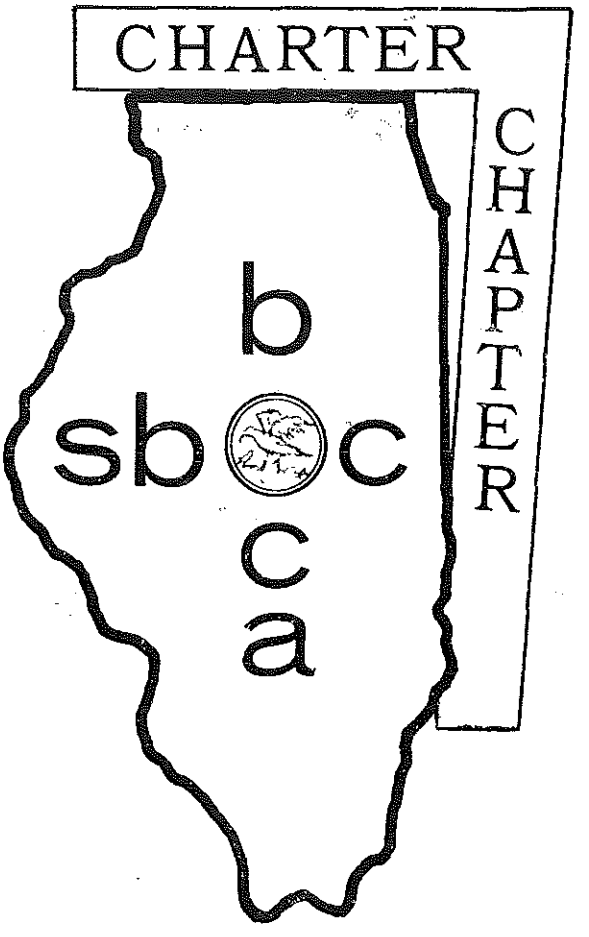
SBOC

SUBURBAN BUILDING OFFICIALS CONFERENCE



Building Code

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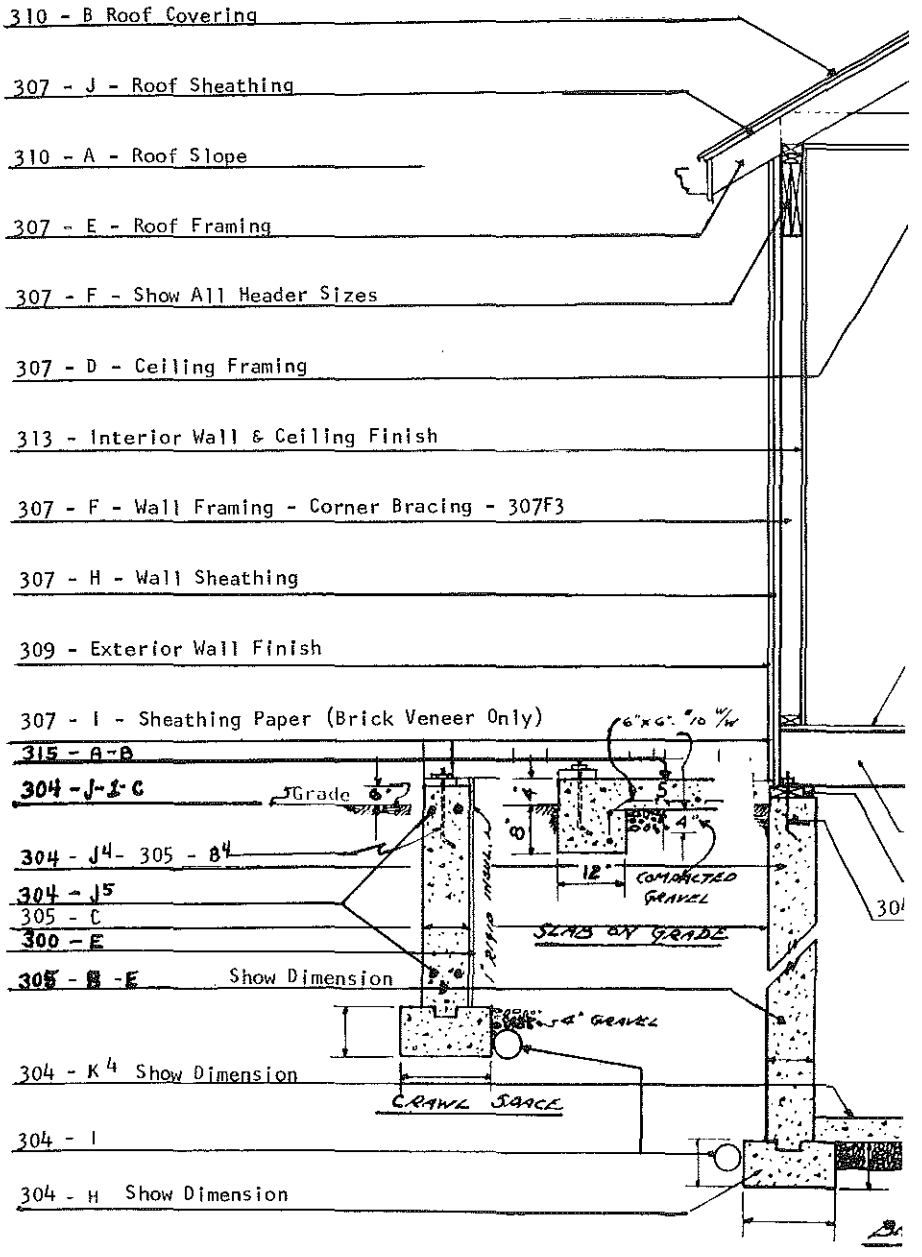

1981 Edition

Rules and Regulations for the Construction, Alteration, Repair and Conversion of Buildings for Residential Purposes

Specifically —

for single family residences, not over 2 stories and an attic in in height;

for duplex houses (two units side by side), two flats, not over 2 stories in height;

for buildings customarily accessory to the foregoing; and

for any residential portions of office, store and other business buildings, not higher than the second floor, subject to such additional requirements as may apply to such buildings.

These rules and regulations set forth requirements which are considered reasonable and are held in every instance to be minimum for the promotion of the public health, safety and general welfare.

Published by the
SUBURBAN BUILDING OFFICIALS CONFERENCE
719 S. Batavia Ave.
Geneva, Illinois 60134

CONTENTS

Swimming Pool Regulations — See Appendix A

DEFINITIONS

(a) Unless otherwise expressly stated, the following terms shall, for the purpose of this code, have the meanings indicated in this section.

(b) Words used in the present tense include the future; the singular number includes the plural and the plural the singular.

(c) Where terms are not defined in this section, they shall have their ordinarily accepted meanings or such as the context may imply.

Apartment, means one or more rooms arranged for the use of one or more individuals living together as a single housekeeping unit, with cooking, living, sanitary and sleeping facilities.

Approved, as to materials and types of construction, refers to approval by the Building Officials as the result of investigation and tests conducted by him, or by reason of accepted principles or tests by national authorities, technical or scientific organizations.

Approved Agency, is an established and recognized agency regularly engaged in conducting tests or furnishing inspection services, when such agency has been approved by the Building Official.

Building Official, means the officer or other designated authority charged with the administration and enforcement of this code, or his duly authorized representative.

Dead Load, means the weight of all permanent construction including walls, floors, roofs, partitions, stairways and of fixed service equipment

Fire resistance rating, means the time in hours that the material of construction will withstand the standard fire exposure as determined by a fire test made in conformity with the "Standard Methods of Fire Test of Building Construction and Materials." See NFPA 1976.

MINIMUM PLANNING REQUIREMENTS

200. LIGHT, VENTILATION AND SAFETY

A. General

1. Install windows in outside walls to provide natural light and ventilation in all habitable rooms.
2. Windows in habitable rooms, whose areas provide the light and ventilation necessary to comply with the following requirements are considered required windows. All windows in addition to these, and also windows in rooms other than habitable rooms, are considered nonrequired windows.
3. The area of glazed portions of doors located in exterior walls may be included when necessary in determining compliance with the above requirements.
4. Where window or drain openings are provided below grade, protect with metal gratings.

B. Habitable Rooms:

Rooms designed to be used for living, sleeping, eating or cooking, not including basement recreation rooms. (See 200-J)

1. Required light and ventilation in each habitable room includes windows, glass sliding doors and other exterior doors with glass area for light and 20% of opening for ventilation.
2. Total glass area: Not less than 8 percent of floor area of room.
3. Ventilating area: Not less than 4 percent of floor area of room.

C. Borrowed Light and Ventilation Between Rooms

1. Unless separately lighted and ventilated by windows which provide the required areas, the floor area of two habitable rooms may be combined in computing required light and ventilation area.
2. The common wall between such rooms shall contain an opening, the area of which shall be not less than 60% of the area of the wall separating these rooms.

D. Bathrooms and Water Closet Compartments

Provide ventilation by one of the following means:

1. Window or skylight:
   Windows or skylights located in exterior walls or roofs with the light and vent area not less than 3 square feet.
2. Vent in or near ceiling with continuous duct connection to outside air.
   Mechanical exhaust, 1 CFM per square foot.

E. Open Basements

Provide light and ventilation by windows or doors, in exterior walls with both glazed and ventilating area not less than 2 percent of the floor area.

F. Utility Rooms

Utility Rooms, Room or area, enclosed or un-enclosed where the major housekeeping appliances, laundry facilities, and water heating device are located.

Ventilate Utility Rooms by:

1. Windows or doors, in exterior walls with ventilating area not less than 5 percent of floor area; or
2. Duct or ducts to outside area minimum total free area 2 percent of floor area.

G. Heater Rooms.

Heater Room, Enclosed room or area where the central hea
ducing device is located.

Ducts to be screened and to have total free area equal
square inch for each 4000 B.T.U. per hour of imput rating
appliances in the enclosure when communicating directly
the outdoors or 1 square inch for each 2000 B.T.U. per ho
imput rating of all appliances in the enclosure when duct
used to the outdoors.

Other requirements pertaining to heating see NFPA No. 5
gas and No. 31 for oil.

H. Crawl Spaces:

Area beneath the bottom of floor joists and the ground b

1. All crawl spaces under houses without basements and
unexcavated spaces under porches, breezeways and pati
other appendages shall be ventilated by openings in
foundation walls. Such spaces shall be provided with a
panels so that they may be easily inspected. The vent
ings shall have a net area not less than 2 square feet for
100 linear feet of exterior wall, plus 1/3 square foot for
100 square feet of exterior wall, plus 1/3 square foot for
100 square feet of crawl space. Openings shall be arrang
provide cross ventilation and covered with corrosion resi
wire mesh, not less than 1/4 inch nor more than 1/2 in
any dimension. No unventilated, inaccessible spaces sha
permitted except when used as a plenum chamber for he
systems approved by the Building Official.
2. In crawl spaces ground shall be covered with a vapor b
of minimum 4 mil polyethylene film or better (or mater
equal perm rating) lapped 4 inches. Extend up foundatio
6 inches. Over this shall be placed 4 inches of coarse gra
material (sand, gravel or stone) or 2 inches of rough co
reasonably level.

I. Attic and Other Enclosed Spaces.

1. To eliminate the problem of moisture condensation on roof
ing in cold weather and to permit the escape of heat i
weather, ventilation of all spaces is required.
2. For gable roofs, where screened louvers generally are pro
and the net area of the opening shall be 1/300 of the area
ceiling below. When a 3/4-inch slot is provided beneath the
the ventilating area may be reduced to 1/900.
3. For hip roofs there shall be provided a 3/4-inch slot beneat
eaves and a sheet metal ventilator near the peak, in which
the net area of the inlet shall be 1/900, and that of the
1/1600 of the area of the ceiling below.
4. For flat roofs, blocking and bridging shall be arranged to pr
interference with movement of air. Such roofs may be venti
along overhanging eaves on the basis of net area of opening
to 1/250 of the area of the ceiling below.

J. Basement Recreation Rooms.

Basement recreation rooms with finished floor 3'6" or less b
the adjoining outside finished grade shall comply with section
basement recreation rooms with finished floors in excess of
below grade shall comply with section 200-E.

K. Fire Protection.

1. Install at least one approved listed and labeled smoke detec
each residential family unit. Locate according to manufact
recommendations.
2. In residential family units having basements or cellars an add
al detector shall be installed in each basement or cellar.

201. SPACE REQUIREMENTS

A. Minimum room sizes.

Except as otherwise provided by ordinance, rooms for the following uses shall meet the standards specified below.

	Min. Area Square ft.
1. Living, dining, cooking,	
(a) Living, dining and cooking when in one room (includes area occupied by equipment)	220
(b) Living, dining, when in one room	180
(c) Living only in one room, when dining space is provided in kitchen or separate room.	160
(d) Kitchen, cooking only (including area occupied by equipment) Provide at least 30 square feet additional area, usable for dining purposes when dining space is included in the kitchen.	60
(e) Dining only	100
2. Sleeping:	
(a) Major bedroom	100
(b) When no bedroom exists and bed is located in living room, the area of living room shall be increased 30 square feet over minimum area requirement of 201-A-1c.	

3. Bathroom:

Size: Adequate for water closet, lavatory, and tub or shower. The water closet may be located in a separate compartment adjoining the bathroom.

B. Additional Habitable Rooms.

See 200-B.

Minimum floor area 80 square feet.

C. Bedroom Closets.

Provide each bedroom with at least one closet or wardrobe having a minimum:

(a) Depth: 1 foot 10 inches.

(b) Floor area: 5 square feet.

(c) Height: 6 feet.

D. Space for Heating Units.

1. Provide space within the building for heating unit or system.
2. Provide clearances for maintenance and repair.
3. Provide clearances for fire safety, determined by insulation of heater and combustibility of walls, floor, and ceiling. As required by Underwriters Laboratories Inc. gas and oil equipment list.

202. HABITABLE BASEMENT ROOMS

A. Comply with requirements for habitable rooms with respect to privacy, light, ventilation, floor area and ceiling height.

B. Finish floor below the adjoining outside finish grade: Maximum, 3'-6".

C. Areaways: Minimum width measured perpendicular to face of building wall, 2 feet. Increased 1 inch for every inch of depth over 2 feet. Head of window, in all cases, to be at or above top of areawall.

203. PORCHES AND TERRACES

A. Minimum dimension from face of building where there are mor than two risers between grade and first floor, 4 feet.

B. Hand and guard rails shall be provided on porches and terrace when more than (2) risers above or below grade are required.

204. INGRESS AND EGRESS

A. Access

1. Living units. Each living unit shall be provided with two mear of access, as remote as possible from each other without passir through any other living unit. Sliding doors may be accepted a a required access.
2. Attics. Provide access to attics having a clear height of over 3(by means of scuttles, minimum 22" x 24", disappearing or buil in stairways. Required scuttles are not permitted in clos ceilings.
3. Crawl Spaces. Provide access of not less than 24" by 24".
4. Basements. Provide direct access to outside by a door, or a windo having an openable area at least 2 feet wide and 30 inches hig stool not more than 3 feet above floor. Where basement is with 5 feet of exterior entrance door this will consititute direct acce:

B. Privacy

1. Bedrooms
   (a) Each bedroom to have access to a bathroom without passi through another bedroom.
   (b) Each habitable room to have access to each other habitak room without passing through a bedroom.
2. Nonacceptable bathroom arrangements:
   (a) Sole bathroom opening directly into a kitchen.
   (b) Bathroom providing sole access to any other room.
   (c) Bathroom in the basement as the only one serving a living un

205. CEILING HEIGHTS

A. Minimum Ceiling Heights

1. Basements: 7'-0" clear under joists.
2. Main floor of any living unit: 8'-0" clear for at least 75 perce of the total floor area.
3. Areas other than main living areas 7'6" clear; under sloping roc 7'6" for not less than 50 percent of area having 5 feet or m headroom.

206. DOORS

A. Exterior Doors

1. Minimum sizes:
   (a) Main entrance doors: 3'0" wide.
   (b) Service entrance doors: 2'8" wide.
   (c) Height: 6'8"

B. Interior Doors

1. Provide a door for each opening to a bedroom, bathroom, a toilet compartment.
2. Minimum sizes:
   (a) All habitable rooms: 2'4" wide by 6'8" high.
   (b) Bathrooms: 2'4" wide by 6'8" high.
   (c) Powder rooms: 2'0" wide and 6'6" high.

207. STAIRWAYS

See 307-K

A. Design and Location:

1. Headroom: Continuous clear headroom measured vertically from front edge of tread to a line parallel with stair run, minimum 6'-6".
2. Width:
   (a) Main stairs: Minimum 2'-9" clear of handrail.
   (b) Basement stairs: Minimum, 2'-6" clear of handrail.
3. Treads: Minimum width, 9½ inches, clear of tread above.
4. Rise: 8 inches maximum. All riser heights to be same in any one story.
5. Winders: Tread width 15 inches from coverging end shall at least equal tread width on straight stair run unless a width of tread at converging end is 6 inches or more.
6. Landings: Width equal to that of stair.
7. Handrail: Install continuous handrail on at least one side of each run on all stairways extending at grasp level on lower floor or landing to grasp level on upper floor or landing without interruption by any means necessitating a change of handhold while traversing said stairway run. The grasp level shall remain a constant height paralleling the stair run and any side directional change shall not be greater than thirty (30) degrees from the direction of the stair run viewed vertically. Maximum width and depth of handrails shall be 2½ inches, unless shaped to provide a secure handhold.
8. Guardrail: Provide guardrail around all stairways of more than 2 risers. Porches, balconies or raised floor surfaces located more than 30 inches above the floor or grade below shall have guardrails not less than 36 inches in height. Handrails and guardrails on open sides of stairways shall have intermediate rails or ornamental closures which will not allow passage of an object 9 inches or more in diameter.

