Canadian Housing Code 1990

Third Revisions and Errata

Issued by the
Canadian Commission on Building and Fire Codes
National Research Council of Canada
Ottawa

January 1993

The attached pages identify revisions and errata to the Canadian Housing Code 1990. The revisions have been approved by the Canadian Commission on Building and Fire Codes for immediate implementation.

In accordance with the CCBFC Policies and Procedures, the list of referenced documents in Table 2.7.3.A. of the 1990 CHC is updated annually. The revisions contained herein include updates to 30 June 1992. Where changes to the title have been made, the relevant requirements have also been updated.

The errata are corrections which have been identified and are included to facilitate the use of the Code. Errata are identified by an ***e***. Revisions are identified by an ***r*** in the margin nearest the change; ***r3*** designates a revision issued in January 1993.

1993 third revisions and errata

2.7.3.1.
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9.10.14.12.(1), (3)
9.23.9.9.(3)
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3.1.4.3. (cited in 9.34.1.5.)

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(d) the source of information for *fire-resistance ratings* of elements of construction (to be indicated on large-scale sections),
(e) the location of *exits*, and
(f) fire detection, suppression and alarm systems.

Section 2.4 Materials, Appliances, Systems and Equipment

2.4.1. General

2.4.1.1. Characteristics of Materials, Appliances, Systems and Equipment. All materials, *appliances*, systems and equipment installed to meet the requirements of this Code shall possess the necessary characteristics to perform their intended functions when installed in a *building*.

2.4.1.2. Storage on the Building Site. All *building* materials, *appliances* and equipment on the *building* site shall be stored in such a way as to prevent deterioration or impairment of their essential properties.

2.4.1.3. Used Materials, Appliances and Equipment. Unless otherwise specified, used materials, *appliances* and equipment may be reused when they meet the requirements of this Code for new materials and are satisfactory for the intended use.

Section 2.5 Equivalents

2.5.1. General

2.5.1.1. Alternate Materials, Appliances, Systems and Equipment Permitted. The provisions of this Code are not intended to limit the appropriate use of materials, *appliances*, systems, equipment, methods of design or construction procedures not specifically described herein.

2.5.1.2. Evidence of Equivalent Performance. Any person desirous of providing an equivalent to satisfy one or more of the requirements of this Code shall submit sufficient evidence to demonstrate that the proposed equivalent will provide the level of performance required by this Code.

2.5.1.3. Equivalence Demonstrated by Past Performance, Test or Evaluation. Materials, *appliances*, systems, equipment, methods of design and construction procedures not specifically described herein, or which vary from the specific requirements in this Code, may be used if it can be shown that these alternatives are suitable on the basis of past performance, tests or evaluations.

2.5.3. Equivalent Test Standards

2.5.3.1. The results of tests based on test standards other than as described in this Code may be used provided such alternate test standards will provide comparable results.

Section 2.6 Review

2.6.5. Off-Site Review

2.6.5.1. Where a *building* or component of a *building* is assembled off the *building* site in such a manner that it cannot be reviewed on site, off-site reviews shall be provided to determine compliance with this Code.

Section 2.7 Referenced Documents

2.7.1. Application

2.7.1.1. The provisions of referenced documents in this Code apply only to the extent that they relate to *buildings*.

2.7.2. Conflicting Requirements

2.7.2.1. In the case of conflict between the provisions of this Code and those of a referenced document, the provisions of this Code shall govern.

2.7.3. Effective Date

2.7.3.1. Unless otherwise specified herein, the documents referenced in this Code shall include all amendments, revisions and supplements effective to
r3 30 June 1992.

2.7.3.2. Where documents are referenced in this Code, they shall be the editions designated in Column 2 of Table 2.7.3.A.

Table 2.7.3.A.

Forming Part of Article 2.7.3.2.

	Documents Referenced in the National Building Code of Canada 1990			
	Issuing Agency	**Document Number**	**Title of Document**	**Code Reference**
r	ASTM	A123-89A	Zinc (Hot-Dip Galvanized) Coatings on Iron and Steel Products	Table 9.20.16.A.
	ASTM	A-153-82 (1987)	Zinc Coating (Hot-Dip) on Iron and Steel Hardware	Table 9.20.16.A.
r2	ASTM	A525-91B	Steel Sheet, Zinc-Coated (Galvanized) by the Hot-Dip Process	9.3.3.2.
r2	ASTM	C4-62 (1991)	Clay Drain Tile	9.14.3.1.(1)
r3	ASTM	C5-79(1992)	Quicklime for Structural Purposes	9.20.3.1.(1)
	ASTM	C27-84(88)	Classification of Fireclay and High-Alumina Refractory Brick	9.21.3.4.
r3	ASTM	C126-91	Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units	9.20.2.1.(1)
r3	ASTM	C207-91 (1992)	Hydrated Lime for Masonry Purposes	9.20.3.1.(1)
r3	ASTM	C212-60 (1991)	Structural Clay Facing Tile	9.20.2.1.(1)
r2	ASTM	C315-91	Clay Flue Linings	9.21.3.3.(1)
r3	ASTM	C411-82 (1992)	Hot-Surface Performance of High-Temperature Thermal Insulation	6.2.3.6.(3) 6.2.9.2.(2)
r	ASTM	C412M-90	Concrete Drain Tile	9.14.3.1.(1)
r2	ASTM	C444M-91	Perforated Concrete Pipe (Metric)	9.14.3.1.(1)
r2	ASTM	C700-91	Vitrified Clay Pipe, Extra Strength, Standard Strength and Perforated	9.14.3.1.(1)
	ASTM	C1002-88	Steel Drill Screws for the Application of Gypsum Board or Metal Plaster Bases	9.24.1.4. 9.29.5.7.
r	ASTM	E90-90	Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions	9.11.1.1.
r	ASTM	E336-90	Measurement of Airborne Sound Insulation in Buildings	9.11.1.1.
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Table 2.7.3.A. (Cont'd)

	Issuing Agency	Document Number	Title of Document	Code Reference
	ASTM	E413-87	Classification for Rating Sound Insulation	9.11.1.1.
r2	ASTM	F476-84 (1991)	Test Methods for Security of Swinging Door Assemblies	9.6.6.10.
r2	CGA	CAN/CGA-B149.1-M91	Natural Gas Installation Code	6.2.1.4.(1)
r2	CGA	CAN/CGA-B149.2-M91	Propane Installation Code	6.2.1.4.(1)
	CGSB	CAN/CGSB-7.1-M86	Cold Formed Steel Framing Components	9.24.1.2.
r	CGSB	CAN/CGSB-7.2-M88	Adjustable Metal Columns	9.17.3.4.
r3	CGSB	CAN/CGSB-10.3-92	Air Setting Refractory Mortar	9.21.3.4. 9.21.3.9.(1) 9.22.2.2.(1)
	CGSB	CAN/CGSB-11.3-M87	Hardboard	9.27.10.1.(2) 9.29.7.1. 9.30.2.2.(1)
	CGSB	CAN/CGSB-11.5-M87	Hardboard, Precoated, Factory Finished, for Exterior Cladding	9.27.10.1.(1)
r2	CGSB	CAN/CGSB-12.1-M90	Tempered or Laminated Safety Glass	9.6.5.2.(2) 9.7.3.1.(1)
r2	CGSB	CAN/CGSB-12.2-M91	Flat, Clear Sheet Glass	9.7.3.1.(1)
r2	CGSB	CAN/CGSB-12.3-M91	Flat, Clear Float Glass	9.7.3.1.(1)
r2	CGSB	CAN/CGSB-12.4-M91	Heat Absorbing Glass	9.7.3.1.(1)
r2	CGSB	CAN/CGSB-12.8-M90	Insulating Glass Units	9.7.3.1.(1)
	CGSB	CAN2-12.10-M76	Glass, Light and Heat Reflecting	9.7.3.1.(1)
r2	CGSB	CAN/CGSB-12.11-M90	Wired Safety Glass	9.6.5.2.(2) 9.7.3.1.(1)
	CGSB	CAN/CGSB-12.20-M89	Structural Design of Glass for Buildings	9.7.3.2.
	CGSB	19-GP-5M-1976	Sealing Compound, One-Component, Acrylic Base, Solvent Curing	9.27.4.2.(2)
	GCSB	CAN/CGSB-19.13-M87	Sealing Compound, One-Component, Elastomeric, Chemical Curing	9.27.4.2.(2)
	CGSB	19-GP-14M-1976	Sealing Compound, One-Component, Butyl-Polyisobutylene Polymer Base, Solvent Curing	9.27.4.2.(2)
r	CGSB	CAN/CGSB-19.22-M89	Mildew-Resistant Sealing Compound, for Tubs and Tile	9.29.10.5.
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Table 2.7.3.A. (Cont'd)

	Issuing Agency	Document Number	Title of Document	Code Reference
r	CGSB	CAN/CGSB-19.24-M90	Multi-Component, Chemical-Curing Sealing Compound	9.27.4.2.(2)
	CGSB	CAN/CGSB-34.4-M89	Siding, Asbestos-Cement, Shingles and Clapboards	9.27.8.1.(1)
	CGSB	CAN/CGSB-34.5-M89	Sheets, Asbestos-Cement, Corrugated	9.27.8.1.(1)
r2	CGSB	CAN/CGSB-34.14-M89	Sheets, Asbestos-Cement, Decorative	9.27.8.1.(1)
	CGSB	CAN/CGSB-34.16-M89	Sheets, Asbestos-Cement, Flat, Fully Compressed	9.27.8.1.(1)
	CGSB	CAN/CGSB-34.17-M89	Sheets, Asbestos-Cement, Flat, Semicompressed	9.27.8.1.(1)
	CGSB	CAN/CGSB-34.21-M89	Panels, Sandwich, Asbestos-Cement with Insulating Cores	9.27.8.1.(1)
	CGSB	CAN/CGSB-34.22-M87	Pipe, Asbestos-Cement, Drain	9.14.3.1.(1)
	CGSB	CAN/CGSB-37.2-M88	Emulsified Asphalt, Mineral Colloid Type, Unfilled, for Dampproofing and Waterproofing and for Roof Coatings	9.13.2.1.(1)
r	CGSB	CAN/CGSB-37.3-M89	Application of Emulsified Asphalts for Dampproofing or Waterproofing	9.13.1.3.(1)
	CGSB	CAN/CGSB-37.4-M89	Fibrated, Cutback, Lap Cement for Asphalt Roofing	9.26.2.1.(1)
	CGSB	CAN/CGSB-37.5-M89	Cutback Asphalt Plastic Cement	9.26.2.1.(1)
	CGSB	37-GP-6Ma-1983	Asphalt, Cutback, Unfilled, for Dampproofing	9.13.2.1.(1)
	CGSB	CAN/CGSB-37.8-M88	Asphalt, Cutback, Filled, for Roof Coating	9.26.2.1.(1)
	CGSB	37-GP-9Ma-1983	Primer, Asphalt, Unfilled, for Asphalt Roofing, Dampproofing and Waterproofing	9.26.2.1.(1)
	CGSB	37-GP-12Ma-1984	Application of Unfilled Cutback Asphalt for Dampproofing	9.13.1.3.(1)
r	CGSB	CAN/CGSB-37.16-M89	Filled Cutback Asphalt, for Dampproofing and Waterproofing	9.13.2.1.(1)
	CGSB	37-GP-18Ma-1985	Tar, Cutback, Unfilled, for Dampproofing	9.13.2.1.(1)
	CGSB	37-GP-21M-1976	Tar, Cutback, Fibrated, for Roof Coating	9.26.2.1.(1)
r	CGSB	CAN/CGSB-37.22-M89	Application of Unfilled Cutback Tar Foundation Coating for Dampproofing	9.13.1.3.(1)
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Table 2.7.3.A. (Cont'd)

