



ASPHALT ROOFING MANUFACTURERS ASSOCIATION 6288 Montrose Road, Rockville, Maryland 20852 (301) 231-9050

ACTION REQUESTED

PLAINTIFF'S EXHIBIT

BIR-707

January 14, 1985

MEMO TO: RESIDENTIAL ROOFING COMMITTEE
FROM: RICHARD D. SNYDER, EXECUTIVE VICE PRESIDENT
SUBJECT: DISCUSSION MATERIAL FOR JANUARY 28-29 MEETING

I am sending you some material for review prior to our meeting in San Antonio January 28-29, 1985:

Thanks to an exhaustive effort by Henry Koopmann, we have a most recent draft of Chapter 32 of the Uniform Building Code. We are getting close to a final document. The Task Force, which includes representation from both ARMA and NRCA, is meeting January 15, and they will report on their discussion at the BUR and Residential Roofing Committee Meetings. Please review this latest draft for that discussion. The most recent revisions or additions can be found easily by looking for marginal notations or hand-printed additions to the text.

I am looking forward to seeing you in San Antonio.

Regards,

RDS/bah

Enclosure

BIRD 012915

Chapter 32

ROOF CONSTRUCTION AND COVERING

General

Sec. 3201. Roofs shall be as specified in this code and as otherwise required by this chapter.

Roof coverings shall be securely fastened to the supporting roof construction and shall provide weather protection for the building at the roof.

Skylights shall be constructed as required in Chapter 34.

Penthouses shall be constructed as required in Chapter 36.

For use of plastics in roofs, see Chapter 52.

For solar energy collectors located above or upon a roof, see Section 1714.

Definitions

Sec. 3202. For purposes of this chapter certain terms are designated as follows:

DELETE
REVISE

~~ASBESTOS FELT, see Section 3204(c)3.~~

~~BASE PLY is the first layer applied in a built-up roofing membrane.~~ → *ply when it is a separate p*

~~BASE SHEET is one layer of felt or combination sheet secured to the deck over which may be applied additional felts, a cap sheet, organic or inorganic fiber-chinglet, smooth coating or mineral aggregate a product used as the base ply in a built-up roofing membrane.~~ → *and not part of a shingled built-up roofing membrane.*

✓ **BUILT-UP ROOF COVERING** is two or more layers of roofing consisting of a base sheet ply, felts and cap sheet, mineral aggregate, smooth coating or similar surfacing material.

✓ **CAP SHEET** is roofing made of organic or inorganic glass fibers, saturated and coated on both sides with a bituminous compound, surfaced with mineral granules, mica, talc, ilmenite, inorganic fibers or similar materials.

CEMENTING is solidly mopped application of asphalt, cold liquid asphalt compound, coal tar pitch or other approved cementing material.

COMBINATION SHEET is a glass fiber felt integrally attached to kraft paper.

CORROSION-RESISTANT is any nonferrous metal or any metal having an unbroken surfacing of nonferrous metal, or steel with not less than 10 percent chromium or with not less than 0.20 percent copper.

REVISE

~~FELT is matted organic or inorganic glass fibers, saturated or coated with bituminous compound.~~ → *reinstate "inorganic" delete "glass"*

REINSTATE & REVISE

~~FELT, NONBITUMINOUS SATURATED, is matted asbestos fibers with binder for use with wood shingle and wood shake assemblies as specified in Section 3204(c).~~ → *FELT, NONBITUMINOUS SATURATED see Section 3204(c)3*

~~GLASS-FIBER FELT is a glass fiber sheet coated on both sides with bituminous compound.~~

REV. JAN 85.

P-529

** It has been suggested that we change this cumbersome name to: FLAMEPROOF FELT; FIRE RESISTANT*

HEAVY DUTY FELT is an organic felt designed specifically as a heavy duty underlayment for roofing tile and shingles.

Delete ~~INTERLAYMENT is a layer of organic felt or nonbituminous saturated asbestos felt not less than 18 inches wide, shingled between each course of roof covering.~~ → *reinstate (change name)*

DELETE
↓
Per Tile Mfgs.

~~INTERLOCKING ROOFING TILES are individual units, typically of clay or concrete, possessing matching ribbed or interlocking vertical side joints that restrict lateral movement and water penetration.~~

METAL ROOFING is metal shingles or sheets for application on solid roof surfaces, and corrugated or otherwise shaped metal sheets or sections for application on solid roof surfaces or roof frameworks.

DELETE

~~NON-NAILABLE DECK is any deck which is incapable of retaining an approved fastener.~~

PREPARED ROOFING is any manufactured or processed roofing material, other than untreated wood shingles and shakes, as distinguished from built-up coverings such as asphalt shingles, mineral surfaced roll roofing, and fire retardant treated wood shingles and shakes.

✓ ROOFING PLY is a layer of felt in a built-up roofing membrane.

ROOFING SQUARE is 100 square feet of roofing surface.

ROOFING TILES are units, typically clay or concrete which comply with U.B.C. Standard No. 32-12.

SHAKE FELT is heavy duty felt designed specifically as interlayment between courses of wood shakes.

SHINGLE UNDERLAYMENT is an organic felt designed specifically as underlayment for shingles.

SPOT CEMENTING is discontinuous application of asphalt, cold liquid asphalt compound, coal tar pitch or other approved cementing material.

UNDERLAYMENT is one or more layers of felt, sheathing paper, non-bituminous saturated asbestos felt, or other approved material over which finish roofing is applied. a roofing system is applied. → *reinstate (change name)*

VAPOR RETARDER is a layer of material or a laminate used to appreciably reduce the flow of water vapor into the roofing system.

WOOD SHAKES are tapered or nontapered pieces of approved durable wood of random widths ranging from 4 inches to 14 inches and of the following four types:

1. Hand-split and resawn; tapered with one sawed and one split face; semi-split; tapered with partially sawn and split faces both sides. 15 inches, 18 inches or 24 inches in length.

2. Taper-split: tapered with both split faces, 24 inches in length.

3. Straight-split: nontapered with both split faces, either 18 inches or 24 inches in length.

4. Taper-sawn—sawn both sides—edges sawn or split. Lengths 24 inches and longer.

WOOD SHINGLES are tapered pieces of approved durable wood, sawed both sides, of random widths ranging from 3 inches to 14 inches and in lengths of 16 inches, 18 inches or 24 inches.

Fire Retardancy Requirements

REVISE

The fire retardancy of identified
 Sec. 3203. ~~Roof coverings shall be classified as Fire Retardant (FR),~~
 Special Purpose (SP), or Ordinary (O) as defined in Section 3204. *the fire retardancy*
~~class of roof covering on any structure regulated by this code shall be as~~
~~shown in Table 32-A.~~

Fire Retardancy Defined

Delete

Sec. 3204. (a) **Fire-retardant Roof Coverings.** A fire-retardant roof covering shall be any one of the following roofings:

1. Any Class A or B built-up roofing assembly.
2. Any mineral aggregate surfaced built-up roof for application to roofs having a slope not more than 3 inches to 12 inches applied as specified in Section 3203(d) + 3208(a) 4- consisting of not less than the following:

Roof Deck

Solid surface of noncombustible materials or minimum of 1/4-inch-
 1/2-inch plywood or 1-inch nominal boards or other material
 approved by the building official.

