APPENDIX A

REFERENCE STANDARDS AGENCIES

The following agencies promulgate standards referenced in this code and the following appendices. The abbreviations in front of the agency are used to identify the standards that the agency promulgates.

AA
Aluminum Association
818 Connecticut Avenue, N.W.
Washington, D.C. 20006

AAMA
Architectural Aluminum Manufacturers Association
35 East Wacker Drive
Room 3200
Chicago, Illinois 60601

ABPA
American Board Products Association
205 West Touhy Avenue
Park Ridge, Illinois 60068

ACI
American Concrete Institute
P.O. Box 19150
Redford Station
Detroit, Michigan 48219

AISC
American Institute of Steel Construction, Inc.
1221 Avenue of the Americas
Suite 1580
New York, New York 10020

AISI
American Iron and Steel Institute
1000 Sixteenth Street, N.W.
Washington, D.C. 20036

AITC
American Institute of Timber Construction
333 W. Hampden Avenue
Englewood, Colorado 80110

AInsA
American Insurance Association
85 John Street
New York, New York 10038

ANSI
American National Standards Institute, Inc.
1430 Broadway
New York, New York 10018

APA
American Plywood Association
1119 A Street
Tacoma, Washington 98401

ASHRAE
American Society of Heating, Refrigerating and Air-Conditioning Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

ASME
American Society of Mechanical Engineers
United Engineering Center
345 East 47th Street
New York, New York 10017

ASTM
American Society for Testing and Materials
1916 Race Street
Philadelphia, Pennsylvania 19103

AWS
American Welding Society
2501 N.W. Seventh Street
Miami, Florida 33125

AWPA
American Wood Preservers' Association
1625 Eye Street, N.W.
Washington, D.C. 20006

AWPB
American Wood Preservers Bureau
P.O. Box 6085
Arlington, Virginia 22206

AWPI
American Wood Preservers Institute
1651 Old Meadow Road
McLean, Virginia 22101

BIA
Brick Institute of America
1750 Old Meadow Road
McLean, Virginia 22101

BOCA
Building Officials and Code Administrators International
17926 South Halsted Street
Homewood, Illinois 60430

CPSC
Consumer Product Safety Commission
Washington, D.C. 20207

DOC
United States Department of Commerce
National Bureau of Standards
Washington, D.C. 20234

DOD-OCD
Department of Defense
Office of Civil Defense
Office of the Secretary of the Army
Washington, D.C. 20390

FM
Factory Mutual Engineering Corporation
Standards-Laboratories Department
1151 Boston-Providence Turnpike
Norwood, Massachusetts 02062

FS
Federal Specifications
Superintendent of Documents
Government Printing Office
Washington, D.C. 20402

GA
Gypsum Association
1603 Orrington Avenue
Suite 1210
Evanston, Illinois 60201

HPMA
Hardwood Plywood Manufacturers Association
P.O. Box 6246
Arlington, Virginia 22206

HUD
United States Department of Housing and Urban Development
Division of Mobile Home Standards
451 Seventh Street, S.W.
Washington, D.C. 20410

IES
Illuminating Engineers Society
345 East 47th Street
New York, New York 10017

ICBO
International Conference of Building Officials
5360 South Workman Mill Road
Whittier, California 90601

MBMA
Metal Building Manufacturers Association
2130 Keith Building
Cleveland, Ohio 44115

NCMA
National Concrete Masonry Association
6845 Elm Street
McLean, Virginia 22101

NFiPA
National Fire Protection Association
470 Atlantic Avenue
Boston, Massachusetts 02210

NFoPA
National Forest Products Association
1619 Massachusetts Avenue, N.W.
Washington, D.C. 20036

RCSHSB
Red Cedar Shingle and Handsplit Shake Bureau
5510 White Building
Seattle, Washington 98101

SJI
Steel Joist Institute
2001 Jefferson Davis Highway
Arlington, Virginia 22202

SMACNA
Sheet Metal and Air-Conditioning Contractors National Association, Inc.
8224 Old Courthouse Road
Vienna, Virginia 22180

SPIB
Southern Pine Inspection Bureau
P.O. Box 846
Pensacola, Florida 32594

SBCCI
Southern Building Code Congress International
900 Montclair Road
Birmingham, Alabama 35213

SSSI
Steel Scaffolding & Shoring Institute
2130 Keith Building
Cleveland, Ohio 44115

TCA
Tile Council of America
4801 Montgomery Lane
Washington, D.C. 20014

TPI
Truss Plate Institute, Inc.
7411 Riggs Road
Hyattsville, Maryland 20783

UL
Underwriters Laboratories Inc.
207 East Ohio Street
Chicago, Illinois 60611

USDA
United States Department of Agriculture
Washington, D.C. 20225

U.S. ARMY
Office of the Chief of Engineers
U.S. Army
Publications Depot
890 South Pickett Street
Alexandria, Virginia 22304

APPENDIX B

ACCEPTED ENGINEERING PRACTICE STANDARDS

See also Appendices C, D, E, F and G for standards on specific materials or test of units or assemblies; some of which include engineering practice standards for specific applications.

Concrete

Concrete Formwork—Recommended Practice for ..... ACI 347–68
Inspection and Testing Agencies for
Concrete, Steel and Bituminous
Materials as Used in Construction ..... ASTM E329–72
Manufacturing Reinforced Concrete Floor and Roof Units—
Recommended Practice for ..... ACI 512–67
Reinforced Concrete—Building Code Requirements for ..... ACI 318–71
1976 Accumulative Supplement ACI–76
Reinforced Concrete Structures—Manual of Standard
Practice for Detailing ..... ACI 315–74
Reinforced Steel Welding Code ..... AWS D12.1–75

Electrical Illumination

Daylighting—Recommended Practices of ..... IES RP5–62
Design Criteria for Lighting Interior Living Spaces ..... IES RP11–69
Electrical Code—National ..... NFiPA 70–78
IEEE Standard Dictionary of Electrical and
Electronic terms ..... ANSI C42.100–72
Industrial Lighting ..... ANSI A 11.1–73
Lighting Handbook IES–72
Office Lighting—Recommended Practice ..... IES RP1–73
School Lighting—Recommended Practice ..... IES RP3–70

Energy Conservation

ASHRAE 1977 Handbook of Fundamentals ASHRAE–77
ASHRAE 1976 Systems Volume ASHRAE–76
Basic Energy Conservation Code BOCA–78
Energy Conservation in New Building Design ..... ASHRAE 90–75

Equipment

Conveyors, Elevators, Hoists and Lifts
Construction, Care and Use of Automotive Lifts
—Safety Requirements for ..... ANSI B153.1–74
Conveyors and Related Equipment—Safety Standards for ..... ANSI B20.1–76
Elevators, Dumbwaiters, Escalators and Moving Walks
—Safety Code for ..... ANSI A17.1–71
—1972 Supplement ..... ANSI A17.1a–72
—1973 Supplement ..... ANSI A17.1b–73
—1974 Supplement ..... ANSI A17.1c–74
—1975 Supplement ..... ANSI A17.1d,e,f–75
Elevators, Escalators and Moving Walks—Practice for the
Inspection of ..... ANSI A17.2–73
Manlifts—Safety Standard for ..... ANSI A90.1–69
—1972 Supplement ..... ANSI A90.1a–72

Equipment—continued

Material Hoists, Safety Requirements for ..... ANSI A 10.5–75
Personnel Hoists, Safety Requirements for ..... ANSI A 10.4–75
Heating
Boiler Code and Unfired Pressure Vessel Code ASME–77
Mechanical Equipment and Piping
Basic Mechanical Code BOCA–78
Basic Plumbing Code BOCA–78

Fire and Sound Tested Assemblies

Approved Guide, Equipment, Materials,
Services for Conservation of Property FM-FMED–77
Fire Resistance Design Manual GA-600–78
Fire Resistance Directory UL-77
Fire Resistance Ratings AInsA–64
–1968 Supplement AInsA–68
–1970 Supplement AInsA–70
–1972 Supplement AInsA–72

Fire Protection and Safety Practices

Life Safety Code ..... NFiPA 101–76
NOTE: NFiPA 101-1976 is acceptable for matters of design of exits not provided for by the BOCA Codes. Finish and construction requirements incorporated therein are not applicable.
Aircraft Hangars–Standard on ..... NFiPA 409–75
Basic Fire Prevention Code BOCA–78
Cellulose Nitrate Motion Picture Film
–Standard for the Storage and Handling of ..... NFiPA 40–74
Dry Cleaning Plants–Standard for ..... NFiPA 32–74
Dust Explosions and Ignition,
Standard for the Prevention of
–in Flour and Feed Mills and Allied
Grain Storage Elevators ..... NFiPA 61C–73
–in Grain Elevators, Bulk Handling Facilities ..... NFiPA 61B–73
–in Industrial Plants–Fundamental Principles for ..... NFiPA 63–75
–in Starch Factories ..... NFiPA 61A–73
Fire Damper Guide for Air Handling Systems SMACNA–70
Fire Tests for Flame Resistant
Textiles and Films–Standard Methods of ..... NFiPA 701–76
Garages
–Parking Structures–Standard for ..... NFiPA 88A–73
–Repair Garages–Standard for ..... NFiPA 88B–73
Gas Shielded Arch Welding–Recommended
Safe Practice for ..... AWS A6.1–66
Household Fire Warning Equipment–Standard for ..... NFiPA 74–75
Incinerators and Rubbish Handling–Standard on ..... NFiPA 82–72
Liquefied Petroleum Gases–Standard for the
Storage and Handling of ..... NFiPA 58–76
Liquefied Petroleum Gases at Utility Gas Plants–Standard for the
Storage and Handling of ..... NFiPA 59–76
Liquids, Flammable and Combustible–Code for ..... NFiPA 30–76
Oxygen-Fuel Gas Systems for Welding and Cutting
–Standard for the Installation and Operation of ..... NFiPA 51–74
Piers and Wharves–Standard for the Construction
and Protection of ..... NFiPA 87–75
Pulverized Fuel Systems–Standard for the
Installation and Operation of ..... NFiPA 60–73
Pyroxylin Plastics–Code for Storage of ..... NFiPA 40E–75
Safe Practices for Welding and Cutting Containers
That Have Held Combustibles ..... AWS A6.0–65

Fire Protection and Safety Practices—continued

Safety in Welding and Cutting ..... ANSI Z49.1–73
Smoke and Heat Venting–Guide for ..... NFiPA 204–68
Spray Finishing Using Flammable and Combustible Materials–
Standard for ..... NFiPA 33–73
Tents, Grandstands and Air-Supported Structures
Used for Places of Assembly–Standard for ..... NFiPA 102–72

Glass

Architectural Glazing Materials–Safety
Standard for ..... CPSC 16–CFR Part 1201; 42FR1428
NOTE: Pursuant to the Consumer Products Safety Act (Federal Public Law 92-573), the Consumer Product Safety Commission has established this Safety Standard for Architectural Glazing Materials (effective July 6, 1977). This standard prescribes which architectural features and field installed configurations of glazing must be provided with appropriate glazing due to human impact hazards and prescribes standards of composition and testing which define appropriate glazing for human impact hazards. The Consumer Product Safety Act preempts state and local government requirements unless identical to those of this standard. Certain safety glazing as listed below have been administratively exempted.
Safety Glazing Material Used in Buildings–Performance
Specifications and Methods of Test for ..... ANSI Z97.1–72/75
NOTE: For products incorporating glazing material which are manufactured, fabricated, or assembled between July 6, 1977, and July 5, 1978, and where such glazing was manufactured before July 6, 1977.

Interior Finishes

Application and Finishing of Gypsum
Board–Specifications for (See Appendix M) ..... GA 216–75
Gypsum Base for Veneer Plasters–Standard
Specification for ..... ASTM C588–76
Gypsum Board Products, Gypsum Lath, Gypsum
Partition Tile or Block, and Precast Reinforced
Gypsum Slabs–Method of Physical Testing of ..... ASTM C473–76
Gypsum Lath–Standard Specification for ..... ASTM C37–76
Gypsum Plasters–Specification for ..... ASTM C28–76
Gypsum Plasters and Gypsum Concrete–Standard
Methods for Physical Testing of ..... ASTM C472–73
Gypsum Veneer Plaster–Specifications for ..... ASTM C587–73
Gypsum Veneer Plaster–Specifications for Application ..... GA 150–70
Gypsum Wallboard–Specification for ..... ASTM C36–76
Interior Lathing and Furring–Specifications for ..... ANSI A42.4–67
Interior Marble–Specifications for ..... ANSI A94.1–61
Metal Ceiling Suspension Systems for Acoustical Tile and Lay-in
Panels–Standard Recommended Practice for Installation of .... ASTM C636–76
Metal Suspension Systems for Acoustical Tile and Lay-in Panel
Ceilings–Standard Specifications for ..... ASTM C635–76
Portland Cement and Portland Cement-Lime Plastering,
Exterior (Stucco) and Interior, Lathing and Furring–
Specifications for ..... ANSI A42.3–71
Portland Cement and Portland Cement-Lime Plastering,
Exterior (Stucco) and Interior–Specifications for ..... ANSI A42.2–71

Interior Finishes—continued

Steel Framing Members to Receive Screw-Attached Gypsum Wallboard Backing Board, or Water-Resistant Backing Board—Specifications for ..... ASTM C745–74
Tile, Ceramic, Installed with
—Chemical Resistant, Water Cleanable Tile-Setting and Grouting Epoxy ..... ANSI A108.6–76
—Dry-Set Portland Cement Mortar ..... ANSI A108.5–76
—Water Resistant Organic Adhesives ..... ANSI A108.4–76
Tile, Electrically Conductive Ceramic, Installed with Conductive Dry Set Portland Cement Mortar ..... ANSI A108.7–76
Tile, Installation of Glazed Wall Tile, Ceramic Mosaic Tile, Quarry and Paver Tile with Portland Cement Mortar ..... ANSI A108.1–76

Masonry

Cold Weather Masonry Construction BIA–68
Design and Construction of Loadbearing Concrete Masonry—Specifications for NCMA–70
Engineered Brick Masonry—Requirements for BIA–69
NOTE: This standard (BIA–69) is only applicable to brick masonry of solid masonry units made from clay or shale.
Masonry—Building Code Requirements for ..... ANSI A41.1–70
Reinforced Masonry—Building Code Requirements for ..... ANSI A41.2–70

Metal

Aluminum

Aluminum Construction Manual, Aluminum Formed Sheet Building Sheathing Design Guide AA-ABS32–69
Aluminum Construction Manual, Specifications for Aluminum Structures AA-SAS30–76
Aluminum Construction Manual, Aluminum Sheet Metal Work in Building Construction AA-ASM35–71

Steel

Architecturally Exposed Structural Steel—Specification for AISC-S307–60
Design of Cold-Formed Steel Structural Members—Specification for AISI–68
Design, Fabrication and Erection of Structural Steel for Buildings—Specification for AISC–S310–69
Supplement No. 1 ..... AISC–S319–70
Supplement No. 2 ..... AISC–S320–71
Supplement No. 3 Revised AISC–S321–75
Design of Cold-Formed Stainless Steel Structural Members—Specification for AISI–74
Gas Systems for Welding and Cutting ..... (See Fire Protection and Safety Practice)
Non-Load (Axial) Bearing Steel Studs, Runners (Track), and Rigid Furring Channels for Screw Application of Gypsum Board—Specification for ..... ASTM C645–76
Longspan Steel Joist LJ and LH Series, and Deepspan Steel Joists DLJ and DLH Series—Standard Specifications for SJI/AISC–74
Metal Building Systems Manual MBMA–74
Open Web Steel Joists, J-Series and H-Series—Standard Specification for SJI/AISC–74
Steel Drill Screw Application of Gypsum Sheet Material to Light Gage Steel Studs—Specification for ..... ASTM C646–76a
Structural Applications of Steel Cables for Buildings—Criteria for AISI–73

Metal—continued

Structural Joints Using ASTM A325 or A490 Bolts—
Specification for AISC–S314–76
Welding Code, Structural ..... AWS D1.1–75
–Revision No. 1 ..... AWS D1.1–Rev-1–76
–Revision No. 2 ..... AWS D1.1–Rev-2–77