	Issuing Agency	Document Number	Title of Document	Code Reference
r	CGSB	CAN/CGSB-37.50-M89	Hot Applied Rubberized Asphalt for Roofing and Waterproofing	9.26.2.1.(1)
r2	CGSB	CAN/CGSB-37.51-M90	Application of Hot-Applied Rubberized Asphalt for Roofing and Waterproofing	9.26.15.1.
	CGSB	37-GP-52M-84	Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric	9.26.2.1.(1)
	CGSB	37-GP-54M-79	Roofing and Waterproofing Membrane, Sheet-Applied, Flexible, Polyvinyl Chloride	9.26.2.1.(1)
	CGSB	37-GP-55M-79	Application of Sheet Applied Flexible Polyvinyl Chloride Roofing Membrane	9.26.16.1.
	GGSB	37-GP-56M-80	Membrane, Modified,Bituminous, Prefabricated, and Reinforced for Roofing	9.26.2.1.(1)
	CGSB	41-GP-6M-1976	Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced	9.26.2.1.(1)
	CGSB	41-GP-24Ma-1983	Siding, Soffits and Fascia, Rigid Vinyl	9.27.13.1.
	CGSB	41-GP-29Ma-1983	Tubing, Plastic, Corrugated, Drainage	9.14.3.1.(1)
	CGSB	CAN/CGSB 51.20-M87	Thermal Insulation, Polystyrene, Boards and Pipe Covering	Table 9.23.16.A. 9.25.3.1.(1) 9.25.3.3.
	CGSB	51-GP-21M-1978	Thermal Insulation, Urethane and Isocyanurate, Unfaced	Table 9.23.16.A. 9.25.3.1.(1)
	CGSB	CAN/CGSB-51.25-M87	Thermal Insulation, Phenolic, Faced	Table 9.23.16.A. 9.25.3.1.(1)
	CGSB	CAN/CGSB-51.26-M86	Thermal Insulation, Urethane and Isocyanurate, Boards, Faced	Table 9.23.16.A. 9.25.3.1.(1)
	CGSB	51-GP-27M-1979	Thermal Insulation, Polystyrene, Loose Fill	9.25.3.1.(1)
	CGSB	CAN2-51.32-M77	Sheathing, Membrane, Breather Type	9.20.13.10.(1) 9.23.17.1. 9.26.2.1.(1)
r	CGSB	CAN/CGSB-51.33-M89	Vapour Barrier, Sheet Excluding Polyethylene, for Use in Building Construction	9.25.3.5.(1)
	CGSB	CAN/CGSB-51.34-M86	Vapour Barrier, Polyethylene Sheet for use in Building Construction	9.13.2.1.(1) 9.18.6.1.(3) 9.25.3.4.(2) 9.25.3.5.(1)
r	CGSB	CAN/CGSB-51.60-M90	Cellulose Fibre Loose Fill Thermal Insulation	9.25.3.1.(1)
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	Issuing Agency	Document Number	Title of Document	Code Reference
	CGSB	CAN/CGSB-63.14-M89	Plastic Skylights	9.7.7.1. 9.7.7.2.
	CGSB	CAN/CGSB-82.1-M89	Sliding Doors	9.6.4.2.
	CGSB	CAN/CGSB-82.5-M88	Insulated Steel Doors	9.6.4.3.
	CGSB	CAN/CGSB-82.6-M86	Doors, Mirrored Glass, Siding or Folding Wardrobe	9.6.5.3.
	CGSB	CAN/CGSB-93.1-M85	Sheet, Aluminum Alloy, Prefinished, Residential	9.27.12.1.(4)
r2	CGSB	CAN/CGSB-93.2-M91	Prefinished Aluminum Siding, Soffits and Fascia for Residential Use	9.27.12.1.(3)
r2	CGSB	CAN/CGSB-93.3-M91	Prefinished Galvanized and Aluminum-Zinc Alloy Steel Sheet for Residential Use	9.27.12.1.(2)
r3	CGSB	CAN/CGSB-93.4-M92	Galvanized Steel and Aluminum-Zinc Alloy Coated Steel Siding, Soffits and Fascia, Prefinished, Residential	9.27.12.1.(1)
	CSA	CAN/CSA-A5-M88	Portland Cement	9.3.1.2. 9.20.3.1.(1) 9.28.2.1.
	CSA	CAN/CSA-A8-M88	Masonry Cement	9.20.3.1.(1)
r	CSA	CAN/CSA-A23.1-M90	Concrete Materials and Methods of Concrete Construction	9.3.1.3.(1) 9.3.1.4.
r	CSA	CAN/CSA-A23.2-M90	Methods of Test for Concrete	9.3.1.8.(1)
	CSA	CAN/CSA-A82.1-M87	Burned Clay Brick (Solid Masonry Units Made from Clay or Shale)	9.20.2.1.(1)
	CSA	A82.3-M1978	Calcium Silicate (Sand-Lime) Building Brick	9.20.2.1.(1)
	CSA	A82.4-M1978	Structural Clay Load-Bearing Wall Tile	9.20.2.1.(1)
	CSA	A82.5-M1978	Structural Clay Non-Load-Bearing Tile	9.20.2.1.(1)
	CSA	A82.22-M1977	Gypsum Plasters	9.20.3.1.(1)
	CSA	A82.27-M1977	Gypsum Board Products	Table 9.23.16.A. 9.29.5.2.
	CSA	A82.30-M1980	Interior Furring, Lathing and Gypsum Plastering	9.29.4.1.
	CSA	A82.31-M1980	Gypsum Board Application	9.29.5.1.(2)
	CSA	A82.56-M1976	Aggregate for Masonry Mortar	9.20.3.1.(1)
	CSA	CAN3-A93-M82	Natural Airflow Ventilators for Buildings	9.19.1.1.(4)
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	Issuing Agency	Document Number	Title of Document	Code Reference
	CSA	A101-M1983	Thermal Insulation, Mineral Fibre, for Buildings	9.25.3.1.(1) Table 9.23.16.A.
	CSA	A123.1-M1979	Asphalt Shingles Surfaced with Mineral Granules	9.26.2.1.(1)
	CSA	A123.2-M1979	Asphalt Coated Roofing Sheets	9.26.2.1.(1)
	CSA	A123.3-M1979	Asphalt or Tar Saturated Roofing Felt	9.26.2.1.(1)
	CSA	A123.4-M1979	Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems	9.13.2.1.(1) 9.26.2.1.(1)
r3	CSA	CAN/CSA-A123.5-M90	Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules	9.26.2.1.(1)
	CSA	A123.17-1963	Asphalt-Saturated Felted Glass-Fibre Mat for Use in Construction of Built-Up Roofs	9.26.2.1.(1)
	CSA	CAN3-A123.51-M85	Asphalt Shingle Application on Roof Slopes 1:3 and Steeper	9.26.1.2.
	CSA	CAN3-A123.52-M85	Asphalt Shingle Application on Roof Slopes 1:6 to less than 1:3	9.26.1.2.
	CSA	CAN3-A165.1-M85	Concrete Masonry Units	9.15.2.2. 9.20.2.1.(1) 9.20.2.6.(1)
	CSA	CAN3-A165.2-M85	Concrete Brick Masonry Units	9.20.2.1.(1)
	CSA	CAN3-A165.3-M85	Prefaced Concrete Masonry Units	9.20.2.1.(1)
	CSA	CAN3-A165.4-M85	Autoclaved Cellular Units	9.20.2.1.(1)
	CSA	CAN/CSA-A247-M86	Insulating Fibreboard	9.23.15.6.(3) Table 9.23.16.A. 9.25.3.1.(1) 9.29.8.1.
	CSA	CAN3-A266.1-M78	Air-Entraining Admixtures for Concrete	9.3.1.9.
	CSA	CAN3-A266.2-M78	Chemical Admixtures for Concrete	9.3.1.9.
	CSA	CAN3-A371-M84	Masonry Construction for Buildings	9.20.15.2.
	CSA	CAN/CSA-A405-M87	Design and Construction of Masonry Chimneys and Fireplaces	9.21.3.5. 9.22.5.2.(2)
	CSA	CAN3-A438-M84	Concrete Construction for Housing and Small Buildings	9.3.1.1.
r	CSA	CAN/CSA-A440-M90	Windows	9.7.2.1. 9.7.6.1.
r2	CSA	B51-M1991	Boiler, Pressure Vessel and Pressure Piping Code	6.2.1.4.(1)
r2	CSA	B52-M1991	Mechanical Refrigeration Code	6.2.1.4.(1)
	CSA	B111-1974	Wire Nails, Spikes and Staples	9.23.3.1. 9.26.2.2.(1) 9.29.5.6.
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Table 2.7.3.A. (Cont'd)