Base Sheet and Roofing Flee

Four layers of Type 15 perforated organic fiber felt, or
 Three layers of Type 15 organic or inorganic glass fiber felt, and

Surfacing Material

400 pounds per roofing square of gravel, crushed rock, ceramic or
 approved similar surfacing material, or
 300 pounds per roofing square of crushed slag.

(See U.B.C. Standard No. 32-5 for mineral roofing aggregate weighing
 less than 60 pounds per cubic foot.)

3. Any built-up roof for application to roofs having a slope not less than 1/4
 inch to 12 inches applied as specified in Section 3203(d) 1, consisting of
 not less than the following:

Roof Deck

Solid surface on noncombustible materials or minimum of 1/4-inch
 plywood or 1-inch nominal boards or other material approved by the
 building official.

Base Sheet and Flee

Two layers of Type 15 organic fiber felt, or
 One layer of 14-pound glass fiber felt base sheet, or combination sheet, or
 One layer of Type 30 organic fiber felt, or
 One layer of Type 45 asbestos fiber felt base sheet, and

Cap Sheets

One layer of 90-pound mineral surfaced organic fiber felt cap sheet
 (requires not less than two layers of organic fiber felt), or
 Two layers of 55-pound mineral surfaced organic fiber felt split sheet, or
 One layer of 80-pound mineral surfaced asbestos fiber felt cap sheet, or
 One layer of 72-pound mineral surfaced glass fiber felt cap sheet, or
 Two layers of Type 15 asbestos fiber finishing felts.

*Alternatively,
 delete entirely.*

DELETE

- ~~4. Any Class A or B prepared roofing.~~
~~5. Any Class C mineral surfaced asphalt shingles laid so that there are not less than two thicknesses at any point and the total weight per roofing square is not less than 235 pounds.~~
 6. Asbestos-cement shingles or sheets.
 7. Concrete slab roof.
 8. Metal roof covering.
 9. Slate shingles.
 10. Clay or concrete roof tile.

DELETE

- ~~11. Any roof covering system of wood shingles or shakes having a Class B rating.~~

(b) Ordinary Roof Covering. An ordinary roof covering shall be any one of the following roofings:

EXCEPTION: Unless otherwise required because of location as specified in Parts IV and V of this code, Group M, Division 1 roof coverings shall consist of not less than one layer of 55-pound smooth-surfaced organic cap sheet, or built-up roofing consisting of two layers of Type 15 organic fiber felt and one layer of surfacing material as specified in Section 3203(f)3; 3204(b)3

} add to Table 32-A

Delete

1. Any roof covering listed in Section 3203(e); 3204(a)
 2. Any built-up roofing assembly not less than Class C roofing.
 3. Any mineral aggregate surface built-up roof for application to roofs having a slope of not more than 3 inches in 12 inches applied as specified in Section 3203(d)2; 3203(a)4, consisting of not less than the following:

Base Sheet and Roofing Fleece

Three layers of Type 15 ~~perforated~~ organic or ^{glass} inorganic fiber felt, and
 Surfacing Material
 300 pounds per roofing square of gravel or other approved surfacing material, or
 250 pounds per roofing square of crushed slag in 50 pounds of asphalt, or
 60 pounds of pitch.

→ reinstate, as originally printed.

Delete

DELETE

- ~~4. Any prepared roofing not less than Class C roofing.~~

Delete

5. Wood shingles (treated or untreated).

Delete

6. Wood shakes (treated or untreated).

(c) Special Purpose Roofs. 1. Wood shakes. Special purpose wood shake roofing shall conform to grading and application requirements of this chapter. In addition, the deck shall be constructed of 3/4-inch plywood with exterior glue or 1-inch nominal T and G boards, overlaid with a layer of approved asbestos felt lapped 2 inches on the horizontal and vertical joints. An 18-inch-wide strip of the same asbestos felt shall be shingled in between each course of shakes in such manner that no felt is exposed to the weather below the shake butts. As an alternate, an underlayment a layer of 1/2-inch Type X gypsum board shall be placed under the solid or spaced sheathing.

non-bituminous saturated

→ non-bituminous saturated

2. In Group H Occupancies over 15,000 square feet in single floor area.

For requirements on smoke and heat venting in buildings with high-piled combustible stock, see the Fire Code.

(b) **Mixed Occupancies.** Venting facilities shall be installed in buildings of mixed occupancy on the basis of the individual occupancy involved.

(c) **Types of Vents.** Vents shall be fixed in the open position or shall open automatically in the event of fire and may consist of skylights, exterior wall windows or other openings leading directly to the exterior of the building. Vents shall be at or near the highest elevation of the ceiling and in no case lower than the upper one third of the smoke curtain. Where plain glass is used, provision shall be made to protect the occupants from glass breakage. In no case shall vents be located closer than 20 feet to an adjoining property line.

(d) **Releasing Devices.** Releasing devices for automatically opening vents shall be activated by temperature. The temperature-releasing device shall be operated normally at a maximum temperature of 165°F; special circumstances warranting higher releasing temperatures may be approved by the building official. Noncorrodible materials shall be used for hinges, latches and related details to prevent sticking and consequent failure to open.

(e) **Size and Spacing of Vents.** 1. **Effective venting area.** The effective venting area is the minimum cross-sectional area through which the hot gases must pass en route to atmosphere. The effective venting area shall be not less than 16 square feet with no dimension less than 2 feet.

2. **Spacing.** The maximum center-to-center spacing between vents within the building shall be:

- A. In Group B Occupancies: 120 feet.
- B. In Group H Occupancies: 100 feet.

3. **Venting ratios.** The following ratios of effective area of vent openings to floor areas shall be:

- A. In Group B Occupancies: 1:100.
- B. In Group H Occupancies: 1:50.

(f) **Curtain Boards.** 1. **General.** Curtain boards shall be provided to subdivide a vented building in accordance with the provisions of this subsection.

2. **Construction.** Curtain boards shall be sheet metal, asbestos board, lath and plaster, gypsum wallboard or other approved materials which provide equivalent performance.

3. **Location and depth.** Curtain boards shall extend down from the ceiling for a minimum depth of 6 feet but need not extend closer than 8 feet to the floor. In Group H Occupancies, the minimum depth shall be 12 feet except that it need not be closer than 8 feet to the floor, provided the curtain is not less than 6 feet in depth.

4. **Spacing.** The distance between curtain boards shall not exceed 250 feet and the curtained area shall be limited to 50,000 square feet. In Group H Occupancies, the distance between curtain boards shall not exceed 100 feet and the curtained area shall be limited to 15,000 square feet.

