DIRECTIONS

FOR APPLYING

PLAINTIFF'S EXHIBIT

USG-1133

USG ASBESTOS CEMENT SHINGLES

US G

CT004 0960

UNITED STATES GYPSUM COMPANY

GENERAL APPLICATION DETAILS

Preparation and Other Requirements of Roof Decks and Surfaces to Receive All Types of USG Asbestos Cement Shingles

Construction of roof decks and provisions for satisfactory surfaces to receive USG Asbestos Cement Shingles are not included in the individual USG Asbestos Shingle Application Instructions. Therefore, the following general provisions should be carefully checked by the applicator before beginning work.

Shingles shall not be applied on roofs having a slope of less than 4 inches to the foot.

Minimum Pitch

American Method Asbestos Cement Shingles—4" in 12". Hexagonal and Dutch Lap Asbestos Cement Shingles—5" in 12".

Nails

Nails for applying the shingles directly to roof decks shall be galvanized or copper, barbed, 1¼ inches long for new work, and with heads not less than ¼ inch in diameter.

Nails for applying shingles over wooden shingles shall be galvanized or copper, barbed, 2 inches long, and with heads not less than ¼ inch in diameter.

Nails for fastening down waterproofing felt shall be galvanized, barbed, 1 inch long, and with heads not less than ⅝ inch in diameter. The discs or caps shall be not less than 1¼ inches in diameter and shall be flat. Bell or cup shaped caps should not be used.

Note:

Nails for sheet metal work shall correspond to the type of sheet metal used.

New Wood Decks

Decks should be constructed of matched tongue and groove, well seasoned or treated lumber of uniform thickness. Boards should be dry, smooth, and free from wide cracks or large knot holes, and should be laid close together. Boards should have solid bearings at ends and be securely nailed to each rafter with not less than two face nails, heads to be driven flush with the surface of the boards.

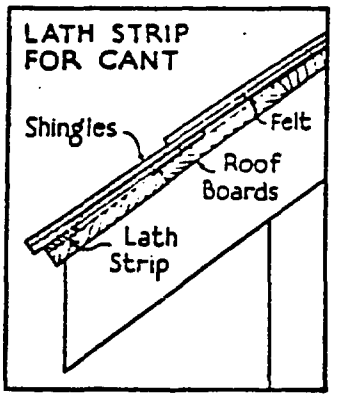
Before applying the shingles, the roof surface shall be swept clean. All loose boards shall be securely nailed in place and all knot holes or other openings or cracks ¼ inch or more in width shall be smoothly covered with sheet metal securely nailed in place on one side only. All nails or other projections that might pierce the shingles shall be removed.

Shingles shall not be applied when rain is falling, nor during weather cold enough to prevent the work being done in the proper manner.

All material shall be housed or protected from the elements or other sources of damage. Shingles shall be stacked on end on planks off the ground.

Over the entire surface to be covered by shingles, lay one thickness of 15-pound Asphalt Waterproofing Felt, lapping all seams at hip, ridge and valley 12" and all other seams 4". Nail felt sufficiently to hold in place until shingles are applied.

Proper pitch for the shingles at the eaves is obtained by applying a cant strip ¼"x1½" flush and parallel with the eaves. See Detail No. 1.