	Issuing Agency	Document Number	Title of Document	Code Reference
r	CSA	CAN/CSA-B139-M91	Installation Code for Oil Burning Equipment	6.2.1.4.(1)
r3	CSA	CAN/CSA-B182.1-M92	Plastic Drain and Sewer Pipe and Pipe Fittings	9.14.3.1.(1)
	CSA	B228.1-1968	Pipes, Ducts, and Fittings for Residential Type Air Conditioning Systems	6.2.4.2.(2)
r2	CSA	CAN/CSA-B365-M91	Installation Code for Solid-Fuel Burning Appliances and Equipment	6.2.1.4.(1) 9.21.1.3.(2) 9.22.10.1. 9.33.1.2.
r	CSA	C22.1-1990	Canadian Electrical Code, Part 1	6.2.1.4.(1) 9.34.1.1.
	CSA	C22.2 No. 0.3-M1985	Test Methods for Electrical Wires and Cables	3.1.4.3.(1)
	CSA	C22.2 No.113-M1984	Fans and Ventilators	9.32.3.3.(2)
	CSA	CAN/CSA-C444-M87	Installation Requirements for Heat Recovery Ventilators	6.2.1.7.
r	CSA	CAN/CSA-F280-M90	Determining the Required Capacity of Residential Space Heating and Cooling Appliances	6.2.1.2.
r2	CSA	CAN/CSA-G40.21-M91	Structural Quality Steels	9.23.4.2.(2)
	CSA	CAN3-G401-M81	Corrugated Steel Pipe Products	9.14.3.1.(1)
	CSA	CAN/CSA-O80.1-M89	Preservative Treatment of All Timber Products by Pressure Processes	9.3.2.9.(1)
	CSA	CAN/CSA-O80.2-M89	Preservative Treatment of Lumber, Timber, Bridge Ties, and Mine Ties by Pressure Processes	4.2.3.2. 9.3.2.9.(1)
	CSA	CAN/CSA-O80.9-M1989	Preservative Treatment of Plywood by Pressure Processes	9.3.2.9.(1)
	CSA	CAN/CSA-O80.15-M89	Preservative Treatment of Wood for Building Foundation Systems, Basements, and Crawl Spaces by Pressure Processes	9.3.2.9.(1)
	CSA	CAN3-O86-M84	Engineering Design in Wood (Working Stress Design)	4.3.1.1.
	CSA	CAN/CSA-O86.1-M89	Engineering Design in Wood (Limit States Design)	4.3.1.1.
	CSA	O115-M1982	Hardwood and Decorative Plywood	9.27.9.1. 9.30.2.2.(1)
	CSA	O118.1-M88	Western Red Cedar Shingles and Shakes	9.26.2.1.(1) 9.27.7.1.(1)
	CSA	O121-M1978	Douglas Fir Plywood	9.23.14.2.(1) 9.23.15.1.(1)
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	Issuing Agency	Document Number	Title of Document	Code Reference
				Table 9.23.16.A. 9.27.9.1. 9.30.2.2.(1)
r	CSA	CAN/CSA-O122-M89	Structural Glued-Laminated Timber	9.23.4.3.(2)
r	CSA	CAN/CSA-O132.2-M90	Wood Flush Doors	9.6.4.1.(1)
r2	CSA	CAN/CSA-O141-91	Softwood Lumber	9.3.2.6.
	CSA	O151- M1978	Canadian Softwood Plywood	9.23.14.2.(1) 9.23.15.1.(1) Table 9.23.16.A. 9.27.9.1. 9.30.2.2.(1)
	CSA	O153-M1980	Poplar Plywood	9.23.14.2.(1) 9.23.15.1.(1) Table 9.23.16.A. 9.27.9.1. 9.30.2.2.(1)
	CSA	CAN/CSA-O177-M89	Qualification Code for Manufacturers of Structural Glued-Laminated Timber	4.3.1.2.
	CSA	CAN3-O188.1-M78	Interior Mat-Formed Wood Particleboard	9.23.14.2.(3) 9.29.9.1.(1) 9.30.2.2.(1)
r3	CSA	CAN/CSA-O325.0-92	Construction Sheathing	9.23.14.2.(1) 9.23.15.1.(1) Table 9.23.16.B.
	CSA	CAN3-O437.0-M85	Waferboard and Strandboard	9.23.14.2.(1) 9.23.15.1.(1) Table 9.23.16.A. 9.27.11.1. 9.29.9.1.(2) 9.30.2.2.(1)
	CSA	CAN3-S304-M84	Masonry Design for Buildings	4.3.2.1.
	CSA	S307-M1980	Load Test Procedure for Wood Roof Trusses for Houses and Small Buildings	9.23.13.11.(9)
r3	CSA	CAN3-S406-M92	Construction of Preserved Wood Foundations	9.15.1.3.(3)
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	Issuing Agency	Document Number	Title of Document	Code Reference
r2	NLGA	1991	Standard Grading Rules for Canadian Lumber	9.3.2.1. Table 9.3.2.A.
r	ULC	CAN/ULC-S101-M89	Standard Methods of Fire Endurance Tests of Building Construction and Materials	3.1.7.1.(1)
	ULC	CAN/ULC-S102-M88	Standard Method of Test for Surface Burning Characteristics of Building Materials and Assemblies	3.1.12.1.(1)
	ULC	CAN/ULC-S102.2-M88	Standard Method of Test for Surface Burning Characteristics of Flooring, Floor Covering, and Miscellaneous Materials and Assemblies	3.1.12.1.(2)
	ULC	CAN/ULC-S109-M87	Standard for Flame Tests of Flame-Resistant Fabrics and Films	6.2.3.4.(1) 6.2.3.5.
	ULC	CAN/ULC S110-M86	Standard Methods of Fire Test for Air Ducts	6.2.3.2.(2) 6.2.3.2.(4)
	ULC	CAN4-S111-M80	Standard Method of Fire Tests for Air Filter Units	6.2.3.14.(1)
	ULC	CAN4-S114-M80	Standard Method of Test for Determination of Non-Combustibility in Building Materials	1.1.3.2.
	ULC	CAN4-S124-M85	Standard Method of Test for the Evaluation of Protective Coverings for Foamed Plastic	3.1.5.11.(2)
	ULC	CAN/ULC-S610-M87	Standard for Factory-Built Fireplaces	9.22.8.1.
	ULC	CAN/ULC-S629-M87	Standard for 650°C Factory-Built Chimneys	9.21.1.2.
	ULC	CAN/ULC-S639-M87	Standard for Steel Liner Assemblies for Solid-Fuel Burning Masonry Fireplace	9.22.2.3.
	Column 1	2	3	4

Part 9
Housing

Section 9.1 General

For requirements covering safety measures at construction and demolition sites, see Part 8 of the National Building Code.

Section 9.2 Definitions

9.2.1. General

9.2.1.1. Words in italics are defined in Part 1.

Section 9.3 Materials, Systems and Equipment

9.3.1. Concrete

9.3.1.1. Concrete. Concrete shall be designed, mixed, placed, cured and tested in accordance with CAN3-A438, "Concrete Construction for Housing and Small Buildings."

9.3.1.2. Cement. Cement shall meet the requirements of CAN3-A5, "Portland Cements."

9.3.1.3. Concrete in Contact with Sulphate Soil

(1) Concrete in contact with sulphate *soil* deleterious to normal cement shall conform to the requirements in Section 16 of CAN3-A23.1, "Concrete Materials and Methods of Concrete Construction."

(2) Sulphate-resisting cement shall be used for concrete referred to in Sentence (1).

9.3.1.4. Aggregates. Aggregates shall consist of sand, gravel, crushed rock, crushed air-cooled blast furnace slag, expanded shale or expanded clay conforming to CAN3-A23.1, "Concrete Materials and Methods of Concrete Construction" and shall be clean, well-graded and free of injurious amounts of organic and other deleterious material.

9.3.1.5. Water. Water shall be clean and free of injurious amounts of oil, organic matter, sediment or any other deleterious material.

9.3.1.6. Compressive Strength. Unless specifically required elsewhere in this Part, the compressive strength of unreinforced concrete shall be not less than 15 MPa after 28 days. (See also Articles 9.3.1.7., 9.12.4.1., 9.15.4.1. and 9.18.6.1.)

9.3.1.7. Concrete for Garage and Carport Floors and Exterior Steps. 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 8 per cent.

9.3.1.8. Concrete Mixes

(1) The concrete mixes described in Table 9.3.1.A. shall be considered acceptable if the slump does not exceed 100 mm when measured according to the slump test described in CAN/CSA-A23.2-M, "Methods of Test for Concrete." r

(2) Aggregate for mixes referred to in Sentence (1) shall not exceed 50 mm in size.

9.3.1.9. Admixtures. Admixtures shall conform to CAN3-A266.1, "Air Entraining Admixtures for Concrete" or CAN3-A266.2, "Chemical Admixtures for Concrete," as applicable.

* Requirement modified to apply to houses only.

Table 9.3.1.A.
Forming Part of Sentence 9.3.1.8.(1)

Concrete Mixes (by volume)			
Concrete Strength, MPa	Cement, parts	Sand, parts	Coarse Aggregate, parts
15	1	2	4
	1	—	6, pit run gravel
20	1	1.75	3, up to 40 mm in size
	1	—	4.75 pit run gravel
Column 1	2	3	4

9.3.1.10. Reinforced Concrete. Reinforced concrete shall be designed to conform to the requirements of Part 4.

9.3.1.11. Cold Weather Requirements

(1) 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.

(2) No frozen material or ice shall be used in concrete described in Sentence (1).

9.3.2. Lumber and Wood Products

9.3.2.1. Grade Marking. Lumber for joists, rafters, trusses and beams and for the uses listed in Table 9.3.2.A. shall be identified by a grade stamp to indicate its grade as determined by the NLGA "Standard Grading Rules for Canadian Lumber." (See Appendix A.)

Table 9.3.2.A.
Forming Part of Article 9.3.2.1.

Minimum Lumber Grades for Specific End Uses				
Use	Boards [1]			Framing
	Paragraph in the NLGA grading rules under which boards are graded			
	All Species		Eastern White Pine & Red Pine	All Species
	Para 113	Para 114	Para 118	
Stud wall framing (loadbearing members)	—	—	—	Stud, Standard, No. 2
Stud wall framing (non-loadbearing members)	—	—	—	Stud, Utility, No. 3
Posts and beams less than 114 mm in thickness	—	—	—	Standard, No. 2
Posts and beams not less than 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 Common	—
Wall sheathing not required as a nailing base	No. 5 Common	Economy	No. 5 Common	—
Column 1	2	3	4	5

A-9.3.2.A. 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.