Roof Drainage

Sec. 3207. (a) General. ~~Roof systems not designed to support accumulated water shall be sloped a minimum of 1/4 inch in 12" for drainage. See Section 2305 (f).~~

delete

(b) Roof Drains. Unless roofs are sloped to drain over roof edges or are designed to support accumulated water, roof drains shall be installed at each low point of the roof.

Roof drains shall be adequate in size to convey the water tributary to the roof drains.

(c) Overflow Drains and Scuppers. Where roof drains are required, overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches above the low point of the roof, or overflow scuppers having three times the size of the roof drains may be installed in adjacent parapet walls with the inlet flow line located 2 inches above the low point of the adjacent roof and having a minimum opening height of 4 inches.

Overflow drains shall be connected to drain lines independent from the roof drains.

(d) Concealed Piping. Roof drains and overflow drains, when concealed within the construction of the building, shall be installed in accordance with the Plumbing Code.

(e) Over Public Property. Roof drainage water from a building shall not be permitted to flow over public property.

EXCEPTION: Groups R, Division 3, and M Occupancies.

→ Refer to §§ 2305 (f), 4505 (f)
& Plumbing Code Sections

Roof covering materials and their application

Sec. 3208. (a) General. Roof coverings shall be as specified in this section, and shall be provided as follows:

1. **Materials.** The quality and design of roofing materials and their fastenings shall conform to the applicable standards listed in Chapter 60.

2. **Identification.** All material shall be delivered in packages bearing the manufacturer's label or identifying mark.

Each package of prepared roofing and built-up roof covering materials shall bear the label of an approved agency having a service for the inspection of material and finished products during manufacture.

Each bundle of wood shingles, slate shingles and wood shakes shall comply with U.B.C. Standards Nos. 32-8, 32-10 and 32-11, respectively, and shall bear the label or identification mark of an approved inspection bureau or agency showing the grade.

Asphalt or pitch shall be delivered in cartons indicating the name of the manufacturer and the softening point of the product. Bulk shipments shall be accompanied by a certification of the softening point by the manufacturer.

(b) **Application.** 1-**General.** Application of roof-covering materials listed in Table No. 32-B shall be in accordance with the following provisions thereof:

1. **Asbestos-cement roofing.** Corrugated asbestos-cement roofing shall be applied in an approved manner.

2. **Asbestos-cement shingles.** Asbestos-cement shingles shall comply with U.B.C. Standard No. 32-9 and shall be installed in an approved manner.

~~Asbestos-cement shingles may be installed on slopes as low as 3 inches in 12 inches where the underlayment consists of two layers of Type 15 asbestos felt applied shingle fashion.~~

3. **Asphalt shingles.** Asphalt shingles shall comply with U.B.C. Standard No. 32-3. Asphalt shingles shall be fastened according to manufacturer's instructions to solidly sheathed roofs, but not less than four nails per each strip shingle not more than nominal 36 inches wide and two nails per each individual shingle not more than 18 inches wide shall be used, and as set forth in Table No. 32-B.

~~Underlayment may be omitted over existing asphalt shingle roofs except where the roof slope is less than 4 inches in 12 inches.~~

4. **Built-up roofs.** Built-up roofing shall be applied on firm, even, clean and dry decks in accordance with the manufacturer's instructions and this code. Wood nailers shall be installed at the perimeter of all non-nailable decks and at the top of all curbs. Adequate attachment shall be provided on all vertical surfaces. Reglets shall be provided in walls or parapets receiving metal counterflashing. Insulated decks shall have wood insulation stops at all edges of the deck. Suitable cant strips shall be used at all vertical intersections. Table No. 32-E

The base sheet shall be cemented or spot-mopped to non-nailable decks as required by the type of deck material, using not less than 20 pounds per square of asphalt for solid mopping (10 pounds per square for spot mopping), or not less than 1 1/2 gallons of cold bituminous compound in accordance with manufacturer's published specifications, or 30 pounds per square of coal tar pitch.

Over approved nailable decks, the base sheet shall be nailed using not less than one fastener per each 1 1/2 square foot.

delete

Successive layers shall be cemented using no less cementing material than that specified for a solidly cemented base sheet.

Mineral aggregate surfaced roofs shall be surfaced with not less than 60 pounds of asphalt or 70 pounds of pitch in which is embedded not less than 400 pounds of gravel or other approved surfacing materials or 300 pounds of crushed slag per roofing square. See Section 3303 (f) 3 for minimum amount of mineral aggregate and asphalt or pitch on ordinary roofs. (See U.B.C. Standard No. 32-5 for mineral roofing aggregate weighing less than 60 pounds per cubic foot.)

Cap sheets shall be cemented to the base sheet or felts using no less cementing material than that specified for solidly cemented base sheets.

Asphalt for use as hot cement and mopping coat for built-up roof covering shall comply with U.B.C. Standard No. 32-2.

Asphalt shall be applied at a temperature not less than 275°F. nor more than 475°F. for high-melt types. Low-melt types shall not be applied at a temperature of less than 350°F. nor more than 400°F.

Asphalt shall not be heated to a temperature above 500°F. for a high-melt type nor 400°F. for low-melt types. Coal tar pitch shall not be heated to a temperature above 400°F. At no time shall the asphalt be heated to a temperature which will exceed its flash point at the kettle.

Built-up roofing shall be applied by starting at the low spots and working toward the ridges, with felts and cap sheets applied in shingle fashion to drain water. Felts and cap sheets shall be applied in solid uniform moppings of bitumen.

Fasteners shall be as set forth herein or in Table No. 32-B and shall be long enough to penetrate into the sheathing $\frac{1}{4}$ inch or through the thickness of the sheathing, whichever is less.

Built-up roofing nails for wood board deck shall be No. 12 gauge, $\frac{3}{16}$ inch head, driven through tin caps or approved nails with integral caps. For plywood, use No. 11 gauge ring shank nails driven through tin caps or approved nails with integral caps. For gypsum decks, insulating concrete, cementitious wood fiber and others, fasteners recommended by the deck manufacturer shall be used.

5. Clay or concrete tile. Tile of clay or concrete shall comply with U.B.C. Standard No. 32-12 and shall be installed in accordance with Table No. 32-D and fastened with corrosion-resistant nails or wire.

DELETE

Noninterlocking tiles with projecting anchor lugs at the bottom of the tiles shall be held in position by means of 1-inch by 2-inch wood stripping nailed to the roof sheathing over the underlayment.

DELETE

Interlocking tiles with projecting anchor lugs may be installed over spaced sheathing board, 1-inch by 2-inch wood stripping nailed to solid roof sheathing or directly to solid roof sheathing, provided in all cases each tile is attached in conformance with Table No. 32-D.

Tile roofs shall have an underlayment of not less than two layers of Type-15 felt or one layer of Type-30 felt.

Interlocking roof tiles may be installed on slopes below 3 inches in 12 inches where underlayment consists of two layers of Type-15 felt or heavier applied shingle fashion and solid mopped together with approved cementing material between the plies.