Wood and Wood Products

Adhesives for Field Gluing Plywood to Wood Framing—
Performance Specifications for APA–AFGO1–74
All-Weather Wood Foundation System—
Basic Requirements NFoPA–TR7–76
–1977 Supplement NFoPA–TR7–77
APA Glued Floor System APA–U405–76
Code of Suggested Practices–Timber Construction Standard ..... AITC 106–77
Construction Details–Typical Timber Construction Standard ..... AITC 104–76
Heavy Timber Construction–Standard for ..... AITC 108–69
Joists and Rafters
Span Tables for NFoPA–77
Design Values NFoPA–77
National Design Specification for Wood Construction NFoPA–77
–1977 Supplement (Design Values) NFoPA–77
Pile Foundations Know How AWPI–70
Pole Building Design AWPI–72
Plywood Commercial/Industrial Construction Guide APA–Y300–76
Plywood Design Specifications APA–Y510–76
Plywood-Lumber Components–Design Specifications for (includes curved panels, beams, stressed-skin panels, sandwich panels, diaphragm construction and folded plates) APA–V815–77
Plywood-Lumber Components–Fabrication Specifications (includes curved panels, beams, stressed-skin panels, sandwich panels, and folded plates) APA–V820–77
Plywood Residential Construction Guide APA–Y405–76
Protection of Structural, Glued Laminated Timber During Transit, Storage and Erection–Recommended Practice for ..... AITC 111–65
Structural Design Data–Wood NFoPA–70
Structural Design Guide for Hardwood Plywood HPMA–HP–SG–72
Structural Glued Laminated Timber—
Inspection Manual for ..... AITC 200–73
Structural Timber Framing–Standard for the Design of ..... AITC 102–76
Timber Construction Manual AITC–74
Trusses–Design Specifications for Light Metal Plate Connected Wood TPI–74
Wood Handbook ..... USDA Handbook No. 72–74

Unclassified Miscellaneous

Basic Property Maintenance Code BOCA–78
Building Materials and Equipment—
Coordination of Dimensions of ..... ANSI A62.1–57
Demolition–Safety Requirements for ..... ANSI A10.6–69
Fallout Shelters–Suggested Building Code Provisions for DOD–OCD–TR–36–66
Flood Proofing Regulations ..... U.S. Army–72
Floor and Wall Openings, Railings, and Toe Boards–Safety Requirements for ..... ANSI A12.1–73
Installing Vitrified Clay Sewer Pipe–Recommended Practice for ..... ASTM C12–74
Loads, Minimum Design in Buildings and Other Structures—
Building Code Requirements for ..... ANSI A58.1–72
Mobile Home Construction and Safety Standards HUD–75

Unclassified Miscellaneous—continued

APPENDIX C

MATERIAL STANDARDS

See also Appendix D for standards for tests of specific materials.

Concrete

Aggregates, Concrete–Specifications for ..... ASTM C33–77
Aggregates, Lightweight, for Structural Concrete–Specifications for ..... ASTM C330–77
Aggregates, Lightweight, for Concrete Masonry Units ..... (See Masonry)
Aggregates, Lightweight, for Insulating Concrete–Specifications for ..... ASTM C332–77
Forms for One-way Concrete Joist Construction–Types and Sizes of ..... DOC PS 16–69
Gypsum Concrete–Specifications for ..... ASTM C317–75
Manufacturing Reinforced Concrete Floor and Roof Units–Recommended Practice for ..... ACI 512–67
Masonry Units–Concrete ..... (See Masonry)
Natural Cement–Specifications for ..... ASTM C10–76
Portland Cement–Specifications for ..... ASTM C150–77
Ready Mix Concrete–Specifications for ..... ASTM C94–74a
Reinforcing ..... (See Metals)
Sheet Materials for Curing Concrete–Specifications for ..... ASTM C171–75
Vermiculite Concrete Roofs and Slabs on Grade–Specifications for ..... ANSI A122.1–65

Interior Finishes

Adhesives, Organic, for Installation of Ceramic Tile Types I and II–Standard for ..... ANSI A136.1–72
Aggregates, Inorganic, for use in Gypsum Plaster–Specifications for ..... ASTM C35–76
Conductive Dry-Set Portland Cement Mortar, Standard Specification for (for Ceramic Tile) ..... ANSI A118.2–76
Dry-Set Portland Cement Mortar–(for Ceramic Tile) ..... ANSI A118.1–76
Epoxy, Chemical Resistant, Water Cleanable Tile-Setting and Grouting–Standard Specifications for ..... ANSI A118.3–76
Gypsum and Gypsum Products, Chemical Analysis of–Standard Methods for ..... ASTM C471–75
Gypsum Base for Veneer Plaster–Specifications for ..... ASTM C588–76
Gypsum Board Products, Gypsum Lath, Gypsum Partition Tile or Block, and Precast Reinforced Gypsum Slabs–Method of Physical Testing of ..... ASTM C473–76
Gypsum Lath–Specifications for ..... ASTM C37–76
Gypsum Plasters–Specifications for ..... ASTM C28–76
Gypsum Plasters and Gypsum Concrete, Physical Testing of–Standard Methods for ..... ASTM C472–73
Gypsum Veneer Plaster–Specifications for ..... ASTM C587–73
Gypsum Wallboard–Specifications for ..... ASTM C36–76
Latex-Portland Cement Mortar, Standard Specification for (for Ceramic Tile) ..... ANSI A118.4–76
Lime, Hydrated, Normal Finishing–Specifications for ..... ASTM C6–74
Lime, Hydrated, Special Finishing–Specifications for ..... ASTM C206–76

Interior Finishes—continued

Quicklime and Hydrated Lime–Methods of Physical Testing of ..... ASTM C110–76a
Quicklime for Structural Purposes–Specifications for ..... ASTM C5–74
Tile, Ceramic–Standard Specifications for ..... TCA 137.1–76

Masonry

Aggregate, Fine–Effect of Organic Impurities in, on Strength of Mortar ..... ASTM C87–75
Aggregates, Lightweight, for Concrete Masonry Units–Specifications for ..... ASTM C331–77
Aggregate for Masonry Grout–Specifications for ..... ASTM C404–76
Aggregate for Masonry Mortar–Specifications for ..... ASTM C144–76
Brick, Building (Solid Masonry Units Made from Clay or Shale)–Specifications for ..... ASTM C62–75a
Brick, Concrete Building–Specifications for ..... ASTM C55–75
Brick, Face, Calcium Silicate (Sand Lime Brick)–Specification for ..... ASTM C73–75
Brick, Facing (Solid Masonry Units Made from Clay or Shale)–Specifications for ..... ASTM C216–77
Brick, Hollow (Hollow Masonry Units Made from Clay or Shale) ..... ASTM C652–77
Cement, Masonry–Specifications for ..... ASTM C91–75
Ceramic Tile (Veneers) ..... (See Interior Finishes)
Clay Facing Tile, Structural–Specification for ..... ASTM C212–75
Clay Load-Bearing Wall Tile, Structural–Specifications for ..... ASTM C34–75
Clay Non-Load Bearing Screen Tile, Structural–Specification for ..... ASTM C530–75
Clay Non-Load-Bearing Wall Tile, Structural–Specification for .... ASTM C56–76
Concrete Masonry Units, Hollow Load Bearing–Specifications for ..... ASTM C90–75
Concrete Masonry Units, Hollow Non-Load Bearing–Specifications for ..... ASTM C129–75
Concrete Masonry Units, Solid Load Bearing–Specifications for ..... ASTM C145–75
Glazed Units: Ceramic Glazed Structural Clay Facing Tile, Facing Brick, and Solid Masonry Units–Specifications for ..... ASTM C126–76
Gypsum Partition Tile and Block–Specifications for ..... ASTM C52–77
Lime, Hydrated for Masonry Purposes–Specifications for ..... ASTM C207–76
Limes ..... (See Interior Finishes)
Mortar and Grout for Reinforced Masonry–Specification for ..... ASTM C476–76
Mortar for Unit Masonry–Specification for ..... ASTM C270–73
Portland Cement-Lime Mortar for Brick Masonry–Standard Specification for ..... BIA M1–72
Portland Cement–Specifications for ..... (See Concrete)

Metal

Alloy Steel Bolts, Quenched and Tempered, for Structural Steel Joints–Standard Specifications for ..... ASTM A490–76a
Alloy Steel Sheets and Strip, Regular Quality Hot-Rolled and Cold-Rolled–Specification for ..... ASTM A506–73
Aluminum-Alloy Bars, Rods and Wire–Standard Specifications for ..... ASTM B211–75
Aluminum-Alloy Extruded Bars, Rods, Shapes and Tubes–Standard Specifications for ..... ASTM B221–76a

Metal—continued

Aluminum-Alloy Die and Hand Forgings—
Standard Specifications for ..... ASTM B247–76
Aluminum Alloy Seamless Pipe and
Seamless Extruded Tubing—
Standard Specifications for ..... ASTM B241–76
Aluminum Alloy Sheet and Plate—
Standard Specifications for ..... ASTM B209–77
Aluminum-Alloy Standard Structural Shapes,
Rolled or Extruded—Standard Specifications for ..... ASTM B308–73
Aluminum-Alloy Drawn Seamless Tubes—
Standard Specifications for ..... ASTM B210–76
Aluminum Alloy Extruded Structural Pipe and Tube—
Standard Specifications for ..... ASTM B429–74
Aluminum-Alloy Round Welded Tubes—
Standard Specifications for ..... ASTM B313–73
Aluminum-Alloy Rivet and Cold Heading
Wire and Rods—Standard Specifications for ..... ASTM B316–75
Aluminum Alloy Die Castings—Standard
Specifications for ..... ASTM B85–76
Aluminum Alloy Permanent Mold Castings—
Standard Specification for ..... ASTM B108–76
Aluminum Alloy Sand Castings—Standard
Specifications for ..... ASTM B26–76a
Aluminum Sliding Glass Doors—Specifications for ..... AAMA 402.9–77
Aluminum Windows—Specifications for ..... AAMA 302.9–77
Bare Mild Steel Electrodes and Fluxes for
Submerged Arc Welding—Specifications for ..... AWS A5.17–76
Bolts, High Strength, for Structural Steel
Joints Including Suitable Nuts and Plain
Hardened Washers—Specifications for ..... ASTM A325–76c
Bolts and Studs, Quenched and Tempered Steel—
Specifications for ..... ASTM A449–76c
Carbon and Alloy Steel Nuts for Bolts for
High-Pressure and High Temperature Service—
Specifications for ..... ASTM A194–77
Carbon-Steel Castings Suitable for Fusion
Welding for High Temperature Service—
Specifications for ..... ASTM A216–75
Carbon Steel Nuts—Specifications for ..... ASTM A563–76a
Carbon Steel Plates of Structural Quality, Low and
Intermediate Tensile Strength—Specifications for ..... ASTM A283–75
Carbon Steel Strip, Cold-Rolled—
Specifications for ..... ASTM A109–72
Castings, Mild-to-Medium Strength Carbon Steel
for General Application—Specifications for ..... ASTM A27–77
Castings, Gray Iron—Specifications for ..... ASTM A48–76
Cold-Formed Welded and Seamless Carbon Steel
Structural Tubing in Rounds and Squares—
Specifications for ..... ASTM A500–77
Steel Castings for Structural Purposes, High
Strength—Specifications for ..... ASTM A148–73
Electrodes, Low Alloy Steel Covered Arc
Welding—Specifications for ..... AWS A5.5–69
Electrodes, Mild Steel Arc Welding—
Specifications for ..... AWS A5.1–69
High Strength, Low Alloy Structural Steel with
50,000 psi Minimum Yield Point to 4 inches
Thick—Specifications for ..... ASTM A588–77
Hot-Formed Welded and Seamless Carbon Steel
Structural Tubing—Specifications for ..... ASTM A501–76

Metal—continued

Metal—continued

Structural Steel–Specifications for ..... ASTM A36–75
Structural Steel, High Strength–
Specifications for ..... ASTM A440–75
Structural Steel, High Strength Low Alloy–
Specifications for ..... ASTM A242–75
Structural Steel, High Strength Low Alloy
Columbium Vanadium–Specifications for ..... ASTM A572–77
Structural Steel, High Strength Low Alloy
Manganese Vanadium–Specifications for ..... ASTM A441–75
Structural Steel, High Yield Strength.
Quenched and Tempered Alloy Steel Plate, Suitable
for Welding–Specifications for ..... ASTM A514–77
Structural Steel with 42,000 psi Minimum Yield Point
(½ in. Maximum Thickness)–Specification for ..... ASTM A529–75
Uncoated Stress–Relieved Wire for Prestressed Concrete–
Specifications for ..... ASTM A421–76

Plumbing and Piping

Asbestos-Cement Non-Pressure Sewer Pipe–
Specifications for ..... ASTM C428–77
Asbestos-Cement Pressure Pipe–
Specifications for ..... ASTM C296–76
Brass Pipe, Seamless Red Brass–
Specification for ..... ASTM B43–76
Cast Iron and Ductile Iron Pressure Pipe–
Specifications for ..... ASTM A377–77
Cast Iron Soil Pipe and Fittings–
Specifications for ..... ASTM A74–75
Clay Pipe
–Compression Joints for Vitrified Clay
Bell and Spigot Pipe ..... ASTM C425–75
–Drain Tile–Specifications for ..... ASTM C4–75
–Extra Strength and Standard Strength
Clay Pipe and Perforated Clay Pipe–
Specifications for ..... ASTM C700–75
Concrete Pipe
–Culvert Storm Drain and Sewer, Reinforced
Specifications for ..... ASTM C76–76
–Sewer–Specifications for ..... ASTM C14–75
Copper Drainage Tube (DWV)–Specification for ..... ASTM B306–76
Copper Pipe, Seamless, Standard Sizes–
Specifications for ..... ASTM B42–76
Steel Pipe
–Black and Hot Dipped Zinc Coated (Galvanized)
Welded and Seamless, for Ordinary Uses–
Specifications for ..... ASTM A120–77
–Steel or Iron, Spiral-Welded–
Specifications for ..... ASTM A211–75
–Welded and Seamless–Specifications for ..... ASTM A53–77
Tile, Clay Drain ..... (See Clay Pipe)
Tube and Tubing
–Brass, Seamless–Specifications for ..... ASTM B135–74
–Copper, Seamless–Specifications for ..... ASTM B75–77
–Copper, Seamless, Water–Specifications for ..... ASTM B88–76
–Copper Brazed Steel Tubing–
Specifications for ..... ASTM A254–76
Welded and Seamless Wrought Steel Pipe ..... ANSI B36.10–75
Valves, Flanges and Pipe Fittings, Gray
Iron Castings–Specifications for ..... ASTM A126–73

Roofing and Siding

Asphalt for Dampproofing and Waterproofing–
Specifications for ..... ASTM D449–73
Asphalt for Use in Constructing Built-Up
Roof Coverings–Specifications for ..... ASTM D312–77
Asphalt Roll Roofing Surfaced with
Mineral Granules–Specifications for ..... ASTM D249–73
Asphalt Roll Roofing Surfaced with Powdered
Talc or Mica–Specifications for ..... ASTM D224–75
Asphalt Shingles Surfaced with Mineral
Granules–Specifications for ..... ASTM D225–70
Asphalt Siding Surfaced with Mineral
Granules–Specifications for ..... ASTM D699–70
Fiberboard Nail-Base Sheathing–
Standard Specification for ..... ASTM D2277–75
Fiber Insulation Board, Structural and Decorative
–Recommended Product and Application Specification
½ Inch Fiberboard Nail-Base Sheathing ..... ABPA-IB Spec. No. 2–75
–Recommended Product and Application Specification
Structural Insulating Roof Deck ..... ABPA-IB Spec. No. 1–75
–Method of Testing (Made from Cellulosic fiber) ..... ASTM C209–72
–Specifications for (Made from Cellulosic fiber) ..... ASTM C208–72
Formboard, Structural Insulating (Made from
Cellulosic Fibers)–Specifications for ..... ASTM C532–74
Grading Rules for CertiGrade Red Cedar Shingles RCSHSB–75
Gypsum Sheathing Board–Specifications for ..... ASTM C79–76

