attachment of metal lath shall be not less than 3.2 mm diam large-head roofing nails not less than 38 mm long for ceiling supports and 25 mm long for wall supports. Such nails shall be spaced not more than 150 mm o.c.
- (5) Staples for the attachment of metal lath shall be not less than 2 mm diam or thickness nor less than 38 mm long with a 19 mm crown. Such staples shall be spaced not more than 150 mm o.c.

- (6) Metal lath shall be applied at right angles to the supports. End joints shall be lapped not less than 25 mm. Side joints of diamond mesh lath shall be lapped not less than 12 mm. Side joints of rib lath shall be lapped so that the adjacent side ribs nest. End joints shall be staggered. End laps that occur between supports shall be tied.
- (7) When metal lath is applied over a continuous surface, it shall be held not less than 6 mm from the back-up by means of furring strips, self-furring nails or self-furring lath.

TABLE 30B—MINIMUM MASS OF METAL LATH

Type of Lath	Min. Mass, kg/m ²	Max. Spacing of Wood Supports, mm	
		Walls	Ceilings
Diamond mesh	1.36	300	300
	1.63	400	300
Flat rib	1.36	400	300
	1.63	400	400
9.5 mm rib	1.36	400	400
	1.63	500	500
	1.90	600	600
Paper-backed welded wire	0.76	400	400
	1.06	600	600
Column 1	2	3	4

F. CORNER REINFORCEMENT FOR PLASTER

- (1) Material for corner reinforcement shall have at least the same corrosion resistance as metal plaster lath.
- (2) All internal corners of walls and ceilings shall be reinforced with metal lath or wire fabric having not less than 50 mm wide legs. Corner beads shall be installed at all external corners.
- (3) Corners of openings shall be reinforced with a strip of metal lath not less than 150 mm by 450 mm long installed at an angle of 45° to the horizontal.
- (4) All plaster reinforcement shall be fastened to the lath and not to the framing.

G. PLASTERING

- (1) Materials used in plastering shall conform to the following:
 CSA A82.21-M1978, "Gypsum and Terms Relating to Gypsum Products,"
 CSA A82.22-M1977, "Gypsum Plasters,"
 CSA A82.42-1950, "Quicklime for Structural Purposes,"
 CSA A82.44-1950, "Normal Finishing Hydrated Lime,"
 CSA A82.46-1962, "Special Finishing Hydrated Lime," or
 CSA A82.57-M1977, "Inorganic Aggregates for Use in Interior Plaster."
- (2) Grounds shall be installed to ensure even and uniform plaster thickness.
- (3) Plaster shall be not less than 10 mm thick at any point, measured from the face of the lath. Where electric cables for heating are embedded in the plaster, there shall be not less than 10 mm of plaster covering the cables.
- (4) Plaster shall be applied in 3 coats consisting of a scratch coat, brown coat and finish coat, except that where the base consists of gypsum lath or unit masonry other than

- concrete masonry, a 2-coat application may be used in which a brown coat is doubled back over the scratch coat.
- (5) When plaster is applied over concrete or concrete masonry, a special bond coat shall be used as the first coat, or a liquid bonding agent conforming to CSA A261-1970, "Liquid Bonding Agents for Interior Plasters" shall be applied before the application of the first coat of plaster. Normal finishing hydrated lime shall not be used in plaster applied to exterior masonry or concrete walls.
 - (6) Plaster to embed cables used for electric heating shall not incorporate lightweight aggregate.
 - (7) When 3-coat plaster is used, the first or scratch coat shall consist of 1 part gypsum plaster to 2 parts sand by weight. The second or brown coat shall consist of 1 part gypsum plaster to 3 parts sand by weight. The finish coat shall consist of 1 part gypsum plaster to 3 parts lime by volume.
 - (8) When 2-coat plaster is used, the first coat shall consist of 1 part gypsum plaster to 2½ parts sand by weight. The finish coat shall consist of 1 part gypsum plaster to 3 parts lime by volume.
 - (9) The finish coat shall be trowelled to a smooth hard finish unless a special decorative finish is used conforming to CSA A82.22-M1977, "Gypsum Plasters."
 - (10) In cold weather plaster shall be applied at from 10°C to 20°C and maintained at this temperature range for not less than 96 h and above freezing thereafter. Ventilation shall be provided for the proper drying of the plaster.

H. GYPSUM BOARD FINISH (TAPED JOINTS)

- (1) Gypsum board shall conform to CSA A82.27-M1977, "Gypsum Wallboard."
- (2) Gypsum board applied as a single layer shall be not less than 9.5 mm thick on supports not more than 400 mm o.c. and 12.7 mm thick on supports not more than 600 mm o.c. When applied as 2 layers, each layer shall be not less than 9.5 mm thick on supports not more than 600 mm o.c.
- (3) The length of fasteners for gypsum board shall conform to Table 30C, except that lesser depths of penetration are permitted for assemblies required to have a fire-resistance rating provided it can be shown, on the basis of fire tests, that such depths are adequate for the required rating.

TABLE 30C—FASTENER PENETRATION INTO WOOD SUPPORTS

Required Fire-Resistance Rating of Assembly, h	Min. Fastener Penetration Into Wood Supports, mm			
	Walls		Ceilings	
	Nails	Screws	Nails	Screws
Fire-resistance not required	20	15	20	15
¾	20	20	30	30
1	20	20	45	45
1½	20	20	60	60
Column 1	2	3	4	5

- (4) Nails for fastening gypsum board to wood supports shall be not less than 2.3 mm shank diameter annular grooved nails with a head diameter of 5.5 mm.

- (5) For single-layer application nails shall be spaced not more than 180 mm o.c. on ceiling supports and not more than 200 mm apart along vertical wall supports, except that nails may be spaced in pairs about 50 mm apart every 300 mm along such walls or ceiling supports. Where the ceiling sheets are supported by the wall sheets around the perimeter of the ceiling, this support may be considered as equivalent to nailing at this location. The uppermost wall nails shall be not more than 200 mm below the ceiling. Nails shall be located not less than 10 mm from the side or edge of the board. Nails shall be driven so that the heads are below the plane of the board surface but do not puncture the paper.
- (6) For double-layer applications the first layer shall be fastened as in (5). The joints in the second layer shall be offset from the joints in the first layer, and the second layer shall be fastened so that the nails penetrate into wood supports the same depth as is required for the first layer. Acceptable systems of adhesive fastened gypsum board may also be used.
- (7) Where strip laminated method of application is used, strips of gypsum board not less than 9.5 mm thick and 150 mm wide shall be nailed to the framing members with nailing conforming to (5). The finish layer of gypsum board shall be attached by means of a suitable adhesive to these strips as described in (6).
- (8) Where gypsum board is applied with drywall screws, the screws shall be spaced not more than 300 mm o.c. along supports, except that on vertical surfaces the screws may be spaced 400 mm o.c. where supports are not more than 400 mm o.c.
- (9) In cold weather the taping and finishing of gypsum board shall be carried out at a temperature of not less than 10°C.
- (10) Nail heads and screw heads shall be covered with a suitable filler.
- (11) Surfaces to receive tape shall be clean, and torn paper or loose material shall be removed. Openings greater than 3 mm shall be filled with patching plaster that is allowed to dry before joint tape cement is applied.
- (12) External corners shall be protected with corrosion-resistant metal corner beads or wood mouldings.
- (13) A band of joint cement about 120 mm wide shall be applied along the joints to embed the tape. The tape shall be smoothed out and excess cement removed with a suitable spreader tool.
- (14) After the cement has dried, a second layer of cement shall be applied so that it completely covers the tape. The edges of the cement shall be feathered to provide a band about 200 mm wide where the joints are recessed and 250 mm wide where the joints are not recessed.
- (15) After the second layer is dry, a third layer of cement shall be applied and feathered to provide a band about 250 mm wide where the joints are recessed and 400 mm wide where the joints are not recessed.
- (16) After the third layer of cement has dried, all rough and uneven areas shall be sanded to provide a smooth even surface.

I. PLYWOOD FINISH

- (1) The minimum thickness of plywood interior finish shall conform to Table 30D, except that no minimum thickness is required when the plywood is applied over solid backing. Thicknesses listed in Table 30D shall permit a manufacturing tolerance of ± 0.4 mm.
- (2) Where plywood for interior finish is grooved, the grooves shall not extend through the face ply and into the plies below the face ply unless the groove is supported by framing or furring, or if the grain of the face ply is at right angles to the supporting members,

unless the thickness of the plywood exceeds the value shown in Table 30D by an amount equal to at least the depth of penetration of the grooves into the plies below the face ply.

- (3) Nails for attaching plywood finishes shall be not less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports, except that staples providing equivalent lateral resistance may also be used.
- (4) All plywood edges shall be supported by furring, blocking or framing.

TABLE 30D—MINIMUM THICKNESS OF PLYWOOD INTERIOR FINISH

Maximum Spacing of Supports, mm o.c.	On Supports with No Horizontal Blocking, mm	On Supports with Blocking at Vertical Intervals not Exceeding 1.2 m, mm
400	4.7	4.0
600	8.0	4.7
Column 1	2	3

J. HARDBOARD FINISH

- (1) Hardboard shall conform to CGSB 11-GP-3M(1976), "Hardboard."
- (2) Hardboard shall be not less than 3.2 mm thick where applied over continuous back-up, 6 mm thick where applied to supports spaced not more than 400 mm o.c. and 9 mm thick where applied to supports spaced not more than 600 mm o.c.
- (3) Nails for fastening hardboard shall be casing or finishing nails not less than 38 mm long, spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.
- (4) All hardboard edges shall be supported by furring, blocking or framing where the back-up is not continuous.

K. INSULATING FIBREBOARD FINISH

- (1) Insulating fibreboard shall conform to CSA A247-M1978, "Insulating Fibreboard."
- (2) Insulating fibreboard sheets shall be not less than 11.1 mm thick on supports not more than 400 mm o.c. Insulating fibreboard tile shall be not less than 12.7 mm thick on supports spaced not more than 400 mm o.c.
- (3) Nails for fastening fibreboard sheets shall be not less than 2.6 mm shank diameter casing or finishing nails of sufficient length to penetrate at least 20 mm into the supports. Nails shall be spaced not more than 100 mm o.c. along edge supports and 200 mm o.c. along intermediate supports.
- (4) All fibreboard edges shall be supported by blocking, furring or framing.

L. PARTICLEBOARD OR WAFERBOARD FINISH

- (1) Particleboard finish shall conform to CAN3-O188.1-M78, "Interior Mat-Formed Wood Particleboard." Waferboard finish shall conform to CAN3-O188.2-M78, "Waferboard."
- (2) Particleboard or waferboard shall be not less than 6.35 mm thick on supports not more than 400 mm o.c. and not less than 9.5 mm thick on supports not more than 600 mm o.c., except that in walls where blocking is provided at mid-wall height, particleboard

or waferboard shall have a thickness of not less than 6.35 mm on supports not more than 600 mm o.c.

- (3) Nails for fastening particleboard or waferboard shall be not less than 38 mm casing or finishing nails spaced not more than 150 mm o.c. along edge supports and 300 mm o.c. along intermediate supports.
- (4) All particleboard or waferboard edges shall be supported by furring, blocking or framing.

M. WALL TILE FINISH

- (1) Ceramic tile shall be set in a mortar base or applied with an adhesive. Plastic tile shall be applied with an adhesive.
- (2) When ceramic tile is applied to a mortar base the cementitious material shall consist of 1 part portland cement to not more than $\frac{1}{4}$ part lime by volume. This shall be mixed with not less than 3 nor more than 5 parts of aggregate per part of cementitious material by volume. Mortar shall be applied over metal lath or masonry. Ceramic tile applied to a mortar base shall be thoroughly soaked and pressed into place forcing the mortar into the joints while the tile is wet.
- (3) Adhesives to attach ceramic or plastic tile shall be applied to the finish coat or brown coat of plaster that has been steel-trowelled to an even surface or to gypsum board or to masonry provided the masonry has an even surface.
- (4) The joints between wall tiles and a bathtub shall be suitably caulked with material conforming to CGSB 19-GP-9Ma(1978), "Sealing Compound, One Component, Silicone Base, Chemical Curing."

N. INTERIOR TRIM

- (1) Interior trim shall be provided where necessary to cover unprotected edges of friable wall finishes or where the junction of 2 surfaces is not finished to provide an acceptable appearance.
- (2) Trim shall be made of wood, metal, plastic or other acceptable material.
- (3) Steel trim shall be primed with a rust-inhibitive paint before installation or otherwise treated to prevent corrosion.
- (4) Aluminum mouldings shall be treated with a protective coating when in contact with masonry, plaster, mortar or concrete.
- (5) Wood trim shall be smooth, clean, sound stock suitable for finishing. Moisture content at the time of installation shall not exceed 12 per cent.

SECTION 31. FLOORING

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) Finished flooring shall be provided in all residential occupancies.
- (3) Finished flooring in bathrooms, kitchens, public entrance halls, laundry and general storage areas shall consist of resilient flooring, felted-synthetic-fibre floor coverings, concrete, terrazzo, ceramic tile, mastic or other types of flooring providing similar degrees of water resistance.
- (4) Wood sleepers supporting finished flooring over a concrete base on ground shall be not less than 19 mm by 38 mm and shall be treated with a soaking coat of acceptable wood preservative.

- (5) Finished flooring shall have a surface that is smooth, even and free from roughness or open defects.

B. PANEL-TYPE UNDERLAY

- (1) A panel-type underlay shall be provided under resilient flooring, parquet flooring, ceramic tile, felted-synthetic-fibre floor coverings or carpeting laid over lumber subflooring. (See C (3).)
- (2) A panel-type underlay shall be provided under resilient flooring, parquet flooring, felted-synthetic-fibre floor coverings, carpeting or ceramic tile on panel-type subflooring whose edges are unsupported. (See Article 23 N (4).)
- (3) Panel-type underlay shall be not less than 6 mm thick and shall conform to one of the following:
 - CSA O115-1967, "Hardwood Plywood,"
 - CSA O121-M1978, "Douglas Fir Plywood,"
 - CSA O151-M1978, "Canadian Softwood Plywood,"
 - CSA O153-1976, "Poplar Plywood,"
 - CAN3-O188.1-M78, "Interior Mat-Formed Wood Particleboard,"
 - CAN3-O188.2-M78, "Waferboard," or
 - CGSB 11-GP-3M(1976), "Hardboard."
- (4) Panel-type underlay shall be fastened to the subfloor with staples or annular grooved flooring nails, spaced not more than 150 mm o.c. along the edges and 200 mm o.c. both ways at other locations.
- (5) Nails for panel-type underlay shall be not less than 19 mm long for 6 mm thick underlay and 22 mm long for 7.9 mm thick underlay. Staples for panel-type underlay shall have not less than a 1.2 mm shank diameter or thickness with a 4.7 mm crown and shall be not less than 22 mm long for 6 mm underlay and 28 mm long for 7.9 mm and 9.5 mm underlay.
- (6) Where panel-type underlay is required to be installed over plywood or waferboard, the joints in the underlay shall be offset at least 200 mm from the joints in the underlying subfloor.
- (7) Underlay beneath resilient or ceramic floors applied with an adhesive shall have all holes or open defects on the surface patched so that the defects will not be transmitted to the finished surface.

C. WOOD STRIP FLOORING

- (1) The thickness of wood strip flooring shall conform to Table 31A.
- (2) Wood strip flooring shall not be laid parallel to lumber subflooring unless a separate underlay is provided.
- (3) If wood strip flooring is applied without a subfloor, it shall be laid at right angles to the joists so that the end joints are staggered and occur over supports or are end matched. If the flooring is end matched, it shall be laid so that no 2 adjoining strips break joints in the same space between supports and each strip bears on no fewer than 2 supports.
- (4) When nails are used wood strip flooring shall be toe nailed or face nailed with at least 1 nail per strip at the spacings shown in Table 31B, except that face nailed strips of more than 25 mm in width shall have no fewer than 2 nails per strip. Face nails shall be countersunk and the holes filled with suitable filler.
- (5) Staples may be used to fasten wood strip flooring not more than 7.9 mm in thickness provided the staples are not less than 29 mm long with a shank diameter of 1.19 mm and with 4.7 mm crowns.

TABLE 31A—WOOD STRIP FLOORING

Type of Flooring	Maximum Joist Spacing, mm	Minimum Thickness of Flooring, mm	
		With Subfloor	No Subfloor
Matched hardwood (interior use only)	400	7.9	19.0
	600	7.9	33.3
Matched softwood (interior or exterior use)	400	19.0	19.0
	600	19.0	31.7
Square edge softwood (exterior use only)	400	—	25.4
	600	—	38.1
Column 1	2	3	4

TABLE 31B—NAILING OF WOOD STRIP FLOORING

Finish Floor Thickness, mm	Minimum Length of Flooring Nails, mm	Maximum Spacing of Flooring Nails, mm
7.9	38 ⁽¹⁾	200
11.1	51	300
19.0	57	400
25.4	63	400
31.7	70	600
38.1	83	600
Column 1	2	3

Note to Table 31B:

⁽¹⁾ See 31C(5).

D. PARQUET FLOORING

Adhesive used to attach parquet block flooring shall be suitable for bonding wood to the applicable subfloor material.

E. RESILIENT FLOORING

- (1) Resilient flooring used on concrete slabs supported on ground shall consist of asphalt, rubber, vinyl-asbestos, unbacked vinyl or vinyl with an inorganic type backing. Such flooring shall be attached to the base with a suitable waterproof and alkali-resistant adhesive.
- (2) Resilient flooring shall conform to one of the following:
 - CSA A100-1962, "Asphalt Floor Tile,"
 - CSA A146-1965, "Linoleum Products,"
 - CSA A126.1-1977, "Vinyl Asbestos Floor Tile,"
 - CSA A145-1959, "Rubber Floor Tile," or
 - CSA A126.3-1972, "Sheet Vinyl Flooring Products."

F. CERAMIC TILE

- (1) Ceramic tile shall be set in a mortar bed or applied to a sound, smooth base with a suitable adhesive.

- (2) When set in a mortar bed the bed shall be not less than 30 mm thick. Asphalt sheathing paper, felt or polyethylene film shall be applied under the mortar bed when the mortar is applied over wood subfloors. The mortar shall consist of 1 part portland cement to not more than $\frac{1}{4}$ part lime to not less than 3 nor more than 5 parts of aggregate per part of cementitious material by volume. The tile shall be soaked before installation and pressed firmly into place while the mortar is still plastic. The mortar shall be compressed into the tile joints and the joints tooled the same day the tile is installed. Where no spacers are provided the joints shall not exceed 2 mm in width.
- (3) Ceramic tile installed with an adhesive shall be applied over a smooth base of concrete or over a panel-type underlay as described in Subsection B, except that particleboard shall meet the exterior bond and test requirements for Grade N-1 or N-2 board in CAN3-O188.1-M78, "Interior Mat-Formed Wood Particleboard." The adhesive shall be applied to both the base and the tile.

G. CARPETING

- (1) Carpeting shall not be used as a finish flooring in kitchens, bathrooms, washrooms, laundry areas or other areas where excessive amounts of water are likely to be encountered unless accepted.
- (2) When carpeting is used it shall be laid over concrete or panel-type subflooring or over lumber subflooring covered with a panel-type underlay conforming to Subsection B.
- (3) Carpeting shall conform to the following specification:
CGSB 4-GP-161M(1978), "Carpets for Residential Use."
- (4) A carpet underlay shall be provided beneath the carpeting. This shall consist of a felt type weighing not less than 1.08 kg/m² conforming to CGSB 4-GP-36M(1978), "Carpet Underlay, Fibre Type," Type I, II or III, or sponge or foam type conforming to CGSB 20-GP-23M(1978), "Cushion, Carpet: Flexible Polymeric Material," at least 4.8 mm thick for Type I and 6.35 mm thick for Type II or III.

H. FELTED-SYNTHETIC-FIBRE FLOOR COVERINGS

- (1) Felted-synthetic-fibre floor coverings may be used in all rooms and spaces. When a felted-synthetic-fibre floor covering is used, it shall be laid over concrete or panel-type subflooring or over lumber subflooring covered with a panel-type underlay conforming to Subsection B.
- (2) A carpet underlay shall not be used beneath felted-synthetic-fibre floor coverings in those areas where carpeting is not permitted (see G (1)).

SECTION 32. PLUMBING FACILITIES

A. SCOPE

- (1) The requirements in this Section apply to all buildings, regardless of size.
- (2) **This Section applies to the facilities required in plumbing systems within dwelling units.**
- (3) **Facilities in plumbing systems other than those required in dwelling units shall conform to Part 3 of the National Building Code of Canada 1980.**

B. GENERAL

- (1) **The construction, extension, alteration, renewal or repair of plumbing systems and sewage disposal systems shall conform to Part 7 of the National Building Code of Canada 1980.**
- (2) Fixture clearance shall conform to the requirements in Section 5.

- (3) Washrooms and water-closet rooms intended for common use in buildings required by Subsection 9B to be accessible to persons in wheelchairs shall conform to the appropriate requirements for public washrooms and toilet rooms in the ACNBC document, "Building Standards for the Handicapped 1980."

C. WATER SUPPLY AND DISTRIBUTION

- (1) Every dwelling unit shall be supplied with potable water.
- (2) Where a piped water supply is available, piping for hot and cold water shall be connected to every kitchen sink, lavatory, bathtub, shower, slop sink and laundry area. Piping for cold water shall be run to every water closet and hose bib.
- (3) Where individual wells deliver less than 20 L/min per dwelling unit over a 1 h period, not less than 900 L cold water storage shall be provided per dwelling unit.

D. REQUIRED FACILITIES

- (1) A kitchen sink, lavatory, bathtub and water closet shall be provided for every dwelling unit where a piped water supply is available.
- (2) Laundry facilities or a space for laundry facilities shall be provided in every dwelling unit or grouped elsewhere in the building in a location conveniently accessible to occupants of every dwelling unit.
- (3) Where a piped water supply is available a hot water supply shall be provided in every dwelling unit.
- (4) Where gravity drainage to a sewer, drainage ditch or dry well is possible, a floor drain shall be installed in a basement or cellar forming part of a dwelling unit.
- (5) A floor drain shall be provided in a garbage room, incinerator room or boiler room serving more than 1 dwelling unit.
- (6) Every public water-closet room shall be equipped with at least 1 water closet and 1 lavatory (see Subsection 5 J).
- (7) Every janitor's water-closet room shall be equipped with 1 water closet and 1 lavatory or slop sink (see Subsection 5 J).
- (8) At least 1 outside hose bib with inside shut-off valve and drain cock or other acceptable draining device shall be provided for each building and for each ground-floor dwelling unit in a building in which there is no dwelling unit above another dwelling unit. In row-housing the bibs are to be provided alternately at front and back.
- (9) Bathrooms in dwelling units shall be equipped with a wall cabinet or vanity, a mirror, toilet paper holder, soap dish, grab bar and towel bar. When a shower is provided, a shower rod or enclosure shall be installed.
- (10) Where automatic washing machines are provided, there shall be at least 1 machine for every 20 dwelling units.
- (11) Where automatic clothes dryers are provided there shall be at least 1 domestic size dryer for every 20 dwelling units, or commercial dryers providing equivalent capacity shall be provided.

E. SEWAGE DISPOSAL

- (1) Except as provided in E (2), wastes from every plumbing fixture shall be piped to the building sewer.
- (2) Where there is no piped water supply available, an alternate acceptable means of waste disposal shall be provided for every dwelling unit.

- (3) **Building sewers shall discharge into a public sewage system where such system is available.**
- (4) **Where a public sewage system is not available, the building sewer shall discharge into a private sewage disposal system.**
- (5) **Where a piped water supply is provided, every laundry room or space shall have a waste connection for the disposal of laundry water.**

F. SERVICE WATER HEATING FACILITIES

- (1) **Where a hot water supply is required by D (3), equipment shall be installed to provide to every dwelling unit an adequate supply of service hot water with a temperature range from 60°C to 75°C.**
- (2) **Service hot water may be distributed from a centrally located heater to supply the entire building or may be supplied by an individual service water heater for each dwelling unit.**
- (3) **Every service water heater and its installation shall conform to Part 6 of the National Building Code of Canada 1980.**
- (4) **Where storage tanks for service water heaters are of steel, they shall be coated with zinc, vitreous enamel (glass lined), hydraulic cement or other corrosion-resistant material.**
- (5) **Fuel-burning service water heaters shall be connected to a chimney flue conforming to Section 21.**
- (6) **Heating coils of service water heaters shall not be installed in a flue or in a combustion chamber of a building heating boiler or furnace unless acceptable for such installations.**
- (7) **Tanks for service water heaters shall be glass lined in conformance with CSA C309-1977, "Performance Requirements for Glass-lined Storage Tanks for Household Hot Water Service," or be lined with at least 9.5 mm of hydraulic cement covering the inside of the tank without voids, or be constructed of materials capable of providing a minimum service life of 10 years with the kind of water encountered.**
- (8) **Central storage tanks for service water heaters serving more than 1 dwelling unit may consist of non-galvanized steel rated at not less than 860 kPa water pressure.**

TABLE 32A—ELECTRIC SERVICE WATER HEATERS, STORAGE TYPE

No. of Bath-rooms ⁽¹⁾	No. of Bed-rooms	Min. Tank Capacity, L	Minimum Wattage of Elements		
			Single Element Type	Dual Element Type (nonsimultaneous operation)	
				Primary Element	Secondary Element
1	1 or 2	90	1 000	750	1 000
	3 or 4	135	1 500	1 000	1 000
2	2 or 3	180	2 000	1 000	1 000
	4 or 5	180	2 500	1 000	3 000
Column 1	2	3	4	5	6

Note to Table 32A:

⁽¹⁾ Rooms containing a shower or bathtub.

- (9) The minimum storage tank capacity and watt input for electric storage type service water heaters serving individual dwelling units shall conform to Table 32A. Other combinations of tank capacity and element wattage may be used where it can be shown that such combinations will provide an equivalent supply of hot water.
- (10) The minimum storage and heating capacity of nonelectric storage type service water heaters for individual dwelling units shall conform to Table 32B. Other combinations of tank capacity and recovery rates may be used where it can be shown that such combinations will provide an equivalent supply of hot water.

TABLE 32B—NONELECTRIC SERVICE WATER HEATERS, STORAGE TYPE

No. of Bathrooms ⁽¹⁾	No. of Bedrooms	Min. Tank Capacity, L	Minimum Heating Capacity, L raised 55°C in 1 h
1	1 or 2	60	55
	3 or 4	70	55
2	2 or 3	100	70
	4 or 5	135	95
Column 1	2	3	4

Note to Table 32B:

⁽¹⁾ Rooms containing a shower or bathtub.

TABLE 32C—MINIMUM HEATING CAPACITY
(L/h at 55°C temperature rise)

Max. No. of Dwelling Units ⁽¹⁾	Min. Storage Capacity per Dwelling Unit, ⁽²⁾					
	0 Instantaneous	25	50	75	100	125
3	1 330	130	111	96	84	74
5	1 540	215	185	157	137	122
10	1 780	435	371	315	274	231
15	1 950	646	557	472	410	347
20	2 110	865	739	627	542	466
25	2 260	1 040	1 010	755	655	559
30	2 430	1 220	1 040	885	764	655
40	2 730	1 520	1 300	1 100	950	807
50	3 070	1 770	1 500	1 270	1 090	935
60	3 410	2 000	1 690	1 420	1 210	—
80	3 980	2 320	1 940	1 590	—	—
100	4 360	2 420	1 990	—	—	—
150	5 270	2 530	—	—	—	—
200	6 050	3 360	—	—	—	—
250	6 820	—	—	—	—	—
300	7 590	—	—	—	—	—
Column 1	2	3	4	5	6	7

Notes to Table 32C:

⁽¹⁾ For numbers of dwelling units not listed, interpolations may be made to determine recovery capacity.

⁽²⁾ For storage capacities not listed, interpolations may be made to determine recovery capacity.

- (11) The minimum heating capacity in litres per hour raised through 55°C for instantaneous or tankless heaters serving individual dwelling units shall be 650 for dwelling units with 1 bathroom and 1 100 for dwelling units with 2 bathrooms.
- (12) Service water heaters of any type serving more than 1 dwelling unit shall have a minimum heating capacity in litres per hour raised through 55°C conforming to Table 32C.
- (13) Storage tanks for service water heaters shall be insulated with mineral wool, cellular asbestos or other acceptable material.

SECTION 33. VENTILATION

A. SCOPE

- (1) The requirements for natural ventilation in this Section apply to all buildings regardless of size. The requirements for mechanical ventilation apply only to buildings that are not more than 3 storeys in building height and with a building area of not more than 600 m². For buildings exceeding these limits the requirements in Part 6 of the National Building Code of Canada 1980 shall apply.
- (2) This Section applies to the ventilation of rooms and spaces by natural ventilation and mechanical ventilation where the rated fan capacity does not exceed 2 m³/s.
- (3) Where the rated fan capacity exceeds 2 m³/s, mechanical ventilation shall conform to Part 6 of the National Building Code of Canada 1980.
- (4) A garage for parking more than 5 cars shall be ventilated in accordance with Part 3 of the National Building Code of Canada 1980.

B. GENERAL

- (1) Rooms and spaces in buildings shall be ventilated by natural means in accordance with Subsection C or by mechanical means in conformance with Subsection D, except that where a dwelling unit is heated with other than fuel-fired equipment within the dwelling unit, a mechanical exhaust system of 1 or more fans or blowers having a total capacity of at least 0.05 m³/s at a pressure differential of 2.5 mm of water shall be provided for each dwelling unit.
- (2) A space that contains a fuel-fired heating appliance shall have natural or mechanical means of supplying the required combustion air.
- (3) Where the ventilation system forms part of the heating system, Section 34 shall also apply.
- (4) Air contaminants released within buildings shall be removed insofar as possible at their points of origin and shall not be permitted to accumulate in unsafe concentrations.
- (5) Every building in which dust, fumes, gases, vapour or other contaminants tend to create a fire or explosion hazard shall be provided with an exhaust ventilation system designed to conform with Part 6 of the National Building Code of Canada 1980 and shall be provided with explosion relief devices and vents or other protective measures to conform with Part 3 of the National Building Code of Canada 1980.

C. NATURAL VENTILATION

- (1) The unobstructed ventilation area to the outdoors for rooms and spaces in residential buildings ventilated by natural means shall conform to Table 33A. Where a vestibule opens directly off a living or dining room within a dwelling unit ventilation to the outdoors for such rooms may be through the vestibule.

- (2) Openings for natural ventilation other than windows shall be constructed to provide protection from the weather and insects. Screening shall be of rust-proof material.

TABLE 33A—NATURAL VENTILATION

Location		Minimum Unobstructed Area
Within dwelling units	Bathrooms or water-closet rooms	0.09 m ²
	Unfinished basement space	0.2 per cent of the floor area
	Dining rooms, living rooms, bedrooms, kitchens, combined rooms, dens, recreation rooms and all other finished rooms	0.28 m ² per room or combination of rooms
Other than within dwelling units	Bathrooms or water-closet rooms	0.09 m ² per water closet
	Sleeping areas	0.14 m ² per occupant
	Laundry rooms, kitchens, recreation rooms	4 per cent of the floor area
	Corridors, storage rooms and other similar public rooms or spaces	2 per cent of the floor area
	Unfinished basement space not used on a shared basis	0.2 per cent of the floor area
Column 1	2	3

D. MECHANICAL VENTILATION

- (1) Where rooms or spaces are mechanically ventilated, the system shall be capable of providing at least 1 air change per hour. Where a kitchen space is combined with a living area, natural or mechanical ventilation shall be provided in the kitchen area.
- (2) No air from any dwelling unit shall be circulated directly or indirectly to any other dwelling unit, public corridor or public stairway.
- (3) Except for self-contained systems that serve individual dwelling units, exhaust ducts from rooms containing water closets, urinals, lavatories, showers or slop sinks, and exhaust ducts serving rooms containing cooking equipment, shall not be interconnected, and shall not be connected to duct systems serving other areas of the building, except at the inlet of the exhaust fan. Where such a connection is made, devices shall be installed to prevent the circulation of exhaust air through the building when the fan is not operating.
- (4) Where a vertical service space contains an exhaust duct that serves more than 1 fire compartment, the duct shall have a fan located at or near the exhaust outlet to ensure that the duct is under negative pressure, and such individual fire compartments shall not have fans that exhaust directly into the duct in the vertical service space.
- (5) Air intakes shall be located so as to avoid contamination from exhaust outlets or other sources in concentrations greater than normal in the locality in which the building is located.
- (6) Exhaust ducts shall discharge directly to the outdoors. Where the exhaust duct passes through or is adjacent to unheated space, the duct shall be insulated to prevent moisture condensation in the duct.

- (7) Ventilation equipment shall be accessible for inspection, maintenance, repair and cleaning. Kitchen exhaust ducts shall be designed and installed so that the entire duct can be cleaned where the duct is not equipped with a filter at the intake end.
- (8) Outdoor air intake and exhaust outlets shall be shielded from weather and insects. Screening shall be of rust-proof material.
- (9) Outdoor air intake openings into the cold air return system shall be provided with a manually operated or automatic damper. Air intake openings larger than 127 mm diam shall be equipped with a manually operated closure if the system is gravity type, or an automatic closure if the system is mechanically operated.
- (10) Except as provided in (11), every ventilating duct shall conform to the requirements of Section 34 for supply ducts.
- (11) An exhaust duct that serves only a bathroom or water-closet room and that is contained entirely within a dwelling unit or space that is common to no other dwelling unit may be of combustible material provided the duct is reasonably air tight and constructed of a material impervious to water.
- (12) Underground ventilating ducts shall be adequately drained. Such ducts shall have no sewer connections and shall be provided with access for inspection and cleaning.

SECTION 34. HEATING AND AIR-CONDITIONING

A. SCOPE

- (1) This Section applies to the design and installation of cooking appliances and heating systems in which the heat input does not exceed 120 kW and to air-conditioning systems in which the rated fan capacity does not exceed 2 m³/s.
- (2) Where the heat input of a heating system exceeds 120 kW or the rated fan capacity of an air-conditioning system exceeds 2 m³/s, Part 6 of the National Building Code of Canada 1980 shall apply.

B. GENERAL

- (1) The design, including heat loss and heat gain calculations, for the construction and installation of heating and air-conditioning systems shall conform to good engineering practice such as the procedures described in the ASHRAE Guide and Data Books, the ASHRAE Handbooks, the HRA Digest and the Hydronics Institute Manuals.
- (2) Equipment forming part of a heating or air-conditioning system, except for concealed or embedded pipes or ducts, shall have easy access for inspection, maintenance and cleaning.
- (3) Oil-burning, gas-burning and electric equipment shall be installed to conform to the following:
 CSA B51-1975, "Code for the Construction and Inspection of Boilers and Pressure Vessels,"
 CSA B52-M1977, "Mechanical Refrigeration Code,"
 CSA B139-1976, "Installation Code for Oil Burning Equipment,"
 CAN1-B149.1-78, "Installation Code for Natural Gas Burning Appliances and Equipment,"
 CAN1-B149.2-78, "Installation Code for Propane Burning Appliances and Equipment," and
 CSA C22.1-1978, "Canadian Electrical Code, Part I."
- (4) Except as provided in Subsection I, the installation of solid-fuel-burning appliances, including mounting, clearances and requirements for safety devices, shall conform to Part 6 of the National Building Code of Canada 1980.

- (5) Heating systems using solid fuel shall not be connected to heating systems incorporating oil or gas-burning appliances or electrical heating appliances unless the total system is acceptable and is designed so that unsafe temperatures will not occur with the operation of all or part of the combined system.
- (6) Residential buildings intended for use in the winter months on a continuing basis shall be equipped with heating facilities capable of maintaining an indoor air temperature of 22°C at the outside winter design temperature, except as provided in (7). All other buildings shall be equipped with heating facilities of sufficient capacity to maintain the desired indoor air temperature commensurate with the use of the building at the outside winter design temperature. Winter design temperatures shall be determined on the basis of the January 2½ per cent design temperature determined in conformance with Article 2.3.1.1. of the National Building Code of Canada 1980.
- (7) Heating facilities shall be provided which shall be capable of maintaining a temperature not less than 18°C in an unfinished basement or cellar. Where crawl spaces are required to be heated, the heating facilities shall be capable of maintaining a temperature of not less than 15°C.

C. HEATING SUPPLY DUCTS

- (1) Except for heating supply ducts serving not more than 1 dwelling unit and encased in concrete slabs-on-ground, heating supply ducts shall be noncombustible or shall be Class 1 ducts installed in conformance with Part 6 of the National Building Code of Canada 1980. Combustible ducts in concrete slabs-on-ground that are connected to a furnace supply plenum shall be located not closer than 600 mm from that plenum and not less than 600 mm from its connection to a riser or register. Ducts in or beneath concrete slabs-on-ground shall be water tight, corrosion-resistant, decay-resistant and mildew-resistant.
- (2) Galvanized steel, aluminum or tin plate supply ducts shall conform to Table 34A. Other metals shall have equivalent strength and durability. Rectangular panels in plenums and ducts greater than 300 mm wide shall be shaped to provide sufficient stiffness.

TABLE 34A—MINIMUM METAL THICKNESS OF DUCTS, mm

Shape and Location of Duct	Size of Duct, mm	Galvanized Steel	Aluminum	Tin Plate
All round ducts and enclosed rectangular ducts	350 or under over 350	0.33 0.41	0.30 0.41	0.38 —
Exposed rectangular ducts having a required clearance of up to 12 mm and serving single dwelling units	350 or under over 350	0.33 0.41	0.41 0.48	— —
Other exposed rectangular ducts	350 or under over 350	0.41 0.48	0.41 0.48	— —
Column 1	2	3	4	5

- (3) Where the installation of heating supply ducts in walls, floors and partitions creates a space between the duct and construction material, the space shall be sealed with noncombustible material at each end.
- (4) Vertical supply ducts located in closets or rooms shall be covered with not less than 6 mm cellular-asbestos insulation or other noncombustible insulation.

- (5) Ducts shall be securely supported by metal hangers, straps, lugs or brackets, except that where zero clearance is permitted as described in (7) and (8), wooden brackets may be used.
- (6) The clearance of furnace plenums from combustible material shall conform to one of the following:
CSA B139-1976, "Installation Code for Oil Burning Equipment,"
CAN1-B149.1-78, "Installation Code for Natural Gas Burning Appliances and Equipment,"
CAN1-B149.2-78, "Installation Code for Propane Burning Appliances and Equipment," or
Part 6 of the National Building Code of Canada 1980 for solid-fuel-burning furnaces.
- (7) Supply ducts from warm-air furnaces having a required plenum clearance of 75 mm or less shall maintain this clearance from combustible material where the duct leaves the main plenum. This may be gradually reduced to 12 mm clearance at a distance of not less than 450 mm from the furnace plenum and to zero beyond a bend or offset in the duct sufficiently large to shield the remainder of the duct from direct radiation from the furnace heat exchanger.
- (8) Supply ducts from warm-air furnaces having a required furnace plenum clearance of over 75 mm but not more than 150 mm shall maintain this clearance from combustible material at the main furnace plenum and for a horizontal distance of 1.8 m from the furnace plenum. This may be reduced to 12 mm clearance beyond this point and to zero clearance beyond a bend or offset in the duct sufficiently large to shield the remainder of the duct from direct radiation from the furnace heat exchanger.
- (9) Supply ducts from warm-air furnaces having a required plenum clearance of more than 150 mm shall have a clearance from combustible material equal to that specified for the furnace plenum. This clearance shall be maintained for a horizontal distance of not less than 1 m from the furnace plenum. This may be reduced to 150 mm clearance beyond this point and to 25 mm clearance at a horizontal distance of 1.8 m from the furnace plenum. This may be further reduced to 8 mm clearance beyond a bend or offset in the duct sufficiently large to shield the remainder of the supply duct from direct radiation from the furnace heat exchanger.
- (10) Clearances for boots and register boxes shall be as described for supply ducts when the boot or box is not separated from combustible material, except that no clearance is required when not less than 6 mm of cellular-asbestos insulation is provided.
- (11) Where a register is installed in a floor directly over a pipeless furnace, a double walled register box with not less than 100 mm between walls, or a register box with the warm-air passage completely surrounded by the cold-air passage, shall be permitted in lieu of the clearances listed in (7) to (9).
- (12) All round pipe joints shall be lapped not less than 25 mm and shall have a snug fit without undue crimping or distortion. Such joints need not be screw fastened or taped.
- (13) Rectangular duct connections shall be made with S and drive cleats or equivalent mechanical connection. Such connections need not be taped if reasonably airtight.
- (14) Trunk ducts shall be securely supported by metal hangers, straps, lugs or brackets. The ducts shall not be nailed directly to wood members. Branch pipes shall be supported at suitable spacing to maintain alignment and prevent sagging.

D. SUPPLY OUTLETS FOR WARM-AIR DUCTS

- (1) A warm-air supply outlet shall be provided in each finished room in a dwelling unit. When rooms are located adjacent to exterior walls, such outlets shall be located so as to bathe at least 1 exterior wall with warm air, except in bathrooms, utility rooms or kitchens where this may not be practical.

- (2) A warm-air supply outlet per 40 m² shall be provided in unfinished basements serving dwelling units, located so as to provide adequate distribution of warm air.
- (3) No fewer than 4 supply outlets shall be provided in crawl spaces used as warm-air plenums, and located to direct the air towards the corners of the crawl space. Ducts for such outlets shall be not less than 1.8 m in length.
- (4) Except for pipeless furnaces and floor furnaces, the capacity of warm-air supply outlets serving dwelling units shall be not less than the design heat loss from the area served and shall not exceed 3 kW per outlet. In basements and heated crawl spaces, the calculated heat gain from the supply ducts and plenum surfaces may be considered in the calculations.
- (5) Registers for warm-air supply outlets in garages shall be located not less than 1.2 m above the floor and be fitted with an automatic damper to prevent garage vapours entering the heating system.
- (6) The temperature of supply air at the warm-air supply outlets shall not exceed 70°C.
- (7) Warm-air supply systems for residential buildings built on concrete slabs-on-grade shall be installed in the slab. Such systems shall be of the perimeter loop type or radial perimeter type.
- (8) Supply outlets shall be provided near the exterior doors of a dwelling unit where such entrances are not heated by warm air from the basement.

E. REGISTERS, DIFFUSERS, GRILLES AND FITTINGS FOR WARM AIR HEATING

- (1) The design of fittings for ducts shall conform to CSA B228.1-1968, "Pipes, Ducts and Fittings for Residential Type Air Conditioning Systems," except that metal thickness requirements shall conform to those in Table 34A.
- (2) Warm-air supply outlets located in finished areas or on the furnace plenum or extended plenum shall be provided with a diffuser and adjustable opening.
- (3) All branch supply ducts which are not fitted with diffusers with an adjustable balance stop shall be supplied with an adjustable damper and fitted with a device to indicate the position of the damper.
- (4) Return-air inlets in finished areas shall be supplied with grilles.

F. RETURN-AIR SYSTEMS

- (1) The return-air system shall be designed to handle the entire air supply.
- (2) Where any part of a return duct will be exposed to radiation from the furnace heat exchanger or other heat radiating part within the furnace, parts of return ducts directly above or within 600 mm horizontally of the outside furnace casing shall be noncombustible. Return ducts in other locations shall be constructed of material having a surface flame-spread rating of not more than 150.
- (3) Combustible return ducts shall be lined with noncombustible material below floor registers, at the bottom of vertical ducts and under furnaces having a bottom return.
- (4) Spaces between studs used as return ducts shall be separated from the unused portions of such spaces by tight-fitting metal stops or wood blocking.
- (5) A vertical return duct shall have openings to return air on not more than 1 floor.
- (6) A public corridor or public stairway shall not be used as a return-air plenum.

- (7) The return-air system shall be designed so that the negative pressure from the circulating fan cannot affect the furnace combustion air supply nor draw combustion products from joints or openings in the furnace or flue pipe.
- (8) Return air inlets shall not be located in a garage or an enclosed furnace room or in a crawl space where the furnace is installed in the crawl space.
- (9) Where warm air is exhausted into a garage, special provision shall be made for make-up air from the outside to compensate for this air.
- (10) Return air from a dwelling unit shall not be recirculated to any other dwelling unit.
- (11) At least 1 return air inlet shall be provided per dwelling unit. Each return shall serve an area having a design heat loss of not more than 18 kW.
- (12) Provision shall be made for the return of air from all rooms by leaving a gap beneath doors, using louvred doors or installing a return duct inlet.
- (13) Except for return-air plenums located within a dwelling unit, where a ceiling assembly is used as a plenum, the requirements of Part 6 of the National Building Code of Canada 1980 shall apply for such systems.

G. STEAM AND HOT WATER HEATING SYSTEMS

- (1) Every steam and hot water pipe shall be constructed of noncombustible material having adequate strength and durability.
- (2) Insulation or other covering for steam or hot water pipes shall be noncombustible, except that combustible insulation may be used provided such insulation conforms to the requirements in Part 6 of the National Building Code of Canada 1980 for combustible pipe insulation.
- (3) Clearance between steam or hot water pipes and combustible construction shall be at least 12 mm for steam or water temperatures greater than 90°C but not more than 120°C, and at least 25 mm for temperatures over 120°C.
- (4) The space around pipes passing through a wall or floor construction shall be fire stopped with noncombustible material.
- (5) When pipes are run in a vertical shaft, the fire-resistance rating of the shaft shall conform to the requirements contained in Subsection 10 K. Such shafts shall have a noncombustible lining where the pipes are not insulated.
- (6) Steam and hot water pipes shall be designed to allow expansion and contraction with changes in temperature.

H. RADIATORS, CONVECTORS AND HEAT EXCHANGERS

- (1) Every heat exchanger or unit heater using hot water or low pressure steam shall be installed with sufficient clearance to ensure that the temperature of any combustible material will not exceed its safe limit.
- (2) Every steam or hot water radiator or convector attached to a wall or located in a recess or concealed space containing combustible material shall be provided with a noncombustible backing.

I. STOVES, RANGES AND SPACE HEATERS BURNING SOLID FUEL

- (1) Stoves, ranges and space heaters using solid fuel shall be installed in a room or space sufficiently large to permit accessibility to the appliance.
- (2) The minimum clearance between stoves, ranges or space heaters using solid fuel and combustible material, whether or not such material is covered with noncombustible material such as plaster, shall conform to Table 34B, except that where protection is pro-

vided as described in Table 6.2.6.B. of the National Building Code of Canada 1980, the clearance may be reduced in conformance to that Table.

**TABLE 34B—MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL
FOR STOVES, RANGES AND SPACE HEATERS
USING SOLID FUEL**

Appliances	Minimum Clearance, mm			
	Top	Sides	Rear	Front
Stoves and ranges without refractory lining	750	—	900	1 200
fire box side	—	900	—	—
other side	—	450	—	—
Stoves and ranges with refractory lining	750	—	600	1 200
fire box side	—	600	—	—
other side	—	450	—	—
Space heaters with an air space between the outside of the fire chamber and the external casing to allow air circulation	900	300	300	1 200
Space heaters other than above	900	900	900	1 200
Column 1	2	3	4	5

- (3) Except as provided in (5), a solid-fuel-fired stove, range or space heater supported on a combustible floor shall be mounted on legs that provide a clear space of at least 100 mm in height, and shall be of a type in which flame or hot gases do not come in contact with its base.
- (4) A floor surface of combustible material beneath a solid-fuel-fired stove, range or space heater shall be protected by a layer of sheet metal of at least 0.56 mm in thickness over 6 mm asbestos cement or asbestos millboard for a distance of at least 450 mm beyond the appliance on the firing side and the side where ashes are removed, and extending at least 150 mm beyond the appliance on the other sides.
- (5) Solid-fuel-fired appliances other than those described in (3) shall be mounted in conformance with Part 6 of the National Building Code of Canada 1980.

J. FIRE PROTECTION FOR GAS AND ELECTRIC RANGES

- (1) Except as provided in (2), a vertical clearance of at least 750 mm shall be provided above the elements or burners of electric and gas fired domestic ranges.
- (2) Where cabinets located above the elements or burners referred to in (1) are noncombustible or are protected with asbestos millboard at least 6 mm thick covered with sheet metal not less than 0.33 mm, or a metal hood with a 125 mm projection beyond the upper cabinets, the vertical clearance may be reduced to 600 mm.
- (3) Combustible wall framing members within 450 mm of the area where the range is to be located shall be protected above the level of the heating elements by material providing fire resistance at least equivalent to 9.5 mm thickness of gypsum board.

SECTION 35. ELECTRICAL FACILITIES

A. GENERAL

- (1) This Section applies to all buildings, regardless of size.
- (2) Electrical installations, including the service capacity of the installation and the number and distribution of circuits, shall meet the requirements of the appropriate provincial or municipal legislation or, in the absence of such legislation, shall conform to CSA C22.1-1978, "Canadian Electrical Code, Part I."
- (3) Unless otherwise accepted, electrical facilities shall be provided for every building and every dwelling unit and public shared space in buildings containing dwelling units.
- (4) Entrance switches, meters, panel boxes, splitter boxes, time clocks and other similar equipment shall not be located in any public area unless adequate precautions are taken to prevent interference with the equipment.
- (5) Recessed lighting fixtures shall not be located in insulated ceilings unless the fixtures are accepted for such installation.

B. LIGHTING OUTLETS

- (1) An exterior lighting outlet with fixture controlled by a wall switch located within the building shall be provided at every entrance to buildings of residential occupancy.
- (2) Except as provided in (3), a lighting outlet with fixture controlled by a wall switch shall be provided in kitchens, bedrooms, living rooms, utility rooms, laundry rooms, dining rooms, bathrooms, water-closet rooms, vestibules and hallways in dwelling units.
- (3) Where a receptacle controlled by a wall switch is provided in bedrooms or living rooms, such rooms need not conform to the requirements in (2).
- (4) Every stairway shall be lighted. Except as provided in (5), 3-way wall switches located at the head and foot of every stairway shall be provided to control at least 1 lighting outlet with fixture for stairways with 4 or more risers in dwelling units.
- (5) The stairway lighting for basements or cellars that do not contain finished space nor lead to an outside entrance or built-in garage and which serve not more than 1 dwelling unit may be controlled by a single switch located at the head of the stairs.
- (6) A lighting outlet with fixture shall be provided for each 30 m² or fraction thereof of floor area in unfinished basements or cellars. The outlet nearest the stair shall be controlled by a wall switch located at the head of the stairs.

TABLE 35A—MINIMUM LIGHTING FOR PUBLIC AREAS

Room or Space	lx	W/m ² of Floor Area (Incandescent Lighting)
Storage rooms	50	5
Service rooms and laundry areas	200	20
Garages	50	5
Public water-closet rooms	100	10
Public corridors and stairways	50	—
Service hallways and stairways	50	—
Recreation rooms	100	10
Column 1	2	3

- (7) A lighting outlet with fixture shall be provided in storage rooms.

- (8) A lighting outlet with fixture shall be provided for an attached, built-in or detached garage or carport. Such outlet shall be controlled by a wall switch near the doorway where the fixture is ceiling mounted above an area normally occupied by a parked car; otherwise a switched lampholder may be used. Where a carport is lighted by a light at the entrance to a dwelling unit, additional carport lighting is not required.
- (9) Every public or service area in buildings shall be provided with lighting outlets with fixtures controlled by a wall switch or panel to illuminate every portion of such areas. When provided by incandescent lighting, illumination shall conform to Table 35A. When other types of lighting are used, illumination equivalent to that shown in Table 35A shall be provided.

C. RECEPTACLES

- (1) Except in kitchens, bathrooms, laundry rooms, water-closet rooms, utility rooms and hallways, wall receptacles shall be installed in every finished room or area in a dwelling unit so that no point along the floor line of any usable wall space is more than 1.8 m from an outlet installed in the same room. Usable wall space shall be considered as wall space not less than 900 mm wide. Such space shall not include doorways, areas occupied by doors when fully opened, windows less than 300 mm above the floor, fireplaces or other permanent installations that would limit the use of the wall space.
- (2) Where a switched receptacle is used in lieu of a lighting outlet and fixture as permitted in B (3), it need not be additional to the requirements in (1) provided only half of a duplex receptacle is switched.
- (3) No fewer than 2 receptacles shall be provided in kitchens in dwelling units. One such receptacle shall be provided over the countertop work surface and one shall be provided at the refrigerator space. In addition, a receptacle shall be provided in a dining area forming part of a kitchen.
- (4) A duplex receptacle shall be provided in every laundry room or area, utility room or area or combined laundry-utility room. When grouped laundry facilities are provided, sufficient outlets shall be provided to serve adequately the equipment to be installed by the building owner or tenants.
- (5) Except for stairs leading to unfinished basements or cellars, no point in a hall or stairway in a dwelling unit shall be more than 4.5 m from a receptacle.
- (6) A special purpose outlet or cable shall be provided to the space where an electric range is to be installed.
- (7) Public corridors and public stairs shall have at least 1 duplex receptacle for each 10 m length or fraction thereof.

D. EMERGENCY LIGHTING

Emergency lighting shall conform to Subsection 9 K.

SECTION 36. GARAGES AND CARPORTS

A. SCOPE

- (1) This Section applies to garages and carports serving not more than 1 dwelling unit.
- (2) The construction of a garage or carport shall conform to the requirements for other buildings in this Standard except as provided in this Section.
- (3) Garage door requirements shall conform to the appropriate requirements in Subsection 6 G.
- (4) Insulation of heated garages shall conform to the requirements in Section 26.

B. GENERAL

Where a roofed enclosure used for the storage or parking of a car or cars has more than 60 per cent of the total perimeter enclosed by walls, doors or windows, the enclosure shall be considered a garage.

C. FOUNDATIONS

- (1) Except as permitted in this Subsection, foundations conforming to Sections 12 and 15 shall be provided for the support of carport and garage superstructures including that portion beneath garage doors.
- (2) In clay-type soils subject to significant movement with a change in soil moisture content, the foundation depth of carports or garages connected to a dwelling unit by a breezeway shall be approximately the same depth as the main building foundation. Where slab-on-grade construction is used, a construction joint shall be provided between the main building slab and the garage or breezeway or carport slab. Except as provided in Section 12, foundations for attached unheated garages or carports shall be below frost level.
- (3) Detached garages of less than 50 m² floor area and not more than 1 storey in height may be supported on wood mud sills provided the garage is not of masonry or masonry veneer construction.
- (4) Piers for the support of carport columns shall extend not less than 150 mm above grade. Such piers shall project not less than 25 mm beyond the base of the column but in no case be less than 190 mm by 190 mm in size.

D. FLOORS

Garage floors shall conform to Article 10 B (8).

E. WALLS AND COLUMNS

- (1) Interior finish need not be applied to garage and carport walls.
- (2) Columns for garages and carports shall conform to Section 17, except that 89 mm by 89 mm wood columns may be used.
- (3) Garage or carport walls and columns shall be anchored to the foundation to resist wind uplift in conformance with Subsection 23 F, except that where a garage is supported on the surface of the ground, ground anchors shall be provided to resist wind uplift.

F. DIMENSIONS

- (1) Garages and carports shall have a clear inside length of not less than 6.1 m.
- (2) Garages and carports shall have a clear inside width of at least 3.05 m for single car parking, except that where a door in a side wall of a garage swings into the garage or where there is a doorway in a wall between the house or apartment building and the carport, the inside width shall be at least 3.35 m. At least 2.5 m additional clear width shall be provided for each additional car. Where a garage or carport is divided by columns or walls, the dimensions of each section shall conform to the preceding requirements. Measurements shall be taken 200 mm from the floor.
- (3) Door heights shall conform to 6 G (2).

SECTION 37. ELEVATORS

A. GENERAL

- (1) In addition to the requirements for elevators in Parts 3 and 6 of the National Building Code of Canada 1980, the requirements in this Section shall apply to all buildings regardless of size.
- (2) At least 1 elevator shall be accessible to and usable by persons in wheelchairs at the entrance level and all levels normally used by the occupants.

B. NUMBER OF ELEVATORS

- (1) Except as provided in (2) and (3), at least 1 elevator shall be provided in every building which has dwelling units above the third storey and in buildings in which the vertical distance from the ground level at the main entrance door and floor of the uppermost dwelling unit exceeds 7.3 m. Where there are exterior stairs or a platform at the main entrance, such vertical distance shall be measured to the bottom of the stair or platform.
- (2) At least 2 elevators shall be provided in buildings which have more than 3 dwelling units on the seventh or higher storey, or where the vertical distance between the main entrance door and the floor of the uppermost dwelling unit exceeds 15.2 m. Where there are exterior stairs or a platform at the main entrance, such vertical distance shall be measured to the bottom of the stair or platform.
- (3) At least 1 elevator shall be provided in every building which is specifically designed to accommodate elderly persons above the second storey, or where the vertical distance from the ground level at the main entrance door to the uppermost floor level designed to accommodate elderly persons exceeds 4.5 m. Where there are exterior stairs or a platform at the main entrance, such vertical distance shall be measured to the bottom of the stair or platform.

C. ELEVATOR CAPACITY

- (1) The elevators shall have a carrying capacity of not less than 7 per cent of the total building occupant load in 5 min.
- (2) The total building occupant load shall be calculated on the basis of 2 persons per bedroom or combination room with sleeping facilities excluding the ground elevator terminal floor.
- (3) At least 1 elevator in each building with dwelling units on 7 or more floors shall have a minimum capacity of 900 kg.

D. ELEVATOR SPEED

- (1) Elevator speeds shall be designed to provide a maximum time interval of 80 s for 2 or more elevators. For single elevator installations the maximum time interval shall be 150 s.
- (2) Elevator speed shall be not less than 1 m/s for buildings of more than 10 storeys in building height.

E. CONTROLS

- (1) In 1-, 2- or 3-car installations, the system shall be not less than simplex, duplex or triplex down collective control, respectively.
- (2) Hydraulic elevators shall have full electric control and operation.
- (3) Where an elevator is required to accommodate physically handicapped persons, the uppermost button in the elevator cab control panel shall be not more than 1.5 m above the elevator cab floor.

SECTION 38. PAINTING

A. GENERAL

- (1) This Section applies to all buildings, regardless of size
- (2) Paints, other protective coatings and materials for mixing and thinning shall conform to appropriate specifications of the Canadian Government Specifications Board or shall be of the type acceptable to the authority having jurisdiction
- (3) Surfaces that are to be finished shall be free from dirt, grease, asphalt or other foreign material that may harm the finish. If a wooden surface is to be painted, a prime coat shall be applied to it, exposed open defects shall be filled with putty or other suitable filler and knots or other resinous areas shall be sealed with suitable knot sealer or aluminum paint
- (4) Paints or other finishes shall be applied at a temperature of not less than 5°C

B. EXTERIOR PAINTING

- (1) Except for cedar and redwood, all exposed exterior materials subject to deterioration in their unprotected state, such as wood (including the tops and bottoms of wood doors), hardboard and ferrous metal shall be painted or otherwise suitably treated
- (2) Exterior metal that is to be painted shall receive at least 1 coat of suitable primer plus 2 finish coats of exterior paint

C. INTERIOR PAINTING

- (1) Bathrooms, kitchens and laundry areas other than in unfinished basements shall be painted or otherwise suitably treated to resist damage from moisture, except that plaster need not be painted
- (2) In habitable rooms, vestibules and halls a suitable finish shall be applied to gypsum board without factory applied decorative finish, wood panelling, trim, cupboards, shelving, sash and window frames, door and door frames
- (3) A suitable finish shall also be applied to handrails and stairs to basements, cellars or attics
- (4) Wood floors and stairs between floor levels with habitable rooms shall be treated with at least 1 coat of sealer plus 1 coat of wax or other suitable finish
- (5) All structural steel surfaces shall be painted to resist corrosion

SECTION 39. WALKWAYS, DRIVEWAYS AND PARKING AREAS

A. PARKING AREA

- (1) This Section applies to all buildings, regardless of size
- (2) Except when equivalent parking is provided in garages or carports, a parking area for the storage of at least 1 car per dwelling unit shall be provided for buildings containing 1 or 2 dwelling units, or provision shall be made on the property for suitable access to and a space for a future parking area, garage or carport
- (3) Except when equivalent parking is provided in garages or carports, at least 1 parking space for each dwelling unit in a building containing more than 2 dwelling units shall be provided on the property. Such parking areas shall not be located so as to impair the view from living rooms, entrances or front yards and shall be at least 6 m away from windows for living rooms, dining rooms, bedrooms or kitchens below grade

- (4) Parking areas shall be at least 6.1 m long and 2.5 m wide with a gradient and cross slope of not more than 60 mm/m and a minimum cross slope of 15 mm/m where the gradient is less than 15 mm/m.
- (5) Depending on the angle of parking, sufficient additional space shall be provided to allow for turnout. This space shall be at least 5.5 m wide, measured between rows of parked cars or from 1 row to the limit of the paved area. This space may be reduced when permitted by the authority having jurisdiction.
- (6) When parking areas are surfaced, the base and topping shall conform to the appropriate requirements in B for driveways.

B. DRIVEWAYS

- (1) A space for a driveway shall be provided to a garage, carport or parking area. Where a garage or carport is provided, a driveway shall be installed to connect with the paved or travelled portion of the street or lane.
- (2) Driveways serving not more than 4 dwelling units shall have a minimum width of 2.5 m, except that combined walkway-driveways shall be at least 3 m wide. Two paved ribbons may be used for driveways serving a single dwelling unit provided the ribbons are at least 600 mm wide and are spaced 1.5 m o.c.
- (3) Driveways serving more than 4 dwelling units shall be at least 2.5 m wide for 1-way driveways and at least 5.5 m wide for 2-way driveways.
- (4) Driveways shall have a maximum cross slope of 60 mm/m and a minimum cross slope of 15 mm/m where the gradient is less than 15 mm/m.
- (5) Driveways shall not be constructed on unconsolidated filled ground.
- (6) The base for driveways shall be crushed stone, gravel or other coarse clean granular material.
- (7) The driveway surface shall consist of stone chips, crushed stone, gravel, asphalt concrete or portland cement concrete.
- (8) When the driveway surface consists of stone chips, gravel or crushed stone, the base shall be at least 150 mm thick and the surface material shall be not more than 20 mm size
- (9) When the driveway surface consists of asphalt concrete, the base material shall be at least 100 mm thick and the compacted thickness of the concrete at least 40 mm thick.
- (10) When the driveway surface consists of portland cement concrete, the base shall be at least 120 mm thick and the concrete at least 75 mm thick, except that the base may be omitted where the ground is solid rock, compacted sand or gravel provided the concrete is 120 mm thick. Concrete shall have at least 20 MPa compressive strength after 28 days and shall have air entrainment of 5 to 7 per cent. Construction joints shall be spaced not more than 3 m apart.
- (11) Waterproofing membranes applied to roofs subject to vehicular traffic or used for parking shall be applied to the roof in a manner that will permit differential movement between the surfacing materials and the roof deck without damaging the membrane.
- (12) Waterproofing membranes in (11) shall be protected against damage during construction by means of a layer of material of sufficient strength to prevent crushing under traffic loads. The wearing surface shall conform to the requirements in (9) and (10).

C. WALKWAYS

- (1) Every entrance to a building except a patio door shall be served by a walkway or a system of walkways, except that not more than 2 walkways need be provided to a

building. A combined walkway-driveway may be used where the building exit serves not more than 2 dwelling units.

- (2) A main walkway shall be provided from the street to the principal entrance of a building on each property.
- (3) Where a garage, parking area or driveway serves a building containing more than 2 dwelling units, a main walkway shall be provided between such building and garage, parking area or driveway.
- (4) All other walkways may be secondary walkways leading to main walkways or to the street.
- (5) The minimum width of walkways shall conform to Table 39A.