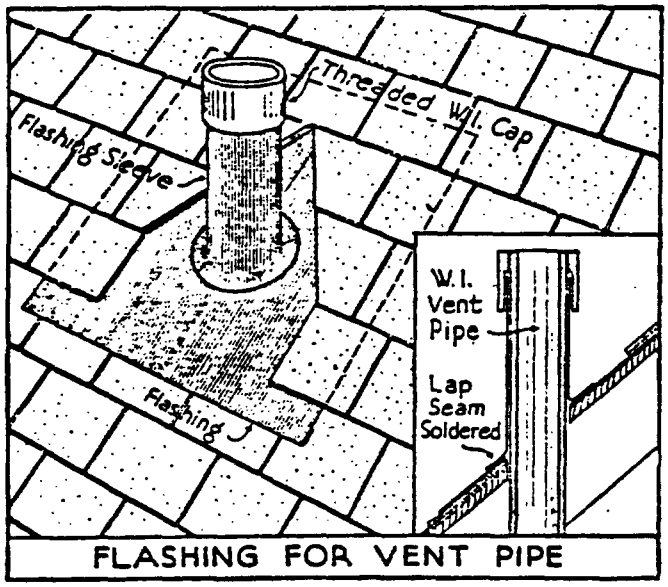
No. 1

FLASHING—GENERAL

All intersections of roofs with vertical surfaces of every kind and all openings in roof surfaces should be flashed with sheet metal, i. e., copper, zinc, lead or tin. The method should be base and counterflashing—see detail No. 7, 8 and 9. Base flashing should be not less than 4" high and should extend not less than 4" out on the roof. Counterflashing should turn down over base flashing not less than 4". When attached to masonry walls counterflashing should extend back into raggle joints not less than 1" and be securely wedged in place. Raggle joint should be completely pointed up with plastic cement. Step-flashing should be used where vertical surfaces occur on sloped surfaces. Step-flashing should be formed of separate pieces of sheet metal, properly inserted in raggle groove and lapped 3" but not less than 2". Step-flashing should not be soldered.

CF004 0961

GENERAL APPLICATION DETAILS



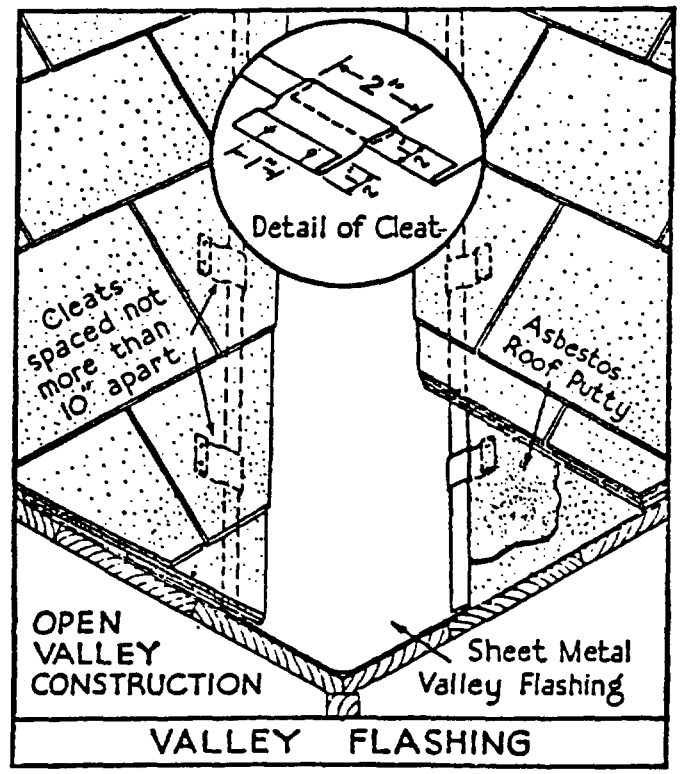
No. 2

Valley Flashing

Apply sheet metal valleys to provide an opening not less than 4" wide. The proper width shall be determined as follows: Starting at the top width of 4", increase the width 1" for every eight feet of length of the valley. Flashing pieces should be full length sheets and of sufficient width to cover the open portion of the valley and extend up under the roof shingles as far as possible without being pierced by the nails holding the shingles. Flashing should be constructed of one piece with no longitudinal seams in the valley. Cross seams at the ends of the valley units should be locked and soldered. Edges should be turned back ½" and held in place by cleats spaced not more than 10" apart and nailed to the deck with two nails. See detail No. 3. Embed shingles that border on valley in Asbestos Slaters' Cement.

When two unequal slopes meet, the steeper side will send down a greater quantity of rain water at a greater pace than the other side. Unchecked, the water may back up under the shingles, beyond the edges of the valley flashing.

To act as a check, an inverted "V" crimp should be formed in the valley. See detail No. 4, 5 and 6. When laying the valley it is a good plan to place a wood core under the inverted "V" to prevent crushing while the roof is being laid.