Wood and Wood Products

American Softwood Lumber Standard ..... DOC PS20–70
Fire Retardant Pressure Treatment, Plywood ..... AWPA C27–74
Fire Retardant Pressure Treatment,
Structural Lumber ..... AWPA C20–74
Glued Laminated Structural Lumber Standards
–Appearance Grades ..... AITC 110–76
–Dimensions of ..... AITC 113–75
–"E" Rated and Visually Graded Lumber of Douglas Fir,
Southern Pine, Hem-Fir, Lodgepole pine ..... AITC 120–74
–Electric Utility Framing and Crossarms ..... AITC 114–74
–Structural Glued Laminated Members and
Laminations Before Gluing of Southern
Pine, Pacific Coast Douglas Fir and
Western Hemlock by Pressure Process ..... AWPA C28–76
–Structural Glued Laminated Southern Pine SPIB–74
–Structural Glued Laminated Timber ..... DOC PS 56–73
–Structural Glued Laminated Timber of
Douglas Fir, Western Larch, Southern
Pine and California Redwood ..... AITC 117–76
–Supplement No. 2–Hem Fir AITC–73
–Supplement No. 3–Douglas Fir and Western Larch Outer
Laminations and Western Woods Core Laminations AITC–74
–Supplement No. 5–Douglas Fir, Western Larch, and Western Woods,
for Small Beams of 20 Inches Depth or Less AITC–76
Hardboard–Commercial Standard for ..... DOC PS 58–73
Hardboard Siding, Voluntary Product Standard for ..... DOC PS 60–73
Hardwood Glued Laminated Timber–Standard Specifications for ... AITC 119–76
Laminated Hardwood Block Flooring–Standard for ..... ANSI O10.2–75
Methods for Establishing Structural Grades and
Related Allowable Properties for Visually Graded
Lumber ..... ASTM D245–74

Wood and Wood Products—continued

Methods of Test for Durability of Fire Retardant Treatment of Wood ..... ASTM D-2898–77
Particleboard–Commercial Standard for ..... DOC CS 236–66
Piles, Round Timber– Establishing Design Stresses for ..... ASTM D2899–74
Piles, Timber, Round– Specifications for ..... ASTM D25–73
Plywood
–Construction and Industrial– Product Standard for ..... DOC PS I–74
–Hardwood and Decorative– Product Standard for ..... DOC PS51–71
–Preservative Treatment for Pressure Process ..... AWPA C9–76
Preservative Treatment
–of Lumber, Timber, Bridge Ties, and Mine Ties (All Species)–Standards for ..... AWPA C2–76
–of Piles by Pressure Process–Standards for ..... AWPA C3–76
–of Poles by Pressure Process–Standards for ..... AWPA C4–75
–by Pressure Process–All Timber Products– Standards for ..... AWPA C1–76
Preservatives for Wood
–Creosote–Standards for ..... AWPA P 1–65
–Creosote and Creosote Solutions ..... AWPA P 2–76
–Oil-Borne Preservatives–Standards for ..... AWPA P 8–74
–Oil-Borne Solvents–Standards for ..... AWPA P 9–76
–Water-Borne Preservatives–Standards for ..... AWPA P 5–76
Quality Control Standards for Pressure-Treated Lumber and Plywood
–With Creosote or Creosote Coal Tar Solution (For Above Ground Use) AWPB-LP-5–75
–With Creosote or Creosote Coal Tar Solution (For Ground Contact) AWPB-LP-55–75
–With Heavy Petroleum Solvent-Penta Solution (For Above Ground Use) AWPB-LP-7–75
–With Heavy Petroleum Solvent-Penta Solution (For Ground Contact) AWPB-LP-77–76
–With Light Petroleum Solvent-Penta Solution (For Above Ground Use) AWPB-LP-3–75
–With Light Petroleum Solvent-Penta Solution (For Ground Contact) AWPB-LP-33–75
–With Volatile Petroleum Solvent (LPG)-Penta Solution (For Above Ground Use) AWPB-LP-4–75
–With Volatile Petroleum Solvent (LPG)-Penta Solution (For Ground Contact) AWPB-LP-44–75
–With Water-Borne Preservatives (For Above Ground Use) AWPB-LP-2–75
–With Water-Borne Preservatives (For Ground Contact) AWPB-LP-22–75
Shingles ..... (See Roofing and Siding)
Structural Timber Framing–Treating Standard for ..... AITC 109–77
Tongue-and-Groove Heavy Timber Roof Decking– Standard for ..... AITC 112–74

Unclassified Miscellaneous

Felt–Methods of Testing ..... ASTM D461–72

Unclassified Miscellaneous—continued

Flammability of Flexible Plastic—
Method of Test for ..... ASTM D568–77
Flammability of Self-supporting Plastics—
Method of Test for ..... ASTM D635–77
Formboard, Gypsum—Specification for ..... ASTM C318–73
Insulated Metal Roof Deck Standard ..... FM–FMRC 4450–71
Laboratory Measurement of Airborne Sound Transmission
Loss of Building Partitions, Standard Recommended
Practice for ..... ASTM E90–75
Laboratory Measurement of Impact Sound Transmission
Through Floor-Ceiling Assemblies Using the Tapping
Machine, Tentative Method of ..... ASTM E492–73T
Nails, Brads, Staples and Spikes:
Wire, Cut and Wrought—Federal Specifications
for, with Amendment 3-1974 ..... FSFF-N-105B–71
Nails for the Application of
Gypsum Wallboard—Standard
Specifications for ..... ASTM C514–72
Perlite Loose Fill Insulation—
Standard Specifications for ..... ASTM C549–73
Plastics—Definitions of Terms Relating to ..... ASTM D883–76
Plastics, Deformation of, Under Load—
Method of Test for ..... ASTM D621–76
Plastics, Density of Smoke from Burning or Decomposition
—Method of Test for ..... ASTM D2843–77
Plastics, Ignition Properties of,
—Method of Test for ..... ASTM D1929–77
Thickness of Solid Electrical Insulation—
Method of Test for ..... ASTM D374–74
Vermiculite Loose Fill Insulation—
Standard Specifications for ..... ASTM C516–75

APPENDIX D

STRUCTURAL UNIT TEST STANDARDS

See also Appendices B and C for engineering practice standards and material standards which contain unit test methods.

Concrete

Coarse Aggregates, Resistance to Abrasion of Small Size, by use of the Los Angeles Abrasion Machine—Test for ..... ASTM C131–76
Fine and Coarse Aggregates, Sieve or Screen Analysis of—Test for ..... ASTM C136–76
Concrete, Obtaining and Testing Drilled Cores and Sawed Beams of ..... ASTM C42–74
Concrete Test Specimens in the Laboratory—Making and Curing.. ASTM C192–76
Concrete, Molded Cylinders—Test for Compressive Strength of ..... ASTM C39–72
Lightweight Insulating Concrete, Compressive Strength—Test for ..... ASTM C495–77
Concrete Masonry Units—Sampling and Testing ..... ASTM C140–75
Concrete Masonry Units, Hollow Load Bearing—Specifications for ..... ASTM C90–75
Concrete Masonry Units, Solid Load Bearing—Specifications for ..... ASTM C145–75
Concrete, Hardened Portland Cement—Test for Cement Content of ..... ASTM C85–73
Concrete, Ready Mixed—Specifications for ..... ASTM C94–74a
Sands for Concrete—Test for Organic Impurities in ..... ASTM C40–75

Interior Finishes

Gypsum and Gypsum Products, Chemical Analysis of—Standard Methods for ..... ASTM C471–75
Gypsum Board Products, Gypsum Lath, Gypsum Partition Tile or Block, and Precast Reinforced Gypsum Slabs—Method of Physical Testing of ..... ASTM C473–76
Gypsum Concrete—Specifications for ..... ASTM C317–75
Gypsum Formboard—Specifications for ..... ASTM C318–73
Gypsum Lath—Specifications for ..... ASTM C37–76
Gypsum Plasters—Specifications for ..... ASTM C28–76
Gypsum Plasters and Gypsum Concrete, Physical Testing of—Standard Methods for ..... ASTM C472–73
Gypsum Sheathing Board—Specifications for ..... ASTM C79–76
Gypsum Wallboard—Specifications for ..... ASTM C36–76
Insulating Board (Made from Cellulosic Fiber), Structural and Decorative
—Methods of Testing ..... ASTM C209–72
—Specifications for ..... ASTM C208–72
Lime ..... (See Masonry)

Masonry

Aggregate for Masonry Mortar—Specifications for ..... ASTM C144–76
Brick, Concrete Building—Specifications for ..... ASTM C55–76
Brick and Structural Clay Tile—Sampling and Testing ..... ASTM C67–73
Cement, Masonry—Specifications for ..... ASTM C91–75

Masonry—continued

Ceramic Tile (Veneers) ..... (See Interior Finishes)
Chemical Analysis of Limestone, Quicklime and Hydrated Lime ..... ASTM C25–72
Concrete Masonry Units ..... (See Concrete)
Diagonal Tension (Shear) in Masonry Assemblages —Method of Test for ..... ASTM E519–74
Flexural Bond Strength of Masonry —Methods of Test for ..... ASTM E518–76
Glazed Units—Ceramic Glazed Structural Clay Facing Tile, Facing Bricks, and Solid Masonry Units—Specifications for ..... ASTM C126–76
Lime and Limestone Products—Methods of Sampling, Inspection, Packing and Marking of ..... ASTM C50–74
Lime, Hydrated and Quick—Methods of Physical Testing of ..... ASTM C110–76a
Lime, Hydraulic Hydrated for Structural Purposes—Specifications for ..... ASTM C141–72
Mortars, Hydraulic Cement—Method of Test for Compressive Strength of (Using 2 in. Cube Specimens) ..... ASTM C109–77
Mortars, Hydraulic Cement—Method of Test for Tensile Strength of ..... ASTM C190–77
Stone, Natural Building—Methods of Test for Absorption and Bulk Specific Gravity of ..... ASTM C97–77
Stone, Natural Building—Method of Test for Compressive Strength of ..... ASTM C170–76
Stone, Natural Building—Methods of Test for Modulus of Ruptures of ..... ASTM C99–76
Water Permeance of Masonry —Method of Test for ..... ASTM E514–74

Metals

Cast Iron—Method of Testing Compression of ..... ASTM A256–76
Metallic Materials—Methods of Tension Testing of ..... ASTM E8–77a

Unclassified Miscellaneous

Cement, Hydraulic—Methods of Sampling ..... ASTM C183–76
Cement, Natural—Specifications for ..... ASTM C10–76
Cement, Portland—Specifications for ..... ASTM C150–77
Clay Pipe, Testing ..... ASTM C301–76
Plastics Under Load—Method of Test for Deformation of ..... ASTM D621–75
Tile, Clay Drain—Specification for ..... ASTM C4–75

Wood and Wood Products

Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials ..... ASTM D1037–72a
Timber, Small Clear Specimens—Method of Testing ..... ASTM D143–72
Timbers in Structural Sizes—Methods of Static Tests of ..... ASTM D198–76
Veneer, Plywood and Other Glued Veneer Construction—Methods of Testing ..... ASTM D805–72

APPENDIX E

STRUCTURAL ASSEMBLY TEST STANDARDS

See also Appendix D for standards for tests of unit materials.

Mechanical Fasteners in Wood, Testing of ..... ASTM D1761–77
Heavy Truss Assemblies, Testing ..... ASTM E73–74
Panels for Building Construction—Methods of
Conducting Strength Test of ..... ASTM E72–77
Rate of Leakage Through Exterior
Windows, Curtain Walls and Doors,
Standard Method of Test for ..... ASTM E283–73

APPENDIX F

DURABILITY TEST STANDARDS

See also Appendices C, D and E for tests of individual materials or unit assemblies.

Concrete and Concrete Aggregate

Concrete, Aggregate–Method of Tests for Voids in ..... ASTM C30–70
Concrete, Air Content of Freshly Mixed, by the Pressure Method–Method of Test for ..... ASTM C231–75
Unit Weight, Yield and Air Content (Gravimetric) of Concrete–Test for ..... ASTM C138–75
Organic Impurities in Sand for Concrete–Method of Test for ..... ASTM C40–75

Masonry and Masonry Products

Ceramic Glazed Structural Clay Facing Tile, Facing Brick and Solid Masonry Units–Specifications for ..... ASTM C126–76
Freezing and Thawing Tests (see specifications for material)
–Brick and Structural Clay Tile–Sampling and Testing ..... ASTM C67–73
–Clay Drain Tile–Specifications for ..... ASTM C4–75

Plastics

Water Absorption of Plastics–Methods of Test for ..... ASTM D570–77

Roofing and Siding

Asphalt Roll Roofing, Cap Sheets, and Shingles–Methods of Testing ..... ASTM D228–69
Bituminous Materials, Accelerated Test of Weathering–Recommended Practice for ..... ASTM D529–73
Felted and Woven Fabrics Saturated with Bituminous Substance for Use in Waterproofing and Roofing–Methods of Sampling and Testing ..... ASTM D146–72

Unclassified Miscellaneous

Evaluating the Properties of Wood-Base Fiber and Particle Panel Materials–Specifications for ..... ASTM D1037–72a
Gypsum and Gypsum Products, Chemical Analysis of–Standard Methods for ..... ASTM C471–75
Gypsum Board Products, Gypsum Lath, Gypsum Partition Tile or Block, and Precast Reinforced Gypsum Slabs–Method of Physical Testing of ..... ASTM C473–76
Gypsum Plasters and Gypsum Concrete, Physical Testing of–Standard Methods for ..... ASTM C472–73

APPENDIX G

FIRE TEST AND FLAME SPREAD TEST STANDARDS

Combustible or Noncombustible Properties

Noncombustibility of Elementary Materials—
Method of Test for Determining ..... ASTM E136–73

Fireresistance Properties

Building Construction and Materials—
Methods of Fire Test of ..... ASTM E119–76
Ceiling Construction ..... (See Building Construction)

Door Assemblies—Methods of
Fire Tests of ..... ASTM E152–76
Fire Dampers ..... UL 555–73
Fire Tests for Flame-Resistant
Textiles and Films—Standard
Methods of ..... NFiPA 701–76
Roof Coverings—Methods of
Fire Test of ..... ASTM E108–75
Tents, Grandstands and Air-Supported
Structures Used for Places
of Assembly—Standard for ..... NFiPA 102–72

Flame Spread Properties

Sound Controlling Blocks and Boards (Acoustical Tiles and Panels,
Prefabricated) with amendment No. 4–1976 ..... FS SS-118a–67
Surface Burning Characteristics of Building Materials—
Method of Test for ..... ASTM E84–77

Flash Point

Flash Point by Pensky-Masters Closed Tester—Method
of Test for ..... ASTM D93–73
Flash Point by Tag Closed Tester—Method of Test for ..... ASTM D56–75
Flash and Fire Points by Cleveland Open Cup—
Method of Test for ..... ASTM D92–72