TABLE 39A—WALKWAY WIDTHS

Type of Walkway	Maximum No. of Dwelling Units Served	Minimum Walkway Width, mm
Main walkways	4	750
	8	900
	16	1 200
	more than 16	1 500
Secondary walkways	4	600
	8	750
	16	900
	more than 16	1 200
Column 1	2	3

- (6) Walkways shall have a maximum gradient of 100 mm/m and a maximum cross slope of 60 mm/m. When the gradient is less than 15 mm/m the minimum cross slope shall be 15 mm/m.
- (7) Where steps occur in walkways, there shall be at least 2 risers at any one location. Such steps shall have a rise of not less than 100 mm nor more than 180 mm and a minimum run of 300 mm. The product of the run and rise shall not exceed 54 000. Steps shall be as wide as the walkway and shall be provided with a handrail on one side when there are more than 3 risers.
- (8) Walkways shall not be constructed over unconsolidated filled ground.
- (9) Except as provided in (10), walkways shall consist of hard burned shale, clay or concrete brick, 40 mm thick smooth, durable flagstone, precast concrete, 100 mm thick portland cement concrete of at least 20 MPa strength after 28 days or 40 mm thick asphalt concrete over a granular base at least 100 mm thick. Portland cement concrete walkways shall have contraction joints spaced not more than 1½ times the walkway width apart.
- (10) Walkways serving not more than 2 dwelling units and all secondary walkways shall consist of the materials listed in (9) or shall consist of at least 75 mm of fine gravel or crushed stone.
- (11) Where a roof is used for pedestrian traffic, provision shall be made to allow for differential movement between the walking surface and the roof deck in conformance with B (11).
- (12) The waterproofing membrane shall be protected against damage during construction in conformance with B (12), and the walking surface in (11) shall conform to the requirements in (9) and (10).

SECTION 40. SITE IMPROVEMENT

A. GENERAL

- (1) This Section applies to all buildings, regardless of size
- (2) Details of the drainage design for the entire building site shall be submitted for approval to the authority having jurisdiction before commencement of any building
- (3) Construction or other debris such as tree stumps or boulders shall be removed from the site before grading or any subsequent landscaping operations are commenced
- (4) All grade transitions including those associated with swales shall be gradual. Gradients exceeding 6 in 10 shall be suitably landscaped or retained to prevent soil erosion. Existing slopes which are adequately retained by trees, shrubs, turf, rock outcropping or any combinations of these will require no further treatment

B. PROTECTION OF EXISTING TREES

- (1) Every effort shall be made to permit the retention of existing, desirable trees
- (2) Where fill occurs around existing trees, the depth of sandy or light sandy loam cover shall not exceed 200 mm over the root area. When heavier soils are used, the depth of cover shall not exceed 150 mm. Such cover shall be kept at least 300 mm away from the tree trunk by a wall of dry stone or unmortared bricks to the depth of the cover
- (3) When a greater depth of fill is required, the entire root area shall be brought to within 150 mm of finished grade by a fill of broken stone blinded at its surface with fine stone. The final 150 mm shall be filled with topsoil. A protective wall of stone or brick shall be provided as in (2) to the full depth of the fill, including stone
- (4) Where the grading operation lowers the grade around trees to be retained, the earth around such trees shall be undisturbed for a radius from the tree equal to approximately $\frac{2}{3}$ of the branch spread. When such change of level exceeds 250 mm, the soil around such trees shall be contained by stone revetting or a dry stone wall or a well formed mound extending to the branch spread

C. GRADING AND TOPSOIL

- (1) The specified lawn area, except for portions of the lot which are covered by rock outcropping, satisfactory tree, shrub or grass growth, shall be subgraded to within 100 mm of the finished lawn grade. All low points shall be filled and compacted
- (2) Where top soil is specified, it shall be reasonably free of stones and capable of supporting good agricultural growth. It shall be applied in a uniform layer to a minimum depth of 100 mm over the area disturbed by the building operation
- (3) In areas where seeding or sodding is specified, the requirement in (2) shall also apply

D. LAWN AREAS

- (1) On areas of the building site on which seeding or sodding is specified, a suitable mixture of low nitrogen, high phosphorous content commercial fertilizer shall be applied evenly and cultivated to the full depth of the top soil at the rate recommended by the manufacturer
- (2) On areas of the building site on which seeding is specified, a Canada No. 1 mixture grade of permanent lawn grass species known to be successful in the locality shall be applied at the rate of 2 to 2.5 kg/100 m². The area shall then be lightly raked, rolled with a light turf roller and watered until the moisture has penetrated to a depth of at least 25 mm
- (3) On areas of the building site on which sodding is specified, sods not less than 20 mm nor more than 40 mm thick containing a good percentage of permanent lawn grass

species common to the locality shall be carefully laid over topsoil which has been cultivated and raked level. Sods shall be laid evenly with no overlapping and with tightly closed joints. Immediately after sodding the ground shall be thoroughly watered to ensure a moisture penetration of 100 to 125 mm. After the soil has dried out sufficiently so that its structure will not be damaged, it shall be rolled with a medium weight roller or tamped to provide a uniform surface.

E. PLANTING OF TREES AND SHRUBS

- (1) Where planting of trees and shrubs is specified the requirements in (2) to (8) shall apply.
- (2) Plant material shall conform to the Guide Specifications for Nursery Stock of the Canadian Nursery Trades Association. Dried out plants shall not be used.
- (3) Pits for tree planting shall be at least 600 mm deep and have a diameter of at least 150 mm beyond the root spread, or a diameter not less than 12 times the diameter of the tree at 300 mm above grade.
- (4) Pits for shrub planting shall be at least 400 mm deep and have a diameter at least 150 mm beyond the root spread.
- (5) Approximately 3 kg of bone meal and 3 kg of activated sludge shall be thoroughly mixed with each cubic metre of topsoil.
- (6) Each plant shall be thoroughly watered when the hole is $\frac{2}{3}$ filled with soil. After final backfilling and watering, the soil shall be left at least 25 mm lower than the surrounding ground level forming a shallow depression to collect rainwater.
- (7) All planted trees with a caliper of 75 mm and over, measured at 300 mm above grade, shall be suitably guyed by at least 3 wires encased at the trunk in water hose or other protective material. Smaller trees shall be supported by a wood stake and suitably protected to prevent damage to the tree.
- (8) Pruning of planted material and existing trees shall be done in accordance with good local practice.

Table A-1
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 0.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 0.5 kN/m ²						
			Gypsum Board or Plastered Ceiling			Other Ceilings			
			Joist Spacing			Joist Spacing			
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm	
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	3.40	3.09	2.69	3.89	3.53	3.09	
		38 x 140	5.34	4.85	4.24	6.11	5.55	4.85	
		38 x 184	7.04	6.40	5.59	8.06	7.32	6.40	
		38 x 235	8.98	8.16	7.13	10.28	9.34	8.16	
		38 x 286	10.93	9.93	8.67	12.51	11.36	9.93	
	No 1	38 x 89	3.40	3.09	2.69	3.89	3.53	3.09	
		38 x 140	5.34	4.85	4.24	6.11	5.55	4.85	
		38 x 184	7.04	6.40	5.59	8.06	7.32	6.40	
		38 x 235	8.98	8.16	7.13	10.28	9.34	8.16	
		38 x 286	10.93	9.93	8.67	12.51	11.36	9.93	
	No 2	38 x 89	3.28	2.98	2.60	3.76	3.41	2.98	
		38 x 140	5.16	4.69	4.10	5.91	5.37	4.49	
		38 x 184	6.81	6.18	5.40	7.79	7.08	5.92	
		38 x 235	8.68	7.89	6.89	9.94	9.03	7.56	
		38 x 286	10.56	9.60	8.38	12.09	10.99	9.19	
	No 3	38 x 89	3.15	2.82	2.31	3.26	2.82	2.31	
		38 x 140	4.81	4.16	3.40	4.81	4.16	3.40	
		38 x 184	6.34	5.49	4.48	6.34	5.49	4.48	
	Construction	38 x 89	3.15	2.86	2.50	3.61	3.23	2.64	
		38 x 89	2.81	2.43	1.98	2.81	2.43	1.98	
	Utility	38 x 89	1.91	1.66	1.35	1.91	1.66	1.35	
	Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	3.27	2.97	2.60	3.75	3.40	2.97
			38 x 140	5.15	4.67	4.08	5.89	5.35	4.64
			38 x 184	6.78	6.16	5.38	7.77	7.06	6.12
38 x 235			8.66	7.87	6.87	9.91	9.00	7.81	
38 x 286			10.53	9.57	8.36	12.06	10.95	9.50	
No 1		38 x 89	3.27	2.97	2.60	3.75	3.40	2.95	
		38 x 140	5.15	4.67	4.08	5.89	5.28	4.31	
		38 x 184	6.78	6.16	5.38	7.77	6.96	5.68	
		38 x 235	8.66	7.87	6.87	9.91	8.89	7.25	
		38 x 286	10.53	9.57	8.36	12.06	10.81	8.82	
No 2		38 x 89	3.16	2.87	2.51	3.62	3.28	2.67	
		38 x 140	4.97	4.51	3.87	5.47	4.74	3.87	
		38 x 184	6.55	5.95	5.10	7.21	6.25	5.10	
		38 x 235	8.36	7.60	6.51	9.21	7.97	6.51	
		38 x 286	10.17	9.24	7.92	11.20	9.70	7.92	
No 3		38 x 89	2.81	2.43	1.98	2.81	2.43	1.98	
		38 x 140	4.15	3.59	2.93	4.15	3.59	2.93	
		38 x 184	5.47	4.74	3.87	5.47	4.74	3.87	
		38 x 235	6.98	6.05	4.94	6.98	6.05	4.94	
		38 x 286	8.49	7.36	6.01	8.49	7.36	6.01	
Construction		38 x 89	3.04	2.76	2.29	3.23	2.80	2.29	
Standard		38 x 89	2.42	2.10	1.71	2.42	2.10	1.71	
Utility		38 x 89	1.66	1.43	1.17	1.66	1.43	1.17	

Continued on next page

Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 0.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 0.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>		
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	3.12	2.83	2.47	3.57	3.24	2.83
		38 x 140	4.90	4.45	3.89	5.61	5.10	4.45
		38 x 184	6.46	5.87	5.13	7.40	6.72	5.87
		38 x 235	8.25	7.49	6.55	9.44	8.58	7.49
		38 x 286	10.03	9.12	7.96	11.49	10.43	9.12
	No. 1	38 x 89	3.12	2.83	2.47	3.57	3.24	2.83
		38 x 140	4.90	4.45	3.89	5.61	5.10	4.45
		38 x 184	6.46	5.87	5.13	7.40	6.72	5.87
		38 x 235	8.25	7.49	6.55	9.44	8.58	7.49
		38 x 286	10.03	9.12	7.96	11.49	10.43	9.12
	No. 2	38 x 89	3.01	2.73	2.38	3.44	3.13	2.73
		38 x 140	4.73	4.29	3.75	5.41	4.92	4.29
		38 x 184	6.23	5.66	4.94	7.13	6.48	5.66
		38 x 235	7.95	7.22	6.31	9.10	8.27	7.22
		38 x 286	9.67	8.79	7.68	11.07	10.06	8.79
	No. 3	38 x 89	2.90	2.63	2.22	3.15	2.72	2.22
		38 x 140	4.55	4.00	3.26	4.62	4.00	3.26
	Construction	38 x 89	2.90	2.63	2.30	3.32	3.01	2.55
		38 x 89	2.67	2.31	1.89	2.67	2.31	1.89
	Standard	38 x 89	2.67	2.31	1.89	2.67	2.31	1.89
		38 x 89	1.86	1.61	1.32	1.86	1.61	1.32
Utility	38 x 89	1.86	1.61	1.32	1.86	1.61	1.32	
	38 x 89	3.27	2.97	2.60	3.75	3.40	2.97	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 140	5.15	4.67	4.08	5.89	5.35	4.59
		38 x 184	6.78	6.16	5.38	7.77	7.06	6.05
		38 x 235	8.66	7.87	6.87	9.91	9.00	7.73
		38 x 286	10.53	9.57	8.36	12.06	10.95	9.40
		38 x 89	3.27	2.97	2.60	3.75	3.40	2.92
	No. 1	38 x 140	5.15	4.67	4.08	5.89	5.22	4.26
		38 x 184	6.78	6.16	5.38	7.77	6.88	5.61
		38 x 235	8.66	7.87	6.87	9.91	8.78	7.17
		38 x 286	10.53	9.57	8.36	12.06	10.68	8.72
		38 x 89	3.16	2.87	2.51	3.62	3.23	2.64
	No. 2	38 x 140	4.97	4.51	3.81	5.39	4.67	3.81
		38 x 184	6.55	5.95	5.02	7.10	6.15	5.02
		38 x 235	8.36	7.60	6.41	9.06	7.85	6.41
		38 x 286	10.17	9.24	7.79	11.03	9.55	7.79
		38 x 89	2.78	2.40	1.96	2.78	2.40	1.96
	No. 3	38 x 140	4.10	3.55	2.89	4.10	3.55	2.89
		38 x 184	5.40	4.68	3.82	5.40	4.68	3.82
		38 x 235	6.89	5.97	4.87	6.89	5.97	4.87
		38 x 286	8.38	7.26	5.93	8.38	7.26	5.93
		38 x 89	3.04	2.75	2.24	3.18	2.75	2.24
	Construction	38 x 89	3.04	2.75	2.24	3.18	2.75	2.24
38 x 89		2.38	2.06	1.68	2.38	2.06	1.68	
Standard	38 x 89	2.38	2.06	1.68	2.38	2.06	1.68	
	38 x 89	1.66	1.43	1.17	1.66	1.43	1.17	
Utility	38 x 89	1.66	1.43	1.17	1.66	1.43	1.17	

Continued on next page

Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 0.5 kN/m²)

Commercial Designation	Grade	Nominal Size	LIVE LOAD 0.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			mm	m	m	m	m	m
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	3 09	2 80	2 45	3 53	3 21	2 80
		38 x 140	4 85	4 41	3 85	5 55	5 05	4 41
		38 x 184	6 40	5 81	5 08	7 32	6 65	5 81
		38 x 235	8 16	7 41	6 48	9 34	8 49	7 41
		38 x 286	9 93	9 02	7 88	11 36	10 33	9 02
	No 1	38 x 89	3 09	2 80	2 45	3 53	3 21	2 80
		38 x 140	4 85	4 41	3 85	5 55	5 05	4 41
		38 x 184	6 40	5 81	5 08	7 32	6 65	5 51
		38 x 235	8 16	7 41	6 48	9 34	8 49	7 03
		38 x 286	9 93	9 02	7 88	11 36	10 33	8 55
	No 2	38 x 89	2 98	2 71	2 37	3 41	3 10	2 59
		38 x 140	4 69	4 26	3 72	5 30	4 59	3 75
		38 x 184	6 18	5 62	4 91	6 99	6 05	4 94
		38 x 235	7 89	7 17	6 26	8 92	7 73	6 31
		38 x 286	9 60	8 72	7 62	10 85	9 40	7 67
	No 3	38 x 89	2 74	2 37	1 94	2 74	2 37	1 94
		38 x 140	4 04	3 50	2 85	4 04	3 50	2 85
		38 x 184	5 33	4 61	3 76	5 33	4 61	3 76
		38 x 235	6 80	5 89	4 80	6 80	5 89	4 80
		38 x 286	8 27	7 16	5 84	8 27	7 16	5 84
	Construction	38 x 89	2 87	2 61	2 20	3 12	2 70	2 20
Standard	38 x 89	2 34	2 03	1 66	2 34	2 03	1 66	
Utility	38 x 89	1 60	1 39	1 13	1 60	1 39	1 13	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 97	2 70	2 36	3 40	3 09	2 70
		38 x 140	4 67	4 24	3 71	5 35	4 86	4 24
		38 x 184	6 16	5 59	4 89	7 05	6 40	5 59
		38 x 235	7 86	7 14	6 24	9 00	8 17	7 14
		38 x 286	9 56	8 68	7 58	10 94	9 94	8 68
	No 1	38 x 89	2 97	2 70	2 36	3 40	3 09	2 70
		38 x 140	4 67	4 24	3 71	5 35	4 86	4 23
		38 x 184	6 16	5 59	4 89	7 05	6 40	5 58
		38 x 235	7 86	7 14	6 24	9 00	8 17	7 12
		38 x 286	9 56	8 68	7 58	10 94	9 94	8 66
	No 2	38 x 89	2 87	2 61	2 28	3 29	2 99	2 61
		38 x 140	4 51	4 10	3 58	5 17	4 63	3 73
		38 x 184	5 95	5 41	4 72	6 82	6 10	4 98
		38 x 235	7 60	6 90	6 03	8 70	7 79	6 36
		38 x 286	9 24	8 39	7 33	10 58	9 47	7 73
	No 3	38 x 89	2 74	2 37	1 94	2 74	2 37	1 94
		38 x 140	4 04	3 50	2 85	4 04	3 50	2 85
		38 x 184	5 33	4 61	3 76	5 33	4 61	3 76
		38 x 235	6 80	5 89	4 80	6 80	5 89	4 80
		38 x 286	8 27	7 16	5 84	8 27	7 16	5 84
	Construction	38 x 89	2 77	2 51	2 19	3 15	2 72	2 22
Standard	38 x 89	2 34	2 03	1 66	2 34	2 03	1 66	
Utility	38 x 89	1 60	1 39	1 13	1 60	1 39	1 13	

Continued on next page

Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 0.5 kN/m²)

Commercial Designation	Grade	Nominal Size <i>mm</i>	LIVE LOAD 0.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Northern Species (includes any Canadian soft wood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2 97	2 70	2 36	3 40	3 09	2 70
		38 x 140	4 67	4 24	3 71	5 35	4 86	4 24
		38 x 184	6 16	5 59	4 89	7 05	6 40	5 59
		38 x 235	7 86	7 14	6 24	9 00	8 17	7 14
		38 x 286	9 56	8 68	7 58	10 94	9 94	8 68
	No 1	38 x 89	2 97	2 70	2 36	3 40	3 09	2 70
		38 x 140	4 67	4 24	3 71	5 35	4 86	4 04
		38 x 184	6 16	5 59	4 89	7 05	6 40	5 33
		38 x 235	7 86	7 14	6 24	9 00	8 17	6 80
		38 x 286	9 56	8 68	7 58	10 94	9 94	8 27
	No 2	38 x 89	2 87	2 61	2 28	3 29	2 99	2 51
		38 x 140	4 51	4 10	3 58	5 13	4 44	3 63
		38 x 184	5 95	5 41	4 72	6 76	5 86	4 78
		38 x 235	7 60	6 90	6 03	8 63	7 47	6 10
		38 x 286	9 24	8 39	7 33	10 50	9 09	7 42
	No 3	38 x 89	2 64	2 29	1 86	2 64	2 29	1 86
		38 x 140	3 87	3 35	2 73	3 87	3 35	2 73
		38 x 184	5 10	4 42	3 60	5 10	4 42	3 60
	Construction	38 x 89	2 64	2 29	1 86	2 64	2 29	1 86
		38 x 140	3 87	3 35	2 73	3 87	3 35	2 73
		38 x 184	5 10	4 42	3 60	5 10	4 42	3 60
Standard	38 x 89	2 26	1 96	1 60	2 26	1 96	1 60	
	38 x 89	2 26	1 96	1 60	2 26	1 96	1 60	
Utility	38 x 89	1 54	1 33	1 09	1 54	1 33	1 09	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	3 02	2 74	2 39	3 45	3 14	2 74
		38 x 140	4 74	4 31	3 76	5 43	4 93	4 31
		38 x 184	6 26	5 68	4 96	7 16	6 51	5 68
		38 x 235	7 98	7 25	6 33	9 14	8 30	7 25
		38 x 286	9 71	8 82	7 70	11 11	10 10	8 82
	No 1	38 x 89	3 02	2 74	2 39	3 45	3 14	2 74
		38 x 140	4 74	4 31	3 76	5 43	4 93	4 18
		38 x 184	6 26	5 68	4 96	7 16	6 51	5 51
		38 x 235	7 98	7 25	6 33	9 14	8 30	7 03
		38 x 286	9 71	8 82	7 70	11 11	10 10	8 55
	No 2	38 x 89	2 91	2 64	2 31	3 33	3 03	2 60
		38 x 140	4 57	4 16	3 63	5 24	4 59	3 75
		38 x 184	6 03	5 48	4 79	6 90	6 05	4 94
		38 x 235	7 70	6 99	6 11	8 81	7 73	6 31
		38 x 286	9 36	8 51	7 43	10 72	9 40	7 67
	No 3	38 x 89	2 74	2 37	1 94	2 74	2 37	1 94
		38 x 140	4 04	3 50	2 85	4 04	3 50	2 85
		38 x 184	5 33	4 61	3 76	5 33	4 61	3 76
		38 x 235	6 80	5 89	4 80	6 80	5 89	4 80
		38 x 286	8 27	7 16	5 84	8 27	7 16	5 84
	Construction	38 x 89	2 79	2 54	2 20	3 12	2 70	2 20
Standard	38 x 89	2 34	2 03	1 66	2 34	2 03	1 66	
Utility	38 x 89	1 60	1 39	1 13	1 60	1 39	1 13	

Table A-2
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 1.9 kN/m²)

Commercial Designation	Grade	Nominal Size <i>mm</i>	LIVE LOAD 1.9 kN/m ²		
			All Ceilings		
			Joist Spacing		
			300 mm	400 mm	600 mm
		<i>mm</i>	<i>m</i>	<i>m</i>	<i>m</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2 17	1 98	1 72
		38 x 140	3 42	3 11	2 71
		38 x 184	4 51	4 10	3 58
		38 x 235	5 76	5 23	4 57
		38 x 286	7 00	6 36	5 56
	No 1	38 x 89	2 17	1 98	1 72
		38 x 140	3 42	3 11	2 71
		38 x 184	4 51	4 10	3 58
		38 x 235	5 76	5 23	4 57
		38 x 286	7 00	6 36	5 56
	No 2	38 x 89	2 10	1 91	1 67
		38 x 140	3 31	3 00	2 59
		38 x 184	4 36	3 96	3 42
		38 x 235	5 56	5 05	4 36
38 x 286		6 77	6 15	5 31	
No 3	38 x 89	1 88	1 63	1 33	
	38 x 140	2 77	2 40	1 96	
	38 x 184	3 66	3 17	2 59	
	38 x 235	4 67	4 04	3 30	
38 x 286	5 68	4 92	4 01		
Construction	38 x 89	2 02	1 83	1 52	
Standard	38 x 89	1 62	1 40	1 14	
Utility	38 x 89	1 10	0 95	0 78	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2 10	1 90	1 66
		38 x 140	3 30	2 99	2 61
		38 x 184	4 35	3 95	3 45
		38 x 235	5 55	5 04	4 40
		38 x 286	6 75	6 13	5 35
	No 1	38 x 89	2 10	1 90	1 66
		38 x 140	3 30	2 99	2 49
		38 x 184	4 35	3 95	3 28
		38 x 235	5 55	5 04	4 19
		38 x 286	6 75	6 13	5 09
	No 2	38 x 89	2 02	1 84	1 54
		38 x 140	3 16	2 73	2 23
		38 x 184	4 16	3 60	2 94
		38 x 235	5 31	4 60	3 76
38 x 286		6 46	5 60	4 57	
No 3	38 x 89	1 62	1 40	1 14	
	38 x 140	2 39	2 07	1 69	
	38 x 184	3 16	2 73	2 23	
	38 x 235	4 03	3 49	2 85	
38 x 286	4 90	4 24	3 46		
Construction	38 x 89	1 86	1 61	1 32	
Standard	38 x 89	1 40	1 21	0 99	
Utility	38 x 89	0 95	0 83	0 67	

Continued on next page

Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 1.9 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.9 kN/m ²		
			All Ceilings		
			Joist Spacing		
			300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2.00	1.81	1.58
		38 x 140	3.14	2.85	2.49
		38 x 184	4.14	3.76	3.29
		38 x 235	5.28	4.80	4.19
		38 x 286	6.43	5.84	5.10
	No 1	38 x 89	2.00	1.81	1.58
		38 x 140	3.14	2.85	2.49
		38 x 184	4.14	3.76	3.29
		38 x 235	5.28	4.80	4.19
		38 x 286	6.43	5.84	5.10
	No 2	38 x 89	1.92	1.75	1.53
		38 x 140	3.03	2.75	2.40
		38 x 184	3.99	3.63	3.17
		38 x 235	5.09	4.63	4.04
38 x 286		6.20	5.63	4.92	
No 3	38 x 89	1.81	1.57	1.28	
	38 x 140	2.66	2.31	1.88	
	38 x 184	3.51	3.04	2.48	
	38 x 235	4.48	3.88	3.17	
	38 x 286	5.45	4.72	3.85	
Construction	38 x 89	1.85	1.68	1.47	
Standard	38 x 89	1.54	1.33	1.09	
Utility	38 x 89	1.07	0.93	0.76	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir and Coast Sitka Spruce)	Select structural	38 x 89	2.10	1.90	1.66
		38 x 140	3.30	2.99	2.61
		38 x 184	4.35	3.95	3.45
		38 x 235	5.55	5.04	4.40
		38 x 286	6.75	6.13	5.35
	No 1	38 x 89	2.10	1.90	1.66
		38 x 140	3.30	2.99	2.46
		38 x 184	4.35	3.95	3.24
		38 x 235	5.55	5.04	4.13
		38 x 286	6.75	6.13	5.03
	No 2	38 x 89	2.02	1.84	1.52
		38 x 140	3.11	2.69	2.20
		38 x 184	4.10	3.55	2.90
		38 x 235	5.23	4.53	3.70
38 x 286		6.36	5.51	4.50	
No 3	38 x 89	1.60	1.39	1.13	
	38 x 140	2.36	2.05	1.67	
	38 x 184	3.12	2.70	2.20	
	38 x 235	3.98	3.44	2.81	
	38 x 286	4.84	4.19	3.42	
Construction	38 x 89	1.83	1.59	1.29	
Standard	38 x 89	1.37	1.19	0.97	
Utility	38 x 89	0.95	0.83	0.67	

Continued on next page

Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 1.9 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.9 kN/m ²		
			All Ceilings		
			Joist Spacing		
			300 mm	400 mm	600 mm
		<i>m</i>	<i>m</i>	<i>m</i>	
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	1 98	1 79	1 57
		38 x 140	3 11	2 82	2 46
		38 x 184	4 10	3 72	3 25
		38 x 235	5 23	4 75	4 15
		38 x 286	6 36	5 78	5 05
	No 1	38 x 89	1 98	1 79	1 57
		38 x 140	3 11	2 82	2 41
		38 x 184	4 10	3 72	3 18
		38 x 235	5 23	4 75	4 06
		38 x 286	6 36	5 78	4 93
	No 2	38 x 89	1 91	1 73	1 49
		38 x 140	3 00	2 65	2 16
		38 x 184	3 96	3 49	2 85
		38 x 235	5 05	4 46	3 64
	38 x 286	6 15	5 42	4 43	
No 3	38 x 89	1 58	1 37	1 12	
	38 x 140	2 33	2 02	1 65	
	38 x 184	3 07	2 66	2 17	
	38 x 235	3 92	3 40	2 77	
	38 x 286	4 77	4 13	3 37	
Construction	38 x 89	1 80	1 56	1 27	
Standard	38 x 89	1 35	1 17	0 95	
Utility	38 x 89	0 92	0 80	0 65	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	1 90	1 73	1 51
		38 x 140	2 99	2 72	2 37
		38 x 184	3 94	3 58	3 13
		38 x 235	5 03	4 57	3 99
		38 x 286	6 12	5 56	4 86
	No 1	38 x 89	1 90	1 73	1 51
		38 x 140	2 99	2 72	2 37
		38 x 184	3 94	3 58	3 13
		38 x 235	5 03	4 57	3 99
		38 x 286	6 12	5 56	4 86
	No 2	38 x 89	1 84	1 67	1 46
		38 x 140	2 89	2 63	2 18
		38 x 184	3 81	3 46	2 87
		38 x 235	4 87	4 42	3 67
	38 x 286	5 92	5 38	4 46	
No 3	38 x 89	1 58	1 37	1 12	
	38 x 140	2 33	2 02	1 65	
	38 x 184	3 07	2 66	2 17	
	38 x 235	3 92	3 40	2 77	
	38 x 286	4 77	4 13	3 37	
Construction	38 x 89	1 77	1 57	1 28	
Standard	38 x 89	1 35	1 17	0 95	
Utility	38 x 89	0 92	0 80	0 65	

Continued on next page

Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 1.9 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.9 kN/m ²		
			All Ceilings		
			Joist Spacing		
			300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	1 90	1 73	1 51
		38 x 140	2 99	2 72	2 37
		38 x 184	3 94	3 58	3 13
		38 x 235	5 03	4 57	3 99
		38 x 286	6 12	5 56	4 86
	No 1	38 x 89	1 90	1 73	1 51
		38 x 140	2 99	2 72	2 33
		38 x 184	3 94	3 58	3 07
		38 x 235	5 03	4 57	3 92
		38 x 286	6 12	5 56	4 77
	No 2	38 x 89	1 84	1 67	1 45
		38 x 140	2 89	2 56	2 09
		38 x 184	3 81	3 38	2 76
		38 x 235	4 87	4 31	3 52
38 x 286		5 92	5 25	4 28	
No 3	38 x 89	1 52	1 32	1 07	
	38 x 140	2 23	1 93	1 58	
	38 x 184	2 94	2 55	2 08	
	38 x 235	3 76	3 25	2 65	
38 x 286	4 57	3 96	3 23		
Construction	38 x 89	1 75	1 51	1 23	
Standard	38 x 89	1 31	1 13	0 92	
Utility	38 x 89	0 89	0 77	0 63	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	1 93	1 75	1 53
		38 x 140	3 04	2 76	2 41
		38 x 184	4 01	3 64	3 18
		38 x 235	5 11	4 65	4 06
		38 x 286	6 22	5 65	4 94
	No 1	38 x 89	1 93	1 75	1 53
		38 x 140	3 04	2 76	2 41
		38 x 184	4 01	3 64	3 18
		38 x 235	5 11	4 65	4 06
		38 x 286	6 22	5 65	4 93
	No 2	38 x 89	1 86	1 69	1 48
		38 x 140	2 93	2 65	2 16
		38 x 184	3 86	3 49	2 85
		38 x 235	4 93	4 46	3 64
38 x 286		6 00	5 42	4 43	
No 3	38 x 89	1 58	1 37	1 12	
	38 x 140	2 33	2 02	1 65	
	38 x 184	3 07	2 66	2 17	
	38 x 235	3 92	3 40	2 77	
	38 x 286	4 77	4 13	3 37	
Construction	38 x 89	1 79	1 56	1 27	
Standard	38 x 89	1 35	1 17	0 95	
Utility	38 x 89	0 92	0 80	0 65	

Table A-3
FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 1.4 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.4 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>		
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2.41	2.19	1.91	2.76	2.50	2.19
		38 x 140	3.79	3.44	3.00	4.34	3.94	3.44
		38 x 184	4.99	4.54	3.96	5.72	5.19	4.54
		38 x 235	6.37	5.79	5.06	7.30	6.63	5.79
		38 x 286	7.75	7.04	6.15	8.87	8.06	7.04
	No 1	38 x 89	2.41	2.19	1.91	2.76	2.50	2.19
		38 x 140	3.79	3.44	3.00	4.34	3.94	3.28
		38 x 184	4.99	4.54	3.96	5.72	5.19	4.33
		38 x 235	6.37	5.79	5.06	7.30	6.63	5.52
		38 x 286	7.75	7.04	6.15	8.87	8.06	6.72
	No 2	38 x 89	2.33	2.11	1.85	2.67	2.42	2.05
		38 x 140	3.66	3.33	2.90	4.18	3.62	2.95
		38 x 184	4.83	4.38	3.83	5.51	4.77	3.89
		38 x 235	6.16	5.60	4.89	7.03	6.09	4.97
		38 x 286	7.49	6.81	5.95	8.55	7.40	6.04
	No 3	38 x 89	2.14	1.86	1.51	2.14	1.86	1.51
		38 x 140	3.16	2.74	2.23	3.16	2.74	2.23
		38 x 184	4.17	3.61	2.95	4.17	3.61	2.95
		38 x 235	5.32	4.61	3.76	5.32	4.61	3.76
		38 x 286	6.47	5.60	4.57	6.47	5.60	4.57
	Construction	38 x 89	2.23	2.03	1.73	2.45	2.12	1.73
Standard	38 x 89	1.84	1.60	1.30	1.84	1.60	1.30	
Utility	38 x 89	1.26	1.09	0.89	1.26	1.09	0.89	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2.32	2.11	1.84	2.66	2.41	2.11
		38 x 140	3.65	3.32	2.90	4.18	3.74	3.05
		38 x 184	4.81	4.37	3.82	5.51	4.93	4.02
		38 x 235	6.14	5.58	4.87	7.03	6.29	5.13
		38 x 286	7.47	6.79	5.93	8.55	7.65	6.24
	No 1	38 x 89	2.32	2.11	1.84	2.66	2.38	1.94
		38 x 140	3.65	3.32	2.83	4.01	3.47	2.83
		38 x 184	4.81	4.37	3.74	5.29	4.58	3.74
		38 x 235	6.14	5.58	4.77	6.75	5.84	4.77
		38 x 286	7.47	6.79	5.80	8.21	7.11	5.80
	No 2	38 x 89	2.24	2.04	1.76	2.49	2.15	1.76
		38 x 140	3.52	3.11	2.54	3.60	3.11	2.54
		38 x 184	4.65	4.11	3.35	4.74	4.11	3.35
		38 x 235	5.93	5.24	4.28	6.05	5.24	4.28
		38 x 286	7.21	6.37	5.20	7.36	6.37	5.20
	No 3	38 x 89	1.84	1.60	1.30	1.84	1.60	1.30
		38 x 140	2.73	2.36	1.93	2.73	2.36	1.93
		38 x 184	3.60	3.11	2.54	3.60	3.11	2.54
		38 x 235	4.59	3.97	3.24	4.59	3.97	3.24
		38 x 286	5.58	4.84	3.95	5.58	4.84	3.95
	Construction	38 x 89	2.12	1.84	1.50	2.12	1.84	1.50
Standard	38 x 89	1.59	1.38	1.12	1.59	1.38	1.12	
Utility	38 x 89	1.09	0.94	0.77	1.09	0.94	0.77	

Continued on next page

Table A-3 (Cont'd)

**FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 1.4 kN/m²)**

Commercial Designation	Grade	Nominal Size, mm	LIVE LOAD 1.4 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
m	m	m	m	m	m			
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2 21	2 01	1 75	2 53	2 30	2 01
		38 x 140	3 48	3 16	2 76	3 98	3 62	3 16
		38 x 184	4 58	4 16	3 64	5 25	4 77	4 16
		38 x 235	5 85	5 32	4 64	6 70	6 09	5 32
		38 x 286	7 12	6 47	5 65	8 15	7 40	6 47
	No 1	38 x 89	2 21	2 01	1 75	2 53	2 30	2 01
		38 x 140	3 48	3 16	2 76	3 98	3 62	3 16
		38 x 184	4 58	4 16	3 64	5 25	4 77	4 16
		38 x 235	5 85	5 32	4 64	6 70	6 09	5 32
		38 x 286	7 12	6 47	5 65	8 15	7 40	6 47
	No 2	38 x 89	2 13	1 94	1 69	2 44	2 22	1 94
		38 x 140	3 35	3 04	2 66	3 84	3 47	2 83
		38 x 184	4 42	4 01	3 51	5 06	4 58	3 74
		38 x 235	5 64	5 12	4 48	6 46	5 84	4 77
		38 x 286	6 86	6 23	5 44	7 85	7 11	5 80
	No 3	38 x 89	2 05	1 79	1 46	2 07	1 79	1 46
		38 x 140	3 03	2 63	2 14	3 03	2 63	2 14
		38 x 184	4 00	3 46	2 83	4 00	3 46	2 83
		38 x 235	5 11	4 42	3 61	5 11	4 42	3 61
		38 x 286	6 21	5 38	4 39	6 21	5 38	4 39
	Construction	38 x 89	2 05	1 87	1 63	2 35	2 05	1 68
	Standard	38 x 89	1 76	1 52	1 24	1 76	1 52	1 24
	Utility	38 x 89	1 22	1 06	0 86	1 22	1 06	0 86
	Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2 32	2 11	1 84	2 66	2 41
38 x 140			3 65	3 32	2 90	4 18	3 70	3 02
38 x 184			4 81	4 37	3 82	5 51	4 88	3 98
38 x 235			6 14	5 58	4 87	7 03	6 22	5 08
38 x 286			7 47	6 79	5 93	8 55	7 57	6 18
No 1		38 x 89	2 32	2 11	1 84	2 66	2 35	1 92
		38 x 140	3 65	3 32	2 80	3 96	3 43	2 80
		38 x 184	4 81	4 37	3 69	5 22	4 52	3 69
		38 x 235	6 14	5 58	4 71	6 66	5 77	4 71
		38 x 286	7 47	6 79	5 73	8 10	7 02	5 73
No 2		38 x 89	2 24	2 04	1 73	2 45	2 12	1 73
		38 x 140	3 52	3 07	2 50	3 54	3 07	2 50
		38 x 184	4 65	4 04	3 30	4 67	4 04	3 30
		38 x 235	5 93	5 16	4 21	5 96	5 16	4 21
		38 x 286	7 21	6 28	5 12	7 25	6 28	5 12
No 3		38 x 89	1 82	1 58	1 29	1 82	1 58	1 29
		38 x 140	2 69	2 33	1 90	2 69	2 33	1 90
		38 x 184	3 55	3 07	2 51	3 55	3 07	2 51
		38 x 235	4 53	3 92	3 20	4 53	3 92	3 20
		38 x 286	5 51	4 77	3 89	5 51	4 77	3 89
Construction		38 x 89	2 09	1 81	1 47	2 09	1 81	1 47
Standard		38 x 89	1 57	1 36	1 11	1 57	1 36	1 11
Utility		38 x 89	1 09	0 94	0 77	1 09	0 94	0 77

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Table A-3 (Cont'd)

**FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 1.4 kN/m²)**

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.4 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	2 19	1 99	1 74	2 50	2 28	1 99
		38 x 140	3 44	3 13	2 73	3 94	3 58	2 95
		38 x 184	4 54	4 12	3 60	5 19	4 72	3 89
		38 x 235	5 79	5 26	4 59	6 63	6 02	4 97
		38 x 286	7 04	6 40	5 59	8 06	7 32	6 04
	No 1	38 x 89	2 19	1 99	1 74	2 50	2 28	1 88
		38 x 140	3 44	3 13	2 73	3 88	3 36	2 75
		38 x 184	4 54	4 12	3 60	5 12	4 44	3 62
		38 x 235	5 79	5 26	4 59	6 54	5 66	4 62
		38 x 286	7 04	6 40	5 59	7 95	6 89	5 62
	No 2	38 x 89	2 11	1 92	1 68	2 41	2 08	1 70
		38 x 140	3 33	3 02	2 46	3 49	3 02	2 46
		38 x 184	4 38	3 98	3 25	4 60	3 98	4 35
		38 x 235	5 60	5 08	4 15	5 87	5 08	4 15
	38 x 286	6 81	6 18	5 04	7 13	6 18	5 04	
No 3	38 x 89	1 80	1 56	1 27	1 80	1 56	1 27	
	38 x 140	2 65	2 30	1 88	2 65	2 30	1 88	
	38 x 184	3 50	3 03	2 47	3 50	3 03	2 47	
	38 x 235	4 47	3 87	3 16	4 47	3 87	3 16	
	38 x 286	5 44	4 71	3 84	5 44	4 71	3 84	
Construction	38 x 89	2 04	1 77	1 45	2 05	1 77	1 45	
Standard	38 x 89	1 54	1 33	1 09	1 54	1 33	1 09	
Utility	38 x 89	1 05	0 91	0 74	1 05	0 91	0 74	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 11	1 91	1 67	2 41	2 19	1 91
		38 x 140	3 31	3 01	2 63	3 79	3 44	2 99
		38 x 184	4 37	3 97	3 47	5 00	4 54	3 94
		38 x 235	5 57	5 06	4 42	6 38	5 80	5 02
		38 x 286	6 78	6 16	5 38	7 76	7 05	6 11
	No 1	38 x 89	2 11	1 91	1 67	2 41	2 19	1 90
		38 x 140	3 31	3 01	2 63	3 79	3 41	2 78
		38 x 184	4 37	3 97	3 47	5 00	4 49	3 67
		38 x 235	5 57	5 06	4 42	6 38	5 73	4 68
		38 x 286	6 78	6 16	5 38	7 76	6 97	5 69
	No 2	38 x 89	2 04	1 85	1 61	2 33	2 11	1 72
		38 x 140	3 20	2 91	2 48	3 51	3 04	2 48
		38 x 184	4 22	3 84	3 27	4 63	4 01	3 27
		38 x 235	5 39	4 90	4 18	5 91	5 12	4 18
	38 x 286	6 55	5 95	5 08	7 19	6 23	5 08	
No 3	38 x 89	1 80	1 56	1 27	1 80	1 56	1 27	
	38 x 140	2 65	2 30	1 88	2 65	2 30	1 88	
	38 x 184	3 50	3 03	2 47	3 50	3 03	2 47	
	38 x 235	4 47	3 87	3 16	4 47	3 87	3 16	
	38 x 286	5 44	4 71	3 84	5 44	4 71	3 84	
Construction	38 x 89	1 96	1 78	1 46	2 07	1 79	1 46	
Standard	38 x 89	1 54	1 33	1 09	1 54	1 33	1 09	
Utility	38 x 89	1 05	0 91	0 74	1 05	0 91	0 74	

Continued on next page

Table A-3 (Cont'd)
FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 1.4 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.4 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>		
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2 11	1 91	1 67	2 41	2 19	1 91
		38 x 140	3 31	3 01	2 63	3 79	3 44	2 87
		38 x 184	4 37	3 97	3 47	5 00	4 54	3 78
		38 x 235	5 57	5 06	4 42	6 38	5 80	4 83
		38 x 286	6 78	6 16	5 38	7 76	7 05	5 87
	No 1	38 x 89	2 11	1 91	1 67	2 41	2 19	1 82
		38 x 140	3 31	3 01	2 63	3 76	3 25	2 65
		38 x 184	4 37	3 97	3 47	4 95	4 29	3 50
		38 x 235	5 57	5 06	4 42	6 32	5 47	4 47
		38 x 286	6 78	6 16	5 38	7 69	6 66	5 44
	No 2	38 x 89	2 04	1 85	1 61	2 33	2 02	1 65
		38 x 140	3 20	2 91	2 38	3 37	2 92	2 38
		38 x 184	4 22	3 84	3 14	4 45	3 85	3 14
		38 x 235	5 39	4 90	4 01	5 67	4 91	4 01
		38 x 286	6 55	5 95	4 88	6 90	5 98	4 88
	No 3	38 x 89	1 73	1 50	1 22	1 73	1 50	1 22
		38 x 140	2 54	2 20	1 80	2 54	2 20	1 80
		38 x 184	3 35	2 90	2 37	3 35	2 90	2 37
		38 x 235	4 28	3 70	3 02	4 28	3 70	3 02
		38 x 286	5 20	4 51	3 68	5 20	4 51	3 68
	Construction	38 x 89	1 96	1 72	1 41	1 99	1 72	1 41
Standard	38 x 89	1 49	1 29	1 05	1 49	1 29	1 05	
Utility	38 x 89	1 01	0 88	0 71	1 01	0 88	0 71	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	2 14	1 94	1 70	2 45	2 23	1 94
		38 x 140	3 36	3 06	2 67	3 85	3 50	2 95
		38 x 184	4 44	4 03	3 52	5 08	4 61	3 89
		38 x 235	5 66	5 14	4 49	6 48	5 89	4 97
		38 x 286	6 89	6 26	5 47	7 88	7 16	6 04
	No 1	38 x 89	2 14	1 94	1 70	2 45	2 23	1 88
		38 x 140	3 36	3 06	2 67	3 85	3 36	2 75
		38 x 184	4 44	4 03	3 52	5 08	4 44	3 62
		38 x 235	5 66	5 14	4 49	6 48	5 66	4 62
		38 x 286	6 89	6 26	5 47	7 88	6 89	5 62
	No 2	38 x 89	2 06	1 87	1 64	2 36	2 10	1 71
		38 x 140	3 24	2 95	2 46	3 49	3 02	2 46
		38 x 184	4 28	3 89	3 25	4 60	3 98	3 25
		38 x 235	5 46	4 96	4 15	5 87	5 08	4 15
		38 x 286	6 64	6 03	5 04	7 13	6 18	5 04
	No 3	38 x 89	1 80	1 56	1 27	1 80	1 56	1 27
		38 x 140	2 65	2 30	1 88	2 65	2 30	1 88
		38 x 184	3 50	3 03	2 47	3 50	3 03	2 47
		38 x 235	4 47	3 87	3 16	4 47	3 87	3 16
		38 x 286	5 44	4 71	3 84	5 44	4 71	3 84
	Construction	38 x 89	1 98	1 77	1 45	2 05	1 77	1 45
Standard	38 x 89	1 54	1 33	1 09	1 54	1 33	1 09	
Utility	38 x 89	1 05	0 91	0 74	1 05	0 91	0 74	

Table A-4
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>		
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	1 98	1 80	1 57	2 27	2 06	1 80
		38 x 140	3 12	2 83	2 48	3 57	3 25	2 83
		38 x 184	4 11	3 74	3 27	4 71	4 28	3 74
		38 x 235	5 25	4 77	4 17	6.01	5 46	4 77
		38 x 286	6 39	5 80	5 07	7 31	6.64	5 80
	No. 1	38 x 89	1 98	1 80	1 57	2 27	2 06	1 80
		38 x 140	3 12	2 83	2 48	3.57	3 25	2 76
		38 x 184	4 11	3 74	3 27	4 71	4 28	3.64
		38 x 235	5 25	4 77	4 17	6.01	5 46	4 65
		38 x 286	6 39	5 80	5 07	7 31	6 64	5 66
	No. 2	38 x 89	1 92	1 74	1 52	2 20	1 99	1 72
		38 x 140	3 02	2 74	2 39	3 45	3 04	2 49
38 x 184		3 98	3 61	3 16	4 55	4 02	3 28	
38 x 235		5 08	4 61	4 03	5 81	5 12	4.18	
	38 x 286	6 17	5.61	4 90	7 07	6 23	5 09	
No. 3	38 x 89	1 80	1 56	1 27	1 80	1 56	1 27	
	38 x 140	2 66	2 30	1 88	2 66	2 30	1 88	
	38 x 184	3 51	3 04	2 48	3 51	3 04	2 48	
	38 x 235	4 48	3 88	3 17	4 48	3.88	3 17	
	38 x 286	5 45	4 72	3 85	5.45	4 72	3 85	
Construction	38 x 89	1 84	1 67	1 46	2 07	1 79	1 46	
Standard	38 x 89	1 55	1 34	1 10	1 55	1 34	1 10	
Utility	38 x 89	1 06	0 92	0 75	1 06	0 92	0 75	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	1 91	1 74	1 52	2 19	1 99	1 74
		38 x 140	3 01	2 73	2 39	3 44	3 13	2 57
		38 x 184	3 97	3 60	3 15	4 54	4 12	3 39
		38 x 235	5 06	4 60	4 02	5 79	5 26	4 32
		38 x 286	6 16	5 59	4 89	7 05	6 40	5 26
	No. 1	38 x 89	1 91	1 74	1.52	2 19	1 99	1 63
		38 x 140	3 01	2 73	2 39	3 38	2 92	2 39
		38 x 184	3.97	3.60	3 15	4 45	3 85	3 15
		38 x 235	5 06	4 60	4 01	5 68	4 92	4 01
		38 x 286	6 16	5 59	4.88	6 91	5 98	4 88
	No. 2	38 x 89	1 85	1 68	1 46	2 09	1 81	1 48
		38 x 140	2 90	2 62	2 14	3 03	2 62	2 14
		38 x 184	3.83	3 46	2 82	3 99	3 46	2.82
		38 x 235	4.89	4 41	3 60	5 10	4 41	3 60
		38 x 286	5 95	5 37	4 38	6 20	5 37	4 38
	No. 3	38 x 89	1 55	1 34	1 10	1 55	1 34	1 10
		38 x 140	2 30	1 99	1 62	2 30	1 99	1 62
		38 x 184	3 03	2 62	2 14	3 03	2 62	2 14
38 x 235		3 87	3 35	2 73	3 87	3 35	2 73	
	38 x 286	4 70	4 07	3 32	4 70	4 07	3.32	
Construction	38 x 89	1 78	1 55	1 26	1 79	1 55	1 26	
Standard	38 x 89	1 34	1 16	0 95	1.34	1 16	0 95	
Utility	38 x 89	0 92	0 79	0 65	0 92	0 79	0.65	

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Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²						
			Gypsum Board or Plastered Ceiling			Other Ceilings			
			Joist Spacing			Joist Spacing			
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm	
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	1 82	1 65	1 44	2 09	1 89	1 65	
		38 x 140	2 86	2 60	2 27	3 28	2 98	2 60	
		38 x 184	3 78	3 43	3 00	4 33	3 93	3 43	
		38 x 235	4 82	4 38	3 83	5 52	5 01	4 38	
		38 x 286	5 87	5 33	4 65	6 71	6 10	5 33	
	No 1	38 x 89	1 82	1 65	1 44	2 09	1 89	1 65	
		38 x 140	2 86	2 60	2 27	3 28	2 98	2 60	
		38 x 184	3 78	3 43	3 00	4 33	3 93	3 43	
		38 x 235	4 82	4 38	3 83	5 52	5 01	4 38	
		38 x 286	5 87	5 33	4 65	6 71	6 10	5 33	
	No 2	38 x 89	1 76	1 59	1 39	2 01	1 83	1 59	
		38 x 140	2 76	2 51	2 19	3 16	2 87	2 39	
		38 x 184	3 64	3 31	2 89	4 17	3 79	3 15	
		38 x 235	4 65	4 22	3 69	5 32	4 83	4 01	
		38 x 286	5 65	5 14	4 49	6 47	5 88	4 88	
	No 3	38 x 89	1 69	1 51	1 23	1 74	1 51	1 23	
		38 x 140	2 55	2 21	1 80	2 55	2 21	1 80	
		38 x 184	3 37	2 92	2 38	3 37	2 92	2 38	
	Construction	38 x 89	1 69	1 54	1 34	1 94	1 73	1 41	
		38 x 89	1 48	1 28	1 04	1 48	1 28	1 04	
		38 x 89	1 03	0 89	0 73	1 03	0 89	0 73	
	Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	1 91	1 74	1 52	2 19	1 99	1 74
			38 x 140	3 01	2 73	2 39	3 44	3 11	2 54
			38 x 184	3 97	3 60	3 15	4 54	4 10	3 35
38 x 235			5 06	4 60	4 02	5 79	5 24	4 28	
38 x 286			6 16	5 59	4 89	7 05	6 37	5 20	
No 1		38 x 89	1 91	1 74	1 52	2 19	1 98	1 61	
		38 x 140	3 01	2 73	2 36	3 33	2 89	2 36	
		38 x 184	3 97	3 60	3 11	4 40	3 81	3 11	
		38 x 235	5 06	4 60	3 97	5 61	4 86	3 97	
		38 x 286	6 16	5 59	4 82	6 82	5 91	4 82	
No 2		38 x 89	1 85	1 68	1 46	2 07	1 79	1 46	
		38 x 140	2 90	2 58	2 11	2 93	2 58	2 11	
		38 x 184	3 83	3 40	2 78	3 93	3 40	2 78	
		38 x 235	4 89	4 34	3 55	5 02	4 34	3 55	
		38 x 286	5 95	5 29	4 31	6 10	5 29	4 31	
No 3		38 x 89	1 53	1 33	1 08	1 53	1 33	1 08	
		38 x 140	2 27	1 96	1 60	2 27	1 96	1 60	
		38 x 184	2 99	2 59	2 11	2 99	2 59	2 11	
		38 x 235	3 81	3 30	2 70	3 81	3 30	2 70	
Construction		38 x 89	1 53	1 33	1 08	1 53	1 33	1 08	
		38 x 89	1 76	1 52	1 24	1 76	1 52	1 24	
		38 x 89	1 32	1 14	0 93	1 32	1 14	0 93	
Utility		38 x 89	0 92	0 79	0 65	0 92	0 79	0 65	

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Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.5 kN/m²)

Commercial Designation	Grade	Nominal Size <i>mm</i>	LIVE LOAD 2.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	1 80	1 64	1 43	2 06	1 87	1 64
		38 x 140	2 83	2 58	2 25	3 25	2 95	2 49
		38 x 184	3 74	3 40	2 97	4 28	3 89	3 28
		38 x 235	4 77	4 33	3 79	5 46	4 96	4 18
		38 x 286	5 80	5 27	4 61	6 64	6 04	5 09
	No 1	38 x 89	1 80	1 64	1 43	2 06	1 87	1 58
		38 x 140	2 83	2 58	2 25	3 25	2 83	2 31
		38 x 184	3 74	3 40	2 97	4 28	3 73	3 05
		38 x 235	4 77	4 33	3 79	5 46	4 77	3 89
		38 x 286	5 80	5 27	4 61	6 64	5 80	4 73
	No 2	38 x 89	1 74	1 58	1 38	1 99	1 75	1 43
		38 x 140	2 74	2 49	2 07	2 93	2 54	2 07
		38 x 184	3 61	3 28	2 73	3 87	3 35	2 73
		38 x 235	4 61	4 19	3 49	4 94	4 28	3 49
		38 x 286	5 61	5 10	4 25	6 01	5 20	4 25
	No 3	38 x 89	1 52	1 31	1 07	1 52	1 31	1 07
		38 x 140	2 23	1 93	1 58	2 23	1 93	1 58
		38 x 184	2 95	2 55	2 08	2 95	2 55	2 08
		38 x 235	3 76	3 26	2 66	3 76	3 26	2 66
		38 x 286	4 58	3 96	3 23	4 58	3 96	3 23
	Construction	38 x 89	1 68	1 49	1 22	1 72	1 49	1 22
Standard	38 x 89	1 30	1 12	0 92	1 30	1 12	0 92	
Utility	38 x 89	0 88	0 76	0 62	0 88	0 76	0 62	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	1 73	1 58	1 38	1 99	1 80	1 58
		38 x 140	2 73	2 48	2 16	3 12	2 84	2 48
		38 x 184	3 60	3 27	2 86	4 12	3 74	3 27
		38 x 235	4 59	4 17	3 64	5 26	4 78	4 17
		38 x 286	5 59	5 08	4 43	6 40	5 81	5 08
	No 1	38 x 89	1 73	1 58	1 38	1 99	1 80	1 58
		38 x 140	2 73	2 48	2 16	3 12	2 84	2 34
		38 x 184	3 60	3 27	2 86	4 12	3 74	3 09
		38 x 235	4 59	4 17	3 64	5 26	4 78	3 94
		38 x 286	5 59	5 08	4 43	6 40	5 81	4 79
	No 2	38 x 89	1 68	1 52	1 33	1 92	1 74	1 45
		38 x 140	2 64	2 40	2 09	2 96	2 56	2 09
		38 x 184	3 48	3 16	2 76	3 90	3 38	2 76
		38 x 235	4 44	4 03	3 52	4 98	4 31	3 52
		38 x 286	5 40	4 91	4 28	6 06	5 24	4 28
	No 3	38 x 89	1 52	1 31	1 07	1 52	1 31	1 07
		38 x 140	2 23	1 93	1 58	2 23	1 93	1 58
		38 x 184	2 95	2 55	2 08	2 95	2 55	2 08
		38 x 235	3 76	3 26	2 66	3 76	3 26	2 66
		38 x 286	4 58	3 96	3 23	4 58	3 96	3 23
	Construction	38 x 89	1 61	1 47	1 23	1 74	1 51	1 23
Standard	38 x 89	1 30	1 12	0 92	1 30	1 12	0 92	
Utility	38 x 89	0 88	0 76	0 62	0 88	0 76	0 62	

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Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Northern Species (includes any Canadian soft wood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	1 73	1 58	1 38	1 99	1 80	1 58
		38 x 140	2 73	2 48	2 16	3 12	2 84	2 41
		38 x 184	3 60	3 27	2 86	4 12	3 74	3 18
		38 x 235	4 59	4 17	3 64	5 26	4 78	4 06
		38 x 286	5 59	5 08	4 43	6 40	5 81	4 94
	No 1	38 x 89	1 73	1 58	1 38	1 99	1 80	1 53
		38 x 140	2 73	2 48	2 16	3 12	2 74	2 23
		38 x 184	3 60	3 27	2 86	4 12	3 61	2 95
		38 x 235	4 59	4 17	3 64	5 26	4 61	3 76
		38 x 286	5 59	5 08	4 43	6 40	5 61	4 58
	No 2	38 x 89	1 68	1 52	1 33	1 92	1 70	1 39
		38 x 140	2 64	2 40	2 01	2 84	2 46	2 01
		38 x 184	3 48	3 16	2 64	3 74	3 24	2 64
		38 x 235	4 44	4 03	3 38	4 78	4 14	3 38
		38 x 286	5 40	4 91	4 11	5 81	5 03	4 11
	No 3	38 x 89	1 46	1 26	1 03	1 46	1 26	1 03
		38 x 140	2 14	1 85	1 51	2 14	1 85	1 51
		38 x 184	2 82	2 44	1 99	2 82	2 44	1 99
		38 x 235	3 60	3 12	2 55	3 60	3 12	2 55
		38 x 286	4 38	3 79	3 10	4 38	3 79	3 10
	Construction	38 x 89	1 61	1 45	1 18	1 67	1 45	1 18
	Standard	38 x 89	1 25	1 08	0 88	1 25	1 08	0 88
	Utility	38 x 89	0 85	0 74	0 60	0 85	0 74	0 60
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	1 76	1 60	1 40	2 02	1 83
38 x 140			2 77	2 52	2 20	3 17	2 88	2 49
38 x 184			3 66	3 32	2 90	4 19	3 80	3 28
38 x 235			4 67	4 24	3 70	5 34	4 85	4 18
38 x 286			5 68	5 16	4 50	6 50	5 90	5 09
No 1		38 x 89	1 76	1 60	1 40	2 02	1 83	1 58
		38 x 140	2 77	2 52	2 20	3 17	2 83	2 31
		38 x 184	3 66	3 32	2 90	4 19	3 73	3 05
		38 x 235	4 67	4 24	3 70	5 34	4 77	3 89
		38 x 286	5 68	5 16	4 50	6 50	5 80	4 73
No 2		38 x 89	1 70	1 54	1 35	1 95	1 76	1 44
		38 x 140	2 67	2 43	2 07	2 93	2 54	2 07
		38 x 184	3 53	3 20	2 73	3 87	3 35	2 73
		38 x 235	4 50	4 09	3 49	4 94	4 28	3 49
		38 x 286	5 47	4 97	4 25	6 01	5 20	4 25
No 3		38 x 89	1 52	1 31	1 07	1 52	1 31	1 07
		38 x 140	2 23	1 93	1 58	2 23	1 93	1 58
		38 x 184	2 95	2 55	2 08	2 95	2 55	2 08
		38 x 235	3 76	3 26	2 66	3 76	3 26	2 66
		38 x 286	4 58	3 96	3 23	4 58	3 96	3 23
Construction		38 x 89	1 63	1 48	1 22	1 72	1 49	1 22
Standard		38 x 89	1 30	1 12	0 92	1 30	1 12	0 92
Utility		38 x 89	0 88	0 76	0 62	0 88	0 76	0 62

Table A-5
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, mm	LIVE LOAD 2.0 kN/m ²						
			Gypsum Board or Plastered Ceiling			Other Ceilings			
			Joist Spacing			Joist Spacing			
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm	
			m	m	m	m	m	m	
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2.14	1.94	1.70	2.45	2.22	1.94	
		38 x 140	3.36	3.05	2.67	3.85	3.50	3.05	
		38 x 184	4.43	4.03	3.52	5.08	4.61	4.03	
		38 x 235	5.66	5.14	4.49	6.48	5.88	5.14	
			38 x 286	6.88	6.25	5.46	7.88	7.16	6.25
	No 1	38 x 89	2.14	1.94	1.70	2.45	2.22	1.94	
		38 x 140	3.36	3.05	2.67	3.85	3.50	3.03	
		38 x 184	4.43	4.03	3.52	5.08	4.61	3.99	
		38 x 235	5.66	5.14	4.49	6.48	5.88	5.10	
			38 x 286	6.88	6.25	5.46	7.88	7.16	6.20
	No 2	38 x 89	2.07	1.88	1.64	2.37	2.15	1.88	
		38 x 140	3.25	2.95	2.58	3.72	3.34	2.72	
		38 x 184	4.29	3.89	3.40	4.91	4.40	3.59	
		38 x 235	5.47	4.97	4.34	6.26	5.61	4.58	
			38 x 286	6.65	6.04	5.28	7.62	6.83	5.57
	No 3	38 x 89	1.98	1.71	1.40	1.98	1.71	1.40	
		38 x 140	2.92	2.52	2.06	2.92	2.52	2.06	
		38 x 184	3.84	3.33	2.72	3.84	3.33	2.72	
38 x 235		4.91	4.25	3.47	4.91	4.25	3.47		
		38 x 286	5.97	5.17	4.22	5.97	5.17	4.22	
Construction	38 x 89	1.98	1.80	1.57	2.26	1.96	1.60		
Standard	38 x 89	1.70	1.47	1.20	1.70	1.47	1.20		
Utility	38 x 89	1.16	1.00	0.82	1.16	1.00	0.82		
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2.06	1.87	1.63	2.36	2.14	1.87	
		38 x 140	3.24	2.94	2.57	3.71	3.37	2.81	
		38 x 184	4.27	3.88	3.39	4.89	4.44	3.71	
		38 x 235	5.45	4.95	4.33	6.24	5.67	4.73	
			38 x 286	6.63	6.03	5.26	7.59	6.90	5.76
	No 1	38 x 89	2.06	1.87	1.63	2.36	2.14	1.79	
		38 x 140	3.24	2.94	2.57	3.70	3.20	2.61	
		38 x 184	4.27	3.88	3.39	4.88	4.22	3.45	
		38 x 235	5.45	4.95	4.33	6.22	5.39	4.40	
			38 x 286	6.63	6.03	5.26	7.57	6.55	5.35
	No 2	38 x 89	1.99	1.81	1.58	2.28	1.99	1.62	
		38 x 140	3.13	2.84	2.34	3.32	2.87	2.34	
		38 x 184	4.13	3.75	3.09	4.37	3.79	3.09	
		38 x 235	5.27	4.78	3.95	5.58	4.83	3.95	
			38 x 286	6.41	5.82	4.80	6.79	5.88	4.80
	No. 3	38 x 89	1.70	1.47	1.20	1.70	1.47	1.20	
		38 x 140	2.52	2.18	1.78	2.52	2.18	1.78	
		38 x 184	3.32	2.87	2.34	3.32	2.87	2.34	
38 x 235		4.23	3.67	2.99	4.23	3.67	2.99		
		38 x 286	5.15	4.46	3.64	5.15	4.46	3.64	
Construction	38 x 89	1.91	1.70	1.38	1.96	1.70	1.38		
Standard	38 x 89	1.47	1.27	1.04	1.47	1.27	1.04		
Utility	38 x 89	1.00	0.87	0.71	1.00	0.87	0.71		