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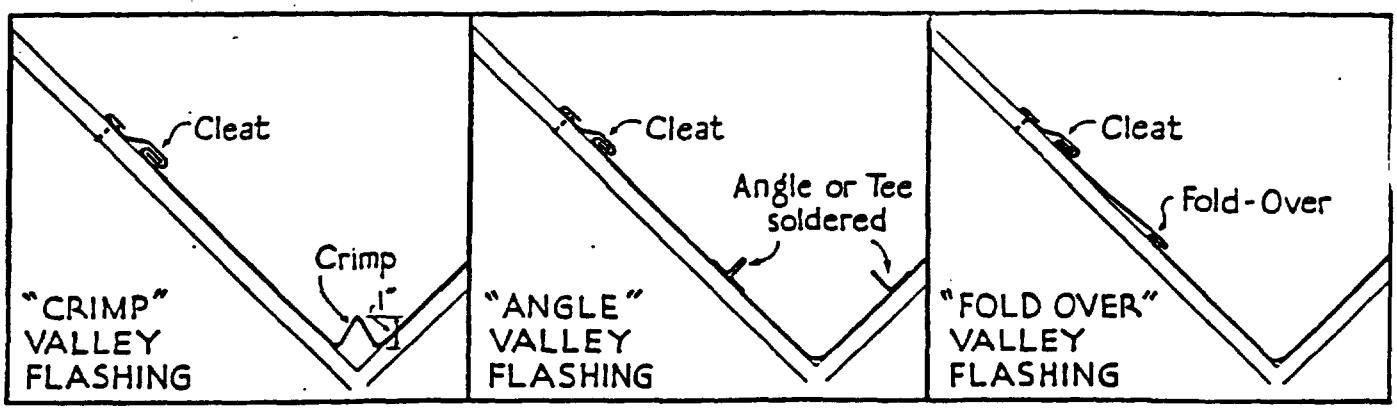


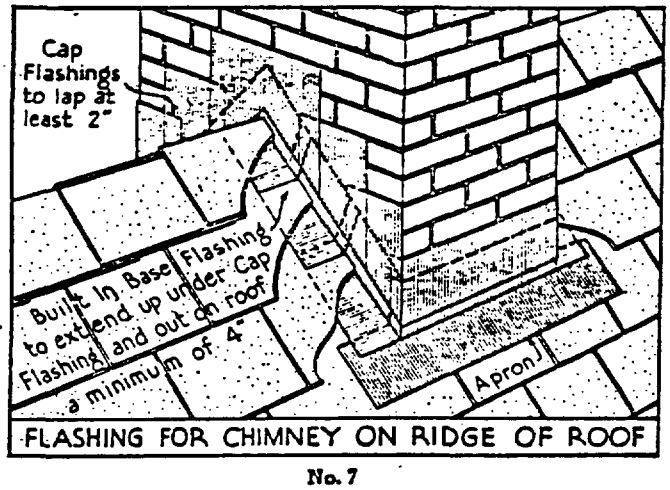
No. 4 No. 5 No. 6

GP00H 0962

GENERAL APPLICATION DETAILS

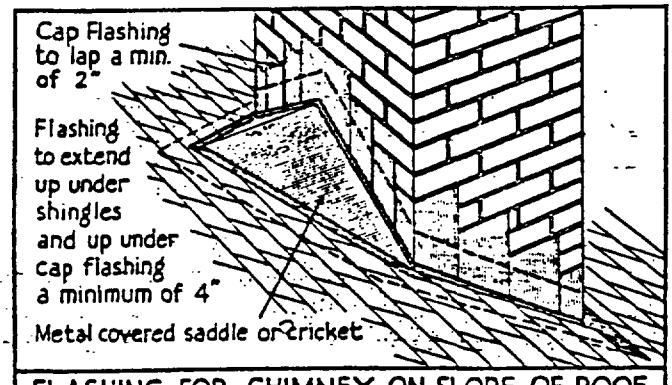
Chimney Flashing

Step-flashing, as previously described, should be installed. If the chimney is located on a pitched roof and will receive on the high side the flow of water from the slope of the roof, a "saddle" or "gusset" or "cricket" should be formed to direct the flow of the water around the chimney. See detail No. 8.