Unclassified Miscellaneous

Surface Flammability of Carpets and Rugs—
Standard for the ..... DOC FF-1–70

APPENDIX H

STANDARD TIME-TEMPERATURE FIRE TEST CONTROLS

Time	Temperature, deg F	Curve area above 68 F base		Temperature, deg C	Curve area above 20 C base	
h:min		Deg. F. x min.	Deg. F. x hr.		Deg. C. x min.	Deg. C. x hr.
0:00	68	00	00	20	00	0
0:05	1,000	2,330	39	538	1,290	22
0:10	1,300	7,740	129	704	4,300	72
0:15	1,399	14,150	236	760	7,860	131
0:20	1,462	20,970	350	795	11,650	194
0:25	1,510	28,050	468	821	15,590	260
0:30	1,550	35,360	589	843	19,650	328
0:35	1,584	42,860	714	862	23,810	397
0:40	1,613	50,510	842	878	28,060	468
0:45	1,638	58,300	971	892	32,390	540
0:50	1,661	66,200	1,103	905	36,780	613
0:55	1,681	74,220	1,237	916	41,230	687
1:00	1,700	82,330	1,372	927	45,740	762
1:05	1,718	90,540	1,509	937	50,300	838
1:10	1,735	98,830	1,647	946	54,910	915
1:15	1,750	107,200	1,787	955	59,560	993
1:20	1,765	115,650	1,928	963	64,250	1,071
1:25	1,779	124,180	2,070	971	68,990	1,150
1:30	1,792	132,760	2,213	978	73,760	1,229
1:35	1,804	141,420	2,357	985	78,560	1,309
1:40	1,815	150,120	2,502	991	83,400	1,390
1:45	1,826	158,890	2,648	996	88,280	1,471
1:50	1,835	167,700	2,795	1,001	93,170	1,553
1:55	1,843	176,550	2,942	1,006	98,080	1,635
2:00	1,850	185,440	3,091	1,010	103,020	1,717
2:10	1,862	203,330	3,389	1,017	112,960	1,882
2:20	1,875	221,330	3,689	1,024	122,960	2,049
2:30	1,888	239,470	3,991	1,031	133,040	2,217
2:40	1,900	257,720	4,295	1,038	143,180	2,386
2:50	1,912	276,110	4,602	1,045	153,390	2,556
3:00	1,925	294,610	4,910	1,052	163,670	2,728
3:10	1,938	313,250	5,221	1,059	174,030	2,900
3:20	1,950	332,000	5,533	1,066	184,450	3,074
3:30	1,962	350,890	5,848	1,072	194,940	3,249
3:40	1,975	369,890	6,165	1,079	205,500	3,425
3:50	1,988	389,030	6,484	1,086	216,130	3,602
4:00	2,000	408,280	6,805	1,093	226,820	3,780

APPENDIX I

FIRE PROTECTION STANDARDS

Alarm and Detecting Systems

Alarms Systems, Public Fire Service Communications ..... NFiPA 73–75
Automatic Fire Detectors–Standard for ..... NFiPA 72E–74
Signaling Systems–Standard for the Installation, Maintenance and Use of
–Auxiliary Protective–for Fire Alarm Service ..... NFiPA 72B–75
–Central Station Protective–for Guard, Fire Alarm and Supervisory Service ..... NFiPA 71–77
–Household Fire Warning Equipment ..... NFiPA 74–75
–Local Protective–for Watchman, Fire Alarm and Supervisory Service ..... NFiPA 72A–75
–Proprietary Protective–for Watchman, Fire Alarm and Supervisory Service ..... NFiPA 72D–75
–Remote Station Protective ..... NFiPA 72C–75
Smoke Detectors, Single and Multiple Stations ..... UL 217–77

Prevention of Spread of Fire

Air Conditioning and Ventilating Systems
–Other than Residence Type ..... NFiPA 90A–76
–Residence Type ..... NFiPA 90B–76
Aircraft Hangars–Standard on ..... NFiPA 409–75
Doors, Tin-Clad Fire ..... UL 10A–73
Dust Explosion Prevention ..... (See Appendix B)
Fire Doors and Windows–Standard for ..... NFiPA 80–77
Hardware, Sliding, for Standard Horizontally Mounted Tin-Clad Fire Doors ..... UL 14B–73
Hardware, Swinging, for Standard Tin-Clad Fire Doors ..... UL 14C–73

Protection Systems

Carbon Dioxide Extinguishing Systems–Standard on ..... NFiPA 12–77
Dry Chemical Extinguishing System –Standard for ..... NFiPA 17–75
Extinguishers, Portable Fire– Standard for the Installation and Maintenance of ..... NFiPA 10–75
Fire Suppression System for Life Safety, Standard for the Design and Installation of ..... BOCA 100–78
Foam Extinguishing Systems, Standard for ..... NFiPA 11–77
Foam-Water Sprinkler Systems and Foam-Water Spray Systems– Standard for the Installation of ..... NFiPA 16–74
Foam Systems–Standard for High Expansion ..... NFiPA 11A–76
Halogenated Fire Extinguishing Agent Systems–Standard for
–Halon 1211 ..... NFiPA 12B–77
–Halon 1301 ..... NFiPA 12A–77

Protection Systems—continued

APPENDIX J

UNIT DEAD LOADS FOR DESIGN PURPOSES

The intent of this appendix is to assist the designer and building official in establishing the minimum weights for materials commonly used in building construction. Some material assemblies have a range in weight. A typical figure is indicated, but when there is reason to suspect a considerable deviation, the actual weight should be determined.

Note on use of Appendix J tables

When making calculations based on the tables in Appendix J, the weights of masonry include mortar but not plaster. For plaster, add 5 pounds per square foot (psf) for each face plastered. Values given represent averages. In some cases there is a considerable range of weight for the same construction.

Table J-1

UNIT DESIGN DEAD LOADS FOR CONCRETE SLABS

Concrete slabs	Pounds per square foot
Concrete, reinforced-stone, per inch of thickness	12½
Concrete, reinforced-lightweight sand, per inch of thickness	9½
Concrete, reinforced, lightweight, per inch of thickness	9
Concrete, plain stone, per inch of thickness	12
Concrete, plain, lightweight, per inch of thickness	8½

Table J-2

UNIT DESIGN DEAD LOADS FOR RIBBED SLABS

Ribbed slabs Depth, in inches (rib depth plus slab thickness)*	Pounds per square foot					
	Width of rib, in inches					
	4	5	6	7	8	9
12 inch clay-tile fillers (normal weight concrete):						
4 plus 2	49	51	52	54	—	—
6 plus 2	60	63	65	67	—	—
8 plus 2½	79	82	85	87	—	—
10 plus 3	96	100	103	106	—	—
12 plus 3	108	112	116	120	—	—

*Make appropriate allowances for tapered ends.

Table J-2 (cont'd.)

UNIT DESIGN DEAD LOADS FOR RIBBED SLABS

Ribbed slabs Depth, in inches (rib depth plus slab thickness)*	Pounds per square foot					
	Width of rib, in inches					
	4	5	6	7	8	9
20 inch wide forms:						
6 plus 2½	45	48	50	50	—	—
8 plus 2½	51	54	57	60	—	—
10 plus 2½	57	60	64	68	—	—
12 plus 2½	63	67	72	76	—	—
14 plus 2½	—	74	79	84	—	—
16 plus 2½	—	—	88	93	98	—
20 plus 2½	—	—	—	111	118	—
30 inch wide forms:						
6 plus 2½	41	43	45	47	—	—
8 plus 2½	45	47	50	53	—	—
10 plus 2½	49	52	55	58	—	—
12 plus 2½	53	57	60	64	—	—
14 plus 2½	—	62	66	70	—	—
16 plus 2½	—	—	72	76	80	—
20 plus 2½	—	—	—	90	95	101
2-way clay-tile fillers (12 × 12):						
4 plus 2	61	62	64	—	—	—
6 plus 2	87	89	90	—	—	—
8 plus 2½	100	103	107	—	—	—
10 plus 3	121	126	131	—	—	—
12 plus 3	136	141	146	—	—	—

*Make appropriate allowances for tapered ends.

Table J-3

UNIT DESIGN DEAD LOADS FOR WAFFLE SLABS

Waffle slabs Depth, in inches (Rib depth plus slab thickness)	Pounds per square foot
19 × 19, 5 @ 24	
6 plus 2½	66
8 plus 2½	78
10 plus 2½	85
12 plus 2½	101
30 × 30, 6 @ 36	
8 plus 3	73
10 plus 3	83
12 plus 3	95
14 plus 3	106
16 plus 3	114
20 plus 3	135

Table J-4

UNIT DESIGN DEAD LOADS FOR FLOOR FINISH

Floor finish	Pounds per square foot
Double ⅞ inch wood on sleepers, light-concrete fill	19
Double ⅞ inch wood on sleepers, stone-concrete fill	28
Single ⅞ inch wood on sleepers, light-concrete fill	16
Single ⅞ inch wood on sleepers, stone-concrete fill	25
3 inch wood block on mastic, no fill	10
1 inch cement finish on stone-concrete fill	32
1 inch terrazzo on stone-concrete fill	32
Marble and mortar on stone-concrete fill	33
Linoleum on stone-concrete fill	32
Linoleum on light-concrete fill	22
1½ inch asphalt mastic flooring	18
3 inch wood block on ½ inch mortar base	16
Solid flat tile on 1 inch mortar base	23
2 inch asphalt block, ½ inch mortar	30
1 inch terrazzo, 2 inch stone concrete	32
Floor finish tile per inch depth	12
Cement finish per inch depth	12
Gypsum slabs per inch depth	4
Precast concrete plank per inch depth	(as determined by test)
Hardwood flooring per inch depth	4
Underflooring per inch depth	3
Linoleum	2
Asphalt tile	2

Table J-5

UNIT DESIGN DEAD LOADS FOR WATERPROOFING

Waterproofing	Pounds per square foot
Five-ply membrane	5

Table J-6

UNIT DESIGN DEAD LOADS FOR FLOOR FILL

Floor fill	Pounds per square foot
Cinder fill, per inch	5
Cinder concrete, per inch	9
Lightweight concrete, per inch	7
Sand, per inch	8
Stone concrete, per inch	12

Table J-7

UNIT DESIGN DEAD LOADS FOR WOOD-JOIST FLOORS

Wood-joist floors (no plaster)—double wood floor joist sizes in inches:	Pounds per square foot	
	12-in spacing	16-in spacing
2 × 6	6	5
2 × 8	6	6
2 × 10	7	6
2 × 12	8	7
3 × 6	7	6
3 × 8	8	7
3 × 10	9	8
3 × 12	11	9
3 × 14	12	10

Table J-8

UNIT DESIGN DEAD LOADS FOR MATERIALS

Materials	Pounds per cubic foot
Cast-stone masonry (cement, stone, sand)	144
Cinder fill	57
Concrete, plain:	
Cinder	108
Expanded-slag aggregate	100
Haydite (burned-clay aggregate)	90
Slag	132
Stone (including gravel)	144
Vermiculite and perlite aggregate, nonload-bearing	25-50
Other light aggregate, load-bearing	70-105
Concrete, reinforced:	
Cinder	111
Slag	138
Stone (including gravel)	150
Earth (dry)	96
Earth (damp)	108
Earth (wet)	120
Cork	15
Masonry, ashlar:	
Granite	168
Limestone, crystalline	168
Limestone, oolitic	135
Marble	173
Sandstone	144
Masonry, rubble mortar:	
Granite	153
Limestone, crystalline	147
Limestone, oolitic	138
Marble	156
Sandstone	137
Rubber stone masonry	156
Terra cotta, architectural:	
Voids filled	120
Voids unfilled	72

Table J-8 (cont'd.)

UNIT DESIGN DEAD LOADS FOR MATERIALS

Materials	Pounds per cubic foot
Timber, seasoned:	
Ash, commercial white	41
Cypress, southern	32
Fir, Douglas, coast region	34
Oak, commercial reds and whites	45
Redwood	28
Spruce, red, white, and Sitka	28
Southern pine, short leaf	39
Southern pine, long leaf	48
Timber, hemlock	30

Table J-9

UNIT DESIGN DEAD LOADS FOR ROOF AND WALL COVERINGS

Roof and wall coverings	Pounds per square foot
Asphalt shingles	2
Cement asbestos shingles	4
Cement tile	16
Clay tile (for mortar add 10 lb):	
2 inch book tile	12
3 inch book tile	20
Roman	12
Spanish	19
Ludowici	10
Composition:	
Three-ply ready roofing	1
Four-ply felt and gravel	5½
Five-ply felt and gravel	6
Copper or tin	1
Corrugated asbestos-cement roofing	4
Fiberboard, ½ inch	¾
Formed sheet steel	1-3
Formed steel decking	(see manufacturer)
Gypsum sheathing, ½ inch	2
Rigid insulation, ½ inch	¾
Sheet lead	3
Skylight, metal frame, ⅜ inch wire glass	8
Slate, 3/16 inch	7
Slate, ¼ inch	10
Spanish tile	20
Wood sheathing, per inch thickness	3
Wood shingles	3

Table J-10

UNIT DESIGN DEAD LOADS FOR SUSPENDED CEILINGS

Suspended ceilings	Pounds per square foot
Cement on wood lath	12
Cement on metal lath	15
Gypsum on wood or metal lath	10
Plaster on tile or concrete	5
Suspended metal lath and gypsum plaster	10
Suspended metal lath and cement plaster	15
Plaster on wood lath	8

Table J-11

UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

Walls and partitions (unplastered)	Pounds per square foot
4 inch clay brick, high absorption	34
4 inch clay brick, medium absorption	39
4 inch clay brick, low absorption	46
4 inch sand-lime brick	38
4 inch concrete brick, heavy aggregate	46
4 inch concrete brick, light aggregate	33
8 inch clay brick, high absorption	69
8 inch clay brick, medium absorption	79
8 inch clay brick, low absorption	89
8 inch sand-lime brick	74
8 inch concrete brick, heavy aggregate	89
8 inch concrete brick, light aggregate	68
12 inch common brick	120
12 inch pressed brick	130
12 inch sand-lime brick	105
12½ inch concrete brick, heavy aggregate	130
12½ inch concrete brick, light aggregate	98
17 inch clay brick, high absorption	134
17 inch clay brick, medium absorption	155
17 inch clay brick, low absorption	173
17 inch sand-lime brick	138
17 inch concrete brick, heavy aggregate	174
17 inch concrete brick, light aggregate	130
22 inch clay brick, high absorption	168
22 inch clay brick, medium absorption	194
22 inch clay brick, low absorption	216
22 inch sand-lime brick	173
22 inch concrete brick, heavy aggregate	216
22 inch concrete brick, light aggregate	160
4 inch brick, 4 inch load-bearing structural clay tile backing	60
4 inch brick, 8 inch load-bearing structural clay tile backing	75
8 inch brick, 4 inch load-bearing structural clay tile backing	102
8 inch combination brick and concrete block	72
12 inch combination brick and concrete block	90
8 inch load-bearing structural clay tile	42
12 inch load-bearing structural clay tile	58
8 inch concrete block, heavy aggregate	55

Table J-11 (cont'd.)
UNIT DESIGN DEAD LOADS FOR UNPLASTERED WALLS AND PARTITIONS

Walls and partitions (unplastered)	Pounds per square foot
12 inch concrete block, heavy aggregate	85
8 inch concrete block, light aggregate	38
12 inch concrete block, light aggregate	55
2 inch furring tile, one side of masonry wall, add to above figures	12
4 inch hollow concrete block—stone aggregate	30
lightweight	20
6 inch hollow concrete block—stone aggregate	42
lightweight	30
8 inch hollow concrete block—stone aggregate	55
lightweight	38
10 inch hollow concrete block—stone aggregate	62
lightweight	46
12 inch hollow concrete block—stone aggregate	85
lightweight	55
4 inch solid concrete block—stone aggregate	45
lightweight	34
6 inch solid concrete block—stone aggregate	50
lightweight	37
8 inch solid concrete block—stone aggregate	67
lightweight	48
10 inch solid concrete block—stone aggregate	84
lightweight	62
12 inch solid concrete block—stone aggregate	108
lightweight	72
4 inch load-bearing clay tile	24
6 inch load-bearing clay tile	36
2 inch non-load-bearing clay tile	11
3 inch non-load-bearing clay tile	18
4 inch non-load-bearing clay tile	20
6 inch non-load-bearing clay tile	30
8 inch non-load-bearing clay tile	36
10 inch non-load-bearing clay tile	40
4 inch non-load-bearing hollow concrete block	20
6 inch non-load-bearing hollow concrete block	30
8 inch non-load-bearing hollow concrete block	40
T.C. 1½ inch split terra cotta furring	8
2 inch split terra cotta furring	10
3 inch split terra cotta furring	12
2 inch hollow gypsum block	9½
3 inch hollow gypsum block	10
4 inch hollow gypsum block	15
5 inch hollow gypsum block	18
6 inch hollow gypsum block	24
2 inch solid gypsum block	12
3 inch solid gypsum block	18
4 inch solid gypsum block	24
2 inch facing tile	15
4 inch facing tile	25
6 inch facing tile	38
2 inch solid plaster	20
4 inch solid plaster	32
4 inch hollow plaster	22
Wood studs 2 × 4, unplastered	4
Wood studs 2 × 4, plastered one side	12
Wood studs 2 × 4, plastered two sides	20
4 inch glass block	18

Table J-12
UNIT DESIGN DEAD LOADS FOR LATH AND PLASTER PARTITIONS

Lath and plaster partitions	Pounds per square foot
2 inch solid cement on metal lath	25
2 inch solid gypsum on metal lath	18
2 inch solid gypsum on gypsum lath	18
2 inch metal studs gypsum and metal lath both sides	18
3 inch metal studs gypsum and metal lath both sides	19
4 inch metal studs gypsum and metal lath both sides	20
6 inch wood studs plaster and wood lath, both sides	18
6 inch wood studs plaster and metal lath, both sides	18
6 inch wood studs plaster and plaster boards, both sides	18
6 inch wood studs unplastered gypsum board, both sides (dry wall)	10

Table J-13
UNIT DESIGN DEAD LOADS FOR PLASTER WORK

Plaster work	Pounds per square foot
Gypsum (one side)	5
Cement (one side)	10
Gypsum on wood lath	8
Gypsum on metal lath	8
Gypsum on plaster board or fiber board	8
Cement on wood lath	10
Cement on metal lath	10

APPENDIX K

UNIT WORKING STRESSES FOR ORDINARY MATERIALS

K-100.0 General

K-100.1 Scope: Unless otherwise specified herein, the allowable working stresses and design capacities for ordinary materials, as defined in Sections 201.0 and 719.0, shall be reduced ten per cent below the recommended values of the accepted engineering standards listed in Appendix B. When the structural material is identified in regard to manufacture and grade, and the identification is accompanied by satisfactory mill tests or the strength and stress grade of the materials are otherwise confirmed to the satisfaction of the building official, the allowable working stresses and design capacities may be increased to comply with the accepted engineering standards.