208. DWELLING UNIT SEPARATION

Provide one hour fire-resistive wall and/or ceiling without openings between living units of duplexes and row houses and between tiers of living units of other multiple family dwellings.

209. MINIMUM WIDTH

The width of any row or duplex dwelling measured between the interior finished surfaces of party walls or end walls shall be not less than 15 feet.

210. FIRE LIMITS

Within the fire limits residential buildings shall comply with the requirements of ordinances relating to construction within such limits.

MINIMUM CONSTRUCTION REQUIREMENTS

300. GENERAL

A. Construction Materials and Methods.

These requirements specify minimum acceptable construction materials and methods. Other materials and methods not specified herein may be approved for use by the Building Official upon the submission of evidence satisfactory to him that their performance in use will be at least equivalent to that of the materials and methods specified herein. It shall be required that such evidence include adequate reports and test data from a recognized testing laboratory, or proven and authoritative service records, or analysis of performance made in accordance with well established principles of mechanics.

B. Loads

1. All parts of dwellings and accessory buildings and structures shall be designed, constructed and maintained to support safely their own weight and all other loads and forces to which they may be subjected.
2. Assumed minimum live loads (uniformly distributed) for design purposes.
   (a) Ceiling or attic floor joists, no storage, none. Attic floors, limited storage only, 20 lbs. per square foot. All other floors 40 lbs. per square foot.
   (b) Girders: Dead loads of floor, partition and ceiling construction plus assumed live loads of floors plus combined dead and live loads of roof.
   (c) Roofs, either pitched or flat: 30 lbs. per sq. ft. normal to the roof surface.
3. Wind loads
   (a) On vertical faces: 20 lbs. per sq. ft. horizontally, any direction.
   (b) Roof or parts of roofs with slopes greater than 30 degrees: 20 lbs. per square foot design wind load.
   (c) Lifting force: 20 lbs. per sq. ft. To prevent sliding or overturning, anchor roofs to walls and columns, and walls and columns to foundations.

C. Special Conditions and Tests.

When special conditions exist or arise during construction, which necessitate additional precautions, the Building Official may require work in excess of these requirements.

D. Vapor Barriers

1. General
   (a) Definition: A material having a vapor transmission rate of 1.0 perms or less. Outside of wall to have vapor transmission rate of 5.0 perms or more. Generally acceptable are:
      1. 55 pounds per 108 square feet of smooth roofing.
      2. Foil or foil backed board.
      3. Duplex laminated papers 30-60-30.
      4. Duplex papers coated w/metal oxides.
      5. Insulation backup paper-treated.
      6. Insulating gypsum wallboard.
      7. Polyethylene films 4 mil. minimum.
2. Ceiling: Where unheated spaces above, install independent vapor barrier or one integral with insulating material immediately above ceiling interior finish.

3. Sidewalls: Install a vapor barrier immediately back of interic wall finish.
4. Crawl Space: See Section 200-H.
5. Vapor barrier to be applied tightly against any electrical ou lets, registers or framed openings.

E. Thermal Insulations

1. Unheated crawl spaces
   (a) Insulation of floors (anyone of the following:)
      1. Foil reflective type on both sides between joists wit 2 inches air space maintained between bottom of floo and foil. Install so that there are no openings at end of joists.
      2. ½ inch rigid insulation board fastened to bottom c floor joists. Install so that there are no openings a ends of joists.
      3. Any insulation better than that above. i.e. 1 inc blanket.
   (b) Insulation of ducts and pipes located in crawl space.
      1. Warm air ducts and plenum shall be covered with i sulation material, minimum thickness 2 inches.
      2. Return air ducts shall be covered with insulation m terial minimum thickness 1 inch.
      3. Sewer and water supply shall be covered with insul tion material, minimum thickness 1 inch.

2. Heated Crawl Spaces
   (a) Install insulation minimum 1 inch thick, on all surface of foundation walls that are adjacent to crawl space.
   (b) Insulation shall be waterproof and non-capillary, ino ganic, and termite and fungi resistant.
   (c) Insulation shall be installed to extend up to underside c sub-flooring, to extend down to 6 inches above groun and to be fastened to foundation walls.

3. Insulation for exterior perimeters of concrete floor slabs
   (a) At least 1 inch thickness at edges.
   (b) Where heating ducts in floor increase to 1½ inches a slab edge.
   (c) Extend insulation down along inside face of foundatic wall for a distance of at least 18 inches.
   (d) Insulation material requirements shall be rigid, ino ganic, waterproof, and non-capillary, or rigid, organi termite and fungi resistant and saturated with aspha to be waterproof.

4. Ceiling Insulation
   (a) Ceilings shall be insulated to provide a U value of 0.: or less for ceilings without heating panels and 0.06 c less for ceilings with heating panels.
   (b) Foil of equivalent rating acceptable.

(c) Examples of typical ceiling constructions which meet the above U values.

U = 0.15

(1) Wood Ceiling Joists.
1/2" gypsum board or lath and plaster.
1-1/2" thick batts or blankets between joists.

(2) Wood Ceiling Joists.
1/2" gypsum board or lath and plaster.
1-1/2" thick insulating roof deck on top or cut between joists.

(3) Wood Ceiling Joists.
1/2" gypsum board or lath and plaster.
3" thickness of lightweight loose fill aggregate (expanded).

(4) (finished floor above)
Wood Ceiling Joists.
1/2" gypsum board or lath and plaster.
1/2" plywood sub-floor.
Wood strips or block finish flooring.
1" batts or blankets.

U = 0.06

(1) Wood joists.
1/2" gypsum board or lath and plaster.
3-1/2" thick or 3-5/8" batts or blankets.

(2) Wood joists (finished floor above).
1/2" gypsum board or lath and plaster.
1/2" plywood sub-floor.
Strip or block finish flooring.
1/2" acoustical tile applied directly to ceiling or on strips.
2" batts or blankets between joists.

(3) (finished floor above and area occupied)
1/2" gypsum board or lath and plaster.
25/32" wood sub-floor.
3/4" wood finish floor on sleepers.
3" batts or blankets.
4" minimum reinforced concrete slab.

5. Exterior Wall Insulation
(a) Frame Construction, 2x4 stud wall.
1/2" gypsum board or lath and plaster.
1-1/2" thick batts or blankets between studs.
(b) Brick Veneer
1/2" gypsum board or lath and plaster.
1-1/2" thick batts or blankets between furring strips.

F. Heating Requirements

(a) Provide heating unit capable of heating dwelling from minus 10 degrees to 72 degrees Fahrenheit @ 15 mph outside wind with heat loss calculated in accord with American Society of Heating and Ventilating Engineers standards.

(b) Heating unit shall be constructed and installed in strict accord with the applicable current published standards, requirements and recommendations of the National Fire Protection Association, American Standards Association, and the American Society of Mechanical Engineers. Labeling and listing by following shall be accepted as conforming with equipment design standards; Underwriters Laboratories, Inc., American Gas Association, or American Society of Mechanical Engineers.

(c) Clearance shall be provided for all heating equipment for access, repair and maintenance.
(d) Smoke pipes where extreme heat is hazardous to human occupancy shall be insulated from furnace to chimney with a minimum of ¼ inch of asbestos material.
(e) Insulation of all heat producing devices shall be such that temperature rise of surrounding frame construction will not exceed 160 degrees Fahrenheit.

301. FOUNDATIONS

A. Walls and Piers

1. Extend bottom of footing to undisturbed, inorganic earth or place footings on a laboratory controlled engineered fill as recommended and certified by an approved independent testing laboratory to the Building Official.
2. Bottom of footing. Not less than 3'6" below finished grade, except where placed on solid rock.
3. Protect against freezing. No concrete shall be placed on frozen ground.

B. Crawl Spaces

1. Ground level at least 24 inches below bottom of floor joists and girders. Ground under dwelling to be approximately level.
2. Remove all debris, sod, tree stumps and other organic matter within area occupied by dwelling.

C. Pressure Treated Wood Foundations.

1. Pressure treated wood foundations shall be installed in accordance with the Technical Report No. 7 as published by the National Forest Products Association.

302. GRADING

Grading or drainage or both shall be performed so that water will drain away from the building on all sides and off the lot in a manner which will provide reasonable freedom from erosion and pocketed surface water. Construction such as walks, driveways and retaining walls shall be installed so that they will not interfere with drainage. All sidewalks, driveways, patios and other flat work shall have the top of the finished surface 4" minimum below the top of the foundation wall.

303. MASONRY MATERIALS

Masonry materials described below apply to all masonry and concrete work.

A. Cement

1. Portland Cement. See Appendix A.
2. Prepared masonry cement for mortar. See Appendix A.
3. Pozzolanic materials, such as fly ash, will not be substituted for any portion of cement without the knowledge and consent of the Building Official. When used as a replacement for cement, manufacturer's recommendations will be followed and subjected to testing by an approved laboratory.
4. Portland Cement, Air Entraining. See ASTM C 175-61.
5. Portland Blast-Furnace Slag Cement.

B. Aggregate

1. Sand: Clean, hard and sharp, free from harmful materials, graded according to intended use.
   (a) Concrete Aggregate - See Appendix A.
   (b) Masonry Mortar Aggregate - See Appendix A.

2. Coarse aggregate (crushed stone or gravel): Hard, strong crystalline rock, properly graded, clean and free from shale or other soft material. See Appendix A.
3. Lightweight aggregate for structural concrete. See Appendix A.

C. Water

Clean and free of deleterious amounts of acids, alkalies, or organic materials.

D. Lime

1. Hydrated lime. See Appendix A.
2. Quick lime, slake thoroughly. See Appendix A.

E. Mortar

See Appendix A.

F. Brick

1. Face Brick: See Appendix A.
2. Common Brick: See Appendix A.
   (a) Selected hard-burned common brick may be used for facing of exterior and interior walls.
   (b) Salmon or soft brick may be used in interior walls when not exposed, and for back-up work.
3. Fire Brick. See FS-HH-B-671d.
4. Concrete Brick. See Appendix A.
5. Second-hand materials. Masonry units may be reused when thoroughly clean, whole and conforming to other provisions of this standard, except that the maximum allowable wall heights shall be limited to 50% of that permitted for walls of new masonry units.

G. Structural Hollow Clay Tile

1. Sound, kiln-burned units, free from defects that would impair the strength or permanence of the construction.
2. Load-bearing tile: See Appendix A.
3. Non-load-bearing tile: See Appendix A.
4. Glazed or unglazed facing tile: See Appendix A.

H. Concrete Masonry Unit.

See Appendix A. Sound and thoroughly cured.

I. Stone

1. Rubble and cut stone: Good quality building stone.
2. Cast stone. See ACI 7C4-44.

J. Flue Lining

Glazed fire clay and vitrified tile, free from cracks or other defects.

K. Glass Block.

See NFPA 76.

304. CONCRETE WORK

A. General

1. Materials: See 303.
2. Water content, including moisture in the aggregate, shall no exceed 7 gallons of water per bag of cement (except a noted).
3. Maximum slump: 6 inches (except as noted).
4. Calcium chloride may be used as an accelerator, but shall no exceed 2 lbs. per bag of cement, and shall be introduced i solution as part of the mixing water. Calcium chloride shal conform to ASTM D 98-59.
5. All concrete shall be air-entrained, 6% ± 1%. Air entrainin admixtures shall conform to ASTM C 260-60T.

B. Quality of Concrete

1. Job Mix: Minimum cement proportions, by volume, 1 part portland cement, 2½ parts sand, 3 parts coarse aggre gate (3/4 to 1 inch maximum size).
2. Commercial Ready-Mix. See Appendix A.
   (a) Minimum portland cement content: 5 bags/cu.yd.
   (b) Mixing period shall not extend beyond 1½ hours pe batch.
3. Exposed Concrete (driveways, sidewalks, curbs and gutters patios, stoops, etc.)
   (a) Minimum portland cement content: 6 bags/cu.yd., for 3/ inch to 1 inch maximum size aggregate.
   (b) Maximum slump: 4 inches.
   (c) Maximum water content, including moisture in the ag gregate: 6 gallons per bag of cement.
4. Hardened Concrete
   To determine the quality of hardened concrete, the wate cement ratio for a tested compressive strength shall be foun in table 5, "Compressive Strength of Concrete for Variou Water-Cement Ratios" of "Recommended Practice for Selec ing Proportions for Concrete" (A.C.I. 613-54) published in th Proceedings of the American Concrete Institute, Vol. 51. Th water-cement ratio thus established will determine whethe or not the concrete meets the code requirements.

C. Reinforced Concrete

The design and construction of reinforced concrete shall be in acco dance with the provisions of the "Building Code Requirements fc Reinforced Concrete" (Appendix A).

D. Forms

1. Double forms required for all basement concrete foundatio walls.
2. Side forms required for footings where soil conditions pre vent sharp-cut trenches.
3. Build tight, straight, plumb, and brace rigidly.

E. Placing

1. Place continuously unless otherwise allowed by Buildin Official.
2. When not placed continuously, clean score and wet the to surface of the concrete before continuing. Key all vertica joints.
3. Spade and rod thoroughly.

F. Curing and Protection

1. Concrete shall be protected from drying for a minimum of 6 days by use of a membrane curing compound (ASTM C 309-58) burlap kept continuously wet, heavy waterproof paper (see Appendix A). or other approved method.
2. Concrete shall be maintained at temperatures of not less than:
   (a) 70° for 3 days or 50° for 5 days for normal concrete.
   (b) 70° for 2 days or 50° for 3 days for high early strength concretes.

G. Loading

Allow sufficient time for strength of concrete to develop before subjecting to loads or traffic.

H. Footings

1. General
   (a) Design for proper distribution of superimposed loads.
   (b) Material: cast-in-place concrete.
   (c) Bear on solid, unfilled ground.
   (d) Reinforce with steel bars where footings cross or bear on filled trenches or other unstable soil.
   (e) Footing dimensions listed below are based upon soils of average bearing capacity (3,000 pounds per square foot.) For soils of lesser bearing capacity or where unusual loading conditions exist, larger footings will be required.
2. Wall Footings:
   (a) Minimum dimensions for spread footings shall be 8 inches deep by 18 inches wide, except that masonry veneer on frame and solid masonry walls shall be 10 inches deep by 20 inches wide.
3. Pier, Post and Column Footings.
   Dwellings: Minimum area 6.25 square feet; thickness minimum 12 inches. (Not permitted under exterior walls.)
4. Chimney Footings:
   (a) Dwellings: Minimum thickness, 12 inches; minimum projection each side, 6 inches.
   (b) Pour integral with wall footing when chimney occurs in outside wall or inside bearing wall.

I. Footing Drain Tile.

See ASTM C 4-55 (54-T)

1. Required outside or inside of basement footings, (if inside, at least 2 feet from footings). Minimum diameter 3 inches.
2. Cover tile with 8 inches gravel or crushed stone, (95 percent) passing 3/4 inch mesh, less than 5 percent passing 3/8 inch mesh.
3. Connect with tight-joint glazed tile or approved equal to storm sewer, dry well or other approved outlet.

J. Concrete Foundation Walls Cast in Place. (For masonry unit foundation walls, see 305-B)

1. General
   (a) Materials. See 303.
   (b) Walls supporting frame construction: Extend concrete not less than 6 inches above adjoining outside finished grade.
   (c) Walls supporting masonry veneered wood frame: Extend foundation so that wood portion of wall is not less than 6 inches above outside finished grade.
2. Minimum thickness:
   (a) Not less than that of wall supported.
   (b) Supporting porch slabs, steps and one-story wood frame structures without basement, minimum 8 inches.

(c) Interior walls not subject to lateral pressure, 6 inches minimum.
(d) All other walls 8 inches minimum.

3. Girder pockets. Provide 4 inch end bearing on main wall for girder. Form pocket for wood girder 1 inch wider than girder
4. Sill anchor bolts to be installed:
   (a) Diameter, ½ inch minimum.
   (b) Minimum length, 10 inches.
   (c) Provide washer under nuts on bolts.
   (d) Spacing, not more than 8 feet on center; minimum, 2 bolts in each piece.
5. Anchorage for intersecting walls and slabs. Provide dowel bar anchorage for porch and terrace slabs, concrete or masonry steps and area walls, which adjoin foundation walls For basementless portions and attached garages, embed four ½ inch round hooked bars 4 feet long in main wall, two near top and two near bottom of attached wall.
6. Chimney foundations: Start at level of lowest adjacent foundation wall footings.
7. If special or unforeseen soil conditions warrant, the Building Official may require either reinforcement of wall or increased thickness.
8. Dampproofing and waterproofing. See 305-C.

K. Concrete Floor Slabs on Ground.

No floor slab to be placed in water or on a soft wet subgrade Basements must be pumped dry at least twenty-four hours before floor is poured.

1. Construction:
   (a) Fill under slabs: Gravel, sand, screenings, or crushed rock, minimum thickness 4 inches. Earth underfill thoroughly leveled and free from vegetable matter, thoroughly tamped.
   (b) Wire mesh reinforcing: When required, minimum weight 40 pounds per 100 square feet.
   (c) Bottom of slab: Not lower than top of footing. Provide at least 4 inches bearing on footing.
2. Cement floor finish:
   (a) Finish basement slab with steel trowel.
   (b) Integral finish on concrete slab.
3. Slabs on ground used as a base for floors or as a finish floor in habitable rooms.
   (a) Minimum thickness, 4 inches.
   (b) Provide membrane water proofing directly under slab, at least 4 mil polyethaline film, lapped 4 inches.
   (c) Refer to 300-E-3.
4. Basement floor slabs: Minimum thickness, 4 inches.
5. Garage floor slabs: See 315 A or B.
6. Terrace and porch floor slabs:
   (a) Minimum thickness, 4 inches.
   (b) If reinforced, fill may be omitted.
   (c) Install metal flashing between slabs and all wood construction. See 311-F.
7. Slabs on ground used to support interior bearing walls or partitions: Thicken to at least 10 inches for a width of 20 inches.