* **9.10.14.2. Area of Exposing Building Face.** The area of an *exposing building face* shall be calculated as the total area of exterior wall of each *dwelling unit* facing in one direction on any side of a *building* measured from the finished ground level to the uppermost ceiling.

* **9.10.14.3. Inadequate Fire Fighting Facilities.** 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 9.10.14.1. or required in Articles 9.10.14.12. and 9.10.14.14. shall be doubled.

* **9.10.14.4. Alternate Method of Determining Limiting Distance.** The *limiting distance* shown in Table 9.10.14.A. may be reduced provided it is not less than the square root of the aggregate area of *unprotected openings* in an *exposing building face.*

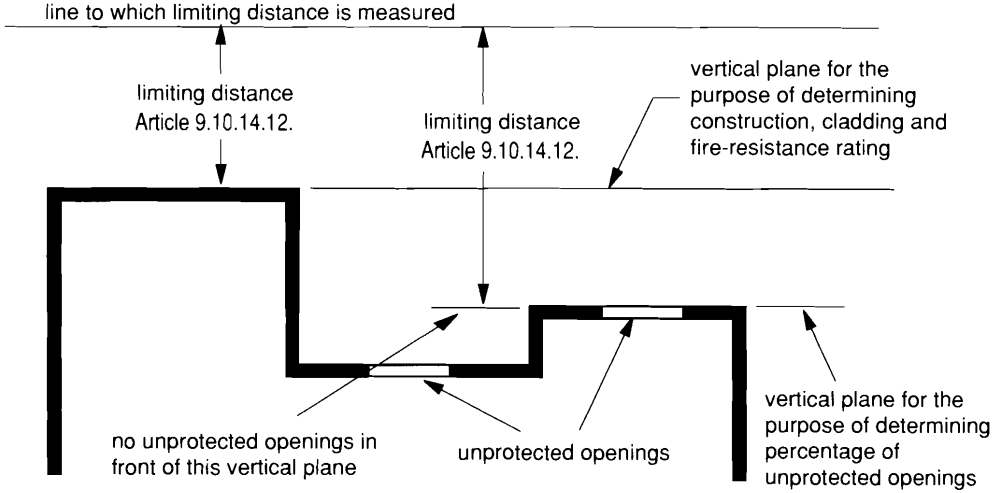
* **9.10.14.5. Openings in Walls Having a Limiting Distance Less Than 1.2 m.** Openings in a wall having a *limiting distance* of less than 1.2 m shall be protected by *closures,* of other than wired glass or glass block, having a *fire protection rating* of at least 20 minutes.

9.10.14.6. Allowance for Sprinklers and Wired Glass or Glass Block. 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 Articles 9.10.13.5. and 9.10.13.7. (See A-3.2.3.11. in Appendix A.)

* **A-3.2.3.11. Increased Openings Permitted.** The maximum area of unprotected openings in an exposing building face can be quadrupled if both sprinklers and protective glazing described in 9.10.14.6. are used.

9.10.14.8. Percentage of Unprotected Openings for Irregular-Shaped Buildings. For the purpose of using Table 9.10.14.A. to determine the actual percentage of *unprotected openings* permitted in an exterior wall, the location of the *exposing building face* is permitted to be taken at a vertical plane located so that there are no *unprotected openings* between the vertical plane and the line to which the *limiting distance* is measured. (See A-3.2.3.1.(4) in Appendix A.)

* **A-3.2.3.1.(4) Spatial Separation Design.** It is intended that Article 9.10.14.12. be used first to establish the basic requirements for the exterior wall in terms of fire-resistance rating, type of construction and type of cladding. The percentage of unprotected openings determined from the application of Article 9.10.14.12. would be unnecessarily restrictive if the actual unprotected openings occur in a plane that is set back from the front of the building face.



A-3.2.3.1.(4)

Article 9.10.14.8. applies to the calculation of the allowable percentage of unprotected openings based upon projection onto a plane that is in front of all unprotected openings. The application of these two Articles is shown in the diagram on page 53. The multiplying effect of Article 9.10.14.6. would be applied, if applicable, to the area of unprotected openings derived from Article 9.10.14.8.

* 9.10.14.12. Exposing Building Face of Houses

r3 **(1)** Except as provided in Sentence (3), the *exposing building face* shall have a *fire-resistance rating* of not less than 45 min 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.

(2) Window openings in the *exposing building face* referred to in Sentence (1) 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 Article 9.10.14.1. where the *limiting distance* is 1.2 m or greater.

r3 **(3)** Cladding on the *exposing building face* described in Sentence (1) may be vinyl when the *limiting distance* is less than 0.6 m, provided the cladding

(a) conforms to Subsection 9.27.13.,
(b) is installed directly over 12.7 mm gypsum sheathing,
(c) has a *flame spread rating* not greater than 25, when tested in accordance with Sentence 3.1.12.1.(2), and
(d) does not exceed 2 mm in thickness, exclusive of fasteners, joints and local reinforcements.

9.10.14.13. Combustible Projections.

Except for *buildings* containing 1 or 2 *dwelling units* only, *combustible* projections on the exterior of a wall that are more than 1 m above ground level, such as balconies, platforms, canopies, eave projections and stairs, and that could expose an adjacent *building* to fire spread, shall not be permitted within 1.2 m of a property line or the centreline of a *public way*, or within 2.4 m of a *combustible* projection on another *building* on the same property.

9.10.14.14. Detached Garage Serving One Dwelling Unit *

(1) Except as required in Article 9.10.14.3., the *exposing building face* of a detached garage shall have a *fire-resistance rating* of not less than 45 min, except that no *fire-resistance rating* is required where the *limiting distance* is 0.6 m or greater.

(2) The *exterior cladding* of detached garages described in Sentence (1) is not required to be *noncombustible* regardless of the *limiting distance*.

(3) The percentage of window openings permitted in the *exposing building face* of detached garages described in Sentence (1) shall conform to the requirements for *unprotected openings* in Article 9.10.14.1.

(4) Where a detached garage serves only one *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*.

9.10.15. Fire Stops

9.10.15.1. Required Fire Stops in Concealed Spaces

(1) Concealed spaces in interior walls, ceilings and crawl spaces shall be separated by fire stops from concealed spaces in exterior walls and *attic or roof spaces*.

(2) Fire stops shall be provided at all interconnections between concealed vertical and horizontal spaces in interior coved ceilings, drop ceilings and soffits where the exposed construction materials within the concealed spaces have a surface *flame-spread rating* greater than 25.

(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 in which the exposed construction materials within the space have a surface *flame-spread rating* greater than 25.

(4) Every concealed space created by a ceiling, * roof space or unoccupied attic space shall be separated by fire stops into compartments of not more than 300 m^2 in area where such space contains exposed construction materials having a surface *flame-spread rating* greater than 25.

(5) No dimension of the concealed space described in Sentence (4) shall exceed 20 m.

(6) Concealed spaces in mansard or gambrel style roofs, exterior cornices, balconies and canopies of *combustible construction* in which the exposed construction materials within the space have a surface *flame-spread rating* exceeding 25 shall have vertical fire stops at intervals of not more than 20 m and at points where such concealed spaces extend across the ends of required vertical *fire separations*.

9.10.15.2. Required Fire Stops in Wall Assemblies

(1) Except as permitted in Sentences (2) and (3), fire stops shall be provided to block off concealed

9.23.9. Floor Joists

9.23.9.1. End Bearing for Joists

(1) Except when supported on ribbon boards, floor joists shall have not less than 38 mm length of end bearing.

(2) Ribbon boards referred to in Sentence (1) shall be not less than 19 mm by 89 mm lumber let into the studs.

9.23.9.2. Joists Supported by Beams

(1) Floor joists may be supported on the tops of beams or may be framed into the sides of beams.

(2) When framed into the side of a wood beam, joists referred to in Sentence (1) shall be supported on

(a) joist hangers or other acceptable mechanical connectors, or

(b) 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 not less than four 89 mm nails, in addition to the nailing for the ledger strip required in Table 9.23.3.A.

(3) When framed into the side of a steel beam, joists referred to in Sentence (1) 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.

(4) Joists referred to in Sentence (3) 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.

(5) Not less than a 12 mm space shall be provided between the splice required in Sentence (4) and the beam to allow for shrinkage of the wood joists.

9.23.9.3. Restraint of Joist Bottoms.

Except as provided in Sentence 9.23.9.4.(2), bottoms of floor joists shall be restrained from twisting at each end by toe-nailing to the supports, end-nailing to the header joists or by providing continuous strapping, blocking between the joists or cross-bridging near the supports.

9.23.9.4. Strapping and Bridging in Tables A1 and A2

(1) Except as permitted in Sentence (2), where strapping only is specified in Tables A-1 and A-2, it shall be

(a) not less than 19 mm by 64 mm, nailed to the underside of floor joists,

(b) located not more than 2 100 mm from each support or other rows of strapping, and

(c) fastened at each end to a sill or header.

(2) Strapping is not required if furring strips or a panel-type ceiling finish is attached directly to the joists.

(3) Where bridging is specified in Tables A-1 and A-2, it shall consist of not less than 19 mm by 64 mm or 38 mm by 38 mm cross bridging located not more than 2 100 mm from each support or other rows of bridging.

(4) Where bridging plus strapping is specified in Tables A-1 and A-2, it shall consist of

(a) bridging as described in Sentence (3), together with wood strapping as described in Sentence (1), or

(b) 38-mm solid blocking located not more than 2 100 mm from each support or other rows of bridging and securely fastened between the joists, together with wood strapping as defined in Sentence (1).

(See 9.23.4.1.(2).)

9.23.9.5. Header Joists

(1) Header joists around floor openings shall be doubled when they exceed 1.2 m in length.

(2) The size of header joists exceeding 3.2 m in length shall be determined by calculations.

9.23.9.6. Trimmer Joists

(1) Trimmer joists around floor openings shall be doubled when the length of the header joist exceeds 800 mm.

(2) When the header joist exceeds 2 m in length the size of the trimmer joists shall be determined by calculations.

9.23.9.7. Support of Tail and Header Joists. When tail joists and header joists are supported by the floor framing, they shall be supported by suitable joist hangers or nailing.

9.23.9.8. Support of Walls

(1) Non-*loadbearing* walls parallel to the floor joists shall be supported by joists beneath the wall or on blocking between the joists.

(2) Blocking referred to in Sentence (1) for the support of non-*loadbearing* walls shall be not less than 38 mm by 89 mm lumber, spaced not more than 1.2 m apart.