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Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size <i>mm</i>	LIVE LOAD 2.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>		
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	1 96	1 78	1 56	2 25	2 04	1 78
		38 x 140	3 09	2 80	2 45	3 53	3 21	2 80
		38 x 184	4 07	3 70	3 23	4 66	4 23	3 70
		38 x 235	5 19	4 72	4 12	5 95	5 40	4 72
		38 x 286	6 32	5 74	5 01	7 23	6 57	5 74
	No 1	38 x 89	1 96	1 78	1 56	2 25	2 04	1 78
		38 x 140	3 09	2 80	2 45	3 53	3 21	2 80
		38 x 184	4 07	3 70	3 23	4 66	4 23	3 70
		38 x 235	5 19	4 72	4 12	5 95	5 40	4 72
		38 x 286	6 32	5 74	5 01	7 23	6 57	5 74
	No 2	38 x 89	1 89	1 72	1 50	2 17	1 97	1 72
		38 x 140	2 98	2 70	2 36	3 41	3 09	2 61
		38 x 184	3 92	3 56	3 11	4 49	4 08	3 45
		38 x 235	5 01	4 55	3 97	5 73	5 21	4 40
		38 x 286	6 09	5 53	4 83	6 97	6 33	5 53
	No 3	38 x 89	1 82	1 65	1 35	1 91	1 65	1 35
		38 x 140	2 80	2 42	1 98	2 80	2 42	1 98
		38 x 184	3 69	3 20	2 61	3 69	3 20	2 61
		38 x 235	4 71	4 08	3 33	4 71	4 08	3 33
		38 x 286	5 73	4 96	4 05	5 73	4 96	4 05
	Construction	38 x 89	1 82	1 66	1 45	2 09	1 89	1 55
Standard	38 x 89	1 62	1 40	1 14	1 62	1 40	1 14	
Utility	38 x 89	1 13	0 98	0 80	1 13	0 98	0 80	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2 06	1 87	1 63	2 36	2 14	1 87
		38 x 140	3 24	2 94	2 57	3 71	3 37	2 78
		38 x 184	4 27	3 88	3 39	4 89	4 44	3 67
		38 x 235	5 45	4 95	4 33	6 24	5 67	4 68
		38 x 286	6 63	6 03	5 26	7 59	6 90	5 70
	No 1	38 x 89	2 06	1 87	1 63	2 36	2 14	1 77
		38 x 140	3 24	2 94	2 57	3 65	3 16	2 58
		38 x 184	4 27	3 88	3 39	4 82	4 17	3 40
		38 x 235	5 45	4 95	4 33	6 15	5 32	4 34
		38 x 286	6 63	6 03	5 26	7 48	6 47	5 29
	No 2	38 x 89	1 99	1 81	1 58	2 26	1 96	1 60
		38 x 140	3 13	2 83	2 31	3 27	2 83	2 31
		38 x 184	4 13	3 73	3 04	4 31	3 73	3 04
		38 x 235	5 27	4 76	3 89	5 50	4 76	3 89
		38 x 286	6 41	5 79	4 73	6 69	5 79	4 73
	No 3	38 x 89	1 68	1 46	1 19	1 68	1 46	1 19
		38 x 140	2 48	2 15	1 75	2 48	2 15	1 75
		38 x 184	3 27	2 83	2 31	3 27	2 83	2 31
		38 x 235	4 18	3 62	2 95	4 18	3 62	2 95
		38 x 286	5 08	4 40	3 59	5 08	4 40	3 59
	Construction	38 x 89	1 91	1 67	1 36	1 92	1 67	1 36
Standard	38 x 89	1 44	1 25	1 02	1 44	1 25	1 02	
Utility	38 x 89	1 00	0 87	0 71	1 00	0 87	0 71	

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Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	1 94	1 76	1 54	2 22	2 02	1 76
		38 x 140	3 05	2 77	2 42	3 50	3 18	2 72
		38 x 184	4 03	3 66	3 20	4 61	4 19	3 59
		38 x 235	5 14	4 67	4 08	5 88	5 35	4 58
		38 x 286	6 25	5 68	4 96	7 16	6 50	5 57
	No 1	38 x 89	1 94	1 76	1 54	2 22	2 02	1 73
		38 x 140	3 05	2 77	2 42	3 50	3 10	2 53
		38 x 184	4 03	3 66	3 20	4 61	4 09	3 34
		38 x 235	5 14	4 67	4 08	5 88	5 22	4 26
		38 x 286	6 25	5 68	4 96	7 16	6 35	5 18
	No 2	38 x 89	1 88	1 70	1 49	2 15	1 92	1 57
		38 x 140	2 95	2 68	2 27	3 21	2 78	2 27
		38 x 184	3 89	3 54	3 00	4 24	3 67	3 00
		38 x 235	4 97	4 51	3 82	5 41	4 68	3 82
		38 x 286	6 04	5 49	4 65	6 58	5 70	4 65
	No 3	38 x 89	1 66	1 44	1 17	1 66	1 44	1 17
		38 x 140	2 45	2 12	1 73	2 45	2 12	1 73
		38 x 184	3 23	2 80	2 28	3 23	2 80	2 28
		38 x 235	4 12	3 57	2 91	4 12	3 57	2 91
		38 x 286	5 01	4 34	3 54	5 01	4 34	3 54
	Construction	38 x 89	1 81	1 64	1 33	1 89	1 64	1 33
Standard	38 x 89	1 42	1 23	1 00	1 42	1 23	1 00	
Utility	38 x 89	0 97	0 84	0 68	0 97	0 84	0 68	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	1 87	1 70	1 48	2 14	1 94	1 70
		38 x 140	2 94	2 67	2 33	3 37	3 06	2 67
		38 x 184	3 88	3 52	3 08	4 44	4 03	3 52
		38 x 235	4 95	4 50	3 93	5 66	5 15	4 50
		38 x 286	6 02	5 47	4 78	6 89	6 26	5 47
	No 1	38 x 89	1 87	1 70	1 48	2 14	1 94	1 70
		38 x 140	2 94	2 67	2 33	3 37	3 06	2 57
		38 x 184	3 88	3 52	3 08	4 44	4 03	3 38
		38 x 235	4 95	4 50	3 93	5 66	5 15	4 32
		38 x 286	6 02	5 47	4 78	6 89	6 26	5 25
	No 2	38 x 89	1 81	1 64	1 43	2 07	1 88	1 59
		38 x 140	2 84	2 58	2 25	3 24	2 81	2 29
		38 x 184	3 75	3 41	2 97	4 27	3 70	3 02
		38 x 235	4 78	4 35	3 80	5 45	4 72	3 85
		38 x 286	5 82	5 29	4 62	6 63	5 74	4 69
	No 3	38 x 89	1 66	1 44	1 17	1 66	1 44	1 17
		38 x 140	2 45	2 12	1 73	2 45	2 12	1 73
		38 x 184	3 23	2 80	2 28	3 23	2 80	2 28
		38 x 235	4 12	3 57	2 91	4 12	3 57	2 91
		38 x 286	5 01	4 34	3 54	5 01	4 34	3 54
	Construction	38 x 89	1 74	1 58	1 35	1 91	1 65	1 35
Standard	38 x 89	1 42	1 23	1 00	1 42	1 23	1 00	
Utility	38 x 89	0 97	0 84	0 68	0 97	0 84	0 68	

Continued on next page

Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.0 kN/m ²						
			Gypsum Board or Plastered Ceiling			Other Ceilings			
			Joist Spacing			Joist Spacing			
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm	
	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Northern Species (includes any Canadian soft-wood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	1 87	1 70	1 48	2 14	1 94	1 70	
		38 x 140	2 94	2 67	2 33	3 37	3 06	2 65	
		38 x 184	3 88	3 52	3 08	4 44	4 03	3 49	
		38 x 235	4 95	4 50	3 93	5 66	5 15	4 45	
			38 x 286	6 02	5 47	4 78	6 89	6 26	5 42
	No 1	38 x 89	1 87	1 70	1 48	2 14	1 94	1 68	
		38 x 140	2 94	2 67	2 33	3 37	3 00	2 45	
		38 x 184	3 88	3 52	3 08	4 44	3 96	3 23	
		38 x 235	4 95	4 50	3 93	5 66	5 05	4 12	
			38 x 286	6 02	5 47	4 78	6 89	6 14	5 01
	No 2	38 x 89	1 81	1 64	1 43	2 07	1 87	1 52	
		38 x 140	2 84	2 58	2 20	3 11	2 69	2 20	
		38 x 184	3 75	3 41	2 90	4 10	3 55	2 90	
		38 x 235	4 78	4 35	3 70	5 23	4 53	3 70	
		38 x 286	5 82	5 29	4 50	6 37	5 51	4 50	
No 3	38 x 89	1 60	1 38	1 13	1 60	1 38	1 13		
	38 x 140	2 34	2 03	1 66	2 34	2 03	1 66		
	38 x 184	3 09	2 68	2 18	3 09	2 68	2 18		
	38 x 235	3 95	3 42	2 79	3 95	3 42	2 79		
		38 x 286	4 80	4 16	3 39	4 80	4 16	3 39	
Construction	38 x 89	1 74	1 58	1 30	1 84	1 59	1 30		
Standard	38 x 89	1 37	1 19	0 97	1 37	1 19	0 97		
Utility	38 x 89	0 93	0 81	0 66	0 93	0 81	0 66		
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	1 90	1 72	1 51	2 17	1 98	1 72	
		38 x 140	2 99	2 71	2 37	3 42	3 11	2 71	
		38 x 184	3 94	3 58	3 13	4 51	4 10	3 58	
		38 x 235	5 03	4 57	3 99	5 75	5 23	4 57	
			38 x 286	6 11	5 55	4 85	7 00	6 36	5 55
	No 1	38 x 89	1 90	1 72	1 51	2 17	1 98	1 72	
		38 x 140	2 99	2 71	2 37	3 42	3 10	2 53	
		38 x 184	3 94	3 58	3 13	4 51	4 09	3 34	
		38 x 235	5 03	4 57	3 99	5 75	5 22	4 26	
			38 x 286	6 11	5 55	4 85	7 00	6 35	5 18
	No 2	38 x 89	1 83	1 66	1 45	2 10	1 90	1 58	
		38 x 140	2 88	2 62	2 27	3 21	2 78	2 27	
		38 x 184	3 80	3 45	3 00	4 24	3 67	3 00	
		38 x 235	4 85	4 40	3 82	5 41	4 68	3 82	
		38 x 286	5 90	5 36	4 65	6 58	5 70	4 65	
No 3	38 x 89	1 66	1 44	1 17	1 66	1 44	1 17		
	38 x 140	2 45	2 12	1 73	2 45	2 12	1 73		
	38 x 184	3 23	2 80	2 28	3 23	2 80	2 28		
	38 x 235	4 12	3 57	2 91	4 12	3 57	2 91		
		38 x 286	5 01	4 34	3 54	5 01	4 34	3 54	
Construction	38 x 89	1 76	1 60	1 33	1 89	1 64	1 33		
Standard	38 x 89	1 42	1 23	1 00	1 42	1 23	1 00		
Utility	38 x 89	0 97	0 84	0 68	0 97	0 84	0 68		

Table A-6
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2 35	2 14	1 87	2 69	2 45	2 14
		38 x 140	3 70	3 36	2 94	4 24	3 85	3 36
		38 x 184	4 88	4 43	3 87	5 59	5 08	4 43
		38 x 235	6 23	5 66	4 94	7 13	6 48	5 66
		38 x 286	7 57	6 88	6 01	8 67	7 88	6 88
	No. 1	38 x 89	2 35	2 14	1 87	2 69	2 45	2 14
		38 x 140	3 70	3 36	2 94	4 24	3 85	3 36
		38 x 184	4 88	4.43	3 87	5 59	5 08	4.43
		38 x 235	6 23	5 66	4 94	7 13	6.48	5 66
		38 x 286	7 57	6 88	6.01	8.67	7 88	6 88
	No. 2	38 x 89	2 27	2 07	1 80	2.60	2 37	2 07
		38 x 140	3 58	3 25	2 84	4.10	3 72	3 04
		38 x 184	4 72	4 29	3.74	5.40	4 91	4 02
		38 x 235	6 02	5.47	4 78	6.89	6 26	5 12
38 x 286		7.32	6 65	5 81	8 38	7 62	6 23	
No. 3	38 x 89	2 18	1 91	1 56	2.21	1.91	1 56	
	38 x 140	3 26	2.82	2 30	3 26	2 82	2 30	
	38 x 184	4 30	3 72	3 04	4 30	3 72	3 04	
	38 x 235	5.49	4 75	3 88	5 49	4 75	3 88	
	38 x 286	6 67	5 78	4.72	6 67	5 78	4 72	
Construction	38 x 89	2 18	1 98	1 73	2 50	2.19	1.79	
Standard	38 x 89	1 90	1 65	1 34	1 90	1 65	1 34	
Utility	38 x 89	1 30	1 12	0 92	1.30	1 12	0.92	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2 27	2 06	1 80	2 60	2 36	2 06
		38 x 140	3 57	3 24	2 83	4 08	3 71	3 15
		38 x 184	4 70	4 27	3 73	5 38	4 89	4 15
		38 x 235	6 00	5 45	4 76	6 87	6 24	5 29
		38 x 286	7 30	6 63	5 79	8 36	7 59	6 44
	No. 1	38 x 89	2.27	2 06	1 80	2 60	2 36	2.00
		38 x 140	3 57	3 24	2 83	4 08	3 58	2 92
		38 x 184	4 70	4 27	3 73	5 38	4 72	3 85
		38 x 235	6 00	5 45	4 76	6 87	6 02	4 92
		38 x 286	7 30	6 63	5 79	8 36	7 33	5 98
	No. 2	38 x 89	2 19	1 99	1 74	2 51	2 22	1 81
		38 x 140	3 44	3 13	2 62	3 71	3 21	2 62
		38 x 184	4 54	4 13	3 46	4 89	4 24	3 46
		38 x 235	5 80	5 27	4 41	6 24	5 40	4 41
38 x 286		7 05	6 41	5 37	7 59	6 57	5 37	
No. 3	38 x 89	1 90	1 65	1 34	1 90	1 65	1 34	
	38 x 140	2 81	2 44	1 99	2 81	2 44	1 99	
	38 x 184	3 71	3 21	2 62	3 71	3 21	2 62	
	38 x 235	4 73	4 10	3 35	4 73	4 10	3 35	
	38 x 286	5 76	4 99	4 07	5 76	4 99	4 07	
Construction	38 x 89	2 11	1 90	1 55	2 19	1 90	1 55	
Standard	38 x 89	1 64	1 42	1 16	1 64	1 42	1 16	
Utility	38 x 89	1 12	0 97	0 79	1 12	0 97	0 79	

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Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2 16	1 96	1 71	2 47	2 25	1 96
		38 x 140	3 40	3 09	2 70	3 89	3 53	3 09
		38 x 184	4 48	4 07	3 55	5 13	4 66	4 07
		38 x 235	5 72	5 19	4 54	6 55	5 95	5 19
	No 1	38 x 89	2 16	1 96	1 71	2 47	2 25	1 96
		38 x 140	3 40	3 09	2 70	3 89	3 53	3 09
		38 x 184	4 48	4 07	3 55	5 13	4 66	4 07
		38 x 235	5 72	5 19	4 54	6 55	5 95	5 19
	No 2	38 x 89	2 08	1 89	1 65	2 38	2 17	1 89
		38 x 140	3 28	2 98	2 60	3 75	3 41	2 92
		38 x 184	4 32	3 92	3 43	4 94	4 49	3 85
		38 x 235	5 51	5 01	4 37	6 31	5 73	4 92
	No 3	38 x 89	2 01	1 82	1 51	2 13	1 85	1 51
		38 x 140	3 13	2 71	2 21	3 13	2 71	2 21
38 x 184		4 13	3 57	2 92	4 13	3 57	2 92	
38 x 235		5 27	4 56	3 72	5 27	4 56	3 72	
Construction	38 x 89	2 01	1 82	1 59	2 30	2 09	1 73	
	Standard	38 x 89	1 81	1 57	1 28	1 81	1 57	1 28
	Utility	38 x 89	1 26	1 09	0 89	1 26	1 09	0 89
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2 27	2 06	1 80	2 60	2 36	2 06
		38 x 140	3 57	3 24	2 83	4 08	3 71	3 11
		38 x 184	4 70	4 27	3 73	5 38	4 89	4 10
		38 x 235	6 00	5 45	4 76	6 87	6 24	5 24
	No 1	38 x 89	2 27	2 06	1 80	2 60	2 36	1 98
		38 x 140	3 57	3 24	2 83	4 08	3 54	2 89
		38 x 184	4 70	4 27	3 73	5 38	4 66	3 81
		38 x 235	6 00	5 45	4 76	6 87	5 95	4 86
	No 2	38 x 89	2 19	1 99	1 74	2 51	2 19	1 79
		38 x 140	3 44	3 13	2 58	3 65	3 16	2 58
		38 x 184	4 54	4 13	3 40	4 82	4 17	3 40
		38 x 235	5 80	5 27	4 34	6 15	5 32	4 34
	No 3	38 x 89	1 88	1 63	1 33	1 88	1 63	1 33
		38 x 140	2 78	2 40	1 96	2 78	2 40	1 96
38 x 184		3 66	3 17	2 59	3 66	3 17	2 59	
38 x 235		4 67	4 05	3 30	4 67	4 05	3 30	
Construction	38 x 89	1 88	1 63	1 33	1 88	1 63	1 33	
	Standard	38 x 89	1 61	1 40	1 14	1 61	1 40	1 14
	Utility	38 x 89	1 12	0 97	0 79	1 12	0 97	0 79

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Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.5 kN/m²)

Commercial Designation	Grade	Nominal Size <i>mm</i>	LIVE LOAD 1.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	2 14	1 94	1 70	2 45	2 22	1 94
		38 x 140	3 36	3 05	2 67	3 85	3 50	3 04
		38 x 184	4 43	4 03	3 52	5 08	4 61	4 02
		38 x 235	5 66	5 14	4 49	6 48	5 88	5 12
	38 x 286	6 88	6 25	5 46	7 88	7 16	6 23	
	No 1	38 x 89	2 14	1 94	1 70	2 45	2 22	1 94
		38 x 140	3 36	3 05	2 67	3 85	3 47	2 83
		38 x 184	4 43	4 03	3 52	5 08	4 57	3 73
		38 x 235	5 66	5 14	4 49	6 48	5 84	4 77
	38 x 286	6 88	6 25	5 46	7 88	7 10	5 80	
	No 2	38 x 89	2 07	1 88	1 64	2 37	2 15	1 75
		38 x 140	3 25	2 95	2 54	3 59	3 11	2 54
		38 x 184	4 29	3 89	3 35	4 74	4 10	3 35
		38 x 235	5 47	4 97	4 28	6 05	5 24	4 28
	38 x 286	6 65	6 04	5 20	7 36	6 37	5 20	
	No 3	38 x 89	1 86	1 61	1 31	1 86	1 61	1 31
		38 x 140	2 74	2 37	1 93	2 74	2 37	1 93
		38 x 184	3 61	3 13	2 55	3 61	3 13	2 55
		38 x 235	4 61	3 99	3 26	4 61	3 99	3 26
	38 x 286	5 61	4 85	3 96	5 61	4 85	3 96	
	Construction	38 x 89	1 99	1 81	1 49	2 11	1 83	1 49
Standard	38 x 89	1 59	1 38	1 12	1 59	1 38	1 12	
Utility	38 x 89	1 08	0 94	0 76	1 08	0 94	0 76	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 06	1 87	1 63	2 36	2 14	1 87
		38 x 140	3 24	2 94	2 57	3 71	3 37	2 94
		38 x 184	4 27	3 88	3 39	4 89	4 44	3 88
		38 x 235	5 45	4 95	4 32	6 24	5 66	4 95
	38 x 286	6 63	6 02	5 26	7 58	6 89	6 02	
	No 1	38 x 89	2 06	1 87	1 63	2 36	2 14	1 87
		38 x 140	3 24	2 94	2 57	3 71	3 37	2 87
		38 x 184	4 27	3 88	3 39	4 89	4 44	3 78
		38 x 235	5 45	4 95	4 32	6 24	5 66	4 83
	38 x 286	6 63	6 02	5 26	7 58	6 89	5 87	
	No 2	38 x 89	1 99	1 81	1 58	2 28	2 07	1 78
		38 x 140	3 13	2 84	2 48	3 58	3 14	2 56
		38 x 184	4 13	3 75	3 27	4 72	4 14	3 38
		38 x 235	5 27	4 78	4 18	6 03	5 28	4 31
	38 x 286	6 41	5 82	5 08	7 33	6 42	5 24	
	No 3	38 x 89	1 86	1 61	1 31	1 86	1 61	1 31
		38 x 140	2 74	2 37	1 93	2 74	2 37	1 93
		38 x 184	3 61	3 13	2 55	3 61	3 13	2 55
		38 x 235	4 61	3 99	3 26	4 61	3 99	3 26
	38 x 286	5 61	4 85	3 96	5 61	4 85	3 96	
	Construction	38 x 89	1 92	1 74	1 51	2 13	1 85	1 51
Standard	38 x 89	1 59	1 38	1 12	1 59	1 38	1 12	
Utility	38 x 89	1 08	0 94	0 76	1 08	0 94	0 76	

Continued on next page

Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.5 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Northern Species (includes any Canadian soft-wood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2.06	1.87	1.63	2.36	2.14	1.87
		38 x 140	3.24	2.94	2.57	3.71	3.37	2.94
		38 x 184	4.27	3.88	3.39	4.89	4.44	3.88
		38 x 235	5.45	4.95	4.32	6.24	5.66	4.95
		38 x 286	6.63	6.02	5.26	7.58	6.89	6.02
	No. 1	38 x 89	2.06	1.87	1.63	2.36	2.14	1.87
		38 x 140	3.24	2.94	2.57	3.71	3.35	2.74
		38 x 184	4.27	3.88	3.39	4.89	4.42	3.61
		38 x 235	5.45	4.95	4.32	6.24	5.65	4.61
		38 x 286	6.63	6.02	5.26	7.58	6.87	5.61
	No. 2	38 x 89	1.99	1.81	1.58	2.28	2.07	1.70
		38 x 140	3.13	2.84	2.46	3.48	3.01	2.46
		38 x 184	4.13	3.75	3.24	4.58	3.97	3.24
		38 x 235	5.27	4.78	4.14	5.85	5.07	4.14
38 x 286		6.41	5.82	5.03	7.12	6.16	5.03	
No. 3	38 x 89	1.79	1.55	1.26	1.79	1.55	1.26	
	38 x 140	2.62	2.27	1.85	2.62	2.27	1.85	
	38 x 184	3.46	2.99	2.44	3.46	2.99	2.44	
	38 x 235	4.41	3.82	3.12	4.41	3.82	3.12	
	38 x 286	5.37	4.65	3.79	5.37	4.65	3.79	
Construction	38 x 89	1.92	1.74	1.45	2.05	1.78	1.45	
Standard	38 x 89	1.53	1.33	1.08	1.53	1.33	1.08	
Utility	38 x 89	1.04	0.90	0.74	1.04	0.90	0.74	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	2.09	1.90	1.66	2.39	2.17	1.90
		38 x 140	3.29	2.99	2.61	3.76	3.42	2.99
		38 x 184	4.34	3.94	3.44	4.96	4.51	3.94
		38 x 235	5.53	5.03	4.39	6.33	5.75	5.03
		38 x 286	6.73	6.11	5.34	7.70	7.00	6.11
	No. 1	38 x 89	2.09	1.90	1.66	2.39	2.17	1.90
		38 x 140	3.29	2.99	2.61	3.76	3.42	2.83
		38 x 184	4.34	3.94	3.44	4.96	4.51	3.73
		38 x 235	5.53	5.03	4.39	6.33	5.75	4.77
		38 x 286	6.73	6.11	5.34	7.70	7.00	5.80
	No. 2	38 x 89	2.02	1.83	1.60	2.31	2.10	1.76
		38 x 140	3.17	2.88	2.52	3.59	3.11	2.54
		38 x 184	4.18	3.80	3.32	4.74	4.10	3.35
		38 x 235	5.33	4.85	4.23	6.05	5.24	4.28
38 x 286		6.49	5.90	5.15	7.36	6.37	5.20	
No. 3	38 x 89	1.86	1.61	1.31	1.86	1.61	1.31	
	38 x 140	2.74	2.37	1.93	2.74	2.37	1.93	
	38 x 184	3.61	3.13	2.55	3.61	3.13	2.55	
	38 x 235	4.61	3.99	3.26	4.61	3.99	3.26	
	38 x 286	5.61	4.85	3.96	5.61	4.85	3.96	
Construction	38 x 89	1.93	1.76	1.49	2.11	1.83	1.49	
Standard	38 x 89	1.59	1.38	1.12	1.59	1.38	1.12	
Utility	38 x 89	1.08	0.94	0.76	1.08	0.94	0.76	

Table A-7
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, mm	LIVE LOAD 1.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
m	m	m	m	m	m			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2.69	2.45	2.14	3.09	2.80	2.45
		38 x 140	4.24	3.85	3.36	4.85	4.41	3.85
		38 x 184	5.59	5.08	4.43	6.40	5.81	5.08
		38 x 235	7.13	6.48	5.66	8.16	7.41	6.48
		38 x 286	8.67	7.88	6.88	9.93	9.02	7.88
	No. 1	38 x 89	2.69	2.45	2.14	3.09	2.80	2.45
		38 x 140	4.24	3.85	3.36	4.85	4.41	3.85
		38 x 184	5.59	5.08	4.43	6.40	5.81	5.08
		38 x 235	7.13	6.48	5.66	8.16	7.41	6.48
		38 x 286	8.67	7.88	6.88	9.93	9.02	7.88
	No. 2	38 x 89	2.60	2.37	2.07	2.98	2.71	2.37
		38 x 140	4.10	3.72	3.25	4.69	4.26	3.52
		38 x 184	5.40	4.91	4.29	6.18	5.62	4.64
		38 x 235	6.89	6.26	5.47	7.89	7.17	5.92
	38 x 286	8.38	7.62	6.65	9.60	8.72	7.20	
No. 3	38 x 89	2.50	2.21	1.80	2.55	2.21	1.80	
	38 x 140	3.77	3.26	2.66	3.77	3.26	2.66	
	38 x 184	4.96	4.30	3.51	4.96	4.30	3.51	
	38 x 235	6.34	5.49	4.48	6.34	5.49	4.48	
	38 x 286	7.71	6.67	5.45	7.71	6.67	5.45	
Construction	38 x 89	2.50	2.27	1.98	2.86	2.53	2.07	
Standard	38 x 89	2.20	1.90	1.55	2.20	1.90	1.55	
Utility	38 x 89	1.50	1.30	1.06	1.50	1.30	1.06	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2.60	2.36	2.06	2.97	2.70	2.36
		38 x 140	4.08	3.71	3.24	4.67	4.25	3.63
		38 x 184	5.38	4.89	4.27	6.16	5.60	4.79
		38 x 235	6.87	6.24	5.45	7.87	7.15	6.11
		38 x 286	8.36	7.59	6.63	9.57	8.69	7.44
	No. 1	38 x 89	2.60	2.36	2.06	2.97	2.70	2.31
		38 x 140	4.08	3.71	3.24	4.67	4.14	3.38
		38 x 184	5.38	4.89	4.27	6.16	5.45	4.45
		38 x 235	6.87	6.24	5.45	7.87	6.96	5.68
		38 x 286	8.36	7.59	6.63	9.57	8.46	6.91
	No. 2	38 x 89	2.51	2.28	1.99	2.87	2.56	2.09
		38 x 140	3.94	3.58	3.03	4.28	3.71	3.03
		38 x 184	5.20	4.72	3.99	5.65	4.89	3.99
		38 x 235	6.64	6.03	5.10	7.21	6.24	5.10
	38 x 286	8.07	7.33	6.20	8.77	7.59	6.20	
No. 3	38 x 89	2.20	1.90	1.55	2.20	1.90	1.55	
	38 x 140	3.25	2.81	2.30	3.25	2.81	2.30	
	38 x 184	4.28	3.71	3.03	4.28	3.71	3.03	
	38 x 235	5.47	4.73	3.87	5.47	4.73	3.87	
	38 x 286	6.65	5.76	4.70	6.65	5.76	4.70	
Construction	38 x 89	2.41	2.19	1.79	2.53	2.19	1.79	
Standard	38 x 89	1.90	1.64	1.34	1.90	1.64	1.34	
Utility	38 x 89	1.30	1.12	0.92	1.30	1.12	0.92	

Continued on next page

Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2.47	2.25	1.96	2.83	2.57	2.25
		38 x 140	3.89	3.53	3.09	4.45	4.05	3.53
		38 x 184	5.13	4.66	4.07	5.87	5.33	4.66
		38 x 235	6.55	5.95	5.19	7.49	6.81	5.95
		38 x 286	7.96	7.23	6.32	9.12	8.28	7.23
	No. 1	38 x 89	2.47	2.25	1.96	2.83	2.57	2.25
		38 x 140	3.89	3.53	3.09	4.45	4.05	3.53
		38 x 184	5.13	4.66	4.07	5.87	5.33	4.66
		38 x 235	6.55	5.95	5.19	7.49	6.81	5.95
		38 x 286	7.96	7.23	6.32	9.12	8.28	7.23
	No. 2	38 x 89	2.38	2.17	1.89	2.73	2.48	2.17
		38 x 140	3.75	3.41	2.98	4.29	3.90	3.38
		38 x 184	4.94	4.49	3.92	5.66	5.14	4.45
		38 x 235	6.31	5.73	5.01	7.22	6.56	5.68
		38 x 286	7.68	6.97	6.09	8.79	7.98	6.91
	No. 3	38 x 89	2.30	2.09	1.74	2.46	2.13	1.74
		38 x 140	3.61	3.13	2.55	3.61	3.13	2.55
		38 x 184	4.77	4.13	3.37	4.77	4.13	3.37
		38 x 235	6.08	5.27	4.30	6.08	5.27	4.30
		38 x 286	7.40	6.41	5.23	7.40	6.41	5.23
	Construction	38 x 89	2.30	2.09	1.82	2.63	2.39	2.00
Standard	38 x 89	2.09	1.81	1.48	2.09	1.81	1.48	
Utility	38 x 89	1.46	1.26	1.03	1.46	1.26	1.03	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2.60	2.36	2.06	2.97	2.70	2.36
		38 x 140	4.08	3.71	3.24	4.67	4.25	3.59
		38 x 184	5.38	4.89	4.27	6.16	5.60	4.74
		38 x 235	6.87	6.24	5.45	7.87	7.15	6.05
		38 x 286	8.36	7.59	6.63	9.57	8.69	7.36
	No. 1	38 x 89	2.60	2.36	2.06	2.97	2.70	2.29
		38 x 140	4.08	3.71	3.24	4.67	4.08	3.33
		38 x 184	5.38	4.89	4.27	6.16	5.39	4.40
		38 x 235	6.87	6.24	5.45	7.87	6.87	5.61
		38 x 286	8.36	7.59	6.63	9.57	8.36	6.82
	No. 2	38 x 89	2.51	2.28	1.99	2.87	2.53	2.07
		38 x 140	3.94	3.58	2.98	4.22	3.65	2.98
		38 x 184	5.20	4.72	3.93	5.56	4.82	3.93
		38 x 235	6.64	6.03	5.02	7.10	6.15	5.02
		38 x 286	8.07	7.33	6.10	8.63	7.48	6.10
	No. 3	38 x 89	2.17	1.88	1.53	2.17	1.88	1.53
		38 x 140	3.21	2.78	2.27	3.21	2.78	2.27
		38 x 184	4.23	3.66	2.99	4.23	3.66	2.99
		38 x 235	5.40	4.67	3.81	5.40	4.67	3.81
		38 x 286	6.56	5.68	4.64	6.56	5.68	4.64
	Construction	38 x 89	2.41	2.15	1.76	2.49	2.15	1.76
Standard	38 x 89	1.87	1.61	1.32	1.87	1.61	1.32	
Utility	38 x 89	1.30	1.12	0.92	1.30	1.12	0.92	

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Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, mm	LIVE LOAD 1.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			m	m	m	m	m	m
Spruce-Pine-Fir (includes Spruce all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	2 45	2 22	1 94	2 80	2 55	2 22
		38 x 140	3 85	3 50	3 05	4 41	4 00	3 50
		38 x 184	5 08	4 61	4 03	5 81	5 28	4 61
		38 x 235	6 48	5 88	5 14	7 41	6 74	5 88
		38 x 286	7 88	7 16	6 25	9 02	8 19	7 16
	No 1	38 x 89	2 45	2 22	1 94	2 80	2 55	2 22
		38 x 140	3 85	3 50	3 05	4 41	4 00	3 27
		38 x 184	5 08	4 61	4 03	5 81	5 28	4 31
		38 x 235	6 48	5 88	5 14	7 41	6 74	5 50
		38 x 286	7 88	7 16	6 25	9 02	8 19	6 70
	No 2	38 x 89	2 37	2 15	1 88	2 71	2 46	2 02
		38 x 140	3 72	3 38	2 93	4 15	3 59	2 93
		38 x 184	4 91	4 46	3 87	5 47	4 74	3 87
		38 x 235	6 26	5 69	4 94	6 99	6 05	4 94
		38 x 286	7 62	6 92	6 01	8 50	7 36	6 01
	No 3	38 x 89	2 15	1 86	1 52	2 15	1 86	1 52
		38 x 140	3 16	2 74	2 23	3 16	2 74	2 23
38 x 184		4 17	3 61	2 95	4 17	3 61	2 95	
	38 x 235	5 32	4 61	3 76	5 32	4 61	3 76	
	38 x 286	6 47	5 61	4 58	6 47	5 61	4 58	
Construction	38 x 89	2 28	2 07	1 72	2 44	2 11	1 72	
Standard	38 x 89	1 84	1 59	1 30	1 84	1 59	1 30	
Utility	38 x 89	1 25	1 08	0 88	1 25	1 08	0 88	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 36	2 14	1 87	2 70	2 45	2 14
		38 x 140	3 71	3 37	2 94	4 24	3 85	3 37
		38 x 184	4 89	4 44	3 88	5 59	5 08	4 44
		38 x 235	6 24	5 66	4 95	7 14	6 49	5 66
		38 x 286	7 58	6 89	6 02	8 68	7 89	6 89
	No 1	38 x 89	2 36	2 14	1 87	2 70	2 45	2 14
		38 x 140	3 71	3 37	2 94	4 24	3 85	3 31
		38 x 184	4 89	4 44	3 88	5 59	5 08	4 37
		38 x 235	6 24	5 66	4 95	7 14	6 49	5 58
		38 x 286	7 58	6 89	6 02	8 68	7 89	6 78
	No 2	38 x 89	2 28	2 07	1 81	2 61	2 37	2 05
		38 x 140	3 58	3 25	2 84	4 10	3 62	2 96
		38 x 184	4 72	4 29	3 75	5 41	4 78	3 90
		38 x 235	6 03	5 48	4 78	6 90	6 10	4 98
		38 x 286	7 33	6 66	5 82	8 39	7 42	6 06
	No 3	38 x 89	2 15	1 86	1 52	2 15	1 86	1 52
		38 x 140	3 16	2 74	2 23	3 16	2 74	2 23
38 x 184		4 17	3 61	2 95	4 17	3 61	2 95	
38 x 235		5 32	4 61	3 76	5 32	4 61	3 76	
38 x 286		6 47	5 61	4 58	6 47	5 61	4 58	
Construction	38 x 89	2 19	1 99	1 74	2 46	2 13	1 74	
Standard	38 x 89	1 84	1 59	1 30	1 84	1 59	1 30	
Utility	38 x 89	1 25	1 08	0 88	1 25	1 08	0 88	

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Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, mm	LIVE LOAD 1.0 kN/m ²					
			Gypsum Board or Plastered Ceiling			Other Ceilings		
			Joist Spacing			Joist Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>			
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2 36	2 14	1 87	2 70	2 45	2 14
		38 x 140	3 71	3 37	2 94	4 24	3 85	3 37
		38 x 184	4 89	4 44	3 88	5 59	5 08	4 44
		38 x 235	6 24	5 66	4 95	7 14	6 49	5 66
		38 x 286	7 58	6 89	6 02	8 68	7 89	6 89
	No 1	38 x 89	2 36	2 14	1 87	2 70	2 45	2 14
		38 x 140	3 71	3 37	2 94	4 24	3 85	3 16
		38 x 184	4 89	4 44	3 88	5 59	5 08	4 17
		38 x 235	6 24	5 66	4 95	7 14	6 49	5 32
		38 x 286	7 58	6 89	6 02	8 68	7 89	6 47
	No 2	38 x 89	2 28	2 07	1 81	2 61	2 37	1 97
		38 x 140	3 58	3 25	2 84	4 02	3 48	2 84
		38 x 184	4 72	4 29	3 74	5 29	4 58	3 74
		38 x 235	6 03	5 48	4 78	6 76	5 85	4 78
	38 x 286	7 33	6 66	5 81	8 22	7 12	5 81	
No 3	38 x 89	2 07	1 79	1 46	2 07	1 79	1 46	
	38 x 140	3 03	2 62	2 14	3 03	2 62	2 14	
	38 x 184	3 99	3 46	2 82	3 99	3 46	2 82	
	38 x 235	5 10	4 41	3 60	5 10	4 41	3 60	
	38 x 286	6 20	5 37	4 38	6 20	5 37	4 38	
Construction	38 x 89	2 19	1 99	1 67	2 37	2 05	1 67	
Standard	38 x 89	1 77	1 53	1 25	1 77	1 53	1 25	
Utility	38 x 89	1 21	1 04	0 85	1 21	1 04	0 85	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	2 39	2 17	1 90	2 74	2 49	2 17
		38 x 140	3 76	3 42	2 99	4 31	3 92	3 42
		38 x 184	4 96	4 51	3 94	5 68	5 16	4 51
		38 x 235	6 33	5 75	5 03	7 25	6 59	5 75
		38 x 286	7 70	7 00	6 11	8 82	8 01	7 00
	No 1	38 x 89	2 39	2 17	1 90	2 74	2 49	2 17
		38 x 140	3 76	3 42	2 99	4 31	3 92	3 27
		38 x 184	4 96	4 51	3 94	5 68	5 16	4 31
		38 x 235	6 33	5 75	5 03	7 25	6 59	5 50
		38 x 286	7 70	7 00	6 11	8 82	8 01	6 70
	No 2	38 x 89	2 31	2 10	1 83	2 64	2 40	2 04
		38 x 140	3 63	3 30	2 88	4 15	3 59	2 93
		38 x 184	4 79	4 35	3 80	5 47	4 74	3 87
		38 x 235	6 11	5 55	4 85	6 99	6 05	4 94
	38 x 286	7 43	6 75	5 90	8 50	7 36	6 01	
No 3	38 x 89	2 15	1 86	1 52	2 15	1 86	1 52	
	38 x 140	3 16	2 74	2 23	3 16	2 74	2 23	
	38 x 184	4 17	3 61	2 95	4 17	3 61	2 95	
	38 x 235	5 32	4 61	3 76	5 32	4 61	3 76	
	38 x 286	6 47	5 61	4 58	6 47	5 61	4 58	
Construction	38 x 89	2 22	2 01	1 72	2 44	2 11	1 72	
Standard	38 x 89	1 84	1 59	1 30	1 84	1 59	1 30	
Utility	38 x 89	1 25	1 08	0 88	1 25	1 08	0 88	

Table A-8
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 2.5 AND 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²			LIVE LOAD 2.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2 50	2 27	1 98	2 69	2 45	2 14
		38 x 140	3 93	3 57	3 09	4 24	3 85	3 36
		38 x 184	5 19	4 71	4 07	5 59	5 08	4 43
		38 x 235	6 62	6 01	5 19	7 13	6 48	5 66
		38 x 286	8 05	7 31	6 32	8 67	7 88	6 88
	No 1	38 x 89	2 50	2 27	1 96	2 69	2 45	2 14
		38 x 140	3 93	3 50	2 86	4 24	3 85	3 16
		38 x 184	5 19	4 62	3 77	5 59	5 08	4 16
		38 x 235	6 62	5 90	4 81	7 13	6 48	5 31
		38 x 286	8 05	7 17	5 86	8 67	7 88	6 46
	No 2	38 x 89	2 42	2 19	1 79	2 60	2 37	1 97
		38 x 140	3 64	3 15	2 57	4 02	3 48	2 84
38 x 184		4 80	4 16	3 39	5 30	4 59	3 74	
38 x 235		6 13	5 30	4 33	6 76	5 85	4 78	
	38 x 286	7 45	6 45	5 27	8 22	7 12	5 81	
No 3	38 x 89	1 87	1 62	1 32	2 06	1 78	1 46	
	38 x 140	2 75	2 38	1 95	3 04	2 63	2 15	
	38 x 184	3 63	3 15	2 57	4 01	3 47	2 83	
	38 x 235	4 64	4 01	3 28	5 12	4 43	3 62	
	38 x 286	5 64	4 88	3 99	6 22	5 39	4 40	
Construction	38 x 89	2 14	1 85	1 51	2 36	2 04	1 67	
Standard	38 x 89	1 61	1 39	1 14	1 77	1 54	1 25	
Utility	38 x 89	1 09	0 95	0 77	1 21	1 05	0 85	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2 41	2 19	1 84	2 60	2 36	2 03
		38 x 140	3 76	3 26	2 66	4 08	3 59	2 93
		38 x 184	4 96	4 29	3 51	5 38	4 74	3 87
		38 x 235	6 33	5 48	4 47	6 87	6 05	4 94
		38 x 286	7 70	6 67	5 44	8 36	7 36	6 01
	No 1	38 x 89	2 39	2 07	1 69	2 60	2 29	1 86
		38 x 140	3 49	3 03	2 47	3 86	3 34	2 72
		38 x 184	4 61	3 99	3 26	5 08	4 40	3 59
		38 x 235	5 88	5 09	4 16	6 49	5 62	4 59
		38 x 286	7 15	6 19	5 06	7 89	6 83	5 58
	No 2	38 x 89	2 17	1 88	1 53	2 39	2 07	1 69
		38 x 140	3 13	2 71	2 21	3 46	2 99	2 44
38 x 184		4 13	3 58	2 92	4 56	3 95	3 22	
38 x 235		5 27	4 57	3 73	5 82	5 04	4 11	
	38 x 286	6 42	5 56	4 54	7 08	6 13	5 00	
No 3	38 x 89	1 61	1 39	1 14	1 77	1 54	1 25	
	38 x 140	2 38	2 06	1 68	2 62	2 27	1 85	
	38 x 184	3 13	2 71	2 22	3 46	3 00	2 44	
	38 x 235	4 00	3 46	2 83	4 41	3 82	3 12	
	38 x 286	4 87	4 21	3 44	5 37	4 65	3 80	
Construction	38 x 89	1 85	1 60	1 31	2 04	1 77	1 44	
Standard	38 x 89	1 39	1 20	0 98	1 53	1 32	1 08	
Utility	38 x 89	0 95	0 82	0 67	1 05	0 90	0 74	

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Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 2.5 AND 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²			LIVE LOAD 2.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2.30	2.09	1.82	2.47	2.25	1.96
		38 x 140	3.61	3.28	2.86	3.89	3.53	3.09
		38 x 184	4.76	4.33	3.78	5.13	4.66	4.07
		38 x 235	6.08	5.52	4.82	6.55	5.95	5.19
		38 x 286	7.39	6.71	5.87	7.96	7.23	6.32
	No 1	38 x 89	2.30	2.09	1.82	2.47	2.25	1.96
		38 x 140	3.61	3.28	2.75	3.89	3.53	3.04
		38 x 184	4.76	4.33	3.63	5.13	4.66	4.01
		38 x 235	6.08	5.52	4.64	6.55	5.95	5.12
		38 x 286	7.39	6.71	5.64	7.96	7.23	6.22
	No 2	38 x 89	2.21	2.01	1.72	2.38	2.17	1.89
		38 x 140	3.48	3.03	2.47	3.75	3.34	2.72
		38 x 184	4.59	3.99	3.26	4.94	4.40	3.59
		38 x 235	5.86	5.09	4.16	6.31	5.62	4.59
		38 x 286	7.12	6.19	5.06	7.68	6.83	5.58
	No 3	38 x 89	1.80	1.56	1.27	1.99	1.72	1.40
		38 x 140	2.64	2.29	1.87	2.92	2.53	2.06
		38 x 184	3.49	3.02	2.46	3.85	3.33	2.72
		38 x 235	4.45	3.85	3.15	4.91	4.25	3.47
		38 x 286	5.41	4.69	3.83	5.97	5.17	4.22
	Construction	38 x 89	2.07	1.79	1.46	2.28	1.97	1.61
Standard	38 x 89	1.53	1.32	1.08	1.69	1.46	1.19	
Utility	38 x 89	1.07	0.92	0.75	1.18	1.02	0.83	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2.41	2.19	1.81	2.60	2.36	2.00
		38 x 140	3.72	3.22	2.63	4.08	3.56	2.90
		38 x 184	4.91	4.25	3.47	5.38	4.69	3.83
		38 x 235	6.26	5.42	4.43	6.87	5.98	4.88
		38 x 286	7.62	6.60	5.38	8.36	7.28	5.94
	No 1	38 x 89	2.37	2.05	1.67	2.60	2.26	1.85
		38 x 140	3.45	2.99	2.44	3.81	3.30	2.69
		38 x 184	4.55	3.94	3.22	5.02	4.35	3.55
		38 x 235	5.81	5.03	4.11	6.41	5.55	4.53
		38 x 286	7.06	6.12	4.99	7.79	6.75	5.51
	No 2	38 x 89	2.14	1.85	1.51	2.36	2.04	1.67
		38 x 140	3.09	2.67	2.18	3.41	2.95	2.41
		38 x 184	4.07	3.52	2.88	4.49	3.89	3.17
		38 x 235	5.19	4.50	3.67	5.73	4.96	4.05
		38 x 286	6.32	5.47	4.47	6.97	6.04	4.93
	No 3	38 x 89	1.59	1.38	1.12	1.75	1.52	1.24
		38 x 140	2.35	2.03	1.66	2.59	2.24	1.83
		38 x 184	3.09	2.68	2.19	3.41	2.96	2.41
		38 x 235	3.95	3.42	2.79	4.36	3.77	3.08
		38 x 286	4.80	4.16	3.39	5.30	4.59	3.75
	Construction	38 x 89	1.82	1.57	1.28	2.01	1.74	1.42
Standard	38 x 89	1.36	1.18	0.96	1.51	1.30	1.06	
Utility	38 x 89	0.95	0.82	0.67	1.05	0.90	0.74	

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Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 2.5 AND 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²			LIVE LOAD 2.0 kN/m ²			
			Rafter Spacing			Rafter Spacing			
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm	
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	Select structural	38 x 89	2 27	2.06	1 78	2 45	2 22	1 94	
		38 x 140	3 57	3 15	2 57	3 85	3 48	2 84	
		38 x 184	4 71	4 16	3 39	5 08	4 59	3 74	
		38 x 235	6 01	5 30	4 33	6 48	5 85	4 78	
			38 x 286	7 31	6 45	5 27	7 88	7 12	5 81
	No 1	38 x 89	2 27	2 00	1 64	2 45	2 21	1 80	
		38 x 140	3 39	2 93	2 39	3 74	3 23	2 64	
		38 x 184	4 46	3 87	3 16	4 93	4 27	3 48	
		38 x 235	5 70	4 93	4 03	6 29	5 44	4 44	
			38 x 286	6 93	6 00	4 90	6 62	5 41	
	No 2	38 x 89	2 10	1 81	1 48	2 31	2 00	1 63	
		38 x 140	3 04	2 63	2 15	3 35	2 90	2 37	
		38 x 184	4 01	3 47	2 83	4 42	3 83	3 12	
38 x 235		5 11	4 43	3 61	5 64	4 88	3 99		
		38 x 286	6 22	5 38	4 40	5 94	4 85		
No 3	38 x 89	1 57	1 36	1 11	1 73	1 50	1 22		
	38 x 140	2 31	2 00	1 63	2 55	2 21	1 80		
	38 x 184	3 05	2 64	2 16	3 37	2 92	2 38		
	38 x 235	3 89	3 37	2 75	4 30	3 72	3 04		
		38 x 286	4 74	4 10	3 35	4 53	3 69		
Construction	38 x 89	1 79	1 55	1 26	1 97	1 71	1 39		
Standard	38 x 89	1 34	1 16	0 95	1 48	1 28	1 05		
Utility	38 x 89	0 92	0 79	0 65	1 01	0 87	0 71		
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 19	1 99	1 73	2 36	2 14	1 87	
		38 x 140	3 44	3 12	2 60	3 71	3 37	2 87	
		38 x 184	4 54	4 12	3 43	4 89	4 44	3 79	
		38 x 235	5 79	5 26	4 38	6 24	5 66	4 83	
			38 x 286	7 04	6 40	5 33	6 89	5 88	
	No 1	38 x 89	2 19	1 99	1 65	2 36	2 14	1 83	
		38 x 140	3 43	2 97	2 42	3 71	3 28	2 67	
		38 x 184	4 52	3 92	3 20	4 89	4 32	3 53	
		38 x 235	5 77	5 00	4 08	6 24	5 51	4 50	
			38 x 286	7 02	6 08	4 96	6 71	5 48	
	No 2	38 x 89	2 11	1 84	1 50	2 28	2 03	1 66	
		38 x 140	3 06	2 65	2 16	3 38	2 93	2 39	
		38 x 184	4 04	3 50	2 85	4 46	3 86	3 15	
38 x 235		5 15	4 46	3 64	5 69	4 92	4 02		
		38 x 286	6 27	5 43	4 43	5 99	4 89		
No 3	38 x 89	1 57	1 36	1 11	1 73	1 50	1 22		
	38 x 140	2 31	2 00	1 63	2 55	2 21	1 80		
	38 x 184	3 05	2 64	2 16	3 37	2 92	2 38		
	38 x 235	3 89	3 37	2 75	4 30	3 72	3 04		
		38 x 286	4 74	4 10	3 35	4 53	3 69		
Construction	38 x 89	1 80	1 56	1 27	1 99	1 72	1 40		
Standard	38 x 89	1 34	1 16	0 95	1 48	1 28	1 05		
Utility	38 x 89	0 92	0 79	0 65	1 01	0 87	0 71		

Continued on next page

Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 2.5 AND 2.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 2.5 kN/m ²			LIVE LOAD 2.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Northern Species (includes any Canadian soft-wood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2.19	1.99	1.72	2.36	2.14	1.87
		38 x 140	3.44	3.06	2.50	3.71	3.37	2.76
		38 x 184	4.54	4.04	3.30	4.89	4.44	3.64
		38 x 235	5.79	5.15	4.21	6.24	5.66	4.64
		38 x 286	7.04	6.27	5.12	7.58	6.89	5.65
	No 1	38 x 89	2.19	1.95	1.59	2.36	2.14	1.75
		38 x 140	3.27	2.83	2.31	3.61	3.13	2.55
		38 x 184	4.32	3.74	3.05	4.76	4.12	3.37
		38 x 235	5.51	4.77	3.89	6.08	5.26	4.30
		38 x 286	6.70	5.80	4.74	7.39	6.40	5.23
	No. 2	38 x 89	2.04	1.76	1.44	2.25	1.95	1.59
		38 x 140	2.94	2.54	2.08	3.24	2.81	2.29
		38 x 184	3.87	3.35	2.74	4.27	3.70	3.02
		38 x 235	4.94	4.28	3.49	5.46	4.72	3.86
		38 x 286	6.01	5.21	4.25	6.64	5.75	4.69
	No 3	38 x 89	1.51	1.31	1.07	1.67	1.44	1.18
		38 x 140	2.21	1.92	1.56	2.44	2.12	1.73
		38 x 184	2.92	2.53	2.06	3.22	2.79	2.28
		38 x 235	3.73	3.23	2.63	4.11	3.56	2.91
		38 x 286	4.54	3.93	3.21	5.00	4.33	3.54
	Construction	38 x 89	1.73	1.50	1.22	1.91	1.66	1.35
Standard	38 x 89	1.30	1.12	0.92	1.43	1.24	1.01	
Utility	38 x 89	0.88	0.76	0.62	0.97	0.84	0.69	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	2.22	2.02	1.76	2.39	2.17	1.90
		38 x 140	3.49	3.15	2.57	3.76	3.42	2.84
		38 x 184	4.61	4.16	3.39	4.96	4.51	3.74
		38 x 235	5.88	5.30	4.33	6.33	5.75	4.78
		38 x 286	7.15	6.45	5.27	7.70	7.00	5.81
	No 1	38 x 89	2.22	2.00	1.64	2.39	2.17	1.80
		38 x 140	3.39	2.93	2.39	3.74	3.23	2.64
		38 x 184	4.46	3.87	3.16	4.93	4.27	3.48
		38 x 235	5.70	4.93	4.03	6.29	5.44	4.44
		38 x 286	6.93	6.00	4.90	7.65	6.62	5.41
	No. 2	38 x 89	2.11	1.83	1.49	2.31	2.02	1.65
		38 x 140	3.04	2.63	2.15	3.35	2.90	2.37
		38 x 184	4.01	3.47	2.83	4.42	3.83	3.12
		38 x 235	5.11	4.43	3.61	5.64	4.88	3.99
		38 x 286	6.22	5.38	4.40	6.86	5.94	4.85
	No 3	38 x 89	1.57	1.36	1.11	1.73	1.50	1.22
		38 x 140	2.31	2.00	1.63	2.55	2.21	1.80
		38 x 184	3.05	2.64	2.16	3.37	2.92	2.38
		38 x 235	3.89	3.37	2.75	4.30	3.72	3.04
		38 x 286	4.74	4.10	3.35	5.23	4.53	3.69
	Construction	38 x 89	1.79	1.55	1.26	1.97	1.71	1.39
Standard	38 x 89	1.34	1.16	0.95	1.48	1.28	1.05	
Utility	38 x 89	0.92	0.79	0.65	1.01	0.87	0.71	

Table A-9
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 1.5 AND 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²			LIVE LOAD 1.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	38 x 89	2.97	2.69	2.35	3.40	3.09	2.69
		38 x 140	4.66	4.24	3.70	5.34	4.85	4.24
		38 x 184	6.15	5.59	4.88	7.04	6.40	5.59
		38 x 235	7.85	7.13	6.23	8.98	8.16	7.13
		38 x 286	9.54	8.67	7.57	10.93	9.93	8.67
	No 1	38 x 89	2.97	2.69	2.35	3.40	3.09	2.69
		38 x 140	4.66	4.24	3.57	5.34	4.85	4.20
		38 x 184	6.15	5.59	4.71	7.04	6.40	5.54
		38 x 235	7.85	7.13	6.01	8.98	8.16	7.07
		38 x 286	9.54	8.67	7.31	10.93	9.93	8.60
	No 2	38 x 89	2.87	2.60	2.23	3.28	2.98	2.60
		38 x 140	4.51	3.93	3.21	5.16	4.63	3.78
		38 x 184	5.94	5.19	4.23	6.81	6.10	4.98
		38 x 235	7.59	6.62	5.40	8.68	7.79	6.36
38 x 286		9.23	8.05	6.57	10.56	9.47	7.73	
No 3	38 x 89	2.33	2.02	1.65	2.74	2.38	1.94	
	38 x 140	3.44	2.98	2.43	4.04	3.50	2.86	
	38 x 184	4.53	3.92	3.20	5.33	4.62	3.77	
	38 x 235	5.78	5.01	4.09	6.81	5.89	4.81	
	38 x 286	7.03	6.09	4.97	8.28	7.17	5.85	
Construction	38 x 89	2.67	2.31	1.89	3.14	2.72	2.22	
Standard	38 x 89	2.01	1.74	1.42	2.36	2.04	1.67	
Utility	38 x 89	1.37	1.18	0.96	1.61	1.39	1.14	
Hem-Fir (includes Western Hemlock and Amabilis Fir)	Select structural	38 x 89	2.86	2.60	2.27	3.27	2.97	2.60
		38 x 140	4.49	4.06	3.32	5.15	4.67	3.90
		38 x 184	5.93	5.36	4.37	6.78	6.16	5.15
		38 x 235	7.56	6.84	5.58	8.66	7.87	6.57
		38 x 286	9.20	8.32	6.79	10.53	9.57	7.99
	No 1	38 x 89	2.86	2.58	2.11	3.27	2.97	2.48
		38 x 140	4.36	3.77	3.08	5.13	4.44	3.63
		38 x 184	5.75	4.98	4.06	6.76	5.86	4.78
		38 x 235	7.33	6.35	5.18	8.63	7.47	6.10
		38 x 286	8.92	7.73	6.31	10.50	9.09	7.42
	No 2	38 x 89	2.70	2.34	1.91	3.16	2.76	2.25
		38 x 140	3.91	3.39	2.76	4.60	3.98	3.25
		38 x 184	5.16	4.46	3.64	6.07	5.25	4.29
		38 x 235	6.58	5.70	4.65	7.74	6.71	5.47
38 x 286		8.00	6.93	5.66	9.42	8.16	6.66	
No 3	38 x 89	2.01	1.74	1.42	2.36	2.04	1.67	
	38 x 140	2.97	2.57	2.10	3.49	3.02	2.47	
	38 x 184	3.91	3.39	2.76	4.60	3.99	3.25	
	38 x 235	4.99	4.32	3.53	5.87	5.09	4.15	
	38 x 286	6.07	5.26	4.29	7.15	6.19	5.05	
Construction	38 x 89	2.31	2.00	1.63	2.72	2.35	1.92	
Standard	38 x 89	1.73	1.50	1.22	2.04	1.76	1.44	
Utility	38 x 89	1.18	1.02	0.83	1.39	1.21	0.98	

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Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 1.5 AND 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²			LIVE LOAD 1.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm <i>m</i>	400 mm <i>m</i>	600 mm <i>m</i>	300 mm <i>m</i>	400 mm <i>m</i>	600 mm <i>m</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	38 x 89	2.72	2 47	2 16	3 12	2 83	2 47
		38 x 140	4 28	3 89	3 40	4 90	4 45	3 89
		38 x 184	5 65	5 13	4 48	6 46	5 87	5 13
		38 x 235	7 21	6 55	5 72	8 25	7 49	6 55
		38 x 286	8 76	7 96	6 95	10 03	9 12	7 96
	No 1	38 x 89	2.72	2 47	2 16	3 12	2 83	2 47
		38 x 140	4 28	3 89	3 40	4 90	4 45	3 89
		38 x 184	5 65	5 13	4 48	6 46	5 87	5 13
		38 x 235	7 21	6 55	5 72	8 25	7 49	6 55
		38 x 286	8 76	7 96	6 95	10 03	9 12	7 96
	No 2	38 x 89	2 62	2 38	2 08	3 01	2 73	2 38
		38 x 140	4 13	3 75	3 08	4 73	4 29	3 63
		38 x 184	5 44	4 94	4 06	6 23	5 66	4 78
		38 x 235	6 95	6 31	5 18	7 95	7 22	6 10
38 x 286		8 45	7 68	6 31	9 67	8 79	7 42	
No 3	38 x 89	2 25	1 95	1 59	2 65	2 29	1 87	
	38 x 140	3 30	2 86	2 33	3 88	3 36	2 74	
	38 x 184	4 35	3 77	3 07	5 12	4 43	3 62	
	38 x 235	5 55	4 81	3 92	6 53	5 66	4 62	
	38 x 286	6 75	5 85	4 77	7 95	6 88	5 62	
Construction	38 x 89	2 53	2 23	1 82	2 90	2 63	2 15	
Standard	38 x 89	1 91	1 65	1 35	2 25	1 95	1 59	
Utility	38 x 89	1 33	1 15	0 94	1 57	1 36	1 11	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, and Coast Sitka Spruce)	Select structural	38 x 89	2 86	2 60	2 26	3 27	2 97	2 60
		38 x 140	4 49	4 02	3 28	5 15	4 67	3 86
		38 x 184	5 93	5 30	4 33	6 78	6 16	5 09
		38 x 235	7 56	6 76	5 52	8 66	7 87	6 50
		38 x 286	9 20	8 23	6 72	10 53	9 57	7 90
	No 1	38 x 89	2 86	2 56	2 09	3 27	2 97	2 46
		38 x 140	4 31	3 73	3 04	5 07	4 39	3 58
		38 x 184	5 68	4 92	4 01	6 68	5 79	4 72
		38 x 235	7 24	6 27	5 12	8 53	7 38	6 03
		38 x 286	8 81	7 63	6 23	10 37	8 98	7 33
	No 2	38 x 89	2 67	2 31	1 89	3 14	2 72	2 22
		38 x 140	3 85	3 33	2 72	4 53	3 92	3 20
		38 x 184	5 08	4 40	3 59	5 98	5 17	4 22
		38 x 235	6 48	5 61	4 58	7 62	6 60	5 39
		38 x 286	7 88	6 82	5 57	9 27	8 03	6 56
	No 3	38 x 89	1 98	1 72	1 40	2 33	2 02	1 65
		38 x 140	2 93	2 53	2 07	3 44	2 98	2 43
		38 x 184	3 86	3 34	2 73	4 54	3 93	3 21
		38 x 235	4 93	4 26	3 48	5 80	5 02	4 10
38 x 286		5 99	5 19	4 23	7 05	6 11	4 98	
Construction	38 x 89	2 27	1 96	1 60	2 67	2 31	1 89	
Standard	38 x 89	1 70	1 47	1 20	2 00	1 74	1 42	
Utility	38 x 89	1 18	1 02	0 83	1 39	1 21	0 98	

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Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 1.5 AND 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²			LIVE LOAD 1.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm	400 mm	600 mm	300 mm	400 mm	600 mm
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce) Jack Pine Lodgepole Pine Balsam Fir and Alpine Fir)	Select structural	38 x 89	2 69	2 45	2 14	3 09	2 80	2 45
		38 x 140	4 24	3 85	3 21	4 85	4 41	3 78
		38 x 184	5 59	5 08	4 23	6 40	5 81	4 98
		38 x 235	7 13	6 48	5 40	8 16	7 41	6 36
		38 x 286	8 67	7 88	6 57	9 93	9 02	7 73
	No 1	38 x 89	2 69	2 45	2 04	3 09	2 80	2 40
		38 x 140	4 22	3 66	2 99	4 85	4 30	3 51
		38 x 184	5 57	4 82	3 94	6 40	5 68	4 63
		38 x 235	7 11	6 15	5 02	8 16	7 24	5 91
		38 x 286	8 64	7 49	6 11	9 93	8 81	7 19
	No 2	38 x 89	2 60	2 26	1 85	2 98	2 67	2 18
		38 x 140	3 79	3 28	2 68	4 46	3 86	3 15
		38 x 184	5 00	4 33	3 53	5 88	5 09	4 16
		38 x 235	6 38	5 52	4 51	7 50	6 50	5 31
38 x 286		7 76	6 72	5 48	9 13	7 90	6 45	
No 3	38 x 89	1 96	1 70	1 38	2 31	2 00	1 63	
	38 x 140	2 89	2 50	2 04	3 40	2 94	2 40	
	38 x 184	3 81	3 30	2 69	4 48	3 88	3 17	
Construction	38 x 89	4 86	4 21	3 43	5 72	4 95	4 04	
	38 x 286	5 91	5 12	4 18	6 95	6 02	4 92	
	38 x 89	2 23	1 93	1 57	2 62	2 27	1 85	
	38 x 89	1 67	1 45	1 18	1 97	1 71	1 39	
Utility	38 x 89	1 14	0 99	0 81	1 35	1 16	0 95	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	38 x 89	2 59	2 36	2 06	2 97	2 70	2 36
		38 x 140	4 08	3 71	3 24	4 67	4 24	3 71
		38 x 184	5 38	4 89	4 27	6 16	5 59	4 89
		38 x 235	6 86	6 24	5 45	7 86	7 14	6 24
		38 x 286	8 35	7 58	6 63	9 56	8 68	7 58
	No 1	38 x 89	2 59	2 36	2 06	2 97	2 70	2 36
		38 x 140	4 08	3 70	3 02	4 67	4 24	3 56
		38 x 184	5 38	4 88	3 99	6 16	5 59	4 69
		38 x 235	6 86	6 23	5 09	7 86	7 14	5 99
		38 x 286	8 35	7 58	6 19	9 56	8 68	7 29
	No 2	38 x 89	2 51	2 28	1 87	2 87	2 61	2 20
		38 x 140	3 82	3 31	2 70	4 50	3 89	3 18
		38 x 184	5 04	4 36	3 56	5 93	5 13	4 19
		38 x 235	6 43	5 57	4 54	7 56	6 55	5 35
		38 x 286	7 82	6 77	5 53	9 20	7 97	6 51
	No 3	38 x 89	1 96	1 70	1 38	2 31	2 00	1 63
		38 x 140	2 89	2 50	2 04	3 40	2 94	2 40
		38 x 184	3 81	3 30	2 69	4 48	3 88	3 17
		38 x 235	4 86	4 21	3 43	5 72	4 95	4 04
Construction	38 x 286	5 91	5 12	4 18	6 95	6 02	4 92	
	38 x 89	2 25	1 95	1 59	2 65	2 29	1 87	
	38 x 89	1 67	1 45	1 18	1 97	1 71	1 39	
	38 x 89	1 14	0 99	0 81	1 35	1 16	0 95	