305. MASONRY WORK

A. General

1. Materials. See 303.
2. Mortar:
   (a) Masonry below grade, portland cement mortar; 1 part portland cement, 3 parts sand by volume. Lime, not more than 25 percent of the cement by volume, may be added.
   (b) All other masonry:
      1. Portland cement mortar. See (2a) above.
      2. Cement-lime mortar: 1 part portland cement, 1 part lime putty, 6 parts sand by volume.
      3. Prepared masonry cement mortars; 1 part masonry cement, 3 parts sand by volume; add no materials other than sand and water.
   (c) Retempering mortar: Mortar that has stiffened on the mortar board due to evaporation should be retempered to restore its workability by thorough remixing and by the addition of water as required. All mortar shall be used within 2 hours after initial mixing.
3. Joints
   (a) Maximum thickness 5/8 inch. Joints for decorative stone work may be increased 1/4 inch.
   (b) Solid masonry units: Fill joints solid.
   (c) Hollow masonry units: No through mortar joints.
   (d) Fill all joints solid both sides of wall.
4. Bonding
   (a) Walls of solid masonry units. Solid masonry bearing and non-bearing walls shall be bonded in accordance with one of the folowing methods:
      1. Bonding with headers.
         The facing and backing shall be bonded with a header course consisting of alternate through header and stretcher every seventh course, or one through header in every 240 square inches, uniformly placed throughout wall.
      2. Bonding with metal ties.
         The facing and backing shall be bonded with corrosion-resistant metal ties conforming to requirements of Section 305-G-4 for cavity walls.
         There shall be one metal tie for not more than each 4-1/2 square feet of wall area. Ties in alternate courses shall be staggered. The maximum vertical distance between ties shall not exceed 18 inches, and the horizontal distance shall not exceed 36 inches. Walls so bonded shall conform to the thickness-(excluding cavity), height and mortar requirements for cavity walls.
   (b) Masonry Walls of Hollow Units
      Where two or more hollow units are used to make up the thickness of a wall, bonding shall be in accord with recommendations of American Standard Building Code Requirements for Masonry M. P. No. 211 (7-15-1954) Section 7.2.
   (c) Stone Walls
      1. Ashlar Masonry:
         Ashlar Masonry, bond stones uniformily distributed shall be provided to the extent of not less than 10 percent of exposed faces.

2. Rubble Stone Masonry:
Rubble stone masonry 24 inches or less in thickness shall have bond stones with a maximum spacing of 3 feet vertically and 3 feet horizontally, and if the masonry is of greater thickness than 24 inches, shall have 1 bond stone for each 6 square feet of wall surface on both sides.

(d) Intersecting concrete and masonry walls shall be bonded together in an approved manner.

5. Closed cell hollow units: Use for rough openings, corners, and wall intersection. Filling exposed ends of cells not acceptable.

6. Protection. Provide frost protection acceptable to Building Official when temperature falls below freezing, except that no masonry work shall be done in temperatures below 20° F. (Protection as outlined by American Standard Building Code Requirements for Masonry M P-211 shall be considered acceptable practice.)

7. Loading. Allow sufficient time for strength of masonry to develop before subjecting to loads.

8. Wetting Clay Masonry Units: All clay brick having absorption rates (determined in accordance with ASTM Specification C67-73) in excess of 0.025 oz. per sq. in. per min. shall be wetted sufficiently so that the rate of absorption does not exceed this amount.

B. Masonry Unit Foundation Walls. (For cast-in-place concrete foundation walls, see 304-J.)

1. General
   (a) Materials. See 303.
   (b) Walls supporting wood frame construction: extend not less than 6 inches above adjoining outside finish grade.
   (c) Walls supporting masonry veneered wood frame: Extend foundation so that wood portion of wall is not less than 6 inches above outside finish grade.
   (d) Walls of hollow masonry units: Cap with minimum of 4 inches of solid masonry or concrete. Hollow units filled with concrete not acceptable.
   (e) Concentrated loads under ends of girders bearing on hollow masonry unit foundation walls: Suport on minimum of 4 inches solid masonry or concrete.

2. Minimum Thickness of Masonry Unit Foundation Walls:
   (a) Foundation walls shall be of sufficient strength and thickness to resist lateral pressures from adjacent earth and to support their vertical loads. Foundation walls or their footings shall extend below the level of frost action (42 inches) and shall be not less in thickness than 10 inches.
   (b) Foundation walls of coursed stone shall be at least 16 inches in thickness.
   (c) Solid foundation walls of solid masonry units that do not extend more than 5 feet below the adjacent finished ground level may be 8 inches in thickness. The combined height of the 8 inch foundation wall and the wall supported shall not exceed 30 feet.

3. Girder pockets: Provide 4-inch end bearing for girder. For wood girder, leave ½ inch space each side.

4. Sill anchor bolts to be installed.
   (a) Diameter: ½ inch minimum.
   (b) Minimum length in masonry unit walls: 15 inches.
   (c) Provide washer under nuts on bolts.
   (d) Spacing: not more than 8 feet on center, minimum 2 bolts in each piece.
5. Anchorage for intersecting walls and slabs: Provide anchor- for porch and terrace slabs, concrete or masonry steps and areawalls, which adjoin foundation walls.
6. Chimney foundations: Start at a level of lowest adjacent foundation wall footings.
7. If special or unforeseen soil conditions warrant, the Building Official may require either reinforcement of wall or increased thickness.

C. Dampproofing and Waterproofing.

1. Dampproof basement or cellar walls on exterior from finish grade to outside edge of footing:
   (a) Masonry unit walls: Apply 1/2 inch thick portland cement plaster coat forming a cove at the footing, over which apply at least one heavy coat of undiluted hot tar, asphalt or compound acceptable to the Building Official.
   (b) Concrete walls cast in place: Apply at least one heavy coat of undiluted hot tar, asphalt or compound acceptable to the Building Official.

D. Piers.

1. Piers only acceptable for open porches.
2. Materials: Masonry units or cast-in-place concrete. See 303.
3. Minimum sizes in inches:
   (a) Masonry: 12" x 12".
   (b) Plain concrete: 10" x 10" or 12 inch round.
4. Minimum height above grade, 6 inches.
5. When of hollow masonry units, cap with at least 4 inches solid masonry or concrete. See 305-B-1-e.
6. Sill anchor bolts or dowels to be installed.
7. Piers shall be poured to proper grade so that required shims shall not exceed ½ inch. Only metal plates and asbestos shims shall be used.

E. Exterior Walls Above Grade:

1. Materials: All materials shall meet the requirements of Section 303.
2. Allowable Heights and Thicknesses:
   (a) In residence buildings not more than two stories in height, walls other than coursed or rough or random rubble stone walls, may be of 8 inch thickness when not over 30 feet in height from grade to ridge at gable ends and when the roof is designed to impart no lateral or horizontal thrust. When the roof imparts a horizontal thrust such walls shall have a minimum thickness of 12 inches.
   (b) Rough or random or coursed rubble stone walls shall be not less than 16 inches in thickness.
   (c) Hollow walls of masonry units shall not exceed 30 feet in height from grade to ridge of gable ends except that 10 inch cavity walls shall not exceed 25 feet in height above the support of such walls. The facing and backing shall each have a thickness of at least a nominal 4 inches and the cavity shall be not less than 2 inches (actual) nor more than 3 inches in width. The facing and backing of cavity walls shall be bonded with metal ties. (See Sec 305-A-4-a-2.)

(d) Walls of 1 story buildings may be of 6 inch thickness when not over 10 feet in height when solid structural clay masonry units are used, or 9 feet in height for hollow structural clay masonry units, except than an allowance of an additional 6 feet is permitted for gables.

3. Maximum height for 8 inch thickness: 22 feet from grade to eaves; or 30 feet from grade to ridge in gable ends. For greater heights, minimum thickness 12 inches except top 22 feet.

4. Backing, when used, solid or hollow masonry units, minimum thickness:
   (a) Bonded to facing, 4 inches. See 305-A-4-a 1 and 2.
   (b) Tied to facing with sheet metal ties, 8 inches.

5. Furring when interior finish is applied: Not less than 1 inch wood strips. Spacing as permitted for interior finish. See 313. Bituminous waterproofing materials on masonry not acceptable for plaster base. Install horizontal furrier strips at ceiling and floor to form fire stops and prevent convection.

6. Lintels. Size to be determined by span in each case. No concentrated loads over nonreinforced lintels.
   (a) Lintels may be:
      1. Precast concrete, reinforced brick and reinforced structural hollow clay tile.
      2. Stone.
      3. Masonry arch.
      4. Steel. See ASTM A7-56T.
   (b) Support on not less than 4 inches of solid masonry.

7. Rafter plate anchor bolts to be installed.
   (a) Diameter, 1/2 inch minimum.
   (b) Minimum length in masonry unit walls, 15 inches; poured concrete walls, 10 inches.
   (c) In masonry walls, washer and 3 inch square plate on bolts.
   (d) Spacing, not more than 8 feet on center.

8. Radiator recesses:
   (a) Construct at time wall is built.
   (b) Maximum recess depth, 4 inches in 8 inch walls, 8 inches in 12 inch walls.
   (c) Back and sides of recess to be waterproofed and insulated.
   (d) Width under windows not greater than rough opening.

9. Vertical chases:
   (a) Construct at time wall is built.
   (b) Maximum length for chases where net wall thickness is 8 inches or less, 4 feet.
   (c) Maximum chase depth, 4 inches.
   (d) Back and sides of chase to be plastered with one-half inch of Portland cement mortar.

10. Horizontal chases:
   (a) Not acceptable unless wall thickness is at least 4 inches greater than thickness required under 305-E-2.
   (b) Maximum depth, 4 inches.

F. Masonry Veneer.

1. Minimum thickness of material:

(a) Architctural terra cotta (cellular)	3 inches
(b) Architectural terra cotta (flat slabs)	1 1/4 inches
(c) Brick	2 inches

(d) Stone (natural)	2 inches
(e) Stone (cast artificial)	1 1/2 inches
(f) Clay tile (structural)	1 3/4 inches
(g) Clay tile (flat slab)	1/4-1 inch
(h) Marble slabs	1 inch
(i) Precast stone facing	5/8 inch
(j) Structural glass	11/32 inch

2. Masonry veneered wood frame construction. Veneer applied over sheathing with air space between.
   (a) Air space: 1-inch minimum between masonry veneer and sheathing.
   (b) Base flashing: Copper or approved equal extending over top of foundation wall from outside face of wall and not less than 12 inches up on sheathing.
   (c) Apply water resistant building paper or saturated asphalt felt over sheathing. Lap base flashing at least 4 inches.
   (d) Bonding: Corrosion-resisting metal ties spaced not more than 15 inches vertically and 32 inches on center horizontally: When other than wood board sheathing is used, secure ties through to studs with corrosion-resisting nails of length sufficient to penetrate wood at least 1 inch.
   (e) Lintels. Size to be determined by materials and span in each case. Bearing, at least 4 inches. Arches permitted.
   (f) Weep Holes. See 305-G-6.

G. Cavity Walls.

1. The minimum thickness of the inner and outer wythes of cavity walls shall not be less than a nominal 4 inches, and the nominal out to out dimension of the wall shall not be less than 10 inches.
2. The maximum height of 10-inch cavity walls and the width of the cavity shall conform to the requirements of Section 305-E-2-c.
3. All masonry units shall be laid in a full head and bed mortar joint. The mortar used in cavity wall construction shall conform to the requirements of "Portland Cement Mortar" or "Cement-Lime Mortar". (See Section 305-A-2-a and b.)
4. The facing and backing of cavity walls shall be bonded with 3/16-inch diameter non-corrosive steel rods or metal ties of equivalent stiffness embedded in the horizontal joints. There shall be one metal tie for not more than each 4½ square feet of wall area. Ties in alternate courses shall be staggered, the maximum vertical distance between ties shall not exceed 18 inches, and the maximum horizontal distance shall not exceed 36 inches. Rods or ties bent to rectangular shape shall be used with hollow masonry units laid with the cells vertical; in other walls the ends of ties shall be bent to 90-degree angles to provide hooks not less than 2 inches long. Additional bonding ties shall be provided at all openings, spaced not more than 3 feet apart around the perimeter and within 12 inches of all openings.
5. Non-corrodible flashing shall be placed over the top of all openings, at window sills and at the bottom of the cavity.
6. Weep holes shall be provided in the head joints in the first course immediately above all flashing. The weep holes shall be spaced not more than 24 inches on centers and every effort shall be made to keep the cavity clean of mortar droppings. When wicks of 1/4 inch fiberglass rope or similar materials are used, weep holes shall be spaced not more than 24 inches on centers.
7. Furring: See 305-E-5.

H. Interior Masonry Walls.

1. Material: Masonry or cast-in-place concrete.
2. Pipe recesses: Construct at time walls are built.
3. Party and fire walls:
   (a) Minimum thickness: Cast-in-place concrete, 6 inches; masonry units 8 inches. Chases or recesses not permitted.
   (b) Flat roofs: Extend above roof, flash and cap with stone, concrete, vitrified tile, or terra cotta.
   (c) Under pitched roofs: Build masonry solid to underside of roof sheathing unless carried above roof.
4. Bearing partitions:
   (a) Minimum thickness of plain concrete or unit masonry wall shall be not less than a nominal 6 inches.
   (b) Sections of walls with distance between openings 2 feet or less: Solid masonry units or hollow units filled with concrete.
   (c) Lintels: Steel, reinforced concrete, reinforced structural clay masonry or masonry arches. Not less than 4 inches bearing upon solid masonry at least 4 inches thick.
   (d) Joist bearings: Solid masonry at least 4 inches thick.
   (e) Girder bearing: Solid masonry at least 8 inches thick.
5. Nonbearing partitions:
   (a) Minimum thickness, 3 inches.
   (b) Lintels: Steel, reinforced concrete or masonry, or masonry arches.

I. Chimneys

1. Provide masonry or approved prefabricated chimney.
   (a) Separate flue required for each fireplace.
   (b) Separate flue required for each appliance fired with natural-draft oil burner. Separate flues required for all other equipment, depending upon sustained chimney draft for proper operation, unless combined flue is specifically approved by the Building Official.
2. Materials: Solid masonry; footing concrete cast-in-place.
3. Effective flue area: At least as recommended by the manufacturer of equipment connected to chimney and at least equal to area of outlet (smoke or vent) of equipment connected to it, minimum diameter for house heating flue, 8 inches. For fireplaces, effective area not less than 1/10 of fireplace opening.
4. Chimney linings, wythes and walls:
   (a) Glazed fire clay flue lining required in all chimneys for liquid and solid fuels. When gas is used as fuel, provide flue lining of metal or composition acceptable to the Building Official, or glazed fire-clay lining or vitrified tile lining, bell and spigot type, bell end up, all with joints made with acid-resisting mortar. Provide drain to dispose of condensation.
   (b) Two flues may be grouped without a wythe of masonry between them provided the joints of the linings are staggered at least 7 inches.
   (c) Wythes separating flues or groups of flues with linings not staggered, 3-3/4 inches minimum thickness.
   (d) Walls, minimum thickness, 3-3/4 inches in addition to lining.
5. Height of chimney: As recommended by equipment manufacturer. Chimneys shall extend at least 2 feet above the highest ridge or portion of the building within 10 feet.
6. Cap chimney to form wash from flue to outside edge, minimum thickness, 2 inches.

7. Metal thimbles and clean-out doors to be built in at the time chimney is constructed. Clean-out doors not necessary for approved prefabricated chimneys.
8. A prefabricated chimney may be used provided that
   (a) it is listed by Underwriters Laboratories as acceptable for the fuel specified.
   (b) it is installed in accordance with the manufacturers specifications and instructions and in accordance with the methods by which it was tested by Underwriters Laboratories.
   (c) it is installed according to the height requirements for masonry chimneys.

J. Fireplaces.

1. Smoke chamber and damper required in all fireplaces.
2. Minimum wall thickness: 8 inches in addition to the lining.
3. Ash dump: When provided, empty into concrete or masonry chamber provided with metal clean-out door.
4. Lining: 2 inch fire brick or other material acceptable to Building Official.
5. Hearth:
   (a) Support independently on masonry or concrete.
   (b) Projection from chimney breast, at least 16 inches.
   (c) Width: At least 8 inches wider than fireplace opening on each side.
   (d) Material, incombustible.
   (e) Combined minimum thickness of hearth and support; 6 inches.
6. Fireplace opening lintel: use brick arch, concrete, stone, steel or reinforced clay masonry.
7. Facing: masonry, no combustible material closer than 3½ inches to fireplace opening.

K. Glass Block.

1. May not use as load-bearing units.
2. Maximum size of unsubdivided panel: area 144 square feet; length 25 feet; height 20 feet.
3. Provide for expansion.

306. STRUCTURAL STEEL AND IRON

A. Structural Steel Construction

1. The design, fabrication and erection of structural steel for building shall conform to the requirements of the Specification for the Design, Fabrication and Erection of Structural Steel for Buildings of American Institute of Steel Construction adopted April 17, 1963.
2. Bearing: On walls, minimum, 4 inches.
3. Bearing Plates:
   (a) Design to distribute load, minimum thickness, 5/16 inch.
   (b) Bed in portland cement mortar.
   (c) Plates may be omitted under wideflange type steel beams if width of flange provides sufficient bearing area so that allowable compressive stress of supporting materials is not exceeded.