(3) Non-*loadbearing* interior walls at right angles to the floor joists are not restricted as to location.

(4) *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.

(5) *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 one or more floors, unless the joist size is designed to support such loads.

9.23.9.9. Cantilevered Floor Joists

(1) Floor joists supporting roof loads shall not be cantilevered more than 400 mm beyond their supports where 38 mm by 184 mm joists are used and not more than 600 mm beyond their supports where 38 mm by 235 mm or larger joists are used.

(2) The cantilevered portions referred to in Sentence (1) 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.

(3) Where cantilevered floor joists described in Sentences (1) and (2) 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 not less than 6 times the
e length of the cantilever, and shall be end nailed to an interior doubled header joist in conformance with Table 9.23.3.A.

9.23.10. Wall Studs

9.23.10.1. Stud Size and Spacing. The size and spacing of studs shall conform to Table 9.23.10.A.

9.23.10.2. Lateral Support. *Loadbearing* studs shall be laterally supported by cladding or blocking.

9.23.10.3. Orientation of Studs

(1) Except as permitted in Sentences (2) and (3), all studs shall be placed at right angles to the wall face.

(2) Studs on the flat are permitted to be used in gable ends of roofs that contain only unfinished space or in non-*loadbearing* interior walls within the limits described in Article 9.23.10.1.

(3) Wall studs that support only a load from an attic not accessible by a stairway are permitted to be placed on the flat within the limits permitted in Article 9.23.10.1. provided

(a) the studs are clad on not less than one side with plywood, waferboard or strandboard sheathing fastened to the face of the studs with a structural adhesive, and

(b) the portion of the roof supported by the studs does not exceed 2.1 m in width.

9.23.10.4. Continuity of Studs. Wall studs shall be continuous for the full *storey* height except at openings and shall not be spliced except by finger-joining with a structural adhesive. (See Appendix A.)

A-9.23.10.4. Fingerjoined Lumber. The NLGA "Standard Grading Rules for Canadian Lumber," referenced in 9.3.2.1. refers to two special product standards, SPS-1, "Fingerjoined Structural Lumber," and SPS-3, "Fingerjoined Stud Lumber – Vertical Use Only," produced by NLGA. Material identified as conforming to these standards is considered to meet the requirements in this Article for joining with a structural adhesive. Lumber fingerjoined in accordance with SPS-3 should be used as a vertical end-loaded member in compression only, where sustained bending or tension-loading conditions are not present, and where the moisture content of the wood will not exceed 19 per cent. Fingerjoined lumber may not be visually regraded or remanufactured into a higher stress grade even if

Table 9.23.12.B.
Forming Part of Sentence 9.23.12.3.(5)

Built-Up Wood Lintels Supporting Roof and Ceiling Loads over Large Openings [4, 5]

Supported Length, m [1]	No. 1 and No.2 Lintel Span, m [2, 3]							Select Structural Lintel Span, m [2, 3]						
Live Load – 1.0 kPa	2.4	3.0	3.6	4.2	4.8	5.4	6.0	2.4	3.0	3.6	4.2	4.8	5.4	6.0
2.4	A	A	A	B	D	F	F	A	A	A	B	C	D	F
3.0	A	A	B	D	F	G*	G*	A	A	A	B	D	E	G*
3.6	A	B	C	D	F	G*	G*	A	A	A	C	D	F	G*
4.2	A	B	D	F	G*	G*	G*	A	A	B	C	E	F	G*
4.8	A	C	D	F	G*	G*	I*	A	A	B	D	F	G*	I*
	No. 1 and No.2 Lintel Span, m [2, 3]							Select Structural Lintel Span, m [2, 3]						
Live Load – 1.5 kPa	2.4	3.0	3.6	4.2	4.8	5.4	6.0	2.4	3.0	3.6	4.2	4.8	5.4	6.0
2.4	A	A	B	D	F	G*	I*	A	A	A	C	D	F	I*
3.0	A	B	D	F	G*	I*	J*	A	A	B	C	E	I*	J*
3.6	A	C	D	F	G*	I*	K*	A	A	B	D	F	I*	K*
4.2	B	D	F	G*	G*	I*	M*	A	A	C	D	F	I*	M*
4.8	B	D	F	G*	I*	K*	M*	A	B	D	F	I*	K*	M*
	No. 1 and No.2 Lintel Span, m [2, 3]							Select Structural Lintel Span, m [2, 3]						
Live Load – 2.0 kPa	2.4	3.0	3.6	4.2	4.8	5.4	6.0	2.4	3.0	3.6	4.2	4.8	5.4	6.0
2.4	A	A	C	D	F	I*	K*	A	A	B	C	E	I*	K*
3.0	A	B	D	F	G*	I*	M*	A	A	C	D	F	I*	M*
3.6	B	D	F	G*	I*	K*	M*	A	B	D	F	I*	K*	M*
4.2	B	D	G*	G*	I*	K*	P*	A	B	D	F	I*	K*	P*
4.8	C	F	G*	G*	I*	M*	P*	A	D	F	G*	I*	M*	P*
	No. 1 and No.2 Lintel Span, m [2, 3]							Select Structural Lintel Span, m [2, 3]						
Live Load – 2.5 kPa	2.4	3.0	3.6	4.2	4.8	5.4	6.0	2.4	3.0	3.6	4.2	4.8	5.4	6.0
2.4	A	C	E	G*	G*	I*	M*	A	A	C	D	F	I*	M*
3.0	B	D	F	G*	I*	K*	M*	A	B	D	F	I*	K*	M*
3.6	B	E	G*	G*	I*	M*	P*	A	B	D	F	I*	M*	P*
4.2	D	F	G*	G*	I*	M*	R*	B	D	F	G*	I*	M*	R*
4.8	D	G*	G*	I*	K*	P*	R*	B	D	F	I*	K*	P*	R*
Column 1	2	3	4	5	6	7	8	9	10	11	12	13	14	15

Addendum to Table 9.23.12.B.:

(1) Supported length means half the span of trusses, roof joists or rafters supported by the lintel plus the length of the overhang beyond the lintel.
(2) Table valid for all major species groups (D Fir-L, Hem-Fir, S-P-F).
(3) Span are clear spans between supports. For total spans, add two bearing lengths.
(4) Provide minimum 89 mm of bearing.
(5) Any size in the Table may be substituted by any size of higher rank (A lowest, R highest).

Legend – Lintel Sizes

A = 3 – 38 × 184
B = 4 – 38 × 184
C = 3 – 38 × 235
D = 4 – 38 × 235
E = 3 – 38 × 286
F = 4 – 38 × 286
G* = 80 × 380
H* = 130 × 304
I* = 80 × 418
J* = 130 × 342
K* = 80 × 456
L* = 130 × 380
M* = 80 × 494
N* = 80 × 532
O* = 130 × 418
P* = 80 × 570
Q* = 130 × 456
R* = 80 × 608

*Glued-laminated 20 f-E grade

(4) When struts are used to provide intermediate support 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.

(5) 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.

(6) Solid blocking shall be installed between floor joists beneath dwarf walls referred to in Sentence (5) that enclose finished rooms.

9.23.13.8. Ridge Support

(1) Except as provided in Sentence (3), 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.

(2) Ridge beams referred to in Sentence (1) 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.

(3) 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.

(4) Ties required in Sentence (3) are permitted to consist of tie rods or ceiling joists forming a continuous tie for opposing rafters and nailed in accordance with Table 9.23.13.A.

(5) Ceiling joists referred to in Sentence (4) shall be fastened together with at least one more nail per joist splice than required for the rafter to joist connection shown in Table 9.23.13.A.

(6) Members referred to in Sentence (5) may be fastened together either directly or through a gusset plate.

9.23.13.9. Restraint of Joist Bottoms. Roof joists supporting a finished ceiling, other than plywood, waferboard or strandboard, shall be restrained from twisting along the bottom edges by means of furring, blocking, cross bridging or strapping conforming to Article 9.23.9.3.

9.23.13.10. Ceiling Joists Supporting Roof Load

(1) Except as permitted in Sentence (2), 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.

(2) When the roof slope is 1 in 4 or less, the ceiling joist sizes referred to in Sentence (1) shall be determined from the span tables for roof joists.

9.23.13.11. Wood Roof Trusses

(1) 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-10 and A-11 provided such trusses conform to the requirements of Sentences (3) to (7). (See Appendix A.)

A-9.23.13.11.(1) 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 on the following page. Each type may have web members additional to those shown, in which case the distances between panel points can be decreased.

The span tables in the Appendix have been calculated for wood species equivalent in strength to Spruce-Pine-Fir, Douglas Fir-Larch or Hem-Fir. The spans are not appropriate for the weaker species, which are included in the northern species combination.

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

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 adjusted to allow for the higher loading in the same manner as described for roof rafters and roof joists.

(a) the insulation is of a type which, when installed, has a vapour permeance less than that required for vapour barriers in Article 9.25.3.5., or
(b) the insulation is foamed plastic insulation with a permeance rating of not more than 230 ng/Pa · s · m^2 and is installed in continuous contact with masonry or concrete walls.

(See Appendix A.)

A-9.25.6.3. Low Permeance Insulation. Where foamed plastic provides the resistance to water vapour specified in this Article, then no additional vapour barrier is necessary to reduce the rate of water vapour diffusion. Most serious problems resulting from moisture condensation, however, are the result of the leakage of moist air from inside the building into concealed wall spaces during colder weather. (See 9.25.) In most cases, vapour diffusion accounts for only a small fraction of the total moisture.

If the insulation is installed by spot applied adhesives, large areas of the wall can share common interconnected air spaces between the insulation and the masonry. These can allow openings in the interior finish (due to holes, cracks, electrical boxes and other discontinuities) to communicate with openings in the exterior masonry surface (e.g. from cracks, joints and weep holes). Any air pressure differential between the inside and outside due to wind effects, mechanical equipment or buoyancy of warm air (stack effect) can cause room air to leak into the cavity between the insulation and masonry and condense as water or eventually as ice. The stack effect increases with the height of the building and is greatest at the top of the building.

Insulation should therefore be installed in continuous contact with the masonry to eliminate the space between them. If this is impractical, the adhesive should be applied as a continuous band around the perimeter of the back side of the insulation to prevent spaces behind the insulation from communicating with each other. While this may not eliminate potential problems, it reduces the risk of an air leak in the interior finish affecting a large area of wall surface. (See Article 9.20.13.10. for dampproofing masonry walls insulated with foamed plastic.)