K-101.0 Masonry stresses

K-101.1 Mortar for unit masonry: Mortar for unit masonry shall comply with either the proportion specifications as set out in Section 815.2, or shall meet the property specifications of the accepted material standard listed in Appendix C. Unless laboratory data are presented to show that the mortar meets the requirements of the property specifications, the proportion specifications shall govern.

K-101.2 Compressive stresses: Except as permitted in other sections of this code, the compressive stresses in masonry shall not exceed the values as shown in Table K-101.

K-101.3 Shear and tensile stresses: Except as permitted in other sections of this code, the allowable shear or tensile stresses in masonry shall not exceed the values permitted in the accepted engineering practice standards listed in Appendix B.

K-102.0 Concrete

K-102.1 Concrete proportions: Concrete shall comply with either the maximum permissible water-cement ratios and minimum cement contents of Table K-102; or shall comply with the standard Building Code Requirements for Reinforced Concrete listed in Appendix B for proportions based on strength tests of trial batches; or of concrete from the production facility representing similar materials and conditions.

K-102.2 Capacities and stresses: The allowable design capacities or working stresses for ordinary materials shall not exceed those in Section 840.0 for plain concrete and in the standard Building Code Requirements for Reinforced Concrete listed in Appendix B, subject to the ten per cent reduction specified for ordinary materials.

K-103.0 Reinforced gypsum concrete

K-103.1 Stresses: When ordinary materials are used, the allowable working stresses shall be based on the following proportions, measured dry by weight with sufficient water to make a plastic mix that will fill the forms: 100 per cent neat calcined gypsum; 97 per cent gypsum and 3 per cent wood chips, shavings or

Table K-101

ALLOWABLE COMPRESSIVE STRESSES GROSS CROSS-SECTIONAL AREA
(Except as noted)

Type of masonry and grade of masonry unit (psi gross area)	Type of mortar			
	M	S	N	O
	psi	psi	psi	psi
Solid masonry of brick and other solid units of clay or shale; sand lime or concrete:				
8000 plus psi	400	350	300	200
from 4500 or 8000 psi	250	225	200	150
from 2500 to 4500 psi	175	160	140	100
from 1500 to 2500 psi	125	115	100	75
Grouted masonry of solid masonry units:				
from 4500 to 8000 psi	350	275	200	—
from 2500 to 4500 psi	275	215	155	—
from 1500 to 2500 psi	225	175	125	—
Solid masonry of solid concrete masonry units:				
1800 plus psi	175	160	140	100
from 1200 to 1800 psi	125	115	100	75
Masonry of hollow units	85	75	70	—
Hollow walls (cavity or masonry bonded)[a]				
Solid masonry units				
2500 plus psi	140	130	110	—
from 1500 to 2500 psi	100	90	80	—
Hollow masonry units	70	60	55	—
Stone ashlar masonry				
Granite	800	720	640	500
Limestone or marble	500	450	400	325
Sandstone or cast stone	400	360	320	250
Rubble stone, coursed, rough or random	140	120	100	80

Note a. On gross cross-sectional area of wall minus area of cavity between wythes. The allowable comprehensive stresses for cavity walls are based upon the assumption that the floor loads bear upon but one (1) of the two (2) wythes. Where hollow walls are loaded concentrically, the allowable stresses may be increased by twenty-five (25) per cent.

Table K-102

MAXIMUM WATER-CEMENT RATIOS AND MINIMUM CEMENT CONTENTS

Specified compressive strength*(psi)	Minimum sacks of cement per cubic yard of concrete	Maximum permissible water-cement ratios			
		Non-air-entrained concrete		Air-entrained concrete	
		Absolute ratio by weight	U.S. gal. per 94 lb. bag of cement	Absolute ratio by weight	U.S. gal. per 94 lb. bag of cement
2500	5	0.65	7.3	0.54	6.1
3000	5½	0.58	6.6	0.46	5.2
3500	6	0.51	5.8	0.40	4.5

*28 day strengths for cements meeting strength limits of ASTM C150, Type 1, 1A, II or IIA and 7 day strengths for type III and IIIA.

fibers; and 87.5 per cent gypsum and 12.5 per cent wood chips, shavings or fibers; with ultimate compressive strengths of 1,800, 1,000 and 500 pounds per square inch respectively.

The working stresses shall not exceed the values prescribed in the standard for Reinforced Gypsum Concrete listed in Appendix B subject to the ten per cent reduction prescribed for ordinary materials.

K-104.0 Steel reinforcement

K-104.1 Stresses: The allowable working stresses for reinforcement specified in the standard Building Code Requirements for Reinforced Concrete listed in Appendix B shall be used in all reinforced construction, including reinforced concrete, reinforced gypsum concrete and all forms of reinforced masonry, subject to the ten per cent reduction specified for ordinary, unidentified materials.

K-105.0 Structural steel and cast steel

K-105.1 Stresses: The allowable working stresses for structural steel and cast steel contained in the Specification for Design, Fabrication and the Erection of Structural Steel for Buildings listed in Appendix B shall be used on all structural building construction, subject to the ten per cent reduction specified for ordinary, unidentified materials.

K-106.0 Cast iron

K-106.1 Stresses: The maximum stress for cast iron shall be as indicated in Table K-106.

Table K-106
CAST IRON STRESS

	Maximum stress in pounds per square inch
Tension	3,000
Extreme tension (fiber stress in bending)	3,000
Extreme compression (fiber stress in bending)	16,000
Shear	3,000
Column compression	9,000 minus 40 $\frac{l}{r}$
Ratio $\frac{l}{r}$ not to exceed seventy (70)	

K-107.0 Open-web steel joist

K-107.1 Stresses: The allowable working stresses specified for open-web steel joists shall be in accordance with the Standard Specifications for Steel Joist Construction listed in Appendix B. For all other steel joists, unless otherwise specifically approved and identified, the allowable working stresses specified by the standard shall be reduced ten per cent.

K-108.0 Cold formed steel construction

K-108.1 Stresses: When ordinary materials which are not identified as to manufacture and grade are used, the allowable working stresses in the Specification for the Design of Cold-formed Steel Structural Members listed in Appendix B shall be reduced ten per cent.

K-109.0 Lumber

K-109.1 Stresses: When the grade of lumber is not identified as provided in Section 719.0 for controlled materials, the maximum allowable working stresses for the species of lumber used shall be determined in accordance with the principles for stress grade lumber as set forth in National Design Specifications for Wood Construction listed in Appendix B.

APPENDIX L

LOAD DESIGN CRITERIA

L-100.0 General

L-100.1 Scope: The load design criteria provided in this appendix shall be used to calculate, and effectively provide for, the loads and stresses acting upon a structure. The provisions of this appendix shall be used in conjunction with applicable sections of Article 7 in which they are referenced.

L-101.0 Earthquake load design

L-101.1 General: When required to withstand lateral forces under Section 718.0, buildings and structures shall be designed in accordance with the following sections according to the zone in which they are located on the seismic probability map in Figure L-101.1.

L-101.1.1 Application of provisions: These lateral force requirements are intended to make buildings earthquake-resistive. The provisions apply to the buildings as a unit and also to all parts thereof, including the structural frame or walls, floor and roof systems, and other structural features. In specific cases, they may be interpreted or added to as to detail by rulings of the building official in order that the intent shall be fulfilled.

L-101.1.2 Additions: Where applicable, every addition to an existing building or structure shall be designed and constructed to resist and withstand the forces provided for herein, and in any case where an existing building or structure is increased in height all portions thereof affected by such increased height shall be reconstructed to resist and withstand the forces provided for herein.

L-101.1.3 Alterations: Where applicable, an existing building or structure shall not be altered or reconstructed in such a manner that the resistance to the forces provided for herein will be less than that before such alteration of reconstruction was made; provided, however, that this provision shall not apply to non-bearing partitions, and shall not apply to other minor alterations which are made in compliance with all requirements of this code.

L-101.2 Plans and design data: Where earthquake loads are applicable, a brief statement of the following items shall be included with each set of plans filed.

1. A summation of the dead and live load of the building, floor by floor, which was used in figuring the shear for which the building is designed.
2. A brief description of the bracing system used, the manner in which the designer expects such system to act and a clear statement of any assumptions used. Assumption as to location of all points of counterflexure in members must be stated.
3. Sample calculation of a typical bent or equivalent. For combined stresses due to the lateral forces and other loads, the allowable unit stresses and the allowable load in connections may be increased as provided in Section 717.0.

L-101.3 Lateral force requirements: Where earthquake loads are applicable, every building or structure and every portion thereof, and minor accessory building, except as exempted in Section 716.0, shall be designed and constructed to resist stresses produced by lateral forces as provided in this appendix.

Stresses shall be calculated as the effect of a force applied horizontally at each floor or roof level above the foundation. The force shall be assumed to come from any horizontal direction.

In those zones where wind, snow, or other loads impose a greater load than those provided herein, such other loads shall be provided for. It may be assumed that wind and earthquake loads will not occur simultaneously.

L-101.4 Definitions: The definitions listed below apply only to the provisions of this appendix.

Space frame: a three-dimensional structural system composed of interconnected members, other than shear or bearing walls, laterally supported so as to function as a complete self-contained unit with or without the aid of horizontal diaphragms or floor bracing systems.

Space frame, vertical load-carrying: A space frame designed to carry all vertical loads.

Space frame, moment resisting: A vertical load-carrying space frame in which the members and joints are capable of resisting design lateral forces by bending moments and column shears.

Space frame, ductile moment resisting: A space frame which complies with the requirements for a ductile moment-resisting space frame as given in Section L-101.11.

Box system: A structural system without a complete vertical load-carrying space frame. In this system, the required lateral forces are resisted by shear walls as hereinafter defined.

Shear wall: A wall designed to resist lateral forces parallel to the wall. Braced frames subjected primarily to axial stresses shall be considered as shear walls for the purpose of this definition.

Lateral force resisting system: That part of the structural system to which the lateral forces prescribed in Section L-101.5.1 are assigned.

L-101.4.1 Symbols and notations: The following symbols and notations apply only to the provisions of this appendix.

C = Numerical coefficient for base shear as defined in Section L-101.5.2.

C_p = Numerical coefficient as defined in Section L-101.5.2 and set forth in Table L-101.5.2.

D = The dimension of the building in feet in a direction parallel to the applied forces (also see Section L-101.10).

D_s = The plan dimension in feet of the vertical lateral force resisting system in the direction of the applied force.

F_i, F_n, F_x = Lateral force applied to level "i", "n", or "x" respectively.

F_p = Lateral forces on the part of the structure, and in the direction, under consideration.

F_t = That portion of "V" considered concentrated at the top of the structure, at the level "n". The remaining portion of the total base shear (V) shall be distributed over the height of the structure including level "n" according to equation L-1-5.

h_i, h_n, h_x = The height in feet above the base to level "i", "n", or "x" respectively.

J = Numerical coefficient for base overturning moment as defined in Section L-101.9.

J_x = Numerical coefficient for overturning moment at level "x".

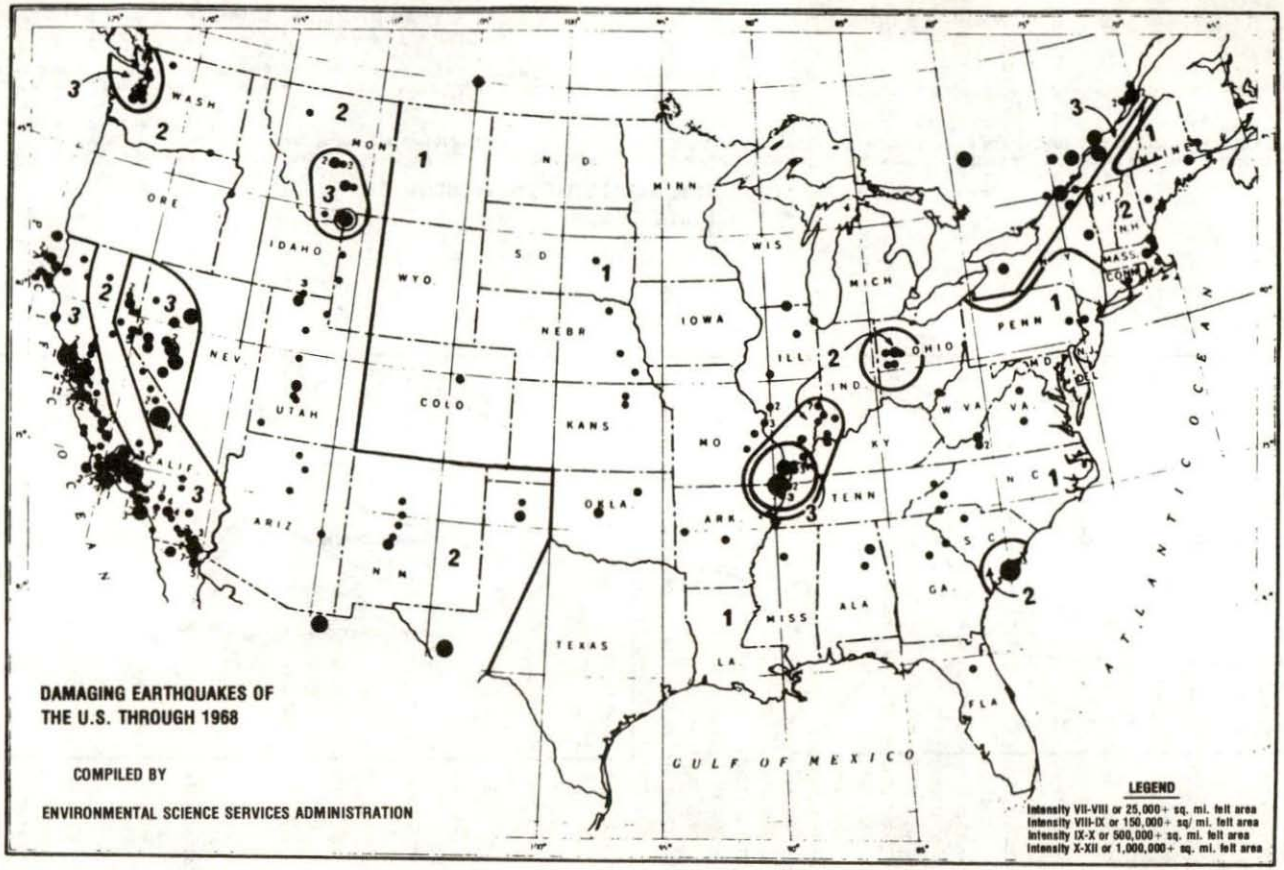
K = Numerical coefficient as set forth in Table L-101.5.1.