Continued on next page

Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 1.5 AND 1.0 kN/m²)

Commercial Designation	Grade	Nominal Size, <i>mm</i>	LIVE LOAD 1.5 kN/m ²			LIVE LOAD 1.0 kN/m ²		
			Rafter Spacing			Rafter Spacing		
			300 mm <i>m</i>	400 mm <i>m</i>	600 mm <i>m</i>	300 mm <i>m</i>	400 mm <i>m</i>	600 mm <i>m</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	38 x 89	2.59	2.36	2.06	2.97	2.70	2.36
		38 x 140	4.08	3.71	3.12	4.67	4.24	3.67
		38 x 184	5.38	4.89	4.11	6.16	5.59	4.84
		38 x 235	6.86	6.24	5.25	7.86	7.14	6.18
		38 x 286	8.35	7.58	6.38	9.56	8.68	7.51
	No. 1	38 x 89	2.59	2.36	1.98	2.97	2.70	2.33
		38 x 140	4.08	3.54	2.89	4.67	4.16	3.40
		38 x 184	5.38	4.66	3.81	6.16	5.49	4.48
		38 x 235	6.86	5.95	4.86	7.86	7.00	5.72
		38 x 286	8.35	7.24	5.91	9.56	8.52	6.95
	No. 2	38 x 89	2.51	2.20	1.80	2.87	2.59	2.11
		38 x 140	3.67	3.17	2.59	4.31	3.74	3.05
		38 x 184	4.83	4.18	3.42	5.69	4.93	4.02
		38 x 235	6.17	5.34	4.36	7.26	6.29	5.13
38 x 286		7.50	6.50	5.30	8.83	7.65	6.24	
No. 3	38 x 89	1.89	1.63	1.33	2.22	1.92	1.57	
	38 x 140	2.76	2.39	1.95	3.25	2.82	2.30	
Construction	38 x 184	3.64	3.16	2.58	4.29	3.71	3.03	
	38 x 235	4.65	4.03	3.29	5.47	4.74	3.87	
Standard	38 x 286	5.66	4.90	4.00	6.66	5.77	4.71	
	38 x 89	2.16	1.87	1.53	2.55	2.20	1.80	
Utility	38 x 89	1.62	1.40	1.14	1.90	1.65	1.35	
	38 x 89	1.10	0.95	0.78	1.30	1.12	0.92	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	38 x 89	2.64	2.39	2.09	3.02	2.74	2.39
		38 x 140	4.14	3.76	3.21	4.74	4.31	3.76
		38 x 184	5.46	4.96	4.23	6.26	5.68	4.96
		38 x 235	6.97	6.33	5.40	7.98	7.25	6.33
		38 x 286	8.48	7.70	6.57	9.71	8.82	7.70
	No. 1	38 x 89	2.64	2.39	2.04	3.02	2.74	2.39
		38 x 140	4.14	3.66	2.99	4.74	4.30	3.51
		38 x 184	5.46	4.82	3.94	6.26	5.68	4.63
		38 x 235	6.97	6.15	5.02	7.98	7.24	5.91
		38 x 286	8.48	7.49	6.11	9.71	8.81	7.19
	No. 2	38 x 89	2.54	2.28	1.86	2.91	2.64	2.19
		38 x 140	3.79	3.28	2.68	4.46	3.86	3.15
		38 x 184	5.00	4.33	3.53	5.88	5.09	4.16
		38 x 235	6.38	5.52	4.51	7.50	6.50	5.31
		38 x 286	7.76	6.72	5.48	9.13	7.90	6.45
	No. 3	38 x 89	1.96	1.70	1.38	2.31	2.00	1.63
		38 x 140	2.89	2.50	2.04	3.40	2.94	2.40
		38 x 184	3.81	3.30	2.69	4.48	3.88	3.17
38 x 235		4.86	4.21	3.43	5.72	4.95	4.04	
38 x 286		5.91	5.12	4.18	6.95	6.02	4.92	
Construction	38 x 89	2.23	1.93	1.57	2.62	2.27	1.85	
Standard	38 x 89	1.67	1.45	1.18	1.97	1.71	1.39	
Utility	38 x 89	1.14	0.99	0.81	1.35	1.16	0.95	

Table A-10
MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN ONE FLOOR IN HOUSES

Commercial Designation	Grade	Supported Joist Length, (l) m	Size of Built-Up Beam, mm					
			3-38 x 184	4-38 x 184	3-38 x 235	4-38 x 235	3-38 x 286	4-38 x 286
			m	m	m	m	m	m
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	No 1	2.4	3.70	4.27	4.72	5.45	5.74	6.63
		3.0	3.31	3.82	4.22	4.87	5.13	5.93
		3.6	3.02	3.49	3.85	4.45	4.69	5.41
		4.2	2.76	3.23	3.53	4.12	4.29	5.01
		4.8	2.46	3.02	3.14	3.85	3.82	4.69
	No 2	2.4	3.33	3.84	4.24	4.90	5.16	5.96
		3.0	2.97	3.44	3.79	4.38	4.62	5.33
		3.6	2.71	3.14	3.46	4.00	4.22	4.87
		4.2	2.51	2.90	3.20	3.70	3.90	4.51
		4.8	2.35	2.71	3.00	3.46	3.65	4.22
Hem-Fir (includes Western Hemlock and Amabilis Fir)	No 1	2.4	3.19	3.69	4.10	4.71	4.96	5.72
		3.0	2.85	3.30	3.64	4.21	4.43	5.12
		3.6	2.61	3.01	3.33	3.84	4.05	4.67
		4.2	2.30	2.79	2.93	3.56	3.57	4.33
		4.8	2.06	2.61	2.62	3.33	3.19	4.05
	No 2	2.4	2.86	3.31	3.65	4.22	4.45	5.13
		3.0	2.56	2.96	3.27	3.77	3.98	4.59
		3.6	2.34	2.70	2.98	3.45	3.63	4.19
		4.2	2.16	2.50	2.76	3.19	3.36	3.88
		4.8	2.02	2.34	2.58	2.98	3.14	3.63
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	No 1	2.4	3.56	4.11	4.54	5.25	5.53	6.38
		3.0	3.18	3.68	4.06	4.69	4.94	5.71
		3.6	2.91	3.36	3.71	4.28	4.51	5.21
		4.2	2.69	3.11	3.43	3.97	4.18	4.82
		4.8	2.46	2.91	3.14	3.71	3.82	4.51
	No 2	2.4	3.19	3.69	4.07	4.71	4.96	5.72
		3.0	2.85	3.30	3.64	4.21	4.43	5.12
		3.6	2.61	3.01	3.33	3.84	4.05	4.67
		4.2	2.41	2.79	3.08	3.56	3.75	4.33
		4.8	2.26	2.61	2.88	3.33	3.50	4.05
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir and Coast Sitka Spruce)	No 1	2.4	3.15	3.64	4.02	4.65	4.90	5.65
		3.0	2.64	3.26	3.37	4.16	4.10	5.06
		3.6	2.26	2.89	2.88	3.69	3.51	4.49
		4.2	1.99	2.53	2.54	3.23	3.09	3.93
		4.8	1.79	2.26	2.28	2.88	2.77	3.51
	No 2	2.4	2.82	3.26	3.60	4.16	4.38	5.06
		3.0	2.52	2.91	3.22	3.72	3.92	4.52
		3.6	2.26	2.66	2.88	3.39	3.51	4.13
		4.2	1.99	2.46	2.54	3.14	3.09	3.82
		4.8	1.79	2.26	2.28	2.88	2.77	3.51
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	No 1	2.4	3.09	3.57	3.95	4.56	4.80	5.55
		3.0	2.77	3.19	3.53	4.08	4.30	4.96
		3.6	2.44	2.92	3.11	3.72	3.79	4.53
		4.2	2.14	2.70	2.74	3.45	3.33	4.19
		4.8	1.92	2.44	2.45	3.11	2.98	3.79
	No 2	2.4	2.78	3.21	3.54	4.09	4.31	4.98
		3.0	2.48	2.87	3.17	3.66	3.85	4.45
		3.6	2.26	2.62	2.89	3.34	3.52	4.06
		4.2	2.10	2.42	2.68	3.09	3.26	3.76
		4.8	1.92	2.26	2.45	2.89	2.98	3.52
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	No 1	2.4	3.13	3.62	4.00	4.62	4.86	5.62
		3.0	2.80	3.24	3.58	4.13	4.35	5.02
		3.6	2.56	2.95	3.26	3.77	3.97	4.59
		4.2	2.26	2.73	2.88	3.49	3.51	4.25
		4.8	2.02	2.56	2.58	3.26	3.14	3.97
	No 2	2.4	2.80	3.23	3.57	4.12	4.34	5.02
		3.0	2.50	2.89	3.19	3.69	3.88	4.49
		3.6	2.28	2.64	2.91	3.37	3.55	4.10
		4.2	2.11	2.44	2.70	3.12	3.28	3.79
		4.8	1.98	2.27	2.52	2.91	3.07	3.55

Continued on next page

Table A-10 (Cont'd)

**MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN ONE FLOOR IN HOUSES**

Commercial Designation	Grade	Supported Joist Length, ⁽¹⁾ <i>m</i>	Size of Built-Up Beam, mm					
			3-38 x 184	4-38 x 184	3-38 x 235	4-38 x 235	3-38 x 286	4-38 x 286
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	No. 1	2.4	2.99	3.45	3.82	4.41	4.64	5.36
		3.0	2.64	3.09	3.37	3.94	4.10	4.80
		3.6	2.26	2.82	2.88	3.60	3.51	4.38
		4.2	1.99	2.53	2.54	3.23	3.09	3.93
		4.8	1.79	2.26	2.28	2.88	2.77	3.51
	No. 2	2.4	2.68	3.10	3.43	3.96	4.17	4.81
		3.0	2.40	2.77	3.07	3.54	3.73	4.30
		3.6	2.19	2.53	2.80	3.23	3.40	3.93
		4.2	1.99	2.34	2.54	2.99	3.09	3.64
		4.8	1.79	2.19	2.28	2.80	2.77	3.40
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	No. 1	2.4	3.09	3.57	3.95	4.56	4.80	5.55
		3.0	2.69	3.19	3.44	4.08	4.18	4.96
		3.6	2.30	2.92	2.94	3.72	3.58	4.53
		4.2	2.03	2.58	2.59	3.29	3.15	4.01
		4.8	1.82	2.30	2.32	2.94	2.83	3.58
	No. 2	2.4	2.78	3.21	3.54	4.09	4.31	4.98
		3.0	2.48	2.87	3.17	3.66	3.85	4.45
		3.6	2.26	2.62	2.89	3.34	3.52	4.06
		4.2	2.03	2.42	2.59	3.09	3.15	3.76
		4.8	1.82	2.26	2.32	2.89	2.83	3.52

Note to Table A-10:

(1) See Appendix A.

Table A-11
MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN TWO FLOORS IN HOUSES

Commercial Designation	Grade	Supported Joist Length, (1) m	Size of Built-Up Beam, mm					
			3-38 x 184	4-38 x 184	3-38 x 235	4-38 x 235	3-38 x 286	4-38 x 286
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	No 1	2.4	2.78	3.24	3.55	4.13	4.32	5.03
		3.0	2.30	2.90	2.93	3.70	3.57	4.50
		3.6	1.97	2.51	2.52	3.21	3.07	3.90
		4.2	1.74	2.20	2.23	2.81	2.71	3.42
		4.8	1.57	1.97	2.01	2.52	2.44	3.07
	No 2	2.4	2.52	2.91	3.21	3.72	3.92	4.52
		3.0	2.26	2.61	2.87	3.33	3.50	4.05
		3.6	1.97	2.38	2.52	3.04	3.07	3.69
		4.2	1.74	2.20	2.23	2.81	2.71	3.42
		4.8	1.57	1.97	2.01	2.52	2.44	3.07
Hem-Fir (includes Western Hemlock and Amabilis Fir)	No 1	2.4	2.31	2.80	2.95	3.57	3.59	4.34
		3.0	1.92	2.44	2.45	3.12	2.99	3.79
		3.6	1.66	2.10	2.12	2.68	2.58	3.25
		4.2	1.48	1.85	1.89	2.36	2.29	2.87
		4.8	1.34	1.66	1.71	2.12	2.08	2.58
	No 2	2.4	2.17	2.51	2.77	3.20	3.37	3.89
		3.0	1.92	2.24	2.45	2.86	2.99	3.48
		3.6	1.66	2.05	2.12	2.62	2.58	3.18
		4.2	1.48	1.85	1.89	2.36	2.29	2.87
		4.8	1.34	1.66	1.71	2.12	2.08	2.58
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	No 1	2.4	2.70	3.12	3.45	3.98	4.19	4.84
		3.0	2.30	2.79	2.93	3.56	3.57	4.33
		3.6	1.97	2.51	2.52	3.21	3.07	3.90
		4.2	1.74	2.20	2.23	2.81	2.71	3.42
		4.8	1.57	1.97	2.01	2.52	2.44	3.07
	No 2	2.4	2.42	2.80	3.09	3.56	3.76	4.34
		3.0	2.16	2.51	2.76	3.19	3.36	3.88
		3.6	1.97	2.28	2.52	2.91	3.07	3.54
		4.2	1.74	2.11	2.23	2.70	2.71	3.28
		4.8	1.57	1.97	2.01	2.52	2.44	3.07
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir and Coast Sitka Spruce)	No 1	2.4	2.00	2.55	2.55	3.25	3.11	3.95
		3.0	1.67	2.11	2.14	2.69	2.60	3.28
		3.6	1.45	1.82	1.86	2.32	2.26	2.82
		4.2	1.30	1.61	1.66	2.06	2.02	2.50
		4.8	1.18	1.45	1.51	1.86	1.84	2.26
	No 2	2.4	2.00	2.47	2.55	3.15	3.11	3.84
		3.0	1.67	2.11	2.14	2.69	2.60	3.28
		3.6	1.45	1.82	1.86	2.32	2.26	2.82
		4.2	1.30	1.61	1.66	2.06	2.02	2.50
		4.8	1.18	1.45	1.51	1.86	1.84	2.26
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Balsam Fir and Alpine Fir)	No 1	2.4	2.16	2.71	2.75	3.46	3.35	4.21
		3.0	1.80	2.28	2.30	2.91	2.79	3.53
		3.6	1.56	1.96	1.99	2.50	2.42	3.04
		4.2	1.39	1.73	1.77	2.21	2.16	2.69
		4.8	1.26	1.56	1.61	1.99	1.96	2.42
	No 2	2.4	2.10	2.43	2.69	3.10	3.27	3.77
		3.0	1.80	2.17	2.30	2.77	2.79	3.38
		3.6	1.56	1.96	1.99	2.50	2.42	3.04
		4.2	1.39	1.73	1.77	2.21	2.16	2.69
		4.8	1.26	1.56	1.61	1.99	1.96	2.42
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	No 1	2.4	2.27	2.74	2.90	3.50	3.53	4.26
		3.0	1.89	2.40	2.41	3.06	2.94	3.73
		3.6	1.64	2.06	2.09	2.63	2.54	3.20
		4.2	1.45	1.82	1.86	2.32	2.26	2.82
		4.8	1.32	1.64	1.68	2.09	2.05	2.54
	No 2	2.4	2.12	2.45	2.71	3.13	3.29	3.81
		3.0	1.89	2.19	2.41	2.80	2.94	3.40
		3.6	1.64	2.00	2.09	2.55	2.54	3.11
		4.2	1.45	1.82	1.86	2.32	2.26	2.82
		4.8	1.32	1.64	1.68	2.09	2.05	2.42

Continued on next page

Table A-11 (Cont'd)

**MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN TWO FLOORS IN HOUSES**

Commercial Designation	Grade	Supported Joist Length, (1) m	Size of Built-Up Beam, mm					
			3-38 x 184	4-38 x 184	3-38 x 235	4-38 x 235	3-38 x 286	4-38 x 286
			<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>	<i>m</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	No 1	2.4	2.00	2.55	2.55	3.25	3.11	3.95
		3.0	1.67	2.11	2.14	2.69	2.60	3.28
		3.6	1.45	1.82	1.86	2.32	2.26	2.82
		4.2	1.30	1.61	1.66	2.06	2.02	2.50
		4.8	1.18	1.45	1.51	1.86	1.84	2.26
	No 2	2.4	2.00	2.35	2.55	3.00	3.11	3.65
		3.0	1.67	2.10	2.14	2.68	2.60	3.26
		3.6	1.45	1.82	1.86	2.32	2.26	2.82
		4.2	1.30	1.61	1.66	2.06	2.02	2.50
		4.8	1.18	1.45	1.51	1.86	1.84	2.26
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	No. 1	2.4	2.04	2.60	2.60	3.32	3.17	4.03
		3.0	1.70	2.15	2.18	2.75	2.65	3.34
		3.6	1.48	1.85	1.89	2.37	2.30	2.88
		4.2	1.32	1.64	1.69	2.09	2.05	2.55
		4.8	1.20	1.48	1.53	1.89	1.87	2.30
	No 2	2.4	2.04	2.43	2.60	3.10	3.17	3.77
		3.0	1.70	2.15	2.18	2.75	2.65	3.34
		3.6	1.48	1.85	1.89	2.37	2.30	2.88
		4.2	1.32	1.64	1.69	2.09	2.05	2.55
		4.8	1.20	1.48	1.53	1.89	1.87	2.30

Note to Table A-11:
(1) See Appendix A.

Table A-12
MAXIMUM CLEAR SPANS BETWEEN END SUPPORTS
FOR FINK TRUSSES, m

Top Member Size, mm	Bottom Member Size, mm	Roof Slope	No. 1 Grade Lumber				No. 2 Grade Lumber			
			Roof Snow Load, kN/m ²				Roof Snow Load, kN/m ²			
			1.0	1.5	2.0	2.5	1.0	1.5	2.0	2.5
38 x 89	38 x 89	1 in 4.8	6.75	4.87	—	—	5.84	4.01	—	—
		1 in 4	9.57	8.12	6.01	4.54	8.02	7.13	5.18	3.78
		1 in 3	9.60	8.83	7.62	6.75	8.91	7.69	6.60	5.84
		1 in 2.4	9.80	9.04	7.79	6.93	9.11	7.87	6.78	6.01
	38 x 114	1 in 4.8	7.74	5.74	3.78	—	6.75	4.85	—	—
		1 in 4	9.27	8.53	7.06	5.48	8.58	7.36	6.14	4.67
		1 in 3	9.60	8.83	7.62	6.75	8.91	7.69	6.60	5.84
		1 in 2.4	9.80	9.04	7.79	6.93	9.11	7.87	6.78	6.01
	38 x 140	1 in 4.8	8.50	6.35	4.39	—	7.44	5.46	3.47	—
		1 in 4	9.27	8.53	7.28	5.89	8.58	7.36	6.29	5.08
		1 in 3	9.60	8.83	7.62	6.75	8.91	7.69	6.60	5.84
		1 in 2.4	9.80	9.04	7.79	6.93	9.11	7.87	6.78	6.01
38 x 114	38 x 89	1 in 4.8	7.97	5.91	3.96	—	6.95	5.02	—	—
		1 in 4	9.57	8.66	7.18	5.56	8.02	7.16	6.24	4.77
		1 in 3	10.54	9.75	8.81	7.97	8.96	8.20	7.31	6.57
		1 in 2.4	11.20	9.90	9.65	8.89	9.57	8.91	8.10	7.41
	38 x 114	1 in 4.8	9.27	6.98	4.95	3.30	8.12	6.04	4.08	—
		1 in 4	11.91	10.23	8.48	6.68	10.31	9.24	7.44	5.79
		1 in 3	12.19	10.64	9.14	8.66	10.74	9.24	8.48	7.49
		1 in 2.4	12.19	10.89	9.39	8.91	10.99	9.49	8.71	7.74
	38 x 140	1 in 4.8	10.23	7.79	5.63	4.08	9.01	6.78	4.77	—
		1 in 4	11.91	10.23	9.11	7.23	10.31	9.47	8.05	6.29
		1 in 3	12.19	10.64	9.14	8.66	10.74	9.47	8.48	7.49
		1 in 2.4	12.19	10.89	9.39	8.91	10.99	9.49	8.71	7.74
38 x 140	38 x 89	1 in 4.8	8.89	6.73	4.72	—	7.39	5.81	3.86	—
		1 in 4	9.57	8.66	7.62	6.35	8.02	7.16	6.24	5.48
		1 in 3	10.54	9.75	8.81	7.97	8.96	8.20	7.31	6.57
		1 in 2.4	11.20	10.49	9.65	8.89	9.57	8.91	8.10	7.41
	38 x 114	1 in 4.8	10.46	7.97	5.79	4.24	9.22	6.95	4.92	3.27
		1 in 4	12.19	11.12	9.62	7.64	10.33	9.24	8.02	6.68
		1 in 3	12.19	12.19	11.17	9.90	11.50	10.54	9.42	8.45
		1 in 2.4	12.19	12.19	11.48	10.18	12.19	11.45	9.98	9.44
	38 x 140	1 in 4.8	11.68	8.96	6.60	5.00	10.33	7.84	5.68	4.14
		1 in 4	12.19	12.19	10.43	8.33	12.19	10.82	9.22	7.31
		1 in 3	12.19	12.19	11.17	9.90	12.19	11.30	9.67	9.16
		1 in 2.4	12.19	12.19	11.48	10.18	12.19	11.60	9.98	9.44
Column 1	2	3	4	5	6	7	8	9	10	11

Table A-13
MAXIMUM CLEAR SPANS BETWEEN END SUPPORTS
FOR HOWE TRUSSES, m

Top Member Size, mm	Bottom Member Size, mm	Roof Slope	No. 1 Grade Lumber				No. 2 Grade Lumber			
			Roof Snow Load, kN/m ²				Roof Snow Load, kN/m ²			
			1.0	1.5	2.0	2.5	1.0	1.5	2.0	2.5
38 x 89	38 x 89	1 in 4.8	9.44	7.31	5.48	4.24	8.30	6.45	4.77	3.63
		1 in 4	9.44	8.50	7.28	6.42	8.55	7.36	6.27	5.53
		1 in 3	9.57	8.83	7.59	6.73	8.89	7.67	6.57	5.84
		1 in 2.4	9.77	9.04	7.79	6.93	9.09	7.87	6.78	6.01
	38 x 114	1 in 4.8	9.62	8.15	6.17	4.82	8.30	7.11	5.41	4.19
		1 in 4	9.62	8.50	7.28	6.42	8.55	7.36	6.27	5.53
		1 in 3	9.62	8.83	7.59	6.73	8.89	7.67	6.57	5.84
		1 in 2.4	9.77	9.04	7.79	6.93	9.09	8.87	6.78	6.01
	38 x 140	1 in 4.8	9.62	8.25	7.03	5.63	8.30	7.11	6.04	4.92
		1 in 4	9.62	8.50	7.28	6.42	8.55	7.36	6.27	5.53
		1 in 3	9.62	8.83	7.59	6.73	8.89	7.67	6.57	5.84
		1 in 2.4	9.77	9.04	7.79	6.93	9.09	7.87	6.78	6.01
38 x 114	38 x 89	1 in 4.8	10.18	8.28	6.27	4.92	8.35	7.16	5.48	4.26
		1 in 4	11.20	9.85	8.45	7.34	9.27	8.07	6.83	5.89
		1 in 3	12.19	10.64	9.14	8.66	10.64	9.22	8.28	7.28
		1 in 2.4	12.19	10.89	9.37	8.89	10.97	9.47	8.71	7.72
	38 x 114	1 in 4.8	11.53	9.37	7.13	5.66	9.95	8.30	6.27	4.92
		1 in 4	11.88	10.21	9.37	8.28	10.28	9.44	8.07	7.11
		1 in 3	12.19	10.64	9.37	8.66	10.71	9.44	8.45	7.49
		1 in 2.4	12.19	10.89	9.37	8.89	10.97	9.47	8.71	7.72
	38 x 140	1 in 4.8	11.53	9.90	8.35	6.68	9.95	9.14	7.39	5.86
		1 in 4	11.88	10.21	9.37	8.28	10.28	9.44	8.07	7.11
		1 in 3	12.19	10.64	9.37	8.66	10.71	9.44	8.45	7.49
		1 in 2.4	12.19	10.89	9.37	8.89	10.97	9.47	8.71	7.72
38 x 140	38 x 89	1 in 4.8	10.18	8.73	6.90	5.46	8.35	7.16	5.96	4.74
		1 in 4	11.20	9.85	8.45	7.34	9.27	8.07	6.83	5.89
		1 in 3	12.19	11.48	10.10	8.96	10.64	9.52	8.28	7.28
		1 in 2.4	12.19	12.19	11.35	10.18	11.60	10.59	9.39	8.40
	38 x 114	1 in 4.8	12.19	10.31	7.89	6.29	10.74	9.16	6.95	5.51
		1 in 4	12.19	12.19	10.69	9.42	11.91	10.38	8.78	7.59
		1 in 3	12.19	12.19	11.17	9.90	12.19	11.27	9.67	9.16
		1 in 2.4	12.19	12.19	11.45	10.18	12.19	11.58	9.95	9.44
	38 x 140	1 in 4.8	12.19	12.09	9.34	7.51	12.16	10.41	8.30	6.62
		1 in 4	12.19	12.19	10.69	9.42	12.19	10.79	9.19	8.68
		1 in 3	12.19	12.19	11.17	9.90	12.19	11.27	9.67	9.16
		1 in 2.4	12.19	12.19	11.45	10.18	12.19	11.58	9.95	9.44
Column 1	2	3	4	5	6	7	8	9	10	11

APPENDIX A

EXPLANATORY MATERIAL

for

RESIDENTIAL STANDARDS 1980

(Appendix A contains explanatory material that applies to the requirements of these Standards. The bold-face reference numbers and letters that introduce each item apply to the requirements in the main body of the Section to which the explanatory material is applicable. The bold-face captions following these reference numbers describe the subjects to which the references apply.)

Definition for Suite

Tenancy in the context of the term suite applies to both rental and ownership tenure. In a condominium arrangement, for example, dwelling units are considered separate suites even though they are individually owned. In order to be of complementary use, a series of rooms that constitute a suite are in reasonably close proximity to each other and have access to each other either directly by means of a common doorway or indirectly by a corridor, vestibule or other similar arrangement.

The term suite does not apply to rooms such as service rooms, common laundry rooms and common recreational rooms that are not leased or under a separate tenure in the context of this Standard.

For certain requirements in this Standard, the expression, “room or suite” is used (e.g. travel distance). This means that the requirement applies within rooms of suites as well as to the suite itself and to rooms that may be located outside the suite. In other places the expression “suite, and rooms not located within a suite” is used (e.g. for the installation of smoke and heat detectors). This means that the requirement applies to individual suites as defined, but not to each room within the suite. The rooms “not within a suite” would include common laundry rooms, common recreational rooms and service rooms, that are not considered as tenant occupied space.

Article 3C(1) GRADE MARKING OF LUMBER

Lumber is generally marketed by grouping species in commercial species combinations as identified in the table entitled “Species Designations and Abbreviations.” The maximum allowable spans for these combinations are listed in the Span Tables for Joists, Rafters and Beams. Some species of lumber are also marketed individually. Since the allowable span for a commercial species combination is based on the weakest species in the combination, the use of the span is permitted for any individual species included in the combination.

Facsimiles of typical grade marks of lumber associations and grading agencies certified by the Canadian Lumber Standards (CLS) Administrative Board to grade mark lumber in Canada are shown in the table entitled “Facsimiles of Canadian Grade Marks.” Certification by the CLS Administrative Board applies to the inspection, grading and grade marking of lumber, including mill supervisory service, in accordance with CSA Standard O141-1970, “Softwood Lumber.”

The grade mark of a CLS certified agency on a piece of lumber indicates its assigned grade, species or species combination, moisture condition at the time of surfacing, the responsible grader or mill of origin and the CLS certified agency under whose supervision the grading and marking was done.

Canadian lumber is graded to the NLGA Standard Grading Rules for Canadian Lumber, published by the National Lumber Grades Authority. The NLGA rules specify standard grade names and grade name abbreviations for use in grade marks to provide positive identification of lumber grades. In a similar fashion standard species names or standard species abbreviations, symbols or marks are provided in the rules for use in grade marks.

Grade marks denote the moisture content of lumber at the time of surfacing. “S-DRY” in the mark indicates the lumber was surfaced at a moisture content not exceeding 19 per cent. “MC 15” indicates a moisture content not exceeding 15 per cent. “S-GRN” in the grade mark signifies that the lumber was surfaced at a moisture content higher than 19 per cent at a size to allow for natural shrinkage during seasoning.

Each mill or grader is assigned a permanent number. The point of origin of lumber is identified in the grade mark by use of a mill or grader number or by the mill name or abbreviation. The CLS certified agency under whose supervision the lumber was grade marked is identified in the mark by the registered symbol of the agency.

SPECIES DESIGNATIONS AND ABBREVIATIONS

Commercial Designations of Species or Species Combination	Abbreviation Permitted on Grade Stamps	Species Included
Douglas Fir-Larch	D Fir-L (N)	Douglas Fir, Western Larch
Hem-Fir	Hem-Fir (N)	Western Hemlock, Amabilis Fir
Spruce-Pine-Fir	S-P-F or Spruce-Pine-Fir	White Spruce, Engelmann Spruce, Black Spruce, Red Spruce, Lodgepole Pine, Jack Pine, Alpine Fir, Balsam Fir
Eastern Hemlock-Tamarack	Hem-Tam (N)	Eastern Hemlock, Tamarack
Western Cedars	W Cedar (N)	Pacific Coast Yellow Cedar, Western Red Cedar
Northern Aspen	N. Aspen	Aspen Poplar, Largetooth Aspen, Balsam Poplar
Coast Species	Coast Species	Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Coast Sitka Spruce
Northern Species	North Species	Any Canadian softwood covered by the NLGA Standard Grading Rules
Douglas Fir	D Fir (N)	Douglas Fir
Western Hemlock	W Hem (N)	Western Hemlock
Western Red Cedar	WR Cedar (N)	Western Red Cedar
Coast Sitka Spruce	C Sitka	Coast Sitka Spruce
Jack Pine	J Pine (N)	Jack Pine
Lodgepole Pine	L Pine (N)	Lodgepole Pine
Ponderosa Pine	P Pine	Ponderosa Pine
Red Pine	R Pine	Red Pine
Western White Pine	WW Pine	Western White Pine
Eastern White Pine	East Pine Pine (N) EW Pine (N)	Eastern White Pine
Alpine Fir	Alpine Fir (N)	Alpine Fir
Aspen Poplar	Aspen (N)	Aspen Poplar



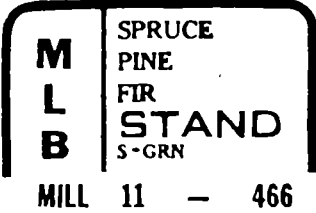


Article 3C(1) (Cont'd)

FACSIMILES OF CANADIAN GRADE MARKS

FACSIMILE OF GRADE MARK	ASSOCIATION OR AGENCY										
<p>A.F.P.A.[®] 00 S—P—F S-DRY STAND</p>	<p>Alberta Forest Products Assoc. 204 - 11710 Kingsway Avenue Edmonton, Alberta T5G 0X5</p>										
<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td colspan="2" style="text-align: center;">SEL STR</td> </tr> <tr> <td style="text-align: center;">SISA[®] EPINETTE PIN SAPIN</td> <td style="text-align: center;">ALIB[®] SPRUCE PINE FIP</td> </tr> <tr> <td colspan="2" style="text-align: center;">NOM ET/OU N° DU MOULIN MILL S NAME AND/OR NUMBER</td> </tr> <tr> <td style="text-align: center;">CLASS</td> <td style="text-align: center;">R1 1108 GRDR</td> </tr> <tr> <td style="text-align: center;">R VERT</td> <td style="text-align: center;">S GRN</td> </tr> </table>	SEL STR		SISA [®] EPINETTE PIN SAPIN	ALIB [®] SPRUCE PINE FIP	NOM ET/OU N° DU MOULIN MILL S NAME AND/OR NUMBER		CLASS	R1 1108 GRDR	R VERT	S GRN	<p>Service d'inspection des sciages de l'Atlantique Atlantic Lumber Inspection Bureau A Branch of Quebec Lumber Manufacturers Association 580 Grande-Allée Est Suite 540 Québec, Québec G1R 2K2</p>
SEL STR											
SISA [®] EPINETTE PIN SAPIN	ALIB [®] SPRUCE PINE FIP										
NOM ET/OU N° DU MOULIN MILL S NAME AND/OR NUMBER											
CLASS	R1 1108 GRDR										
R VERT	S GRN										
<p>CLA S-P-F 100 No. 1 S-GRN.</p>	<p>Canadian Lumbermen's Association 27 Goulburn Avenue Ottawa, Ontario K1N 8C7</p>										
<p>LMA[®] 1 S-GRN 1 1 D FIR-N</p>	<p>Cariboo Lumber Mfrs. Association 301 - 197 2nd Avenue North Williams Lake, B.C. V2G 1Z5</p>										
<p>W.F.I.[®] W.CEDAR S-GRN.-(N) 100 No 3</p>	<p>Council of Forest Industries of British Columbia 1500 - 1055 West Hastings Street Vancouver, B.C. V6E 2H1</p>										

Article 3C(1) (Cont'd)

FACSIMILES OF CANADIAN GRADE MARKS

FACSIMILE OF GRADE MARK	ASSOCIATION OR AGENCY
 <p>ILMA[®] S-DRY 1 00 S-P-F</p>	<p>Interior Lumber Manufacturers Association 295 - 333 Martin Street Penticton, B.C. V2A 5K7</p>
 <p>CFPA[®] 00 S-P-F S-DRY CONST</p>	<p>Central Forest Products Association 14-G 1975 Corydon Avenue Winnipeg, Manitoba R3P 0R1</p>
 <p>M L B SPRUCE PINE FIR STAND S-GRN MILL 11 - 466</p>	<p>Maritime Lumber Bureau P.O. Box 459 Amherst, Nova Scotia B4H 4A1</p>
 <p>NILA[®] 278 S-P-F 1 S-DRY</p>	<p>Northern Interior Lumber Sector 514 - 550 Victoria Street Prince George, B.C. V2L 2K1</p>
 <p>O.L.M.A.[®] 01-1 CONST. S-DRY SPRUCE - PINE - FIR</p>	<p>Ontario Lumber Manufacturers Association Suite 414 - 159 Bay Street Toronto, Ontario M5J 1J7</p>

Article 3C(1) (Cont'd)

FACSIMILES OF CANADIAN GRADE MARKS

FACSIMILE OF GRADE MARK	ASSOCIATION OR AGENCY
<p>S. T. B. (R) 101 S-P-F CONST. S-GRN</p>	<p>Saskatchewan Forest Products Corporation 550 First Avenue East Prince Albert, Saskatchewan S6V 2A5</p>
	<p>L'association des manufacturiers de bois de sciage du Québec Quebec Lumber Manufacturers Association 580 Grande-Allée Est Suite 540 Québec, Québec G1R 2K2</p>
<p>No 1 0 (M) S-DRY 0 D FIR (N) NLGA RULE</p>	<p>MacDonald Inspection 125 East 4th Avenue Vancouver, B.C. V5T 1G4</p>
<p>RLB (R) 00 NLGA RULE No 1 S - GRN HEM-FIR-N</p>	<p>Pacific Lumber Inspection Bureau Suite 1130 - 1411 Fourth Avenue Bldg. Seattle, Washington 98101 B.C. Division Office 1460 - 1055 West Hastings Street Vancouver, B.C. V6E 2G8</p>
 <p>10 CONST S-P-F S-GRN</p>	<p>N.W.T. Grade Stamping Agency P.O. Box 2157 Yellowknife, N.W.T. X0E 1J7</p>

Table 3B LUMBER GRADING

To identify board grades the paragraph number of the NLGA rules under which the lumber is graded must be shown in the grade mark. Paragraph 113 is equivalent to WWPA rules and paragraph 114 is equivalent to WCLIB rules. When graded in accordance with WWPA or WCLIB rules, the grade mark will not contain a paragraph number.

Table 4D CLASSIFICATION OF SOILS

Sand or gravel may be classified by means of a picket test in which a 38 mm by 38 mm picket bevelled at the end at 45° to a point is pushed into the soil. Such material is classified as “dense or compact” if a man of average weight cannot push the picket more than 200 mm into the soil and “loose” if the picket penetrates 200 mm or more.

Clay and silt may be classified as “stiff” if it is difficult to indent by thumb pressure, “firm” if it can be indented by moderate thumb pressure, “soft” if it can be easily penetrated by thumb pressure, where this test is carried out on undisturbed soil in the wall of a test pit.

Table 12A MINIMUM DEPTHS OF FOUNDATIONS

The requirements for clay soils or soils not clearly defined are intended to apply to those soils that are subject to significant volume changes with changes in soil moisture content.

Article 23D(1) SPAN TABLES FOR WOOD JOISTS AND RAFTERS**General**

In these span tables the term “rafter” refers to a sloping wood framing member which supports the roof sheathing and encloses an attic space but does not support a ceiling. The term “roof joist” refers to a horizontal or sloping wood framing member that supports the roof sheathing and the ceiling finish but does not enclose an attic space.

Where rafters or roof joists are intended for use in a locality having a higher design roof snow load than shown in the tables, the maximum member spacing may be calculated as the product of the member spacing and snow load shown in the span tables divided by the design roof snow load for the locality being considered. The following are examples of how this principle can be applied:

- (1) For a 3.0 kN/m² design snow load, use spans for 1.5 kN/m² and 600 mm o.c. spacing but space members 300 mm o.c., or use spans for 2.0 kN/m² and 600 mm o.c. spacing but space members 400 mm o.c.
- (2) For a 3.5 kN/m² design snow load, use spans for 2.5 kN/m² and 600 mm o.c. spacing but space members 400 mm o.c.
- (3) For a 4.0 kN/m² design snow load, use spans for 2.0 kN/m² and 600 mm o.c. spacing but space members 300 mm o.c.

Use of Tables

The allowable spans in the span tables are measured from face or edge of support to face or edge of support.

In the case of sloping roof framing members the spans are expressed in terms of the horizontal distance between supports rather than the length of the sloping member. The snow loads are also expressed in terms of the horizontal projection of the sloping roof. Spans for odd size lumber (i.e. 38 mm x 114 mm, 38 mm x 165 mm, etc.) may be estimated by straight line interpolation in the tables. Spans for 38 mm x 114 mm lumber of Construction, Standard or Utility grades may be 30 per cent greater than the spans listed for 38 mm x 89 mm lumber.

These span tables may be used where members support a uniform live load only. Where the members are required to be designed to support a concentrated load, they must be designed in conformance with Section 4.3 of the National Building Code of Canada 1980.

Spans for wood joists, rafters and beams which fall outside the scope of these tables, including those for U.S. species and individual species not marketed in the commercial species combinations described in the Span Tables, can be calculated in conformance with CSA O86-1976, “Code for the Engineering Design of Wood.”

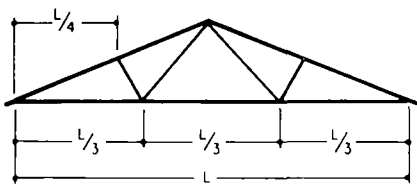
Table 23C and Article 23D(2) MAXIMUM SPANS FOR STEEL BEAMS SUPPORTING FLOORS IN DWELLINGS

A beam may be considered to be laterally supported if wood joists bear on its top flange at intervals of 600 mm or less over its entire length, if all the load being applied to this beam is transmitted through the joists and if 19 mm by 38 mm wood strips in contact with the top flange are nailed on both sides of the beam to the bottom of the joists supported. Other additional methods of positive lateral support are acceptable.

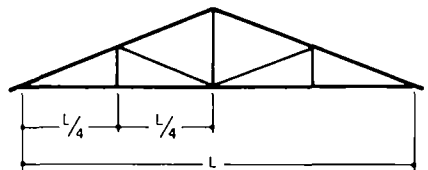
For supported joist lengths intermediate between those shown in the table, straightline interpolation may be used in determining the maximum beam span.

Article 23M(15) SPAN TABLES FOR WOOD ROOF TRUSSES

In these Tables the term "Fink" truss refers to the common "W" type truss and the term "Howe" truss refers to the type which has a vertical member extending from its peak. Schematic drawings of the simplest version of each type are shown in the following diagrams. Each type may have web members additional to those shown, so that the distances between panel points are decreased in these cases.



Fink Truss



Howe Truss

The span tables in this Appendix have been calculated for wood species equivalent in strength to Spruce, Balsam Fir, Lodgepole Pine, Ponderosa Pine and Alpine Fir. The spans can therefore be safely used for the stronger species such as Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir, Pacific Coast Yellow Cedar, Tamarack, Jack Pine and Eastern Hemlock. The spans are not appropriate for the weaker species which include Western Red Cedar, Red Pine, Western White Pine, Eastern White Pine, Poplar and Eastern White Cedar.

The spans are based on 600 mm o.c. truss spacing.

The span tables for wood roof trusses have been calculated for 1.0, 1.5, 2.0 and 2.5 kN/m² design roof snow loads, assuming the design roof snow load to be 60 per cent of the ground snow load, and are designed to meet the performance criteria in Article 23M(18). Originally, the criteria were based on a design snow load of 80 per cent of the ground snow load, using a factor of safety of 2.0. Subsequent roof snow load observations indicated a factor of 60 per cent of the ground snow load to be more appropriate, and in order to maintain the same degree of safety the factor of safety was increased from 2.0 to 2½. The following Table provides a comparison between the ground snow load and the roof snow load.

Roof snow load, kN/m ²	1.0	1.5	2.0	2.5
Equivalent ground snow load, kN/m ²	1.7	2.5	3.3	4.2

Where wood roof trusses are intended for use in a locality having a design roof snow load higher than shown in the Tables, the maximum truss spacing may be calculated as the product of the truss spacing and snow load in the span tables divided by the design snow load for the locality where the trusses are to be used. The following are examples of how this principle can be applied:

- (1) For 3.0 kN/m² design snow load, use spans for 1.5 kN/m² design snow load but space trusses 300 mm o.c., or use spans for 2.0 kN/m² design snow load but space trusses 400 mm o.c.
- (2) For 3.5 kN/m² design snow load, use spans for 2.5 kN/m² design snow load but space trusses 400 mm o.c.
- (3) For 4.0 kN/m² design snow load, use spans for 2.0 kN/m² but space trusses 300 mm o.c.

Where wood roof trusses are to be used in an area where the design roof snow load falls between the values shown in the Tables, the spans may be interpolated between the spans shown in the Tables. The truss spans in these Tables are valid only where the design live load on the bottom member does not exceed 0.5 kN/m² of ceiling area. This applies to trusses in buildings whose attic spaces have limited access through an access hatch and not to attics that are accessible by stairways. The spans do not apply to trusses which may be subject to concentrated loads such as those required to support hoisting equipment. In addition, the top members of the trusses must be constructed to prevent lateral buckling by the provision of roof sheathing or by other suitable bracing.

Article 23N(3) WATER ABSORPTION TEST

A method for determining water absorption is described in ASTM D 1037-72a, "Standard Methods of Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials." The treatment to reduce water absorption may be considered to be acceptable if a 300 mm x 300 mm sample when treated on all sides and edges does not increase in weight by more than 6 per cent when tested in the horizontal position.

Table 29B STUCCO LATH

Paper-backed welded wire lath may also be used on horizontal surfaces provided its characteristics are suitable for such application.

Tables A-10 and A-11 WOOD BEAMS

Supported joist length means $\frac{1}{2}$ the sum of the joist spans on both sides of the beam. For supported joist lengths intermediate between those shown in the tables, straight line interpolation may be used in determining the maximum beam span.

APPENDIX B

**IMPERIAL CONVERSION
OF
METRIC VALUES IN TEXT**

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Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
Table of Contents	600 m ²	6,458 sq ft	5E(6)	280 mm	11 in.
Preface	600 m ²	6,458 sq ft	5E(6)	210 mm	8¼ in.
1A(1)	600 m ²	6,458 sq ft	5E(6)	0.55 m ²	6 sq ft
3B(5)	14 MPa	2,030 psi	5E(6)	130 mm	5½ in.
3B(6)	20 MPa	2,900 psi	5F(1)	7 m ²	75 sq ft
3B(7)	100 mm	4 in.	5F(1)	6 m ²	65 sq ft
3B(7)	50 mm	2 in.	5F(1)	2 m	6 ft 7 in.
Table 3A	—	**	5F(2)	9.8 m ²	106 sq ft
3B(10)	5°C	41°F	5F(2)	8.8 m ²	95 sq ft
3B(10)	10°C	50°F	5F(2)	2.7 m	8 ft 10 in.
3B(10)	25°C	77°F	5F(3)	4.2 m ²	45 sq ft
Table 3B	114 mm	5 in.*	5F(3)	2 m	6 ft 7 in.
4B(1)	750 mm	30 in.	5F(4)	7 m ²	75 sq ft
Table 4A	—	**	5F(4)	4.6 m ²	50 sq ft
Table 4B	—	**	5F(4)	2 m	6 ft 7 in.
4C(1)	1 kN/m ²	21 psf	5G(1)	0.75 m ³	27 cu ft
4C(2)	4.3 m	14 ft 1 in.	5G(1)	1.5 m	4 ft 11 in.
4C(2)	1 kN/m ²	21 psf	5G(1)	9.8 m ²	106 sq ft
4C(3)	6 m	19 ft 8 in.	5G(2)	0.35 m ³	12 cu ft
4C(3)	12 m	39 ft 4 in.	5G(2)	1.5 m	4 ft 11 in.
4C(3)	600 mm	24 in.	5G(2)	7 m ²	75 sq ft
4C(4)	600 m ²	6,458 sq ft	5G(4)	2.5 m ²	27 sq ft
4F(1)	600 m ²	6,458 sq ft	5G(4)	1.25 m ²	13 sq ft
4F(2)	600 m ²	6,458 sq ft	5G(4)	300 mm	12 in.
4G(1)	1 m	39 in.	5G(4)	450 mm	18 in.
4G(1)	300 mm	12 in.	5G(5)	1.2 m	47 in.
4G(1)	25 mm	1 in.	5G(5)	300 mm	12 in.
Table 4D	—	**	5G(5)	600 mm	24 in.
4G(7)	480 kg/m ³	30 lb/cu ft	5H(3)	0.55 m ²	6 sq ft
Table 5A	—	**	5H(3)	300 mm	12 in.
5B(2)	2.15 m	7 ft 1 in.	5H(3)	2 m	6 ft 7 in.
5B(3)	2 m	6 ft 7 in.	5H(4)	2 m	6 ft 7 in.
5C(1)	13.5 m ²	145 sq ft	5H(5)	550 mm	22 in.
5C(1)	3 m	9 ft 10 in.	5H(5)	530 mm	21 in.
5C(1)	11 m ²	118 sq ft	5H(5)	350 mm	14 in.
5D(1)	3.25 m ²	35 sq ft	5H(5)	1.2 m	47 in.
5D(1)	7 m ²	75 sq ft	5H(6)	280 mm	11 in.
5D(2)	2.3 m	7 ft 7 in.	5H(6)	200 mm	7¾ in.
5D(3)	1.7 m	5 ft 7 in.	5I(1)	0.55 m ²	6 sq ft
5E(1)	4.2 m ²	45 sq ft	5I(1)	0.2 m ²	2 sq ft
5E(1)	3.7 m ²	40 sq ft	5I(2)	600 mm	24 in.
5E(2)	900 mm	35 in.	5I(3)	350 mm	14 in.
5E(3)	550 mm	22 in.	5I(3)	450 mm	18 in.
5E(3)	1.35 m ²	15 sq ft	5I(3)	300 mm	12 in.
5E(3)	1.8 m	5 ft 11 in.	5J(3)	530 mm	21 in.
5E(4)	550 mm	22 in.	5J(3)	450 mm	18 in.
5E(4)	1.0 m ²	11 sq ft	5J(3)	600 mm	24 in.
5E(4)	900 mm	35 in.	5J(4)	380 mm	15 in.
5E(5)	1.5 m ²	16 sq ft	5J(4)	450 mm	18 in.
5E(5)	1.1 m ²	12 sq ft	5J(5)	380 mm	15 in.
5E(5)	280 mm	11 in.	5J(5)	530 mm	21 in.
5E(5)	210 mm	8¼ in.	5J(5)	450 mm	18 in.
5E(6)	2 m ²	22 sq ft	5J(6)	300 mm	12 in.
5E(6)	2 m	6 ft 7 in.	5J(6)	450 mm	18 in.
5E(6)	1.5 m ²	16 sq ft	5J(7)	230 mm	9 in.

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
5J(7)	0.15 m ²	2 sq ft	Table 7B	—	**
5K(1)	860 mm	34 in.	7F(2)	1 070 mm	42 in.
5K(1)	4.3 mm	14 ft 1 in.	7F(4)	1 m	39 in.
5K(1)	710 mm	28 in.	8C(1)	230 mm	9 in.
5K(2)	1.1 m	—	8C(1)	200 mm	7 ⁷ / ₈ in.
5L(1)	900 mm	35 in.	8C(2)	200 mm	7 ⁷ / ₈ in.
5L(2)	760 mm	30 in.	8C(2)	210 mm	8 ¹ / ₄ in.
5L(2)	710 mm	28 in.	8C(2)	235 mm	9 ¹ / ₄ in.
5L(2)	900 mm	35 in.	8C(3)	200 mm	7 ⁷ / ₈ in.
5M(1)	5.65 m ³	200 cu ft	8C(3)	125 mm	4 ⁷ / ₈ in.
5M(1)	2.12 m ³	75 cu ft	8C(3)	230 mm	9 in.
5M(1)	1.8 m	5 ft 11 in.	8C(3)	250 mm	9 ⁷ / ₈ in.
5M(1)	1 2 m	47 in.	8C(3)	millimetres	inches
5M(2)	5 65 m ³	200 cu ft	8C(3)	45 000	70
5M(3)	4 25 m ³	150 cu ft	8C(3)	48 500	75
5M(3)	0.85 m ³	30 cu ft	8C(4)	250 mm	9 ⁷ / ₈ in.
5M(3)	1.8 m	5 ft 11 in.	8C(4)	25 mm	1 in.
5M(3)	600 mm	24 in.	8C(5)	900 mm	35 in.
5M(4)	5.5 m ²	59 sq ft	8C(6)	860 mm	34 in.
5M(4)	0.55 m ²	6 sq ft	8C(7)	1.95 m	6 ft 5 in.
5M(4)	22 m ²	237 sq ft	8C(7)	2.05 m	6 ft 5 in.
6A(3)	13 mm	1/2 in.	8D(1)	900 mm	35 in.
Table 6A	—	**	8D(1)	1 100 mm	43 in.
6C(2)	810 mm	32 in.	8D(5)	3.6 m	11 ft 10 in.
6C(2)	2 030 mm	6 ft 8 in.	8D(6)	1 95 m	6 ft 5 in.
6C(3)	760 mm	30 in.	8D(6)	2 05 m	6 ft 9 in.
6D(2)	35 mm	1 ³ / ₈ in.	8E(2)	200 mm	7 ⁷ / ₈ in.
6D(3)	45 mm	1 ³ / ₄ in.	8E(2)	150 mm	5 ⁷ / ₈ in.
6E(3)	45 mm	1 ³ / ₄ in.	8F(2)	300 mm	12 in.
6E(3)	35 mm	1 ³ / ₈ in.	8F(3)	900 mm	35 in.
6E(4)	35 mm	1 ³ / ₈ in.	8F(4)	900 mm	35 in.
6E(4)	25 mm	1 in.	8F(5)	1.5 m	4 ft 11 in.
Table 6B	—	**	8F(5)	900 mm	35 in.
6F(2)	500 mm	20 in.	8F(5)	300 mm	12 in.
6F(3)	0.5 m ²	5 sq ft	8F(6)	9 m	29 ft 6 in.
6F(3)	900 mm	35 in.	8F(6)	1 2 m	3 ft 11 in.
6G(1)	2.44 m	8 ft	8G(1)	1 100 mm	43 in.
6G(1)	4.27 m	14 ft	8G(4)	800 mm	31 in.
6G(1)	1.93 m	6 ft 4 in.	8G(4)	900 mm	35 in.
6G(1)	3.05 m	10 ft	8G(5)	40 mm	1 ¹ / ₂ in.
6G(1)	4.88 m	16 ft	8G(7)	100mm	3 ⁷ / ₈ in.
6G(1)	100 mm	4 in.	8G(8)	300 mm	12 in.
6G(2)	44 mm	1 ³ / ₄ in.	8H(1)	600 mm	24 in.
6G(2)	35 mm	1 ³ / ₈ in.	8H(3)	1 070 mm	42 in.
6G(3)	0 61 mm	0 24 in.	8H(4)	900 mm	35 in.
6G(3)	0.81 mm	0 32 in.	8H(4)	1 070 mm	42 in.
6H(1)	0 013 mm	0 0005 in.	8H(5)	800 mm	31 in.
6H(2)	89 mm	3 ¹ / ₂ in.	8H(5)	900 mm	35 in.
6H(2)	2.5 mm	8 ft 2 in.	8H(6)	150 mm	5 ⁷ / ₈ in.
6H(4)	76 mm	3 in.	8H(6)	1 070 mm	42 in.
6H(4)	2 0 mm	0.08 in.	8H(6)	600 mm	24 in.
6H(6)	1 8 m	5 ft 11 in.	8H(7)	100 mm	3 ⁷ / ₈ in.
Table 7A	0 37 m ²	4 sq ft	8H(8)	100 mm	3 ⁷ / ₈ in.
Table 7A	0-55 m ²	6 sq ft	8H(8)	900 mm	35 in.
Table 7A	600 mm	24 in.			

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
8I(1)	150 mm	5½ in	10F(2)	3 m	9 ft 10 in
8I(2)	90 mm	3½ in	10F(7)	3 m	9 ft 10 in
8I(2)	235 mm	9¼ in	10F(7)	1 m	39 in
8I(2)	25 mm	1 in	10F(8)	3 m	9 ft 10 in
8I(2)	38 mm	1½ in	10G(4)	1 8 m	5 ft 11 in
8I(2)	900 mm	35 in	10G(8)	1 070 mm	42 in
8I(2)	600 mm	24 in	10G(9)	600 m ²	6,458 sq ft
8I(2)	1 200 mm	47 in	10H(7)	25 mm	1 in
8I(3)	25 mm	1 in	10H(7)	160 cm ²	25 in ²
8I(3)	750 mm	30 in	10I(5)	400 m ²	4,305 sq ft
8I(3)	38 mm	1½ in	10J(7)	150 mm	5¾ in
8J(2)	200 mm	7¾ in	10J(7)	3 m	9 ft 10 in
9C(2)	4 6 m ²	50 sq ft	10J(10)	250°C	482°F
9C(3)	1 100 mm	43 in	10J(10)	645 cm ²	0 7 sq ft
9C(3)	900 mm	35 in	10K(6)	0 41 mm	0 016 in
9C(4)	1 100 mm	43 in	10K(6)	0 48 mm	0 019 in
9C(6)	millimetres	inches	10K(7)	750 mm	30 in
9C(6)	55	22	10K(12)	1 000 cm ²	1 sq ft
9C(6)	300 mm	12 in	10K(12)	1 m	39 in
9C(8)	2 15 m	7 ft 1 in	10L(3)	5 m	16 ft 5 in
9D(3)	0 8 m ²	9 sq ft	10L(4)	1 2 m	47 in
9D(5)	3 m	9 ft 10 in	10M(2)	45 mm	1¾ in
9E(6)	100 kPa	14 5 psig	10M(2)	6 mm	¼ in
9F(2)	50 mm	2 in	10M(2)	3 mm	¼ in
9F(2)	550 mm	22 in	10M(3)	45 mm	1¾ in
9F(3)	750 mm	30 in	10M(3)	38 mm	1½ in
9F(4)	1 980 mm	6 ft 6 in	10M(5)	6 mm	¼ in
9F(5)	2 030 mm	6 ft 8 in	10M(5)	1 35 mm	0 053 m
9F(5)	810 mm	32 in	10M(5)	20 mm	¾ in
9F(5)	600 mm	24 in	10M(8)	11 m ²	118 sq ft
9F(5)	1 200 mm	47 in	10M(8)	3 7 m	12 ft 2 in
9F(7)	300 mm	12 in	10M(14)	1 47 mm	0 058 in
9F(8)	150 mm	5¾ in	10M(14)	1 59 mm	¼ in
9F(13)	90 N	20 lb	10M(14)	30°C	54°F
9G(3)	6 m	19 ft 8 in	10M(15)	760°C	1,400°F
9G(3)	645 cm ²	1 ft ²	10M(15)	130 cm ²	20 sq in
9G(4)	100 m ²	1,076 sq ft	10M(15)	1 2 m	47 in
9G(4)	15 m	49 ft 3 in	10M(16)	760°C	1,400°F
9H(2)	30 m	98 ft	10M(16)	500 mm	20 in
9H(2)	45 m	148 ft	10M(18)	45 mm	1¾ in
9H(5)	5 m	16 ft 5 in	Table 10C	—	**
9H(5)	15 m	49 ft 3 in	10N(5)	9 m	29 ft 6 in
9I(2)	1 m	39 in	10N(7)	1 2 m	47 in
9I(2)	0 55 m	22 in	10N(7)	0 6 m	2 ft
9I(2)	7 m	23 ft	10N(8)	0 6 m	2 ft
9J(5)	20 mm	¾ in	10N(9)	3 m	9 ft 10 in
9J(5)	150 mm	5¾ in	10O(2)	3 m	9 ft 10 in
9J(5)	115 mm	4½ in	10O(4)	300 m ²	3,229 sq ft
9K(4)	10 lx	1 foot candle	10O(4)	20 m	65 ft 7 in
9K(4)	1 W/m ²	1 W/10 sq ft	10O(5)	20 m	65 ft 7 in
10C(4)	1 2 m	47 in	10O(6)	0 91 mm	0 036 in
10D(3)	2 m	6 ft 7 in	10O(6)	6 mm	¼ in
10D(3)	900 cm ²	1 sq ft	10O(6)	12 7 mm	½ in
10D(3)	130 cm ²	20 sq in	10O(6)	12 mm	½ in
10F(2)	2 mm	6 ft 7 in	10O(6)	19 mm	1 in *

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
10O(6)	38 mm	2 in.*	15D(1)	2.5 m	8 ft 2 in.
10S(1)	1 100 mm	43 m.	15D(2)	1.2 m	47 in
10S(1)	550 mm	22 in.	15D(3)	150 mm	5 ⁷ / ₈ in
10S(1)	900 mm	35 in.	15D(4)	350 mm	14 in.
10S(3)	25 m	82 ft	15D(4)	90 mm	3 ¹ / ₂ in.
10S(3)	1 100 mm	43 in.	15D(5)	90 mm	3 ¹ / ₂ in.
10S(3)	550 mm	22 in	15D(5)	200 mm	7 ⁷ / ₈ in.
10S(3)	900 mm	35 in.	15D(5)	900 mm	35 in.
Table 11A	—	**	15D(7)	25 m	82 ft
Table 11B	—	**	15D(7)	15 m	49 ft 3 in.
12A(1)	300 mm	12 m.	15E(1)	50 mm	2 in.
Table 12A	1 2 m	47 in.	15E(1)	38 mm x 89 mm	2 m. x 4 in.*
12B(5)	50 m ²	538 sq ft	15E(1)	12 mm	½ in.
12C(3)	600 mm	24 in.	15E(2)	190 mm	8 in.*
12C(3)	250 mm	9 ⁷ / ₈ in	15E(3)	140 mm	6 in.*
12D(1)	10 MPa	1 450 psi	15E(3)	90 mm	4 in.*
13C(1)	6 mm	¼ in	15E(3)	290 mm	12 in.*
13D(1)	75 mm	3 m	15E(3)	200 mm	8 in.*
13E(1)	6 mm	¼ m	15G(3)	600 mm	2 ft
13E(3)	0 05 mm	0.002 m.	15G(5)	50 m ²	538 sq ft
13E(3)	100 mm	3 ⁷ / ₈ in	15G(5)	150 mm	5 ⁷ / ₈ in
13F(2)	0 15 mm	0 006 in.	15G(8)	150 mm	5 ⁷ / ₈ in
13F(2)	Type S	45 lb	15G(10)	75 mm	3 in
13F(2)	100 mm	3 ⁷ / ₈ in.	15G(10)	600 mm	24 in
13F(3)	0.05 mm	0.002 in.	15G(10)	150 m ²	1,615 sq ft
14C(2)	100 mm	3 ⁷ / ₈ in	15G(10)	1 m	39 in.
14C(4)	6 mm	¼ m.	15G(10)	300 mm	12 in.
14C(4)	10 mm	¾ in.	15G(12)	3 m	9 ft 10 in.
14C(4)	0 10 mm	0.004 in	15G(13)	300 mm	12 in
14C(5)	150 mm	5 ⁷ / ₈ in	15G(14)	140 mm x 140 mm	6 in x 6 in.*
14C(5)	4 mm	No 4 sieve		125 mm	4 ⁷ / ₈ in.
14D(1)	4 mm	No. 4 sieve	16B(1)	2 mm	No 10 sieve
14D(2)	125 mm	4 ⁷ / ₈ in	16B(1)	125 mm	4 ⁷ / ₈ in
14D(2)	300 mm	12 in.	16B(2)	2 mm	No. 10 sieve
14D(4)	125 mm	4 ⁷ / ₈ in	16E(1)	75 mm	3 in.
14E(2)	750 mm	30 in.	16F(1)	75 mm	3 in
14E(2)	0.25 m ²	2.7 sq ft	16F(1)	20 mm	¾ in
14E(3)	5 m	16 ft 5 in	16F(2)	150 mm	5 ⁷ / ₈ m
15B(1)	14 MPa	2 030 psi	16G(2)	50 mm	2 in
15B(2)	7.5 MPa	1 088 psi	17A(1)	5 m	16 ft 5 in.
15B(2)	12 5 MPa	1 813 psi	17A(1)	2 4 kN/m ²	50 psf
15B(5)	3.5 m	11 ft 6 in.	17C(1)	73 mm	2 ⁷ / ₈ in.
15B(5)	4 3 m	14 ft 1 in.	17C(1)	4.76 mm	¾ in
15C(3)	4.9 m	16 ft 1 in	17C(3)	100 mm	4 in. x 4 in.*
15C(3)	2 4 kN/m ²	50 psf	17C(3)	6.35 mm	¼ in
Table 15A	—	**	17D(1)	184 mm	8 in.*
15C(5)	65 mm	2½ in.	17D(1)	140 mm x 140 mm	6 in. x 6 in.*
15C(6)	130 mm	5 ¹ / ₈ in	17D(2)	38 mm	2 in.*
15C(7)	100 mm	3 ⁷ / ₈ in.	17D(2)	9.52 mm	¾ in.
15C(9)	200 mm	7 ⁷ / ₈ in.	17D(2)	450 mm	18 in.
15C(9)	5.5 m	18 ft 1 in.	17D(2)	76 mm	3 in
15C(9)	100 mm	3 ⁷ / ₈ in	17D(2)	300 mm	12 in
15C(9)	2.7 m	8 ft 10 in	17D(2)	0 05 mm	0.002 in.
15C(10)	100 mm	3 ⁷ / ₈ in.	17D(3)		
Table 15B	—	**			

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
17D(3)	Type S	45 lb	20G(2)	190 mm	8 in.*
17E(2)	290 mm x 290 mm	12 in. x 12 in.*	20G(3)	190 mm	8 in *
17E(2)	240 mm x 380 mm	10 in. x 16 in.*	20G(3)	100 mm	3 7/8 in.
17F(2)	200 mm x 200 mm	7 7/8 in. x 7 7/8 in.	20G(3)	750 mm	30 in
17F(2)	230 mm	9 in	20G(3)	500 mm	20 in
18B(1)	500 mm	20 in.	20G(4)	600 mm	24 in
18B(1)	700 mm	28 in.	20H(1)	50 mm	2 in.*
18B(1)	550 mm	22 in.	20H(1)	38 mm	2 in.*
18B(1)	900 mm	35 in.	20H(2)	57 mm	2 1/4 in.
18C(2)	0.1 m ²	1 sq ft	20H(2)	38 mm	2 in.*
18C(2)	50 m ²	538 sq ft	20H(2)	50 mm	2 in.
18D(1)	300 mm	12 in.	20H(3)	90 mm	3 1/2 in.
18D(1)	450 mm	18 in.	20H(3)	40 mm	1 5/8 in.
18D(2)	600 mm	24 in	20H(4)	190 mm	8 in.*
18D(2)	900 mm	35 in	20H(4)	50 mm	2 in.
18F(1)	50 mm	2 in.	20H(4)	300 mm	11 3/4 in.
18F(1)	10 MPa	1,450 psi	20H(4)	100 mm	4 in *
18F(1)	Type S	45 lb	20H(4)	290 mm	12 in.*
18F(1)	0.10 mm	0 004 in.	20H(5)	30 mm	1 1/8 in.
18F(1)	100 mm	3 7/8 in.	20I(1)	3.76 mm	0.148 in
19B(3)	38 mm x 38 mm	2 in. x 2 in *	20I(1)	460 mm	18 in.
19B(3)	25 mm	1 in	20I(1)	150 mm	5 7/8 in
19C(1)	600 mm	24 in	20I(3)	600 mm	24 in.
19C(1)	550 mm	22 in.	20I(3)	900 mm	35 in
19C(1)	900 mm	35 in.	20I(3)	90 mm	3 1/2 in.
19C(1)	550 mm	22 in	20I(5)	17.8 mm ²	0.028 sq in
19C(1)	700 mm	28 in	20I(5)	50 mm	2 in.
20A(1)	11 m	36 ft 1 in.	20I(6)	25 mm	1 in
Table 20A	—	**	20I(7)	300 mm	12 in
20D(1)	12 mm	1/2 in.	20I(7)	900 mm	35 in.
20D(1)	20 mm	3/4 in.	20I(7)	460 mm	18 in.
Table 20C	—	**	20I(8)	600 mm	24 in.
20F(1)	140 mm	5 1/2 in.	20I(8)	100 mm	3 7/8 in.
20F(1)	2.8 m	9 ft 2 in	20I(8)	900 mm	35 in.
20F(1)	4.6 m	15 ft 1 in	20I(8)	300 mm	12 in
20F(1)	190 mm	7 1/2 in.	20I(8)	460 mm	18 in.
20F(1)	90 mm	3 1/2 in	20I(8)	75 mm	3 in
20F(2)	90 mm	3 1/2 in	20I(9)	0.41 mm	0.016 in.
20F(2)	50 mm	2 in.	20I(9)	22 mm	7/8 in.
20F(2)	75 mm	3 in.	Table 20D	—	**
20F(2)	100 mm	3 7/8 in.	20I(11)	3.76 mm	0.148 in.
20F(2)	230 mm	9 in.	20I(11)	75 mm	3 in
20F(2)	7.6 m	24 ft 11 in.	20I(11)	600 mm	24 in.
20F(2)	330 mm	13 in	20I(11)	190 mm	8 in.
20F(2)	6 m	19 ft 8 in	20I(11)	150 mm	5 7/8 in.
20F(4)	65 mm	2 1/2 in.	20K(1)	2 m	6ft 7 in.
20F(5)	75 mm	3 in.	20K(1)	1 m	39 in.
20F(5)	11 m	36 ft 1 in.	20K(1)	40 mm	1 1/2 in.
20F(5)	25 mm	1 in.	20K(1)	4.76 mm	3/16 in
20F(5)	90 mm	3 1/2 in	20K(2)	4.76 mm	3/16 in.
20F(7)	300 mm	12 in	20K(2)	40 mm	1 1/2 in.
20G(1)	500 mm	20 in.	20K(2)	800 mm	31 mm
			20K(3)	4.76 mm	3/16 in.
			20K(3)	900 mm	35 in.
			20K(4)	12.7 mm	1/2 in.