Section 9.26 Roofing

9.26.1. General

9.26.1.1. Purpose of Roofing. Roofs shall be protected with roofing, including flashing, installed to shed rain effectively and prevent water due to ice damming from entering the roof.

9.26.1.2. Alternate Installation Methods. Methods described in CAN3-A123.51, "Asphalt Shingle Application on Roof Slopes 1:3 and Steeper," or CAN3-A123.52, "Asphalt Shingle Application on Roof Slopes 1:6 to less than 1:3" are permitted to be used for asphalt shingle applications not described in this Section.

9.26.2. Roofing Materials

9.26.2.1. Material Standards

(1) Roofing materials shall conform to
(a) CAN/CGSB 37.4-M, "Fibrated, Cutback, Lap Cement for Asphalt Roofing," *e*
(b) CAN/CGSB 37.5-M, "Cutback Asphalt Plastic Cement," *e*
(c) CAN/CGSB 37.8-M, "Asphalt, Cutback, Filled, for Roof Coating,"
(d) CGSB 37-GP-9Ma, "Primer, Asphalt for Asphalt Roofing, Dampproofing and Waterproofing,"
(e) CGSB 37-GP-21M, "Tar, Cutback, Fibrated, for Roof Coating,"
(f) CAN/CGSB-37.50M, "Hot Applied Rubberized Asphalt for Roofing and Waterproofing," *r*
(g) CGSB 37-GP-52M, "Roofing and Waterproofing Membrane, Sheet Applied, Elastomeric,"
(h) CGSB 37-GP-54M, "Roofing and Waterproofing Membrane, Sheet Applied, Flexible, Polyvinyl Chloride,"
(i) CGSB 37-GP-56M, "Membrane, Modified, Bituminous, Prefabricated, and Reinforced for Roofing,"
(j) CGSB 41-GP-6M, "Sheets, Thermosetting Polyester Plastics, Glass Fiber Reinforced,"
(k) CAN2-51.32, "Sheathing, Membrane, Breather Type,"

(l) CSA A123.1, "Asphalt Shingles Surfaced with Mineral Granules,"
(m) CSA A123.2, "Asphalt Coated Roofing Sheets,"
(n) CSA A123.3, "Asphalt or Tar Saturated Roofing Felt,"
(o) CSA A123.4, "Bitumen for Use in Construction of Built-Up Roof Coverings and Dampproofing and Waterproofing Systems,"
(p) CSA A123.17, "Asphalt-Saturated Felted Glass-Fibre Mat for Use in Construction of Built-Up Roofs," or
(q) CSA-O118.1, "Western Red Cedar Shingles, and Shakes."
r3 (r) CAN/CSA A123.5-M, "Asphalt Shingles Made from Glass Felt and Surfaced with Mineral Granules."

9.26.2.2. Nails

(1) Nails used for roofing shall be corrosion-resistant roofing or shingle nails conforming to CSA B111, "Wire Nails, Spikes and Staples."

(2) Nails shall have sufficient length to penetrate through, or 12 mm into, roof sheathing.

(3) 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.

(4) 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. (See Appendix A.)

A-9.26.2.2.(4) Fasteners for Treated Shingles. Where shingles or shakes have been chemically treated with a preservative or a fire retardant, the fastener should be of a material known to be compatible with the chemicals used in the treatment.

9.26.2.3. Staples

(1) Staples used to apply asphalt or wood shingles shall be corrosion-resistant and shall be driven with the crown parallel to the eaves.

(2) 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 Article 9.26.7.4. is increased by one-third.

(3) 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. (See 9.26.2.2.(4).)

9.26.3. Roof Slope

9.26.3.1. Slope

(1) Except as provided in Sentences (2) and (3), the roof slopes on which roof coverings may be applied shall conform to Table 9.26.3.A.

(2) Asphalt and gravel or coal tar and gravel roofs may be constructed with lower slopes than required in Sentence (1) when effective drainage is provided by roof drains located at the lowest points on the roofs.

(3) Sheet metal roof cladding systems specifically designed for low-slope applications are permitted to be installed with lower slopes than required in Sentence (1).

9.26.4. Flashing at Intersections

9.26.4.1. Materials. Sheet metal flashing shall consist of not less than 1.73 mm thick sheet lead, 0.33 mm thick galvanized steel, 0.46 mm thick copper, 0.46 mm thick zinc or 0.48 mm thick aluminum.

9.26.4.2. Valley Flashing

(1) Where sloping surfaces of shingled roofs intersect to form a valley, the valley shall be flashed.

(2) 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 one layer of sheet metal not less than 600 mm wide, or 2 layers of roll roofing.

(4) The bottom layer of roofing required in Sentence (3) shall consist of not less than Type S smooth 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.

(5) The top layer of roofing required in Sentence (3) 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

(c) downstream of the *furnace* provided the cooling unit is designed to prevent excessive temperature or pressure in the refrigeration system.

Section 6.3 Chimneys and Venting Equipment

6.3.1. General

* **6.3.1.1. Requirement for Venting.** Except as provided in Section 21, the products of combustion from oil-, gas- and solid-fuel burning *appliances* shall be vented in conformance with the requirements in the applicable *appliance* installation standard listed in Sentence 6.2.1.4.(1).

9.33.1.2. Solid-Fuel Burning Appliances. The installation of solid-fuel burning *stoves*, *ranges* and *space heaters*, including the requirements for combustion air, shall conform to CAN/CSA-B365, "Installation Code for Solid-Fuel Burning Appliances and Equipment."

9.33.1.3. Design Temperatures

(1) 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 Sentences (4) and (5).

(2) All *buildings* other than those described in Sentence (1) 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.

(3) Winter design temperatures shall be determined in conformance with Subsection 2.2.1.

(4) Heating facilities shall be provided which shall be capable of maintaining a temperature not below 18°C in an unfinished *basement* in *buildings* of *residential occupancy*.

(5) Where crawl spaces are required to be heated, the heating facilities shall be capable of maintaining a temperature not below 15°C.

9.33.2. Fire Protection for Gas and Electric Ranges

9.33.2.1. Vertical Clearance

(1) Except as provided in Sentence (2), a vertical clearance of not less than 750 mm shall be provided above the elements or burners of electric- and gas-fired domestic *ranges*. e

(2) Where cabinets located above the elements or burners referred to in Sentence (1) are *noncombustible* or are protected with asbestos millboard not less than 6 mm thick, covered with sheet metal not less than 0.33 mm thick, or by a metal hood with a 125 mm projection beyond the upper cabinets, the vertical clearance may be reduced to 600 mm.

9.33.2.2. Clearance to Wall Framing. *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 not less than that of a 9.5 mm thickness of gypsum board. e

Section 9.34 Electrical Facilities

9.34.1. General

9.34.1.1. Standard for Electrical Installations. Electrical installations, including the service capacity of the installation and the number and distribution of circuits and receptacles, shall meet the requirements of the appropriate provincial or municipal legislation or, in the absence of such legislation, shall conform to CSA C22.1, "Canadian Electrical Code, Part I."

9.34.1.2. Required Facilities. Where electrical services are available, electrical facilities shall be provided for every *building* in conformance with this Section.

9.34.1.4. Recessed Lighting Fixtures. Recessed lighting fixtures shall not be located in insulated ceilings unless the fixtures are designed for such installations.

9.34.1.5. Wiring and Cables. Electrical wiring and cables installed in *buildings* permitted to

be of *combustible construction* shall conform to Sentence 3.1.4.3.(1).

3.1.4.3. Electrical Wires and Cables

r3 **(1)** Optical fibre cables and electrical wires and cables installed in *buildings* permitted to be of *combustible construction* shall

(a) not convey flame or continue to burn for more than 1 min when tested in conformance with the Vertical Flame Test in Clause 4.11.1. of CSA C22.2 No. 0.3, "Test Methods for Electrical Wires and Cables," or

(b) be located in

(i) totally enclosed *noncombustible* raceways (see Appendix A),

(ii) masonry walls,

(iii) concrete slabs, or

r3 (iv) totally enclosed nonmetallic raceways conforming to Article 3.1.5.19.

9.34.2. Lighting Outlets

9.34.2.1. Lighting of Entrances. 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*.

9.34.2.2. Outlets in Dwelling Units

(1) Except as provided in Sentence (2), 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*.

(2) Where a receptacle controlled by a wall switch is provided in bedrooms or living rooms, such rooms need not conform to the requirements in Sentence (1).

9.34.2.3. Stairways

(1) Every stairway shall be lighted.

(2) Except as provided in Sentence (3), 3-way wall switches located at the head and foot of every stairway shall be provided to control not less than one lighting outlet with fixture for stairways with 4 or more risers in *dwelling units*.

(3) The stairway lighting for *basements* that do not contain finished space or lead to an outside entrance or built-in garage and which serve not more than one *dwelling unit* may be controlled by a single switch located at the head of the stairs.

9.34.2.4. Basements

(1) A lighting outlet with fixture shall be provided for each 30 m^2 or fraction thereof of floor area in unfinished *basements*.

(2) The outlet required in Sentence (1) nearest the stairs shall be controlled by a wall switch located at the head of the stairs.

9.34.2.5. Storage Rooms. A lighting outlet with fixture shall be provided in storage rooms.

9.34.2.6. Garages and Carports

(1) A lighting outlet with fixture shall be provided for an attached, built-in or detached garage or carport.

(2) Outlets required in Sentence (1) 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.

(3) Where a carport is lighted by a light at the entrance to a *dwelling unit*, additional carport lighting is not required.

Section 9.35 Garages and Carports

9.35.1. Scope

9.35.1.1. Application. This Section applies to garages and carports serving not more than one *dwelling unit*.

9.35.1.2. Construction Requirements. The construction of a garage or carport shall conform to the requirements for other *buildings* in this Part except as provided in this Section.

9.35.2. General

9.35.2.1. 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.