B. Light Gage Cold-Formed Steel Construction

1. The design of light gage cold-formed steel construction shall conform to the Specification for the Design of Light Gage Cold-Formed Steel Structural Members of American Iron and Steel Institute, 1962 Edition.

2. All individual structural members and assembled panels light gage cold-formed steel construction, except where fabi cated of approved corrosion-resistive steel or of steel havii a corrosion-resistive metallic or other approved coating, sha be protected against corrosion with an acceptable shop co of paint, enamel, or other approved protection.

C. Open Web Steel Joist Construction

1. The design, fabrication and erection of open web steel joi construction shall comply with the following specification
   (a) "Standard Specifications for Open Web Steel Joists, Series" adopted by the Steel Joist Institute, effecti October 1, 1963.
   (b) "Tentative Specifications for Open Web Steel Joists Series" adopted by the Steel Joist Institute, effecti October 1, 1963.
   (c) "Standard Specifications for Open Web Steel Jois Longspan or LA-Series" adopted by the American Ins tute of Steel Construction and the Steel Joist Institu July 1, 1961.
   (d) "Standard Specifications for Open Web Steel Joists, Hi Strength Longspan or LH-Series," adopted by the Am ican Institute of Steel Construction and the Steel Joi Institute, June 21, 1962.

D. Welding

1. Details of welding technique, inspection of welding and qua fication of welding operators shall conform to the recomme dations of the "Standard Code for Arc and Gas Welding Building Construction" of the American Welding Socie AWS D1.1

307. WOOD CONSTRUCTION

A. Lumber

1. Stress-Grade Lumber: Except as otherwise specifically provided this code, "National Design Specifications for Stress Grade Lu ber and Its Fastenings NFPA 1977 Edition" shall be accepted good engineering practice covering design and use of stress-gra lumber, of glue-laminated timber and of their fastenings.
2. All plywood used structurally shall bear the identification of approved testing agency as to type and grade of plywood, a species of veneer.
3. Lumber dimensions:
   (a) Wood structural members shall be of sufficient sizes carry the dead and live loads without exceeding t allowable working stresses hereinafter specified.
   (b) Computations to determine the required sizes lumber members shall be based on the net dimensio (actual size) and not on the nominal sizes.
   (c) Where minimum sizes of lumber members are requir by this code, they shall be construed as meaning nomin sizes. For sawn lumber, the dressed sizes establish in American Lumber Standards shall be accepted as t minimum net sizes conforming to such nominal sizes. F glue-laminated timber, the net sizes established in t National Design Specification shall be accepted as t minimum sizes conforming to such nominal sizes.
   (d) The Building Official may require the sizes and t allowable unit stress, or the species and the grade lumber, used for structural design purposes to be sho on the plans or given in a statement filed therewit

If rough sizes or finished sizes greater or smaller than the American Lumber Standard dressed sizes are to be used, the actual sizes shall be specified.

B. Framing - General

Except as specifically provided for herein, compliance with Wood Construction Data Series NFPA shall be acceptable as good engineering practice.

1. Structural framing members:
   (a) Splicing between bearing points not permitted.
   (b) When structural strength is impaired by cutting, drilling, or by inherent defects, replace or reinforce members in manner acceptable to Building Official.
2. Framing at chimneys.
   (a) Bearing of framing members on chimney masonry not acceptable. Piers built integral with chimney may be used for girder bearing provided end of girder is at least 2 inches away from chimney masonry.
   (b) Framing members: Not closer than 2 inches to chimney masonry. Space may be 1/2 inch of asbestos board 1/4 inch thick and same width as framing members is used between masonry and framing.
3. Firestopping:
   (a) Firestop all furring, partitions and outside stud walls at level of each floor or ceiling, and at juncture of roof rafters and wall.
   (b) Wood or masonry, tightly fitted, or other methods acceptable to Building Official may be used.

C. Floor Framing.

1. Columns and posts:
   (a) Structural steel or iron. See 306. Shims, metal—loose shims not acceptable. Maximum of 2-1/4 inches.
   (b) Wood posts: Bear on concrete base resting on footing, top of base 3 inches above finish floor; securely fasten top of post to girder. If necessary for bearing, install bearing plate or cap secured to both post and girder.
2. Girders:
   (a) Material: Structural steel, reinforced concrete, solid wood, or built-up wood.
   (b) Spans for wood girders: Determine in accordance with sound engineering practice and subject to approval of the Building Official.
   (c) Joints of solid and built-up wood girders to be made over pier or column supports only.
   (d) Air space each side of wood girders framing into masonry, 1/2 inch.
3. Sills:
   Level and grout with portland cement mortar. Wood shingles, chips, or similar material are not acceptable for permanent shims.
4. Maximum spans for wood joists:
   Except for stress-grade lumber of an assured quality, designed in accordance with the National Design Specifications, NFPA, all wood joists shall be limited as follows:
   (a) Lumber must be properly identified as to species and grade by an agency approved by the American Lumber Standards Committee, and shall be limited to the spans given in the

NFPA 1977 publication "Maximum Spans for Joists and Rafters".

(b) Wood floor trusses: Allowable spans for wood floor trusses shall be designed in accordance with accepted engineering practices.

MAXIMUM SPANS FOR JOISTS AND RAFTERS

		DF-L		HEM-FIR		PP		SYP-KD		S-P-F	
		#2	#3	#2	#3	#2	#3	#2	#3	#2	#3
Size & Spacing		FLOOR JOISTS 40 lb. live load, 10 lb. dead load.									
2 X 8	16	13-1	10-7	12-3	9-3	11-3	8-8	12-7	11-0	11-5	8-8
	24	11-5	8-6	9-11	7-7	9-2	7-1	10-8	8-11	9-4	7-1
2 X 10	16	16-9	13-6	15-8	11-10	14-5	11-0	16-0	14-0	14-8	10-10
	24	14-7	10-10	12-8	9-9	11-8	9-0	13-7	11-4	11-11	9-0
2 X 12	16	20-4	16-4	19-1	14-4	17-6	13-5	19-6	17-0	17-9	13-4
	24	17-5	13-5	15-6	11-10	14-2	11-0	16-7	13-10	14-6	11-0
		FLOOR JOISTS 30 lb. live load, 10 lb. dead load.									
2 X 8	16	14-5	11-9	13-6	10-6	12-6	9-8	13-10	12-3	12-10	9-8
	24	12-7	9-8	11-3	8-7	10-3	7-11	11-11	10-0	10-5	7-10
2 X 10	16	18-5	15-1	17-3	13-5	15-11	12-4	17-8	15-8	16-5	12-4
	24	16-1	12-3	14-4	10-11	13-2	9-11	15-1	12-9	13-4	10-1
2 X 12	16	22-5	18-3	21-0	16-4	19-4	15-1	21-6	19-1	19-11	15-1
	24	19-7	14-11	17-5	13-4	16-0	12-4	18-4	15-7	16-3	12-4

(c) Framing into headers or side of wood girders. Use steel joist hangers, metal framing anchors or wood bearing strip at least 2" x 3". Notching of joist more than 1/ of depth not permitted.

(d) Framing into side of steel girders. Allow 1/2 inch clearance over top of top flange. Secure to girder or to opposite joists, or bridge joist firmly at girder ends if other ends are fixed. Notch for bearing not more than 1/ of joist depth.

(e) Framing into masonry.

1. Minimum bearing, 3 inches.
2. Fire cut or bevel, 2 inches.
3. Second-story floor joists parallel with masonry. Tie to masonry with metal straps extending over and secured to at least 1 joist and not more than 8 feet on center.

(f) Butt or lap joists over girders and bearing partitions

1. Butting: center and tie with metal straps or 1 inch thick wood ties at least 2 feet long.
2. Lapping: at least 4 inches; spike together; maximum projection beyond bearing, 1 foot.

(g) Double Joists:

1. Under all bearing partitions and under plaster finished non-bearing partitions when parallel to floor joists.
2. Where piping or duct work occurs block joists apart at 4 foot intervals.
3. Under heading partitions, more than two joists may be required by the Building Official, depending upon loading conditions.
4. Support of furnace unit: Double the floor joists framing each side of floor opening for plenum of furnace spike joists together.

5. Support of hot water heater, washing machine or special loading conditions. Double the floor joists supporting unit, especially where the equipment is aligned on both sides of a partition wall.

(h) Headers and trimmers:
1. Headers 4 feet or less in length may be single; headers receiving three or more tail beams, support in steel hangers, or on ledger boards not less than 2" x 3". If header is over 7 feet in length, secure ledger to trimmer with lag screws.
2. For openings at end of joist span with headers 4 feet or less, trimmers may be single.
3. Use double framing under all other conditions.

(i) Cutting of floor joists:
1. Notching top or bottom for piping and duct work is permitted to not more than 1/6 minimum required joist depth except no notching in middle third of span; otherwise install header.
2. Holes may be bored through joists, maximum diameter 2-1/2 inches: edges not nearer than 2 inches to top and bottom of joists.

(j) Cross-bridging:
1. Maximum spacing, 8 feet; minimum size, 1" x 3" double nail at each end; bridging split in nailing not acceptable.
2. Rigid metal bridging may be used when acceptable to Building Official.

(k) Cantilevered construction: submit detail drawing.

5. Subflooring
(a) Wood Boards:
1. The minimum thickness of floor sheathing shall be as shown in the following table:

Joist Spacing (Inches)	Minimum Net Thickness (Inches) Perpendicular to Joist	Diagonal to Joist
24	11/16	3/4
16	5/8	5/8

2. No two adjoining boards to break joints over same joist space; each board to bear on at least two joists.
3. Other spacings may be used when subflooring is designed according to loads to be imposed.

(b) Plywood:
1. Apply with face grain perpendicular to supports and panels continuous over two or more spans.
2. Maximum spacing of supports under plywood subflooring shall be based on the Panel Identification Index.
3. Minimum recommended width of girders, supporting floor loads for 1-1/8 inch plywood at 48 inches o.c. is 4 inches

Panel Identification Index	Plywood Thickness (inches)	Maximum Span (inches)
30/12	5/8	12*
32/16	1/2, 5/8	16**
36/16	3/4	16**
42/20	5/8, 3/4, 7/8	20**
48/24	3/4, 7/8	24
1-1/8" Groups 1 & 2	1-1/8	48
1-1/4" Groups 3 & 4	1-1/4	48

*May be 16" if 25/32" wood strip flooring is installed at right angles to joists.
**May be 24" if 25/32" wood strip flooring is installed at right angles to joists.

4. Under nonstructural finish flooring, when used as a ba for parquet wood finish flooring less than 25/32 inch thick, linoleum, composition, rubber or ceramic tile, i stall solid blocking under all edges at right angles to flo joists, or tongue-and-groove plywood approved by tl Building Official may be used.
5. Nailing: Nail securely to joists and blocking with nails inches o.c. on edges and 10 inches o.c. at intermedia framing members. Use 6d common nails for 1/2" pl wood, 8d for 5/8" and 3/4" and 10d common or 8d ri shank for 1-1/8" thick plywood.
6. As underlay, when used for leveling purposes over all su flooring, minimum thickness 1/4 inch 3-ply. See 314-D-

(c) Clearance: Provide 1/2 inch clearance between all subfloc ing and all masonry walls, chimneys and partitions.

(d) Floors finished with any material other than hardwood s 314-D-2.

(e) Combination subfloor-underlayment: Combination su floor-underlayment shall be installed in accordance with t following table:

COMBINED SUBFLOOR-UNDERLAYMENT

Plywood Grade	Plywood Species Group	Maximum Support Spacing		
		16" o.c.	20" o.c.	24" o.c
		Min. Panel Thickness (inch)	Min. Panel Thickness (inch)	Min. Panel Thickne (inch)
UNDERLAYMENT INT-APA (with interior, intermediate or exterior glue) or UNDERLAYMENT EXT-APA (C-C Plugged)	1	1/2	19/32[a]	23/32[b]
	2 & 3	19/32[a]	23/32[b]	7/8
	4	23/32[b]	7/8	1

(a) May be 5/8" panel.
(b) May be 3/4" panel.

D. Ceiling Framing.
See 300-D.

1. Joists:
   (a) Maximum spans for ceiling or attic floor joists are follows:
      1. For no attic storage, maximum access openi 600 sq. inches.
      2. With larger access opening, design for limited at storage.
      3. With permanent or disappearing stair, design acco ing to floor joist table in 307-C-4-a.

   (b) Maximum spans for wood joists:
   Except for stress-grade lumber of an assured quali designed in accordance with the National Design Speci cations, NFPA, all wood joists shall be limited as fo lo and see 307.C4.

CEILING JOISTS

		DF-L		HEM-FIR		PP		SYP-KD		S-P-F	
		#2	#3	#2	#3	#2	#3	#2	#3	#2	#3
		CEILING JOISTS 20 lb. live load, 10 lb. dead load.									
2 X 6	16	13-6	10-5	12-0	9-2	11-1		12-9	10-9	11-2	
	24	11-0	8-5	9-10	7-6	9-0		10-5	8-9	9-2	
2 X 8	16	17-10	13-8	15-10	12-1	14-6		16-10	14-2	14-8	11-2
	24	14-6	11-1	12-11	9-10	11-11	9-2	14-0	11-7	12-0	9-3
		CEILING JOISTS 10 lb. live load, 5 lb. dead load.									
2 X 6	16	18-1	14-7	16-11	12-11	15-7	12-0	17-4	15-3	15-10	12-0
	24	15-7	11-11	13-11	10-7	12-9	9-9	14-9	12-5	12-11	9-10
2 X 8	16	23-10	19-3	22-4	17-1	20-7	15-10	22-10	20-1	20-10	15-10
	24	20-7	15-9	18-4	13-11	16-10	12-10	19-6	16-4	17-1	12-10

(c) Use ceiling joists as ties for rafters whenever possible.
(d) Bridging: Solid, 2 inches thick full depth of joists, staggered for end nailing. Joists 8 inches and over, 1" x 3" cross bridging or rigid metal bridging may be used; when acceptable to Building Official; maximum spacing, 8 feet on center.
(e) Framing of ceiling joists over girders and bearing partitions; as required for floor joists. See 307-C-4-e.

2. Hung ceilings, flat roof construction:
(a) Minimum size 2" x 4" on edge separated by wood or metal hangers, not more than 10 feet on center.
(b) Ceiling joist bridging not required.

E. Roof Framing.

1. General
(a) Headers and trimmers:
1. Headers 4 feet or less in length may be single.
2. When chimney is at ridge or eaves and header is 4 feet or less, trimmers may be single; use double framing under all other conditions.
3. Dormer windows not supported on partitions: Double headers and rafters.
(b) Anchor wall plates for rafters and roof joists on masonry wall. See 305-E-7.

2. Pitched Roofs:
(a) Minimum pitch. See 310-A-1.
(b) Maximum allowable spans for roof rafters shall be in conformance with the Span Tables for Joists and Rafters as published by the National Forest Products Association.

RAFTERS 30 lb. live load, Flat or Sloped
Supporting Drywall Ceiling

		DF-L		HEM-Fir		PP		SYP-KD		S-P-F	
		½3	#3	#2	#3	#2	#3	#2	#3	#2	#3
2 x 8	16	15-7	11-11	13-10	10-8	12-9	9-9	15-11	12-2	12-11	9-9
	24	12-8	9-8	11-4	8-8	10-5	8-0	12-11	9-11	10-7	8-0
2 x 10	16	19-11	15-2	17-8	13-7	16-4	12-6	20-2	15-6	16-6	12-6
	24	16-3	12-4	14-5	11-1	13-3	10-2	16-6	12-8	13-5	10-2

RAFTERS 30 lb. live load, 3 in 12 or less
No Ceiling Load

		DF-L		HEM-Fir		PP		SYP-KD		S-P-F	
		#2	#3	#2	#3	#2	#3	#2	#3	#2	#3
2 x 8	16	16-5	12-8	14-8	11-4	13-6	10-5	16-10	12-11	13-8	10-5
	24	13-6	10-4	12-0	9-2	11-1	8-6	13-9	10-7	11-3	8-6
2 x 10	16	21-2	16-2	18-10	14-4	17-4	13-3	21-5	16-5	17-6	13-3
	24	17-3	13-2	15-4	11-10	14-2	10-11	17-6	13-5	14-4	10-11

over 3 in 12
ROOF RAFTERS

		DF-L		HEM-FIR		PP		SYP-KD		S-P-F	
		#2	#3	#2	#3	#2	#3	#2	#3	#2	#3
RAFTERS 30 lb. live load, slope over 3 in 12.											
2 X 6	16	13-0	9-11	11-7	8-11	10-8	8-2	12-5	10-3	10-10	8-2
	24	10-7	8-2	9-5	7-3	8-9	6-8	10-1	8-5	8-10	6-8
2 X 8	16	17-2	13-2	15-3	11-9	14-1	10-10	16-4	13-7	14-3	10-11
	24	14-0	10-9	12-6	9-7	11-6	8-9	13-4	11-1	11-8	8-9
RAFTERS 20 lb. live load, slope over 3 in 12.											
2 X 6	16	15-3	11-8	13-6	10-5	12-6	9-7	14-6	12-0	12-8	9-7
	24	12-5	9-6	11-1	8-6	10-3	7-10	11-10	9-10	10-4	7-11
2 X 8	16	20-1	15-5	17-10	13-9	16-5	12-8	19-1	15-10	16-8	12-8
	24	16-5	12-7	14-7	11-3	13-5	10-4	15-7	12-11	13-7	10-4

(c) Rafters: Cut for level bearing and spike to wall plat no portion of cut end of rafters to project beyond insi edge of wall plate; frame rafters opposite at ridge; pr vide tie for rafters to prevent thrust and uplift.