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
20K(4)	2.4 m	7 ft 10 in.	21F(5)	230 mm	9 in.
20K(4)	90 mm	3½ in.	Table 21C	—	**
20K(4)	38 mm	2 in.*	21F(6)	290 mm	12 in.*
20K(5)	90 mm	3½ in.	22B(1)	50 mm	2 in.
20K(6)	300 mm	12 in.	22B(1)	25 mm	1 in.
20L(1)	25 mm	1 in.	22C(1)	190 mm	7½ in.
20L(2)	25 mm	1 in.	22C(1)	50 mm	2 in.
20L(3)	25 mm	1 in.	22C(1)	140 mm	5½ in.
20L(3)	90 mm	3½ in.	22C(2)	90 mm	3½ in.
20L(3)	12 mm	½ in.	22C(2)	190 mm	7½ in.
20M(1)	1.73 mm	0.068 in.	22E(1)	400 mm	16 in.
20M(1)	0.33 mm	0.013 in.	22E(1)	200 mm	7¾ in.
20M(1)	0.36 mm	0.014 in.	22E(2)	140 mm	5½ in.
20M(1)	0.46 mm	0.018 in.	22E(2)	100 mm	3¾ in.
20M(1)	0.48 mm	0.019 in.	22G(2)	190 mm	7½ in.
20M(2)	1.73 mm	0.068 in.	22G(2)	140 mm	5½ in.
20M(2)	0.33 mm	0.013 in.	22I(1)	150 mm	5¾ in.
20M(2)	0.36 mm	0.014 in.	22I(1)	38 mm	1½ in.
20M(2)	0.46 mm	0.018 in.	22I(1)	300 mm	11¾ in.
20M(2)	Type S	45 lb	22I(2)	50 mm	2 in.
20M(2)	0.15 mm	0.006 in.	22I(3)	100 mm	3¾ in.
20M(2)	0.05 mm	0.002 in.	22I(3)	50 mm	2 in.
20M(6)	25 mm	1 in.	22I(4)	50 mm	2 in.
20M(7)	150 mm	5¾ in.	22I(4)	25 mm	1 in.
20N(1)	600 mm	24 in.	23A(1)	600 mm	24 in.
20O(1)	100 mm	3¾ in.	23A(2)	2.4 kN/m ²	50 psf
20O(4)	25 mm	1 in.	23A(3)	2.4 kN/m ²	50 psf
20Q(1)	5°C	41°F	23B(2)	12 mm	½ in.
21A(1)	12 m	39 ft 4 in.	23B(3)	0.05 mm	0.002 in.
21A(1)	813 cm ²	130 sq in.	23B(3)	Type S	45 lb
21A(1)	120 kW	409,458 Btu/hr	23B(3)	150 mm	5¾ in.
Table 21A	—	**	Table 23A	—	**
21B(5)	225 mm	8¾ in.	23C(4)	50 mm	2 in.
21B(5)	200 mm	7¾ in.	23C(4)	0.41 mm	0.016 in.
21B(5)	300 mm	12 in.	23C(4)	1.2 m	47 in.
21C(2)	15.9 mm	¾ in.	23C(4)	63 mm	2½ in.
21C(2)	1100°C	2,012°F	Table 23B	—	**
21C(4)	190 mm	7½ in.	23C(5)	1.6 mm	0.063 in.
21C(6)	200 mm	7¾ in.	23C(5)	9.5 mm	¾ in.
21C(6)	50 mm	2 in.	23C(5)	3.2 mm	0.126 in.
21D(4)	900 mm	35 in.	23C(5)	11.1 mm	7/16 in.
21D(4)	600 mm	24 in.	Tables A-1 to	—	**
21D(4)	3 m	9 ft 10 in.	A-11	—	**
21D(4)	200 mm	7¾ in.	Table 23C	—	**
21D(5)	25 mm	1 in.	23E(1)	50 mm	2 in.
21D(7)	75 mm	3 in.	23E(3)	40 mm	1½ in.
21D(8)	75 mm	3 in.	23E(4)	50 mm	2 in.
21D(8)	90 mm	3½ in.	23F(2)	12.7 mm	½ in.
Table 21B	—	**	23F(2)	2.4 m	7 ft 10 in.
21F(1)	50 mm	2 in.	23F(2)	100 mm	3¾ in.
21F(1)	12 mm	½ in.	23F(4)	4.3 m	14 ft 1 in.
21F(2)	150 mm	5¾ in.	23F(4)	12.7 mm	½ in.
21F(4)	12 mm	½ in.	23F(4)	500 N/m	34 lb/in ft
21F(5)	450 mm	18 in.	23G(1)	38 mm x 89 mm	2 in. x 4 in.*
21F(5)	400°C	752°F	23G(2)	25 mm	1 in.

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
23H(1)	89 mm	3½ in	23L(1)	38 mm	2 in.*
23H(3)	38 mm	2 in.*	23L(2)	38 mm	2 in.*
23H(4)	150 mm	5¾ in.	23L(3)	82 mm	3¼ in
23H(6)	38 mm	2 in.*	23L(3)	450 mm	18 in
23H(6)	89 mm	3½ in	23L(4)	38 mm x 64 mm	2 in x 3 in.*
23H(6)	450 mm	18 in.	23L(4)	4.9 m	16 ft 1 in.
23H(6)	100 mm	3⅞ in	23L(4)	9.8 m	32 ft 2 in.
23H(6)	150 mm	5¾ in	23L(4)	89 mm	4 in.*
23H(7)	38 mm	2 in.*	23L(4)	38 mm	2 in.*
23H(7)	12.7 mm	½ in	Table 23E	—	**
23H(7)	1.2 m	47 in	23L(5)	38 mm x 69 mm	2 in. x 3 in *
23H(7)	600 mm	24 in.	23L(5)	64 mm	3 in *
23I(1)	38 mm	1½ in.	23L(5)	38 mm	2 in *
23I(1)	19 mm x 89 mm	1 in x 4 in.*	23L(5)	19 mm	¾ in.
23I(3)	38 mm x 64 mm	2 in x 3 in *	23L(5)	2.4 m	7 ft 10 in.
23I(3)	38 mm x 38 mm	2 in. x 2 in.*	23M(3)	38 mm	1½ in.
23I(3)	89 mm	3½ in	23M(4)	17.5 mm	⅞ in.
23I(4)	38 mm x 38 mm	2 in x 2 in *	23M(4)	200 mm	7⅞ in
23I(4)	6.3 mm	¼ in.	23M(4)	75 mm	3 in
23I(4)	600 mm	24 in.	23M(4)	0.41 mm	0.016 in.
23I(4)	12 mm	½ in.	23M(4)	1.2 m	47 in
23I(5)	2.1 m	6 ft 11 in.	23M(4)	63 mm	2½ in
23I(5)	19 mm x 64 mm	1 in. x 3 in.*	23M(6)	50 mm	2 in
23I(5)	38 mm x 38 mm	2 in. x 2 in *	23M(6)	38 mm	1½ in
23I(5)	25 mm x 3.2 mm	1 in. x ⅛ in	23M(7)	38 mm x 89 mm	2 in x 4 in.*
23I(5)	19 mm x 89 mm	1 in. x 4 in.*	23M(7)	2.4 m	7 ft 10 in.
23I(6)	1.2 m	47 in	23M(7)	19 mm x 89 mm	1 in x 4 in *
23I(6)	3.2 m	10 ft 6 in	23M(8)	38 mm x 89 mm	2 in. x 4 in *
23I(7)	800 mm	31 in	23M(10)	38 mm x 140 mm	2 in. x 6 in *
23I(7)	2.0 m	6 ft 7 in.	23M(10)	1.2 m	47 in.
23I(9)	1.8 m	5 ft 11 in	23M(10)	38 mm x 89 mm	2 in x 4 in *
23I(9)	200 mm	7⅞ in.	Table 23F	—	**
23I(9)	38 mm x 89 mm	2 in. x 4 in.*	23M(13)	25 mm	1 in
23I(9)	1.2 m	47 in	23M(14)	12.19 m	40 ft
23I(12)	900 mm	35 in.	23M(14)	600 mm	24 in
23I(12)	600 mm	24 in	23M(15)	600 mm	24 in
23I(13)	400 mm	16 in.	Tables A-12	—	**
23I(13)	38 mm x 184 mm	2 in x 8 in *	and A-13	—	**
23I(13)	600 mm	24 in	23M(16)	3.05 m	10 ft
23I(13)	38 mm x 235 mm	2 in x 10 in.*	23M(16)	38 mm x 114 mm	1 in x 5 in *
Table 23D	—	**	23M(16)	3.66 m	12 ft
23J(2)	2.1 m	6 ft 11 in	23M(16)	38 mm x 140 mm	1 in. x 6 in.*
23K(1)	38 mm	2 in *	23M(17)	1.83 m	6 ft
23K(1)	19 mm	¾ in.	23M(17)	19 mm x 89 mm	1 in x 4 in.*
23K(5)	50 mm	2 in	23M(17)	63 mm	2½ in.
23K(6)	75 mm	3 in	23M(17)	38 mm x 89 mm	2 in. x 4 in.*
23K(6)	150 mm	5¾ in	Table 23G	4.3 m	14 ft 1 m
23K(6)	0.91 mm	0.036 in.	23N(4)	38 mm x 38 mm	2 in. x 2 in.*
23K(6)	19 mm x 89 mm	1 in x 4 in *	Table 23H	—	**
23K(6)	300 mm	12 in.	23N(7)	19 mm	¾ in.
23K(6)	63 mm	2½ in	23N(7)	12.5 mm	½ in.
23K(8)	75 mm	3 in	23N(7)	12.7 mm	½ in
23K(8)	150 mm	5¾ in	23N(7)	600 mm	24 in
23K(8)	0.91 mm	0.036 in.	23N(7)	400 mm	16 in
23K(8)	63 mm	2½ in	23N(9)	184 mm	8 in.*

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
23O(3)	2 mm	1/16 in.	26D(7)	12 mm	1/2 in.
23O(4)	286 mm	12 in.*	26D(9)	12 mm	1/2 in.
23O(5)	38 mm x 38 mm	2 in. x 2 in.*	26D(9)	0.18 m ² x °C/W	1 ft ² · h · °F/Btu
Table 23I	—	**	26E(2)	6 ng/Pa x s x m	4 perm-inches
23O(7)	11.1 mm	7/16 in.	26E(6)	25 mm	1 in.
23O(7)	400 mm	16 in.	26E(6)	100 mm	3 7/8 in.
23O(7)	0 33 mm	0.013 in.	26E(13)	100 mm	3 7/8 in.
23O(7)	0 61 mm	0 024 in.	27B(2)	12 mm	1/2 in.
Table 23J	—	**	27B(2)	9 5 mm	3/8 in.
23P(3)	3.2 mm	0.126 in.	27B(2)	2.95 mm	0.0116 in.
23P(3)	11.1 mm	7/16 in.	27B(2)	4.8 mm	3/16 in.
23P(5)	2 mm	1/16 in.	27B(2)	2.0 mm	0.079 in.
23Q(4)	100 mm	3 7/8 in.	27B(3)	19 mm	3/4 in.
23Q(5)	150 mm	5 7/8 in.	27B(3)	1 6 mm	0 063 in.
23R(3)	19 mm x 89 mm	1 in. x 4 in.*	27B(3)	25 mm	1 in.
23R(3)	63 mm	2 1/2 in.	27B(3)	11 mm	7/16 in.
24A(1)	600 mm	24 in.	27B(3)	29 mm	1 1/8 in.
24C(1)	38 mm	2 in.*	27B(3)	9.5 mm	3/8 in.
24C(2)	200 mm	8 in.*	Table 27A	480 mm	19 in.
24D(3)	38 mm	1 1/2 in.	27D(1)	1.73 mm	0 068 in.
24E(2)	1 19 mm	0 047 in.	27D(1)	0.33 mm	0.013 in.
24E(3)	300 mm	12 in.	27D(1)	0 36 mm	0 014 in.
24E(3)	9 5 mm	3/8 in.	27D(1)	0.46 mm	0 018 in.
24E(3)	450 mm	18 in.	27D(1)	0 48 mm	0 019 in.
24F(1)	38 mm	2 in.*	27D(3)	600 mm	24 in.
24F(1)	3 6 m	11 ft 10 in.	27D(3)	Type S	45 lb
Table 24K	—	**	27D(3)	Type M	90 lb
24F(2)	250 mm	10 in.*	27D(3)	457 mm	18 in.
24F(2)	2 4 m	7 ft 10 in.	27D(3)	450 mm	18 in.
24F(5)	750 mm	30 in.	27D(3)	25 mm	1 in.
24F(6)	40 mm	1 1/2 in.	27D(3)	914 mm	36 in.
24F(8)	4 9 m	16 ft 1 in.	27D(3)	100 mm	3 7/8 in.
24F(8)	9.8 m	32 ft 2 in.	27D(4)	25 mm	1 in.
Table 24L	—	**	27D(4)	150 mm	5 7/8 in.
25A(5)	10 mm	3/8 in.	27D(4)	100 mm	3 7/8 in.
Table 25A	—	**	27D(4)	75 mm	3 in.
25B(2)	0 50 mm	0 020 in.	27D(5)	75 mm	3 in.
25B(3)	0 45 mm	0 018 in.	27D(6)	150 mm	5 7/8 in.
25B(3)	25 mm	1 in.	27D(6)	25 mm	1 in.
25B(4)	1 200 mm	47 in.	27D(6)	100 mm	3 7/8 in.
25B(4)	63 mm	2 1/2 in.	27D(7)	150 mm	5 7/8 in.
25B(4)	0 50 mm	0 020 in.	27D(8)	750 mm	30 in.
25B(4)	91 mm	3 5/8 in.	27D(9)	150 mm	5 7/8 in.
25B(4)	0 85 mm	0 033 in.	27E(1)	914 mm	36 in.
25B(5)	400 mm	16 in.	27E(1)	300 mm	12 in.
Table 25B	—	**	27E(2)	0 15 mm	0 006 in.
25C(1)	50 mm	2 in.	27E(2)	480 mm	18 7/8 in.
25C(1)	600 mm	24 in.	27E(2)	Type S	45 lb
25C(1)	300 mm	12 in.	27E(2)	100 mm	3 7/8 in.
25C(1)	63 mm	2 1/2 in.	27E(3)	900 mm	35 in.
25C(1)	25 mm	1 in.	27F(1)	0.195 kg/m ²	4 lb/square
25C(3)	12 mm	1/2 in.	27F(1)	0 05 mm	0 002 in.
25C(7)	2.4 m	7 ft 10 in.	27F(2)	50 mm	2 in.
26D(5)	50 mm	2 in.	27F(2)	100 mm	3 7/8 in.
26D(7)	6 mm	1/4 in.	27G(2)	12 mm	1/2 in.

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
27G(2)	300 mm	12 in.	27M(1)	0.35 mm	0.014 in.
27G(2)	Type M	90 lb	27M(1)	0.46 mm	0.018 in.
27G(2)	304 mm	12 in.	27M(1)	0.48 mm	0.019 in.
27G(3)	50 mm	2 in.	27O(3)	0.41 mm	0.016 in.
27G(4)	1 m	39 in.	27O(3)	0.43 mm	0.017 in.
27G(5)	25 mm	1 in.	27O(3)	0.51 mm	0.020 in.
27G(5)	40 mm	1½ in.	27O(3)	0.36 mm	0.014 in.
27G(5)	12 mm	½ in.	27O(3)	0.38 mm	0.015 in.
27G(6)	25 mm	1 in.	27O(3)	0.46 mm	0.018 in.
27G(7)	100 mm	3¾ in.	27O(4)	1.9 mm	0.075 in.
27G(7)	150 mm	5¾ in.	27O(4)	1.8 mm	0.071 in.
27G(7)	25 mm	1 in.	28B(2)	200 mm	7¾ in.
27H(2)	200 mm	7¾ in.	28B(3)	50 mm	2 in.
27H(3)	0.5L/m ²	1 gal./100 sq ft	28B(4)	10 mm	¾ in.
27H(3)	1 kg/m ²	20 lb/100 sq ft	28C(1)	1.73 mm	0.068 in.
27H(4)	100 mm	3¾ in.	28C(1)	0.33 mm	0.013 in.
27H(4)	50 mm	2 in.	28C(1)	0.35 mm	0.014 in.
27H(5)	50 mm	2 in.	28C(1)	0.46 mm	0.018 in.
27H(5)	25 mm	1 in.	28C(1)	0.48 mm	0.019 in.
27H(6)	300 mm	12 in.	28C(1)	1.02 mm	0.040 in.
27H(6)	25 mm	1 in.	28C(4)	50 mm	2 in.
27H(6)	40 mm	1½ in.	28E(2)	38 mm x 38 mm	2 in. x 2 in.*
27H(6)	50 mm	2 in.	28E(2)	600 mm	24 in.
27I(4)	400 mm	16 in.	28E(3)	19 mm x 38 mm	1 in. x 2 in.*
27I(4)	75 mm	3 in.	28E(3)	19 mm x 64 mm	1 in. x 3 in.*
27I(4)	350 mm	14 in.	28E(3)	400 mm	16 in.
27I(5)	6 mm	¼ in.	28E(3)	19 mm x 89 mm	1 in. x 4 in.*
27I(5)	38 mm	1½ in.	28E(3)	600 mm	24 in.
27I(6)	19 mm	¾ in.	28E(4)	14.3 mm	⅝ in.
27I(6)	38 mm	1½ in.	28E(4)	12.5 mm	½ in.
Table 27B	—	**	28E(4)	15.9 mm	⅝ in.
27J(1)	450 mm	18 in.	28E(5)	14.3 mm	⅝ in.
27J(1)	100 mm	3¾ in.	28E(5)	7.5 mm	⅝ in.*
27J(1)	350 mm	14 in.	28E(5)	7.9 mm	⅝ in.*
27J(1)	32 mm	1¼ in.	28E(6)	14.3 mm	⅝ in.
27J(1)	9 mm	⅜ in.	28E(6)	9.5 mm	⅜ in.
27J(2)	900 mm	35 in.	28E(6)	11.1 mm	⅞ in.
27J(2)	300 mm	12 in.	28E(7)	38 mm x 9.5 mm	2 in.* x ⅜ in.
27J(2)	450 mm	18 in.	28E(8)	89 mm x 9.5 mm	4 in.* x ⅜ in.
27J(3)	6 mm	¼ in.	28E(8)	20 mm	¾ in.
27J(3)	40 mm	1⅝ in.	Table 28A	—	**
27J(4)	20 mm	¾ in.	28E(11)	19 mm	¾ in.
27J(4)	40 mm	1⅝ in.	28E(11)	25 mm	1 in.
27J(5)	190 mm	7½ in.	28F(2)	14.3 mm	⅝ in.
27J(5)	450 mm	18 in.	28F(2)	286 mm	12 in.*
27J(5)	250 mm	9⅞ in.	28F(3)	5 mm	⅜ in.
27J(5)	600 mm	24 in.	28F(3)	12 mm	½ in.
Table 27D	—	**	28F(3)	184 mm	8 in.*
27K(4)	6 mm	¼ in.	28F(3)	14.3 mm	⅝ in.
27K(4)	15 mm	⅝ in.	28F(3)	286 mm	12 in.*
27K(6)	per m ²	per sq ft	28F(4)	1 mm/16mm	⅛ in./in.
27K(6)	15 kg	33 lb	28F(4)	9.5 mm	⅜ in.
27K(6)	10 kg	22 lb	28F(4)	25 mm	1 in.
27K(9)	50 mm	2 in.	28F(4)	12 mm	½ in.
27M(1)	0.33 mm	0.013 in.	28G(2)	65 mm	2½ in.

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
28G(2)	350 mm	14 in.	29D(2)	1.19 mm	0.047 in.
28G(3)	20 mm	¾ in.	29D(2)	150 mm	5⅞ in.
28G(3)	25 mm	1 in.	Table 29B	—	**
28G(3)	50 mm	2 in.	29D(4)	6 mm	¼ in.
28G(4)	40 mm	1½ in.	29D(5)	50 mm	2 in.
28G(5)	12 mm	½ in.	29D(5)	150 mm	5⅞ in.
Table 28B	—	**	29D(7)	150 mm	5⅞ in.
28H(2)	8.06 kg/m ²	165 lb/square	29D(7)	400 mm	16 in.
28H(2)	4.75 mm	⅜ in.	29D(7)	100 mm	3⅞ in.
28H(2)	400 mm	16 in.	29D(7)	600 mm	24 in.
28H(2)	6 mm	¼ in.	29D(7)	20 fasteners	16 fasteners
28H(2)	600 mm	24 in.	—	per m ²	per sq yard
28H(2)	3.15 mm	⅙ in.	29D(8)	150 mm	5⅞ in.
28H(3)	25 mm	1 in.	29D(8)	400 mm	16 in.
28H(4)	25 mm	1 in.	29D(8)	100 mm	3⅞ in.
28I(2)	6 mm	¼ in.	29D(8)	600 mm	24 in.
Table 28C	—	**	29F(1)	10°C	50°F
28I(4)	2 mm	⅙ in.	29F(2)	15 mm	⅝ in.
28I(4)	25 mm	1 in.	29F(3)	6 mm	¼ in.
28I(5)	2 mm	⅙ in.	29F(4)	6 mm	¼ in.
28I(5)	25 mm	1 in.	29F(5)	3 mm	⅙ in.
28J(2)	6.0 mm	¼ in.	30B(1)	1 8 m	5 ft 11 in.
28J(2)	7.5 mm	⅝ in.	30B(1)	1 2 m	47 in.
28J(2)	400 mm	16 in.	30B(1)	400 mm	16 in.
28J(2)	9.0 mm	⅜ in.	Table 30A	—	**
28J(2)	10.5 mm	⅜ in.	30C(2)	51 mm	2 in.
28J(2)	1 5 mm	⅙ in.	30D(2)	9.5 mm	⅜ in.
28J(3)	5 mm	⅜ in.	30D(2)	400 mm	16 in.
28J(3)	25 mm	1 in.	30D(2)	12 7 mm	½ in.
28J(4)	5 mm	⅜ in.	30D(2)	600 mm	24 in.
28J(4)	25 mm	1 in.	30D(4)	406 mm	16 in.
28J(5)	3 mm	⅙ in.	30D(4)	400 mm	16 in.
28K(2)	7 9 mm	⅜ in.	30D(4)	610 mm	24 in.
28K(2)	9 5 mm	⅜ in.	30D(5)	32 mm	1¼ in.
28K(2)	400 mm	16 in.	30D(5)	2 29 mm	0 090 in.
28K(2)	12 7 mm	½ in.	30D(5)	7 5 mm	⅙ in.
28K(2)	600 mm	24 in.	30D(6)	25 mm	1 in.
28K(3)	3 mm	⅙ in.	30D(6)	9 5 mm	⅜ in.
28K(4)	3 mm	⅙ in.	30D(6)	28 mm	1⅙ in.
28L(2)	0 33 mm	0.013 in.	30D(6)	12.7 mm	½ in.
28L(4)	0 58 mm	0.023 in.	30D(6)	1.6 mm	0 063 in.
28L(4)	0 46 mm	0 018 in.	30D(6)	19 mm	¾ in.
28N(1)	9.5 mm	⅜ in.	Table 30B	—	**
28N(1)	6 mm	¼ in.	30E(3)	1 6 mm	0 063 in.
28N(1)	3.2 mm	⅙ in.	30E(3)	400 mm	16 in.
28N(1)	600 mm	24 in.	30E(3)	2.9 mm	0 114 in.
28N(1)	7.9 mm	⅜ in.	30E(4)	3 2 mm	0.126 in.
28N(1)	400 mm	16 in.	30E(4)	38 mm	1½ in.
29A(5)	200 mm	7⅞ in.	30E(4)	25 mm	1 in.
Table 29A	—	**	30E(4)	150 mm	5⅞ in.
29C(2)	3.2 mm	0.126 in.	30E(5)	2 mm	0.079 in.
29C(2)	11 1 mm	⅞ in.	30E(5)	38 mm	1½ in.
29C(2)	1 98 mm	0 078 in.	30E(5)	19 mm	¾ in.
29C(3)	25 mm	1 in.	30E(5)	150 mm	5⅞ in.
29C(3)	38 mm	1½ in.	30E(6)	25 mm	1 in.

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
30E(6)	12 mm	½ in.	30L(3)	38 mm	1½ in.
30E(7)	6 mm	¼ in.	30L(3)	150 mm	5⅞ in.
30F(2)	50 mm	2 in.	30L(3)	300 mm	12 in.
30F(3)	150 mm	5⅞ in.	31A(4)	19 mm x 38 mm	1 in. x 2 in.*
30F(3)	450 mm	18 in.	31B(3)	6 mm	¼ in.
30G(3)	10 mm	⅜ in.	31B(4)	150 mm	5⅞ in.
30G(10)	10°C	50°F	31B(4)	200 mm	7⅞ in.
30G(10)	20°C	68°F	31B(5)	19 mm	¾ in.
30H(2)	9.5 mm	⅜ in.	31B(5)	6 mm	¼ in.
30H(2)	400 mm	16 in.	31B(5)	7.9 mm	⅜ in.
30H(2)	12.7 mm	½ in.	31B(5)	1.2 mm	0.047 in.
30H(2)	600 mm	24 in.	31B(5)	4.7 mm	⅜ in.
Table 30C	—	**	31B(5)	22 mm	⅞ in.
30H(4)	2.3 mm	0.091 in.	31B(5)	28 mm	1⅛ in.
30H(4)	5.5 mm	⅞ in.	31B(5)	9.5 mm	⅜ in.
30H(5)	180 mm	7⅞ in.	31B(6)	200 mm	7⅞ in.
30H(5)	200 mm	7⅞ in.	Table 31A	—	**
30H(5)	50 mm	2 in.	31C(4)	25 mm	1 in.
30H(5)	300 mm	11¾ in.	Table 31B	—	**
30H(5)	10 mm	⅜ in.	31C(5)	7.9 mm	⅜ in.
30H(7)	9.5 mm	⅜ in.	31C(5)	29 mm	1⅞ in.
30H(7)	150 mm	5⅞ in.	31C(5)	1.19 mm	0.047 in.
30H(8)	300 mm	12 in.	31C(5)	4.7 mm	⅜ in.
30H(8)	400 mm	16 in.	31F(2)	30 mm	1⅞ in.
30H(9)	10°C	50°F	31F(2)	2 mm	⅜ in.
30H(11)	3 mm	⅜ in.	31G(4)	1.08 kg/m ²	32 oz./sq yd
30H(13)	120 mm	4¾ in.	31G(4)	4.8 mm	⅜ in.
30H(14)	200 mm	7⅞ in.	31G(4)	6.35 mm	¼ in.
30H(14)	250 mm	9⅞ in.	32C(3)	20 L/min	4 gal./min.
30H(15)	250 mm	9⅞ in.	32C(3)	900 L	200 gal.
30H(15)	400 mm	16 in.	32F(1)	60°C	140°F
Table 30D	—	**	32F(1)	75°C	167°F
30I(1)	0.4 mm	¼ in.	32F(7)	9.5 mm	⅜ in.
30I(3)	38 mm	1½ in.	32F(8)	860 kPa	124 psi
30I(3)	150 mm	5⅞ in.	Table 32A	—	**
30I(3)	300 mm	12 in.	Table 32B	—	**
30I(2)	3.2 mm	⅜ in.	32F(11)	litres/hour	Canadian gallons/hour
30J(2)	6 mm	¼ in.	—	—	—
30J(2)	400 mm	16 in.	32F(11)	55°C	100 F°
30J(2)	9 mm	⅜ in.	32F(11)	650	140
30J(2)	600 mm	24 in.	32F(11)	1 100	240
30J(3)	38 mm	1½ in.	32F(12)	litres/hour	Canadian gallons/hour
30J(3)	150 mm	5⅞ in.	—	—	—
30J(3)	300 mm	12 in.	32F(12)	55°C	100 F°
30K(2)	11.1 mm	⅞ in.	Table 32C	—	**
30K(2)	400 mm	16 in.	33A(1)	600 m ²	6,458 sq ft
30K(2)	12.7 mm	½ in.	33A(2)	2 m ³ /s	4,238 cfm
30K(3)	2.6 mm	0.102 in.	33A(3)	2 m ³ /s	4,238 cfm
30K(3)	20 mm	¾ in.	33B(1)	0.05 m ³ /s	106 cfm
30K(3)	100 mm	3⅞ in.	33B(1)	2.5 mm	0.1 in.
30K(3)	200 mm	7⅞ in.	Table 33A	—	**
30L(2)	6.35 mm	¼ in.	33D(9)	127 mm	5 in.
30L(2)	400 mm	16 in.	34A(1)	120 kW	409,458 Btu/hr
30L(2)	9.5 mm	⅜ in.	34A(1)	2 m ³ /s	4,238 cfm
30L(2)	600 mm	24 in.	34A(2)	120 kW	409,458 Btu/hr

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
34A(2)	2 m ³ /s	4,238 cfm	36C(4)	150 mm	5 ⁷ / ₈ in.
34B(6)	22°C	72°F	36C(4)	25 mm	1 in
34B(7)	18°C	64°F	36C(4)	190 mm x	
34B(7)	15°C	59°F		190 mm	7 ¹ / ₂ in. x 7 ¹ / ₂ in.
34C(1)	600 mm	24 in.	36E(2)	89 mm x 89 mm	4 in. x 4 in.*
34C(2)	300 mm	12 in	36F(1)	6.1 m	20 ft
Table 34A	—	**	36F(2)	3.05 m	10 ft
34C(4)	6 mm	¼ in.	36F(2)	3.35 m	11 ft
34C(7)	75 mm	3 in.	36F(2)	2.5 m	8 ft 2 in
34C(7)	12 mm	½ in.	36F(2)	200 mm	7 ⁷ / ₈ in
34C(7)	450 mm	18 in.	37B(1)	7.3 m	24 ft
34C(8)	75 mm	3 in	37B(2)	15.2 m	50 ft
34C(8)	150 mm	5 ⁷ / ₈ in	37B(3)	4.5 m	14 ft 9 in
34C(8)	1.8 m	5 ft 11 in	37C(3)	900 kg	1987 lb
34C(8)	12 mm	½ in.	37D(2)	1 m/s	200 ft/min
34C(9)	150 mm	5 ⁷ / ₈ in	37E(3)	1.5 m	4 ft 11 in
34C(9)	1 m	39 in	38A(4)	5°C	41°F
34C(9)	25 mm	1 in	39A(3)	6 m	19 ft 8 in.
34C(9)	1.8 m	5 ft 11 in.	39A(4)	6.1 m	20 ft
34C(9)	8 mm	5 ¹⁶ / ₆₄ in.	39A(4)	2.5 m	8 ft 2 in
34C(10)	6 mm	¼ in.	39A(4)	60 mm/m	¾ in /ft
34C(11)	100 mm	3 ⁷ / ₈ in	39A(4)	15 mm/m	½ in /ft
34C(12)	25 mm	1 in.	39A(5)	5.5 m	18 ft 1 in
34D(2)	40 m ²	431 sq ft	39B(2)	2.5 m	8 ft 2 in.
34D(3)	1.8 m	5 ft 11 in	39B(2)	3 m	9 ft 10 in
34D(4)	3 kW	10,236 Btu/hr	39B(2)	600 mm	24 in
34D(5)	1.2 m	47 in.	39B(2)	1.5 m	4 ft 11 in.
34D(6)	70°C	158°F	39B(3)	2.5 m	8 ft 2 in.
34F(2)	600 mm	24 in.	39B(3)	5.5 m	18 ft 1 in.
34F(11)	18 kW	64,419 Btu/hr	39B(4)	60 mm/m	¾ in /ft
34G(3)	12 mm	½ in	39B(4)	15 mm/m	½ in./ft
34G(3)	90°C	194°F	39B(8)	150 mm	5 ⁷ / ₈ in.
34G(3)	120°C	248°F	39B(8)	20 mm	¾ in.
34G(3)	25 mm	1 in.	39B(9)	100 mm	3 ⁷ / ₈ in
Table 34B	—	**	39B(9)	40 mm	1 ⁵ / ₈ in
34I(3)	100 mm	3 ⁷ / ₈ in.	39B(10)	120 mm	4 ³ / ₄ in.
34I(4)	0.56 mm	0.022 in.	39B(10)	75 mm	3 in.
34I(4)	6 mm	¼ in.	39B(10)	20 MPa	2,900 psi
34I(4)	450 mm	18 in.	39B(10)	3 m	9 ft 10 in
34I(4)	150 mm	5 ⁷ / ₈ in.	Table 39A	—	**
34J(1)	750 mm	30 in	39C(6)	100 mm/m	1 ¹ / ₄ in /ft
34J(2)	6 mm	¼ in	39C(6)	60 mm/m	¾ in /ft
34J(2)	0.33 mm	0.013 in	39C(6)	15 mm/m	¼ in./ft
34J(2)	125 mm	4 ⁷ / ₈ in	39C(7)	100 mm	3 ⁷ / ₈ in
34J(2)	600 mm	24 in.	39C(7)	180 mm	7 ¹ / ₈ in
34J(3)	450 mm	18 in.	39C(7)	300 mm	11 ³ / ₄ in
34J(3)	9.5 mm	¾ in	39C(7)	54 000	84
35B(6)	30 m ²	323 sq ft	39C(9)	40 mm	1 ⁵ / ₈ in.
Table 35A	—	**	39C(9)	100 mm	3 ⁷ / ₈ in.
35C(1)	1.8 m	5 ft 11 in.	39C(9)	20 MPa	2,900 psi
35C(1)	900 mm	35 in.	39C(10)	75 mm	3 in
35C(1)	300 mm	12 in	40B(2)	200 mm	7 ⁷ / ₈ in
35C(5)	4.5 m	14 ft 9 in.	40B(2)	150 mm	5 ⁷ / ₈ in
35C(7)	10 m	32 ft 10 in	40B(2)	300 mm	11 ³ / ₄ in
36C(3)	50 m ²	538 sq ft	40B(3)	150 mm	5 ⁷ / ₈ in

*Nominal dimension

**See Appendix C

Code Reference	Metric Units	Imperial Units	Code Reference	Metric Units	Imperial Units
40B(4)	250 mm	9 $\frac{7}{8}$ in.			
40C(1)	100 mm	3 $\frac{7}{8}$ in.			
40C(2)	100 mm	3 $\frac{7}{8}$ in.			
40D(2)	2 to 2.5 kg/ 100 m ²	4 to 5 lb/ 1,000 sq ft			
40D(2)	25 mm	1 in.			
40D(3)	20 mm	$\frac{3}{4}$ in.			
40D(3)	40 mm	1 $\frac{5}{8}$ in.			
40D(3)	100 to 125 mm	4 to 5 in.			
40E(3)	600 mm	24 in.			
40E(3)	150 mm	5 $\frac{7}{8}$ in.			
40E(3)	300 mm	12 in.			
40E(4)	400 mm	16 in.			
40E(4)	150 mm	5 $\frac{7}{8}$ in.			
40E(5)	3 kg/m ³	4 oz./bushel			
40E(6)	25 mm	1 in.			
40E(7)	75 mm	3 in.			
40E(7)	300 mm	12 in.			

APPENDIX C

**IMPERIAL CONVERSION
of
METRIC VALUES IN TABLES**

IMPERIAL CONVERSION OF METRIC VALUES IN TABLES

TABLE 3A—CONCRETE MIXES, BY VOLUME

Concrete Strength, psi	Cement, part	Sand, parts	Coarse Aggregate
2,030	1	2	4 parts
	1	—	6 parts pit run gravel
2,465	1	2	3½ parts up to 1½ in. in size
	1	—	5½ parts pit run gravel
Column 1	2	3	4

TABLE 4A—UNIFORM DESIGN LOADS FOR FLOORS

Use of Area of Floor	Minimum Design Live Load, psf
Corridors	(1)
Balconies, residential, not used as passage ways	40
Balconies, other types	100 ⁽²⁾
Equipment rooms	75 ⁽³⁾
Exits	100
Garages	
for passenger cars	50
for unloaded buses and light trucks	125
for loaded trucks and buses and all trucking spaces	251
Kitchens	
other than domestic type	100
Residential occupancies	
attics not accessible by a stairway	10
attics accessible by a stairway	29
bedrooms	29
all other rooms	40
stairs within dwelling units	40
Driveways not supported by the ground	251
Sidewalks not supported by the ground and adjacent to driveways that may be subject to loads from cars or trucks	251
Walks not supported by the ground and not subject to loads from cars or trucks	100
Storage areas	100 ⁽³⁾
Column 1	2

Notes to Table 4A:

(1) See 4B(3).

(2) See 4B(4).

(3) See 4B(2).

TABLE 4B—CONCENTRATED DESIGN LOADS FOR FLOORS

Use of Area of Floor	Minimum Concentrated Design Load, lb
Floors and areas used by passenger cars	2,473
Floors and areas used by vehicles not exceeding 7,937 lb gross weight and walks not subject to vehicular traffic over basements, cellars or other open areas	4,047
Floors and areas used by vehicles exceeding 7,937 lb but not exceeding 19,842 lb gross weight	8,093
Floors and areas used by vehicles exceeding 19,842 lb gross weight	12,140
Driveways or sidewalks adjacent to driveways over basements, cellars or other open areas	12,140
Column 1	2

TABLE 4D—ALLOWABLE BEARING PRESSURES FOR SOIL AND ROCK

Type and Condition of Soil or Rock	Maximum Allowable Bearing Pressure, psf
Dense or compact sand or gravel ⁽¹⁾	3,133
Loose sand or gravel ⁽¹⁾	1,044
Dense or compact silt ⁽¹⁾	2,089
Stiff clay ⁽¹⁾	3,133
Firm clay ⁽¹⁾	1,566
Soft clay ⁽¹⁾	835
Till	4,177
Clay shale	6,266
Sound rock	10,443
Column 1	2

Note to Table 4D:⁽¹⁾ See Appendix A.

TABLE 5A—ROOM HEIGHTS

Room or Space	Minimum Heights
Living room or space, dining room or space, kitchen or kitchen space	7 ft 7 in. over at least 75 per cent of the required floor area with a clear height of 6 ft 11 in. at any point over the required area
Bedroom or bedroom space	7 ft 7 in. over at least 50 per cent of the required floor area or 6 ft 11 in. over all of the required floor area Any part of the floor having a clear height of less than 4 ft 7 in. shall not be considered in computing the required floor area
Unfinished basement or cellar including laundry area therein	6 ft 5 in. under beams in laundry areas and in any location that would normally be used for passage to laundry and required storage areas
Bathroom, water-closet room or laundry area above grade	6 ft 11 in. in any area where a person would normally be in a standing position
Passage, hall or main entrance vestibule and finished rooms not specifically mentioned above	6 ft 11 in.
Column 1	2

TABLE 6A—MINIMUM SIZE OF DOORS

At Entrance to:	Width, in.	Height, ft—in.
Dwelling unit (required entrance) Vestibule or entrance hall	32	6—6
Stairs to a floor level that contains a finished space All doors in at least 1 line of passage from the exterior to the basement Utility rooms	32	6—6
Walk-in closet	24	6—6
Bathroom, water-closet room, shower room	24	6—6
Rooms located off hallways that are permitted to be 28 in. wide	24	6—6
Rooms not mentioned above, exterior balconies	30	6—6
Column 1	2	3

TABLE 6B—GLASS SIZE FOR DOORS

Minimum Glass Thickness, in.	Maximum Area, ft ²
0.079	2.7
0.118	5.4
0.157	10.8
0.197	13.5
0.236	not limited
Column 1	2

TABLE 7B—MAXIMUM GLASS PERIMETER FOR VARIOUS THICKNESSES, in.

Minimum Glass Thickness of Inner and Outer Panes	Sash Type or Fixed Glazing	Factory-Sealed Double Glazing	
		Fused Edges	Other than Fused Edges
0.79	120	180	150
0.118	168	252	210
0.157	240	360	300
0.197	280	420	350
0.236	339	509	424
0.315	no limit	no limit	no limit
Column 1	2	3	4

TABLE 10C—MAXIMUM PERCENTAGE OF UNPROTECTED OPENINGS IN EXTERIOR WALLS

Maximum Area of Exposing Building Face, sq ft	Limiting Distance										
	Less than 4 ft	4 ft	6 ft	8 ft	10 ft	15 ft	20 ft	30 ft	40 ft	50 ft	60 ft
300	0	8	11	17	25	54	100	—	—	—	—
400	0	7	10	15	21	43	75	100	—	—	—
500	0	7	10	14	19	36	62	100	—	—	—
1,000	0	7	8	11	13	23	37	76	100	—	—
Over 1,000	0	7	8	9	10	14	20	37	60	90	100
Column 1	2	3	4	5	6	7	8	9	10	11	12

TABLE 11A—FIRE AND SOUND RESISTANCE OF WALLS

Type of Wall	No.	Description	Finish on Each Side (¹)	Fire-Resistance Rating, hr	Sound Rating (³)
Solid brick	1	4 in.* thick walls of shale, clay, concrete or sand-lime brick	None	1	II ⁽²⁾
	2	6 in.* thick walls of shale, clay, concrete or sand-lime brick	None	2½	II ⁽²⁾
	3	6 in.* thick walls of shale, clay, concrete or sand-lime brick	None	4	I ⁽²⁾
Hollow concrete block (normal weight aggregate)	4	4 in.*	None	¾	III
	5	Same as 4	A or B	1½	III
	6	Same as 4	C or D	2	II
	7	6 in.*	None	1	II ⁽²⁾
	8	Same as 7	A	1½	II
	9	Same as 7	B, C or D	2	II
	10	Same as 7 with mineral fibre between resilient channels on at least 1 side	A	1½	I
	11	8 in.*	None	1½	II ⁽²⁾
	12	Same as 11	A or B	2	I
	13	Same as 11	C or D	3	I
Concrete	14	6 in.	None	3	I ⁽²⁾
	15	8 in.	None	4	I ⁽²⁾
Interior wood stud, single row	16	2 x 4 in.* studs 16 in. o.c.	C or D	1	III
	17	2 x 4 in.* studs 16 in. o.c., mineral fibre with a mass of at least 0.25 lb/sq ft in cavity	A	¾	III
	18	Same as 17 with resilient metal channels on at least 1 side	A	¾	II
Interior stud, 2 rows staggered on 2 x 6 in.* plate	19	Two rows 2 x 4 in.* studs, each set 16 in. or 24 in. o.c. staggered on common 2 x 6 in.* plate, mineral fibre on each side	C or D	1 ⁽⁴⁾	II
Column 1	2	3	4	5	6

TABLE 11A—FIRE AND SOUND RESISTANCE OF WALLS (Cont'd)

Type of Wall	No.	Description	Finish on Each Side (1)	Fire-Resistance Rating, hr	Sound Rating (3)
Interior stud, 2 rows staggered on 2 x 6 in.* plate (Cont'd)	20	Two rows 2 x 4 in.* studs, each set 16 in. or 24 in. o.c. staggered on common 2 x 6 in.* plate, mineral fibre with a mass of at least 0.25 lb/sq ft on each side	A	¾	II
Interior wood, 2 rows on separate plates	21	Two rows 2 x 4 in.* studs, each set 16 in. or 24 in. o.c. on 2 x 4 in.* plates set 1 in. apart, mineral fibre on 1 side	C or D	1 ⁽⁴⁾	II
	22	Two rows 2 x 4 in.* studs, each set 16 in. or 24 in. o.c. on 2 x 4 in.* plates set 1 in. apart, mineral fibre with a mass of at least 0.25 lb/sq ft on 1 side	A	¾	II
Exterior wood stud	23	2 x 4 in.* or 2 x 6 in.* studs spaced up to 24 in. o.c., mineral fibre with a mass of at least 0.25 lb/sq ft wall sheathing and siding	A (interior side)	¾	—
	24	Same as 23	C or D (Interior side)	1	—
Non-load-bearing steel stud	25	3⅝ in. steel studs spaced up to 24 in. o.c.	C	¾	III
	26	Same as 25	D	1	III
	27	Same as 25 with mineral fibre filling cavity	C	1	II
	28	Same as 25 with mineral fibre filling cavity	D	1 ⁽⁴⁾	II
Column 1	2	3	4	5	6

Addendum to Table 11A:

- (1) The finishes designated by letter refer to the following:

A = ½ in. gypsum board, taped joints,

B = ½ in. gypsum-sand plaster,

C = ⅝ in. special fire-resistant Type X gypsum board conforming to CSA A82.27-M1977, "Gypsum Board Products," and

D = ¾ in. gypsum-sand plaster on ⅝ in. gypsum lath or metal lath.

- (2) Sound ratings listed assume that walls have their surfaces sealed by at least 2 coats of paint or other surface finish described in Section 30 to prevent airborne sound leakage.

- (3) Rating I signifies constructions with sound transmission class ratings of 50 or more.

Rating II signifies constructions with sound transmission class ratings of 45 to 50.

Rating III signifies constructions with sound transmission class ratings of less than 45.

- (4) Mineral fibre is required for sound resistance only and need not be provided to achieve the fire-resistance rating. Mineral fibre includes fibre processed from rock, slag or glass.

*Nominal dimension

TABLE 11B—FIRE AND SOUND RESISTANCE OF FLOORS, CEILINGS AND ROOFS⁽²⁾

Type of Assembly	No	Description	Ceiling Finish ⁽¹⁾	Fire-Resistance Rating, hr	Sound Rating ⁽³⁾
Concrete slabs	1	3½-in reinforced concrete with ¾-in minimum cover over reinforcing steel	None	1	II
	2	5-in reinforced concrete with 1 in minimum cover over reinforcing steel	None	2	I
Open web steel joists	3	Open web steel joists with minimum 2-in -thick concrete deck, ceiling secured to furring channels spaced not more than 24 in o c wired to underside of joists	C or D	1	I
Wood floor joists	4	Nominal 1-in T&G lumber or ⅝ in * plywood or waferboard sub floor with mineral fibre between joists spaced 16 in o c Ceiling finish attached to resilient channels	C	¾	II
	5	Same as 4	D	1	II
	6	Nominal 1 in T&G lumber or ⅝ m * plywood or waferboard sub-floor over joists spaced 16 in o c , 2 m concrete topping	C	¾	II
	7	Same as 6	D	1	II
	8	Same as 6 with mineral fibre between joists and ceiling finish attached to resilient channels	C	¾	II
	9	Same as 6 with mineral fibre between joists and ceiling finish attached to resilient channels	D	1	I
	Wood ceiling joists or roof trusses	10	Nominal 2 in thick framing members spaced not more than 24 in o c	C	½
11		Same as 10	C (2 layers)	1	—
Column 1	2	3	4	5	6

Addendum to Table 11B:

⁽¹⁾ The finishes designated by letter refer to the following

C = ⅝-in special fire-resistant Type X gypsum board conforming to CSA A82 27-M1977, "Gypsum Board Products," and

D = ¾-in gypsum-sand plaster on ⅝-in gypsum lath or metal lath

⁽²⁾ Fire resistance ratings for floor assemblies may be applied to roof assemblies having the same ceiling finish provided that, where wood joists are used, the roof sheathing consists of not less than ½ in * plywood or waferboard or 1 in * lumber. Where steel joists are used, the ratings are based on the assumption that the roof deck is at least equivalent in fire resistance to 2 in concrete.

⁽³⁾ Rating I signifies constructions with sound transmission class ratings of 50 or more

Rating II signifies constructions with sound transmission class ratings of 45 to 50

Rating III signifies constructions with sound transmission class ratings of less than 45

TABLE 15A—MINIMUM FOOTING SIZES

No. of Floors Supported	Minimum Width of Strip Footings, in.		Minimum Footing Area for Columns Spaced 9 ft 10 in. o.c., ⁽¹⁾ ft ²
	Supporting Exterior Walls	Supporting Interior Walls	
1	9 ⁷ / ₈	7 ⁷ / ₈	4.3
2	14 ⁽²⁾	14 ⁽³⁾	8.1
3	18 ⁽²⁾	20 ⁽³⁾	10.8
Column 1	2	3	4

Notes to Table 15A:⁽¹⁾ See 15C(8).⁽²⁾ See 15C(5) and (6).⁽³⁾ See 15C(7).**TABLE 15B—THICKNESS OF FOUNDATION WALLS**

Type of Foundation Wall	Minimum Wall Thickness, in.*	Maximum Height of Finish Grade Above Basement Floor or Inside Grade	
		Foundation Wall Laterally Unsupported At the Top, ⁽¹⁾ ft—in.	Foundation Wall Laterally Supported At the Top, ⁽¹⁾ ft—in.
Solid concrete (2,030 psi min. strength)	6	2—6	5—0
	8	4—0	7—0
	10	4—6	7—6
	12	5—0	7—6
Solid concrete (2,900 psi min. strength)	6	2—6	6—0
	8	4—0	7—6
	10	4—6	7—6
	12	5—0	7—6
Unit masonry	6	2—0	2—0
	8	3—0	4—0
	10	4—0	6—0
	12	4—6	7—0
Column 1	2	3	4

Note to Table 15B:⁽¹⁾ See 15D(2).

*Nominal dimension.

TABLE 20A—COMPRESSIVE STRENGTH OF MASONRY

Type of Masonry Unit	Minimum Compressive Strength over Gross Area, psi	
	Masonry Unit Exposed to Weather	Masonry Unit not Exposed to Weather
Hollow loadbearing concrete units	1,015	725
Solid loadbearing concrete units	1,813	1,160
Hollow non-loadbearing concrete units	1,015	363
Solid non-loadbearing concrete units	1,813	1,160
Solid loadbearing cellular units	Not permitted	725
Solid non-loadbearing cellular units	Not permitted	290
Column 1	2	3

TABLE 20C—MAXIMUM ALLOWABLE SPANS FOR STEEL LINTELS SUPPORTING MASONRY VENEER, ft.—in.

Minimum Angle Size, in.			3 in. Brick	3½ in. Brick	3¾ in. Stone
Vert. Leg	Horiz. Leg	Thickness			
3½	3	¼	8—4	—	—
3½	3½	¼	8—6	8—1	7—7
3¾	3½	¼	9—2	8—9	8—2
4¾	3½	⅙	11—5	10—10	10—1
4¾	3½	⅜	11—11	11—5	10—8
Column 1	2	3	4	5	6

TABLE 20D—VENEER TIE SPACING

Maximum Vertical Spacing, in.	Maximum Horizontal Spacing, in.
16	31
20	24
24	16
Column 1	2

TABLE 21A—FLUE SIZES

Maximum Rated Input of One or More Appliances, Btu/hr	Minimum Size of Flue, in.	
	Round	Rectangular
102,363	6*	8 x 8*
170,605	7*	8 x 8*
272,968	8*	8 x 8*
409,452	9*	8 x 12*
Column 1	2	3

TABLE 21B—WALL THICKNESS OF FLUE PIPES

Diameter of Flue Pipes, in.	Minimum Thickness of Metal, in.	
	Uncoated Steel	Galvanized Steel
Below 6	0.016	0.016
6 to 8	0.021	0.019
Over 8	0.027	0.024
Column 1	2	3

TABLE 21C—CLEARANCE BETWEEN A FLUE PIPE AND
PROTECTED COMBUSTIBLE MATERIAL

Type of Protection Applied to the Combustible Material Unless Otherwise Specified and Covering All Surfaces Within 18 in. of the Flue Pipe	Clearance Between Flue Pipe and Combustible Material, in.
¼-in. asbestos millboard spaced out 1 in. by noncombustible material	12
0.013-in. sheet metal on ¼ in. asbestos millboard	12
0.013-in. sheet metal spaced out 1 in. by noncombustible material	9
0.013-in. sheet metal on ⅛-in. asbestos millboard spaced out 1 in. by noncombustible material	9
1⅝-in. asbestos-cement covering on flue pipe	9
0.027-in. sheet metal on 1-in. mineral wool batts reinforced with wire mesh or equivalent	3
Column 1	2

*Nominal dimension.

TABLE 23A—NAILING FOR FRAMING

Construction Detail	Minimum Length of Nails, in.	Minimum Number or Maximum Spacing of Nails
Floor joist to plate—toe nail	3¼	2
Wood or metal strapping to underside of floor joists	2¼	2
Cross bridging to joists	2¼	2 each end
Double header or trimmer joists	3	12 in. o.c.
Floor joist to stud (balloon construction)	3	2
Ledger strip to wood beam	3¼	2 per joist
Joist to joist splice (see also Table 23F)	3	2 at each end
Tail joist to adjacent header joist (end nailed) around openings	{ 3¼	5
	{ 4	3
Each header joist to adjacent trimmer joist (end nailed) around openings	{ 3¼	5
	{ 4	3
Stud to wall plate (each end) toe nail or end nail	2½	4
	3¼	2
Doubled studs at openings, or studs at partition or wall intersections and corners	3	30 in. o.c.
Doubled top wall plates	3	24 in. o.c.
Bottom wall plate or sole plate to joists or blocking (exterior walls) ⁽¹⁾	3¼	16 in. o.c.
Interior partitions to framing or subflooring	3¼	24 in. o.c.
Horizontal member over openings in non-loadbearing partitions— each end	3¼	2
Lintels to studs	3¼	2 at each end
Ceiling joist to plate—toe nail each end	3¼	2
Roof rafter, roof truss or roof joist to plate—toe nail	3¼	3
Rafter plate to each ceiling joist	4	2
Rafter to joist (with ridge supported)	3	3
Rafter to joist (with ridge unsupported)	3	see Table 23F
Gusset plate to each rafter at peak	2¼	4
Rafter to ridge board—toe nail	2¼	4
	—end nail	3¼
Collar tie to rafter —each end	3	3
Collar tie lateral support to each collar tie	2¼	2
Jack rafter to hip or valley rafter	3¼	2
Roof strut to rafter	3	3
Roof strut to bearing partition—toe nail	3¼	2
2 by 6 or less plank decking to support	3¼	2
Plank decking wider than 2 by 6 to support	3¼	3
2-in. edge laid plank decking to support (toe nail)	3	1
2-in. edge laid plank to each other	3	18 in. o.c.
Column 1	2	3

Note to Table 23A:⁽¹⁾ See 23C(4).

TABLE 23B—SHEATHING AND SUBFLOOR ATTACHMENT

Element	Minimum Length of Fasteners for Sheathing and Subfloor Attachment, in.				Min. No. or Max. Spacing of Fasteners
	Common or Spiral Nails	Ring Thread Nails	Roofing Nails	Staples	
Plywood or waferboard up to 3/8 in.* thick	2	1 3/4	N/A	1 1/2	5 7/8 in. (o.c.) along edges and 12 in. (o.c.) along intermediate supports
Plywood or waferboard from 3/8 in.* to 3/4 in.* thick	2	1 3/4	N/A	2	
Plywood or waferboard over 3/4 in.* thick	2 1/4	2	N/A	N/A	
Fibreboard sheathing up to 1/2 in.* thick	N/A	N/A	1 3/4	1 1/2	
Gypsum sheathing up to 1/2 in.* thick	N/A	N/A	1 3/4	N/A	
Board lumber 8 in.* or less wide	2	N/A	N/A	2	2 per support
Board lumber more than 8 in.* wide	2	N/A	N/A	2	3 per support
Column 1	2	3	4	5	6

TABLE 23C—MAXIMUM SPANS FOR STEEL BEAMS SUPPORTING FLOORS IN DWELLINGS, ft—in.

No. of Storeys	Beam Type	Supported Joist Length (Half the Sum of Joist Spans on Both Sides of the Beam)				
		7 ft 10 in.	9 ft 10 in.	11 ft 10 in.	13 ft. 9 in	15 ft 9 in.
1	S100 x 11	13—9	12—4	11—3	10—6	9—9
	S130 x 15	17—6	15—8	14—4	13—4	12—6
	S150 x 19	21—3	19—0	17—5	16—2	15—1
	W150 x 22	22—10	20—5	18—9	17—4	16—3
	W200 x 27	30—1	27—0	24—9	23—0	21—6
	S200 x 27	29—8	26—8	24—5	22—8	21—6
2	S100 x 11	10—5	9—4	8—6	7—11	7—5
	S130 x 15	13—3	11—11	10—10	10—0	9—1
	S150 x 19	16—1	14—5	13—2	12—2	11—5
	W150 x 22	17—3	15—6	14—2	13—1	12—4
	W200 x 27	22—10	20—6	18—9	17—5	16—3
	S200 x 27	22—7	19—11	18—6	17—2	16—1
Column 1	2	3	4	5	6	7

*Nominal dimension.

TABLE 23D—SIZE AND SPACING OF STUDS

Type of Wall	Supported Loads (including dead loads)	Minimum Stud Size, in.*	Maximum Stud Spacing, in.	Maximum Unsupported Height, ft—in.
Interior	No load	2 by 2 2 by 4 flat ⁽¹⁾	16 16	7—10 11—10
	Attic not accessible by a stairway	2 by 3 2 by 3 flat ⁽¹⁾	24 16	9—10 7—10
		2 by 4 2 by 4 flat ⁽¹⁾	24 16	11—10 7—10
	Attics accessible by a stairway plus 1 floor, Roof load plus 1 floor, Attic not accessible by stairway plus 2 floors	2 by 4	16	11—10
	Roof load, Attic accessible by a stairway, Attic not accessible by a stairway plus 1 floor	2 by 4 2 by 3	24 16	11—10 7—10
	Attic accessible by a stairway plus 2 floors or roof load plus 2 floors	2 by 4 3 by 4 2 by 6	12 16 16	11—10 11—10 13—9
	Attic accessible by a stairway plus 3 floors or roof load plus 3 floors	2 by 6	12	13—9
Exterior	Roof with or without attic storage	2 by 3 2 by 4	16 24	7—10 9—10
		2 by 4 2 by 6	16 24	9—10 9—10
	Roof with or without attic storage plus 2 floors	2 by 4 3 by 4 2 by 6	12 16 16	9—10 9—10 11—10
		2 by 6	12	5—11
Column 1	2	3	4	5

Note to Table 23D:⁽¹⁾ See 23J(2).

*Nominal dimension.