Table A–4 (Continued)

Roof Joists – (Design Roof Snow Loads 1.0 and 1.5 kPa)								
Commercial Designation	Grade	Member Size, mm	1.0 kPa Joist Spacing			1.5 kPa 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 × 89	2.55	2.32	2.03	2.23	2.03	1.77
		38 × 140	4.02	3.65	3.19	3.51	3.19	2.79
		38 × 184	5.28	4.80	4.19	4.61	4.19	3.66
		38 × 235	6.74	6.13	5.35	5.89	5.35	4.68
		38 × 286	8.21	7.46	6.52	7.17	6.52	5.69
	No. 1 and No. 2	38 × 89	2.47	2.24	1.96	2.16	1.96	1.71
		38 × 140	3.89	3.53	3.08	3.40	3.08	2.69
		38 × 184	5.11	4.64	4.05	4.46	4.05	3.54
		38 × 235	6.52	5.93	5.18	5.70	5.18	4.52
		38 × 286	7.94	7.21	6.30	6.94	6.30	5.50
	No. 3	38 × 89	2.43	2.20	1.93	2.12	1.93	1.68
		38 × 140	3.82	3.47	3.03	3.33	3.03	2.65
		38 × 184	5.02	4.56	3.77	4.38	3.97	3.24
		38 × 235	6.41	5.65	4.61	5.60	4.86	3.97
		38 × 286	7.57	6.56	5.35	6.51	5.64	4.60
	Construction	38 × 89	2.43	2.20	1.93	2.12	1.93	1.68
	Standard	38 × 89	2.33	2.12	1.85	2.04	1.85	1.62
Northern Species (includes any Canadian softwood covered by the NLGA Standard Grading Rules)	Select Structural	38 × 89	2.28	2.07	1.81	1.99	1.81	1.58
		38 × 140	3.59	3.26	2.85	3.14	2.85	2.49
		38 × 184	4.72	4.29	3.75	4.12	3.75	3.27
		38 × 235	6.03	5.48	4.79	5.27	4.79	4.18
		38 × 286	7.34	6.67	5.82	6.41	5.82	5.09
	No. 1 and No. 2	38 × 89	2.23	2.03	1.77	1.95	1.77	1.55
		38 × 140	3.51	3.19	2.79	3.07	2.79	2.43
		38 × 184	4.61	4.19	3.66	4.03	3.66	3.20
		38 × 235	5.89	5.35	4.68	5.15	4.68	4.09
		38 × 286	7.17	6.52	5.58	6.26	5.69	4.80
	No. 3	38 × 89	2.18	1.98	1.73	1.90	1.73	1.50
		38 × 140	3.42	3.05	2.49	2.99	2.62	2.14
		38 × 184	4.28	3.71	3.03	3.68	3.19	2.60
		38 × 235	5.23	4.53	3.70	4.50	3.90	3.18
		38 × 286	6.07	5.26	4.29	5.22	4.52	3.69
	Construction	38 × 89	2.18	1.98	1.73	1.90	1.73	1.51
	Standard	38 × 89	2.12	1.93	1.68	1.85	1.68	1.47

Table A–5

Forming Part of Sentence 9.23.4.1.(1)

Roof Joists – (Design Roof Snow Loads 2.0 and 2.5 kPa)

Commercial Designation	Grade	Member Size, mm	2.0 kPa Joist Spacing			2.5 kPa 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 × 89	2.15	1.95	1.71	1.99	1.81	1.58
		38 × 140	3.38	3.07	2.68	3.14	2.85	2.49
		38 × 184	4.44	4.04	3.53	4.12	3.75	3.27
		38 × 235	5.67	5.15	4.50	5.27	4.79	4.18
		38 × 286	6.91	6.27	5.48	6.41	5.82	5.09
	No. 1 and No. 2	38 × 89	2.06	1.87	1.63	1.91	1.74	1.52
		38 × 140	3.24	2.94	2.57	3.01	2.73	2.39
		38 × 184	4.26	3.87	3.38	3.95	3.59	3.14
		38 × 235	5.44	4.94	4.22	5.05	4.59	3.84
		38 × 286	6.62	6.00	4.90	6.14	5.46	4.46
	No. 3	38 × 89	1.91	1.65	1.35	1.74	1.50	1.23
		38 × 140	2.72	2.36	1.92	2.48	2.15	1.75
		38 × 184	3.31	2.87	2.34	3.01	2.61	2.13
		38 × 235	4.05	3.51	2.86	3.69	3.19	2.61
		38 × 286	4.70	4.07	3.32	4.28	3.70	3.03
	Construction	38 × 89	1.99	1.81	1.58	1.85	1.68	1.47
	Standard	38 × 89	1.93	1.75	1.53	1.79	1.62	1.42
Hemlock – Fir (includes Western Hemlock and Amabilis Fir)	Select Structural	38 × 89	2.12	1.93	1.68	1.97	1.79	1.56
		38 × 140	3.33	3.03	2.65	3.10	2.81	2.46
		38 × 184	4.38	3.98	3.48	4.07	3.70	3.23
		38 × 235	5.60	5.09	4.44	5.20	4.72	4.12
		38 × 286	6.81	6.19	5.41	6.32	5.75	5.02
	No. 1 and No. 2	38 × 89	2.06	1.87	1.63	1.91	1.74	1.52
		38 × 140	3.24	2.94	2.57	3.01	2.73	2.39
		38 × 184	4.26	3.87	3.38	3.95	3.59	3.14
		38 × 235	5.44	4.94	4.32	5.05	4.59	4.01
		38 × 286	6.62	6.01	5.25	6.14	5.58	4.68
	No. 3	38 × 89	1.99	1.81	1.58	1.85	1.68	1.47
		38 × 140	3.14	2.85	2.37	2.91	2.65	2.16
		38 × 184	4.09	3.54	2.89	3.72	3.22	2.63
		38 × 235	5.00	4.33	3.53	4.55	3.94	3.22
		38 × 286	5.80	5.02	4.10	5.28	4.57	3.73
	Construction	38 × 89	1.99	1.81	1.58	1.85	1.68	1.47
	Standard	38 × 89	1.93	1.75	1.53	1.79	1.62	1.42

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Appendix A
Explanatory Material for the Canadian Housing Code 1990

A-1.1.2.1. Application to Existing Buildings. This Code is most often applied to existing buildings when an owner voluntarily wishes to rehabilitate a building, change its use or build an addition; or when an enforcement authority decrees that the building be altered for reasons of public safety. Whatever the reason, its application to existing buildings requires careful consideration of the level of safety needed for that building.

This consideration involves an analytical process similar to that required to assess alternate design proposals for new construction. First the objective of the Code requirements must be established. To assist the Code user in this regard, Appendix notes are included to clarify the intent of certain requirements. In addition, commentaries on the more complicated Code issues are available. Once the objective is defined, one must then determine to what extent the existing building must be altered to meet the objective.

In developing Code requirements for new buildings, consideration has been given to the cost they impose on a design in relation to the perceived benefits in terms of safety. The former is definable; the latter difficult to establish on a quantitative basis. In applying the Code requirements to an existing building, the benefits derived are the same as in new buildings. On the other hand, the increased cost of implementing in an existing building a design solution that would normally be intended for a new building may be prohibitive.

The successful application of Code requirements to existing construction becomes a matter of balancing the cost of implementing a requirement with the relative importance of that requirement to the overall Code objectives. The degree to which any particular requirement can be relaxed without affecting the intended level of safety of the Code requires considerable judgment on the part of both the designer and the authority having jurisdiction.

Further information on the application of Code requirements to existing buildings may be found in Canadian Building Digest No. 230, "Applying Building Codes to Existing Buildings," available from the Institute for Research in Construction, National Research Council of Canada, Ottawa, K1A 0R6.

A-2 Relationship of the NBC to Standards Development and Conformity Assessment. *r3*
The development of many requirements in the National Building Code and its related documents such as the CHC, and the assessment of conformity to those requirements is supported by several of the services provided by the member organizations of Canada's National Standards System (NSS).

The NSS is a federation of accredited organizations concerned with standards writing, certification and testing, established under the auspices of the Standards Council of Canada Act. Activities of the NSS are coordinated by the Standards Council of Canada (SCC), which has currently accredited 5 standards writing organizations, 7 certification organizations and many testing organizations.

The SCC is a federal non-profit crown corporation responsible for the coordination of voluntary standardization in Canada. It also has responsibilities for Canada's activities in international standardization.

The Appendix to this document is included for explanatory purposes only and does not form part of the requirements. The bold-face reference numbers that introduce each item apply to the requirements in the Code.

•Canadian Standards

The NBC contains many references to standards published by accredited standards writing organizations in Canada. As part of the accreditation requirements, these organizations adhere to the principles of consensus. This generally means substantial majority agreement of a committee comprising a balance of producer, user and general interest members and the consideration of all negative comments. The organizations also have a requirement for second level review of the technical preparation and balloting of standards prepared under their auspices. Standards prepared in this way are eligible for designation by SCC as National Standards of Canada. (The Canadian Commission on Building and Fire Codes follows these same principles of consensus in the operation of its Codes writing process.) The following organizations are accredited as standards writing organizations in Canada for standards referenced in the NBC:

Bureau de normalisation du Québec (BNQ)
Canadian Gas Association (CGA)
Canadian General Standards Board (CGSB)
Canadian Standards Association (CSA)
Underwriter's Laboratories of Canada (ULC)

•Foreign Standards

A number of subject areas are covered by the NBC where the Canadian standards writing organizations have chosen not to develop standards. In these cases, the Code often makes reference to standards developed by organizations in other countries, such as the American Society for Testing and Materials (ASTM) and the National Fire Protection Association (NFPA). These standards are developed using processes that may differ from that used by the Canadian standards writing organizations; nevertheless these standards have been reviewed by the relevant standing committees (see below) and found acceptable.

Section 2.7., Referenced Documents, contains Table 2.7.3.A that lists the standards referred to in the NBC. When a standard is to be referred to in the NBC, the committee responsible for the relevant section reviews the content of the standard to ensure that it is compatible with the code. Thereafter, referenced standards are annually reviewed in two ways. The originating organization is asked to confirm the status of the original, amended or new edition of the standard and the relevant standing committee is canvassed for any known problems associated with the standard.

•Conformity Assessment

The National Building Code is a set of minimum requirements contained within its own text or that of referenced documents. The process of assessing conformity to the requirements during construction is the responsibility of the authority having jurisdiction and the supervising professional designers.

Those persons responsible for ensuring that a material, appliance, system or equipment meets the performance requirements of this Code have several means available to assist them. These means vary from on-site inspection to the use of certification services provided by accredited third party organizations. Test reports or mill certificates provided by manufacturers or suppliers can assist in the acceptance of products. Engineering reports may be required on more complex products.

Testing - The accreditation programs of the SCC include one for testing organizations. About 75 organizations are accredited, with 20 accredited as capable of reliably testing building products to established standards. The test results produced by these organizations are used in the evaluation, qualification and certification of building products to Code requirements.