(d) Collar beams:
1. Minimum size 1" x 6" or 2" x 4"; maximum spaci 4 feet on center.
2. When ceiling joists do not serve as tie at plate li or are not below lower third of rafters, install ceili joists (collar beams) same size as rafters on ea pair of rafters, and make special provisions for tyi the lower end of rafters to the floor or wall constr tion.

(e) Ridge boards: Not required for simple gable roofs whe rafters frame opposite each other. All other types, t 2 inch member with depth not less than cut end of raft

(f) Valley rafters:
1. Minimum thickness, 2 inches: minimum depth, less than cut end of jack rafters.

2. Maximum unsupported length of single valley rafters, 8 feet; double rafters, 12 feet.
3. May be omitted when jack rafters of one roof frame on sole plate on top of roof sheathing of adjoining roof.

(g) Crickets or chimney saddles at upper side of all chimneys not in contact with ridge.

3. Flat Roofs:
   (a) Roof joist spans. See 307-E-2-b.
   (b) Cross-bridging: Minimum size, 1" x 3" maximum spacing, 8 feet on center.
   (c) Joists supporting hung ceilings. See 307-D-2.
   (d) Framing of roof joists over girders and bearing partitions: As required for floor joists. See 307-C-4-e.
4. Trussed rafters: Trussed rafters may be used in construction of roofs for residence and buildings of similar size and design, when designed according to generally accepted good engineering practices.

F. Exterior Wall and Bearing Partition Framing.

1. Studs:
   (a) Continuous lengths without splicing.
   (b) Minimum size, 2" x 4".
   (c) Size, height and spacing. The size, height and spacing of studs shall be in accordance with the following table except that utility studs shall not be spaced more than 16 inches on center.

SEE TABLE BELOW

STUD SIZE	BEARING WALLS				NON-BEARING WALLS	
	STUD HEIGHT	SUPPORTING ROOF AND CEILING ONLY	SUPPORTING ONE FLOOR ROOF AND CEILING	SUPPORTING TWO FLOORS ROOF AND CEILING	STUD HEIGHT	SPACING (inches)
2 x 3[1]	10	—	—	—	10	16
2 x 4	10	24	16	—	14	24
3 x 4	10	24	24	16	14	24
2 x 5	10	24	24	—	16	24
2 x 6	10	24	24	16	20	24

[1] Shall not be used in exterior walls.

   (d) Maximum length for balloon frame, 20 feet; notch studs at second floor to receive 1" x 4" ribbon. Nail joists to studs.
2. Corner posts: Not less than three 2" x 4"s set to receive interior finish.
3. Corner Bracing:
   (a) Braces at external corners: 1" x 4", let into outside face of studs and plates, set approximately at 45 degrees, extend from sill to plate. Attaching ends of braces to blocks nailed to studs or plates not acceptable. May be omitted only when wood sheathing boards are laid diagonally, when fiberboard, minimum 25/32" x 4' x 8' or nail base or intermediate fiberboard, minimum 1/2" x 4' x 8' or gypsum sheathing, minimum 1/2" x 4' x 8' or plywood, minimum 5/16" x 4' x 8' (see Sec. 307-H-2) is applied vertically. All approved sheathing shall be nailed according to manufacturers specifications.

(b) Openings at or near corner: Brace as in (A), set as near opening as possible.

4. Sill Construction:
   (a) Sill anchorage. See 304-J-4 and 305-B-4.
   (b) Sills and girders on top of foundation walls and piers; level and grout with portland cement mortar; wood not to be used for permanent shims.
   (c) Other methods may be used if detailed on drawings submitted with application and acceptable to Building Official.

5. Window and door openings:
   (a) Inner stud on jambs: Extend in one piece from header to bearing and nail to outer stud.

(b) One story building where header carries roof load only assuming 1200 F and double top plate.

Spans less than 4'	two 2"x4" on edge
Spans 4' to 6'	two 2"x6" on edge
Spans 6' to 8'	two 2"x8" on edge
Spans 8' to 10'	two 2"x10" on edge

Two story or bi-level where header carries one floor and roof loads assuming 1200 F and double top plate.

Spans less than 4'	two 2"x6" on edge
Spans 4' to 6'	two 2"x8" on edge
Spans 6' to 8'	two 2"x10" on edge
Spans 8' to 10'	two 2"x12" on edge

(c) Where headers suport concentrated loads or are subjected to other unusual loading conditions, the header shall be specially designed.

(d) If desired, truss construction may be used.

6. Plates:

(a) Top plates, two 2x4s. Lap at corners and intersecting partitions. Single 2x4 acceptable for bearing partitions when studs occur directly under joists or rafters. When plates are cut for piping or duct work, install steel angles on each side of plate not less than 1-1/2" x 1-1/2" x 1/8", to serve as plate ties and bearing for joists. Spike angles to joists and plates, using not less than 3 nails at each end. Alternate method for reinforcing cut plates: solid full depth 2 inch header and metal tie 1/2 inch by 12 gauge with three heavy nails or screws at each end.

(b) Where headers support concentrated loads or are subjected to other unusual loading conditions, header shall be specially designed.

(c) Sole plates, minimum thickness, 2 inches; exterior wall studs may bear on the sill or on a sole plate on top of subfloor.

7. End studs of bearing partitions connecting to masonry walls. Anchor with bolts or spikes.

8. Wood bearing partitions in cellars or basements are not acceptable.

9. Studs to be continuous (balloon frame) when exterior is to have continuous stucco finish.

G. Non-bearing Partition Framing.

1. Studs:

(a) Use continuous lengths without splicing.

(b) Partitions exceeding 6 feet of unsupported length containing openings; size and spacing same as bearing partitions.

(c) Partitions less than 6 feet unsupported length with openings:

Minimum Size	Maximum Spacing.
2x4s (2" thickness)	16" on center.
2x4s (4" thickness)	24" on center.
2x3s (3" thickness)	16" on center.

(d) Partitions 6 feet or over in length without openings.

Minimum Size	Maximum Spacing.
2x4s (2" thickness)	16" on center.
2x3s (3" thickness)	24" on center.
2x4s (4" thickness)	24" on center.

2. Openings:
   (a) In 2 inch thick partitions: Inner stud on jambs, size 2" x 2" extend in one piece from header to bearing and nail to outer stud; or single frame with 2" x 6" jambs continuous from top plate to sole plate with header notched 2 inches into each jamb.
   (b) In 3 inch and 4 inch thick partitions: Single framing permitted provided opening does not exceed 3 feet in width and header is secured by spiking through jamb studs.
   (c) Headers.
   Opening width, 3 feet or less:
   2"-thick partitions, 2" x 4" on edge.
   3"-thick partition, 2" x 3" flat.
   4"-thick partition, 2" x 4" flat.
   Opening width, over 3 feet:
   2"-thick partitions, 2" x 4" on edge.
   3"-thick partition, two 2x3s flat.
   4"-thick partition, two 2x4s.
3. Top and sole plates: Minimum thickness, 2 inches; lap top plate at outside walls and at bearing partitions.
4. Wardrobes, cabinets or casework acceptable as non-bearing partition.
5. Solid plaster partitions.
   (a) Maximum unsupported length 16 feet.
   (b) Core: 3/8 inch or 1/2 inch gypsum lath continuous from floor to ceiling and full width of door frames. Set in grooves of wood sill and plate members and of jambs and heads of door frames. Grooved member not required at intersection of walls to be plastered. At masonry wall intersections, tie or lace cornerite through lath core with wire. Butting units may be fastened as recommended by manufacturer and as approved by the Building Official.
   (c) Sill and plate members: Finished thickness, 1-1/4 inches minimum. Securely nail to floor and structural framing.
   (d) Doorframes: Mill built as finished frame. Thickness 1-5/8 inches minimum. Prime coat all sides. Secure to floor framing and sill members. Provide anchor for plaster by driving 8d nails on each side of lath, 3/8 inch out from groove, at 30 degree angle with plane of lath, on 12 inch centers staggered, then bend back against lath.
   (e) Pipes and conduits: Plumbing pipes, not permitted. Moisture resistant electrical conduit, tie securely to face of lath. Use shallow outlet box.
   (f) Coat core both sides with gypsum plaster to overall thickness of 2 inches, three coat or two coat double-up work.
6. Solid gypsum wallboard partitions.
   (a) Maximum unsupported length:
   12' partition height - 12' maximum length
   11' partition height - 18' maximum length
   10' partition height - Unlimited length
   (b) Core - 1" thick gypsum coreboard either single or multiple layers of 2' or 4' widths.
   (c) Face panels - 1/2", 5/8" or multiple laminations of regular or type "X" gypsum wallboard of 4' widths.
   (d) Runners - 20 to 26 gauge metal or construction grade lumber.
   (e) Laminating Adhesive - Gypsum wallboard joint compound for tape embedment, complying with ASTM C475, or as recommended by wallboard manufacturer.

7. Gypsum wallboard hollow partitions.
   (a) Maximum unsupported height:
   12' maximum height for 2-1/4" thick partition
   14' maximum height for 2-5/8" thick partition
   (b) Ribs - 1" thick gypsum coreboard, or multiple layers of 1/2", 5/8" or 1" thickness laminated to the required core thickness, in 6" or 8" widths and lengths of approximately 6" less than partition height.
   (c) Face panels - 1/2", 5/8" or multiple layers of regular or type "X" gypsum wallboard of 4' widths.
   (d) Minimum thickness - hollow wallboard partitions shall be not less than 2-1/4" thick (1" core and two 5/8" face panels).
   (e) Runners - construction grade lumber of thickness equal to partition core or 20 to 26 gauge metal runners.
   (f) Laminating Compound - Gypsum wallboard joint compound for tape embedment, complying with ASTM C475, or as otherwise recommended by wallboard manufacturer.

H. Wall Sheathing.

Sheathing may be omitted on detached accessory buildings not containing habitable rooms.

1. Wood boards:
   (a) May be used under any exterior finish material.
   (b) Minimum thickness, 1/2 inch; maximum width, 8 inches unless triple nailed; maximum stud spacing 24 inches on center.
   (c) Break joints over center of studs unless end-matched (T&G) boards are used; no two adjoining end-matched boards to break joints over same stud space and each board to bear on at least two studs.
   (d) Application: When laid diagonally extend at 45 degrees in opposite directions from each corner; apply horizontally under stucco finish.
2. Plywood.
   (a) May be used under any exterior finish material.
   (b) Plywood wall sheathing shall be installed in accordance with the following table:

Panel Identification Index	Panel Thickness (inch) and Construction	Maximum Stud Spacing (inches) Exterior Covering Nailed to:	
		Stud	Sheathing
12/0,16/0,20/0	5/16	16	16*
16/0,20/0,24/0,32/16	3/8 and 1/2 3-ply	24	16 24*
24/0,32/16	1/2 (4&5 ply)	24	24

**Apply plywood sheathing with face grain across studs.*

   (c) Types of finish which affect the minimum thickness of plywood used:
      1. Under wood shingles: If 5/16 inch plywood is used, apply shingles over 1" x 2" nailing strips using copper or galvanized nails for attaching shingles. Nailing strips may be omitted if annular ringed nails are used for attaching the shingles.

2. Under asbestos-cement shingles and siding, if 5/16 inch thick plywood is used apply siding or single material with annular ringed nails. Do not apply over wood nailing strips.

3. Fiberboard: Structural. See FS-LLL-I-535.
   (a) Under wood shingle siding: Apply 1" x 2" nailing strips over sheathing, spaced according to shingle spacing. Wood shingles may also be applied over fiberboard shingle backer and fiberboard sheathing with annular grooved nails at least 2 inch length.
   (b) Asbestos-cement siding or asbestos-cement shingles shall be attached with special metal fastening devices.
   (c)

Minimum thickness	Maximum stud spacing
1/2 inch	16 inches
3/4 inch	24 inches

   (d) Wood shingles and asbestos-cement shingles may be applied over fiberboard nail-base sheathing with annular grooved nails with minimum length of 1-3/4" for wood shingles and 1-3/8" for asbestos-cement shingles.

4. Gypsum Sheathing Board. See ASTM C 79-54.
   (a) Asbestos-cement siding or asbestos-cement shingles shall be attached with special metal fastening devices.
   (b) Minimum thickness, 1/2 inch; maximum stud spacing, 16 inches.
   (c) Under wood shingle siding: Apply 1" x 2" nailing strips over sheathing, spaced according to shingle exposure.

I. Sheathing Paper

1. Material
   (a) Water-resistant building paper.
   (b) Asphalt saturated felt.
   (c) Vapor resistance shall be less than that of vapor barrier provided on inside of wall.

2. Application
   (a) Use over all types of sheathing except as noted in I-3.
   (b) Apply shingle fashion, 4 inch lap. Lap 4 inches over paper strips around openings.
   (c) Use 6 inch wide strips behind exterior trim of all exterior openings.

3. Paper not required over gypsum or fiberboard, factory treated to be moisture resistant, (except when used behind masonry veneer and stucco) provided:
   (a) Necessary corner and opening cuts are caulked with elastic waterproof caulking material. Corner joints may be protected with 18 inch widths of sheathing paper applied shingle fashion.
   (b) At heads of openings, bottom edge of board is located to permit head flashing to be extended under and turned up behind sheathing, and joint between head flashing and board is caulked.

J. Roof Sheathing.

1. Wood boards:
   (a) May be used under any roofing material.
   (b) The allowable span for board type roof sheathing shall not exceed 24" and shall be 5/8 inch minimum net thickness for solid sheathing and 3/4 inch net thickness for spaced sheathing.
   (c) Break joints over center of rafters unless end-matched (tongue and groove) boards are used; no two adjoining end-matched boards to break joints over same rafter space and each board to bear on at least two rafters.

(d) Application: Lay closed under all roof material except woc shingles. Under wood shingles, use 1" x 4" shingle lath spac according to shingle exposure.

2. Plywood:

(a) May be used under any roofing material.

(b) Apply with face grain perpendicular to supports and pane continuous over two or more spans.

(c) Plywood sheathing shall be installed in accordance with tl Panel Identification Index.

Identification Index	Plywood thickness (inches)	Maximum span (inches)	Unsupporte edge-max. length (inches)
12/0		12	12
16/0	3/8	16	16
20/0	3/8	20	20
24/0	3/8	24	20
	1/2		24
32/16	1/2, 5/8	32	28
42/20	5/8, 3/4, 7/8	42	32
48/24	3/4, 7/8	48	36
2•4-1	1-1/8	72	48
1-1/8" Grp. 1&2	1-1/8	72	48
1-1/4" Grp. 3&4	1-1/4	72	48

(d) Edges of 3/8" thick plywood shall be blocked or ply clip used.

(e) Flat roofs used for walking traffic shall be designed a floors.

(f) Nailing: Nail securely to rafters with 6d nails for 1/2 thickness and less, 8d nails for 5/8" thickness and grea er. Space at 6" o.c. at edges and 12" o.c. at intermediat supports.

(g) Protect exposed edges of sheathing along eaves and rak of roof with mouldings or sheet-metal flashing. Flashin along eaves may be integral with gutters. If gutters ar not installed, form the flashing to provide a drip.

3. Fiberboard acceptable for roof sheathing, 1-1/2" minimu thickness for regular density and 3/4" for high density, whe installed at rafter and purlin spacings in accordance wit manufacturers recommendations.

K. Stair Stringers.

(Also see 207)

1. Provide solid bearing at top and bottom.

2. Effective depth of wooden stringers, minimum, 3-1/2 inches.
3. Open basement stairs: Minimum stringer thickness, 2 inches.
4. Third stringer: Install if treads are less than 1-1/8 inches thick and stair is more than 2'-6" wide.

L. Caulking.

1. Caulk around exterior openings in masonry or masonry veneer walls.
2. Caulk at intersections of wood and masonry except when flashed. This does not apply to tops of foundations.
3. Caulking shall remain elastic non-hardening and firmly adherent.

309. EXTERIOR WALL FINISH

1. General. Exterior covering shall be installed in accordance with this Chapter and Tables No. 5-A, No. 5-B, No. 5-C, No. 5-E, No. 5-F, and No. 5-G.
2. Exterior Lath. All lath and lath attachments shall be of corrosion-resistant materials and shall conform to Tables No. 5-A and No. 5-B.

Where lath on vertical surfaces extends between rafters, or other similar projecting members, solid backing shall be installed to provide support for lath and attachments.

Backing for vertical surfaces shall consist of sheathing or of not less than No. 18 U.S. gauge steel wire stretched taut horizontally and spaced not more than 6 inches apart vertically.

Gypsum lath shall not be used, except that on horizontal supports of ceilings or roof soffits, it may be used as backing for metal lath or wire lath and portland cement plaster.

Backing is not required under metal lath or paperbacked wire lath.