TABLE 23E—WOOD LINTEL SPANS

Location of Lintels	Supported Loads Including Dead Loads and Ceiling	Nominal Depth of Lintels, in.*	Maximum Allowable Spans, ft—in.
Interior walls	Limited attic storage	4	4—0
		6	6—0
		8	8—0
		10	10—0
	Full attic storage or roof load or limited attic storage plus 1 floor	12	12—6
		4	2—0
		6	3—0
		8	4—0
Full attic storage plus 1 floor or roof load plus 1 floor or limited attic storage plus 2 or 3 floors	10	5—0	
	12	6—0	
	4	—	
	6	2—6	
Full attic storage plus 2 or 3 floors or roof load plus 2 or 3 floors	8	3—0	
	10	4—0	
	12	5—0	
	4	—	
Roof with or without attic storage	6	2—0	
	8	3—0	
	10	3—6	
	12	4—0	
Exterior walls	Roof with or without attic storage	4	3—8
		6	5—6
		8	7—4
		10	9—2
	Roof with or without attic storage plus 1 floor	12	11—0
		4	1—10
		6	4—7
		8	6—5
	Roof with or without attic storage plus 2 or 3 floors	10	7—4
		12	8—3
		4	1—10
		6	3—8
Column 1	2	8	5—6
		10	6—5
		12	7—4
		3	4

*Nominal dimension.

TABLE 23F—RAFTER-TO-JOIST NAILING
Minimum Number of Nails at least 3 in. long
(Unsupported Ridge)

Roof Slope	Rafter Spacing, in.	Rafter Tied to Every Joist						Rafter Tied to Joist Every 4 ft					
		Building Width up to 26 ft 3 in.			Building Width up to 32 ft 2 in.			Building Width up to 26 ft 3 in.			Building Width up to 32 ft 2 in.		
		Roof Snow Load, psf											
		21 or less	31	42 or more	21 or less	31	42 or more	21 or less	31	42 or more	21 or less	31	42 or more
4 in 12	16	4	5	6	5	6	8	11	—	—	—	—	—
	24	6	8	9	8	11	—	11	—	—	—	—	—
5 in 12	16	4	4	5	5	6	7	7	9	—	9	—	—
	24	5	6	8	7	8	11	7	9	—	—	—	—
6 in 12	16	4	4	4	4	4	5	6	8	9	8	11	—
	24	4	5	6	5	6	8	6	8	9	8	11	—
7 in 12	16	4	4	4	4	4	4	5	6	8	7	8	11
	24	4	4	5	5	6	7	5	6	8	7	8	11
9 in 12	16	4	4	4	4	4	4	4	5	6	5	6	7
	24	4	4	4	4	4	5	4	5	6	5	6	7
12 in 12	16	4	4	4	4	4	4	4	4	4	4	4	5
	24	4	4	4	4	4	4	4	4	4	4	4	5
Col. 1	2	3	4	5	6	7	8	9	10	11	12	13	14

TABLE 23H—THICKNESS OF SUBFLOORING

Maximum Joist Spacing, in.	Minimum Plywood Thickness, in.*	Minimum Waferboard or Particleboard Thickness, in.*	Minimum Lumber Thickness, in.
16	$\frac{5}{8}$	$\frac{5}{8}$	$\frac{1}{4}$
20	$\frac{5}{8}$	$\frac{3}{4}$	$\frac{3}{4}$
24	$\frac{3}{4}$	1	$\frac{3}{4}$
Column 1	2	3	4

TABLE 23I—THICKNESS OF ROOF SHEATHING

Joist or Rafter Spacing, in.	Minimum Plywood Thickness, in.*		Minimum Waferboard Thickness, in.*		Minimum Lumber Thickness, in.
	Edges Supported	Edges Unsupported	Edges Supported	Edges Unsupported	
12	$\frac{5}{16}$	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{1}{4}$
16	$\frac{5}{16}$	$\frac{3}{8}$	$\frac{3}{8}$	$\frac{7}{16}$	$\frac{1}{4}$
20	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{4}$
24	$\frac{3}{8}$	$\frac{1}{2}$	$\frac{7}{16}$	$\frac{1}{2}$	$\frac{3}{4}$
Column 1	2	3	4	5	6

*Nominal dimension.

TABLE 23J—WALL SHEATHING THICKNESS AND SPECIFICATIONS

Type of Sheathing	Minimum Thickness, in. ⁽¹⁾		Material Standards
	With Supports 16 in. o.c.	With Supports 24 in. o.c.	
Lumber	1 $\frac{1}{6}$	1 $\frac{1}{6}$	See Table 3B
Fibreboard (insulating)	3 $\frac{3}{8}$ *	7 $\frac{7}{16}$ *	CSA A247-M1978
Gypsum board	3 $\frac{3}{8}$ *	1 $\frac{1}{2}$ *	CSA A82.27-M1977 CSA 0121-M1978
Plywood (exterior type)	1 $\frac{1}{4}$ *	5 $\frac{5}{16}$ *	CSA 0151-M1978 CSA 0153-1976
Waferboard	1 $\frac{1}{4}$ *	5 $\frac{5}{16}$ *	CAN3-0188.2-M78
Column 1	2	3	4

Note to Table 23J:⁽¹⁾ See 28E(4) to 28E(6).**TABLE 24K—NOMINAL THICKNESS OF PLANK FRAMING**

Supported Load (Including dead load and ceiling)	Minimum Plank Thickness, in.*
Roof with or without attic storage	2
Roof with or without attic storage plus 1 floor	2
Roof with or without attic storage plus 2 floors	3
Column 1	2

TABLE 24L—LINTEL SPANS

Lintel Size, in.*	Maximum Span, ft—in.
2 by 8	5—1
2 by 10	6—5
2 by 12	7—4
3 by 8	6—5
3 by 10	7—4
Column 1	2

*Nominal dimension.

TABLE 25A—STEEL STUDS FOR NON-LOADBEARING PARTITIONS

Minimum Stud Size, in.	Maximum Stud Spacing, in.	Maximum Wall Height, ft—in.
1¼ x 1½	16 24	9—10 8—10
1¼ x 2½	16 24	13—1 11—10
1¼ x 3⅝	16 24	17—1 16—1
Column 1	2	3

TABLE 25B—STEEL STUDS FOR NON-LOADBEARING EXTERIOR WALLS

Minimum Stud Size, in.	Minimum Nominal Metal Thickness, in. (excluding coating)	Maximum Stud Length, ft—in.		
		Spacing of Studs		
		12 in. o.c.	16 in. o.c.	24 in. o.c.
1¼ x 3⅝	0.021	9—10	7—10	—
1¼ x 3⅝	0.027	10—10	8—10	7—10
1¼ x 3⅝	0.033	11—10	9—10	8—10
1¼ x 3⅝	0.039	13—1	10—10	9—10
Column 1	2	3	4	5

TABLE 27B—EXPOSURE OF WOOD ROOF SHINGLES

Roof Slope	Maximum Shingle Exposure, in.					
	No. 1 Grade			No. 2 Grade		
	Length of Shingle			Length of Shingle		
	16 in.	18 in.	24 in.	16 in.	18 in.	24 in.
4 in 12 or less	3¾	4⅞	5¾	3½	3⅞	5½
over 4 in 12	4⅞	5½	7½	3⅞	4½	6½
Column 1	2	3	4	5	6	7

TABLE 27D—QUANTITIES OF BITUMEN FOR BUILT-UP ROOFS

Type of Roof	Amount of Bitumen per 100 sq ft of Roof Surface	
	Mopping Coats Between Layers	Flood Coat
Asphalt and aggregate	20.5 lb	61.4 lb
Coal-tar and aggregate	24.6 lb	73.7 lb
Cold process roofing	1.5 gal. cold process cement	4.1 gal. cold process top coating
Column 1	2	3

TABLE 28A—ATTACHMENT OF SIDING

Type of Siding	Min. Nail or Staple Length, in.	Min. No. of Nails or Staples	Maximum Nail or Staple Spacing
Wood trim	2	—	24 in. (o.c.)
Lumber siding or horizontal siding made from sheet material	2	—	24 in. (o.c.)
Metal siding	1½	—	24 in. (o.c.) (nailed to framing) 16 in. (o.c.) (nailed to sheathing only)
Handsplit wood shakes up to 8 in. in width	2	2	—
Handsplit wood shakes over 8 in. in width	2	3	—
Wood shingles and machine grooved shakes up to 8 in. in width	1¼	2	—
Wood shingles and machine grooved shakes over 8 in. in width	1¼	3	—
Asbestos-cement shingles	1¼	2	—
Panel or sheet type siding up to ¼ in. thick	1½	—	5⅞ in. (o.c.) along edges
Panel or sheet type siding greater than ¼ in. thickness	2	—	12 in. (o.c.) along inter- mediate supports
Column 1	2	3	4

TABLE 28B—EXPOSURE AND THICKNESS OF WOOD SHINGLES AND MACHINE GROOVED SHAKES

Shake or Shingle Length, in.	Maximum Exposure		Minimum Butt Thickness, in.
	Single Coursing, in.	Double Coursing, in.	
16	7½	12	⅜
18	8½	14	⅞
24	11½	16	½
Column 1	2	3	4

TABLE 28C—MINIMUM PLYWOOD THICKNESS, EXTERIOR WALL FINISH

Spacing of Supports, in.	Face Grain Parallel to Supports, in.*	Face Grain Right Angles to Supports, in.*
16	⅜	¼
24	½	⅜
Column 1	2	3

TABLE 29A—AGGREGATE GRADING FOR STUCCO

Sieve Sizes	Per Cent Passing	
	Maximum	Minimum
No. 4	—	100
8	—	90
16	90	60
30	60	45
50	30	10
100	5	—
Column 1	2	3

*Nominal dimension.

TABLE 29B—STUCCO LATH

Location	Type of Lath	Min. Diam of Wire, in.	Max. Mesh Opening	Min. Wt /Sq Yd
Vertical surfaces	Welded or woven wire	0.047 0.053 0.063	1 in. 1½ in. 2 in.	— — —
	Stucco mesh reinforcing (expanded metal)	—	4 sq in.	1.8 lb
Horizontal surfaces ⁽¹⁾	¾-in. rib lath	—	—	3.4 lb
	Cedar lath	—	—	—
Column 1	2	3	4	5

Note to Table 29B:

⁽¹⁾ See Appendix A.

TABLE 30A—MINIMUM SIZE OF FURRING, in.

Maximum Spacing of Furring, in.	Maximum Spacing of Furring Supports		
	Continuous Support	16 in. o.c.	24 in. o.c.
12	¾ by 2*	¾ by 2*	¾ by 3*
16	¾ by 2*	¾ by 2*	¾ by 3*
24	¾ by 2*	¾ by 3*	¾ by 4*
Column 1	2	3	4

TABLE 30B—MINIMUM WEIGHT OF METAL LATH

Type of Lath	Min. Weight, lb per sq yd	Max. Spacing of Wood Supports, in.	
		Walls	Ceilings
Diamond mesh	2.5	12	12
	3.0	16	12
Flat rib	2.5	16	12
	3.0	16	16
¾-in. rib	2.5	16	16
	3.0	20	20
	3.5	24	24
Paper-backed welded wire	1.4	16	16
	1.95	24	24
Column 1	2	3	4

*Nominal dimension.

TABLE 30C—FASTENER PENETRATION INTO WOOD SUPPORTS

Required Fire-Resistance Rating of Assembly, hr	Min. Fastener Penetration Into Wood Supports, in.			
	Walls		Ceilings	
	Nails	Screws	Nails	Screws
Fire-resistance not required				
3/4	3/4	5/8	3/4	5/8
1	3/4	3/4	1 1/8	1 1/8
1 1/2	3/4	3/4	1 3/4	1 3/4
Column 1	2	3	4	5

TABLE 30D—MINIMUM THICKNESS OF PLYWOOD INTERIOR FINISH

Maximum Spacing of Supports, in. o.c.	On Supports with No Horizontal Blocking, in.	On Supports with Blocking at Vertical Intervals not Exceeding 4 ft, in.
16	3/16	5/32
24	3/8	3/16
Column 1	2	3

TABLE 31A—WOOD STRIP FLOORING

Type of Flooring	Maximum Joist Spacing, in.	Minimum Actual Thickness of Flooring, in.	
		With Subfloor	No Subfloor
Matched hardwood (interior use only)	16	5/16	3/4
	24	5/16	1 5/16
Matched softwood (interior or exterior use)	16	3/4	3/4
	24	3/4	1 1/4
Squared edge softwood (exterior use only)	16	—	1
	24	—	1 1/2
Column 1	2	3	4

TABLE 31B—NAILING OF WOOD STRIP FLOORING

Finish Floor Thickness, in.	Minimum Length of Flooring Nails, in.	Maximum Spacing of Flooring Nails, in.
5/16	1½ ⁽¹⁾	7/8
7/16	2	12
3/4	2¼	16
1	2½	16
1¼	2¾	24
1½	3¼	24
Column 1	2	3

Note to Table 31B:⁽¹⁾ See 31C(5).**TABLE 32A—ELECTRIC SERVICE WATER HEATERS, STORAGE TYPE**

No. of Bath-rooms ⁽¹⁾	No. of Bed-rooms	Min. Tank Capacity, Can. gal.	Minimum Wattage of Elements		
			Single Element Type	Dual Element Type (nonsimultaneous operation)	
				Primary Element	Secondary Element
1	1 or 2	20	1,000	750	1,000
	3 or 4	30	1,500	1,000	1,000
2	2 or 3	40	2,000	1,000	1,000
	4 or 5	40	2,500	1,000	3,000
Column 1	2	3	4	5	6

Note to Table 32A:⁽¹⁾ Rooms containing a shower or bathtub.**TABLE 32B—NONELECTRIC SERVICE WATER HEATERS, STORAGE TYPE**

No. of Bathrooms ⁽¹⁾	No. of Bedrooms	Min. Tank Capacity, Can. gal.	Minimum Heating Capacity, Can. gal. raised 100F° in 1 h
1	1 or 2	14	12
	3 or 4	16	12
2	2 or 3	22	16
	4 or 5	30	21
Column 1	2	3	4

Note to Table 32B:⁽¹⁾ Rooms containing a shower or bathtub.

TABLE 32C—MINIMUM HEATING CAPACITY
(Can. gal. per hr at 100F° temp. rise)

Max. No. of Dwelling Units ⁽¹⁾	Min. Storage Capacity per Dwelling Unit, ⁽²⁾					
	0 Instantaneous	5	10	15	20	25
3	292	29	25	22	19	17
5	338	48	42	36	31	28
10	392	97	84	72	63	54
15	430	144	126	108	94	81
20	464	193	167	144	124	108
25	498	232	200	173	150	130
30	535	272	234	203	175	152
40	600	340	293	252	218	188
50	675	396	340	292	251	217
60	750	447	383	326	278	240
80	875	519	439	374	316	—
100	958	541	452	376	—	—
150	1,160	566	462	—	—	—
200	1,330	753	616	—	—	—
250	1,500	942	—	—	—	—
300	1,670	1,130	—	—	—	—
Column 1	2	3	4	5	6	7

Notes to Table 32C:

(1) For numbers of dwelling units not listed, interpolations may be made to determine recovery capacity.

(2) For storage capacities not listed, interpolations may be made to determine recovery capacity.

TABLE 33A—NATURAL VENTILATION

	Location	Minimum Unobstructed Area
Within dwelling units	Bathrooms or water-closet rooms	1 sq ft
	Unfinished basement space	0.2 per cent of the floor area
	Dining rooms, living rooms, Bedrooms, kitchens, combined rooms, Dens, recreation rooms and all other finished rooms	3 sq ft per room or combination of rooms
Other than within dwelling units	Bathrooms or water-closet rooms	1 sq ft per water-closet
	Sleeping areas	1½ sq ft per occupant
	Laundry rooms, kitchens, recreation rooms	4 per cent of the floor area
	Corridors, storage rooms and other similar public rooms or spaces	2 per cent of the floor area
	Unfinished basement space not used on a shared basis	0.2 per cent of the floor area
Column 1	2	3

TABLE 34A—MINIMUM METAL THICKNESS OF DUCTS, in.

Shape and Location of Duct	Size of Duct, in.	Galvanized Steel	Aluminum	Tin Plate
All round ducts and enclosed rectangular ducts	14 or under over 14	0.013 0.016	0.012 0.016	0.015 —
Exposed rectangular ducts having a required clearance of up to ½ in. and serving single dwelling units	14 or under over 14	0.013 0.016	0.016 0.019	— —
Other exposed rectangular ducts	14 or under over 14	0.016 0.019	0.016 0.019	— —
Column 1	2	3	4	5

TABLE 34B—MINIMUM CLEARANCES TO COMBUSTIBLE MATERIAL FOR STOVES, RANGES AND SPACE HEATERS USING SOLID FUEL

Appliances	Minimum Clearance, in.			
	Top	Sides	Rear	Front
Stoves and ranges without refractory lining	30	—	35	47
fire box side	—	35	—	—
other side	—	18	—	—
Stoves and ranges with refractory lining	30	—	24	47
fire box side	—	24	—	—
other side	—	18	—	—
Space heaters with an air space between the outside of the fire chamber and the external casing to allow air circulation	35	12	12	47
Space heaters other than above	35	35	35	47
Column 1	2	3	4	5

TABLE 35A—MINIMUM LIGHTING FOR PUBLIC AREAS

Room or Space	Footcandles	Watts per Square Foot of Floor Area (Incandescent Lighting)
Storage rooms	5	$\frac{1}{2}$
Service rooms and laundry areas	20	2
Garages	5	$\frac{1}{2}$
Public water-closet rooms	10	1
Public corridors and stairways	5	—
Service hallways and stairways	5	—
Recreation rooms	10	1
Column 1	2	3

TABLE 39A—WALKWAY WIDTHS

Type of Walkway	Maximum No. of Dwelling Units Served	Minimum Walkway Width, ft—in.
Main walkways	4	2—6
	8	3—0
	16	4—0
	more than 16	5—0
Secondary walkways	4	2—0
	8	2—6
	16	3—0
	more than 16	4—0
Column 1	2	3

Table A-1
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 10 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 10 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	11	3	10	2	9	6	8	11	12	10	11	8	10	10	10	2
		2 x 6	17	8	16	0	14	11	14	0	20	3	18	4	17	1	16	0
		2 x 8	23	3	21	2	19	8	18	6	26	8	24	3	22	6	21	2
		2 x 10	29	9	27	0	25	1	23	7	34	0	30	11	28	8	27	0
		2 x 12	36	2	32	10	30	6	28	8	41	5	37	7	34	11	32	10
	No 1	2 x 4	11	3	10	2	9	6	8	11	12	10	11	8	10	10	10	2
		2 x 6	17	8	16	0	14	11	14	0	20	3	18	4	17	1	16	0
		2 x 8	23	3	21	2	19	8	18	6	26	8	24	3	22	6	21	2
		2 x 10	29	9	27	0	25	1	23	7	34	0	30	11	28	8	27	0
		2 x 12	36	2	32	10	30	6	28	8	41	5	37	7	34	11	32	10
	No 2	2 x 4	10	10	9	10	9	2	8	7	12	5	11	3	10	5	9	10
		2 x 6	17	1	15	6	14	4	13	6	19	6	17	9	16	5	15	0
		2 x 8	22	6	20	5	19	0	17	10	25	9	23	5	21	8	19	9
		2 x 10	28	8	26	1	24	2	22	9	32	10	29	10	27	7	25	2
2 x 12		34	11	31	9	29	5	27	8	40	0	36	4	33	7	30	8	
No 3	2 x 4	10	5	9	5	8	5	7	8	10	11	9	5	8	5	7	8	
	2 x 6	16	1	13	11	12	5	11	4	16	1	13	11	12	5	11	4	
	2 x 8	21	3	18	4	16	5	15	0	21	3	18	4	16	5	15	0	
	2 x 10	27	1	23	5	21	0	19	2	27	1	23	5	21	0	19	2	
	2 x 12	32	11	28	6	25	6	23	3	32	11	28	6	25	6	23	3	
Construction	2 x 4	10	5	9	6	8	9	8	3	11	11	10	9	9	7	8	9	
Standard	2 x 4	9	2	7	11	7	1	6	5	9	2	7	11	7	1	6	5	
Utility	2 x 4	6	5	5	7	5	0	4	7	6	5	5	7	5	0	4	7	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	10	10	9	10	9	2	8	7	12	5	11	3	10	5	9	10
		2 x 6	17	1	15	6	14	4	13	6	19	6	17	9	16	6	15	6
		2 x 8	22	6	20	5	19	0	17	10	25	9	23	5	21	8	20	5
		2 x 10	28	8	26	1	24	2	22	9	32	10	29	10	27	8	26	1
		2 x 12	34	11	31	9	29	5	27	8	40	0	36	4	33	8	31	9
	No 1	2 x 4	10	10	9	10	9	2	8	7	12	5	11	3	10	5	9	8
		2 x 6	17	1	15	6	14	4	13	6	19	6	17	7	15	9	14	5
		2 x 8	22	6	20	5	19	0	17	10	25	9	23	3	20	9	19	0
		2 x 10	28	8	26	1	24	2	22	9	32	10	29	8	26	6	24	3
		2 x 12	34	11	31	9	29	5	27	8	40	0	36	1	32	3	29	5
	No 2	2 x 4	10	5	9	6	8	10	8	3	11	11	10	10	9	10	8	11
		2 x 6	16	5	14	11	13	10	12	9	18	1	15	8	14	0	12	9
		2 x 8	21	8	19	8	18	3	16	10	23	11	20	8	18	6	16	10
		2 x 10	27	8	25	1	23	4	21	6	30	6	26	5	23	7	21	6
2 x 12		33	8	30	7	28	4	26	2	37	1	32	1	28	9	26	2	
No 3	2 x 4	9	2	7	11	7	1	6	5	9	2	7	11	7	1	6	5	
	2 x 6	13	9	11	11	10	8	9	9	13	9	11	11	10	8	9	9	
	2 x 8	18	2	15	9	14	1	12	10	18	2	15	9	14	1	12	10	
	2 x 10	23	2	20	1	17	11	16	5	23	2	20	1	17	11	16	5	
	2 x 12	28	2	24	5	21	10	19	11	28	2	24	5	21	10	19	11	
Construction	2 x 4	10	0	9	1	8	2	7	5	10	7	9	2	8	2	7	5	
Standard	2 x 4	7	11	6	10	6	1	5	7	7	11	6	10	6	1	5	7	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	

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Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 10 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 10 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	10	4	9	4	8	8	8	2	11	9	10	8	9	11	9	4
		2 x 6	16	2	14	9	13	8	12	10	18	7	16	10	15	8	14	9
		2 x 8	21	4	19	5	18	0	16	11	24	6	22	3	20	8	19	5
		2 x 10	27	3	24	9	23	0	21	8	31	3	28	4	26	4	24	9
		2 x 12	33	2	30	2	28	0	26	4	38	0	34	6	32	0	30	2
	No. 1	2 x 4	10	4	9	4	8	8	8	2	11	9	10	8	9	11	9	4
		2 x 6	16	2	14	9	13	8	12	10	18	7	16	10	15	8	14	9
		2 x 8	21	4	19	5	18	0	16	11	24	6	22	3	20	8	19	5
		2 x 10	27	3	24	9	23	0	21	8	31	3	28	4	26	4	24	9
		2 x 12	33	2	30	2	28	0	26	4	38	0	34	6	32	0	30	2
	No. 2	2 x 4	9	11	9	0	8	4	7	11	11	5	10	4	9	7	9	0
		2 x 6	15	8	14	2	13	2	12	5	17	11	16	3	15	1	14	2
		2 x 8	20	7	18	9	17	5	16	4	23	7	21	5	19	11	18	9
		2 x 10	26	4	23	11	22	2	20	11	30	2	27	5	25	5	23	11
2 x 12		32	0	29	1	27	0	25	5	36	8	33	4	30	11	29	1	
No. 3	2 x 4	9	7	8	8	8	1	7	5	10	7	9	2	8	2	7	5	
	2 x 6	15	0	13	5	12	0	11	0	15	6	13	5	12	0	11	0	
	2 x 8	19	10	17	9	15	10	14	6	20	6	17	9	15	10	14	6	
	2 x 10	25	4	22	8	20	3	18	6	26	2	22	8	20	3	18	6	
	2 x 12	30	9	27	7	24	8	22	6	31	10	27	7	24	8	22	6	
Construction	2 x 4	9	7	8	8	8	1	7	7	10	11	9	11	9	2	8	4	
Standard	2 x 4	8	9	7	7	6	9	6	2	8	9	7	7	6	9	6	2	
Utility	2 x 4	5	11	5	1	4	7	4	2	5	11	5	1	4	7	4	2	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	10	10	9	10	9	2	8	7	12	5	11	3	10	5	9	10
		2 x 6	17	1	15	6	14	4	13	6	19	6	17	9	16	6	15	3
		2 x 8	22	6	20	5	19	0	17	10	25	9	23	5	21	8	20	1
		2 x 10	28	8	26	1	24	2	22	9	32	10	29	10	27	8	25	8
		2 x 12	34	11	31	9	29	5	27	8	40	0	36	4	33	8	31	3
	No. 1	2 x 4	10	10	9	10	9	2	8	7	12	5	11	3	10	5	9	8
		2 x 6	17	1	15	6	14	4	13	6	19	6	17	3	15	5	14	1
		2 x 8	22	6	20	5	19	0	17	10	25	9	22	9	20	4	18	7
		2 x 10	28	8	26	1	24	2	22	9	32	10	29	0	26	0	23	8
		2 x 12	34	11	31	9	29	5	27	8	40	0	35	4	31	7	28	10
	No. 2	2 x 4	10	5	9	6	8	10	8	3	11	11	10	9	9	7	8	9
		2 x 6	16	5	14	11	13	10	12	9	18	1	15	8	14	0	12	9
		2 x 8	21	8	19	8	18	3	16	10	23	11	20	8	18	6	16	10
		2 x 10	27	8	25	1	23	4	21	6	30	6	26	5	23	7	21	6
2 x 12		33	8	30	7	28	4	26	2	37	1	32	1	28	9	26	2	
No. 3	2 x 4	9	2	7	11	7	1	6	5	9	2	7	11	7	1	6	5	
	2 x 6	13	9	11	11	10	8	9	9	13	9	11	11	10	8	9	9	
	2 x 8	18	2	15	9	14	1	12	10	18	2	15	9	14	1	12	10	
	2 x 10	23	2	20	1	17	11	16	5	23	2	20	1	17	11	16	5	
	2 x 12	28	2	24	5	21	10	19	11	28	2	24	5	21	10	19	11	
Construction	2 x 4	10	0	9	1	8	2	7	5	10	7	9	2	8	2	7	5	
Standard	2 x 4	7	11	6	10	6	1	5	7	7	11	6	10	6	1	5	7	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	

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Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 10 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 10 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.			
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	10	2	9	3	8	7	8	1	11	8	10	7	9	10	9	3
		2 x 6	16	0	14	7	13	6	12	9	18	4	16	8	15	6	14	7
		2 x 8	21	2	19	3	17	10	16	9	24	3	22	0	20	5	19	3
		2 x 10	27	0	24	6	22	9	21	5	30	11	28	1	26	1	24	6
		2 x 12	32	10	29	10	27	8	26	1	37	7	34	2	31	9	29	10
	No. 1	2 x 4	10	2	9	3	8	7	8	1	11	8	10	7	9	10	9	3
		2 x 6	16	0	14	7	13	6	12	9	18	4	16	8	15	1	13	9
		2 x 8	21	2	19	3	17	10	16	9	24	3	22	0	19	11	18	2
		2 x 10	27	0	24	6	22	9	21	5	30	11	28	1	25	5	23	2
		2 x 12	32	10	29	10	27	8	26	1	37	7	34	2	30	11	28	2
	No. 2	2 x 4	9	10	8	11	8	4	7	10	11	3	10	3	9	4	8	7
		2 x 6	15	6	14	1	13	1	12	4	17	7	15	3	13	8	12	5
		2 x 8	20	5	18	7	17	3	16	3	23	3	20	1	18	0	16	5
		2 x 10	26	1	23	9	22	0	20	9	29	8	25	8	23	0	21	0
		2 x 12	31	9	28	10	26	9	25	2	36	1	31	3	27	11	25	6
	No. 3	2 x 4	9	2	7	11	7	1	6	5	9	2	7	11	7	1	6	5
		2 x 6	13	1	11	4	10	2	9	3	13	1	11	4	10	2	9	3
		2 x 8	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3
2 x 10		22	1	19	2	17	1	15	7	22	1	19	2	17	1	15	7	
2 x 12		26	11	23	3	20	10	19	0	26	11	23	3	20	10	19	0	
Con-struction	2 x 4	9	6	8	7	7	11	7	3	10	3	8	10	7	11	7	3	
Standard	2 x 4	7	11	6	10	6	1	5	7	7	11	6	10	6	1	5	7	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	9	10	8	11	8	3	7	9	11	3	10	3	9	6	8	11
		2 x 6	15	6	14	1	13	0	12	3	17	8	16	1	14	11	14	1
		2 x 8	20	5	18	6	17	2	16	2	23	4	21	3	19	8	18	6
		2 x 10	26	0	23	8	21	11	20	8	29	10	27	1	25	2	23	8
		2 x 12	31	8	28	9	26	9	25	2	36	3	32	11	30	7	28	9
	No. 1	2 x 4	9	10	8	11	8	3	7	9	11	3	10	3	9	6	8	11
		2 x 6	15	6	14	1	13	0	12	3	17	8	16	1	14	11	14	1
		2 x 8	20	5	18	6	17	2	16	2	23	4	21	3	19	8	18	6
		2 x 10	26	0	23	8	21	11	20	8	29	10	27	1	25	2	23	8
		2 x 12	31	8	28	9	26	9	25	2	36	3	32	11	30	7	28	9
	No. 2	2 x 4	9	6	8	7	8	0	7	6	10	10	9	10	9	2	8	7
		2 x 6	14	11	13	7	12	7	11	10	17	1	15	3	13	8	12	5
		2 x 8	19	8	17	11	16	7	15	8	22	7	20	1	18	0	16	5
		2 x 10	25	2	22	10	21	2	19	11	28	9	25	8	23	0	21	0
		2 x 12	30	7	27	9	25	10	24	3	35	0	31	3	27	11	25	6
	No. 3	2 x 4	9	1	7	11	7	1	6	5	9	2	7	11	7	1	6	5
		2 x 6	13	9	11	11	10	8	9	9	13	9	11	11	10	8	9	9
		2 x 8	18	2	15	9	14	1	12	10	18	2	15	9	14	1	12	10
2 x 10		23	2	20	1	17	11	16	5	23	2	20	1	17	11	16	5	
2 x 12		28	2	24	5	21	10	19	11	28	2	24	5	21	10	19	11	
Con-struction	2 x 4	9	1	8	3	7	8	7	3	10	5	9	2	8	2	7	5	
Standard	2 x 4	7	11	6	10	6	1	5	7	7	11	6	10	6	1	5	7	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	

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Table A-1 (Cont'd)
CEILING JOISTS — ATTIC NOT ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 10 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 10 lb per sq ft															
			Gypsum Board or Plastered Ceiling								Other Ceilings							
			Joist Spacing								Joist Spacing							
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	9	10	8	11	8	3	7	9	11	3	10	3	9	6	8	11
		2 x 6	15	6	14	1	13	0	12	3	17	8	16	1	14	11	14	1
		2 x 8	20	5	18	6	17	2	16	2	23	4	21	3	19	8	18	6
		2 x 10	26	0	23	8	21	11	20	8	29	10	27	1	25	2	23	8
		2 x 12	31	8	28	9	26	9	25	2	36	3	32	11	30	7	28	9
	No 1	2 x 4	9	10	8	11	8	3	7	9	11	3	10	3	9	6	8	11
		2 x 6	15	6	14	1	13	0	12	3	17	8	16	1	14	9	13	5
		2 x 8	20	5	18	6	17	2	16	2	23	4	21	3	19	5	17	9
		2 x 10	26	0	23	8	21	11	20	8	29	10	27	1	24	10	22	8
		2 x 12	31	8	28	9	26	9	25	2	36	3	32	11	30	2	27	7
	No 2	2 x 4	9	6	8	7	8	0	7	6	10	10	9	10	9	2	8	4
		2 x 6	14	11	13	7	12	7	11	10	17	1	14	10	13	3	12	1
		2 x 8	19	8	17	11	16	7	15	7	22	7	19	7	17	6	15	11
		2 x 10	25	2	22	10	21	2	19	11	28	9	25	0	22	4	20	4
		2 x 12	30	7	27	9	25	10	24	3	35	0	30	4	27	2	24	9
	No. 3	2 x 4	8	9	7	7	6	9	6	2	8	9	7	7	6	9	6	2
		2 x 6	13	1	11	4	10	2	9	3	13	1	11	4	10	2	9	2
		2 x 8	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3
		2 x 10	22	1	19	2	17	1	15	7	22	1	19	2	17	1	15	7
		2 x 12	26	11	23	3	20	10	19	0	26	11	23	3	20	10	19	0
Con- struction	2 x 4	9	1	8	3	7	8	7	0	9	10	8	7	7	8	7	0	
Standard	2 x 4	7	5	6	5	5	9	5	3	7	5	6	5	5	9	5	3	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	10	0	9	1	8	5	7	11	11	5	10	4	9	7	9	1
		2 x 6	15	8	14	3	13	3	12	5	17	11	16	4	15	2	14	3
		2 x 8	20	8	18	9	17	5	16	5	23	8	21	6	20	0	18	9
		2 x 10	26	5	24	0	22	3	20	11	30	3	27	5	25	6	24	0
		2 x 12	32	1	29	2	27	1	25	6	36	9	33	5	31	0	29	2
	No 1	2 x 4	10	0	9	1	8	5	7	11	11	5	10	4	9	7	9	1
		2 x 6	15	8	14	3	13	3	12	5	17	11	16	4	15	1	13	9
		2 x 8	20	8	18	9	17	5	16	5	23	8	21	6	19	11	18	2
		2 x 10	26	5	24	0	22	3	20	11	30	3	27	5	25	5	23	2
		2 x 12	32	1	29	2	27	1	25	6	36	9	33	5	30	11	28	2
	No. 2	2 x 4	9	7	8	9	8	1	7	7	11	0	10	0	9	3	8	7
		2 x 6	15	1	13	9	12	9	12	0	17	4	15	3	13	8	12	5
		2 x 8	19	11	18	1	16	10	15	10	22	10	20	1	18	0	16	5
		2 x 10	25	5	23	1	21	5	20	2	29	2	25	8	23	0	21	0
		2 x 12	31	0	28	1	26	1	24	7	35	5	31	3	27	11	25	6
	No 3	2 x 4	9	2	7	11	7	1	6	5	9	2	7	11	7	1	6	5
		2 x 6	13	1	11	4	10	2	9	3	13	1	11	4	10	2	9	3
		2 x 8	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3
		2 x 10	22	1	19	2	17	1	15	7	22	1	19	2	17	1	15	7
		2 x 12	26	11	23	3	20	10	19	0	26	11	23	3	20	10	19	0
Con- struction	2 x 4	9	3	8	5	7	10	7	3	10	3	8	10	7	11	7	3	
Standard	2 x 4	7	11	6	10	6	1	5	7	7	11	6	10	6	1	5	7	
Utility	2 x 4	5	3	4	7	4	1	3	8	5	3	4	7	4	1	3	8	

Table A-2
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m.</i>	LIVE LOAD 40 lb per sq ft							
			All Ceilings							
			Joist Spacing							
			12 in.		16 in.		20 in.		24 in.	
<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	7	1	6	5	5	11	5	7
		2 x 6	11	1	10	1	9	4	8	10
		2 x 8	14	8	13	4	12	4	11	7
		2 x 10	18	9	17	0	15	9	14	10
		2 x 12	22	9	20	8	19	2	18	1
	No. 1	2 x 4	7	1	6	5	5	11	5	7
		2 x 6	11	1	10	1	9	4	8	10
		2 x 8	14	8	13	4	12	4	11	7
		2 x 10	18	9	17	0	15	9	14	10
		2 x 12	22	9	20	8	19	2	18	1
	No. 2	2 x 4	6	10	6	2	5	9	5	5
		2 x 6	10	9	9	9	9	0	8	5
		2 x 8	14	2	12	10	11	11	11	2
		2 x 10	18	1	16	5	15	3	14	3
		2 x 12	22	0	20	0	18	6	17	4
	No. 3	2 x 4	6	2	5	4	4	9	4	4
		2 x 6	9	1	7	10	7	0	6	5
		2 x 8	12	0	10	4	9	3	8	6
		2 x 10	15	4	13	3	11	10	10	10
	2 x 12	18	7	16	1	14	5	13	2	
	Construction	2 x 4	6	7	5	11	5	5	4	11
Standard	2 x 4	5	2	4	5	4	0	3	8	
Utility	2 x 4	3	8	3	2	2	10	2	7	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	6	10	6	2	5	9	5	5
		2 x 6	10	9	9	9	9	0	8	6
		2 x 8	14	2	12	10	11	11	11	3
		2 x 10	18	1	16	5	15	3	14	4
		2 x 12	22	0	20	0	18	6	17	5
	No. 1	2 x 4	6	10	6	2	5	9	5	5
		2 x 6	10	9	9	9	8	11	8	1
		2 x 8	14	2	12	10	11	9	10	9
		2 x 10	18	1	16	5	15	0	13	8
		2 x 12	22	0	20	0	18	3	16	8
	No. 2	2 x 4	6	7	5	11	5	6	5	0
		2 x 6	10	3	8	10	7	11	7	3
		2 x 8	13	6	11	8	10	5	9	6
		2 x 10	17	3	14	11	13	4	12	2
		2 x 12	20	11	18	2	16	3	14	10
	No. 3	2 x 4	5	2	4	5	4	0	3	8
		2 x 6	7	9	6	9	6	0	5	6
		2 x 8	10	3	8	10	7	11	7	3
		2 x 10	13	1	11	4	10	2	9	3
		2 x 12	15	11	13	10	12	4	11	3
	Construction	2 x 4	5	11	5	2	4	7	4	2
Standard	2 x 4	4	5	3	10	3	5	3	2	
Utility	2 x 4	2	11	2	7	2	3	2	1	

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Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m.</i>	LIVE LOAD 40 lb per sq ft							
			All Ceilings							
			Joist Spacing							
			12 in.		16 in.		20 in.		24 in.	
	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>		
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	6	6	5	10	5	5	5	2
		2 x 6	10	2	9	3	8	7	8	1
		2 x 8	13	5	12	3	11	4	10	8
		2 x 10	17	2	15	7	14	6	13	7
		2 x 12	20	11	19	0	17	7	16	7
	No. 1	2 x 4	6	6	5	10	5	5	5	2
		2 x 6	10	2	9	3	8	7	8	1
		2 x 8	13	5	12	3	11	4	10	8
		2 x 10	17	2	15	7	14	6	13	7
		2 x 12	20	11	19	0	17	7	16	7
	No. 2	2 x 4	6	3	5	8	5	3	4	11
		2 x 6	9	10	8	11	8	3	7	10
		2 x 8	13	0	11	9	10	11	10	3
		2 x 10	16	7	15	1	14	0	13	2
		2 x 12	20	2	18	4	17	0	16	0
	No. 3	2 x 4	5	11	5	2	4	7	4	2
		2 x 6	8	9	7	7	6	9	6	2
		2 x 8	11	7	10	0	8	11	8	2
		2 x 10	14	9	12	10	11	5	10	5
		2 x 12	18	0	15	7	13	11	12	8
	Construction	2 x 4	6	0	5	5	5	1	4	8
Standard	2 x 4	4	11	4	3	3	10	3	6	
Utility	2 x 4	3	4	2	10	2	7	2	4	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	6	10	6	2	5	9	5	5
		2 x 6	10	9	9	9	9	0	8	6
		2 x 8	14	2	12	10	11	11	11	3
		2 x 10	18	1	16	5	15	3	14	4
		2 x 12	22	0	20	0	18	6	17	5
	No. 1	2 x 4	6	10	6	2	5	9	5	5
		2 x 6	10	9	9	9	8	8	7	11
		2 x 8	14	2	12	10	11	6	10	6
		2 x 10	18	1	16	5	14	8	13	5
		2 x 12	22	0	20	0	17	10	16	4
	No. 2	2 x 4	6	7	5	11	5	5	4	11
		2 x 6	10	3	8	10	7	11	7	3
		2 x 8	13	6	11	8	10	5	9	6
		2 x 10	17	3	14	11	13	4	12	2
		2 x 12	20	11	18	2	16	3	14	10
	No. 3	2 x 4	5	2	4	5	4	0	3	8
		2 x 6	7	9	6	9	6	0	5	6
		2 x 8	10	3	8	10	7	11	7	3
		2 x 10	13	1	11	4	10	2	9	3
		2 x 12	15	11	13	10	12	4	11	3
	Construction	2 x 4	5	11	5	2	4	7	4	2
Standard	2 x 4	4	5	3	10	3	5	3	2	
Utility	2 x 4	2	11	2	7	2	3	2	1	

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Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 40 lb per sq ft							
			All Ceilings							
			Joist Spacing							
			12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Spruce-Pine-Fir (includes Spruce (all Species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	6	5	5	10	5	5	5	1
		2 x 6	10	1	9	2	8	6	8	0
		2 x 8	13	4	12	1	11	3	10	7
		2 x 10	17	0	15	5	14	4	13	6
		2 x 12	20	8	18	9	17	5	16	5
	No. 1	2 x 4	6	5	5	10	5	5	5	1
		2 x 6	10	1	9	2	8	6	7	9
		2 x 8	13	4	12	1	11	3	10	3
		2 x 10	17	0	15	5	14	4	13	1
		2 x 12	20	8	18	9	17	5	15	11
	No. 2	2 x 4	6	2	5	7	5	3	4	10
		2 x 6	9	9	8	7	7	8	7	0
		2 x 8	12	10	11	4	10	2	9	3
		2 x 10	16	5	14	6	13	0	11	10
		2 x 12	20	0	17	8	15	9	14	5
	No. 3	2 x 4	5	2	4	5	4	0	3	8
		2 x 6	7	5	6	5	5	9	5	3
		2 x 8	9	9	8	6	7	7	6	11
		2 x 10	12	6	10	10	9	8	8	10
		2 x 12	15	2	13	2	11	9	10	9
	Construction	2 x 4	5	9	5	0	4	5	4	1
Standard	2 x 4	4	5	3	10	3	5	3	2	
Utility	2 x 4	2	11	2	7	2	3	2	1	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	6	2	5	7	5	2	4	11
		2 x 6	9	9	8	10	8	2	7	9
		2 x 8	12	10	11	18	10	10	10	2
		2 x 10	16	5	14	11	13	10	13	0
		2 x 12	19	11	18	1	16	10	15	10
	No. 1	2 x 4	6	2	5	7	5	2	4	11
		2 x 6	9	9	8	10	8	2	7	9
		2 x 8	12	10	11	8	10	10	10	2
		2 x 10	16	5	14	11	13	10	13	0
		2 x 12	19	11	18	1	16	10	15	10
	No. 2	2 x 4	6	0	5	5	5	0	4	9
		2 x 6	9	5	8	6	7	8	7	0
		2 x 8	12	5	11	3	10	2	9	3
		2 x 10	15	10	14	4	13	0	11	10
		2 x 12	19	3	17	6	15	9	14	5
	No. 3	2 x 4	5	2	4	5	4	0	3	8
		2 x 6	7	9	6	9	6	0	5	6
		2 x 8	10	3	8	10	7	11	7	3
		2 x 10	13	1	11	4	10	2	9	3
		2 x 12	15	11	13	10	12	4	11	3
	Construction	2 x 4	5	9	5	2	4	7	4	2
Standard	2 x 4	4	5	3	10	3	5	3	2	
Utility	2 x 4	2	11	2	7	2	3	2	1	

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Table A-2 (Cont'd)
FLOOR JOISTS — LIVING QUARTERS
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 40 lb per sq ft								
			All Ceilings								
			Joist Spacing								
			12 in.		16 in.		20 in.		24 in.		
		<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>		
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	6	2	5	7	5	2	4	11	
		2 x 6	9	9	8	10	8	2	7	9	
		2 x 8	12	10	11	8	10	10	10	2	
		2 x 10	16	5	14	11	13	10	13	0	
		2 x 12	19	11	18	1	16	10	15	10	
	No. 1	2 x 4	6	2	5	7	5	2	4	11	
		2 x 6	9	9	8	10	8	2	7	7	
		2 x 8	12	10	11	8	10	10	10	0	
		2 x 10	16	5	14	11	13	10	12	10	
		2 x 12	19	11	18	1	16	10	15	7	
	No. 2	2 x 4	6	0	5	5	5	0	4	8	
		2 x 6	9	5	8	4	7	6	6	10	
		2 x 8	12	5	11	1	9	10	9	0	
		2 x 10	15	10	14	1	12	7	11	6	
		2 x 12	19	3	17	2	15	4	14	0	
	No. 3	2 x 4	4	11	4	3	3	10	3	6	
		2 x 6	7	5	6	5	5	9	5	3	
		2 x 8	9	9	8	6	7	7	6	11	
	Construction	2 x 4	12	6	10	10	9	8	8	10	
		2 x 12	15	2	13	2	11	9	10	9	
	Standard	2 x 4	5	7	4	10	4	4	3	11	
	Utility	2 x 4	4	2	3	8	3	3	2	11	
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	6	3	5	8	5	3	5	0
			2 x 6	9	10	8	11	8	4	7	10
2 x 8			13	0	11	10	11	0	10	4	
2 x 10			16	7	15	1	14	0	13	2	
2 x 12			20	3	18	4	17	0	16	0	
No. 1		2 x 4	6	3	5	8	5	3	5	0	
		2 x 6	9	10	8	11	8	4	7	9	
		2 x 8	13	0	11	10	11	0	10	3	
		2 x 10	16	7	15	1	14	0	13	1	
		2 x 12	20	3	18	4	17	0	15	11	
No. 2		2 x 4	6	0	5	6	5	1	4	9	
		2 x 6	9	6	8	7	7	8	7	0	
		2 x 8	12	7	11	4	10	2	9	3	
		2 x 10	16	0	14	6	13	0	11	10	
		2 x 12	19	6	17	8	15	9	14	5	
No. 3		2 x 4	5	2	4	5	4	0	3	8	
		2 x 6	7	5	6	5	5	9	5	3	
		2 x 8	9	9	8	6	7	7	6	11	
		2 x 10	12	6	10	10	9	8	8	10	
		2 x 12	15	2	13	2	11	9	10	9	
Construction		2 x 4	5	9	5	0	4	5	4	1	
Standard		2 x 4	4	5	3	10	3	5	3	2	
Utility		2 x 4	2	11	2	7	2	3	2	1	

Table A-3
FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	1	10	4	9	8	14	0	12	9	11	10	11	1
		2 x 8	16	2	14	8	13	7	12	10	18	6	16	9	15	7	14	8
		2 x 10	20	7	18	9	17	4	16	4	23	7	21	5	19	11	18	9
		2 x 12	25	1	22	9	21	2	19	11	28	8	26	1	24	2	22	9
	No 1	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	1	10	4	9	8	14	0	12	9	11	8	10	7
		2 x 8	16	2	14	8	13	7	12	10	18	6	16	9	15	4	14	0
		2 x 10	20	7	18	9	17	4	16	4	23	7	21	5	19	7	17	11
		2 x 12	25	1	22	9	21	2	19	11	28	8	26	1	23	10	21	9
	No 2	2 x 4	7	6	6	10	6	4	5	11	8	7	7	10	7	3	6	8
		2 x 6	11	10	10	9	9	11	9	4	13	6	11	9	10	6	9	7
		2 x 8	15	7	14	2	13	2	12	4	17	10	15	6	13	10	12	8
		2 x 10	19	11	18	1	16	9	15	9	22	9	19	9	17	8	16	2
	2 x 12	24	2	22	0	20	5	19	2	27	8	24	1	21	6	19	7	
	No 3	2 x 4	6	11	6	0	5	5	4	11	6	11	6	0	5	5	4	11
		2 x 6	10	3	8	11	7	11	7	3	10	3	8	11	7	11	7	3
		2 x 8	13	7	11	9	10	6	9	7	13	7	11	9	10	6	9	7
	2 x 10	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3	
	2 x 12	21	1	18	3	16	4	14	11	21	1	18	3	16	4	14	11	
	Con- struction	2 x 4	7	3	6	7	6	1	5	7	7	11	6	10	6	1	5	7
Standard	2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	7	6	6	10	6	4	5	11	8	7	7	10	7	3	6	9
		2 x 6	11	10	10	9	9	11	9	4	13	6	12	2	10	11	9	11
		2 x 8	15	7	14	2	13	2	12	4	17	10	16	1	14	4	13	1
		2 x 10	19	11	18	1	16	9	15	9	22	9	20	6	18	4	16	9
		2 x 12	24	2	22	0	20	5	19	2	27	8	24	11	22	4	20	4
	No 1	2 x 4	7	6	6	10	6	4	5	11	8	7	7	7	6	9	6	2
		2 x 6	11	10	10	9	9	11	9	2	13	0	11	3	10	1	9	2
		2 x 8	15	7	14	2	13	2	12	2	17	2	14	10	13	4	12	2
		2 x 10	19	11	18	1	16	9	15	6	21	11	19	0	17	0	15	6
		2 x 12	24	2	22	0	20	5	18	10	26	8	23	1	20	8	18	10
	No 2	2 x 4	7	3	6	7	6	1	5	9	8	1	7	0	6	3	5	9
		2 x 6	11	5	10	0	9	0	8	2	11	7	10	0	9	0	8	2
		2 x 8	15	0	13	3	11	10	10	10	15	3	13	3	11	10	10	10
		2 x 10	19	2	16	11	15	1	13	9	19	6	16	11	15	1	13	9
	2 x 12	23	4	20	7	18	4	16	9	23	9	20	7	18	4	16	9	
	No 3	2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1
		2 x 6	8	10	7	7	6	10	6	3	8	10	7	7	6	10	6	3
		2 x 8	11	7	10	1	9	0	8	2	11	7	10	1	9	0	8	2
		2 x 10	14	10	12	10	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 12	18	1	15	7	14	0	12	9	18	1	15	7	14	0	12	9
	Con- struction	2 x 4	6	9	5	10	5	3	4	9	6	9	5	10	5	3	4	9
Standard	2 x 4	5	1	4	4	3	11	3	7	5	1	4	4	3	11	3	7	
Utility	2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4	

Continued on next page

Table A-3 (Cont'd)

**FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 30 lb per sq ft)**

Commercial Designation	Grade	Nominal Size,	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		20 in.		24 in.			
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.		
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	7	1	6	6	6	0	5	8	8	2	7	5	6	11	6	6
		2 x 6	11	3	10	2	9	5	8	11	12	10	11	8	10	10	10	2
		2 x 8	14	10	13	5	12	6	11	9	16	11	15	5	14	3	13	5
		2 x 10	18	11	17	2	15	11	15	0	21	8	19	8	18	3	17	2
		2 x 12	23	0	20	11	19	5	18	3	26	4	23	11	22	2	20	11
	No. 1	2 x 4	7	1	6	6	6	0	5	8	8	2	7	5	6	11	6	6
		2 x 6	11	3	10	2	9	5	8	11	12	10	11	8	10	10	10	2
		2 x 8	14	10	13	5	12	6	11	9	16	11	15	5	14	3	13	5
		2 x 10	18	11	17	2	15	11	15	0	21	8	19	8	18	3	17	2
		2 x 12	23	0	20	11	19	5	18	3	26	4	23	11	22	2	20	11
	No. 2	2 x 4	6	10	6	3	5	9	5	5	7	11	7	2	6	8	6	3
		2 x 6	10	10	9	10	9	1	8	7	12	5	11	3	10	1	9	2
		2 x 8	14	3	13	0	12	0	11	4	16	4	14	10	13	4	12	2
		2 x 10	18	3	16	7	15	4	14	6	20	11	19	0	17	0	15	6
		2 x 12	22	2	20	2	18	8	17	7	25	5	23	1	20	8	18	10
	No. 3	2 x 4	6	7	5	10	5	3	4	9	6	9	5	10	5	3	4	9
		2 x 6	9	11	8	7	7	8	7	0	9	11	8	7	7	8	7	0
		2 x 8	13	1	11	4	10	2	9	3	13	1	11	4	10	2	9	3
		2 x 10	16	9	14	6	12	11	11	10	16	9	14	6	12	11	11	10
		2 x 12	20	4	17	8	15	9	14	5	20	4	17	8	15	9	14	5
	Con-struction	2 x 4	6	7	6	0	5	7	5	3	7	7	6	6	5	10	5	4
Standard	2 x 4	5	7	4	10	4	4	3	11	5	7	4	10	4	4	3	11	
Utility	2 x 4	3	9	3	3	2	11	2	8	3	9	3	3	2	11	2	8	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	7	6	6	10	6	4	5	11	8	7	7	10	7	3	6	9
		2 x 6	11	10	10	9	9	11	9	4	13	6	11	11	10	8	9	9
		2 x 8	15	7	14	2	13	2	12	4	17	10	15	9	14	1	12	10
		2 x 10	19	11	18	1	16	9	15	9	22	9	20	2	18	0	16	5
		2 x 12	24	2	22	0	20	5	19	2	27	8	24	6	21	11	20	0
	No. 1	2 x 4	7	6	6	10	6	4	5	11	8	7	7	7	6	9	6	2
		2 x 6	11	10	10	9	9	10	9	0	12	9	11	0	9	10	9	0
		2 x 8	15	7	14	2	13	0	11	11	16	10	14	7	13	0	11	11
		2 x 10	19	11	18	1	16	7	15	2	21	6	18	7	16	7	15	2
		2 x 12	24	2	22	0	20	3	18	5	26	1	22	7	20	3	18	5
	No. 2	2 x 4	7	3	6	7	6	1	5	7	7	11	6	10	6	1	5	7
		2 x 6	11	5	10	0	9	0	8	2	11	7	10	0	9	0	8	2
		2 x 8	15	0	13	3	11	10	10	10	15	3	13	3	11	10	10	10
		2 x 10	19	2	16	11	15	1	13	9	19	6	16	11	15	1	13	9
		2 x 12	23	4	20	7	18	4	16	9	23	9	20	7	18	4	16	9
	No. 3	2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1
		2 x 6	8	10	7	7	6	10	6	3	8	10	7	7	6	10	6	3
		2 x 8	11	7	10	1	9	0	8	2	11	7	10	1	9	0	8	2
		2 x 10	14	10	12	10	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 12	18	1	15	7	14	0	12	9	18	1	15	7	14	0	12	9
	Con-struction	2 x 4	6	9	5	10	5	3	4	9	6	9	5	10	5	3	4	9
Standard	2 x 4	5	1	4	4	3	11	3	7	5	1	4	4	3	11	3	7	
Utility	2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4	

Continued on next page

Table A-3 (Cont'd)

FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	10	6	5
		2 x 6	11	1	10	1	9	4	8	10	12	9	11	7	10	6	9	7
		2 x 8	14	8	13	4	12	4	11	7	16	9	15	3	13	10	12	8
		2 x 10	18	9	17	0	15	9	14	10	21	5	19	6	17	8	16	2
		2 x 12	22	9	20	8	19	2	18	1	26	1	23	8	21	6	19	7
	No 1	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	8	6	1
		2 x 6	11	1	10	1	9	4	8	10	12	6	10	9	9	8	8	10
		2 x 8	14	8	13	4	12	4	11	7	16	5	14	3	12	9	11	7
		2 x 10	18	9	17	0	15	9	14	10	21	0	18	2	16	3	14	10
		2 x 12	22	9	20	8	19	2	18	1	25	6	22	1	19	9	18	1
	No 2	2 x 4	6	10	6	2	5	9	5	5	7	9	6	8	6	0	5	5
		2 x 6	10	9	9	9	8	9	7	11	11	3	9	9	8	9	7	11
		2 x 8	14	2	12	10	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 10	18	1	16	5	14	8	13	5	19	0	16	5	14	8	13	5
		2 x 12	22	0	20	0	17	11	16	4	23	1	20	0	17	11	16	4
	No 3	2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1
		2 x 6	8	5	7	3	6	6	5	11	8	5	7	3	6	6	5	11
		2 x 8	11	1	9	7	8	7	7	10	11	1	9	7	8	7	7	10
		2 x 10	14	2	12	3	10	11	10	0	14	2	12	3	10	11	10	0
		2 x 12	17	2	14	11	13	4	12	2	17	2	14	11	13	4	12	2
Con- struction	2 x 4	6	6	5	8	5	1	4	7	6	6	5	8	5	1	4	7	
Standard	2 x 4	5	1	4	4	3	11	3	7	5	1	4	4	3	11	3	7	
Utility	2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	4	9	7
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	8	12	8
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	17	5	16	2
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	21	2	19	7
	No 1	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	1
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	0	9	10	9	0
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	7	13	0	11	11
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	7	16	7	15	2
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	7	20	3	18	5
	No 2	2 x 4	6	7	6	0	5	6	5	2	7	6	6	10	6	1	5	7
		2 x 6	10	4	9	5	8	9	7	11	11	3	9	9	8	9	7	11
		2 x 8	13	8	12	5	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 10	17	5	15	10	14	8	13	5	19	0	16	5	14	8	13	5
		2 x 12	21	2	19	3	17	10	16	4	23	1	20	0	17	11	16	4
	No 3	2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1
		2 x 6	8	10	7	7	6	10	6	3	8	10	7	7	6	10	6	3
		2 x 8	11	7	10	1	9	0	8	2	11	7	10	1	9	0	8	2
		2 x 10	14	10	12	10	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 12	18	1	15	7	14	0	12	9	18	1	15	7	14	0	12	9
Con- struction	2 x 4	6	4	5	9	5	3	4	9	6	9	5	10	5	3	4	9	
Standard	2 x 4	5	1	4	4	3	11	3	7	5	1	4	4	3	11	3	7	
Utility	2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4	

Continued on next page

Table A-3 (Cont'd)
FLOOR JOISTS — BEDROOMS AND ATTICS ACCESSIBLE BY A STAIRWAY
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling								Other Ceilings							
			Joist Spacing								Joist Spacing							
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in.	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Northern Species (includes any Canadian soft-wood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	1	9	2
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	4	12	2
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	17	0	15	6
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	20	8	18	10
	No. 1	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	5	5	10
		2 x 6	10	9	9	9	9	0	8	6	12	2	10	6	9	5	8	7
		2 x 8	14	2	12	10	11	11	11	2	16	1	13	11	12	5	11	4
		2 x 10	18	0	16	5	15	3	14	4	20	6	17	9	15	11	14	6
		2 x 12	21	11	19	11	18	6	17	5	24	11	21	7	19	4	17	8
	No. 2	2 x 4	6	7	6	0	5	6	5	2	7	6	6	6	5	10	5	4
		2 x 6	10	4	9	5	8	6	7	9	10	11	10	6	8	6	7	9
		2 x 8	13	8	12	5	11	2	10	2	14	5	12	6	11	2	10	2
		2 x 10	17	5	15	10	14	3	13	0	18	5	16	6	14	3	13	0
		2 x 12	21	2	19	3	17	5	15	10	22	5	19	5	17	5	15	10
	No. 3	2 x 4	5	7	4	10	4	4	3	11	5	7	4	10	4	4	3	11
		2 x 6	8	5	7	3	6	6	5	11	8	5	7	3	6	6	5	11
		2 x 8	11	1	9	7	8	7	7	10	11	1	9	7	8	7	7	10
		2 x 10	14	2	12	3	10	11	10	0	14	2	12	3	10	11	10	0
		2 x 12	17	2	14	11	13	4	12	2	17	2	14	11	13	4	12	2
	Con- struction	2 x 4	6	4	5	5	4	11	4	5	6	4	5	5	4	11	4	5
	Standard	2 x 4	4	9	4	1	3	8	3	4	4	9	4	1	3	8	3	4
	Utility	2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	6	11	6	3	5	10	5	6	7	11	7	2	6	8	6
2 x 6			10	10	9	10	9	2	8	7	12	5	11	4	10	6	9	7
2 x 8			14	4	13	0	12	1	11	4	16	5	14	11	13	10	12	8
2 x 10			18	3	16	7	15	5	14	6	20	11	19	0	17	8	16	2
2 x 12			22	3	20	3	18	9	17	8	25	6	23	2	21	6	19	7
No. 1		2 x 4	6	11	6	3	5	10	5	6	7	11	7	2	6	8	6	1
		2 x 6	10	10	9	10	9	2	8	7	12	5	10	9	9	8	8	10
		2 x 8	14	4	13	0	12	1	11	4	16	5	14	3	12	9	11	7
		2 x 10	18	3	16	7	15	5	14	6	20	11	18	2	16	3	14	10
		2 x 12	22	3	20	3	18	9	17	8	25	6	22	1	19	9	18	1
No. 2		2 x 4	6	8	6	0	5	7	5	3	7	7	6	8	6	0	5	5
		2 x 6	10	6	9	6	8	9	7	11	11	3	9	9	8	9	7	11
		2 x 8	13	10	12	7	11	6	10	6	14	10	12	10	11	6	10	6
		2 x 10	17	8	16	0	14	8	13	5	19	0	16	5	14	8	13	5
		2 x 12	21	5	19	6	17	11	16	4	23	1	20	0	17	11	16	4
No. 3		2 x 4	5	10	5	1	4	6	4	1	5	10	5	1	4	6	4	1
		2 x 6	8	5	7	3	6	6	5	11	8	5	7	3	6	6	5	11
		2 x 8	11	1	9	7	8	7	7	10	11	1	9	7	8	7	7	10
		2 x 10	14	2	12	3	10	11	10	0	14	2	12	3	10	11	10	0
		2 x 12	17	2	14	11	13	4	12	2	17	2	14	11	13	4	12	2
Con- struction		2 x 4	6	5	5	8	5	1	4	7	6	6	5	8	5	1	4	7
Standard		2 x 4	5	1	4	4	3	11	3	7	5	1	4	4	3	11	3	7
Utility		2 x 4	3	4	2	11	2	7	2	4	3	4	2	11	2	7	2	4