When interlocking tiles are used, the underlayment may consist of one layer of Type-40 or heavier asphalt-coated base sheet extending from the eave to a point 24 inches inside the exterior wall line of the building. When this method is used, all horizontal and vertical seams of the base sheet shall be lapped 6 inches and be continuously sealed with approved cementing material and shall be applied only over solid sheathing.

Per Tile Mfgs.

6. Metal roofing. Metal roofing exposed to the weather shall be corrosion resistant. Metal roofing shall be applied in an approved manner.

Flat sheets shall be applied only to solidly sheathed roofs.

Corrugated or ribbed steel shall be not less than No. 30 galvanized sheet gauge.

Flat steel sheets shall be not less than No. 30 galvanized sheet gauge. Other ferrous sections or shapes shall be not less than No. 26 galvanized sheet gauge.

Flat nonferrous sheets shall be not less than No. 28 B. & S. gauge.

Other nonferrous sections or shapes shall be not less than No. 25 B. & S. gauge.

Corrugated or otherwise shaped sheets or sections shall be designed to support the required live load between supporting members.

Ferrous sheets or sections shall comply with U.B.C. Standards Nos. 27-9 and 32-4.

Nonferrous sheets or sections shall comply with U.B.C. Standard No. 32-4.

7. Metal shingles. Metal shingles shall be applied in an approved manner.

Nonferrous shingles shall be not less than No. 28 B. & S. gauge.

8. Sheet roofing. Sheet roofing shall comply with the provisions of U.B.C. Standard No. 32-3 and shall be installed in an approved manner.

9. Slate shingles. Slate shingles shall comply with U.B.C. Standard No. 32-10 and shall be installed in an approved manner.

10. Wood shakes. Shakes shall comply with U.B.C. Standard No. 32-B and shall be installed in accordance with Table No. 32-B.

Shakes may be applied to roofs with solid or spaced sheathing. In wind-driven snow areas sheathing shall be solid and the shakes shall be applied over an underlayment of not less than Type 15 felt.

Shakes shall be laid with a side lap of not less than 1 1/2 inches between joints in adjacent courses. Spacing between shakes shall be not less than 1/4 inch nor more than 3/4 inch.

Shakes shall be fastened to the sheathing with two nails only, positioned approximately 1 inch from each edge and approximately 2 inches above the exposure line. The starter course at the eaves shall be doubled. The bottom or first layer may be either shakes or shingles.

Fifteen-inch or 18-inch shakes may be used for the final course at the ridge.

Shakes shall be laid with not less than 18-inch-wide strips of not less than Type 30 felt shingled between each course in such a manner that no felt is exposed to the weather below the shake butts.

Weather exposures shall not exceed those set forth in Table No. 32-A. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.

Wood shakes may be installed on a slope not less than 3 inches in 12 inches when installed over an underlayment of not less than Type 15 felt and when approved by the building official.

11. Wood shingles. Shingles shall comply with U.B.C. Standard No. 32-11 and shall be installed in accordance with Table No. 32-B.

Shingles may be applied to roofs with solid or spaced sheathing.

Shingles shall be laid with a side lap of not less than 1 1/4 inches between joints in adjacent courses, and not in direct alignment in alternate courses. Spacing between shingles shall be not less than 1/4 inch nor more than 3/4 inch. Each shingle shall be fastened with two nails only, positioned approximately 3/4 inch from each edge and approximately 1 inch above the exposure line. Starter course at the eaves shall be doubled.

Weather exposures shall not exceed those set forth in Table No. 32-A. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.

SEVERE CLIMATE
in text needs a
reference definition

3208

(c) Flashing. 1. Valleys: Roof valley flashings shall be provided for shingles as follows: *as shown below. Shingle application shall be consistent with applicable Table 32-B or 32-C.*

A. Asphalt shingles. The roof valley flashing shall be the same as required for wood shingles or shall be of ~~laced woven~~ asphalt shingles applied in an approved manner with an underlayment of not less than ~~one layer of shingle underlayment or~~ Type 15 felt extending 18 inches from the center line each way, ~~or shall be of two layers of 90-pound mineral-surfaced cap sheet cemented together with the bottom layer not less than 12 inches wide laid face down and the top layer not less than 24 inches wide laid face up, or per manufacturer's instructions.~~

completely revise

B. Metal shingles. The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal applied over an underlayment of not less than ~~one layer of shingle underlayment or~~ Type 15 felt. The metal shall extend at least 8 inches from the center line each way and shall have a splash diverter rib not less than $\frac{1}{4}$ inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches.

revise underlayment

C. Asbestos-cement shingles, slate shingles, and clay and concrete tile. The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal applied over an underlayment of not less than ~~one layer of shingle underlayment or~~ Type 15 felt.

The metal shall extend at least 11 inches from the center line each way and shall have a splash diverter rib not less than 1 inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches.

revise underlayment

D. Wood shingles and wood shakes. The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal applied over an underlayment of not less than ~~one layer of shingle underlayment or~~ Type 15 felt. The metal shall extend at least 8 inches from the center line each way for wood shingles and 11 inches from the center line each way for wood shakes. Sections of flashing shall have an overlap of not less than 4 inches.

Add rib.

revise underlayment

2. Other Flashing. At the juncture of the roof and vertical surfaces, flashing and counterflashing shall be provided ~~as required in Section 1707-(b)-~~ per roofing manufacturer's instructions, and, when of metal shall be not less than ~~28-~~ 26 gauge corrosion resistant metal.

QUESTION 28 ga.
NRCA Manual calls
for 26 ga. due to
deflection problems
with thinner metal.

(d) Roof insulation. The use of combustible roof insulation shall may be permitted, provided it is covered with approved built-up roof covering applied directly thereto as set forth in Table No. 32-E. For other types of roof covering, the insulation shall be covered with a suitable nailing base. For foam plastic, see Section 1712.

completely revise

Insulation shall be of a rigid type suitable for application of a roof covering.

Where fire-retardant roof coverings are required, insulations shall be a type approved for the type of deck and the built-up roofing applied.

Where built-up roofing is to be applied, vapor barriers shall be installed between the deck and the insulation where the average January temperature is below 45°F, or where excessive moisture conditions are anticipated within the building.

REV. JAN 85

P-539

Insulation shall be of a type designed for use with a roof covering. The use of combustible roof insulation may be permitted, provided it is covered with approved roof covering applied directly thereto as set forth in Table No. 32-E. For other types of roof covering, the insulation shall be covered in accordance with roof covering manufacturer's recommendation. For foam plastics, see Section 1712.

SEE FOLLOWING
PAGE

A. Asphalt Shingles

The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal, which shall extend at least 8 inches from the center line. Sections of flashing shall have an end lap of not less than 4 inches. Alternatively, the valley shall consist of woven asphalt shingles in accordance with manufacturer's printed instructions. In each case, the roof valley flashing shall have a 36 inch wide underlayment directly under it consisting of one layer of shingle underlayment or Type 15 felt running the full length of the valley, in addition to the underlayment specified in Table No. 32-B. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 inches in 12 inches.