Table No. 5-A — MAXIMUM SPACING OF SUPPORTS FOR LATH

TYPE OF LATH[1]	MINIMUM WEIGHT (Per Square Yard) GAUGE AND MESH SIZE	VERTICAL (In Inches)			HORIZONTAL (In Inches)	
			Metal			
		Wood	Solid Plaster Partitions	Other	Wood or Concrete	Metal
Expanded Metal Lath (Diamond Mesh)	2.5 3.4	16 16	16 16	12 16	— 16	— 13½
Flat Rib Expanded Metal Lath	2.75 3.4	16 19	16 24	16 19	16 19	12 19
Stucco Mesh Expanded Metal Lath	1.8 and 3.6	16[2]	—	—	—	—
3/8" Rib Expanded Metal Lath	3.4 4.0	24 24	24 24	24 24	24 24	24 24
Sheet Lath	4.5	24	—	24	24	24
3/4" Rib Expanded Metal Lath	5.4	—	—	—	36[3]	36[3]
Wire Lath — Welded	1.95 pounds, No. 11 gauge, 2" x 2" 1.4 pounds, No. 16 gauge, 2" x 2" 1.4 pounds, No. 18 gauge, 1" x 1"[4]	24 16 16	24 16 —	24 16 —	24 16 —	24 16 —
Wire Lath — Woven	1.4 pounds, No. 17 gauge, 1½" Hexagonal[4] 1.4 pounds, No. 18 gauge, 1" Hexagonal[4]	16 16	— —	— —	— —	— —
3/8" Gypsum Lath (perforated)		16	—	16	16	16
3/8" Gypsum Lath (plain)		16	—	16	16	16
1/2" Gypsum Lath (perforated)		16	—	16	16	16
1/2" Gypsum Lath (plain)		24	—	24	24	24

[1] *Metal lath and wire lath used as reinforcement for portland cement plaster shall be furred out away from vertical supports at least ¼ inch. Self-furring lath meets furring requirements.*
[2] *Wire backing required on open vertical frame construction except under expanded metal lath and paper back wire lath.*
[3] *Contact or furred ceilings only. May not be used in suspended ceilings.*
[4] *Stucco netting, not to be used as a base for gypsum plaster.*

Table No. 5-B — MAXIMUM SPACING OF FASTENERS FOR SUPPORT OF LATH

TYPE OF LATH	NAILS			STAPLES[1] (Round or Flattened Wire)				
	Type	Maximum Spacing		Leg[2]	Wire Gauge No.	Minimum Crown Width	Maximum Spacing	
		Vertical	Horizontal				Vertical	Horizont
		(In Inches)			(In Inches)			
Diamond Mesh Expanded Metal Lath and Flat Rib Metal Lath	4d blued box (clinched)[3] 1" No. 11 gauge, 7/16" head, barbed 1-1/2" No. 11 gauge, 7/16" head, barbed	6 6 6	— — 6	7/8	16	7/16	6	6
3/8" Rib Metal Lath and Sheet Lath	1-1/2" No. 11 gauge, 7/16" head, barbed	6	6	1-1/4	16	7/16	6	6
3/4" Rib Metal Lath	4d Common 2" No. 11 gauge, 7/16" head, barbed	At ribs —	— At ribs	1-3/4 —	16 —	7/16 —	At ribs —	At ribs —
Wire Lath[4]	4d blued box (clinched) [3] 1" No. 11 gauge, 7/16" head, barbed 1-1/2" No. 11 gauge, 7/16" head, barbed 1-1/4" No. 12 gauge, 3/8" head, furring	6 6 6 6	— — 6 —	7/8	16	7/16	6	6
3/8" Gypsum Lath	1-1/8" No. 13 gauge, 19/64" head, blued[3]	5	5	7/8	16	7/16	5	5
1/2" Gypsum Lath	1-1/4" No. 13 gauge, 19/64" head, blued[3]	5[5] 4[6]	5[5] 4[6]	1-1/8	16	7/16	4	4

[1] *With divergent points and semi-flattened round wire for gypsum lath.*
[2] *When lath and stripping are stapled simultaneously, increase leg length of staple 1/8 inch.*
[3] *For interior only.*
[4] *Attach self-furring wire fabric lath to supports at furring device.*
[5] *Perforated lath.*
[6] *Plain lath.*

Table No. 5-C — THICKNESS OF PLASTER

PLASTER BASE	FINISHED THICKNESS OF PLASTER FROM FACE OF LATH, MASONRY, CONCRETE	
	Gypsum Plaster	Portland Cement Plaster
Expanded Metal Lath	5/8" minimum[1]	5/8" minimum[1] 3/4" minimum (interior)[2] 7/8" minimum (exterior)[2]
Wire Lath	5/8" minimum[1]	
Gypsum Lath	1/2" minimum	
Masonry Walls[3]	1/2" minimum	1/2" minimum
Monolithic Concrete Walls[3],[4]	5/8" maximum	7/8" maximum
Monolithic Concrete Ceilings[3],[4]	3/8" maximum[5]	1/2" maximum
Gypsum Veneer Base[6]	1/16" minimum	

[1] *When measured from back plane of expanded metal lath, exclusive of ribs, or self-furring lath, plaster thickness shall be 3/4-inch minimum.*
[2] *When measured from face of support or backing.*
[3] *Because masonry and concrete surfaces may vary in plane, thickness of plaster need not be uniform.*
[4] *When applied over a liquid bonding agent, finish coat may be applied directly to concrete surface.*
[5] *Approved acoustical plaster may be applied directly to concrete, or over base coat plaster, beyond the maximum plaster thickness shown.*
[6] *Attachment shall be in accordance with Table No. 5-F.*

Table No. 5-D — GYPSUM PLASTER PROPORTIONS[1]

NUMBER	COAT	PLASTER BASE OR LATH	MAXIMUM VOLUME AGGREGATE PER 100 POUNDS NEAT PLASTER[2] (Cubic Feet)	
			Damp Loose Sand[3]	Perlite or Vermiculit
Two-coat Work	Base Coat	Gypsum Lath	2½	2
	Base Coat	Masonry	3	3
Three-coat Work	First Coat	Lath	2[4]	2
	Second Coat	Lath	3[4]	2[5]
	First and Second Coats	Masonry	3	3

[1] *Wood fibered gypsum plaster may be mixed in the proportions of 100 pounds of gypsum to not more than one cubic foot of sand where applied on masonry or concrete.*
[2] *When determining the amount of aggregate in set plaster, a tolerance of 10 percent shall be allowed.*
[3] *Combinations of sand and lightweight aggregate may be used provided the volume and weight relationship of the combined aggregate to gypsum plaster is maintained.*
[4] *If used for both first and second coats, the volume of aggregate may be 2½ cubic feet.*
[5] *Where plaster is one inch or more in total thickness the proportions for the second coat may be increased to 3 cubic feet.*

Table No. 5-E — PORTLAND CEMENT PLASTER

Coat	MAXIMUM VOLUME AGGREGATE PER VOLUME CEMENTITIOUS MATERIAL[1]			Approximate Minimum Thickness[4]	Minimum Period Moist Curing	Minimum Interval Between Coats
	Portland Cement Plaster[2] Maximum Volume Aggregate per Volume Cement	Portland Cement-Lime Plaster[3] Maximum Volume Lime per Volume Cement	Portland Cement-Lime Plaster[3] Maximum Volume Sand per Volume Cement and Lime			
First	4	3/4	4	3/8[5]	48[6] Hours	48[7] Hours
Second	5	3/4	5	1st and 2nd Coats	48 Hours	7 Days[8]
Finished	3[9]	—	3[9]	1/8"	—	—[8]

[1] *When determining the amount of aggregate in set plaster, a tolerance of 10 percent may be allowed.*
[2] *From 10 to 20 pounds of dry hydrated lime (or an equivalent amount of lime putty) may be added as a plasticizing agent to each sack of Type I and Type II Standard portland cement in base coat plaster.*
[3] *No additions of plasticizing agents shall be made.*
[4] *See Table No. 5-C.*
[5] *Measured from face of support or backing to crest of scored plaster.*
[6] *Twenty-four hours minimum period for moist curing of interior portland cement plaster.*
[7] *Twenty-four hours minimum interval between coats of interior portland cement plaster.*
[8] *Finish coat plaster may be applied to interior portland cement base coats after a 48-hour period.*
[9] *For finish coat, plaster up to an equal part of dry hydrated lime by weight (or an equivalent volume of lime putty) may be added to Type I, Type II and Type III Standard portland cement.*

Table No. 5-F — APPLICATION OF GYPSUM WALLBOARD

THICKNESS OF GYPSUM WALLBOARD (Inch)	PLANE OF FRAMING SURFACE	LONG DIMENSION 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
				NAILS[1,2]	SCREWS[3]	
1/2	Horizontal	Either Direction	16		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		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		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	24	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	

[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 5/8 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, No. 13-1/2 gauge, 1-5/8 inches long, 15/64-inch head for 1/2-inch gypsum wallboard; 6d, No. 13 gauge, 1-7/8 inches long, 15/64-inch head for 5/8-inch gypsum wallboard.*
[2] *Two nails spaced not less than 2 inches apart, nor more than 2-1/2 inches apart and pairs of nails spaced not more than 12 inches center-to-center may be used.*
[3] *Screws shall be No. 6 with tapered head and long enough to penetrate into wood framing not less than 5/8 inch and metal framing not less than 1/4 inch.*

3. Exterior Plaster. Plastering with portland cement plaster shall be not less than three coats when applied over metal lath or wire lath and shall be not less than two coats when applied over masonry, concrete, or gypsum backing. If plaster surface is completely covered by veneer or other facing material, or is completely concealed, plaster application need only be two coats provided the total thickness is as set forth in Table No. 5-E.

On wood frame construction with an on-grade concrete floor slab system, exterior plaster shall be applied in such a manner as to cover, but not extend below, lath, paper and screed.

Only approved plasticity agents and approved amounts thereof may be added to portland cement. When plastic cement is used, no additional lime or plasticizers shall be added. Hydrated lime or the equivalent amount of lime putty used as a plasticizer, may be added to standard portland cement in an amount not to exceed 20 percent by weight of the portland cement.

The proportion of aggregate to cementitious materials shall be as set forth in Table No. 5-E.

Table No. 5-G — WEATHER-RESISTANT SIDING ATTACHMENT

Siding Material		Nominal[1] Thickness (Inches)	Joint Treatment	Weather Resistance Membrane Required	TYPE OF SUPPORTS FOR THE SIDING MATERIAL AND FASTENERS[2]				Number Spacing Fastene
					Wood or Plywood Sheathing	Fiberboard Sheathing into Stud	Gypsum Sheathing into Stud	Direct to Studs	
Horiz. Alum.[4]	Without Insulation	.019[10]	Lap	No	.120-Nail-1-1/2"	.120-Nail-2"	.120-Nail-1-1/2"	Not Allowed	Same as Spacir
	Without Insulation	.024	Lap	No.	.120-Nail 1-1/2" long	.120-Nail 2" long	.120-Nail 2" long	Not Allowed	
	With Insulation	.019	Lap	No.	.120-Nail-1-1/2"	.120-Nail-2-1/2"	.120-Nail-2-1/2"	.120-Nail-1-1/2"	
Horizontal Asbestos Cement Boards Shingles[7]		5/32 1/8	(2) Lap	(2) Yes	.113-Nail-1-1/2"	.113-Nail-2"	.113-Nail-1-3/4"	.113-Nail-1-3/8"	2 Nails Shing
Brick Veneer Clay Tile Veneer Concrete Veneer		2 1/4 to 1 2	Sec. 503	Yes	— See Sec. 503 and Figure No. A-5 —				
Horizontal Fiberboard[3]		1/2	Sec. 503	No	.099-Nail-2" Staple 1-3/4"	.113-Nail-2-3/4" Staple 2-1/2"	.113-Nail-2-1/2" Staple 2-1/4"	.099-Nail-2" Staple 1-3/4"	Same as Spacl
Hardboard[3] Board and Batten Vertical		1/4	(2)	(2)	.099-Nail-2" Staple 1-1/2"	.099-Nail-2-1/2" Staple 2"	.099-Nail-2" Staple 1-3/4"	.099-Nail-1-3/4" Staple 1-1/4"	6" Panel 8" Inter
Hardboard[3] Lap-Siding-Horizontal		7/16	(2)	(2)	.099-Nail-2" Staple 1-7/8"	.099-Nail-2-1/2" Staple 2-1/2"	.099-Nail-2-1/4" Staple 2-1/4"	.099-Nail-2" Staple 1-7/8"	Same as Spaci 2 per Bo
Vertical Panel Siding		7/16	(2)	(2)	.099-Nail-2" Staple 1-1/2"	.099-Nail-2-1/4" Staple 2-1/4"	.099-Nail-2" Staple 2"	.080-Nail-1-3/4" Staple 1-1/2"	6" Panel 12" Inte
Steel[3]		29 ga.	Lap	No	.113-Nail-1-3/4" Staple 1-3/4"	.113-Nail-2-3/4" Staple 2-1/2"	.113-Nail-2-1/2" Staple 2-1/4"	Not Allowed	Same as Spac
Stone Veneer		2	Sec. 503	Yes	— See Sec. 503 and Figure No. A-5 —				
Particle Board Panels		3/8	(2)	(2)	.113-NG 1-2" Staple 1-3/8"	.113-Nail-2-1/2" Staple 2-1/4"	.113-Nail 1-2" Staple 2"	Not Allowed	6" on 8" Inte
		5/8	(2)	(2)	.113-Nail-2" Staple 1-7/8"	.113-Nail-2-1/2" Staple 2-1/2"	.113-Nail-2-1/2" Staple 2-1/4"	.113-Nail-2" Staple 1-5/8"	6" on 8" Inte
Plywood Panels (Exterior Grade)		3/8	(2)	(2)	.099-Nail-2" Staple 1-3/8"	.113-Nail-2-1/2" Staple 2-1/4"	.099-Nail-2" Staple 2"	.099-Nail-2" Staple 1-3/8"	6" on 12" Int
Wood Rustic, Drop Shiplap		3/8 Min. 19/32 Av.	Lap	No	Fastener Penetration into Stud - 1"			.113-Nail-2-1/2" Staple 2"	Face N up t Widths, per Be
Bevel		7/16	Lap	No					8" Wid
Butt		3/16	Lap	No					over,
Tipp									per Be
Shakes[7]		3/8	Lap	Yes	.0915-Nail-2" Staple 2"				
Shingles[7]		3/8	Lap	Yes	16" and 18" Shingles		.076-Nail-1-1/4" Staple 1-1/4"		2 Fas per S or S
					24" Shingles		.080-Nail-1-1/2" Staple 1-1/2"		

[1] *Based on stud spacing of 16 inches o.c. Where studs are spaced 24 inches siding may be applied to sheathing approved for that spacing.*
[2] *If boards are applied over sheathing or weather-resistant membrane, joints need not be treated. Otherwise vertical joints must occur at studs and covered with batts.*
[3] *Shall be of approved type.*
[4] *Nail is a general description and may be T-head, modified round head, or round head with smooth or deformed shanks.*
[5] *Staples shall have a minimum crown width of 7/16 inch O.D. and be manufactured of minimum 16 gauge wire.*
[6] *All attachments shall be coated with a corrosion-resistive coating.*
[7] *Shingles and shakes applied over regular density fiberboard or gypsum sheathing shall be fastened to horizontal wood nailers or fiberboard shingle backer.*
[8] *Aluminum nails shall be used to attach aluminum siding.*
[9] *Nails or staples must be aluminum, galvanized, or rust-preventive coated and shall be driven into the studs for fiberboard or gypsum backing.*
[10] *Aluminum (.019-inch) may be unbacked only when the flat areas are 5 inches or less in the narrow dimension.*

4. Masonry Veneer. General. All masonry veneer shall be insta in accordance with this Chapter, Figure No. A-5 and Table 5-G. Exterior masonry veneer shall not be attached to woo any point more than 25 feet above the adjacent ground eleva in Seismic Zones No. 2 and No. 3 nor more than 35 fee Seismic Zones No. 0 and No. 1.

(a) Masonry veneer shall not support any vertical load othe the dead load of the veneer above. Veneer above open shall be supported upon lintels of noncombustible mat and the allowable span shall not exceed the values set f in Table No. 5-H. The lintels shall have a length of bea of not less than 4 inches.

Table No. 5-H — ALLOWABLE SPANS FOR LINTELS SUPPORTING MASONRY VENEER

Size of Steel Angle[1]	No Story Above	One Story Above	Two Stories Above	No. of 1/2" or Equivalent Reinforcing Bars[2]
∠ 3 x 3 x ¼	6' - 0"	3' - 6"	3' - 0"	1
∠ 4 x 3 x ¼	8' - 0"	5' - 0"	3' - 0"	1
∠ 6 x 3½ x ¼	14' - 0"	8' - 0"	3' - 6"	2
∠ 2 – 6 x 3½ x ¼	20' - 0"	11' - 0"	5' - 0"	4

[1] *Long leg of the angle shall be placed in a vertical position.*

[2] *Depth of reinforced lintels shall be not less than 8 inches and all cells of hollow masonry lintels shall be grouted solid. Reinforcing bars shall extend not less than 8 inches into the support.*

(b) Masonry veneer shall be attached to the supporting wall with corrosion-resistant metal ties.

Veneer ties, if strand wire, shall be not less in thickness than No. 6 U.S. gauge wire and shall have a hook embedded in the mortar joint, or if sheet metal, not less than No. 22 U.S. gauge corrugated. Each tie shall be spaced not more than 24 inches on center horizontally and shall support not more than 3¼ square feet of wall area.

Exception: In Seismic Zone No. 2 or No. 3 and in wind areas of more than 30 pounds per square foot, each tie shall support not more than 2 square feet of wall area.

In lieu of such wire ties, an approved method of grouting the veneer to a paperbacked reinforcement attached directly to the studs may be used.

5. Weather Protection. Exterior walls shall be covered with a weather-resistant siding and/or membrane.

6. Weather-Resistant Siding. The weather-resistant covering shall be attached in accordance with Table No. 5-G and where required the cellular spaces shall be ventilated so as not to make ineffective the firestopping at floor, attic and roof levels. In addition, where cellular spaces are provided with interior non-corrodible vapor type barriers other means shall be used to avoid condensation and leakage of moisture.

7. Weather-Resistant Membrane. Asphalt-saturated felt free from holes and breaks and weighing not less than 14 pounds per 100 square feet or other approved weather-resistant membrane shall be applied over studs or sheathing of all exterior walls as required by Table No. 5-G. Such felt or membrane shall be applied weatherboard fashion, lapped not less than 2 inches at horizontal joints and not less than 6 inches at vertical joints.

Such felt or membrane may be omitted in the following cases:

(a) Under weather-resistant siding.
(b) In accessory buildings.
(c) Over water-repellent panel sheathing.
(d) Under approved paperbacked metal or wire fabric lath.
(e) Under metal lath, wire lath, or wire fabric lath on noncombustible construction.