Certification - Certification is the confirmation by an independent organization that a product or service meets a requirement. Certification of a product, process, or system entails physical examination, testing as specified in appropriate standards, plant examination and follow-up unannounced plant inspections. This procedure leads to the issuing of a formal assurance or declaration by means of a certification mark or certificate that the product, process or system is in full conformity with specified requirements.

In some cases, a product for which no standard exists can be certified using procedures and criteria developed by the accredited certifying organization and specifically designed to measure the performance of that product.

The following organizations are accredited by the SCC to provide certification services in the field of building products /facilities.They publish lists of certified products.

Canadian Gas Association (CGA)
Canadian General Standards Board (CGSB)
Canadian Standards Association (CSA)
Council of Forest Industries (COFI)
Underwriters Laboratories of Canada (ULC)
Warnock Hersey Professional Services (WHPS)
Canadian Welding Bureau (CWB)

Facsimiles of the registered certifications marks of these organizations are illustrated below:

Evaluation - Evaluation is a written opinion by an independent professional organization that a product will perform its intended function in a building. Evaluation is very often done to determine equivalency of performance of an innovative product to the intent of a Code requirement. Follow-up plant inspections are not part of the evaluation process.

Several organizations, including the Canadian Construction Materials Centre (CCMC) offer evaluation services. To encourage the use of new and innovative proprietary products, CCMC and most of the certification organizations evaluate the equivalency of such products to the Code requirements. CCMC also evaluates products for which a standard exists but for which no other industry supported service is available. It operates under agreements with most of the provincial and territorial governments and with Canada Mortgage and Housing Corporation (CMHC).

Qualification - Qualification of building products also evaluates the ability of a product to perform its intended function by verifying that it meets the requirements of a standard. Qualification normally includes some follow-up plant inspection. Some organizations publish lists of qualified products that meet the specified requirements. Some organizations qualify manufacturing and/or testing facilities for building products for compliance with the Code and relevant standards.

•Equivalence

Article 2.5.1.3 permits equivalence to be determined by past performance, test or evaluation. The determination of the equivalence of materials, appliances, systems, equipment and methods of design and construction not specifically described in the Code usually requires specialized knowledge and evaluation methods. Equivalence can be determined, therefore, through the certification, evaluation and qualification processes.

A-9.3.2.1. Grade Marking of Lumber. Lumber is generally grouped for marketing into the species combinations contained in the following table. The maximum allowable spans for those 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 the northern species combination is based on the weakest species in the combination, the use of the span for this combination is permitted for any individual species not included in the Spruce-Pine-Fir, Douglas Fir-Larch, Hem-Fir combinations.

Facsimiles of typical grade marks of lumber associations and grading agencies accredited by the Canadian Lumber Standards (CLS) Accreditation Board to grade mark lumber in Canada are shown in the following table. Accreditation by the CLS Accreditation Board applies to the inspection, grading and grade marking of lumber, including mill supervisory service, in accordance with CSA Standard 0141, "Softwood Lumber."

The grade mark of a CLS accredited 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 accredited 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 Designation of Species or Species Combination	Abbreviation Permitted on Grade Stamps	Species Included
Douglas Fir – Larch	D Fir – L (N)	Douglas Fir, Western Larch
Hemlock – 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
Northern Species	North Species	Any Canadian softwood covered by the NLGA Standard Grading Rules

A-9.10.3.1. Fire and Sound Resistance of Building Assemblies. The following tables may be used to select building assemblies for compliance with Article 9.10.3.1. and Subsection 9.11.2. However, these tables are provided only for the convenience of Code users. Assemblies not listed in these tables are equally acceptable provided their fire and sound resistance can be demonstrated to meet the above-noted requirements on the basis of tests described in 9.10.3.1. and 9.11.1. or by using the data in Chapter 2 of the Supplement to the NBC 1990.

Table A-9.10.3.A.

Fire and Sound Resistance of Walls

Type of Wall	No.	Description	Finish on Each Side[1]	Fire-Resistance Rating	Typical Sound Transmission Class[2]
Hollow concrete block (normal weight aggregate)	1	140-mm block	None[3]	1 h	48
	2	Same as 1	B	2 h	51
	3	Same as 1, with both surfaces fastened directly, or both on metal resilient channels, or both on metal resilient channels with absorptive material[4]	A	2 h	47
	4	Same as 1, with metal resilient channels and absorptive material on one side[4]	A	1.75 h	51
	5	Same as 1, with 38-mm x 38-mm wood strapping and absorptive material on both sides[4]	A	2 h	57
	6	190-mm block	None[3]	1.5 h	50
	7	190-mm block	B	2 h	50
	8	Same as 6, with both surfaces fastened directly, or both on metal resilient channels, or both on metal resilient channels with absorptive material[4]	A	2.5 h	49

Table A-9.10.3.A. (Cont'd)

Fire and Sound Resistance of Walls					
Type of Wall	No.	Description	Finish on Each Side[1]	Fire-Resistance Rating	Typical Sound Transmission Class[2]
	9	Same as 6, with metal resilient channels and absorptive material on one side[4]	A	2.5 h	53
	10	Same as 6, with 38-mm x 38-mm wood strapping on at least one side	A[6]	2.5 h	53
	11	Same as 6, with 38-mm x 38-mm wood strapping and absorptive material on both sides[4]	A[6]	2.5 h	59
	12	Same as 6, with 50-mm metal Z-bars (or 38-mm x 38-mm wood strapping plus metal resilient channels) and absorptive material on both sides[4]	A	2.5 h	64
	13	Same as 6, with studs (65-mm steel or 38-mmx 64-mm wood) and absorptive material on both sides[4]	A[6]	2.5 h	70
	14	Same as 6, with metal resilient channels and absorptive material on one side	D (finish one side only)	2.5 h	55
Concrete	15	150 mm	None[3]	3 h	55
	16	200 mm	None[3]	4 h	58
Interior wood stud single row	17	38-mm x 89-mm studs 400 mm o.c.	C	1 h	34
	18	38-mm x 89-mm studs 400 mm o.c., with absorptive material[5]	A[6]	45 min	36

A-9.23.4.1.(2) Numerical Method to Establish Vibration-Controlled Spans for Wood Frame Floors. In addition to the normal strength and deflection analyses, the calculations on which the floor joist span tables are based include a method of ensuring that the spans are not so long that floor vibrations could lead to occupants' perceiving the floors as too "bouncy" or "springy." Limiting deflection under the normal uniformly distributed loads to 1/360 of the span does not provide this assurance.

Normally, vibration analysis requires detailed dynamic modelling. However, the calculations for the span tables use the following simplified static analysis method of estimating vibration-acceptable spans:

- The span which will result in a 2-mm deflection of a single joist supporting a 1 kN concentrated midpoint load is calculated.

- This span is multiplied by a factor, K, to determine the "vibration-controlled" span for the entire floor system. If this span is less than the strength- or deflection-controlled span under uniformly distributed load, the vibration-controlled span becomes the maximum allowable span.

The K factor is determined from the following relationship:

$$\ln(K) = A - B \cdot \ln(S_i/S_{184}) + G$$

where A = a constant, the value of which is determined from Table A,

B = a constant, the value of which is determined from Table B,

S_i = span which results in 2-mm deflection of the joist in question under 1 kN con centrated midpoint load,

S_{184} = span which results in 2-mm deflection of 38 x 184-mm joist of same species and grade as the joist in question under 1 kN concentrated midpoint load,

G = a constant, the value of which is determined from Table G.

For any joist size, species and grade, the value of K which results in a vibration controlled span of 3 m is the largest allowed value.

Note that, for a sawn lumber joist, the ratio S_i/S_{184} is equivalent to its depth (mm) divided by 184.

Due to rounding differences, the method, as presented here, might produce results slightly different from those produced by the computer program used to generate the span tables.

Additional background information on this method can be found in the following publications:

- Onysko, D.M. Serviceability Criteria for Residential Floors Based on a Field Study of Consumer Response. Project 03-50-10-008. Forintek Canada Corp., Ottawa, Canada 1985.

Table A

Constant A									
Subfloor Thickness, mm	Strapping Only			Bridging Only			Strapping + Bridging		
	Joist Spacing, mm			Joist spacing, mm			Joist spacing, mm		
	300	400	600	300	400	600	300	400	600
12.5	0.28	0.24	0.19	0.36	0.30	0.24	0.40	0.33	0.27
15.5	0.30	0.25	0.20	0.37	0.31	0.25	0.42	0.35	0.28
19.5	0.36	0.30	0.24	0.45	0.37	0.30	0.50	0.42	0.33

- Onysko, D.M. Performance Criteria for Residential Floors Based on Consumer Responses. 1988 International Conference on Timber Engineering, Seattle, September 19-22, Forest Products Research Society, Vol.1, 1988 pp. 736-745.
- Onysko, D.M. Performance and Acceptability of Wood Floors - Forintek Studies. Proceedings of Symposium/Workshop on Serviceability of Buildings, Ottawa, May 16-18, National Research Council of Canada, Ottawa, 1988.

Table B

Floor Description	Constant B
Basic floor – 15.5-mm plywood subfloor (or equivalent in Table 9.23.14.A.) – 400-mm joist spacing – no bridging	0.33
Basic floor with bridging	0.38
Basic floor with bridging and strapping	0.41

Table G

Floor Description	Constant G
Floors with nailed subfloor	0
Floor with field-glued subfloor, * vibration-controlled span greater than 3 m	0.10
Floor with field-glued subfloor, * vibration-controlled span 3 m or less	0.15

* Subfloor glued to floor joists with elastomeric adhesive complying with CGSB Standard 71-GP-26M, "Standard for Adhesives for Field-gluing Plywood to Lumber Framing for Floor Systems."

R

S

T

Conversion Factors		
To Convert	**To**	**Multiply by**
°C	°F	1.8 and add 32
kg	lb	2.205
kPa	lbf/in^2 (psi)	0.1450
kPa	lbf/ft^2	20.88
L	gal (imp.)	0.2200
L/s	gal/min (gpm)	13.20
lx	ft-candle	0.09290
m	ft	3.281
m^2	ft^2	10.76
m^3	ft^3	35.31
mm	in.	0.03937
m^3/h	ft^3/min (cfm)	0.5886
m/s	ft/min	196.8
MJ	Btu	947.8
N	lbf	0.2248
ng/(Pa · s · m^2)	perms	0.0174
Pa	Inches of water	0.004014
W	Btu/h	3.412