B. Metal Shingles

The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal, which shall extend at least 8 inches from the center line each way and shall have a splash diverter rib not less than 3/4 inch high at the flow line formed as a part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches.

The metal valley flashing shall have a 36 inch wide underlayment directly under it consisting of one layer of shingle underlayment or Type 15 felt running the full length of the valley, in addition to underlayment required for metal shingles. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 inches in 12 inches.

P- 539A

JAN 85

(c) Flashing. 1. Valleys. Roof valley flashings shall be provided for shingles as follows:

C. Asbestos-cement shingles, slate shingles, and clay and concrete tile. The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal, applied over an underlayment of not less than one layer of shingle underlayment or Type 15 felt.

which The metal shall extend at least 11 inches from the center line each way and shall have a splash diverter rib not less than 1 inch high at the flow line formed as part of the flashing. Sections of flashing shall have an end lap of not less than 4 inches.

For roof slopes of 3 inches in 12 inches and over, the metal valley flashing shall have a 36 inch wide underlayment directly under it consisting of one layer of shingle underlayment or Type 15 felt running the full length of the valley, in addition to the underlayment specified in Table No. 32-D. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 inches in 12 inches.

D. Wood Shingles and Wood Shakes

The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal, which shall extend at least 8 inches from the center line each way for wood shingles and 11 inches from the center line each way for wood shakes. The metal valley flashing for wood shingles shall have a splash diverter rib not less than 3/4 inch high at the flow line formed as part of the flashing. For wood shakes the diverter rib shall be not less than 1 inch high.

→ The metal valley flashing shall have a 36 inch wide underlayment directly under it consisting of one layer of shingle underlayment or Type 15 felt running the full length of the valley, in addition to underlayment specified in Table No. 32-B. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 inches in 12 inches.

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TABLE NO. 92-A ROOF COVERING REQUIREMENT

OCCUPANCY	TYPES OF CONSTRUCTION									
	I	II			III	IV	V			
	F.I.L.	F.R.	ONE-HOUR	N	ONE-HOUR	N	H.T.	ONE-HOUR	N	
MINIMUM FIRE CLASSIFICATION RETARDANCY										
A-1	FR	FR	Not Permitted							
A12-2,1	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
A-3	FR	FR	FR	FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	
A-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
B1-2	FR	FR	FR	FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	
B13-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
E	FR	FR	FR	FR	FR	FR	FR	FR	FR	
H-1	FR	FR	FR	FR	FR	FR	FR	FR	FR	
H12-3-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
I-1	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
I-2	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
I-3	FR	FR	FR ¹	Not Permitted	FR ¹	Not Permitted	Not Permitted	FR ¹	Not Permitted	
M	FR	FR	FR	FR	O ⁴	O ⁴	O ⁴	O ⁴	O ⁴	
R-1	FR	FR	FR	FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	
R-3	FR	FR	FR	FR	O	O	O	O	O	

N—No requirements for fire resistance
F.R.—Fire resistive
H.T.—Heavy Timber

FR - Fire Retardant Roof Covering
SP - Special Purpose Roof Covering
O - Ordinary Roof Covering

1. See Section 1002 (b)

2. Ordinary roof coverings may be used on buildings of Group R, Division 1 Occupancies which are not more than two stories in height and have not more than 3000 square feet of projected roof area and there is a minimum of 10 feet from the extremity of the roof to the property line on all sides except for street fronts.

3. Group A, Division 3; Group B, Divisions 1 and 2 and Group R, Division 1 Buildings Occupancies which are not more than two stories in height and have not more than 6000 square feet of projected roof area and there is a minimum of 10 feet from the extremity of the roof to the property line or assumed property line on all sides except for street fronts may have Class C roof coverings which comply with U.B.C. Standard No. 32-7 and roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 3204 (e), Special Purpose Roofs.

4. Copy EXCEPTION from page P-532

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D. Wood Shingles and Wood Shakes

The roof valley flashing shall be provided of not less than No. 28 galvanized sheet gauge corrosion-resistant metal, which shall extend at least 8 inches from the center line each way for wood shingles and 11 inches from the center line each way for wood shakes. The metal valley flashing for wood shingles shall have a splash diverter rib not less than 3/4 inch high at the flow line formed as part of the flashing. For wood shakes the diverter rib shall be not less than 1 inch high.

The metal valley flashing shall have a 36 inch wide underlayment directly under it consisting of one layer of shingle underlayment or Type 15 felt running the full length of the valley, in addition to underlayment specified in Table No. 32-B. In severe climates, the metal valley flashing underlayment shall be solid cemented to the roofing underlayment for roof slopes under 7 inches in 12 inches.

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TABLE NO. 32-A ROOF COVERING REQUIREMENT

OCCUPANCY	TYPES OF CONSTRUCTION									
	I	II			III		IV	V		
	F.I.L.	F.R.	ONE-HOUR	N	ONE-HOUR	N	H.T.	ONE-HOUR	N	
MINIMUM FIRE CLASSIFICATION RETARDANCY										
A-1	FR	FR	Not Permitted							
A) 2-2.1	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
A-3	FR	FR	FR	FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	
A-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
B) 1-2	FR	FR	FR	FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	SP ² , FR	
B) 3-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
E	FR	FR	FR	FR	FR	FR	FR	FR	FR	
H-1	FR	FR	FR	FR	FR	FR	FR	FR	FR	
H) 2-3-4	FR	FR	FR	FR	FR	FR	FR	FR	FR	
I-1	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
I-2	FR	FR	FR	Not Permitted	FR	Not Permitted	FR	FR	Not Permitted	
I-3	FR	FR	FR ¹	Not Permitted	FR ¹	Not Permitted	Not Permitted	FR ¹	Not Permitted	
M	FR	FR	FR	FR	O ⁴	O ⁴	O ⁴	O ⁴	O ⁴	
R-1	FR	FR	FR	FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	O ² , SP ² , FR	
R-3	FR	FR	FR	FR	O	O	O	O	O	

N—No requirements for fire resistance
 FR.—Fire resistive
 H.T.—Heavy Timber

FR — Fire Retardant Roof Covering
 SP — Special Purpose Roof Covering
 O — Ordinary Roof Covering

1. See Section 1002 (b)

2. Ordinary roof coverings may be used on buildings of Group R, Division 1 Occupancies which are not more than two stories in height and have not more than 3000 square feet of projected roof area and there is a minimum of 10 feet from the extremity of the roof to the property line on all sides except for street fronts.

3. Group A, Division 3; Group B, Divisions 1 and 2 and Group R, Division 1 Buildings Occupancies which are not more than two stories in height and have not more than 6000 square feet of projected roof area and there is a minimum of 10 feet from the extremity of the roof to the property line or assumed property line on all sides except for street fronts may have Class C roof coverings which comply with U.B.C. Standard No. 32-7 and roofs of No. 1 cedar or redwood shakes and No. 1 shingles constructed in accordance with Section 3204(e). Special Purpose Roofs.