Level i = Level of the structure referred to by the subscript "i".

Level n = That level which is uppermost in the main portion of the structure.

Level x = That level which is under design consideration.

M = The overturning moment at the base of the building or structure.


DAMAGING EARTHQUAKES OF
THE U.S. THROUGH 1968
COMPILED BY
ENVIRONMENTAL SCIENCE SERVICES ADMINISTRATION
LEGEND
Intensity VII-VIII or 25,000+ sq. mi. felt area
Intensity VIII-IX or 150,000+ sq/ mi. felt area
Intensity IX-X or 500,000+ sq. mi. felt area
Intensity X-XII or 1,000,000+ sq. mi. felt area
WASH
ORE
CALIF
IDAHO
NEV
MONT
WYO
UTAH
ARIZ
COLO
N M
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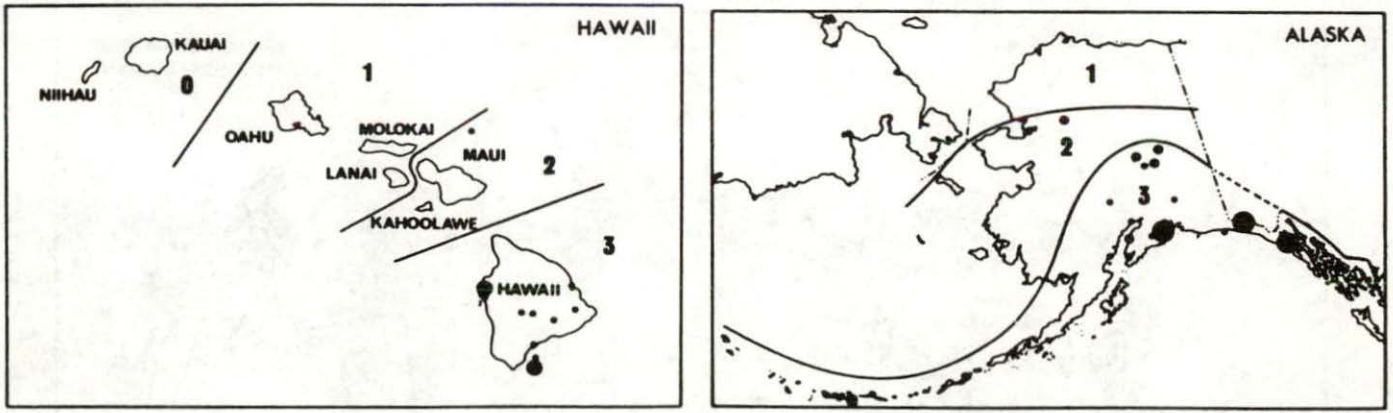


Figure L-101.1
DAMAGING EARTHQUAKES IN THE UNITED STATES THROUGH 1968

Note a. Maps of the three separate areas of the United States which indicated earthquake risk zones to supplement coefficient Z. This zoning was superimposed on maps showing the damaging earthquakes of the United States through 1968 that were compiled and supplied by the National Ocean Survey. The earthquake risk zones were determined by the ANSI Committee A58.

Note b. Large number represents zone classification: Zone 0, no damage; Zone 1. minor damage; Zone 2, moderate damage; Zone 3, major damage. Small number next to dots represents approximate number of recorded earthquakes in area of the intensity shown by size of dot.

M_x = The overturning moment at level "x".
N = The total number of stories above exterior grade to level "n".
T = Fundamental period of vibration of the building or structure in seconds in the direction under consideration.
V = The total lateral force or shear at the base.

$$V = F_t + \sum_{i=1}^{n} F_i \quad \text{where } i = 1 \text{ designates first level above the base}$$

W = The total dead load $W = \sum_{i=1}^{n} W_i$

Exception: W shall be equal to the total dead load plus 25 per cent of the floor live load in storage and warehouse occupancies.

W_i, W_x = That portion of W which is located at or is assigned to level "i" or "x" respectively
W_p = The weight of a portion of a structure
Z = Numerical coefficient dependent upon the zone as determined by the maps in Figure L-101.1. For locations in Zone 1, "Z" shall be equal to 0.25. For locations in Zone 2, "Z" shall be equal to 0.50. For locations in Zone 3, "Z" shall be equal to 1.0.

L-101.5 Minimum earthquake forces for structures

L-101.5.1 Total lateral force and distribution of lateral force: Every structure shall be designed and constructed to withstand minimum total lateral seismic forces assumed to act non-concurrently in the direction of each of the main axes of the structure in accordance with the following formula:

$$V = ZKCW \qquad \text{(Equation L-1-1)}$$

The value of K shall be not less than that in Table L-101.5.1. The value of C shall be determined in accordance with the following formula:

$$C = 0.05 \div \sqrt[3]{T} \qquad \text{Equation L-1-2)}$$

Exception: C shall be 0.10 for all one- and two-story buildings.

T is the fundamental period of vibration of the structure in seconds in the direction under consideration. Properly substantiated technical data for establishing the period T for the contemplated structure may be submitted. In the absence of such data, the value T for buildings shall be determined by the following formula:

$$T = 0.05\, h_n \div \sqrt{D} \qquad \text{(Equation L-1-3)}$$

Exception: In all buildings in which the lateral force resisting system consists of a moment-resisting space frame which resists 100 per cent of the required lateral forces and which frame is not enclosed by or adjoined by more rigid elements which would tend to prevent the frame from resisting lateral forces:

$$T = 0.10\, N \qquad \text{(Equation L-1-3A)}$$

The total lateral force "V" shall be distributed in the height of the structure in the following manner:

$$F_t = .004V\,(h_n \div D_s)^2 \qquad \text{(Equation L-1-4)}$$

F_t need not exceed 0.15 "V" and may be considered as 0 for values $(h_n \div D_s)$ of 3 or less, and

$$F_x = (V\text{-}F_t)w_x h_x \div \sum_{i=1}^{n} w_i h_i \qquad \text{(Equation L-1-5)}$$

Exception: One- and two-story buildings shall have uniform distribution. At each level designated as "x", the force F_x shall be applied over the area of the building in accordance with the mass distribution on that level.

L-101.5.2 Lateral force on parts or portions of buildings and other structures: Parts or portions of buildings or structures and their anchorage shall be designed for lateral forces in accordance with the following formula:

$$F_p = ZC_pW_p \qquad \text{(Equation L-1-6)}$$

The values of C_p are in Table L-101.5.2. The distribution of these forces shall be according to the gravity loads pertaining thereto.

L-101.5.3 Pile foundations and caisson footings: Individual pile and caisson footings of every building or structure shall be interconnected by ties, each of which can carry by tension and compression a horizontal force equal to 10 per cent of the larger pile cap loading, unless it can be demonstrated that equivalent restraint can be provided by other means.

L-101.6 Distribution of horizontal shear: Total shear in any horizontal plane shall be distributed to the various elements of the lateral force resisting system in proportion to their rigidities, considering the rigidity of the horizontal bracing system or diaphragm. Rigid elements that are assumed not to be part of the lateral force-resisting system may be incorporated into buildings provided that their effect on the action of the system is considered and provided for in the design.

L-101.7 Drift: Lateral deflections or drift of a story relative to its adjacent stories shall be considered in accordance with accepted engineering practice.

Table L-101.5.1

HORIZONTAL FORCE FACTOR "K" FOR BUILDINGS OR OTHER STRUCTURES[1]

Type or arrangement of resisting elements	Value of K[2]
All building framing systems except as hereinafter classified	1.00
Buildings with a box system as defined in Section L-101.4	1.33
Buildings with a dual bracing system consisting of a ductile moment resisting space frame and shear walls designed in accordance with the following criteria. 1. The frames and shear walls shall resist the total lateral force in accordance with their relative rigidities considering the interaction of the shear walls and frames. 2. The shear walls acting independently of the ductile moment resisting space frame shall resist the total required lateral force. 3. The ductile moment resisting space frame shall have the capacity to resist not less than 25 per cent of the required lateral force.	0.80
Buildings with a ductile moment resisting space frame designed in accordance with the following criteria: the ductile moment resisting space frame shall have the capacity to resist the total required lateral force.	0.67
Elevated tanks plus full contents, on four or more crossbraced legs and not supported by a building[3,4,5]	3.00
Structures other than buildings and other than those set forth in Table L-101.5.2	2.00

Note 1. Where wind load would produce higher stresses, these loads shall be used in lieu of the loads resulting from earthquake forces.

Note 2. See maps in Figure L-101.1 for seismic probability zones and definition of "Z" as specified in Section L-101.4.1.

Note 3. The minimum value of "KC" shall be 0.12 and the maximum value of "KC" need not exceed 0.25.

Note 4. For overturning, the factor "J" as specified in Section L-101.9 shall be 1.00.

Note 5. The torsional requirements of Section L-101.8 shall apply

L-101.8 Horizontal torsional moments: Provisions shall be made for the increase in shear resulting from the horizontal torsion due to an eccentricity between the center of mass and the center of rigidity. Negative torsional shears shall be neglected. Where the vertical resisting elements depend on diaphragm action for shear distribution at any level, the shear resisting elements shall be capable of resisting a torsional moment assumed to be equivalent to the story shear acting with an eccentricity of not less than five percent of the maximum building dimension at that level.

L-101.9 Overturning: Every building or structure shall be designed to resist the overturning effects caused by the wind forces and related requirements, or the earthquake forces specified in this appendix, whichever governs.

Table L-101.5.2

HORIZONTAL FORCE FACTOR "C_p" FOR PARTS OR PORTIONS OF BUILDINGS OR OTHER STRUCTURES

Part or portion of buildings	Direction of force	Value of C_p
Exterior bearing and nonbearing walls, interior bearing walls and partitions, interior nonbearing walls and partitions over 10 feet in height, masonry fences over 6 feet in height.	Normal to flat surface	0.20
Cantilever parapet and other cantilever walls, except retaining walls.	Normal to flat surface	1.00
Exterior and interior ornamentations and appendages	Any direction	1.00
When connected to or a part of a building: towers, tanks, towers and tanks plus contents, chimneys, smokestacks, and penthouses	Any direction	0.20[1]
When resting on the ground, tank plus effective mass of its contents	Any direction	0.10
Floors and roofs acting as diaphragms[2]	Any direction	0.10
Connections for exterior panels or for elements complying with Section L-101.12.5	Any direction	2.00

Note 1. When $\frac{h_n}{D}$ of any building is equal to or greater than five to one, increase value by 50 percent.

Note 2. Floors and roofs acting as diaphragms shall be designed for a minimum value of C_p of 10 per cent applied to loads tributary from that story unless a greater value of C_p is required by the basic seismic formula $V = ZKCW$.

Exception: The axial loads from earthquake force on vertical elements and footings in every building or structure may be modified in accordance with the following provisions.

1. The overturning moment (M) at the base of the building or structure shall be determined in accordance with the following formula:

$$M = J\left(F_t h_n + \sum_{i=1}^{n} F_i h_i\right) \qquad \text{(Equation L-1-7)}$$

where $J = 0.6 \div \sqrt[3]{T^2}$ (Equation L-1-8)

The value of "J" need not be more than 1.00.

2. For structures other than buildings, the value of "J" shall not be less than 0.45, and the overturning moment (M_x) at any level designated as "x" shall be determined in accordance with the following formula:

$$M_x = J_x[F_t(h_n - h_x) + \sum_{i=x}^{n} F_i(h_i - h_x)] \qquad \text{(Equation L-1-9)}$$

$$\text{where } J_x = J + (1 - J)(h_x \div h_n)^3 \qquad \text{(Equation L-1-10)}$$

At any level, the incremental changes of the design overturning moment, in the story under consideration, shall be distributed to the various resisting elements in the same proportion as the distribution of the shears in the resisting system. Where either vertical members are provided which are capable of partially resisting the overturning moments, a redistribution may be made to these members if framing members of sufficient strength and stiffness to transmit the required loads are provided.

Where a vertical resisting element is discontinuous, the overturning moment carried by the lowest story of that element shall be carried down as loads to the foundation.

L-101.10 Setbacks: Buildings having setbacks wherein the plan dimension of the tower in each direction is at least 75 per cent of the corresponding plan dimension of the lower part may be considered as a uniform building without setbacks for the purpose of determining seismic forces.

For other conditions of setbacks, the tower shall be designed as a separate building using the larger of the seismic coefficients at the base of the tower determined by considering the tower as either a separate building for its own height or as part of the overall structure. The resulting total shear from the tower shall be applied at the top of the lower part of the building which shall be otherwise considered separately for its own height.

L-101.11 Structural systems: Buildings more than 160 feet in height shall have ductile moment-resisting space frames which (including connections) are capable of resisting not less than 25 per cent of the required seismic force for the structure as a whole. All buildings designed with a horizontal force factor "K" of 0.67 or 0.80 shall be ductile moment-resisting space frames.

Exceptions

1. Buildings more than 160 feet in height in Zone 1 may have shear walls or braced frames in lieu of a ductile moment-resisting space frame provided a K value of 1.00 or 1.33 is utilized in the design.
2. Other structural systems may be approved by the building official when evidence is submitted showing that adequate energy absorption and ductility are provided to withstand the anticipated earthquakes based on a seismological evaluation for the location.

Moment-resisting space frames and ductile moment-resisting space frames may be enclosed by or adjoined by more rigid elements which would tend to prevent the space frame from resisting lateral forces where it can be shown that the action or failure of the more rigid elements will not impair the vertical and lateral load resisting ability of the space frame.

The necessary ductility for a ductile moment-resisting space frame shall be provided by a frame which will incorporate established criteria* for achieving ductility in the elastic and inelastic range. Shear walls in buildings where "K" =

0.80 shall be constructed to achieve ductile systems in accordance with established criteria.*

L-101.12 Design requirements

L-101.12.1 Building separations: All portions of structures shall be designed and constructed to act as an integral unit in resisting horizontal forces unless separated structurally by a distance sufficient to avoid contact under deflection from seismic action or wind forces.

L-101.12.2 Minor alterations: Minor structural alterations may be made in existing buildings and other structures; but the resistance to lateral forces shall be not less than that before such alterations were made, unless the building as altered meets the requirements of this appendix.

L-101.12.3 Structural elements: All elements within the structure which are considered to resist seismic forces or movement and/or are connected so as to participate with the structural system shall be designed in accordance with accepted structural practice.

L-101.12.4 Combined vertical and horizontal forces: In computing the effect of seismic force in combination with vertical loads, gravity load stresses induced in members by dead load plus design live load, except roof live load and snow load, shall be considered.

L-101.12.5 Exterior elements: Non-bearing non-shear wall panels or other elements which are attached to, or enclose the exterior, shall accommodate movements of the structure resulting from lateral forces or temperature changes. These panels or other elements shall be supported by approved means or by mechanical fasteners in accordance with the provisions described below.

1. Connections and panel joints shall allow for a relative movement between stories of not less than two times story drift caused by wind or seismic forces, or ¼ inch, whichever is greater.
2. Connections shall have sufficient ductility and rotation capacity so as to preclude fracture or brittle failures at or near connections.
3. Connections to permit movement in the plane of the panel for story drift may be properly designed sliding connections using slotted or oversize holes or may be connections which permit movement by bending of ductile material.

L-102.0 Snow load design criteria

L-102.1 General: Where buildings and structures or parts thereof are required by this code to withstand snow loads, the following criteria shall be used.

L-102.1.1 Design snow load: For purposes of snow load design, the snow load shall be determined from Figures L-102.1a, L-102.1b, or L-102.1c, whichever is applicable depending upon the intended use of the building or structure and its geographic location (see Section 711.0).

L-102.1.2 Distribution: For purposes of snow load design, the snow load distribution and related snow load coefficients shall be determined from Figures L-102.2a, L-102.2b or L-102.2c, whichever is applicable depending upon the slope of the roof.