8. Flashing. Approved corrosion-resistive flashing shall be provided at top and sides of all exterior window and door openings in such manner as to be leakproof. Similar flashings shall be installed at

the intersection of chimneys or other masonry construction wit frame or stucco walls, with projecting lips on both sides und stucco copings; under and at the ends of masonry, wood or met copings and sills; continuously above all projecting wood trim; wall and roof intersections; under built-in gutters; at junction chimneys and roofs; in all roof valleys and around all roof ope ings.

9. Plywood Application. Exterior plywood joints shall occur ov framing members, unless wood or plywood sheathing is used joints are lapped horizontally a minimum of 1½ inches or othe wise made waterproof to the satisfaction of the Building Officia

10. Attachment. All wall coverings shall be securely fastened accordance with Table No. 5-G, or with other approved alum num, copper, zinc, zinc-coated or other approved corrosio resistive fasteners.

Shingles and other weather coverings shall be attached with a propriate standard shingle nails or other approved pneumaticall mechanically driven fasteners to furring strips securely nailed studs, or with approved mechanically-bonding nails.

Wood shingles or shakes attached with approved corrosio resistive annular grooved nails may be applied over fiberboa shingle backer and nail base type fiberboard sheathing installe in accordance with Table No. 5-G. Wood shingles or shakes ar asbestos shingles or siding may be nailed directly to approve nail base fiberboard sheathing not less than ½ inch nomin thickness with approved corrosion-resistive annular grooved nail

310. ROOF COVERINGS

A. General

1. Roof Slope:
   (a) Shingle and tile roof, 4 in 12 minimum.
   (b) Single roofs less than 4 in 12 but not less than 2 in 1 shall be applied in strict accordance with Specificatio Index B-1-a, of the Asphalt Roofing Industry Bureau. I lieu of cementing the individual tabs Self Sealing Shi gles listed by the Underwriters' Laboratories in carryin their "Wind Resistant" Label may be used.
   (c) Built-up Roofs (gravel or slag surface). 2 in 12 maximun
   (d) Built-up Roofs with mineral surfaced cap sheet, 3 in 1 maximum.
   (e) When materials and method of application provide pr cautions in excess of these 4 minimum requirements t assure a weather-tight roof, above roof slopes may b reduced subject to acceptance by Building Officia Application and materials as outlined by "Manufacturer Selection and Application of Asphalt Roofing and Sidin Products" published by A.R.I.B. shall be considered a acceptable good practice.
2. Either a 9" wide or wider strip of Mineral Surfaced Ro Roofing or a row of inverted shingles may be used as a star er course.
3. Nails for attaching roof covering, copper or hot-dipped ga vanized nails. Staples permitted.

B. Asphalt Shingles

1. Fire Underwriters' Class C Label on each bundle.
2. Approximate shipping weights per square:
   (a) Square butt strip, 235 pounds.
   (b) Hexagon strip, 200 pounds.

(c) Irregular shaped shingles manufactured in conformanc with the Underwriters' Laboratories minimum weigl requirements.

3. Exposure as required for Underwriters' Class C label.
4. Headlap as recommended by manufacturers; minimum inches.
5. Underlay:
   (a) Asphalt saturated felt; weight approximately 15 pounc per 100.
   (b) No underlay required on roof slopes of 7 in 12 inch or more; or when triple thickness is obtained at all poin on roof slopes of 4 in 12 inches or more.
   (c) One layer of 15 pound Asphalt saturated felt shall l required under all double thickness shingles on ro slopes between 4 in 12 and 7 in 12.
   (d) On roof slopes less than 4 in 12 but not less than 2 in 1 all double thickness shingles shall have all tabs cementc down with quick-setting cement or be Wind Resistai self-sealing shingles with an underlay of two layers of 1 pound asphalt saturated felt by commencing with a 1! width strip laid along the eaves followed by a 36 inch she completely overlapping the first 19 inch sheet and co tinuing with 36 inch sheets each overlapping the prece ing sheet by 19 inches. A continuous layer of plastic ro cement shall be applied at the rate of two gallons per 1(sq. ft. between the two layers of asphalt felt on the ro area starting from the eaves to a point on the roof 2 inches inside the inside wall line of the building. Tl cement shall be applied with a comb trowel and the ove lying sheet shall be pressed firmly into the cement ov the entire cemented area.
6. Reroofing - No more than two (2) layers without architect written approval.

C. Wood Shingles.

1. Edge-grain, tapered shingles (No. 1 grade).
2. Minimum size:

Length (Inches)	Thickness
16	5 Butts in 2 inches.
18	5 Butts in 2-1/4 inches.
24	4 Butts in 2 inches.

3. Maximum exposure:

Slope of Roof		Exposure for shingle length - inches		
Rise	Run	16	18	24
3 to 7	12	4	4 1/2	6
7 to 18	12	5	5 1/2	7 1/2

4. Underlay not permitted.

D. Asbestos Cement Shingles.

1. Quality: Dense, hard structure and thoroughly seasoned. S FS-SS-S-291c.
2. Fire Underwriters' Class A or B label on each bundle.
3. Underlay: one layer asphalt-saturated felt, approximate 30 pounds per 100 square feet.

4. American Method:
   (a) Standard shingle: Minimum weight per square, 470 pounds.

Length of shingle - in.	Maximum Exposure - in.
16	7
15	6 1/2
12	5

   (b) Strip shingle: Minimum weight per square, 285 pounds.
5. Dutch method:
   (a) Minimum weight per square, 265 pounds.
   (b) Minimum headlap, 3 inches.
   (c) Minimum sidelap, 4 inches.
6. French or Hexagonal Method:
   (a) Minimum weight per square, 250 pounds.
   (b) Minimum overlap 2 edges, 3 inches.

E. Tile Roofing.

1. Quality: Hard-burned roofing tile.
2. Underlay: One layer asphalt saturated felt approximately 30 pounds per 100 square feet.
3. Shingle tile, American Method.

Length of shingle - in.	Maximum exposure - in.
16	7
15	6 1/2
14	6
12	5

4. Interlocking tile and curved tile: Lay in accordance with manufacturer's recommendations.

F. Slate shingles:

1. Quality: Free from knots or knurls and of reasonable smooth cleavage. See FS-SS-S-451.
2. Underlay: Asphalt saturated felt approximately 30 pounds per 100 square feet.
3. Laid American Method:
   (a) Minimum thickness, 3/16".

(b) Length of shingle - in.	Maximum exposure - in.
18	7 1/2
16	6 1/2
14	5 1/2
12	4 1/2
10	3 1/2

G. Built-Up Roofs.

1. Asphalt or tar and gravel coverings, including flashings: Comply with requirements of Underwriters' Laboratories, Inc., Built-up roof coverings, minimum 3-ply.
2. Apply according to manufacturer's directions.
3. Each ply of felt: Minimum weight, 15 pounds per 100 square feet.
4. Surface with:
   (a) Roofing gravel or crushed stone: Approximately 400 pounds per 100 square feet; or

(b) Crushed slag: Approximately 300 pounds per 100 square feet.

(c) Other material approved as to quality and weight by Building Official.

5. Top ply of felt and crushed stone or slag surfacing may be replaced with one layer of mineral surfaced cap sheet, minimum weight 85 pounds per square.

H. Metal Roofs.

1. Materials.
   (a) Galvanized sheet metal; 26-gauge sheets, 1.25-ounce (total weight both sides) zinc coating per square foot.
   (b) Copper: 16-ounce soft (roofing temper).
   (c) Roofing tin: 40-pound coating.
   (d) Lead: Sheet lead, 2-1/2 lbs. per sq. ft.
2. Nails:
   (a) Hard copper or copper alloy, for copper roofs.
   (b) Hot-dipped galvanized, for galvanized, sheet metal roofs.
3. Seams, flat or standing; flat seams, locked and soldered.
4. Provide for expansion.

I. Other types of roof coverings.

Roof coverings such as metal shingles, canvas or roll roofing: may be used when the type and weight of material, and method of application are acceptable to the Building Official.

311. FLASHING

Flashings, a lap joint or a turned up flange, usually of metal to make a water-tight connection between two different materials.

A. Material

1. Copper: 16-ounce soft (roofing temper).
2. Galvanized sheet metal: 26-gauge, 1.25-ounce (total weight both sides) zinc coating per square foot.
3. Lead: Hard lead, 2 pounds; soft lead, 4 pounds.
4. Tin: 40-pound coating, painted both sides.
5. Membrane waterproofing material acceptable to Building Official.
6. Copper and zinc flashings, gutters and downspouts not to be used in conjunction with each other.
7. Aluminum of suitable weight to Building Official.

B. Openings not protected by overhang.

1. Heads of openings, wood frame walls:
   (a) Sheet metal extended behind finish siding material and turned down over outside edge of head trim unless drip cap extends behind and above bottom of finished material; or
   (b) Three-ounce copper-coated building paper may be used provided flashing is not exposed to weather more than 2 inches. Extend behind siding. Blind tack at outside edge of drip cap, 1 inch on center.
2. Heads and sills of openings, masonry-veneered wood frame walls.
   (a) Material: Sheet metal or membrane waterproofing material acceptable to Building Official.

(b) Head flashing: Extend from front edge of lintel, up a over top of lintel and up on sheathing under buildi paper.
(c) Sill flashing: Extend under masonry sill, up on sheathi and under wood sill.

3. Heads and sills of openings, masonry walls.
(a) Material: Sheet metal or membrane waterproofing m terial acceptable to Building Official.
(b) Head flashing: Extend from front edge of lintel, up a over top of lintel, through wall and turn up 1 inch inside surface.
(c) Sill flashing: Extend under and behind masonry s

4. Heads of openings, stuccoed wood frame walls:
(a) Material: sheet metal.
(b) Drip: Form drip on front edge of drip cap and exte flashing up behind paper underneath stucco.

C. Intersections.

1. Provide sheet metal flashing for all horizontal and verti intersections of stucco with other materials.
2. All flashing in connection with masonry walls shall ha flashing or counter-flashing built into masonry not less th one inch.

D. Valleys

1. Rigid shingle roof covering:
(a) Flash with sheet metal.
(b) Flashing on:
1. Roof slopes less than 7 in 12, width 18 inches.
2. Roof slopes 7 in 12 or more, width 12 inches.

2. Asphalt shingle roof covering:
(a) Flash with sheet metal; or
(b) Two thicknesses of mineral surfaced roll-roofing m terial cut from rolls weighing not less than 85 pounds p square.

Bottom strip, 18 inches wide, top strip at least 36 inch wide, lapped 12 inches.

E. Roof and Wall Intersections.

1. Sloping roof: Sheet metal flashings.
2. Flat roof: Sheet metal or same material as roof coverir When sheet metal is not used, install 45 degree cant strip roof and wall intersection.

F. Terrace or porch slabs.

Suspended (reinforced) type or bearing on the ground, whi abut wood construction at exterior wall.

1. Flashing material: Sheet metal.
2. Extend flashing at finish floors of terrace or porch from 1 inch outside exterior face of finish, turn up 4 inches behi exterior finish, thence turn down and extend 4 inches belc top of outside of foundation.

G. Chimneys.

1. All chimney and roof intersections, sheet metal flashir
2. Cricket or saddle covering: Sheet metal.

312. GUTTERS AND DOWNSPOUTS

When dwelling is provided with a basement install gutters and downspouts unless omission is specifically permitted by Building Official.

A. Materials.

1. Copper, 16 ounce, hard (cornice temper).
2. Galvanized sheet metal: 26-gauge sheets, 1.25 ounce (total weight both sides) zinc coating per square foot.
3. Solid wood gutters: Paint inside with two coats pitch or three coats lead and oil after installation.
4. Aluminum of suitable weight acceptable to Building Official.
5. Stainless steel.

B. Basket strainers.

1. Material: copper wire for copper gutters, heavily galvanized wire for all other gutters.
2. Install strainers in all gutter outlets to down-spouts.

C. Roof water disposal:

Provide outlet acceptable to Building Official.

313. INTERIOR WALL AND CEILING FINISH

A. Lath and Plaster.

1. Wood Lath:
   (a) Maximum stud or furring spacing, 16 inches on center.
   (b) Lath, No. 1, 5/16 inch thick.
   (c) Space lath 1/4 to 3/8 inch apart. Break joints every seventh lath, nail at each bearing.
2. Expanded metal lath:
   (a) Painted or galvanized lath.
   (b) Minimum weights; maximum spacing of supports.

Use	Pounds per yd.	Stud spacing - in.
Walls:		
All dwellings	2.5	16
1 Story dwellings	x3.4	20
	x4.0	24
	xx3.0	24
		Joist Spacing - in.
Ceilings	x2.75	16
	3.4	16
	xx3.4	24

x Flat rib
xx High rib

3. Insulating fiberboard lath:
   (a) Minimum thickness, 1/2 inch.
   (b) Lath size, 18" x 48". Lath, 24" x 48" may be used provided all joints at right angles to the framing members are covered with continuous strips of metal lath and ends

of lath are nailed to solid bearing (framing members) approximately 4 inches on center including intermedia supports.
(c) Maximum stud or joists spacing, 16 inches on center.
(d) Apply in accordance with manufacturer's direction.

4. Gypsum lath:
(a) Minimum Thickness, 3/8 inch.
(b) Size 16" x 48".
(c) Maximum stud or joist spacing, 16 inches on center.
(d) Apply in accordance with manufacturer's directions.

5. Lathing:
(a) Heads of openings: Install lath so vertical joints first course of lath above head will not occur on jan studs.
(b) Corner beads: Galvanized metal, for all external corne
(c) Corner and joint reinforcing: Metal lath 2-1/2 inch l on each surface.
(d) Over solid wood surfaces: install metal lath on stri or use furring nails. Lap metal lath on adjoining la surfaces.

6. Plaster.
(a) Mix all plaster (lime and prepared) according to man facteurer's recommendations.
(b) Quick lime, slake thoroughly.
(c) Minimum thickness, 1/2 inch over lath base.
Finish all ceilings level and walls and corners, plumb a straight.

7. Drying Period: Allow sufficient time for plaster to d thoroughly before application of trim.

B. Ceramic Tile.

Waterproof all surfaces prior to the application of the settir coat of adhesive.

C. Bath-Shower Walls.

1. Surface materials: Dense, smooth and water-repellent. Wal of showers and bath enclosures with shower heads shall be surfaced to a height not less than six feet above shower bas and not less than four feet above lip of tubs.
2. Backing materials: Backing materials shall be suitable f application of tile or other approved surfaces.
3. Installation: Installation of backing materials, and requir waterproofing shall be in accordance with manufacture recommendations. All joints and other openings shall caulked or otherwise protected from infiltration of wate

D. Dry Wall Finish.

1. Minimum thickness:

Type of wall finish	Actual Inches Spacing of studs or furring stri		
	16	20	24
Wood boards	3/8	1/2	1/2
Plywood	1/4	3/8	3/8
Gypsum board	3/8	1/2	1/2
Fiberboard	1/2	3/4	3/4

2. Other types of boards, including compressed dense composition board less than 1/2 inch thick, may be used when acceptable to the Building Official. Maximum stud spacing 16" on center.
3. There shall be 3/8" drywall backerboard behind all wood paneling less than 25/32 inches thick.

E. Heater Room Interior Finish.

See Tables 11-A and 11-B.

314. FINISH FLOORS

A. Cement Floors.

1. Mix. See 304-B and 304-K-2.
2. Heater room floors on wood construction where solid or liquid fuel is used:
   (a) Minimum thickness, 4 inches.
   (b) Use sheet metal over tops of joints for concrete forms or cut in 1-inch boards flush with top of joists. If wood boards are used, remove after the slab has set.
   (c) Reinforce slab with wire mesh weighing not less than 30 pounds per 100 square feet, or with 1/4 inch bars spaced 1 foot on center each way.
3. Heater room floors on wood construction where gas burning equipment raises temperature of floor to above 160 degrees, comply with the provisions of 2 above. See American Gas Assoc. specifications.

B. Wood Floors.

1. Materials.
   (a) Flooring: Kiln-dried materials.
   (b) Strip flooring, hardwood or softwood, minimum thickness 25/32 inch, maximum width 2 1/4 inches for hardwood, 3 1/4 inches for softwood. 3/8 inch thickness may be used where laid directly on a subfloor. Wider widths (plank flooring) and parquet flooring may be used when precautions are taken to prevent warping or cupping.
   (c) Nails: Maximum spacing, 16 inches on center.
   (d) Building paper or deadening felt: Apply under all finish flooring unless floor is insulated.
2. Installation.
   (a) Finish flooring over subflooring: Apply at right angles to subflooring except when subflooring is laid diagonally.
   (b) Finish flooring on strips; wood strips, minimum size, 1" x 2"; maximum spacing, 16 inches on center. Apply strips over building paper or deadening felt on top of subflooring.
   (c) Strip flooring on concrete: Apply on not less than 2" x 2" sleepers embedded in concrete.
   (d) Wood block flooring on concrete: Set blocks in mastic and install in accordance with flooring manufacturer's directions.

Table 11-A — STANDARD INSTALLATION CLEARANCES FOR HEAT-PRODUCING APPLIANCES[1]

These clearances apply unless otherwise shown on listed appliances.
Appliances shall not be installed in alcoves or closets unless so listed.
For installation on combustible floors see footnote 2.