Table A-4
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 50 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 50 lb per sq ft															
			Gypsum Board or Plastered Ceiling					Other Ceilings										
			Joist Spacing															
			12 m.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Douglas Fir—Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	6	7	5	11	5	6	5	2	7	6	6	10	6	4	5	11
		2 x 6	10	4	9	4	8	8	8	2	11	10	10	9	9	11	9	4
		2 x 8	13	7	12	4	11	6	10	9	15	7	14	2	13	2	12	4
		2 x 10	17	4	15	9	14	8	13	9	19	11	18	1	16	9	15	9
	2 x 12	21	2	19	2	17	10	16	9	24	2	22	0	20	5	19	2	
	No. 1	2 x 4	6	7	5	11	5	6	5	2	7	6	6	10	6	4	5	11
		2 x 6	10	4	9	4	8	8	8	2	11	10	10	9	9	11	9	2
		2 x 8	13	7	12	4	11	6	10	9	15	7	14	2	13	2	12	1
		2 x 10	17	4	15	9	14	8	13	9	19	11	18	1	16	9	15	6
	2 x 12	21	2	19	2	17	10	16	9	24	2	22	0	20	5	18	10	
	No. 2	2 x 4	6	4	5	9	5	4	5	0	7	3	6	7	6	1	5	9
		2 x 6	9	11	9	0	8	5	7	11	11	5	10	2	9	1	8	3
2 x 8		13	2	11	11	11	1	10	5	15	0	13	5	12	0	10	11	
2 x 10		16	9	15	3	14	2	13	4	19	2	17	1	15	3	13	11	
2 x 12	20	5	18	6	17	2	16	2	23	4	20	9	18	7	17	0		
No. 3	2 x 4	6	0	5	2	4	8	4	3	6	0	5	2	4	8	4	3	
	2 x 6	8	11	7	8	6	10	6	3	8	11	7	8	6	10	6	3	
	2 x 8	11	9	10	2	9	1	8	3	11	9	10	2	9	1	8	3	
	2 x 10	15	0	13	0	11	7	10	7	15	0	13	0	11	7	10	7	
2 x 12	18	3	15	9	14	1	12	10	18	3	15	9	14	1	12	10		
Con- struction	2 x 4	6	1	5	6	5	1	4	10	6	10	5	11	5	3	4	10	
Standard	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7	
Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6	
Hem—Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	6	4	5	9	5	4	5	0	7	3	6	7	6	1	5	9
		2 x 6	9	11	9	0	8	5	7	11	11	5	10	4	9	5	8	7
		2 x 8	13	2	11	11	11	1	10	5	15	0	13	8	12	5	11	4
		2 x 10	16	9	15	3	14	2	13	4	19	2	17	5	15	10	14	6
	2 x 12	20	5	18	6	17	2	16	2	23	4	21	3	19	3	17	7	
	No. 1	2 x 4	6	4	5	9	5	4	5	0	7	3	6	7	5	10	5	4
		2 x 6	9	11	9	0	8	5	7	11	11	3	9	9	8	8	7	11
		2 x 8	13	2	11	11	11	1	10	5	14	10	12	10	11	6	10	6
		2 x 10	16	9	15	3	14	2	13	4	18	11	16	5	14	8	13	5
	2 x 12	20	5	18	6	17	2	16	2	23	1	20	0	17	10	16	4	
	No. 2	2 x 4	6	1	5	6	5	2	4	10	7	0	6	1	5	5	4	11
		2 x 6	9	7	8	8	7	9	7	1	10	0	8	8	7	9	7	1
2 x 8		12	8	11	5	10	3	9	4	13	2	11	5	10	3	9	4	
2 x 10		16	2	14	7	13	1	11	11	16	10	14	7	13	1	11	11	
2 x 12	19	8	17	9	15	11	14	6	20	6	17	9	15	11	14	6		
No. 3	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7	
	2 x 6	7	7	6	7	5	11	5	4	7	7	6	7	5	11	5	4	
	2 x 8	10	0	8	8	7	9	7	1	10	0	8	8	7	9	7	1	
	2 x 10	12	10	11	1	9	11	9	1	12	10	11	1	9	11	9	1	
2 x 12	15	7	13	6	12	1	11	0	15	7	13	6	12	1	11	0		
Con- struction	2 x 4	5	10	5	0	4	6	4	1	5	10	5	0	4	6	4	1	
Standard	2 x 4	4	4	3	9	3	4	3	1	4	4	3	9	3	4	3	1	
Utility	2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0	

Continued on next page

Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 50 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m.</i>	LIVE LOAD 50 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	6	0	5	5	5	1	4	9	6	11	6	3	5	10	5	5
		2 x 6	9	5	8	7	8	0	7	6	10	10	9	10	9	2	8	7
		2 x 8	12	6	11	4	10	6	9	11	14	3	13	0	12	1	11	4
		2 x 10	15	11	14	6	13	5	12	8	18	3	16	7	15	5	14	6
		2 x 12	19	5	17	7	16	4	15	5	22	2	20	2	18	9	17	7
	No. 1	2 x 4	6	0	5	5	5	1	4	9	6	11	6	3	5	10	5	5
		2 x 6	9	5	8	7	8	0	7	6	10	10	9	10	9	2	8	7
		2 x 8	12	6	11	4	10	6	9	11	14	3	13	0	12	1	11	4
		2 x 10	15	11	14	6	13	5	12	8	18	3	16	7	15	5	14	6
		2 x 12	19	5	17	7	16	4	15	5	22	2	20	2	18	9	17	7
	No. 2	2 x 4	5	9	5	3	4	11	4	7	6	8	6	0	5	7	5	3
		2 x 6	9	1	8	3	7	8	7	3	10	5	9	6	8	8	7	11
2 x 8		12	0	10	11	10	2	9	7	13	9	12	6	11	6	10	6	
2 x 10		15	4	14	0	13	0	12	2	17	7	16	0	14	8	13	5	
2 x 12		18	8	17	0	15	9	14	10	21	5	19	6	17	10	16	4	
No. 3	2 x 4	5	7	5	0	4	6	4	1	5	10	5	0	4	6	4	1	
	2 x 6	8	7	7	5	6	8	6	1	8	7	7	5	6	8	6	1	
	2 x 8	11	4	9	10	8	9	8	0	11	4	9	10	8	9	8	0	
	2 x 10	14	6	12	6	11	2	10	3	14	6	12	6	11	2	10	3	
	2 x 12	17	7	15	3	13	8	12	5	17	7	15	3	13	8	12	5	
Con- struction	2 x 4	5	7	5	1	4	8	4	5	6	5	5	8	5	0	4	7	
Standard	2 x 4	4	10	4	2	3	9	3	5	4	10	4	2	3	9	3	5	
Utility	2 x 4	3	3	2	10	2	6	2	3	3	3	2	10	2	6	2	3	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	6	4	5	9	5	4	5	0	7	3	6	7	6	1	5	9
		2 x 6	9	11	9	0	8	5	7	11	11	5	10	4	9	3	8	5
		2 x 8	13	2	11	11	11	1	10	5	15	0	13	8	12	2	11	1
		2 x 10	16	9	15	3	14	2	13	4	19	2	17	5	15	7	14	2
		2 x 12	20	5	18	6	17	2	16	2	23	4	21	2	18	11	17	3
	No. 1	2 x 4	6	4	5	9	5	4	5	0	7	3	6	7	5	10	5	4
		2 x 6	9	11	9	0	8	5	7	9	11	0	9	6	8	6	7	9
		2 x 8	13	2	11	11	11	1	10	3	14	6	12	7	11	3	10	3
		2 x 10	16	9	15	3	14	2	13	1	18	7	16	1	14	4	13	1
		2 x 12	20	5	18	6	17	2	15	11	22	7	19	7	17	6	15	11
	No. 2	2 x 4	6	1	5	6	5	2	4	10	6	10	5	11	5	3	4	10
		2 x 6	9	7	8	8	7	9	7	1	10	0	8	8	7	9	7	1
2 x 8		12	8	11	5	10	3	9	4	13	2	11	5	10	3	9	4	
2 x 10		16	2	14	7	13	1	11	11	16	10	14	7	13	1	11	11	
2 x 12		19	8	17	9	15	11	14	6	20	6	17	9	15	11	14	6	
No. 3	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7	
	2 x 6	7	7	6	7	5	11	5	4	7	7	6	7	5	11	5	4	
	2 x 8	10	0	8	8	7	9	7	1	10	0	8	8	7	9	7	1	
	2 x 10	12	10	11	1	9	11	9	1	12	10	11	1	9	11	9	1	
	2 x 12	15	7	13	6	12	1	11	0	15	7	13	6	12	1	11	0	
Con- struction	2 x 4	5	10	5	0	4	6	4	1	5	10	5	0	4	6	4	1	
Standard	2 x 4	4	4	3	9	3	4	3	1	4	4	3	9	3	4	3	1	
Utility	2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0	

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Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 50 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 50 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	5	11	5	5	5	0	4	9	6	10	6	2	5	9	5	5
		2 x 6	9	4	8	6	7	11	7	5	10	9	9	9	9	0	8	3
		2 x 8	12	4	11	3	10	5	9	10	14	2	12	10	11	11	10	11
		2 x 10	15	9	14	4	13	4	12	6	18	1	16	5	15	3	13	11
	2 x 12	19	2	17	5	16	2	15	3	22	0	20	0	18	6	17	0	
	No 1	2 x 4	5	11	5	5	5	0	4	9	6	10	6	2	5	9	5	3
		2 x 6	9	4	8	6	7	11	7	5	10	9	9	4	8	4	7	7
		2 x 8	12	4	11	3	10	5	9	10	14	2	12	10	11	0	10	0
		2 x 10	15	9	14	4	13	4	12	6	18	1	15	8	14	1	12	10
	2 x 12	19	2	17	5	16	2	15	3	22	0	19	1	17	1	15	7	
	No 2	2 x 4	5	9	5	3	4	10	4	7	6	7	5	9	5	2	4	9
		2 x 6	9	1	8	3	7	6	6	10	9	9	8	5	7	6	6	10
2 x 8		11	11	10	10	9	11	9	1	12	10	11	1	9	11	9	1	
2 x 10		15	3	13	10	12	8	11	7	16	5	14	2	12	8	11	7	
2 x 12	18	7	16	10	15	5	14	1	20	0	17	3	15	5	14	1		
No 3	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7	
	2 x 6	7	3	6	3	5	7	5	1	7	3	6	3	5	7	5	1	
	2 x 8	9	7	8	3	7	5	6	9	9	7	8	3	7	5	6	9	
	2 x 10	12	3	10	7	9	5	8	8	12	3	10	7	9	5	8	8	
2 x 12	14	10	12	10	11	6	10	6	14	10	12	10	11	6	10	6		
Con- struction	2 x 4	5	6	4	11	4	4	4	0	5	8	4	11	4	4	4	0	
Standard	2 x 4	4	4	3	9	3	4	3	1	4	4	3	9	3	4	3	1	
Utility	2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	5	9	5	2	4	10	4	6	6	7	6	0	5	6	5	2
		2 x 6	9	0	8	2	7	7	7	2	10	4	9	5	8	9	8	2
		2 x 8	11	11	10	10	10	0	9	5	13	8	12	5	11	6	10	10
		2 x 10	15	3	13	10	12	10	12	1	17	5	15	10	14	8	13	10
		2 x 12	18	6	16	10	15	7	14	8	21	2	19	3	17	10	16	10
	No 1	2 x 4	5	9	5	2	4	10	4	6	6	7	6	0	5	6	5	2
		2 x 6	9	0	8	2	7	7	7	2	10	4	9	5	8	6	7	9
		2 x 8	11	11	10	10	10	0	9	5	13	8	12	5	11	3	10	3
		2 x 10	15	3	13	10	12	10	12	1	17	5	15	10	14	4	13	1
		2 x 12	18	6	16	10	15	7	14	8	21	2	19	3	17	6	15	11
	No 2	2 x 4	5	6	5	0	4	8	4	5	6	4	5	9	5	3	4	10
		2 x 6	8	9	7	11	7	4	6	10	9	9	8	5	7	6	6	10
		2 x 8	11	6	10	5	9	8	9	1	12	10	11	1	9	11	9	1
		2 x 10	14	8	13	4	12	5	11	7	16	5	14	2	12	8	11	7
		2 x 12	17	10	16	3	15	1	14	1	20	0	17	3	15	5	14	1
	No 3	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7
		2 x 6	7	7	6	7	5	11	5	4	7	7	6	7	5	11	5	4
		2 x 8	10	0	8	8	7	9	7	1	10	0	8	8	7	9	7	1
2 x 10		12	10	11	1	9	11	9	1	12	10	11	1	9	11	9	1	
2 x 12		15	7	13	6	12	1	11	0	15	7	13	6	12	1	11	0	
Con- struction	2 x 4	5	4	4	10	4	6	4	1	5	10	5	0	4	6	4	1	
Standard	2 x 4	4	4	3	9	3	4	3	1	4	4	3	9	3	4	3	1	
Utility	2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0	

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Table A-4 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 50 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 50 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	5	9	5	2	4	10	4	6	6	7	6	0	5	6	5	2
		2 x 6	9	0	8	2	7	7	7	2	10	4	9	5	8	8	7	11
		2 x 8	11	11	10	10	10	0	9	5	13	8	12	5	11	6	10	6
		2 x 10	15	3	13	10	12	10	12	1	17	5	15	10	15	10	13	5
		2 x 12	18	6	16	10	15	7	14	8	21	2	19	3	17	10	16	4
	No 1	2 x 4	5	9	5	2	4	10	4	6	6	7	6	0	5	6	5	0
		2 x 6	9	0	8	2	7	7	7	2	10	4	9	1	8	2	7	5
		2 x 8	11	11	10	10	10	0	9	5	13	8	12	0	10	9	9	10
		2 x 10	15	3	13	10	12	10	12	1	17	5	15	4	13	9	12	6
		2 x 12	18	6	16	10	15	7	14	8	21	2	18	8	16	8	15	3
	No 2	2 x 4	5	6	5	0	4	8	4	5	6	4	5	8	5	0	4	7
		2 x 6	8	9	7	11	7	4	6	8	9	6	8	2	7	4	6	8
		2 x 8	11	6	10	5	9	8	8	10	12	6	10	10	9	8	8	10
		2 x 10	14	8	13	4	12	4	11	3	15	11	13	10	12	4	11	3
		2 x 12	17	10	16	3	15	0	13	8	19	5	16	10	15	0	13	8
	No 3	2 x 4	4	10	4	2	3	9	3	5	4	10	4	2	3	9	3	5
		2 x 6	7	3	6	3	5	7	5	1	7	3	6	3	5	7	5	1
		2 x 8	9	7	8	3	7	5	6	9	9	7	8	3	7	5	6	9
		2 x 10	12	3	10	7	9	5	8	8	12	3	10	7	9	5	8	8
		2 x 12	14	10	12	10	11	6	0	6	14	10	12	10	11	6	10	6
	Construction	2 x 4	5	4	4	9	4	3	3	10	5	5	4	9	4	3	3	10
	Standard	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11
	Utility	2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	5	10	5	3	4	11	4	7	6	8	6	0	5	7	5
2 x 6			9	2	8	4	7	9	7	3	10	6	9	6	8	10	8	3
2 x 8			12	1	11	0	10	2	9	7	13	10	12	7	11	8	10	11
2 x 10			15	5	14	0	13	0	12	3	17	8	16	0	14	11	13	11
2 x 12			18	9	17	0	15	10	14	11	21	6	19	6	18	1	17	0
No 1		2 x 4	5	10	5	3	4	11	4	7	6	8	6	0	5	7	5	3
		2 x 6	9	2	8	4	7	9	7	3	10	6	9	4	8	4	7	7
		2 x 8	12	1	11	0	10	2	9	7	13	10	12	4	11	0	10	0
		2 x 10	15	5	14	0	13	0	12	3	17	8	15	8	14	1	12	10
		2 x 12	18	9	17	0	15	10	14	11	21	6	19	1	17	1	15	7
No 2		2 x 4	5	7	5	1	4	9	4	5	6	5	5	9	5	2	4	9
		2 x 6	8	10	8	0	7	5	6	10	9	9	8	5	7	6	6	10
		2 x 8	11	8	10	7	9	10	9	1	12	10	11	1	9	11	9	1
		2 x 10	14	10	13	6	12	6	11	7	16	5	14	2	12	8	11	7
		2 x 12	18	1	16	5	15	3	14	1	20	0	17	3	15	5	14	1
No 3		2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7
		2 x 6	7	3	6	3	5	7	5	1	7	3	6	3	5	7	5	1
		2 x 8	9	7	8	3	7	5	6	9	9	7	8	3	7	5	6	9
		2 x 10	12	3	10	7	9	5	8	8	12	3	10	7	9	5	8	8
		2 x 12	14	10	12	10	11	6	10	6	14	10	12	10	11	6	10	6
Construction		2 x 4	5	5	4	11	4	4	4	0	5	8	4	11	4	4	4	0
Standard		2 x 4	4	4	3	9	3	4	3	1	4	4	3	9	3	4	3	1
Utility		2 x 4	2	11	2	6	2	3	2	0	2	11	2	6	2	3	2	0

Table A-5
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 40 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>			
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	10	6	5
		2 x 6	11	1	10	1	9	4	8	10	12	9	11	7	10	9	10	1
		2 x 8	14	8	13	4	12	4	11	7	16	9	15	3	14	2	13	4
		2 x 10	18	9	17	0	15	9	14	10	21	5	19	6	18	1	17	0
	2 x 12	22	9	20	8	19	2	18	1	26	1	23	8	22	0	20	8	
	No 1	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	10	6	5
		2 x 6	11	1	10	1	9	4	8	10	12	9	11	7	10	9	10	1
		2 x 8	14	8	13	4	12	4	11	7	16	9	15	3	14	2	13	3
		2 x 10	18	9	17	0	15	9	14	10	21	5	19	6	18	1	16	11
	2 x 12	22	9	20	8	19	2	18	1	26	1	23	8	22	0	20	7	
	No 2	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	1	9	11	9	1
2 x 8		14	2	12	10	11	11	11	3	16	2	14	8	13	1	12	0	
2 x 10		18	1	16	5	15	3	14	4	20	8	18	9	16	9	15	3	
2 x 12	22	0	20	0	18	6	17	5	25	2	22	9	20	4	18	7		
No 3	2 x 4	6	7	5	8	5	1	4	8	6	7	5	8	5	1	4	8	
	2 x 6	9	9	8	5	7	6	6	10	9	9	8	5	7	6	6	10	
	2 x 8	12	10	11	1	9	11	9	1	12	10	11	1	9	11	9	1	
	2 x 10	16	5	14	2	12	8	11	7	16	5	14	2	12	8	11	7	
2 x 12	20	0	17	3	15	5	14	1	20	0	17	3	15	5	14	1		
Construction	2 x 4	6	7	5	11	5	6	5	2	7	6	6	6	5	10	5	3	
Standard	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11	
Utility	2 x 4	3	11	3	4	3	0	2	9	3	11	3	4	3	0	2	9	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	4	9	5
		2 x 8	14	2	12	10	11	11	11	3	16	2	14	9	13	7	12	5
		2 x 10	18	1	16	5	15	3	14	4	20	8	18	9	17	4	15	10
	2 x 12	22	0	20	0	18	6	17	5	25	2	22	10	21	2	19	3	
	No 1	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	5	5	10
		2 x 6	10	9	9	9	9	0	8	6	12	3	10	8	9	6	8	8
		2 x 8	14	2	12	10	11	11	11	3	16	2	14	1	12	7	11	6
		2 x 10	18	1	16	5	15	3	14	4	20	8	18	0	16	1	14	8
	2 x 12	22	0	20	0	18	6	17	5	25	2	21	10	19	7	17	10	
	No 2	2 x 4	6	7	5	11	5	6	5	2	7	6	6	8	5	11	5	5
		2 x 6	10	4	9	5	8	6	7	9	11	0	9	6	8	6	7	9
2 x 8		13	8	12	5	11	2	10	3	14	6	12	6	11	2	10	3	
2 x 10		17	5	15	10	14	4	13	1	18	6	16	0	14	4	13	1	
2 x 12	21	2	19	3	17	5	15	11	22	6	19	5	17	5	15	11		
No 3	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11	
	2 x 6	8	4	7	3	6	5	5	11	8	4	7	3	6	5	5	11	
	2 x 8	11	0	9	6	8	6	7	9	11	0	9	6	8	6	7	9	
	2 x 10	14	1	12	2	10	10	9	11	14	1	12	2	10	10	9	11	
2 x 12	17	1	14	10	13	3	12	1	17	1	14	10	13	3	12	1		
Construction	2 x 4	6	4	5	6	4	11	4	6	6	5	5	6	4	11	4	6	
Standard	2 x 4	4	9	4	2	3	8	3	4	4	9	4	2	3	8	3	4	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	

Continued on next page

Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 40 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	6	6	5	10	5	5	5	2	7	5	6	9	6	3	5	10
		2 x 6	10	2	9	3	8	7	8	1	11	8	10	7	9	10	9	3
		2 x 8	13	5	12	3	11	4	10	8	15	5	14	0	13	0	12	3
		2 x 10	17	2	15	7	14	6	13	7	19	8	17	10	16	7	15	7
		2 x 12	20	11	19	0	17	7	16	7	23	11	21	9	20	2	19	0
	No. 1	2 x 4	6	6	5	10	5	5	5	2	7	5	6	9	6	3	5	10
		2 x 6	10	2	9	3	8	7	8	1	11	8	10	7	9	10	9	3
		2 x 8	13	5	12	3	11	4	10	8	15	5	14	0	13	0	12	3
		2 x 10	17	2	15	7	14	6	13	7	19	8	17	10	16	7	15	7
		2 x 12	20	11	19	0	17	7	16	7	23	11	21	9	20	2	19	0
	No. 2	2 x 4	6	3	5	8	5	3	4	11	7	2	6	6	6	0	5	8
		2 x 6	9	10	8	11	8	3	7	10	11	3	10	3	9	6	8	6
2 x 8		13	0	11	9	10	11	10	3	14	10	13	6	12	6	11	6	
2 x 10		16	7	15	1	14	0	13	2	19	0	17	3	16	0	14	8	
2 x 12		20	2	18	4	17	0	16	0	23	1	21	0	19	6	17	10	
No. 3	2 x 4	6	0	5	5	4	11	4	6	6	5	5	6	4	11	4	6	
	2 x 6	9	5	8	2	7	3	6	8	9	5	8	2	7	3	6	8	
	2 x 8	12	5	10	9	9	7	8	9	12	5	10	9	9	7	8	9	
	2 x 10	15	10	13	9	12	3	11	2	15	10	13	9	12	3	11	2	
	2 x 12	19	3	16	8	14	11	13	8	19	3	16	8	14	11	13	8	
Construction	2 x 4	6	0	5	5	5	1	4	9	6	10	6	2	5	6	5	0	
Standard	2 x 4	5	3	4	7	4	1	3	9	5	3	4	7	4	1	3	9	
Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	1	9	3
		2 x 8	14	2	12	10	11	11	11	3	16	2	14	9	13	4	12	2
		2 x 10	18	1	16	5	15	3	14	4	20	8	18	9	17	1	15	7
		2 x 12	22	0	20	0	18	6	17	5	25	2	22	10	20	9	18	11
	No. 1	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	5	5	10
		2 x 6	10	9	9	9	9	0	8	6	12	1	10	5	9	4	8	6
		2 x 8	14	2	12	10	11	11	11	3	15	11	13	9	12	4	11	3
		2 x 10	18	1	16	5	15	3	14	4	20	4	17	7	15	9	14	4
		2 x 12	22	0	20	0	18	6	17	5	24	9	21	5	19	2	17	6
	No. 2	2 x 4	6	7	5	11	5	6	5	2	7	6	6	6	5	10	5	3
		2 x 6	10	4	9	5	8	6	7	9	11	0	9	6	8	6	7	9
2 x 8		13	8	12	5	11	2	10	3	14	6	12	6	11	2	10	3	
2 x 10		17	5	15	10	14	4	13	1	18	6	16	0	14	4	13	1	
2 x 12		21	2	19	3	17	5	15	11	22	6	19	5	17	5	15	11	
No. 3	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11	
	2 x 6	8	4	7	3	6	5	5	11	8	4	7	3	6	5	5	11	
	2 x 8	11	0	9	6	8	6	7	9	11	0	9	6	8	6	7	9	
	2 x 10	14	1	12	2	10	10	9	11	14	1	12	2	10	10	9	11	
	2 x 12	17	1	14	10	13	3	12	1	17	1	14	10	13	3	12	1	
Construction	2 x 4	6	4	5	6	4	11	4	6	6	5	5	6	4	11	4	6	
Standard	2 x 4	4	9	4	2	3	8	3	4	4	9	4	2	3	8	3	4	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	

Continued on next page

Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 40 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	6	5	5	10	5	5	5	1	7	4	6	8	6	2	5	10
		2 x 6	10	1	9	2	8	6	8	0	11	7	10	6	9	9	9	1
		2 x 8	13	4	12	1	11	3	10	7	15	3	13	10	12	10	12	0
		2 x 10	17	0	15	5	14	4	13	6	19	6	17	8	16	5	15	3
		2 x 12	20	8	18	9	17	5	16	5	23	8	21	6	20	0	18	7
	No. 1	2 x 4	6	5	5	10	5	5	5	1	7	4	6	8	6	2	5	9
		2 x 6	10	1	9	2	8	6	8	0	11	7	10	6	9	2	8	4
		2 x 8	13	4	12	1	11	3	10	7	15	3	13	6	12	1	11	0
		2 x 10	17	0	15	5	14	4	13	6	19	6	17	3	15	5	14	1
		2 x 12	20	8	18	9	17	5	16	5	23	8	20	11	18	9	17	1
	No. 2	2 x 4	6	2	5	7	5	3	4	11	7	1	6	4	5	8	5	2
		2 x 6	9	9	8	10	8	3	7	6	10	8	9	3	8	3	7	6
		2 x 8	12	10	11	8	10	10	9	11	14	1	12	2	10	11	9	1
		2 x 10	16	5	14	11	13	10	12	8	18	0	15	7	13	11	12	8
		2 x 12	20	0	18	2	16	10	15	5	21	10	18	11	16	11	15	5
	No. 3	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11
		2 x 6	7	11	6	10	6	2	5	7	7	11	6	10	6	2	5	7
		2 x 8	10	6	9	1	8	1	7	5	10	6	9	1	8	1	7	5
		2 x 10	13	5	11	7	10	4	9	5	13	5	11	7	10	4	9	5
		2 x 12	16	4	14	1	12	7	11	6	16	4	14	1	12	7	11	6
	Con- struction	2 x 4	5	11	5	4	4	9	4	4	6	2	5	4	4	9	4	4
Standard	2 x 4	4	9	4	2	3	8	3	4	4	9	4	2	3	8	3	4	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	6	2	5	7	5	2	4	11	7	1	6	5	6	0	5	7
		2 x 6	9	9	8	10	8	2	7	9	11	2	10	1	9	5	8	10
		2 x 8	12	10	11	8	10	10	10	2	14	8	13	4	12	5	11	8
		2 x 10	16	5	14	11	13	10	13	0	18	9	17	1	15	10	14	11
		2 x 12	19	11	18	1	16	10	15	10	22	10	20	9	19	3	18	1
	No. 1	2 x 4	6	2	5	7	5	2	4	11	7	1	6	5	6	0	5	7
		2 x 6	9	9	8	10	8	2	7	9	11	2	10	1	9	4	8	6
		2 x 8	12	10	11	8	10	10	10	2	14	8	13	4	12	4	11	3
		2 x 10	16	5	14	11	13	10	13	0	18	9	17	1	15	9	14	4
		2 x 12	19	11	18	1	16	10	15	10	22	10	20	9	19	2	17	6
	No. 2	2 x 4	6	0	5	5	5	0	4	9	6	10	6	2	5	9	5	3
		2 x 6	9	5	8	6	7	11	7	5	10	8	9	3	8	3	7	6
		2 x 8	12	5	11	3	10	5	9	10	14	1	12	2	10	11	9	11
		2 x 10	15	10	14	4	13	4	12	7	18	0	15	7	13	11	12	8
		2 x 12	19	3	17	6	16	3	15	3	21	10	18	11	16	11	15	5
	No. 3	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11
		2 x 6	8	4	7	3	6	5	5	11	8	4	7	3	6	5	5	11
		2 x 8	11	0	9	6	8	6	7	9	11	0	9	6	8	6	7	9
		2 x 10	14	1	12	2	10	10	9	11	14	1	12	2	10	10	9	11
		2 x 12	17	1	14	10	13	3	12	1	17	1	14	10	13	3	12	1
	Con- struction	2 x 4	5	9	5	2	4	10	4	6	6	5	5	6	4	11	4	6
Standard	2 x 4	4	9	4	2	3	8	3	4	4	9	4	2	3	8	3	4	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	

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Table A-5 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 40 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	6	2	5	7	5	2	4	11	7	1	6	5	6	0	5	7
		2 x 6	9	9	8	10	8	2	7	9	11	2	10	1	9	5	8	8
		2 x 8	12	10	11	8	10	10	10	2	14	8	13	4	12	5	11	6
		2 x 10	16	5	14	11	13	10	13	0	18	9	17	1	15	10	14	8
		2 x 12	19	11	18	1	16	10	15	10	22	10	20	9	19	3	17	10
	No. 1	2 x 4	6	2	5	7	5	2	4	11	7	1	6	5	6	0	5	6
		2 x 6	9	9	8	10	8	2	7	9	11	2	10	0	8	11	8	2
		2 x 8	12	10	11	8	10	10	10	2	14	8	13	2	11	9	10	9
		2 x 10	16	5	14	11	13	10	13	0	18	9	16	10	15	0	13	9
		2 x 12	19	11	18	1	16	10	15	10	22	10	20	6	18	4	16	8
	No. 2	2 x 4	6	0	5	5	5	0	4	9	6	10	6	2	5	6	5	0
		2 x 6	9	5	8	6	7	11	7	4	10	4	9	0	8	0	7	4
2 x 8		12	5	11	3	10	5	9	8	13	8	11	10	10	7	9	8	
2 x 10		15	10	14	4	13	4	12	4	17	6	15	1	13	6	12	4	
2 x 12		19	3	17	6	16	2	15	0	21	3	18	5	16	5	15	0	
No. 3	2 x 4	5	3	4	7	4	1	3	9	5	3	4	7	4	1	3	9	
	2 x 6	7	11	6	10	6	2	5	7	7	11	6	10	6	2	5	7	
	2 x 8	10	6	9	1	8	1	7	5	10	6	9	1	8	1	7	5	
	2 x 10	13	5	11	7	10	4	9	5	13	5	11	7	10	4	9	5	
	2 x 12	16	4	14	1	12	7	11	6	16	4	14	1	12	7	11	6	
Construction	2 x 4	5	9	5	2	4	7	4	3	6	0	5	2	4	7	4	3	
Standard	2 x 4	4	6	3	11	3	6	3	2	4	6	3	11	3	6	3	2	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	6	3	5	8	5	3	5	0	7	2	6	6	6	0	5	8
		2 x 6	9	10	8	11	8	4	7	10	11	4	10	3	9	6	8	11
		2 x 8	13	0	11	10	11	0	10	4	14	11	13	6	12	7	11	10
		2 x 10	16	7	15	1	14	0	13	2	19	0	17	3	16	0	15	1
		2 x 12	20	3	18	4	17	0	16	0	23	2	21	0	19	6	18	4
	No. 1	2 x 4	6	3	5	8	5	3	5	0	7	2	6	6	6	0	5	8
		2 x 6	9	10	8	11	8	4	7	10	11	4	10	3	9	2	8	4
		2 x 8	13	0	11	10	11	0	10	4	14	11	13	6	12	1	11	0
		2 x 10	16	7	15	1	14	0	13	2	19	0	17	3	15	5	14	1
		2 x 12	20	3	18	4	17	0	16	0	23	2	20	11	18	9	17	1
	No. 2	2 x 4	6	0	5	6	5	1	4	9	6	11	6	3	5	8	5	2
		2 x 6	9	6	8	8	8	0	7	6	10	8	9	3	8	3	7	6
2 x 8		12	7	11	5	10	7	9	11	14	1	12	2	10	11	9	11	
2 x 10		16	0	14	7	13	6	12	8	18	0	15	7	13	11	12	8	
2 x 12		19	6	17	8	16	5	15	5	21	10	18	11	16	11	15	5	
No. 3	2 x 4	5	6	4	9	4	3	3	11	5	6	4	9	4	3	3	11	
	2 x 6	7	11	6	10	6	2	5	7	7	11	6	10	6	2	5	7	
	2 x 8	10	6	9	1	8	1	7	5	10	6	9	1	8	1	7	5	
	2 x 10	13	5	11	7	10	4	9	5	13	5	11	7	10	4	9	5	
	2 x 12	16	4	14	1	12	7	11	6	16	4	14	1	12	7	11	6	
Construction	2 x 4	5	10	5	3	4	9	4	4	6	2	5	4	4	9	4	4	
Standard	2 x 4	4	9	4	2	3	8	3	4	4	9	4	2	3	8	3	4	
Utility	2 x 4	3	2	2	9	2	5	2	3	3	2	2	9	2	5	2	3	

Table A-6
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m</i>	LIVE LOAD 30 lb per sq ft													
			Gypsum Board or Plastered Ceiling						Other Ceilings							
			Joist Spacing						Joist Spacing							
			12 m		16 m		20 in		24 in		12 m		16 m		20 in	
<i>m</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	7 9	7 1	6 7	6 2	8 11	8 1	7 6	7 1	7 6	7 1	7 1	7 1	7 1	7 1
		2 x 6	12 3	11 1	10 4	9 8	14 0	12 9	11 10	11 10	11 10	11 10	11 10	11 10	11 10	11 10
		2 x 8	16 2	14 8	13 7	12 10	18 6	16 9	15 7	14 8	14 8	14 8	14 8	14 8	14 8	14 8
		2 x 10	20 7	18 9	17 4	16 4	23 7	21 5	19 11	18 9	18 9	18 9	18 9	18 9	18 9	18 9
		2 x 12	25 1	22 9	21 2	19 11	28 8	26 1	24 2	22 9	22 9	22 9	22 9	22 9	22 9	22 9
	No 1	2 x 4	7 9	7 1	6 7	6 2	8 11	8 1	7 6	7 1	7 6	7 1	7 1	7 1	7 1	7 1
		2 x 6	12 3	11 1	10 4	9 8	14 0	12 9	11 10	11 10	11 10	11 10	11 10	11 10	11 10	11 10
		2 x 8	16 2	14 8	13 7	12 10	18 6	16 9	15 7	14 8	14 8	14 8	14 8	14 8	14 8	14 8
		2 x 10	20 7	18 9	17 4	16 4	23 7	21 5	19 11	18 9	18 9	18 9	18 9	18 9	18 9	18 9
		2 x 12	25 1	22 9	21 2	19 11	28 8	26 1	24 2	22 9	22 9	22 9	22 9	22 9	22 9	22 9
	No 2	2 x 4	7 6	6 10	6 4	5 11	8 7	7 10	7 3	6 10	6 10	6 10	6 10	6 10	6 10	6 10
		2 x 6	11 10	10 9	9 11	9 4	13 6	12 3	11 1	10 2	10 2	10 2	10 2	10 2	10 2	10 2
		2 x 8	15 7	14 2	13 2	12 4	17 10	16 2	14 8	13 5	13 5	13 5	13 5	13 5	13 5	13 5
		2 x 10	19 11	18 1	16 9	15 9	22 9	20 8	18 9	17 1	17 1	17 1	17 1	17 1	17 1	17 1
		2 x 12	24 2	22 0	20 5	19 2	27 8	25 2	22 9	20 9	20 9	20 9	20 9	20 9	20 9	20 9
	No 3	2 x 4	7 3	6 4	5 8	5 2	7 4	6 4	5 8	5 2	5 8	5 8	5 8	5 8	5 8	5 8
		2 x 6	10 11	9 5	8 5	7 8	10 11	9 5	8 5	7 8	7 8	7 8	7 8	7 8	7 8	7 8
		2 x 8	14 4	12 5	11 1	10 2	14 4	12 5	11 1	10 2	10 2	10 2	10 2	10 2	10 2	10 2
		2 x 10	18 4	15 11	14 2	13 0	18 4	15 11	14 2	13 0	13 0	13 0	13 0	13 0	13 0	13 0
		2 x 12	22 4	19 4	17 3	15 9	22 4	19 4	17 3	15 9	15 9	15 9	15 9	15 9	15 9	15 9
	Construction	2 x 4	7 3	6 7	6 1	5 9	8 3	7 3	6 6	5 11	5 11	5 11	5 11	5 11	5 11	5 11
Standard	2 x 4	6 2	5 4	4 9	4 4	6 2	5 4	4 9	4 4	4 4	4 4	4 4	4 4	4 4	4 4	
Utility	2 x 4	4 4	3 9	3 4	3 1	4 4	3 9	3 4	3 1	3 1	3 1	3 1	3 1	3 1	3 1	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	7 6	6 10	6 4	5 11	8 7	7 10	7 3	6 10	6 10	6 10	6 10	6 10	6 10	6 10
		2 x 6	11 10	10 9	9 11	9 4	13 6	12 3	11 5	10 6	10 6	10 6	10 6	10 6	10 6	10 6
		2 x 8	15 7	14 2	13 2	12 4	17 10	16 2	15 0	13 11	13 11	13 11	13 11	13 11	13 11	13 11
		2 x 10	19 11	18 1	16 9	15 9	22 9	20 8	19 2	17 9	17 9	17 9	17 9	17 9	17 9	17 9
		2 x 12	24 2	22 0	20 5	19 2	27 8	25 2	23 4	21 7	21 7	21 7	21 7	21 7	21 7	21 7
	No 1	2 x 4	7 6	6 10	6 4	5 11	8 7	7 10	7 2	6 7	6 7	6 7	6 7	6 7	6 7	6 7
		2 x 6	11 10	10 9	9 11	9 4	13 6	11 11	10 8	9 9	9 9	9 9	9 9	9 9	9 9	9 9
		2 x 8	15 7	14 2	13 2	12 4	17 10	15 9	14 1	12 10	12 10	12 10	12 10	12 10	12 10	12 10
		2 x 10	19 11	18 1	16 9	15 9	22 9	20 1	18 0	16 5	16 5	16 5	16 5	16 5	16 5	16 5
		2 x 12	24 2	22 0	20 5	19 2	27 8	24 6	21 10	20 0	20 0	20 0	20 0	20 0	20 0	20 0
	No 2	2 x 4	7 3	6 7	6 1	5 9	8 3	7 5	6 8	6 1	6 1	6 1	6 1	6 1	6 1	6 1
		2 x 6	11 5	10 4	9 6	8 8	12 3	10 7	9 6	8 8	8 8	8 8	8 8	8 8	8 8	8 8
		2 x 8	15 0	13 8	12 6	11 5	16 2	14 0	12 6	11 5	11 5	11 5	11 5	11 5	11 5	11 5
		2 x 10	19 2	17 5	16 0	14 7	20 8	17 11	16 0	14 7	14 7	14 7	14 7	14 7	14 7	14 7
		2 x 12	23 4	21 2	19 5	17 9	25 2	21 9	19 5	17 9	17 9	17 9	17 9	17 9	17 9	17 9
	No 3	2 x 4	6 2	5 4	4 9	4 4	6 2	5 4	4 9	4 4	4 4	4 4	4 4	4 4	4 4	4 4
		2 x 6	9 4	8 1	7 3	6 7	9 2	8 1	7 3	6 7	6 7	6 7	6 7	6 7	6 7	6 7
		2 x 8	12 4	10 8	9 6	8 8	12 4	10 8	9 6	8 8	8 8	8 8	8 8	8 8	8 8	8 8
		2 x 10	15 8	13 7	12 2	11 1	15 8	13 7	12 2	11 1	11 1	11 1	11 1	11 1	11 1	11 1
		2 x 12	19 1	16 7	14 10	13 6	19 1	16 7	14 10	13 6	13 6	13 6	13 6	13 6	13 6	13 6
	Construction	2 x 4	6 11	6 2	5 6	5 0	7 2	6 2	5 6	5 0	5 0	5 0	5 0	5 0	5 0	5 0
Standard	2 x 4	5 4	4 8	4 2	3 9	5 4	4 8	4 2	3 9	3 9	3 9	3 9	3 9	3 9	3 9	
Utility	2 x 4	3 7	3 1	2 9	2 6	3 7	3 1	2 9	2 6	2 6	2 6	2 6	2 6	2 6	2 6	

Continued on next page

Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m</i>	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling								Other Ceilings							
			Joist Spacing								Joist Spacing							
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	7	1	6	6	6	0	5	8	8	2	7	5	6	11	6	6
		2 x 6	11	3	10	2	9	5	8	11	12	10	11	8	10	10	10	2
		2 x 8	14	10	13	5	12	6	11	9	16	11	15	5	14	3	13	5
		2 x 10	18	11	17	2	15	11	15	0	21	8	19	8	18	3	17	2
		2 x 12	23	0	20	11	19	5	18	3	26	4	23	11	22	2	20	11
	No. 1	2 x 4	7	1	6	6	6	0	5	8	8	2	7	5	6	11	6	6
		2 x 6	11	3	10	2	9	5	8	11	12	10	11	8	10	10	10	2
		2 x 8	14	10	13	5	12	6	11	9	16	11	15	5	14	3	13	5
		2 x 10	18	11	17	2	15	11	15	0	21	8	19	8	18	3	17	2
		2 x 12	23	0	20	11	19	5	18	3	26	4	23	11	22	2	20	11
No. 2	2 x 4	6	10	6	3	5	9	5	5	7	11	7	2	6	8	6	3	
	2 x 6	10	10	9	10	9	1	8	7	12	5	11	8	10	5	9	9	
	2 x 8	14	3	13	0	12	0	11	4	16	4	14	10	13	9	12	10	
	2 x 10	18	3	16	7	15	4	14	6	20	11	19	8	17	7	16	5	
	2 x 12	22	2	20	2	18	8	17	7	25	5	23	1	21	5	20	0	
No. 3	2 x 4	6	7	6	0	5	6	5	0	7	2	6	2	5	6	5	0	
	2 x 6	10	5	9	1	8	2	7	5	10	6	9	1	8	2	7	5	
	2 x 8	13	9	12	0	10	9	9	10	13	11	12	0	10	9	9	10	
	2 x 10	17	6	15	4	13	9	12	6	17	9	15	4	13	9	12	6	
	2 x 12	21	4	18	8	16	8	15	3	21	7	18	8	16	8	15	3	
Construction	2 x 4	6	7	6	0	5	7	5	3	7	7	6	10	6	2	5	8	
Standard	2 x 4	5	11	5	1	4	7	4	2	5	11	5	1	4	7	4	2	
Utility	2 x 4	4	0	3	5	3	1	2	10	4	0	3	5	3	1	2	10	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	7	6	6	10	6	4	5	11	8	7	7	10	7	3	6	10
		2 x 6	11	10	10	9	9	11	9	4	13	6	12	3	11	4	10	4
		2 x 8	15	7	14	2	13	2	12	4	17	10	16	2	14	11	13	8
		2 x 10	19	11	18	1	16	9	15	9	22	9	20	8	19	1	17	5
		2 x 12	24	2	22	0	20	5	19	2	27	8	25	2	23	2	21	2
	No. 1	2 x 4	7	6	6	10	6	4	5	11	8	7	7	10	7	2	6	7
		2 x 6	11	10	10	9	9	11	9	4	13	6	11	8	10	5	9	6
		2 x 8	15	7	14	2	13	2	12	4	17	10	15	5	13	9	12	7
		2 x 10	19	11	18	1	16	9	15	9	22	9	19	8	17	7	16	1
		2 x 12	24	2	22	0	20	5	19	2	27	8	25	11	21	5	19	7
No. 2	2 x 4	7	3	6	7	6	1	5	9	8	3	7	3	6	6	5	11	
	2 x 6	11	5	10	4	9	6	8	8	12	3	10	7	9	6	8	8	
	2 x 8	15	0	13	8	12	6	11	5	16	2	14	0	12	6	11	5	
	2 x 10	19	2	17	5	16	0	14	7	20	8	17	11	16	0	14	7	
	2 x 12	23	4	21	2	19	5	17	9	25	2	21	9	19	5	17	9	
No. 3	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4	
	2 x 6	9	4	8	1	7	3	6	7	9	4	8	1	7	3	6	8	
	2 x 8	12	4	10	8	9	6	8	8	12	4	10	8	9	6	8	8	
	2 x 10	15	8	13	7	12	2	11	1	15	8	13	7	12	2	11	1	
	2 x 12	19	1	16	7	14	10	13	6	19	1	16	7	14	10	13	6	
Construction	2 x 4	6	11	6	2	5	6	5	0	7	2	6	2	5	6	5	0	
Standard	2 x 4	5	4	4	8	4	2	3	9	5	4	4	8	4	2	3	9	
Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6	

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Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing				Joist Spacing				Joist Spacing							
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	10	6	5
		2 x 6	11	1	10	1	9	4	8	10	12	9	11	7	10	9	10	1
		2 x 8	14	8	13	4	12	4	11	7	16	9	15	3	14	2	13	4
		2 x 10	18	9	17	0	15	9	14	10	21	5	19	6	18	1	17	0
		2 x 12	22	9	20	8	19	2	18	1	26	1	23	8	22	0	20	8
	No. 1	2 x 4	7	1	6	5	5	11	5	7	8	1	7	4	6	10	6	5
		2 x 6	11	1	10	1	9	4	8	10	12	9	11	5	10	3	9	4
		2 x 8	14	8	13	4	12	4	11	7	16	9	15	1	13	6	12	4
		2 x 10	18	9	17	0	15	9	14	10	21	5	19	3	17	3	15	8
		2 x 12	22	9	20	8	19	2	18	1	26	1	23	5	20	11	19	1
	No. 2	2 x 4	6	10	6	2	5	9	5	5	7	10	7	1	6	4	5	9
		2 x 6	10	9	9	9	9	1	8	5	11	11	10	4	9	3	8	5
		2 x 8	14	2	12	10	11	11	11	1	15	9	13	8	12	2	11	1
		2 x 10	18	1	16	5	15	3	14	2	20	1	17	5	15	7	14	2
		2 x 12	22	0	20	0	18	7	17	3	24	6	21	2	18	11	17	3
	No. 3	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4
		2 x 6	8	11	7	8	6	10	6	3	8	11	7	8	6	10	6	3
		2 x 8	11	9	10	2	9	1	8	3	11	9	10	2	9	1	8	4
2 x 10		15	0	13	0	11	7	10	7	15	0	13	0	11	7	10	7	
2 x 12		18	3	15	9	14	1	12	10	18	3	15	9	14	1	12	10	
Con- struction	2 x 4	6	7	5	11	5	4	4	11	6	11	6	0	5	4	4	11	
Standard	2 x 4	5	4	4	8	4	2	3	9	5	4	4	8	4	2	3	9	
Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	4	9	9
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	8	12	10
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	17	5	16	5
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	21	2	19	11
	No. 1	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	4	9	9
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	8	12	10
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	17	5	16	5
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	21	2	19	11
	No. 2	2 x 4	6	7	6	0	5	6	5	2	7	6	6	10	6	4	5	11
		2 x 6	10	4	9	5	8	9	8	2	11	10	10	4	9	3	8	5
		2 x 8	13	8	12	5	11	6	10	10	15	8	13	8	12	2	11	1
		2 x 10	17	5	15	10	14	8	13	10	19	11	17	5	15	7	14	2
		2 x 12	21	2	19	3	17	10	16	10	24	3	21	2	18	11	17	3
	No. 3	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4
		2 x 6	9	4	8	1	7	3	6	7	9	4	8	1	7	3	6	7
		2 x 8	12	4	10	8	9	6	8	8	12	4	10	8	9	6	8	8
2 x 10		15	8	13	7	12	2	11	1	15	8	13	7	12	2	11	1	
2 x 12		19	1	16	7	14	10	13	6	19	1	16	7	14	10	13	6	
Con- struction	2 x 4	6	4	5	9	5	4	5	0	7	2	6	2	5	6	5	0	
Standard	2 x 4	5	4	4	8	4	2	3	9	5	4	4	8	4	2	3	9	
Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6	

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Table A-6 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 30 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 30 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		12 in.		16 in.		20 m.		24 in.			
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>		
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	4	9	9
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	8	12	10
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	17	5	16	5
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	21	2	19	11
	No 1	2 x 4	6	10	6	2	5	9	5	5	7	9	7	1	6	7	6	2
		2 x 6	10	9	9	9	9	0	8	6	12	3	11	2	10	0	9	1
		2 x 8	14	2	12	10	11	11	11	2	16	2	14	8	13	2	12	0
		2 x 10	18	0	16	5	15	3	14	4	20	8	18	9	16	10	15	4
		2 x 12	21	11	19	11	18	6	17	5	25	2	22	10	20	6	18	8
	No 2	2 x 4	6	7	6	0	5	6	5	2	7	6	6	10	6	2	5	8
		2 x 6	10	4	9	5	8	9	8	2	11	7	10	0	9	0	8	2
		2 x 8	13	8	12	5	11	6	10	10	15	4	13	3	11	10	10	10
		2 x 10	17	5	15	10	14	8	13	10	19	6	16	11	15	1	13	10
		2 x 12	21	2	19	3	17	10	16	10	23	9	20	7	18	5	16	10
	No 3	2 x 4	5	11	5	1	4	7	4	2	5	11	5	1	4	7	4	2
		2 x 6	8	11	7	8	6	10	6	3	8	11	7	8	6	10	6	3
		2 x 8	11	9	10	2	9	1	8	3	11	9	10	2	9	1	8	3
		2 x 10	15	0	13	0	11	7	10	7	15	0	13	0	11	7	10	7
		2 x 12	18	3	15	9	14	1	12	10	18	3	15	9	14	1	12	10
	Construction	2 x 4	6	4	5	9	5	2	4	9	6	8	5	9	5	2	4	9
	Standard	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7
	Utility	2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	6	11	6	3	5	10	5	6	7	11	7	2	6	8	6
2 x 6			10	10	9	10	9	2	8	7	12	5	11	4	10	6	9	10
2 x 8			14	4	13	0	12	1	11	4	16	5	14	11	13	10	13	0
2 x 10			18	3	16	7	15	5	14	6	20	11	19	0	17	8	16	7
2 x 12			22	3	20	3	18	9	17	8	25	6	23	2	21	6	20	3
No. 1		2 x 4	6	11	6	3	5	10	5	6	7	11	7	2	6	8	6	3
		2 x 6	10	10	9	10	9	2	8	7	12	5	11	4	10	3	9	4
		2 x 8	14	4	13	0	12	1	11	4	16	5	14	11	13	6	12	4
		2 x 10	18	3	16	7	15	5	14	6	20	11	19	0	17	3	15	8
		2 x 12	22	3	20	3	18	9	17	8	25	6	23	2	20	11	19	1
No. 2		2 x 4	6	8	6	0	5	7	5	3	7	7	6	11	6	4	5	9
		2 x 6	10	6	9	6	8	10	8	4	11	11	10	4	9	3	8	5
		2 x 8	13	10	12	7	11	8	10	11	15	9	13	8	12	2	11	1
		2 x 10	17	8	16	0	14	10	14	0	20	1	17	5	15	7	14	2
		2 x 12	21	5	19	6	18	1	17	0	24	6	21	2	18	11	17	3
No. 3		2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4
		2 x 6	8	11	7	8	6	10	6	3	8	11	7	8	6	10	6	3
		2 x 8	11	9	10	2	9	1	8	3	11	9	10	2	9	1	8	3
		2 x 10	15	0	13	0	11	7	10	7	15	0	13	0	11	7	10	7
		2 x 12	18	3	15	9	14	1	12	10	18	3	15	9	14	1	12	10
Construction		2 x 4	6	5	5	10	5	4	4	11	6	11	6	0	5	4	4	11
Standard		2 x 4	5	4	4	8	4	2	3	9	5	4	4	8	4	2	3	9
Utility		2 x 4	3	7	3	1	2	9	2	6	3	7	3	1	2	9	2	6

Table A-7
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 20 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in		16 in		20 in		24 in		12 in		16 in		20 in		24 in	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Douglas Fir—Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	8	11	8	1	7	6	7	1	10	2	9	3	8	7	8	1
		2 x 6	14	0	12	9	11	10	11	1	16	0	14	7	13	6	12	9
		2 x 8	18	6	16	9	15	7	14	8	21	2	19	3	17	10	16	9
		2 x 10	23	7	21	5	19	11	18	9	27	0	24	6	22	9	21	5
		2 x 12	28	8	26	1	24	2	22	9	32	10	29	10	27	8	26	1
	No 1	2 x 4	8	11	8	1	7	6	7	1	10	2	9	3	8	7	8	1
		2 x 6	14	0	12	9	11	10	11	1	16	0	14	7	13	6	12	9
		2 x 8	18	6	16	9	15	7	14	8	21	2	19	3	17	10	16	9
		2 x 10	23	7	21	5	19	11	18	9	27	0	24	6	22	9	21	5
		2 x 12	28	8	26	1	24	2	22	9	32	10	29	10	27	8	26	1
	No 2	2 x 4	8	7	7	10	7	3	6	10	9	10	8	11	8	4	7	10
		2 x 6	13	6	12	3	11	5	10	9	15	6	14	1	12	10	11	9
		2 x 8	17	10	16	2	15	0	14	2	20	5	18	7	16	11	15	5
		2 x 10	22	9	20	8	19	2	18	1	26	1	23	8	21	7	19	9
		2 x 12	27	8	25	2	23	4	22	0	31	9	28	10	26	4	24	0
	No 3	2 x 4	8	3	7	4	6	7	6	0	8	6	7	4	6	7	6	0
		2 x 6	12	7	10	11	9	9	8	11	12	7	10	11	9	9	8	11
		2 x 8	16	7	14	4	12	10	11	9	16	7	14	4	12	10	11	9
		2 x 10	21	2	18	4	16	5	15	0	21	2	18	4	16	5	15	0
		2 x 12	25	9	22	4	20	0	18	3	25	9	22	4	20	0	18	3
	Construction	2 x 4	8	3	7	6	7	0	6	7	9	6	8	5	7	6	6	10
Standard	2 x 4	7	2	6	2	5	6	5	0	7	2	6	2	5	6	5	0	
Utility	2 x 4	5	0	4	4	3	11	3	7	5	0	4	4	3	11	3	7	
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	8	7	7	10	7	3	6	10	9	10	8	11	8	4	7	10
		2 x 6	13	6	12	3	11	5	10	9	15	6	14	1	13	1	12	2
		2 x 8	17	10	16	2	15	0	14	2	20	5	18	7	17	3	16	0
		2 x 10	22	9	20	8	19	2	18	1	26	1	23	8	22	0	20	6
		2 x 12	27	8	25	2	23	4	22	0	31	9	28	10	26	9	24	11
	No 1	2 x 4	8	7	7	10	7	3	6	10	9	10	8	11	8	4	7	7
		2 x 6	13	6	12	3	11	5	10	9	15	6	13	9	12	4	11	3
		2 x 8	17	10	16	2	15	0	14	2	20	5	18	2	16	3	14	10
		2 x 10	22	9	20	8	19	2	18	1	26	1	23	3	20	9	18	11
		2 x 12	27	8	25	2	23	4	22	0	31	9	28	3	25	3	23	1
	No 2	2 x 4	8	3	7	6	7	0	6	7	9	6	8	7	7	8	7	0
		2 x 6	13	0	11	10	11	0	10	0	14	2	12	3	11	0	10	0
		2 x 8	17	2	15	7	14	6	13	2	18	8	16	2	14	6	13	2
		2 x 10	22	11	19	11	18	6	16	10	23	10	20	8	18	6	16	10
		2 x 12	26	8	24	3	22	6	20	6	29	0	25	2	22	6	20	6
	No 3	2 x 4	7	2	6	2	5	6	5	0	7	2	6	2	5	6	5	0
		2 x 6	10	9	9	4	8	4	7	7	10	9	9	4	8	4	7	7
		2 x 8	14	3	12	4	11	0	10	0	14	3	12	4	11	0	10	0
		2 x 10	18	2	15	8	14	1	12	10	18	2	15	8	14	1	12	10
		2 x 12	22	1	19	1	17	1	15	7	22	1	19	1	17	1	15	7
	Construction	2 x 4	8	0	7	2	6	5	5	10	8	3	7	2	6	5	5	10
Standard	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	

Continued on next page

Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 20 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	<i>ft in</i>	
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	8 2	7 5	6 11	6 6	9 4	8 6	7 11	7 5	8 6	7 11	7 5	8 6	7 11	7 5		
		2 x 6	12 10	11 8	10 10	10 2	14 9	13 4	12 5	11 8	13 4	12 5	11 8	13 4	12 5	11 8		
		2 x 8	16 11	15 5	14 3	13 5	19 5	17 8	16 4	15 5	17 8	16 4	15 5	17 8	16 4	15 5		
		2 x 10	21 8	19 8	18 3	17 2	24 9	22 6	20 11	19 8	22 6	20 11	19 8	22 6	20 11	19 8		
		2 x 12	26 4	23 11	22 2	20 11	30 2	27 5	25 5	23 11	27 5	25 5	23 11	27 5	25 5	23 11		
	No. 1	2 x 4	8 2	7 5	6 11	6 6	9 4	8 6	7 11	7 5	8 6	7 11	7 5	8 6	7 11	7 5		
		2 x 6	12 10	11 8	10 10	10 2	14 9	13 4	12 5	11 8	13 4	12 5	11 8	13 4	12 5	11 8		
		2 x 8	16 11	15 5	14 3	13 5	19 5	17 8	16 4	15 5	17 8	16 4	15 5	17 8	16 4	15 5		
		2 x 10	21 8	19 8	18 3	17 2	24 9	22 6	20 11	19 8	22 6	20 11	19 8	22 6	20 11	19 8		
		2 x 12	26 4	23 11	22 2	20 11	30 2	27 5	25 5	23 11	27 5	25 5	23 11	27 5	25 5	23 11		
	No. 2	2 x 4	7 11	7 2	6 8	6 3	9 0	8 2	7 7	7 2	8 2	7 7	7 2	8 2	7 7	7 2		
		2 x 6	12 5	11 3	10 5	9 10	14 2	12 11	12 0	11 3	12 11	12 0	11 3	12 11	12 0	11 3		
		2 x 8	16 4	14 10	13 9	13 0	18 9	17 0	15 10	14 10	17 0	15 10	14 10	17 0	15 10	14 10		
		2 x 10	20 11	19 0	17 7	16 7	23 11	21 9	20 2	18 11	21 9	20 2	18 11	21 9	20 2	18 11		
		2 x 12	25 5	23 1	21 5	20 2	29 1	26 5	24 6	23 1	26 5	24 6	23 1	26 5	24 6	23 1		
	No. 3	2 x 4	7 7	6 10	6 5	5 10	8 3	7 2	6 5	5 10	7 2	6 5	5 10	7 2	6 5	5 10		
		2 x 6	11 11	10 6	9 5	8 7	12 2	10 6	9 5	8 7	12 2	10 6	9 5	8 7	12 2	10 6		
		2 x 8	15 9	13 11	12 5	11 4	16 0	13 11	12 5	11 4	16 0	13 11	12 5	11 4	16 0	13 11		
		2 x 10	20 1	17 9	15 10	14 6	20 6	17 9	15 10	14 6	20 6	17 9	15 10	14 6	20 6	17 9		
		2 x 12	24 5	21 7	19 3	17 7	24 11	21 7	19 3	17 7	24 11	21 7	19 3	17 7	24 11	21 7		
	Construction	2 x 4	7 7	6 10	6 5	6 0	8 8	7 10	7 2	6 6	7 10	7 2	6 6	7 10	7 2	6 6		
Standard	2 x 4	6 10	5 11	5 3	4 10	6 10	5 11	5 3	4 10	6 10	5 11	5 3	4 10	6 10	5 11			
Utility	2 x 4	4 7	4 0	3 7	3 3	4 7	4 0	3 7	3 3	4 7	4 0	3 7	3 3	4 7	4 0			
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	8 7	7 10	7 3	6 10	9 10	8 11	8 4	7 10	8 11	8 4	7 10	8 11	8 4	7 10		
		2 x 6	13 6	12 3	11 5	10 9	15 6	14 1	13 1	11 11	14 1	13 1	11 11	14 1	13 1	11 11		
		2 x 8	17 10	16 2	15 0	14 2	20 5	18 7	17 3	15 9	18 7	17 3	15 9	18 7	17 3	15 9		
		2 x 10	22 9	20 8	19 2	18 1	26 1	23 8	23 0	20 1	23 8	23 0	20 1	23 8	23 0	20 1		
		2 x 12	27 8	25 2	23 4	22 0	31 9	28 10	26 9	24 6	28 10	26 9	24 6	28 10	26 9	24 6		
	No. 1	2 x 4	8 7	7 10	7 3	6 10	9 10	8 11	8 4	7 10	8 11	8 4	7 10	8 11	8 4	7 10		
		2 x 6	13 6	12 3	11 5	10 9	15 6	13 6	12 1	11 0	13 6	12 1	11 0	13 6	12 1	11 0		
		2 x 8	17 10	16 2	15 0	14 2	20 5	17 10	15 11	14 6	17 10	15 11	14 6	17 10	15 11	14 6		
		2 x 10	22 9	20 8	19 2	18 1	26 1	22 9	20 4	18 7	22 9	20 4	18 7	22 9	20 4	18 7		
		2 x 12	27 8	25 2	23 4	22 0	31 9	27 8	24 9	22 7	27 8	24 9	22 7	27 8	24 9	22 7		
	No. 2	2 x 4	8 3	7 6	7 0	6 7	9 6	8 5	7 6	6 10	8 5	7 6	6 10	8 5	7 6	6 10		
		2 x 6	13 0	11 10	11 0	10 0	14 2	12 3	11 0	10 0	12 3	11 0	10 0	12 3	11 0	10 0		
		2 x 8	17 2	15 7	14 6	13 2	18 8	16 2	14 6	13 2	16 2	14 6	13 2	16 2	14 6	13 2		
		2 x 10	21 11	19 11	18 6	16 10	23 10	20 8	18 6	16 10	20 8	18 6	16 10	20 8	18 6	16 10		
		2 x 12	26 8	24 3	22 6	20 6	29 0	25 2	22 6	20 6	25 2	22 6	20 6	25 2	22 6	20 6		
	No. 3	2 x 4	7 2	6 2	5 6	5 0	7 2	6 2	5 6	5 0	6 2	5 6	5 0	6 2	5 6	5 0		
		2 x 6	10 9	9 4	8 4	7 7	10 9	9 4	8 4	7 7	9 4	8 4	7 7	9 4	8 4	7 7		
		2 x 8	14 3	12 4	11 0	10 0	14 3	12 4	11 0	10 0	12 4	11 0	10 0	12 4	11 0	10 0		
		2 x 10	18 2	15 8	14 1	12 10	18 2	15 8	14 1	12 10	15 8	14 1	12 10	15 8	14 1	12 10		
		2 x 12	22 1	19 1	17 1	15 7	22 1	19 1	17 1	15 7	19 1	17 1	15 7	19 1	17 1	15 7		
	Construction	2 x 4	8 0	7 2	6 5	5 10	8 3	7 2	6 5	5 10	7 2	6 5	5 10	7 2	6 5	5 10		
Standard	2 x 4	6 2	5 4	4 9	4 4	6 2	5 4	4 9	4 4	6 2	5 4	4 9	4 4	6 2	5 4			
Utility	2 x 4	4 1	3 7	3 2	2 11	4 1	3 7	3 2	2 11	4 1	3 7	3 2	2 11	4 1	3 7			