4. Copy EXCEPTION from page P-532

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		Asphalt shingles	
ROOF SLOPE	NOT PERMITTED BELOW 2":12"		
	2":12" to 4":12"	4":12" & over	
DECK REQUIREMENT		Asphalt shingles shall comply with U.B.C. Standard No. 32-3: Asphalt shingles shall be fastened according to manufacturer's instructions to solidly sheathed roofs, but not less than four nails per each strip shingle not more than nominal 36 inches wide and two nails per each individual shingle not more than 18 inches wide shall be used.	
		Sheathing shall conform to Sections 2516(d) and 2517(h)7	
UNDERLAYMENT	Temperate climate	Asphalt strip shingles laid with double coverage may be installed on slopes as low as 2 inches in 12 inches, provided the shingles are approved self-sealing or are hand-sealed and are installed with an underlayment consisting of two layers of shingle underlayment or Type 15 felt applied shingle fashion. Starting with an 18" wide sheet and a 36" wide sheet over it at the eaves, each subsequent sheet shall be lapped 19" horizontally.	One layer shingle underlayment or 1" horizontally and 4" vertically to shingles.
	Severe climate: In wind-driven snow areas subject to roof ice buildup. In areas subject to wind-driven snow or roof ice buildup.	Same as for temperate climate, and additionally the two layers of Type 15 felt applied shingle fashion shall be installed and solid mopped cemented together with approved cementing material between the plies extending from the eave up the roof to a point line 24 inches inside the exterior wall line of the building.	Same as for temperate climate, except coated roofing or coated glass be applied from the eaves to a line to exterior wall line with all laps on
ATTACHMENT		Corrosion-resistant nails, minimum 12 Gauge, 1/2 inch head, or corrosion-resistant staples, minimum 16 Gauge, 3/16 inch crown width. Fasteners shall comply with the requirements of U.B.C. Standard No. 25-17 Fasteners shall be long enough to penetrate into the sheathing 1/4 inch or through the thickness of the sheathing.	
Type of fasteners			
No. of fasteners ¹		4 per 36 - 40 inch strip 2 per 9-18 inch shingle	
Exposure Field of roof Hips & ridges		Per manufacturer's instructions included with packages of shingles. Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.	
Method		Per manufacturer's instructions included with packages of shingles.	
FLASHING			
Valleys		Per Section 3208(c) 1A	Per Section 3208(c)
Other Flashing		Per Section 3208(c) 2	Per Section 3208(c)

¹ Figures shown are for normal application. For special conditions such as mansard application and where roofs are in special wind regions, shingles shall be attached per manufacturer's instructions.

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TABLE 32-B
SHINGLE APPLICATION

	Wood shingles	Wood shakes
	NOT PERMITTED BELOW 3°:12°	
	see Table No. 32-C	see Table No. 32-C
	Shingles may be applied to roofs with solid or spaced sheathing.	Shakes may be applied to roofs with solid or spaced sheathing.
	Spaced sheathing for wood roofs shall be spaced not to exceed 6 inches clear nor more than the nominal width of the sheathing board. Sheathing boards shall be not less than 1 inch by 4 inches nominal dimensions. Sheathing shall conform to Sections 2516(1) and 2517(1), 7	
felt lapped 2" or.	No requirements	One Shakes shall be laid with not less than 18-inch-wide interlayment strips of not less than shake felt or Type 30 felt shingled between each course in such a manner that no felt is exposed to the weather below the shake butts.
hat one layer No. 15 felt shall be as inside the shed together.	Two layers of shingle underlayment or Type 15 felt applied shingle fashion shall be installed and solid mopped cemented together with approved cementing material between the plies extending from the eave up the roof to a point 36 inches inside the exterior wall line of the building. line	Sheathing shall be solid and the shakes shall be applied over an underlayment of not less than shingle underlayment or Type 15 felt, and Two layers of shingle underlayment or Type 15 felt applied shingle fashion shall be installed and solid mopped cemented together with approved cementing material between the plies extending from the eave up the roof to a point 36 inches inside the exterior wall line of the building. line
whichever is less.	Corrosion-resistant nails, minimum 14 Gauge, 7/8 inch head, or corrosion-resistant staples, when approved by the building official.	Corrosion-resistant nails, minimum 13 Gauge, 7/8 inch head, or corrosion-resistant staples, when approved by the building official.
	Fasteners shall comply with the requirements of U.B.C. Standard No. 25-17	
	Fasteners shall be long enough to penetrate into the sheathing 1/4 inch or through the thickness of the sheathing, whichever is less.	
	2 per shingle	2 per shake
	Weather exposures shall not exceed those set forth in Table No. 32-C Hip and ridge weather exposures shall not exceed those permitted for the field of the roof.	
	Shingles shall be laid with a side lap of not less than 1 1/2 inches between joints in adjacent courses, and not in direct alignment in alternate courses. Spacing between shingles shall be not less than 1/4 inch nor more than 1/2 inch, approximately 1/4 inch. Each shingle shall be fastened with two nails only, positioned approximately 1/4 inch from each edge and approximately 1 inch above the exposure line. Starter course at the eaves shall be doubled.	Shakes shall be laid with a side lap of not less than 1 1/2 inches between joints in adjacent courses. Spacing between shakes shall be not less than 1/4 inch nor more than 1/2 inch, approximately 1/2 inch. Shakes shall be fastened to the sheathing with two nails only, positioned approximately 1 inch from each edge and approximately 2 inches above the exposure line. The starter course at the eaves shall be doubled. The bottom or first layer may be either shakes or shingles. starter course at the eaves and Fifteen-inch or 18-inch shakes may be used for the final course at the ridge.
	Per Section 3208(c) 1D Per Section 3208(c) 2	Per Section 3208(c) 1D Per Section 3208(c) 2

TABLE NO. 32-C—MAXIMUM WEATHER EXPOSURE

GRADE LENGTH	3" TO LESS THAN 6" IN 12"	6" IN 12" AND STEEPER
WOOD SHINGLES		
No. 1 16-inch	3½"	5"
No. 2 ¹ 16-inch	3½"	4"
No. 3 ¹ 16-inch	3"	3½"
No. 1 18-inch	4½"	5½"
No. 2 ¹ 18-inch	4"	4½"
No. 3 ¹ 18-inch	3½"	4"
No. 1 24-inch	5½"	7½"
No. 2 ¹ 24-inch	5½"	6½"
No. 3 ¹ 24-inch	5"	5½"
WOOD SHAKES²		
18-inch	7½" ³	7½"
24-inch	10" ³	10"

¹To be used only when specifically permitted by the building official.

²Exposure of the 24-inch by ½-inch resawn handsplit tapered shake type shall not exceed 7½ inches on roof slopes less than 8 inches in 12 inches to a minimum of 4 inches in 12 inches.