Figure L-102.1a

SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
25-YEAR MEAN RECURRENCE INTERVAL

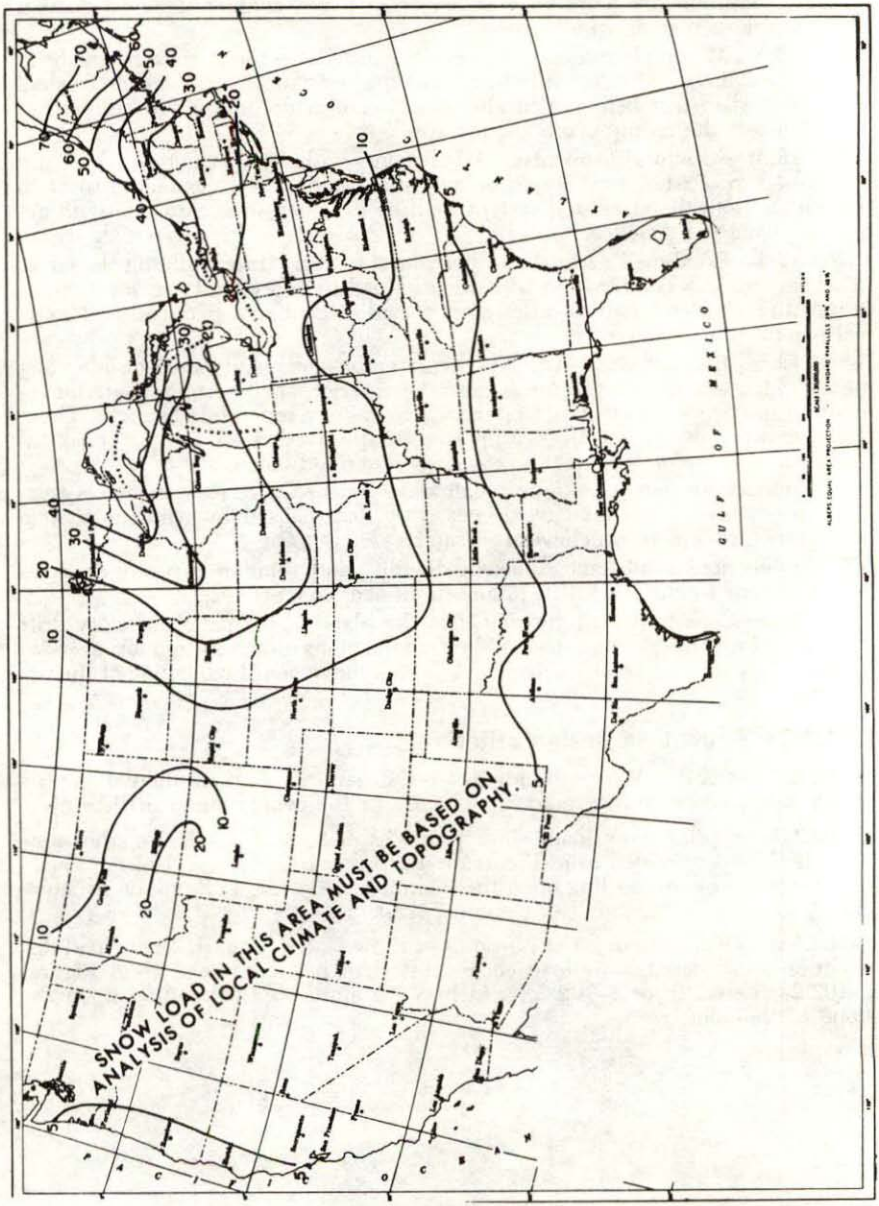


Figure L-102.1b

SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND,
50-YEAR MEAN RECURRENCE INTERVAL

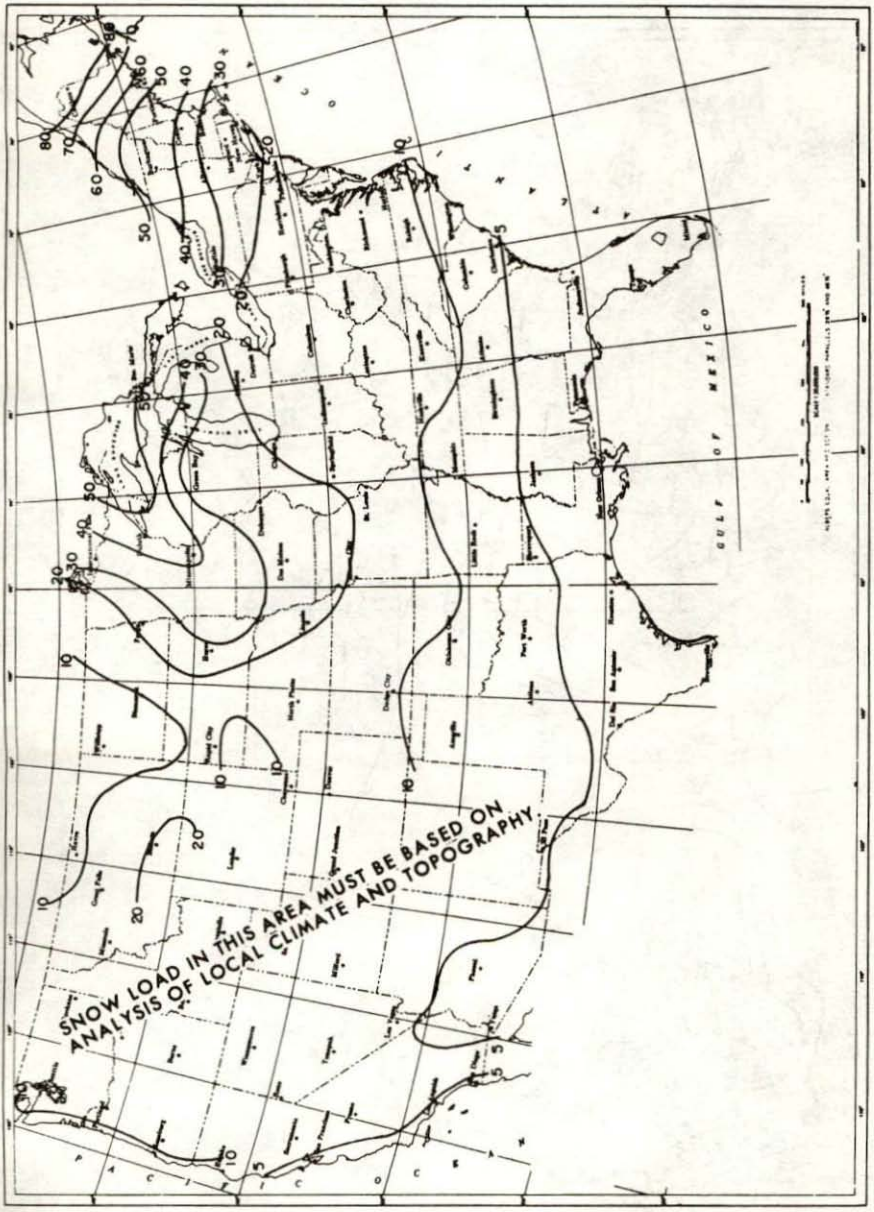


Figure L-102.1c

SNOW LOAD IN POUND-FORCE PER SQUARE FOOT ON THE GROUND, 100-YEAR MEAN RECURRENCE INTERVAL

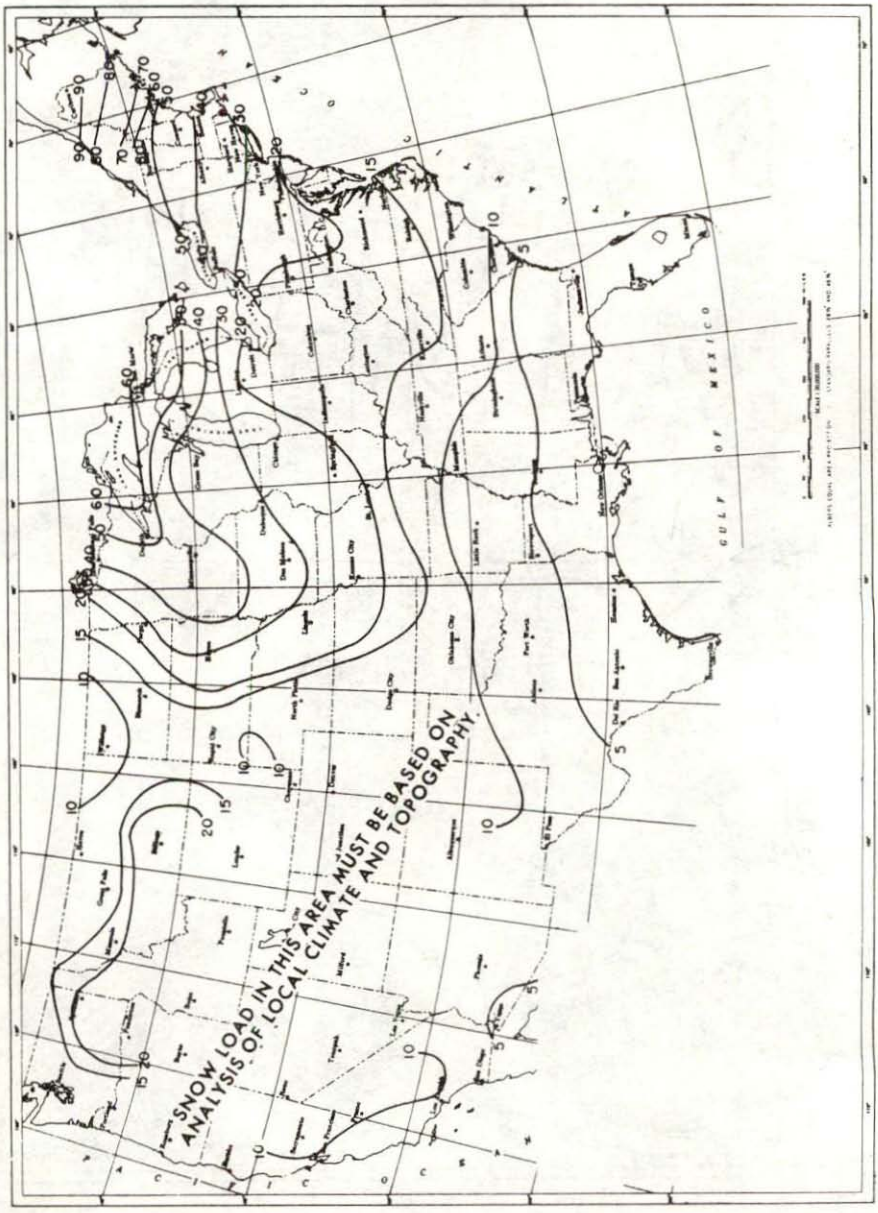
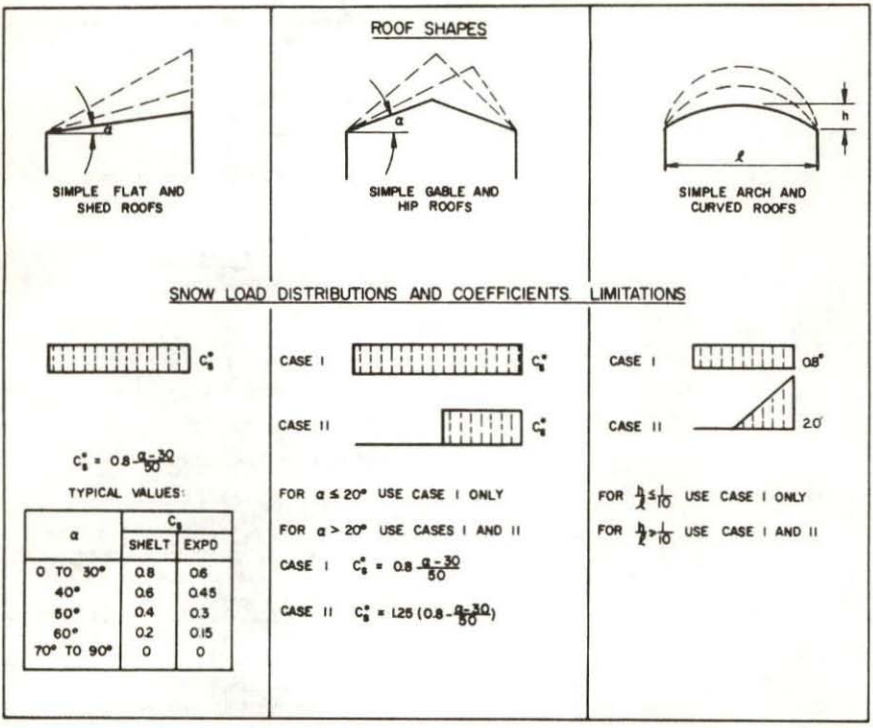


Figure L-102.2a

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS



α	C_s	
	SHELT	EXPD
0 TO 30°	0.8	0.6
40°	0.6	0.45
50°	0.4	0.3
60°	0.2	0.15
70° TO 90°	0	0

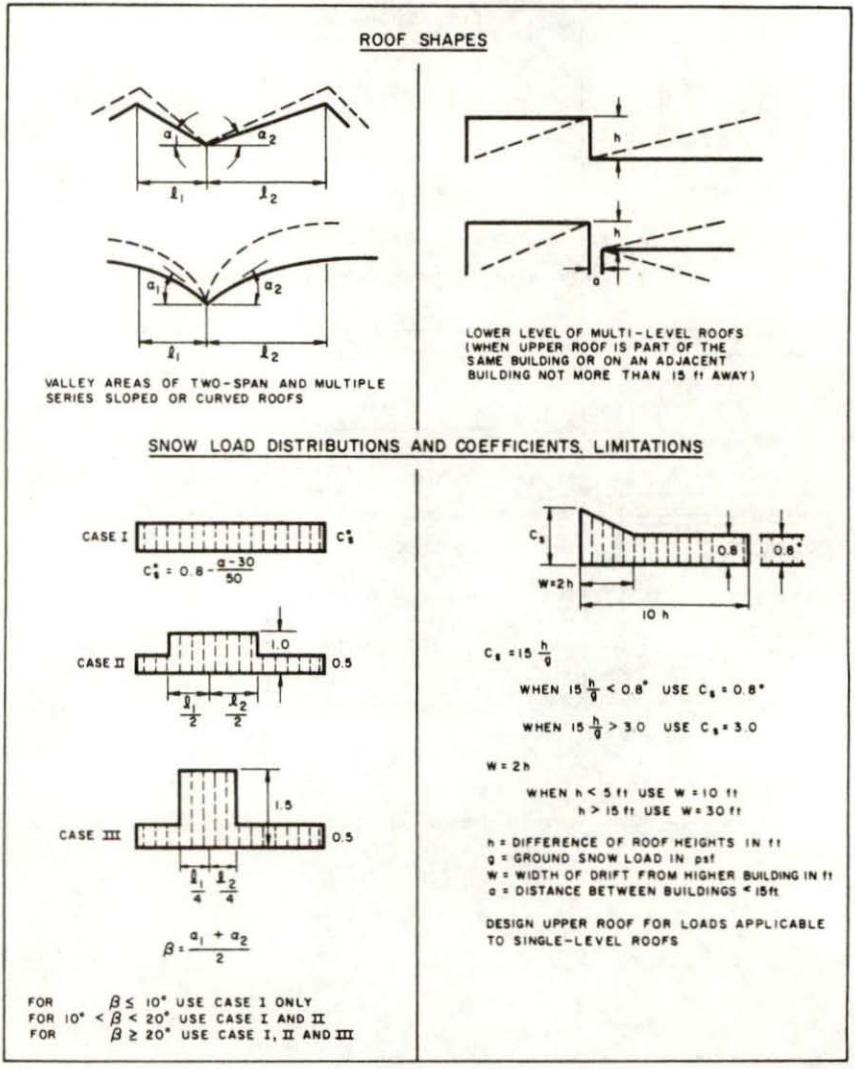
*For roofs conforming to wind exposure requirements of 711.3.1, all values of C_s marked with an asterisk (*) may be reduced 25 per cent.
The term

$$\frac{a - 30}{50}$$

is valid only for a > 30 degrees.