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Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 20 lb per sq ft															
			Gypsum Board or Plastered Ceiling					Other Ceilings										
			Joist Spacing					Joist Spacing										
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>	<i>ft.</i>	<i>in.</i>
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	8	1	7	4	6	10	6	5	9	3	8	5	7	10	7	4
		2 x 6	12	9	11	7	10	9	10	1	14	7	13	3	12	3	11	7
		2 x 8	16	9	15	3	14	2	13	4	19	3	17	5	16	2	15	3
		2 x 10	21	5	19	6	18	1	17	0	24	6	22	3	20	8	19	6
		2 x 12	26	1	23	8	22	0	20	8	29	10	27	1	25	2	23	8
	No. 1	2 x 4	8	1	7	4	6	10	6	5	9	3	8	5	7	10	7	4
		2 x 6	12	9	11	7	10	9	10	1	14	7	13	2	11	10	10	9
		2 x 8	16	9	15	3	14	2	13	4	19	3	17	5	15	7	14	3
		2 x 10	21	5	19	6	18	1	17	0	24	6	22	3	19	11	18	2
		2 x 12	26	1	23	8	22	0	20	8	29	10	27	1	24	2	22	1
No. 2	2 x 4	7	10	7	1	6	7	6	2	8	11	8	2	7	4	6	8	
	2 x 6	12	4	11	2	10	4	9	9	13	9	11	11	10	8	9	9	
	2 x 8	16	3	14	9	13	8	12	10	18	2	15	9	14	1	12	10	
	2 x 10	20	9	18	10	17	6	16	5	23	3	20	1	18	0	16	5	
	2 x 12	25	2	22	11	21	3	20	0	28	3	24	6	21	10	20	0	
No. 3	2 x 4	7	2	6	2	5	6	5	0	7	2	6	2	5	6	5	0	
	2 x 6	10	3	8	11	7	11	7	3	10	3	8	11	7	11	7	3	
	2 x 8	13	7	11	9	10	6	9	7	13	7	11	9	10	6	9	7	
	2 x 10	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3	
	2 x 12	21	1	18	3	16	4	14	10	21	1	18	3	16	4	14	10	
Construction	2 x 4	7	6	6	10	6	2	5	8	8	0	6	11	6	2	5	8	
Standard	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	2	10	4	9	9	14	1	12	9	11	10	11	2
		2 x 8	16	2	14	8	13	8	12	10	18	6	16	10	15	7	14	8
		2 x 10	20	8	18	9	17	5	16	5	23	8	21	6	19	11	18	9
		2 x 12	25	2	22	10	21	2	19	11	28	9	26	2	24	3	22	10
	No. 1	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	2	10	4	9	9	14	1	12	9	11	10	11	0
		2 x 8	16	2	14	8	13	8	12	10	18	6	16	10	15	7	14	6
		2 x 10	20	8	18	9	17	5	16	5	23	8	21	6	19	11	18	7
		2 x 12	25	2	22	10	21	2	19	11	28	9	26	2	24	3	22	7
No. 2	2 x 4	7	6	6	10	6	4	6	0	8	7	7	10	7	3	6	10	
	2 x 6	11	10	10	9	10	0	9	5	13	7	11	11	10	8	9	9	
	2 x 8	15	8	14	2	13	2	12	5	17	11	15	9	14	1	12	10	
	2 x 10	19	11	18	1	16	10	15	10	22	10	20	1	18	0	16	5	
	2 x 12	24	3	22	1	20	6	19	3	27	9	24	6	21	10	20	0	
No. 3	2 x 4	7	2	6	2	5	6	5	0	7	2	6	2	5	6	5	0	
	2 x 6	10	9	9	4	8	4	7	7	10	9	9	4	8	4	7	7	
	2 x 8	14	3	12	4	11	0	10	0	14	3	12	4	11	0	10	0	
	2 x 10	18	2	15	8	14	1	12	10	18	2	15	8	14	1	12	10	
	2 x 12	22	1	19	1	17	1	15	7	22	1	19	1	17	1	15	7	
Construction	2 x 4	7	3	6	7	6	1	5	9	8	3	7	2	6	5	5	10	
Standard	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	

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Table A-7 (Cont'd)
ROOF JOISTS — SUPPORTING CEILING
(LIVE LOAD 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 20 lb per sq ft															
			Gypsum Board or Plastered Ceiling						Other Ceilings									
			Joist Spacing						Joist Spacing									
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>			
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	2	10	4	9	9	14	1	12	9	11	10	11	2
		2 x 8	16	2	14	8	13	8	12	10	18	6	16	10	15	7	14	8
		2 x 10	20	8	18	9	17	5	16	5	23	8	21	6	19	11	18	9
		2 x 12	25	2	22	10	21	2	19	11	28	9	26	2	24	3	22	10
	No. 1	2 x 4	7	9	7	1	6	7	6	2	8	11	8	1	7	6	7	1
		2 x 6	12	3	11	2	10	4	9	9	14	1	12	9	11	6	10	6
		2 x 8	16	2	14	8	13	8	12	10	18	6	16	10	15	3	13	11
		2 x 10	20	8	18	9	17	5	16	5	23	8	21	6	19	5	17	9
		2 x 12	25	2	22	10	21	2	19	11	28	9	26	2	23	8	21	7
	No. 2	2 x 4	7	6	6	10	6	4	6	0	8	7	7	10	7	2	6	6
		2 x 6	11	10	10	9	10	0	9	5	13	5	11	7	10	4	9	6
2 x 8		15	8	14	2	13	2	12	5	17	8	15	4	13	8	12	6	
2 x 10		19	11	18	1	16	10	15	10	22	7	19	6	17	6	15	11	
2 x 12		24	3	22	1	20	6	19	3	27	5	23	9	21	3	19	5	
No. 3	2 x 4	6	10	5	11	5	3	4	10	6	10	5	11	5	3	4	10	
	2 x 6	10	3	8	11	7	11	7	3	10	3	8	11	7	11	7	3	
	2 x 8	13	7	11	9	10	6	9	7	13	7	11	9	10	6	9	7	
	2 x 10	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3	
	2 x 12	21	1	18	3	16	4	14	10	21	1	18	3	16	4	14	10	
Con- struction	2 x 4	7	3	6	7	6	0	5	5	7	9	6	8	6	0	5	5	
Standard	2 x 4	5	10	5	0	4	6	4	1	5	10	5	0	4	6	4	1	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	7	11	7	2	6	8	6	3	9	1	8	3	7	7	7	2
		2 x 6	12	5	11	4	10	6	9	10	14	3	12	11	12	0	11	4
		2 x 8	16	5	14	11	13	10	13	0	18	9	17	1	15	10	14	11
		2 x 10	20	11	19	0	17	8	16	7	24	0	21	9	20	3	19	0
		2 x 12	25	6	23	2	21	6	20	3	29	2	26	6	24	7	23	2
	No. 1	2 x 4	7	11	7	2	6	8	6	3	9	1	8	3	7	7	7	2
		2 x 6	12	5	11	4	10	6	9	10	14	3	12	11	11	10	10	9
		2 x 8	16	5	14	11	13	10	13	0	18	9	17	1	15	7	14	3
		2 x 10	20	11	19	0	17	8	16	7	24	0	21	9	19	11	18	2
		2 x 12	25	6	23	2	21	6	20	3	29	2	26	6	24	2	22	1
	No. 2	2 x 4	7	7	6	11	6	5	6	0	8	9	7	11	7	4	6	8
		2 x 6	12	0	10	11	10	1	9	6	13	9	11	11	10	8	9	9
2 x 8		15	10	14	4	13	4	12	7	18	1	15	9	14	1	12	10	
2 x 10		20	2	18	4	17	0	16	0	23	1	20	1	18	0	16	5	
2 x 12		24	7	22	4	20	9	19	6	28	1	24	6	21	10	20	0	
No. 3	2 x 4	7	2	6	2	5	6	5	0	7	2	6	2	5	6	5	0	
	2 x 6	10	3	8	11	7	11	7	3	10	3	8	11	7	11	7	3	
	2 x 8	13	7	11	9	10	6	9	7	13	7	11	9	10	6	9	7	
	2 x 10	17	4	15	0	13	5	12	3	17	4	15	0	13	5	12	3	
	2 x 12	21	1	18	3	16	4	14	10	21	1	18	3	16	4	14	10	
Con- struction	2 x 4	7	4	6	8	6	2	5	8	8	0	6	11	6	2	5	8	
Standard	2 x 4	6	2	5	4	4	9	4	4	6	2	5	4	4	9	4	4	
Utility	2 x 4	4	1	3	7	3	2	2	11	4	1	3	7	3	2	2	11	

Table A-8
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 50 AND 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size,	LIVE LOAD 50 lb per sq ft								LIVE LOAD 40 lb per sq ft							
			Rafter Spacing								Rafter Spacing							
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Douglas Fir—Larch (includes Douglas Fir and Western Larch)	Select structural	2x4	8	3	7	6	7	0	6	7	8	11	8	1	7	6	7	1
		2x6	13	0	11	10	10	11	10	3	14	0	12	9	11	10	11	1
		2x8	17	2	15	7	14	6	13	6	18	6	16	9	15	7	14	8
		2x10	21	11	19	11	18	5	17	3	23	7	21	5	19	11	18	9
	No. 1	2x4	8	3	7	6	7	0	6	6	8	11	8	1	7	6	7	1
		2x6	13	0	11	8	10	5	9	6	14	0	12	9	11	6	10	6
		2x8	17	2	15	4	13	9	12	6	18	6	16	9	15	2	13	10
		2x10	21	11	19	7	17	7	16	0	23	7	21	5	19	4	17	8
	No. 2	2x4	8	0	7	3	6	6	5	11	8	7	7	10	7	2	6	7
		2x6	12	2	10	6	9	5	8	7	13	5	11	7	10	4	9	5
		2x8	16	0	13	10	12	5	11	4	17	8	15	3	13	8	12	6
		2x10	20	5	17	8	15	10	14	5	22	6	19	6	17	5	15	11
No. 3	2x4	6	3	5	5	4	10	4	5	6	10	5	11	5	4	4	10	
	2x6	9	2	8	0	7	1	6	6	10	2	8	9	7	10	7	2	
	2x8	12	2	10	6	9	5	8	7	13	5	11	7	10	4	9	6	
	2x10	15	6	13	5	12	0	10	11	17	1	14	10	13	3	12	1	
Construction	2x4	7	1	6	2	5	6	5	0	7	10	6	9	6	1	5	6	
	2x6	10	3	8	4	7	0	6	8	9	9	8	0	7	5	4	1	
	2x8	14	6	12	0	10	3	9	5	13	1	11	4	10	2	8	6	
	2x10	18	10	16	4	14	7	13	4	20	10	18	0	16	1	14	8	
Standard	2x4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1	
	2x6	7	6	6	6	5	6	4	6	7	10	6	9	6	1	5	6	
	2x8	10	9	9	2	8	6	7	3	11	1	9	6	10	2	8	6	
	2x10	14	12	12	4	11	7	6	10	15	4	13	3	12	5	11	7	
Utility	2x4	3	8	3	2	2	10	2	7	4	1	3	6	3	2	2	10	
	2x6	5	10	4	10	3	10	3	10	6	7	7	10	7	3	6	8	
	2x8	8	7	7	11	6	9	6	0	8	7	8	11	10	9	9	10	
	2x10	11	11	10	4	12	10	11	9	17	10	15	10	14	2	12	11	
Hem—Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2x4	8	0	7	3	6	7	6	0	8	7	7	10	7	3	6	8
		2x6	12	7	10	11	9	9	8	11	13	6	12	0	10	9	9	10
		2x8	16	7	14	4	12	10	11	9	17	10	15	10	14	2	12	11
		2x10	21	2	18	4	16	5	15	0	22	9	20	3	18	1	16	6
	No. 1	2x4	7	10	6	10	6	1	5	6	8	7	7	6	6	8	6	1
		2x6	11	8	10	1	9	0	8	3	12	10	11	2	9	11	9	1
		2x8	15	4	13	4	11	11	10	10	17	0	14	8	13	2	12	0
		2x10	19	7	17	0	15	2	13	10	21	8	18	9	16	9	15	4
	No. 2	2x4	7	3	6	3	5	7	5	1	8	0	6	11	6	2	5	8
		2x6	10	4	9	0	8	0	7	4	11	5	9	11	8	10	8	1
		2x8	13	8	11	10	10	7	9	8	15	1	13	1	11	8	10	8
		2x10	17	5	15	1	13	6	12	4	19	3	16	8	14	11	13	7
No. 3	2x4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1	
	2x6	7	10	6	10	6	1	5	7	8	8	7	6	6	9	6	2	
	2x8	10	5	9	0	8	0	7	4	11	6	9	11	8	10	8	1	
	2x10	13	3	11	6	10	3	9	4	14	8	12	8	11	4	10	4	
Construction	2x4	6	0	5	3	4	8	4	3	6	8	5	9	5	2	4	8	
	2x6	8	6	7	11	6	11	6	9	11	10	10	11	10	10	10	10	
	2x8	11	11	10	10	10	10	10	10	17	10	15	10	14	11	13	7	
	2x10	15	14	13	10	12	6	11	5	17	10	15	5	13	10	12	7	
Standard	2x4	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
	2x6	6	9	5	10	5	10	5	10	10	10	10	10	10	10	10	10	
	2x8	9	11	8	10	8	10	8	10	13	10	12	10	12	10	12	10	
	2x10	12	12	10	10	10	10	10	10	17	10	15	10	13	10	12	7	
Utility	2x4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	
	2x6	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
	2x8	6	9	5	10	5	10	5	10	10	10	10	10	10	10	10	10	
	2x10	8	11	8	10	8	10	8	10	13	10	12	10	12	10	12	7	

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Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 50 AND 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in.</i>	LIVE LOAD 50 lb per sq ft						LIVE LOAD 40 lb per sq ft									
			Rafter Spacing						Rafter Spacing									
			12 in.		16 in.		20 in.		12 in.		16 in.		20 in.					
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>				
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	7	7	6	11	6	5	6	0	8	2	7	5	6	11	6	6
		2 x 6	11	11	10	10	10	1	9	5	12	10	11	8	10	10	10	2
		2 x 8	15	9	14	3	13	3	12	6	16	11	15	5	14	3	13	5
		2 x 10	20	1	18	3	16	11	15	11	21	8	19	8	18	3	17	2
		2 x 12	24	5	22	2	20	7	19	5	26	4	23	11	22	2	20	11
	No. 1	2 x 4	7	7	6	11	6	5	6	0	8	2	7	5	6	11	6	6
		2 x 6	11	11	10	10	10	1	9	2	12	10	11	8	10	10	10	2
		2 x 8	15	9	14	3	13	3	12	2	16	11	15	5	14	3	13	5
		2 x 10	20	1	18	3	16	11	15	6	21	8	19	8	18	3	17	1
		2 x 12	24	5	22	2	20	7	18	10	26	4	23	11	22	2	20	10
	No. 2	2 x 4	7	4	6	8	6	2	5	8	7	11	7	2	6	8	6	3
		2 x 6	11	6	10	1	9	0	8	3	12	5	11	2	9	11	9	1
		2 x 8	15	2	13	4	11	11	10	10	16	4	14	8	13	2	12	0
		2 x 10	19	5	17	0	15	2	13	10	20	11	18	9	16	9	15	4
2 x 12		23	7	20	8	18	6	16	10	25	5	22	10	20	5	18	7	
No. 3	2 x 4	6	0	5	3	4	8	4	3	6	8	5	9	5	2	4	8	
	2 x 6	8	11	7	8	6	10	6	3	9	10	8	6	7	7	6	11	
	2 x 8	11	9	10	2	9	1	8	3	12	11	11	2	10	0	9	2	
	2 x 10	15	0	13	0	11	7	10	7	16	6	14	4	12	10	11	8	
	2 x 12	18	3	15	9	14	1	12	10	20	1	17	5	15	7	14	2	
Con- struction	2 x 4	6	9	5	10	5	3	4	9	7	5	6	5	5	9	5	3	
Standard	2 x 4	5	0	4	4	3	10	3	6	5	6	4	9	4	3	3	11	
Utility	2 x 4	3	4	2	11	2	7	2	4	3	8	3	2	2	10	2	7	
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	8	0	7	3	6	7	6	0	8	7	7	10	7	3	6	8
		2 x 6	12	4	10	8	9	7	8	9	13	6	11	10	9	9	9	8
		2 x 8	16	4	14	1	12	7	11	6	17	10	15	7	13	11	12	9
		2 x 10	20	10	18	0	16	1	14	8	22	9	19	11	17	9	16	3
		2 x 12	25	4	21	11	19	7	17	11	27	8	24	2	21	8	19	9
	No. 1	2 x 4	7	10	6	10	6	1	5	6	8	7	7	6	6	8	6	1
		2 x 6	11	5	9	10	8	10	8	1	12	7	10	11	9	9	8	11
		2 x 8	15	1	13	0	11	8	10	8	16	7	14	4	12	10	11	9
		2 x 10	19	2	16	8	14	10	13	7	21	2	18	4	16	5	15	0
		2 x 12	23	4	20	3	18	1	16	6	25	9	22	4	20	0	18	3
	No. 2	2 x 4	7	1	6	2	5	6	5	0	7	10	6	9	6	1	5	6
		2 x 6	10	4	9	0	8	0	7	4	11	5	9	11	8	10	8	1
		2 x 8	13	8	11	10	10	7	9	8	15	1	13	1	11	8	10	8
		2 x 10	17	5	15	1	13	6	12	4	19	3	16	8	14	11	13	7
2 x 12		21	3	18	5	16	5	15	0	23	5	20	3	18	2	16	7	
No. 3	2 x 4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1	
	2 x 6	7	10	6	10	6	1	5	7	8	8	7	6	6	9	6	2	
	2 x 8	10	5	9	0	8	0	7	4	11	6	9	11	8	10	8	1	
	2 x 10	13	3	11	6	10	3	9	4	14	8	12	8	11	4	10	4	
	2 x 12	16	2	14	0	12	6	11	5	17	10	15	5	13	10	12	7	
Con- struction	2 x 4	6	0	5	3	4	8	4	3	6	8	5	9	5	2	4	8	
Standard	2 x 4	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
Utility	2 x 4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	

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Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 50 AND 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m.</i>	LIVE LOAD 50 lb per sq ft				LIVE LOAD 40 lb per sq ft											
			Rafter Spacing				Rafter Spacing											
			12 m.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>m.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>m.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>m.</i>	<i>ft</i>	<i>in.</i>
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	7	6	6	10	6	4	5	10	8	1	7	4	6	10	6	5
		2 x 6	11	10	10	6	9	5	8	7	12	9	11	7	10	4	9	5
		2 x 8	15	7	13	10	12	5	11	4	16	9	15	3	13	8	12	6
		2 x 10	19	11	17	8	15	10	14	5	21	5	19	6	17	5	15	11
	2 x 12	24	2	21	6	19	3	17	7	26	1	23	8	21	3	19	5	
	No. 1	2 x 4	7	6	6	8	5	11	5	5	8	1	7	4	6	7	6	0
		2 x 6	11	2	9	8	8	8	7	10	12	4	10	8	9	6	8	8
		2 x 8	14	9	12	9	11	5	10	5	16	3	14	1	12	7	11	6
		2 x 10	18	9	16	3	14	6	13	3	20	9	17	11	16	1	14	8
	2 x 12	22	10	19	9	17	8	16	2	25	3	21	10	19	6	17	10	
No. 2	2 x 4	6	11	6	0	5	4	4	11	7	8	6	7	5	11	5	5	
	2 x 6	10	1	8	9	7	10	7	1	11	2	9	8	8	7	7	10	
	2 x 8	13	4	11	6	10	4	9	5	14	8	12	9	11	4	10	4	
	2 x 10	17	0	14	8	13	2	12	0	18	9	16	3	14	6	13	3	
2 x 12	20	8	17	11	16	0	14	7	22	10	19	9	17	8	16	1		
No. 3	2 x 4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1	
	2 x 6	7	6	6	6	5	10	5	4	8	3	7	2	6	5	5	10	
	2 x 8	9	11	8	7	7	8	7	0	10	11	9	6	8	6	7	9	
	2 x 10	12	8	10	11	9	9	8	11	14	0	12	1	10	10	9	10	
2 x 12	15	5	13	4	11	11	10	10	17	0	14	8	13	2	12	0		
Con- struction	2 x 4	5	10	5	1	4	6	4	1	6	5	5	7	5	0	4	7	
Standard	2 x 4	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
Utility	2 x 4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	7	3	6	7	6	1	5	9	7	9	7	1	6	7	6	2
		2 x 6	11	5	10	4	9	5	8	7	12	3	11	2	10	4	9	5
		2 x 8	15	0	13	8	12	5	11	4	16	2	14	8	13	8	12	6
		2 x 10	19	2	17	5	15	10	14	5	20	8	18	9	17	5	15	11
	2 x 12	23	4	21	2	19	3	17	7	25	2	22	10	21	2	19	5	
	No. 1	2 x 4	7	3	6	7	5	11	5	5	7	9	7	1	6	7	6	0
		2 x 6	11	5	9	10	8	10	8	1	12	3	10	11	9	9	8	11
		2 x 8	15	0	13	0	11	8	10	8	16	2	14	4	12	10	11	9
		2 x 10	19	2	16	8	14	10	13	7	20	8	18	4	16	5	15	0
	2 x 12	23	4	20	3	18	1	16	6	25	2	22	4	20	0	18	3	
No. 2	2 x 4	7	0	6	2	5	6	5	0	7	6	6	9	6	1	5	6	
	2 x 6	10	1	8	9	7	10	7	1	11	2	9	8	8	7	7	10	
	2 x 8	13	4	11	6	10	4	9	5	14	8	12	9	11	4	10	4	
	2 x 10	17	0	14	8	13	2	12	0	18	9	16	3	14	6	13	3	
2 x 12	20	8	17	11	16	0	14	7	22	10	19	9	17	8	16	1		
No. 3	2 x 4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1	
	2 x 6	7	10	6	10	6	1	5	7	8	8	7	6	6	9	6	2	
	2 x 8	10	5	9	0	8	0	7	4	11	6	9	11	8	10	8	1	
	2 x 10	13	3	11	6	10	3	9	4	14	8	12	8	11	4	10	4	
2 x 12	16	2	14	0	12	6	11	5	17	10	15	5	13	10	12	7		
Con- struction	2 x 4	6	0	5	3	4	8	4	3	6	8	5	9	5	2	4	8	
Standard	2 x 4	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
Utility	2 x 4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	

Continued on next page

Table A-8 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 50 AND 40 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 50 lb per sq ft						LIVE LOAD 40 lb per sq ft									
			Rafter Spacing						Rafter Spacing									
			12 in.		16 in.		20 in.		12 in.		16 in.		20 in.					
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>				
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	7	3	6	7	6	1	5	8	7	9	7	1	6	7	6	2
		2 x 6	11	5	10	1	9	0	8	3	12	3	11	2	9	11	9	1
		2 x 8	15	0	13	4	11	11	10	10	16	2	14	8	13	2	12	0
		2 x 10	19	2	17	0	15	2	13	10	20	8	18	9	16	9	15	4
		2 x 12	23	4	20	8	18	6	16	10	25	2	22	10	20	5	18	7
	No. 1	2 x 4	7	3	6	5	5	9	5	3	7	9	7	1	6	4	5	9
		2 x 6	10	11	9	5	8	5	7	8	12	0	10	5	9	4	8	6
		2 x 8	14	4	12	5	11	1	10	2	15	10	13	9	12	3	11	2
		2 x 10	18	4	15	11	14	2	13	0	20	3	17	6	15	8	14	4
		2 x 12	22	4	19	4	17	3	15	9	24	8	21	4	19	1	17	5
	No. 2	2 x 4	6	9	5	10	5	3	4	9	7	5	6	5	5	9	5	3
		2 x 6	9	10	8	6	7	7	6	11	10	10	9	4	8	4	7	8
		2 x 8	12	11	11	2	10	0	9	2	14	3	12	4	11	1	10	1
		2 x 10	16	6	14	3	12	9	11	8	18	3	15	9	14	1	12	10
		2 x 12	20	1	17	5	15	7	14	2	22	2	19	2	17	2	15	8
	No. 3	2 x 4	5	0	4	4	3	10	3	6	5	6	4	9	4	3	3	11
		2 x 6	7	6	6	6	5	10	5	4	8	3	7	2	6	5	5	10
		2 x 8	9	11	8	7	7	8	7	0	10	11	9	6	8	6	7	9
		2 x 10	12	8	10	11	9	9	8	11	14	0	12	1	10	10	9	10
		2 x 12	15	5	13	4	11	11	10	10	17	0	14	8	13	2	12	0
	Construction	2 x 4	5	8	4	11	4	4	4	0	6	3	5	5	4	10	4	5
Standard	2 x 4	4	3	3	8	3	3	3	0	4	8	4	1	3	8	3	4	
Utility	2 x 4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	7	4	6	8	6	2	5	10	7	11	7	2	6	8	6	3
		2 x 6	11	6	10	6	9	5	8	7	12	5	11	4	10	4	9	5
		2 x 8	15	3	13	10	12	5	11	4	16	5	14	11	13	8	12	6
		2 x 10	19	5	17	8	15	10	14	5	20	11	19	0	17	5	15	11
		2 x 12	23	8	21	6	19	3	17	7	25	6	23	2	21	3	19	5
	No. 1	2 x 4	7	4	6	8	5	11	5	5	7	11	7	2	6	7	6	0
		2 x 6	11	2	9	8	8	8	7	10	12	4	10	8	9	6	8	8
		2 x 8	14	9	12	9	11	5	10	5	16	3	14	1	12	7	11	6
		2 x 10	18	9	16	3	14	6	13	3	20	9	17	11	16	1	14	8
		2 x 12	22	10	19	9	17	8	16	2	25	3	21	10	19	6	17	10
	No. 2	2 x 4	6	11	6	0	5	4	4	11	7	7	6	7	5	11	5	5
		2 x 6	10	1	8	9	7	10	7	1	11	2	9	8	8	7	7	10
		2 x 8	13	4	11	6	10	4	9	5	14	8	12	9	11	4	10	4
		2 x 10	17	0	14	8	13	2	12	0	18	9	16	3	14	6	13	3
		2 x 12	20	8	17	11	16	0	14	7	22	10	19	9	17	8	16	1
	No. 3	2 x 4	5	3	4	6	4	0	3	8	5	9	5	0	4	5	4	1
		2 x 6	7	6	6	6	5	10	5	4	8	3	7	2	6	5	5	10
		2 x 8	9	11	8	7	7	8	7	0	10	11	9	6	8	6	7	9
		2 x 10	12	8	10	11	9	9	8	11	14	0	12	1	10	10	9	10
		2 x 12	15	5	13	4	11	11	10	10	17	0	14	8	13	2	12	0
	Construction	2 x 4	5	10	5	1	4	6	4	1	6	5	5	7	5	0	4	7
Standard	2 x 4	4	6	3	11	3	6	3	2	5	0	4	4	3	10	3	6	
Utility	2 x 4	3	0	2	7	2	4	2	1	3	4	2	10	2	7	2	4	

Table A-9
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 30 AND 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 30 lb per sq ft								LIVE LOAD 20 lb per sq ft							
			Rafter Spacing								Rafter Spacing							
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	Select structural	2 x 4	9	10	8	11	8	3	7	9	11	3	10	2	9	6	8	11
		2 x 6	15	5	14	0	13	0	12	3	17	8	16	0	14	11	14	0
		2 x 8	20	4	18	6	17	2	16	2	23	3	21	2	19	8	18	6
		2 x 10	26	0	23	7	21	11	20	7	29	9	27	0	25	1	23	7
		2 x 12	31	7	28	8	26	8	25	1	36	2	32	10	30	6	28	8
	No. 1	2 x 4	9	10	8	11	8	3	7	9	11	3	10	2	9	6	8	11
		2 x 6	15	5	14	0	13	0	11	10	17	8	16	0	14	11	14	0
		2 x 8	20	4	18	6	17	2	15	8	23	3	21	2	19	8	18	5
		2 x 10	26	0	23	7	21	11	20	0	29	9	27	0	25	1	23	6
		2 x 12	31	7	28	8	26	8	24	4	36	2	32	10	30	6	28	7
	No. 2	2 x 4	9	6	8	7	8	0	7	5	10	10	9	10	9	2	8	7
		2 x 6	14	11	13	1	11	9	10	8	17	1	15	5	13	9	12	7
		2 x 8	19	8	17	3	15	5	14	1	22	6	20	4	18	2	16	7
		2 x 10	25	1	22	1	19	9	18	0	28	8	26	0	23	3	21	2
		2 x 12	30	6	26	10	24	0	21	11	34	11	31	7	28	3	25	9
	No. 3	2 x 4	7	9	6	9	6	0	5	6	9	2	7	11	7	1	6	5
		2 x 6	11	6	9	11	8	11	8	1	13	6	11	8	10	6	9	7
		2 x 8	15	2	13	1	11	9	10	8	17	10	15	5	13	10	12	7
		2 x 10	19	4	16	9	15	0	13	8	22	9	19	9	17	8	16	1
		2 x 12	23	6	20	5	18	3	16	8	27	8	24	0	21	5	19	7
	Construction	2 x 4	8	10	7	8	6	10	6	3	10	5	9	0	8	1	7	4
	Standard	2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
	Utility	2 x 4	4	7	4	0	3	7	3	3	5	5	4	8	4	2	3	10
	Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	Select structural	2 x 4	9	6	8	7	8	0	7	6	10	10	9	10	9	2	8
2 x 6			14	11	13	6	12	2	11	1	17	1	15	6	14	4	13	1
2 x 8			19	8	17	10	16	0	14	8	22	6	20	5	18	11	17	3
2 x 10			25	1	22	9	20	6	18	8	28	8	26	1	24	1	22	0
2 x 12			30	6	27	8	24	11	22	9	34	11	31	9	29	4	26	9
No. 1		2 x 4	9	6	8	6	7	7	6	11	10	10	9	10	8	11	8	2
		2 x 6	14	6	12	7	11	3	10	3	17	1	14	10	13	3	12	1
		2 x 8	19	2	16	7	14	10	13	7	22	6	19	7	17	6	15	11
		2 x 10	24	6	21	2	18	11	17	4	28	8	24	11	22	4	20	4
		2 x 12	29	9	25	9	23	1	21	1	34	11	30	4	27	2	24	9
No. 2		2 x 4	9	0	7	10	7	0	6	5	10	5	9	3	8	3	7	6
		2 x 6	12	11	11	2	10	0	9	2	15	3	13	2	11	9	10	9
		2 x 8	17	1	14	9	13	2	12	1	20	1	17	5	15	7	14	2
		2 x 10	21	9	18	10	16	10	15	5	25	8	22	2	19	10	18	1
		2 x 12	26	6	22	11	20	6	18	9	31	2	27	0	24	2	22	0
No. 3		2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
		2 x 6	9	10	8	6	7	7	6	11	11	7	10	0	8	11	8	2
		2 x 8	13	0	11	3	10	0	9	2	15	3	13	3	11	10	10	9
		2 x 10	16	7	14	4	12	10	11	8	19	6	16	11	15	1	13	9
		2 x 12	20	2	17	5	15	7	14	3	23	9	20	6	18	4	16	9
Construction		2 x 4	7	6	6	6	5	10	5	4	8	10	7	8	6	10	6	3
Standard		2 x 4	5	8	4	11	4	4	4	0	6	8	5	9	5	2	4	8
Utility		2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1

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Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 30 AND 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>in</i>	LIVE LOAD 30 lb per sq ft								LIVE LOAD 20 lb per sq ft							
			Rafter Spacing								Rafter Spacing							
			12 m.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>	<i>ft</i>	<i>in.</i>
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	Select structural	2 x 4	9	0	8	2	7	7	7	1	10	4	9	4	8	8	8	2
		2 x 6	14	2	12	10	11	11	11	3	16	2	14	9	13	8	12	10
		2 x 8	18	8	16	11	15	9	14	10	21	4	19	5	18	0	16	11
		2 x 10	23	10	21	8	20	1	18	11	27	3	24	9	23	0	21	8
		2 x 12	29	0	26	4	24	5	23	0	33	2	30	2	28	0	26	4
	No. 1	2 x 4	9	0	8	2	7	7	7	1	10	4	9	4	8	8	8	2
		2 x 6	14	2	12	10	11	11	11	3	16	2	14	9	13	8	12	10
		2 x 8	18	8	16	11	15	9	14	10	21	4	19	5	18	0	16	11
		2 x 10	23	10	21	8	20	1	18	11	27	3	24	9	23	0	21	8
		2 x 12	29	0	26	4	24	5	23	0	33	2	30	2	28	0	26	4
	No. 2	2 x 4	8	8	7	11	7	4	6	10	9	11	9	0	8	4	7	11
		2 x 6	13	8	12	5	11	3	10	3	15	8	14	2	13	2	12	1
		2 x 8	18	0	16	4	14	10	13	7	20	7	18	9	17	5	15	11
		2 x 10	23	0	20	11	18	11	17	4	26	4	23	11	22	2	20	4
		2 x 12	28	0	25	5	23	1	21	1	32	0	29	1	27	0	24	9
	No. 3	2 x 4	7	6	6	6	5	10	5	4	8	10	7	8	6	10	6	3
		2 x 6	11	1	9	7	8	7	7	10	13	1	11	4	10	1	9	3
		2 x 8	14	8	12	8	11	4	10	4	17	3	14	11	13	4	12	2
		2 x 10	18	8	16	2	14	6	13	2	22	0	19	1	17	0	15	6
		2 x 12	22	9	19	8	17	7	16	1	26	9	23	2	20	9	18	11
	Construction	2 x 4	8	4	7	4	6	6	5	11	9	7	8	7	7	8	7	0
	Standard	2 x 4	6	3	5	5	4	10	4	5	7	4	6	4	5	8	5	2
	Utility	2 x 4	4	2	3	8	3	3	2	11	4	11	4	3	3	10	3	6
	Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	Select structural	2 x 4	9	6	8	7	8	0	7	6	10	10	9	10	9	2	8
2 x 6			14	11	13	4	11	11	10	11	17	1	15	6	14	1	12	10
2 x 8			19	8	17	7	15	9	14	4	22	6	20	5	18	6	16	11
2 x 10			25	1	22	6	20	1	18	4	28	8	26	1	23	8	21	7
2 x 12			30	6	27	4	24	6	22	4	34	11	31	9	28	9	26	3
No. 1		2 x 4	9	6	8	6	7	7	6	11	10	10	9	10	8	11	8	2
		2 x 6	14	3	12	4	11	0	10	1	16	9	14	6	13	0	11	10
		2 x 8	18	9	16	3	14	6	13	3	22	1	19	2	17	1	15	7
		2 x 10	24	0	20	9	18	7	16	11	28	2	24	5	21	10	19	11
		2 x 12	29	2	25	3	22	7	20	7	34	4	29	9	26	7	24	3
No. 2		2 x 4	8	10	7	8	6	10	6	3	10	5	9	0	8	1	7	4
		2 x 6	12	11	11	2	10	0	9	2	15	3	13	2	11	9	10	9
		2 x 8	17	1	14	9	13	2	12	1	20	1	17	5	15	7	14	2
		2 x 10	21	9	18	10	16	10	15	5	25	8	22	2	19	10	18	1
		2 x 12	26	6	22	11	20	6	18	9	31	2	27	0	24	2	22	0
No. 3		2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
		2 x 6	9	10	8	6	7	7	6	11	11	7	10	0	8	11	8	2
		2 x 8	13	0	11	3	10	0	9	2	15	3	13	3	11	10	10	9
		2 x 10	16	7	14	4	12	10	11	8	19	6	16	11	15	1	13	9
		2 x 12	20	2	17	5	15	7	14	3	23	9	20	6	18	4	16	9
Construction		2 x 4	7	6	6	6	5	10	5	4	8	10	7	8	6	10	6	3
Standard		2 x 4	5	8	4	11	4	4	4	0	6	8	5	9	5	2	4	8
Utility		2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1

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Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 30 AND 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, in.	LIVE LOAD 30 lb per sq ft				LIVE LOAD 20 lb per sq ft											
			Rafter Spacing				Rafter Spacing											
			12 in.		16 in.		20 in.		24 in.		12 in.		16 in.		20 in.		24 in.	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	Select structural	2 x 4	8	11	8	1	7	6	7	1	10	2	9	3	8	7	8	1
		2 x 6	14	0	12	9	11	9	10	8	16	0	14	7	13	6	12	7
		2 x 8	18	6	16	9	15	5	14	1	21	2	19	3	17	10	16	7
		2 x 10	23	7	21	5	19	9	18	0	27	0	24	6	22	9	21	2
	2 x 12	28	8	26	1	24	0	21	11	32	10	29	6	27	8	25	9	
	No. 1	2 x 4	8	11	8	1	7	5	6	9	10	2	9	3	8	7	8	0
		2 x 6	13	11	12	1	10	9	9	10	16	0	14	2	12	8	11	7
		2 x 8	18	4	15	11	14	3	13	0	21	2	18	9	16	9	15	3
		2 x 10	23	5	20	3	18	2	16	7	27	0	23	11	21	4	19	6
	2 x 12	28	6	24	8	22	1	20	2	32	10	29	1	26	0	23	9	
	No. 2	2 x 4	8	7	7	6	6	8	6	1	9	10	8	10	7	10	7	2
		2 x 6	12	7	10	11	9	9	8	11	14	10	12	10	11	6	10	6
		2 x 8	16	7	14	4	12	10	11	9	19	7	16	11	15	2	13	10
		2 x 10	21	2	18	4	16	5	15	0	24	11	21	7	19	4	17	8
	2 x 12	25	9	22	4	20	0	18	3	30	4	26	3	23	6	21	5	
	No. 3	2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
2 x 6		9	4	8	1	7	3	6	7	11	0	9	7	8	6	7	9	
2 x 8		12	4	10	8	9	7	8	9	14	7	12	7	11	3	10	3	
2 x 10		15	9	13	8	12	3	11	2	18	7	16	1	14	5	13	2	
2 x 12	19	3	16	8	14	10	13	7	22	7	19	7	17	6	16	0		
Con-struction	2 x 4	7	4	6	4	5	8	5	2	8	7	7	5	6	8	6	1	
Standard	2 x 4	5	8	4	11	4	4	4	0	6	8	5	9	5	2	4	8	
Utility	2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1	
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	Select structural	2 x 4	8	7	7	9	7	3	6	10	9	10	8	11	8	3	7	9
		2 x 6	13	6	12	3	11	5	10	8	15	6	14	1	13	0	12	3
		2 x 8	17	10	16	2	15	0	14	1	20	5	18	6	17	2	16	2
		2 x 10	22	9	20	8	19	2	18	0	26	0	23	8	21	11	20	8
	2 x 12	27	8	25	2	23	4	21	11	31	8	28	9	26	9	25	2	
	No. 1	2 x 4	8	7	7	9	7	3	6	9	9	10	8	11	8	3	7	9
		2 x 6	13	6	12	3	11	0	10	1	15	6	14	1	13	0	11	10
		2 x 8	17	10	16	2	14	6	13	3	20	5	18	6	17	1	15	7
		2 x 10	22	9	20	8	18	7	16	11	26	0	23	8	21	10	19	11
	2 x 12	27	8	25	2	22	7	20	7	31	8	28	9	26	7	24	3	
	No. 2	2 x 4	8	3	7	6	6	10	6	3	9	6	8	7	8	0	7	4
		2 x 6	12	7	10	11	9	9	8	11	14	10	12	10	11	6	10	6
		2 x 8	16	7	14	4	12	10	11	9	19	7	16	11	15	2	13	10
		2 x 10	21	2	18	4	16	5	15	0	24	11	21	7	19	4	17	8
	2 x 12	25	9	22	4	20	0	18	3	30	4	26	3	23	6	21	5	
	No. 3	2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
2 x 6		9	10	8	6	7	7	6	11	11	7	10	0	8	11	8	2	
2 x 8		13	0	11	3	10	0	9	2	15	3	13	3	11	10	10	9	
2 x 10		16	7	14	4	12	10	11	8	19	6	16	11	15	1	13	9	
2 x 12	20	2	17	5	15	7	14	3	23	9	20	6	18	4	16	9		
Con-struction	2 x 4	7	6	6	6	5	10	5	4	8	10	7	8	6	10	6	3	
Standard	2 x 4	5	8	4	11	4	4	4	0	6	8	5	9	5	2	4	8	
Utility	2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1	

Continued on next page

Table A-9 (Cont'd)
RAFTERS — NOT SUPPORTING CEILING
(LIVE LOADS 30 AND 20 lb per sq ft)

Commercial Designation	Grade	Nominal Size, <i>m</i>	LIVE LOAD 30 lb per sq ft								LIVE LOAD 20 lb per sq ft							
			Rafter Spacing								Rafter Spacing							
			12 in		16 in		20 in.		24 in		12 in		16 in		20 in.		24 in.	
			<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>	<i>ft</i>	<i>in</i>
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select structural	2 x 4	8	7	7	9	7	3	6	10	9	10	8	11	8	3	7	9
		2 x 6	13	6	12	3	11	3	10	3	15	6	14	1	13	0	12	1
		2 x 8	17	10	16	2	14	10	13	7	20	5	18	6	17	2	15	11
		2 x 10	22	9	20	8	18	11	17	4	26	0	23	8	21	11	20	4
		2 x 12	27	8	25	2	23	1	21	1	31	8	28	9	26	9	24	9
	No. 1	2 x 4	8	7	7	9	7	2	6	6	9	10	8	11	8	3	7	8
		2 x 6	13	6	11	9	10	6	9	7	15	6	13	10	12	5	11	4
		2 x 8	17	10	15	6	13	11	12	8	20	5	18	3	16	4	14	11
		2 x 10	22	9	19	10	17	9	16	2	26	0	23	4	20	10	19	1
		2 x 12	27	8	24	1	21	7	19	8	31	8	28	5	25	5	23	2
	No. 2	2 x 4	8	3	7	4	6	6	5	11	9	6	8	7	7	8	7	0
		2 x 6	12	3	10	7	9	6	8	8	14	5	12	6	11	2	10	2
		2 x 8	16	2	14	0	12	6	11	5	19	0	16	5	14	8	13	5
		2 x 10	20	7	17	10	15	11	14	7	24	3	21	0	18	9	17	2
		2 x 12	25	1	21	8	19	5	17	8	29	6	25	6	22	10	20	10
	No. 3	2 x 4	6	3	5	5	4	10	4	5	7	4	6	4	5	8	5	2
		2 x 6	9	4	8	1	7	3	6	7	11	0	9	7	8	6	7	9
		2 x 8	12	4	10	8	9	7	8	9	14	7	12	7	11	3	10	3
		2 x 10	15	9	13	8	12	3	11	2	18	7	16	1	14	5	13	2
		2 x 12	19	3	16	8	14	10	13	7	22	7	19	7	17	6	16	0
	Construction	2 x 4	7	1	6	1	5	5	5	0	8	4	7	2	6	5	5	10
	Standard	2 x 4	5	4	4	7	4	1	3	9	6	3	5	5	4	10	4	5
	Utility	2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1
	Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	Select structural	2 x 4	8	8	7	11	7	4	6	11	10	0	9	1	8	5	7
2 x 6			13	8	12	5	11	6	10	8	15	8	14	3	13	3	12	5
2 x 8			18	1	16	5	15	3	14	1	20	8	18	9	17	5	16	5
2 x 10			23	1	20	11	19	5	18	0	26	5	24	0	22	3	20	11
2 x 12			28	0	25	6	23	8	21	11	32	1	29	2	27	1	25	6
No. 1		2 x 4	8	8	7	11	7	4	6	9	10	0	9	1	8	5	7	11
		2 x 6	13	8	12	1	10	9	9	10	15	8	14	2	12	8	11	7
		2 x 8	18	1	15	11	14	3	13	0	20	8	18	9	16	9	15	3
		2 x 10	23	1	20	3	18	2	16	7	26	5	23	11	21	4	19	6
		2 x 12	28	0	24	8	22	1	20	2	32	1	29	1	26	0	23	9
No. 2		2 x 4	8	5	7	6	6	8	6	1	9	7	8	9	7	10	7	2
		2 x 6	12	7	10	11	9	9	8	11	14	10	12	10	11	6	10	6
		2 x 8	16	7	14	4	12	10	11	9	17	7	16	11	15	2	13	10
		2 x 10	21	2	18	4	16	5	15	0	24	11	21	7	19	4	17	8
		2 x 12	25	9	22	4	20	0	18	3	30	4	26	3	23	6	21	5
No. 3		2 x 4	6	6	5	8	5	0	4	7	7	8	6	8	5	11	5	5
		2 x 6	9	4	8	1	7	3	6	7	11	0	9	7	8	6	7	9
		2 x 8	12	4	10	8	9	7	8	9	14	7	12	7	11	3	10	3
		2 x 10	15	9	13	8	12	3	11	2	18	7	16	1	14	5	13	2
		2 x 12	19	3	16	8	14	10	13	7	22	7	19	7	17	6	16	0
Construction		2 x 4	7	4	6	4	5	8	5	2	8	7	7	5	6	8	6	1
Standard		2 x 4	5	8	4	11	4	4	4	0	6	8	5	9	5	2	4	8
Utility		2 x 4	3	9	3	3	2	11	2	8	4	5	3	10	3	5	3	1

Table A-10
MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN ONE FLOOR IN HOUSES

Commercial Designation	Grade	Supported Joist Length, ⁽¹⁾ ft	Size of Built-Up Beam, in.											
			3-2 x 8		4-2 x 8		3-2 x 10		4-2 x 10		3-2 x 12		4-2 x 12	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	No 1	8	12	0	13	10	15	4	17	8	18	7	21	6
		10	10	9	12	5	13	8	15	8	16	8	19	3
		12	9	9	11	4	12	6	14	5	15	2	17	7
		14	8	10	10	5	11	4	13	4	13	9	16	3
		16	7	10	9	9	10	1	12	6	12	3	15	2
	No 2	8	10	10	12	6	13	9	15	11	16	9	19	5
		10	9	8	11	2	12	4	14	3	15	0	17	4
		12	8	10	10	2	11	3	13	0	13	8	15	10
		14	8	2	9	5	10	5	12	0	12	8	14	8
		16	7	8	8	10	9	9	11	3	11	10	13	8
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	No 1	8	10	4	12	0	13	3	15	4	16	1	18	7
		10	9	3	10	9	11	10	13	8	14	5	16	8
		12	8	2	9	9	10	5	12	6	12	8	15	2
		14	7	2	9	1	9	2	11	7	11	1	14	1
		16	6	5	8	2	8	2	10	5	10	0	12	8
	No 2	8	9	3	10	8	11	9	13	7	14	4	16	7
		10	8	3	9	6	10	6	12	2	12	10	14	10
		12	7	6	8	8	9	7	11	1	11	8	13	6
		14	7	0	8	1	8	11	10	3	10	10	12	6
		16	6	5	7	6	8	2	9	7	10	0	11	8
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	No 1	8	11	7	13	5	14	10	17	1	18	0	20	10
		10	10	4	12	0	13	3	15	4	16	1	18	7
		12	9	6	10	11	12	1	14	0	14	9	17	0
		14	8	9	10	1	11	2	12	11	13	7	15	9
		16	7	11	9	6	10	1	12	1	12	3	14	9
	No 2	8	10	4	12	0	13	3	15	4	16	1	18	7
		10	9	3	10	9	11	10	13	8	14	5	16	8
		12	8	6	9	9	10	10	12	6	13	2	15	2
		14	7	10	9	1	10	0	11	7	12	2	14	1
		16	7	4	8	6	9	4	10	10	11	5	13	2
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	No. 1	8	10	2	11	9	12	11	15	0	15	9	18	3
		10	8	4	10	6	10	8	13	5	13	0	16	4
		12	7	2	9	2	9	2	11	8	11	1	14	3
		14	6	4	8	0	8	1	10	3	9	10	12	5
		16	5	8	7	2	7	3	9	2	8	10	11	1
	No 2	8	9	3	10	8	11	9	13	7	14	4	16	7
		10	8	3	9	6	10	6	12	2	12	10	14	10
		12	7	2	8	8	9	2	11	1	11	1	13	6
		14	6	4	8	0	8	1	10	3	9	10	12	5
		16	5	8	7	2	7	3	9	2	8	10	11	1
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	No. 1	8	9	11	11	6	12	8	14	8	15	5	17	10
		10	8	11	10	3	11	4	13	1	13	10	15	11
		12	7	8	9	4	9	9	11	11	11	11	14	7
		14	6	9	8	7	8	7	10	11	10	5	13	4
		16	6	0	7	8	7	8	9	9	9	5	11	11
	No 2	8	9	0	10	4	11	6	13	3	13	11	16	1
		10	8	0	9	3	10	3	11	10	12	6	14	5
		12	7	4	8	6	9	4	10	10	11	5	13	2
		14	6	9	7	10	8	7	10	0	10	5	12	2
		16	6	0	7	4	7	8	9	4	9	5	11	5
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	No. 1	8	10	2	11	9	13	0	15	0	15	9	18	3
		10	9	1	10	6	11	7	13	5	14	1	16	4
		12	8	2	9	7	10	5	12	3	12	8	14	10
		14	7	2	8	10	9	2	11	4	11	1	13	9
		16	6	5	8	2	8	2	10	5	10	0	12	8
	No 2	8	9	0	10	4	11	6	13	3	13	11	16	1
		10	8	0	9	3	10	3	11	10	12	6	14	5
		12	7	4	8	6	9	4	10	10	11	5	13	2
		14	6	9	7	10	8	8	10	0	10	6	12	2
		16	6	4	7	4	8	1	9	4	9	10	11	5

Continued on next page

Table A-10 (Cont'd)

**MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN ONE FLOOR IN HOUSES**

Commercial Designation	Grade	Supported Joist Length, ⁽¹⁾ ft	Size of Built-Up Beam, in.											
			3-2 x 8		4-2 x 8		3-2 x 10		4-2 x 10		3-2 x 12		4-2 x 12	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	No. 1	8	9	8	11	3	12	5	14	4	15	1	17	5
		10	8	4	10	0	10	8	12	10	13	0	15	7
		12	7	2	9	2	9	2	11	8	11	1	14	3
		14	6	4	8	0	8	1	10	3	9	10	12	5
		16	5	8	7	2	7	3	9	2	8	10	11	1
	No. 2	8	8	9	10	1	11	2	12	10	13	7	15	8
		10	7	10	9	0	10	0	11	6	12	1	14	0
		12	7	1	8	3	9	1	10	6	11	1	12	9
		14	6	4	7	7	8	1	9	9	9	10	11	10
		16	5	8	7	1	7	3	9	1	8	10	11	1
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	No. 1	8	9	11	11	6	12	8	14	8	15	5	17	10
		10	8	4	10	3	10	8	13	1	13	0	15	11
		12	7	2	9	2	9	2	11	8	11	1	14	3
		14	6	4	8	0	8	0	10	3	9	9	12	5
		16	5	8	7	2	7	3	9	2	8	10	11	1
	No. 2	8	9	0	10	4	11	6	13	3	13	11	16	1
		10	8	0	9	3	10	3	11	10	12	6	14	5
		12	7	2	8	6	9	2	10	10	11	1	13	2
		14	6	4	7	10	8	0	10	0	9	9	12	2
		16	5	8	7	2	7	3	9	2	8	10	11	1

Note to Table A-10:

⁽¹⁾ See Appendix A.

Table A-11
MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN TWO FLOORS IN HOUSES

Commercial Designation	Grade	Supported Joist Length, ⁽¹⁾ ft	Size of Built-Up Beam, in.											
			3-2 x 8		4-2 x 8		3-2 x 10		4-2 x 10		3-2 x 12		4-2 x 12	
			ft	in.	ft	in.	ft	in.	ft	in.	ft	in.	ft	in.
Douglas Fir-Larch (includes Douglas Fir and Western Larch)	No. 1	8	8	10	10	5	11	4	13	4	13	9	16	3
		10	7	4	9	4	9	4	11	11	11	5	14	6
		12	6	4	8	0	8	0	10	3	9	9	12	5
		14	5	7	7	0	7	1	9	0	8	8	10	11
		16	5	0	6	4	6	5	8	0	7	10	9	9
	No. 2	8	8	2	9	5	10	5	12	0	12	8	14	8
		10	7	3	8	5	9	4	10	9	11	4	13	1
		12	6	4	7	8	8	0	9	10	9	9	11	11
		14	5	7	7	0	7	1	9	0	8	8	10	11
		16	5	0	6	4	6	5	8	0	7	10	9	9
Hem-Fir (includes Western Hemlock, Amabilis Fir and Grand Fir)	No. 1	8	7	2	9	0	9	2	11	7	11	1	14	1
		10	5	11	7	7	7	7	9	8	9	3	11	9
		12	5	2	6	6	6	7	8	3	8	0	10	1
		14	4	7	5	9	5	10	7	4	7	2	8	11
		16	4	2	5	2	5	4	6	7	6	6	8	0
	No. 2	8	7	0	8	1	8	11	10	3	10	10	12	6
		10	5	11	7	2	7	7	9	2	9	3	11	2
		12	5	2	6	6	6	7	8	3	8	0	10	1
		14	4	7	5	9	5	10	7	4	7	2	8	11
		16	4	2	5	2	5	4	6	7	6	6	8	0
Eastern Hemlock-Tamarack (includes Eastern Hemlock and Tamarack)	No. 1	8	8	9	10	1	11	2	12	11	13	7	15	9
		10	7	4	9	1	9	4	11	7	11	5	14	1
		12	6	4	8	0	8	1	10	3	9	10	12	5
		14	5	7	7	0	7	1	9	0	8	8	10	11
		16	5	0	6	4	6	5	8	1	7	10	9	10
	No. 2	8	7	10	9	1	10	0	11	7	12	2	14	1
		10	7	0	8	1	8	11	10	4	10	11	12	7
		12	6	4	7	5	8	1	9	5	9	10	11	6
		14	5	7	6	10	7	1	8	9	8	8	10	7
		16	5	0	6	4	6	5	8	1	7	10	9	10
Coast Species (includes Douglas Fir, Western Larch, Western Hemlock, Amabilis Fir, Grand Fir and Coast Sitka Spruce)	No. 1	8	6	4	8	0	8	1	10	3	9	10	12	5
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2
	No. 2	8	6	4	8	0	8	1	10	3	9	10	12	5
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2
Spruce-Pine-Fir (includes Spruce (all species except Coast Sitka Spruce), Jack Pine, Lodgepole Pine, Ponderosa Pine, Balsam Fir and Alpine Fir)	No. 1	8	6	9	8	7	8	7	10	11	10	5	13	4
		10	5	7	7	1	7	2	9	1	8	9	11	0
		12	4	10	6	1	6	3	7	10	7	7	9	6
		14	4	4	5	5	5	7	6	11	6	9	8	5
		16	3	11	4	10	5	1	6	3	6	2	7	7
	No. 2	8	6	9	7	10	8	7	10	0	10	5	12	2
		10	5	7	7	0	7	2	8	11	8	9	10	11
		12	4	10	6	1	6	3	7	10	7	7	9	6
		14	4	4	5	5	5	7	6	11	6	9	8	5
		16	3	11	4	10	5	1	6	3	6	2	7	7
Western Cedars (includes Western Red Cedar and Pacific Coast Yellow Cedar)	No. 1	8	7	2	8	10	9	2	11	4	11	1	13	9
		10	5	11	7	7	7	7	9	8	9	3	11	9
		12	5	2	6	6	6	7	8	3	8	0	10	1
		14	4	7	5	9	5	10	7	4	7	2	8	11
		16	4	2	5	2	5	4	6	7	6	6	8	0
	No. 2	8	6	9	7	10	8	8	10	0	10	6	12	2
		10	5	11	7	0	7	7	8	11	9	3	10	11
		12	5	2	6	5	6	7	8	2	8	0	9	11
		14	4	7	5	9	5	10	7	4	7	2	8	11
		16	4	2	5	2	5	4	6	7	6	6	8	0

Continued on next page

Table A-11 (Cont'd)

**MAXIMUM SPANS⁽¹⁾ FOR BUILT-UP WOOD BEAMS
SUPPORTING NOT MORE THAN TWO FLOORS IN HOUSES**

Commercial Designation	Grade	Supported Joist Length, ⁽¹⁾ ft	Size of Built-Up Beam, in.											
			3-2 x 8		4-2 x 8		3-2 x 10		4-2 x 10		3-2 x 12		4-2 x 12	
			ft	in	ft	in	ft	in	ft	in	ft	in	ft	in
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	No 1	8	6	4	8	0	8	1	10	3	9	10	12	5
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2
	No 2	8	6	4	7	7	8	1	9	9	9	10	11	10
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2
Northern Aspen (includes Aspen Poplar, Large Tooth Aspen and Balsam Poplar)	No 1	8	6	4	8	0	8	1	10	3	9	10	12	5
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2
	No 2	8	6	4	7	10	8	1	10	0	9	10	12	2
		10	5	3	6	8	6	9	8	6	8	2	10	4
		12	4	7	5	9	5	10	7	4	7	2	8	11
		14	4	1	5	1	5	3	6	6	6	5	7	11
		16	3	9	4	7	4	9	5	10	5	10	7	2

Note to Table A-11:

(1) See Appendix A.

Table A-12
MAXIMUM CLEAR SPANS BETWEEN END SUPPORTS
FOR FINK TRUSSES, ft—in.

Top Member Size, in.*	Bottom Member Size, in.*	Roof Slope	No. 1 Grade Lumber				No. 2 Grade Lumber			
			Roof Snow Load, psf				Roof Snow Load, psf			
			20	30	40	50	20	30	40	50
2 x 4	2 x 4	1 in 4.8	22-2	16-0	—	—	19-2	13-2	—	—
		1 in 4	31-5	26-8	19-9	14-11	26-4	23-5	17-0	12-5
		1 in 3	31-6	29-0	25-0	22-2	29-3	25-3	21-8	19-2
		1 in 2.4	32-2	29-8	25-7	22-9	29-11	25-10	22-3	19-9
	2 x 5	1 in 4.8	25-5	18-10	12-5	—	22-2	15-11	—	—
		1 in 4	30-5	28-0	23-2	18-0	28-2	24-2	20-2	15-4
		1 in 3	31-6	29-0	25-0	22-2	29-3	25-3	21-8	19-2
		1 in 2.4	32-2	29-8	25-7	22-9	29-11	25-10	22-3	19-9
	2 x 6	1 in 4.8	27-11	20-10	14-5	—	24-5	17-11	11-5	—
1 in 4		30-5	28-0	23-11	19-4	28-2	24-2	20-8	16-8	
1 in 3		31-6	29-0	25-0	22-2	29-3	25-3	21-8	19-2	
1 in 2.4		32-2	29-8	25-7	22-9	29-11	25-10	22-3	19-9	
2 x 5	2 x 4	1 in 4.8	26-2	19-5	13-0	—	22-10	16-6	—	—
		1 in 4	31-5	28-5	23-7	18-3	26-4	23-6	20-6	15-8
		1 in 3	34-7	32-0	28-11	26-2	29-5	26-11	24-0	21-7
		1 in 2.4	36-9	32-6	31-8	29-2	31-5	29-3	26-7	24-4
	2 x 5	1 in 4.8	30-5	22-11	16-3	10-10	26-8	19-10	13-5	—
		1 in 4	39-1	33-7	27-10	21-11	33-10	30-4	24-5	19-0
		1 in 3	40-0	34-11	30-0	28-5	35-3	30-4	27-10	24-7
		1 in 2.4	40-0	35-9	30-10	29-3	36-1	31-2	28-7	25-5
	2 x 6	1 in 4.8	33-7	25-7	18-6	13-5	29-7	22-3	15-8	—
1 in 4		39-1	33-7	29-11	23-9	33-10	31-1	26-5	20-8	
1 in 3		40-0	34-11	30-0	28-5	35-3	31-1	27-10	24-7	
1 in 2.4		40-0	35-9	30-10	29-3	36-1	31-2	28-7	25-5	
2 x 6	2 x 4	1 in 4.8	29-2	22-1	15-6	—	24-3	19-1	12-8	—
		1 in 4	31-5	28-5	25-0	20-10	26-4	23-6	20-6	18-0
		1 in 3	34-7	32-0	28-11	26-2	29-5	26-11	24-0	21-7
		1 in 2.4	36-9	34-5	31-8	29-2	31-5	29-3	26-7	24-4
	2 x 5	1 in 4.8	34-4	26-2	19-0	13-11	30-3	22-10	16-2	10-9
		1 in 4	40-0	36-6	31-7	25-1	33-11	30-4	26-4	21-11
		1 in 3	40-0	40-0	36-8	32-6	37-9	34-7	30-11	27-9
		1 in 2.4	40-0	40-0	37-8	33-5	40-0	37-7	32-9	31-0
	2 x 6	1 in 4.8	38-4	29-5	21-8	16-5	33-11	25-9	18-8	13-7
1 in 4		40-0	40-0	34-3	27-4	40-0	35-6	30-3	24-0	
1 in 3		40-0	40-0	36-8	32-6	40-0	37-1	31-9	30-1	
1 in 2.4		40-0	40-0	37-8	33-5	40-0	38-1	32-9	31-0	
Column 1	2	3	4	5	6	7	8	9	10	11

*Nominal dimension.

Table A-13
MAXIMUM CLEAR SPANS BETWEEN END SUPPORTS
FOR HOWE TRUSSES, ft—in.

Top Member Size, in.*	Bottom Member Size, in.*	Roof Slope	No. 1 Grade Lumber				No. 2 Grade Lumber			
			Roof Snow Load, psf				Roof Snow Load, psf			
			20	30	40	50	20	30	40	50
2 x 4	2 x 4	1 in 4.8	31—0	24—0	18—0	13—11	27—3	21—2	15—8	11—11
		1 in 4	31—0	27—11	23—11	21—1	28—1	24—2	20—7	18—2
		1 in 3	31—5	29—0	24—11	22—1	29—2	25—2	21—7	19—2
		1 in 2.4	32—1	29—8	25—7	22—9	29—10	25—10	22—3	19—9
	2 x 5	1 in 4.8	31—7	26—9	20—3	15—10	27—3	23—4	17—9	13—9
		1 in 4	31—7	27—11	23—11	21—1	28—1	24—2	20—7	18—2
		1 in 3	31—7	29—0	24—11	22—1	29—2	25—2	21—7	19—2
		1 in 2.4	32—1	29—8	25—7	22—9	29—10	25—10	22—3	19—9
	2 x 6	1 in 4.8	31—7	27—1	23—1	18—6	27—3	23—4	19—10	16—2
		1 in 4	31—7	27—11	23—11	21—1	28—1	24—2	20—7	18—2
		1 in 3	31—7	29—0	24—11	22—1	29—2	25—2	21—7	19—2
		1 in 2.4	32—1	29—8	25—7	22—9	29—10	25—10	22—3	19—9
2 x 5	2 x 4	1 in 4.8	33—5	27—2	20—7	16—2	27—5	23—6	18—0	14—0
		1 in 4	36—9	32—4	27—9	24—1	30—5	26—6	22—5	19—4
		1 in 3	40—0	34—11	30—0	28—5	34—11	30—3	27—2	23—11
		1 in 2.4	40—0	35—9	30—9	29—2	36—0	31—1	28—7	25—4
	2 x 5	1 in 4.8	37—10	30—9	23—5	18—7	32—8	27—3	20—7	16—2
		1 in 4	39—0	33—6	30—9	27—2	33—9	31—0	26—6	23—4
		1 in 3	40—0	34—11	30—9	28—5	35—2	31—0	27—9	24—7
		1 in 2.4	40—0	35—9	30—9	29—2	36—0	31—1	28—7	25—4
	2 x 6	1 in 4.8	37—10	32—6	27—5	21—11	32—8	30—0	24—3	19—3
		1 in 4	39—0	33—6	30—9	27—2	33—9	31—0	26—6	23—4
		1 in 3	40—0	34—11	30—9	28—5	35—2	31—0	27—9	24—7
		1 in 2.4	40—0	35—9	30—9	29—2	36—0	31—1	28—7	25—4
2 x 6	2 x 4	1 in 4.8	33—5	28—8	22—8	17—11	27—5	23—6	19—7	15—7
		1 in 4	36—9	32—4	27—9	24—1	30—5	26—6	22—5	19—4
		1 in 3	40—0	37—8	33—2	29—5	34—11	31—3	27—2	23—11
		1 in 2.4	40—0	40—0	37—3	33—5	38—1	34—9	30—10	27—7
	2 x 5	1 in 4.8	40—0	33—10	25—11	20—8	35—3	30—1	22—10	18—1
		1 in 4	40—0	40—0	35—1	30—11	39—1	34—1	28—10	24—11
		1 in 3	40—0	40—0	36—8	32—6	40—0	37—0	31—9	30—1
		1 in 2.4	40—0	40—0	37—7	33—5	40—0	38—0	32—8	31—0
	2 x 6	1 in 4.8	40—0	39—8	30—8	24—8	39—11	34—2	27—3	21—9
		1 in 4	40—0	40—0	35—1	30—11	40—0	35—5	30—2	28—6
		1 in 3	40—0	40—0	36—8	32—6	40—0	37—0	31—9	30—1
		1 in 2.4	40—0	40—0	37—7	33—5	40—0	38—0	32—8	31—0
Column 1	2	3	4	5	6	7	8	9	10	11

*Nominal dimension.

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