³Wood shakes may be installed on a slope not less than 3 inches in 12 inches when installed over an underlayment of not less than Type 15 felt and when approved by the building official.

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TABLE NO. 32-D
ROOFING TILE APPLICATION

ROOF SLOPE		Less than 3":12"	3"12" and over.
DECK REQUIREMENT- [ⓐ]			
Solid sheathing per Sections 2516(d) and 2517(h)7.			
UNDERLAYMENT			
Temperate climate	Build-up roofing membrane, three plies minimum, applied per Section 3208(b)4. Surfacing not required.	One layer heavy duty felt or Type 30 felt lapped 2" horizontally and 6" vertically.	
Severe climate: Areas subject to wind-driven snow or roof ice build-up.	Same as for temperate climate.	Same as for temperate climate, except that extending from the eaves up the roof to a line 24 inches inside the exterior wall line of the building, two layers of underlayment shall be applied shingle fashion and solid cemented together with approved cementing material.	
Special Wind Regions as shown in Figure No. 23-4		Per tile manufacturer's instructions. Same as for severe climate.	
ATTACHMENT			
Type of fasteners	Corrosion-resistant nails, minimum 11 gauge $\frac{1}{8}$ Head Fasteners shall comply with the requirements of U.B.C. Standard No. 25-17. Fasteners shall be long enough to penetrate into the sheathing $\frac{1}{4}$ inch or through the thickness of the sheathing, whichever is less. Attaching wire for slate shingles and clay or concrete tile shall be not smaller than No. 14 gauge and shall comply with U.B.C. Standards Nos. 32-6 and 32-13.		
No. of fasteners	1 $\frac{1}{2}$ fasteners per tile [ⓑ] Flat tile without vertical laps, 2 fasteners per tile.	2 fasteners per tile [ⓑ] Tiles with anchor lugs engaged over horizontal battens may have one fastener on slopes exceeding 7:12.	
Tile head lap	3 inches minimum.		
Application method	Per tile manufacturer's instructions.		
FLASHING			
Valleys other flashing	Per Section 3208(c) 1C Per Section 3208(c) 2		

[ⓐ] When battens are used, they shall be 1 inch by 2 inches. Provision shall be made for drainage. Battens shall be fastened over the underlayment with 8 penny nails spaced at 24 inches on center.

[ⓑ] On slopes 7:12 and less, tiles with an installed weight exceeding 7.5 pounds per square foot having a width no greater than 16 inches may have one fastener.

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TABLE 32-E BUILT-UP ROOF COVERING APPLICATION

	NAILABLE DECKS	NON-NAILABLE DECKS
Deck Conditions	Built-up roofing decks shall be firm, applied on clean, smooth and dry decks in accordance with the manufacturer's instructions and this code. Insulated decks shall have wood insulation stops at all edges of the deck, unless an alternate suitable curbing is provided. Insulated decks with slopes greater than 2 inches in 12" shall have treated wood insulation stops at not more than 6 feet face to face. Solid wood sheathing shall conform to Sections 2516(d) and 2517(N)(7).	Structural concrete decks shall be primed—Provide wood nailers where nailing is required for roofing plies (see below).
Underlayment	One layer sheathing paper, Type 15 felt, or other approved underlayment nailed sufficiently to hold in place, is required over board decks where space between boards would allow bitumen to drip thru. No underlayment requirement for plywood decks. Underlayment on other decks shall be in accordance with deck manufacturer's recommendation.	
Base ply	Over approved nailable decks, the base sheet shall be nailed using not less than one fastener per each 1 1/2 square foot.	<i>Non-nailable decks shall be primed, and the base ply shall be cemented or spot mopped to non-nailable decks as required by the type of deck material, wings not less than 30 pounds per square of asphalt for solid mopping (10 pounds per square for spot mopping) or not less than 1 1/4 gallons of cold bituminous compound in accordance with manufacturer's published specifications, or 30 pounds per square of coal tar pitch, using adhesive application rates shown in Table No. 32-H.</i>
Mechanical fasteners	Fasteners shall be set forth herein or in Table No. 32-B and shall be long enough to penetrate into the sheathing 3/4 inch or through the thickness of the sheathing, whichever is less. Built-up roofing nails for wood board deck shall be minimum No. 12 gauge, 7/8-inch head, driven through tin caps or approved nails with integral caps. For plywood, see No. 11 gauge ring shank nails driven through tin caps or approved nails with integral caps. shall be used. For gypsum decks, insulating concrete, cementitious wood fiber and others, fasteners recommended by the deck manufacturer shall be used.	In addition to the application requirements of Table No. 32-B: Built-up roofing on slopes greater than 1 inch in 12 inches for gravel surface or 2 inches in 12 inches for smooth or cap sheet surface shall be blind nailed through tin caps into the deck, wood nailers or wood insulation stops at not more than 18 inches on center to secure all underlayment plies. Built-up roofing on slopes exceeding 3 inches in 12 inches shall be installed with plies laid parallel to the slope of the deck, and the surfacing material shall be other than gravel or slag. When mechanical fasteners are required for attachment of roofing plies to wood nailers or insulation stops (see below), they shall be as required for wood board decks.
Vapor retarder (insulated decks)	Where built-up roofing is to be applied, a vapor retarder shall be installed between the deck and the insulation, unless the manufacturer's instructions indicate otherwise. Where built-up roofing is to be applied, a vapor retarder shall be installed below 45°F or where excessive moisture conditions are anticipated within the building. It shall be applied as for a base ply.	Where built-up roofing is to be applied, a vapor retarder shall be installed between the deck and the insulation where the average January temperature is below 45°F or where excessive moisture conditions are anticipated within the building. It shall be applied as for a base ply.
Insulation	Insulation shall be of a rigid type suitable for application of a roof covering. Where fire-retardant roof coverings are required, insulations shall be a type approved for the type of deck and the built-up roofing applied. When no vapor retarder is required on a nailable deck, roof insulation shall be fastened as recommended by the insulation manufacturer. When a vapor retarder is required, roof insulation is to be solid mopped to the vapor retarder using adhesive application rates specified in Table No. 32-H.	Insulation shall be of a rigid type suitable for application of a roof covering. Where fire-retardant roof coverings are required, insulations shall be a type approved for the type of deck and the built-up roofing applied. When no vapor retarder is required on a non-nailable deck, roof insulation shall be solid mopped to the deck using adhesive application rates specified in Table No. 32-H. When a vapor retarder is required, roof insulation is to be solid mopped to the vapor retarder using adhesive application rate specified in Table No. 32-H.