Figure L-102.2b

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS



*For roofs conforming to wind exposure requirements of 711.3.1, all values of C_s marked with an asterisk (*) may be reduced 25 per cent.

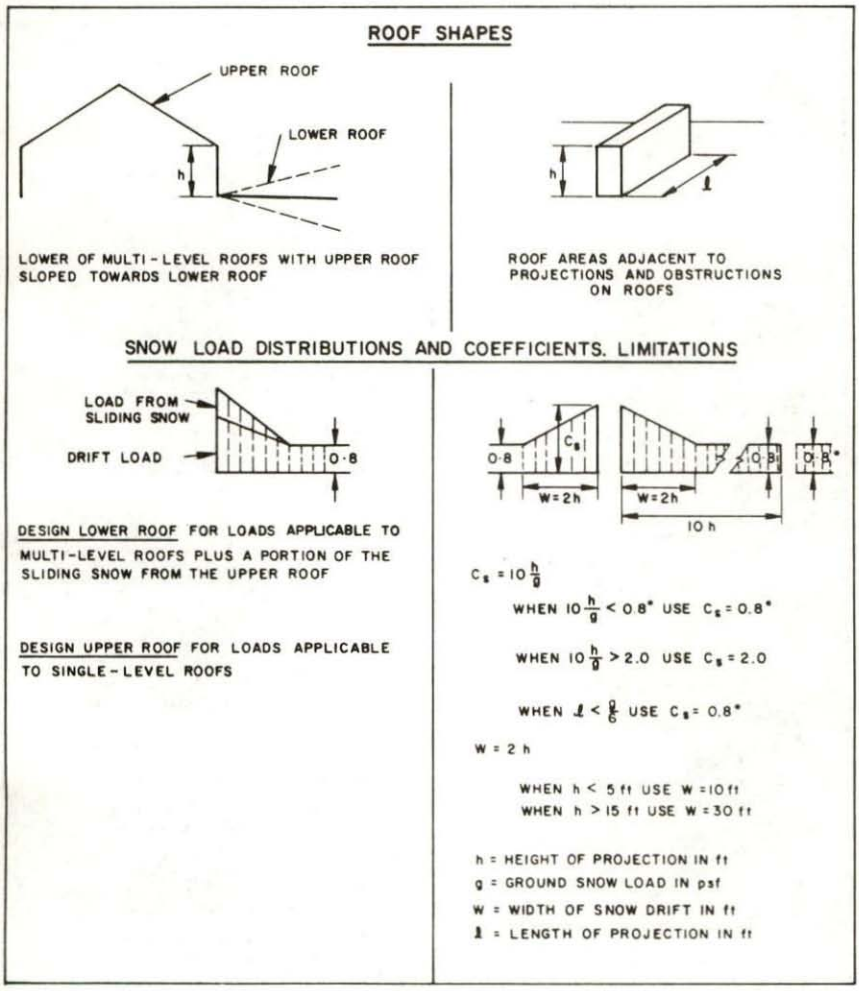
The term

$$\frac{a - 30}{50}$$

is valid only for a > 30 degrees.

Figure L-102.2c

SNOW LOAD DISTRIBUTIONS AND COEFFICIENTS



*For roofs conforming to wind exposure requirements of 711.3.1, all values of C_s marked with an asterisk (*) may be reduced 25 per cent.

APPENDIX M

RECOMMENDED NAILING SCHEDULE

Building element	Nail size and type	Number and location
Stud to sole plate	8d common 16d common	4 toe-nail or 2 direct nail
Stud to cap plate	16d common	2 toe-nail or 2 direct nail
Double studs	10d common	12″ o.c. direct
Corner studs	16d common	24″ o.c. direct
Sole plate to joist or blocking	16d common	16″ o.c.
Double cap plate	10d common	16″ o.c. direct nail
Cap plate laps	10d common	2 direct-nail
Ribbon strip, 6″ or less	10d common	2 each direct bearing
Ribbon strip, 6″ or more	10d common	3 each direct bearing
Roof rafter to plate	8d common	3 toe-nail
Roof rafter to ridge	16d common	2 toe-nail or direct nail
Jack rafter to hip	10d common 16d common	3 toe-nail or 2 direct nail
Floor joists to studs	10d common	5 direct or
(No ceiling joists)	10d common	3 direct
Floor joists to studs	10d common	2 direct
(With ceiling joists)		
Floor joists to sill or girder	8d common	3 toe-nail
Ledger strip	16d common	3 each direct joist
Ceiling joists to plate	16d common	3 toe-nail
Ceiling joists (laps over partition)	10d common	3 direct nail
Ceiling joists (parallel to rafter)	10d common	3 direct nail
Collar beam	10d common	3 direct
Bridging to joists	8d common	2 each direct end
Diagonal brace (to stud and plate)	8d common	2 each direct bearing
Tail beams to headers (when nailing permitted)	20d common	1 each end 4 sq. ft. floor area
Header beams to trimmers (when nailing permitted)	20d common	1 each end 8 sq. ft. floor area
1″ roof decking (6″ or less in width)	8d common	2 each direct rafter
1″ roof decking (over 6″ in width)	8d common	3 each direct rafter

Building element	Nail size and type	Number and location
1″ sub-flooring (6″ or less)	8d common	2 each direct joist
1″ sub-flooring (8″ or more)	8d common	3 each direct joist
2″ sub-flooring	16d common	2 each direct joist
1″ wall sheathing (8″ or less in width)	8d common	2 each direct stud
1″ wall sheathing (over 8″ in width)	8d common	3 each direct stud
Plywood roof and wall sheathing (½″ or less)	6d common	6″ o.c. direct edges and 12″ o.c. intermediate
(⅝″ or greater)	8d common	6″ o.c. direct edges and 12″ o.c. intermediate
(5/16″, ⅜″, or ½″)	16 ga. galvanized wire staples, ⅜″ minimum crown; length of 1″ plus plywood thickness	4″ o.c. edges and 8″ o.c. intermediate
(⅝″)	Same as immediately above	2½″ o.c. edges and 5″ o.c. intermediate
Plywood subflooring:		
(½″)	6d common *or* 6d annular or spiral thread	6″ o.c. direct edges and 10″ o.c. intermediate
(⅝″, ¾″)	8d common *or* 6d annular or spiral thread	6″ o.c. direct edges and 10″ o.c. intermediate
(1″, 1⅛″)	10d common *or* 8d ring shank *or* 8d annular or spiral thread	6″ o.c. direct edges and 6″ o.c. intermediate
(½″)	16 ga. galvanized wire staples	4″ o.c. edges and 7″ o.c. intermediate
(⅝″)	⅜″ minimum crown, 1⅝″ length	2½″ o.c. edges and 4″ o.c. intermediate
Built up girders and beams	20d common	32″ o.c. direct
Continuous header to stud	8d common	4 toenail
Continuous header, two pieces	16d common	16″ o.c. direct

Building element	Nail size and type	Number and location
½" fiberboard sheathing	1½" galvanized roofing nail *or* 6d common nail *or* 16 gage staple, 1⅛" long with minimum crown of 7/16"	3" o.c. exterior edge, 6" o.c. intermediate
25/32" fiberboard sheathing	1¾" galvanized roofing nail *or* 8d common nail *or* 16 gage staple, 1½" long with minimum crown of 7/16"	3" o.c. exterior edge, 6" o.c. intermediate
Gypsum sheathing	12 gage 1¼" large head corrosion-resistive	4" o.c. on edge, 8" o.c. intermediate
Particleboard (⅜"-½")	6d common	6" o.c. direct edges and 8" o.c. intermediate
(⅝"-¾")	8d common	6" o.c. direct edges and 8" o.c. intermediate
Particleboard sheathing		
(⅜"-½")	6d common	6" o.c. direct edges and 12" o.c. intermediate
(⅝"¾")	8d common	6" o.c. direct edges and 12" o.c. intermediate
Shingles, wood*	No. 14 B&S corrosion-resistive	2 each bearing
Weather boarding	8d corrosion-resistive	2 each bearing

Shingle nails shall penetrate not less than ¾ inch into nailing strips, sheathing or supporting construction except as otherwise provided in Section 854.4.4.

Table M-1
MAXIMUM SPACING OF GYPSUM WALLBOARD FASTENERS
(For non-fire rated construction assemblies)[5]

Thickness of gypsum wallboard (inch)	Plane of framing surface	Long dimension of gypsum wallboard sheets in relation to direction of framing members	Maximum spacing of framing members (center-to-center) (in inches)	Maximum spacing of fasteners (center-to-center) (in inches)		Nails[1] to wood[4]
				Nails[1,2]	Screws[3]	
1/2	Horizontal	Either direction	16	7	12	No. 13 gauge, 1-3/8″ long, 19/64″ head No. .098 gauge, 1-1/4″ long, Annular ringed 5d, cooler nail
	Horizontal	Perpendicular	24	7	12	
	Vertical	Either direction	24	8	12	
5/8	Horizontal	Either direction	16	7	12	No. 13 gauge, 1-5/8″ long, 19/64″ head No. .098 gauge, 1-3/8″ long, Annular ringed 6d, cooler nail
	Horizontal	Perpendicular	24	7	12	
	Vertical	Either direction	24	8	12	
Fastening required with adhesive application						
1/2 or 5/8	Horizontal	Either direction	16	16	16	As required for 1/2″ and 5/8″ gypsum wallboard, see above
		Perpendicular	24	12	16	
	Vertical	Either direction	24	16	24	
2-3/8 (3/4 total)	Horizontal	Perpendicular	24	16	16	Base ply nailed as required for 1/2″ gypsum wallboard and face ply placed with adhesive
	Vertical	Either direction	24	24	24	

Note 1. Where the metal framing has a clinching design formed to receive the nails by two edges of metal, the nails shall be not less than ⅝ inch longer than the wallboard thickness, and shall have ringed shanks. Where the metal framing has a nailing groove formed to receive the nails, the nails shall have barbed shanks or be 5d cooler nail (No. 13½ gauge, 1⅝ inches long, 15/64-inch head) for ½ inch gypsum wallboard; 6d cooler nail (No. 13 gauge, 1⅞ inches long, 15/64-inch head) for ⅝ inch gypsum wallboard.

Note 2. Two nails spaced not less than 2 inches apart, nor more than 2½ inches apart and pairs of nails spaced not more than 12 inches center-to-center may be used.

Note 3. Screws shall be No. 6 with tapered head and long enough to penetrate into wood framing not less than ⅝ inch and metal framing not less than ¼ inch.

Note 4. All nails shall meet ASTM C514 or Federal Specification FF-N-105C.

Note 5. For fireresistance rated construction see the pertinent fire test information.

APPENDIX N

METRIC EQUIVALENTS

1 inch equals 25.4 millimeters
1 inch equals 2.54 centimeters
1 foot equals 0.305 meter or 30.48 centimeters
1 yard equals 0.914 meter
1 mile equals 1.609 kilometers
1 square inch equals 6.452 square centimeters
1 square foot equals 0.093 square meter
1 square yard equals 0.836 square meter
1 acre equals 0.405 hectare
1 cubic inch equals 16.387 cubic centimeters
1 cubic foot equals 0.028 cubic meter
1 cubic yard equals 0.765 cubic meter
1 quart (liquid) equals 0.946 liter
1 gallon equals 0.004 cubic meter
1 ounce (avoirdupois) equals 28.349 grams
1 pound (avdp.) equals 0.454 kilogram
1 ton (2000 pounds) equals 0.9072 metric ton or 907.2 kilograms
1 horsepower equals 0.746 kilowatts
1 millimeter equals 0.039 inch
1 centimeter equals 0.394 inch
1 meter equals 3.281 feet
1 meter equals 100 centimeters or 1000 millimeters
1 kilometer equals 0.621 mile
1 kilometer equals 1000 meters
1 square centimeter equals 0.155 square inch
1 square meter equals 10.764 square feet
1 hectare equals 2.471 acres
1 cubic centimeter equals 0.061 cubic inch
1 cubic meter equals 35.315 cubic feet
1 cubic meter equals 1.308 cubic yards
1 liter equals 1.057 quarts (lq.)
1 gram equals 0.035 ounces (avdp.)
1 kilogram equals 2.205 pounds (avdp.)
1 metric ton equals 1.102 tons or 2204.6 pounds (avdp.)
1 metric ton equals 1000 kilograms
1 kilowatt equals 1.134 horsepower

APPENDIX O

ABOUT THE BOCA ORGANIZATION

Founded in 1915, Building Officials and Code Administrators (BOCA) International, Inc., is a non-profit service organization dedicated to professional code administration and enforcement for the protection of public health, safety and welfare. BOCA's objectives span both public and professional interests, and the organization's primary activities include the following:

- To serve the public's need for sound and progressive construction regulation through promulgation of the BOCA *Basic Code* series of model regulatory construction codes. The *Basic Codes* are performance-oriented model codes responsive to the latest advancements in construction technology.
- To serve governmental units, code administration personnel, and related building industry professionals by providing authoritative technical, educational and informational services relating to all speciality areas of code administration and enforcement.

The nation's oldest professional association for regulatory code officials, BOCA currently serves a membership that includes both regulatory officials and a wide variety of private sector building and construction professionals. This broad membership base of professional participation assists in maintaining the *Basic Codes* as responsive consensus documents published and promulgated in the public interest.

The BOCA *Basic Codes*

BOCA's complete model code services program is dedicated to the improvement of building regulations, and the effective administration, organization, and methods of enforcement of these regulations by professionally-staffed state and local governmental units.

To accomplish this, BOCA provides a complete model code services package, the "backbone" of which is the BOCA *Basic Code* series. *Basic Codes* available in completely revised and updated 1978 editions include the *Basic Building Code, Basic Mechanical Code, Basic Plumbing Code, Basic Fire Prevention Code, Basic Property Maintenance Code* and *Basic Energy Conservation Code.*

Democratic *Basic Code* revision

The BOCA *Basic Codes* are maintained in their current, responsive state through a current, responsive state through a democratic public hearing and revision procedure which allows all interested parties the opportunity to both propose changes to code provisions and testify regarding such change proposals. Change proposals to the BOCA *Basic Codes* are either accepted or rejected by vote of the organization's active membership, which consists of practicing regulatory code officials. Voting

on change proposals is conducted at the organization's Annual Conference, at which time final testimony is heard. Public hearings on proposed code changes are held prior to the Conference at the annual BOCA Mid-Winter Meeting

All of the *Basic Codes* are completely revised and published in new editions every three years. During each of these three years, voting on proposed code changes is conducted. Code changes from the first two years of revision activity are published in annual supplements. This supplement material, along with the results of the third year's code change activity, is then incorporated directly into the next edition of the code.

This procedure is maintained for its responsiveness to our rapidly-advancing building technology, and for its ability to retain code content in the hands of professional regulatory code officials and above the reach of various special interests. The BOCA *Basic Codes* are designed to protect public health, safety and welfare through efficient and effective use of available materials and current building technology.

Other BOCA publications

In addition to the *Basic Code* series, the BOCA organization publishes a variety of other publications useful to professional building departments and code personnel. These include the *Building Official and Code Administrator* Magazine, a wide and complete variety of building department forms and permits, textbooks and handbooks regarding code administration and enforcement, and code agency organizational recommendations. Along with the magazine, BOCA membership benefits include the BOCA *Bulletin*, copies of all Research Reports issued by BOCA's Research and Evaluation Service, and draft copies of all proposed code changes and proposed new code publications.

Technical services

BOCA's Technical Services Department offers a variety of professional engineering services to BOCA members and building industry firms and manufacturers. These include Plan Examinations services, Research and Evaluation services, Follow-up Inspection services, consultations and special studies, and code interpretations for BOCA members at no charge.

For further information

For specific information regarding BOCA publications or services, write: Building Officials and Code Administrators International, Inc., 17926 South Halsted Street, Homewood, Illinois 60430, or phone (312) 799-2300.

INDEX

By section number

For this printing of the Kentucky Building Code, *various deletions have been made to the Index of the BOCA* Basic Building Code/1978 *to remove references to provisions which have not been adopted by the Commonwealth of Kentucky. New Kentucky provisions which have been added for this printing may be found indexed under the headings "Administrative" and "Plumbing".*

B

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