RESIDENTIAL TYPE APPLIANCES For Installation in Rooms Which Are Large[3]		APPLIANCES: Above Top of Casing or Appliance (Inches)	From Top and Sides of Warm-Air Bonnet or Plenum (Inches)	From Front[4] (Inches)	From Back (Inches)	From Sides (Inches)	CHIMNEY CONNECTOR (Inches)	VENT CONNECTOR[5] (Inches)
BOILERS AND WATER HEATERS[6] FUEL								
Steam Boilers - 15 p.s.i. Water Boilers - 250°F. Water Heaters - 200°F. All Water Walled or Jacketed	Automatic Oil or Combination Gas and Oil	6	—	24	6	6	18	—
	Automatic Gas	6	—	18	6	6	—	9
	Solid	6	—	48	6	6	18	—
FURNACES — CENTRAL								
Gravity, Upflow, Downflow, Horizontal and duct Warm Air - 250°F. maximum Limit Control	Automatic Oil or Combination Gas and Oil	6[7]	6[7]	24	6	6	18	—
	Automatic Gas	6[7]	6[7]	18	6	6	—	9
	Solid	18[8]	18[8]	48	18	18	18	—
	Electric	6[7]	6[7]	18	6	6	—	—
FURNACES — FLOOR								
For Mounting in Combustible Floors	Automatic Oil or Combination Gas and Oil	36	—	12	12	12	18	—
	Automatic Gas	36	—	12	12	12	—	9
HEAT EXCHANGER, SUPPLIED FROM A REMOTE SOURCE								
Steam - 15 p.s.i. maximum Hot water - 250°F. maximum		1	1	1	1	1	—	—
ROOM HEATERS AND ROOM HEATING STOVES BURNING SOLID FUEL								
Circulating Type Vented or Unvented	Oil or Solid	36	—	24	12	12	18	—
	Gas	36	—	24	12	12	—	9
Radiant or Other Type Vented or Unvented	Oil or Solid	36	—	36	36	36	18	—
	Gas	36	—	36	18	18	—	9
	Gas with Double Metal or Ceramic Back	36	—	36	12	18	—	9
RADIATORS, SELF-CONTAINED[6]								
Steam or Hot Water	Gas	36	—	6	6	6	—	9
RANGES — COOKING STOVES						Front Side	Other Side	
Vented or Unvented	Oil	30	—	—	9	24	18	18	—
	Gas	30	—	—	6	6	6	—	6
	Solid - Clay lined Firepot	30	—	—	24	24	18	18	—
	Solid unlined Firepot	30	—	—	36	36	18	18	—
	Electric	30	—	—	6	6		—	—
CLOTHES DRYERS								
Listed Types	Gas	6	—	24	6	6	—	1
	Electric	6	—	24	0	0 one side		—

[1] *Standard clearances may be reduced in existing construction only by affording protection to combustible material in accordance with Table No. 11-B.*

[2] *An appliance may be mounted on a combustible floor if the appliance is listed for such installation or if the floor is protected in an approved manner.*

[3] *Rooms which are large in comparison to the size of the appliance are those having a volume equal to at least 12 times the total volume of a furnace and at least 16 times the total volume of a boiler. If the actual ceiling height of a room is greater than 8 feet, the volume of a room shall be figured on the basis of a ceiling height of 8 feet.*

[4] *The minimum dimension shall be that necessary for servicing the appliance including access for cleaning and normal care, tube removal, etc.*

[5] *The minimum dimension shall be 18 inches for gas appliances not equipped with draft hoods, except clothes dryers. The dimension may be 6 inches for listed gas appliances equipped with draft hoods and for boilers and furnaces equipped with listed conversion burners and with draft hoods. A vent connector of listed Type B or L venting material may be used with listed gas appliances with draft hoods and may be installed at clearances marked on the material.*

[6] *Steampipes and hot-water heating pipes shall be installed with a clearance of at least one inch to all combustible construction or material, except that at the points where pipes carrying steam or hot water at not over 15 pounds gage pressure emerge from a floor, wall, or ceiling, the clearance at the opening through the finish floor boards or wall ceiling boards may be reduced to not less than 1/2 inch. Each such opening shall be covered with a plate of non-combustible material.*

Such pipes passing through stock shelving shall be covered with not less than one inch of approved insulation.

Wood boxes or casings enclosing uninsulated steam- or hot-water heating pipes or wooden covers to recesses in walls in which such uninsulated pipes are placed, shall be lines with metal or asbestos millboard.

Where the temperature of the boiler piping does not exceed 160°F., the provisions of this Table shall not apply.

Coverings or insulation used on steam- or hot-water pipes shall be of non-combustible material.

[7] *For a listed oil, combination gas oil, gas or electric furnace this dimension may be 2 inches if the furnace limit control cannot be set higher than 250°F., or this dimension may be one inch if the limit control cannot be set higher than 200°F.*

[8] *The dimension may be 6 inches for an automatically stoker-fired forced warm-air furnace equipped with 250°F. limit control and with barometric draft control operated by draft intensity and permanently set to limit draft to a maximum intensity of .13-inch water gage.*

[9] *To combustible material or metal cabinets. If the underside of such combustible material or metal cabinet is protected with asbestos millboard at least 1/4 inch thick covered with sheet metal of not less than No. 28 gage, the distance may be not less than 24 inches.*

Table 11-B — MAXIMUM REDUCED CLEARANCES (INCHES), WITH SPECIFIED FORMS OF PROTECTION [1]

TYPE OF PROTECTION Applied to the Combustible Material Unless Otherwise Specified and Covering All Surfaces Within the Distance Specified as the Required Clearance With No Protection (Thicknesses Are Minimum)	WHERE THE REQUIRED CLEARANCE WITH NO PROTECTION IS:											
	36 Inches			18 Inches			12 Inches		9 Inches	6 Inches		
	Above	Sides and Rear	Chimney or Vent Connector	Above	Sides and Rear	Chimney or Vent Connector	Above	Sides and Rear	Chimney or Vent Connector	Above	Sides and Rear	Chimney or Vent Connector
(a) 1/4" asbestos millboard spaced out 1" [2]	30	18	30	15	9	12	9	6	6	3	2	3
(b) No. 28 Manufacturers' Standard gage steel sheet on 1/4" asbestos millboard	24	18	24	12	9	12	9	6	4	3	2	2
(c) No. 28 Manufacturers' Standard gage steel sheet spaced out 1" [2]	18	12	18	9	6	9	6	4	4	2	2	2
(d) No. 28 Manufacturers' Standard gage steel sheet on 1/8" asbestos millboard spaced out 1" [2]	18	12	18	9	6	9	6	4	4	2	2	2
(e) 1-1/2" asbestos cement covering on heating appliance	18	12	36	9	6	18	6	4	9	2	1	6
(f) 1/4" asbestos millboard on 1" mineral fiber bats reinforced with wire mesh or equivalent	18	12	18	6	6	6	4	4	4	2	2	2
(g) No. 22 Manufacturers' Standard gage steel sheet on 1" mineral fiber bats reinforced with wire or equivalent	18	12	12	4	3	3	2	2	2	2	2	2
(h) 1/4" asbestos cement board or 1/4" asbestos millboard	36	36	36	18	18	18	12	12	9	4	4	4
(i) 1/4" cellular asbestos	36	36	36	18	18	18	12	12	9	3	3	3

[1] *Except for the protection described in (e), all clearances should be measured from the outer surface of the appliance to the combustible material disregarding any intervening protection applied to the combustible material.*

[2] *Spacers should be of noncombustible material.*

C. Ceramic Tile.

See 307-C-5-f.

1. Materials. See ASTM C 126-52T.
2. Grade: Not less than Standard grade.
3. Setting bed.
   (a) Mix 1 part portland cement, 4 parts sand; or 1 part portland cement, 2 parts sand, and 4 parts pea-size aggregate.
   (b) Minimum thickness: 1-1/4 inches, if re-inforced with wire mesh; 3 inches when installed below top of chamfered joists, with finish tile surface at least 1-1/2 inches above tops of joists.
4. When applied over wood subfloor: Install asphalt saturated felt over sub-floor underneath the wire mesh.

D. Rubber Tile, Asphalt Tile, Linoleum and Wall to Wall Carpeting.

1. Do not apply rubber tile or linoleum on slabs resting on the ground. Asphalt tile may be used on slabs bearing on the ground provided the slab area where the tile are to be applied has first been covered with membrane waterproofing.
2. Hardboard, plywood or similar underlayment leveler having a nominal thickness of 1/4 inch shall be used over wood subfloors to provide a smooth, flat surface for the finish floor covering (including wall to wall carpeting.) Apply in accordance with manufacturer's recommendations.
3. Adhesive for flooring to be waterproof; type as recommended by manufacturer of the floor covering.

315. GARAGES

A. Attached and Built-In Garages.

1. Construction same as required for the dwelling.
2. If door opening occurs between garage and dwelling, provide 6" curb at the service door, or construct garage floor 6" lower than adjoining floor.
3. Installation of house heating unit or other fuel burning appliance in garage space not permitted. Install on-hour fire-rated partition between space containing house-heating unit and garage space. Doors are not permitted common to heater room and/or garage.

4. There shall be no openings from a private garage directly int room used for sleeping purposes. Other openings between garage and residence shall be equipped with solid wood c doors not less than 1-3/4 inches in thickness or equivalent. T garage shall be completely separated from the residence and attic area by means of 5/8 inch (1 Hour) gypsum board equivalent applied to the garage side. Garage floor surfa shall be of approved noncombustible materials.
5. Hot air heat duct openings shall be a minimum of 4' o floor of garage with a fusable link fire damper. Cold air turns are not permitted.

B. One-story frame detached garages and accessory buildir

1. Comply with construction requirements for one-story dw ings with the following exceptions:
   (a) Foundation walls and footing may not be less than below finish grade, 6" minimum thickness at the and may be flared to not less than 12" at the bott
   (b) Grade beam construction permitted consisting of a concrete floor or a minimum 4" of crushed stone, s or gravel poured monolithically with a minimum thickened outer edge a width of 20" around perime of building, said 20" grade beam to be of equal de and on undisturbed soil.
   (c) Studs, maximum spacing 24" O.C. Doubling of studs required on jambs of openings less than 3' 5" wide.
   (d) Wall sheathing and building paper may be omitted corner bracing is used. Each corner is to be braced fr top outward in two directions to a minimum of 72" fr corner at sill plate, and may be applied on the ins surface of studs, minimum 1"x4".
   (e) Corner post may be two 2"x4" or one 4"x4".
   (f) Top plate may be single, provided rafters occur dire over studs and plate at corners is lapped to provide
   (g) Rafter ties at eaves not less than 2"x4", maximum s ing 6' O.C.
   (h) Concrete floor, minimum 4" of concrete on minimum of crushed stone, sand or gravel.

C. One story solid masonry or masonry veneer detached gara and accessory buildings.

1. Comply with construction requirements for one-story dw ings with the following exceptions:
   (a) Combined foundation wall and footing is allowed vided it goes down 42" below grade and the botton flared to 16". Wall width shall be wide enough to s port wall above but in no event less than 8" minim width.
   (b) Brick veneer framing may comply with 315-B.

APPENDIX A

DURABILITY TEST STANDARDS

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 C231–74
Concrete, Weight per Cubic Foot, Yield and Air
Content of—Method of Test for ..... ASTM C138–74
Organic Impurities in Sand for Concrete—Method of Test for ..... ASTM C40–73

Masonry and Masonry Products

Ceramic Glazed Structural Clay Facing Tile,
Facing Brick and Solid Masonry Units—
Specifications for (Autoclave Test) ..... ASTM C126–71
Freezing and Thawing Tests (see specifications
for materials)
—Bricks—Methods of Sampling and Testing ..... ASTM C67–73
—Drain Tile—Specifications for ..... ASTM C4–70

Plastics

Water Absorption of Plastics—Methods of Test for ..... ASTM D570–72

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

Fiber Building Boards—Method of Accelerated Aging ..... ASTM D1037–72a
Gypsum and Gypsum Products, Chemical Analysis of—
Standard Methods for ..... ASTM C471–72
Gypsum Board Products and Gypsum Partition Tile or Block,
Physical Testing of—Standard Methods of ..... ASTM C473–74
Gypsum Plasters and Gypsum Concrete, Physical Testing of—
Standard Methods for ..... ASTM C472–73

APPENDIX A

STRUCTURAL UNIT TEST STANDARDS

Concrete

Coarse Aggregates, Resistance to Abrasion of Small Size, by use of the Los Angeles Abrasion Machine–Test for ..... ASTM C131
Fine and Coarse Aggregates, Sieve or Screen Analysis of– Test for (A 37.8–1973) ..... ASTM C136
Concrete, Obtaining and Testing Drilled Cores and Sawed Beams of ..... ASTM C42
Concrete Test Specimens in the Laboratory–Making and Curing ..... ASTM C192
Concrete, Molded Cylinders–Test for Compressive Strength of ..... ASTM C39
Lightweight Insulating Concrete, Compressive Strength–Test for ..... ASTM C495
Concrete Masonry Units–Sampling and Testing (A 84.1–1972) ..... ASTM C140
Concrete Masonry Units, Hollow Load Bearing– Specifications for ..... ASTM C90
Concrete Masonry Units, Solid Load Bearing– Specifications for (A 81.1–1972) ..... ASTM C145
Concrete, Hardened Portland Cement–Test for Cement Content of (A 1.22–1967) ..... ASTM C85
Concrete, Ready Mixed–Specifications for (A 37.69–1970) ..... ASTM C94–
Sands for Concrete–Test for Organic Impurities in ..... ASTM C40

Interior Finishes

Gypsum and Gypsum Products, Chemical Analysis of– Standard Methods for ..... ASTM C471
Gypsum Board Products and Gypsum Partition Tile or Block, Physical Testing of–Standard Methods for ..... ASTM C473
Gypsum Concrete–Specifications for ..... ASTM C317
Gypsum Formboard–Specifications for ..... ASTM C318
Gypsum Lath–Specifications for ..... ASTM C37
Gypsum Plasters–Specifications for ..... ASTM C28
Gypsum Plasters and Gypsum Concrete, Physical Testing of– Standard Methods for ..... ASTM C472
Gypsum Sheathing Board–Specifications for ..... ASTM C79
Gypsum Wallboard–Specifications for ..... ASTM C36
Insulating Board (Made from Cellulosic Fiber), –Methods of Testing ..... ASTM C209
–Specifications for ..... ASTM C208
Lime ..... (See Maso

Masonry

Aggregate for Masonry Mortar–Specifications for ..... ASTM C144
Brick, Concrete Building–Specifications for ..... ASTM C55
Brick–Methods of Testing and Sampling ..... ASTM C67
Cement, Masonry–Specifications for ..... ASTM C91
Ceramic Tile (Veneers) ..... (See Interior Finis

Masonry—continued

Chemical Analysis of Limestone, Quicklime and Hydrated Lime ..... ASTM C25–72
Concrete Masonry Units ..... (See Concrete)
Glazed Units–Ceramic Glazed Structural Clay Facing Tile, Facing Bricks, and Solid Masonry Units–Specifications for ..... ASTM C126–71
Lime and Limestone Products–Methods of Sampling, Inspection, Packing and Marking of ..... ASTM C50–68
Lime, Hydrated and Quick–Methods of Physical Testing of ..... ASTM C110–71
Lime, Hydraulic Hydrated for Structural Purposes–Specifications for ..... ASTM C141–67
Mortars, Hydraulic Cement–Method of Test for Compressive Strength of (Using 2 in. Cube Specimens)..... ASTM C109–73
Mortars, Hydraulic Cement–Method of Test for Tensile Strength of ..... ASTM C190–72
Stone, Natural Building–Methods of Test for Absorption and Bulk Specific Gravity of ..... ASTM C97–70
Stone, Natural Building–Method of Test for Compressive Strength of ..... ASTM C170–70
Stone, Natural Building–Methods of Test for Modulus of Ruptures of ..... ASTM C99–70

Metals

Cast Iron–Method of Testing Compression of ..... ASTM A256–46
Metallic Materials–Methods of Tension Testing of ..... ASTM E8–69

Unclassified Miscellaneous

Cement, Hydraulic–Methods of Sampling ..... ASTM C183–73a
Cement, Natural–Specifications for ..... ASTM C10–73
Cement, Portland–Specifications for ..... ASTM C150–74
Clay Pipe, Testing ..... ASTM C301–72
Plastics Under Load–Method of Test for Deformation of ..... ASTM D621–64
Tile, Clay Drain–Specification for ..... ASTM C4–70

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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 D198–67
Veneer, Plywood and Other Glued Veneer Construction–Methods of Testing ..... ASTM D805–72

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Preservative Treatment
—of Lumber, Timber, Bridge Ties, and Mine Ties (All Species)—Standards for ..... AWPA C2–7
—of Piles by Pressure Process—Standards for ..... AWPA C3–7
—of Poles by pressure process—Standards for ..... AWPA C4–7
—by Pressure Process—All Timber Products—Standards for ..... AWPA C1–7
Quality Control Standards for Pressure-Treated Lumber and Plywood
—With Creosote or Creosote Coal Tar Solution (For Above Ground Use) AWPB-LP-5–7
—With Creosote or Creosote Coal Tar Solution (For Ground Contact) AWPB-LP-55–7
—With Heavy Petroleum Solvent-Penta Solution (For Above Ground Use) AWPB-LP-7–7
—With Heavy Petroleum Solvent-Penta Solution (For Ground Contact) AWPB-LP-77–7
—With Light Petroleum Solvent-Penta Solution (For Above Ground Use) AWPB-LP-3–7
—With Light Petroleum Solvent-Penta Solution (For Ground Contact) AWPB-LP-33–7
—With Volatile Petroleum Solvent (LPG)-Penta Solution (For Above Ground Use) AWPB-LP-4–7
—With Volatile Petroleum Solvent (LPG)-Penta Solution (For Ground Contact) AWPB-LP-44–7
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—With Water-Borne Preservatives (For Ground Contact) AWPB-LP-22–7
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