Roofing plies	Successive layers shall be cemented using no less cementing material than that specified for a solidly cemented base sheet together and to the base ply or the insulation, using adhesive rates shown in Table No. 32-K. In addition to the application requirements of Table No. 32-B, built-up roofing on slopes greater than 1 inch in 12 inches for gravel surface or 2 inches in 12 inches for smooth or cap sheet surface, mechanical fasteners are required. Roofing plies shall be blind nailed through insulation into the deck, wood nailers or wood insulation strips at not more than 18 inches on center to secure all underlying plies in accordance with roofing manufacturer's recommendation. Built-up roofing on slopes exceeding 3 inches in 12 inches, plies shall be installed with plies laid parallel to the slope of the deck and the surfacing material shall be other than gravel-casting. (Strapping method).	
Hot cementing	DELETE	^{Asphalt} Asphalt for use as hot cement and mopping coat (for built-up roof covering shall comply with U.B.C. Standard No. 32-2; requirements as set forth in Table No. 32-G. Asphalt shall be applied at a temperature not less than 375°F. for more than 475°F. for high melt types. Low melt types shall not be applied at a temperature of less than 350°F. nor more than 400°F. Asphalt shall not be heated to a temperature above 500°F. for a high melt type nor 400°F. for low melt types. Coal tar pitch shall not be heated to a temperature above 400°F. At no time shall the asphalt be heated to a temperature which will exceed its flash point at the kettle.
Workmanship	DELETE	Built-up roofing shall be applied by starting at the low spots and working toward the ridges, with felts and cap sheets applied in shingle fashion to drain water. Felts and cap sheets shall be applied in solid uniform moppings of bitumen.
Curbs and Walls		Suitable cant strips shall be used at all vertical intersections. Adequate attachment shall be provided on all vertical surfaces. Reglets shall be provided in walls or parapets receiving metal counterflashing.
Surfacing		Mineral aggregate surfaced roofs shall be surfaced with not less than 40 pounds of asphalt or 70 pounds of pitch in which is embedded not less than 400 pounds of gravel or other approved surfacing materials or 300 pounds of crushed slag per roofing square. See Section 3203 (7-3) for minimum amounts of mineral aggregate and asphalt or pitch on ordinary roofs. (See U.B.C. Standard No. 32-5 for mineral roofing aggregate weighing less than 40 pounds per cubic foot) comply with the requirements of U.B.C. Standard No. 32-5 and Table No. 32-I. Cap sheets shall be cemented to the base sheet or felts using no less cementing material than that specified for solidly cemented base sheet. Roofing plies as set forth in Table No. 32-H.

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TABLE 32 F

Built-up roofing

Use of mechanical fasteners for attaching roofing plies,
related to slope of roof

Nailable decks Non-nailable decks ¹ Insulation over nailable or non-nailable decks ²		
Surfacing	Slope	Requirement
GRAVEL	under 1:12	Mech. fastener not req'd ³
	1:12 to 3:12	Mech. fastener required ⁴
	over 3:12	Not permitted
SMOOTH	under 2:12	Mech. fastener not req'd ³
	2:12 to 3:12	Mech. fastener required ⁴
	over 3:12	Same as 2:12 to 3:12, but plies laid parallel to slope of deck
CAP SHEET	under ½:12	Not permitted
	½:12 to 2:12	Mech. fastener not req'd ³
	2:12 to 3:12	Mech. fastener required ⁴
	over 3:12	Same as 2:12 to 3:12, but plies laid parallel to slope of deck

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Footnotes for Table 32 F

- 1 Wood nailers provided in non-nailable decks shall be spaced at no more than 8 feet face to face, when mechanical fasteners are required for securing the roofing membrane.
- 2 Wood insulation stops, the same thickness as the insulation, shall be spaced at no more than 8 feet face to face, when mechanical fasteners are required for securing the roofing membrane.
- 3 Roofing manufacturer's specifications may require mechanical fasteners at slopes lower than stated in this code requirement.
- 4 Roofing plies and cap sheet shall be blind nailed using mechanical fasteners in accordance with requirements shown in Table No.32-E.

REV. SEP 84 - CORRECTED

DELETE ENTIRELY

TABLE 32 G

Hot bitumen for built-up roofing

Material requirement	Asphalt		Coal-tar Bitumen
	UBC Std. No. 32-2		UBC Std. No. 32-XX ²
	High Melt	Low melt types	All types
HEATING max. temp. ¹	500°F	<u>450°F</u>	<u>425°F</u>
APPLICATION min. temp.	375°F	350°F	325°F no requirement
max. temp.	475°F	400°F	375°F no requirement

Footnotes:

¹ At no time shall the ~~asphalt~~ bitumen be heated to a temperature which will exceed its flash point at the kettle.

² ASTM D450

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TABLE 32 H .

Built-up roofing

Cementing adhesive application rate

Minimum application rate, material/100 ft. ² roof area			
	Hot asphalt	Hot coal-tar bitumen	Cold process cement
Material to be adhered			
Base ply or vapor retarder			
1. Spot mopping	<u>15 lbs.</u>	<u>15 lbs.</u>	<u>1 gal.</u>
2. Solid cementing	20 lbs.	25 30 lbs.	1½ gal.
Insulation			
1. Solid cementing	<u>20 lbs.</u>	25 30 lbs.	<u>1½ gal.</u>
Roofing plies (and between layers of vapor retarder)			
1. Felts	20 lbs.	25 30 lbs.	not permitted
2. Coated Felts	20 lbs.	25 30 lbs.	1½ gal.
3. Glass fiber felts	25 lbs.	25 30 lbs.	<u>1½ gal.</u>
4. Coated glass fiber felts	20 lbs.	25 30 lbs.	<u>1½ gal.</u>
Cap sheets	20 lbs.	not permitted	1½ gal.

TABLE 32 I

Built-up roofing

Pour coat requirement for ~~adhering~~ aggregate surfacing

Mineral aggregate ¹	Minimum application rate, material/100 ft ² roof area	
	Asphalt	Coal-tar bitumen
FIRE RETARDANT ROOF COVERINGS		
Gravel, 400#/sq.	50 50 lbs.	60 70 lbs.
Slag, 300#/sq.	50 50 lbs.	60 70 lbs.
ORDINARY ROOF COVERINGS		
Gravel, 300#/sq.	40 50 lbs.	50 70 lbs.
Slag, 250#/sq.	40 50 lbs.	50 50 lbs.

¹ Mineral aggregate shall not be used for built-up roofing membranes at roof slopes greater than 3 inches in 12 inches.

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TABLE 32 I

Built-up roofing

Pour coat requirement for ~~adhering~~ aggregate surfacing

Mineral aggregate ¹	Minimum application rate, material/100 ft ² roof area	
	Asphalt	Coal-tar bitumen
FIRE RETARDANT ROOF COVERINGS		
Gravel, 400#/sq.	50 60 lbs.	60 70 lbs.
Slag, 300#/sq.	50 60 lbs.	60 70 lbs.
ORDINARY ROOF COVERINGS		
Gravel, 300#/sq.	40 50 lbs.	50 70 lbs.
Slag, 250#/sq.	40 50 lbs.	50 60 lbs.

¹Mineral aggregate shall not be used for built-up roofing membranes at roof slopes greater than 3 inches in 12 inches.

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