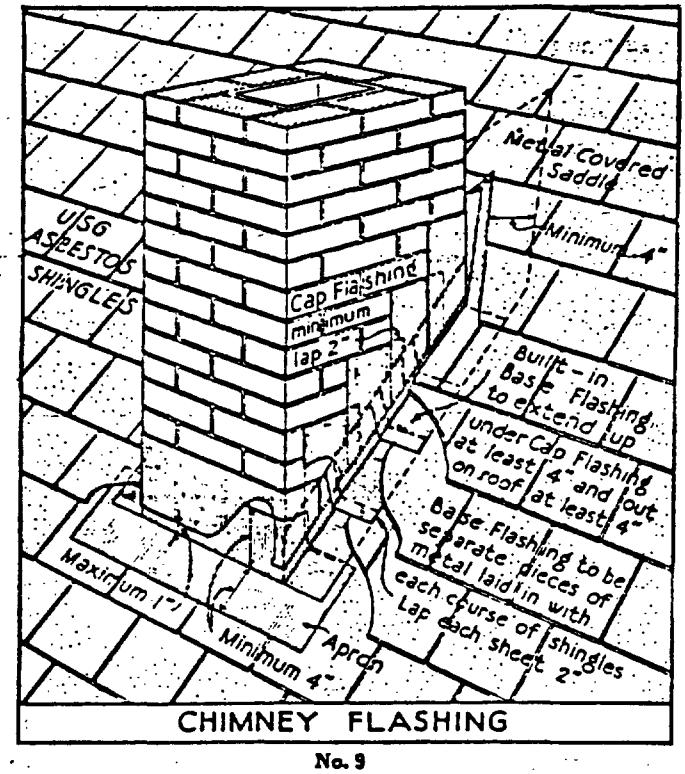
FLASHING FOR CHIMNEY ON RIDGE OF ROOF

No. 7



FLASHING FOR CHIMNEY ON SLOPE OF ROOF

No. 8



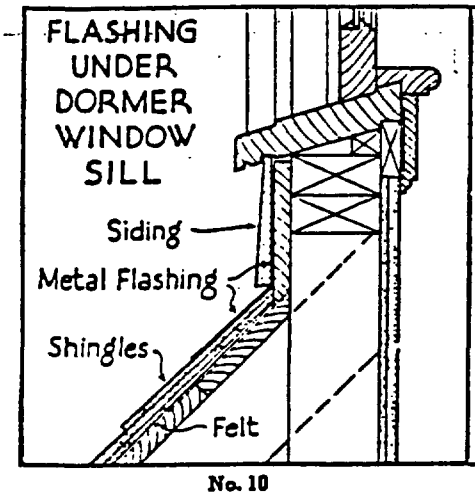
CHIMNEY FLASHING

No. 9

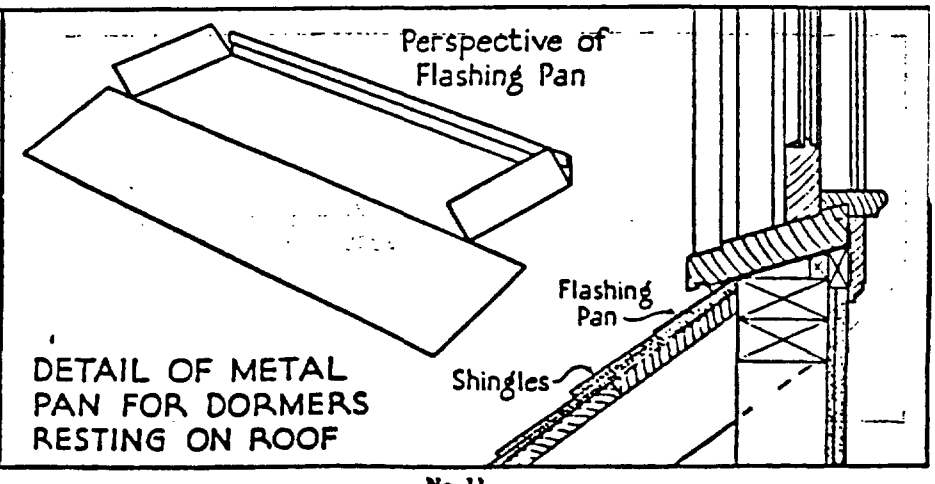
Dormer Window Flashing

Where dormer windows rest on the roof, construct a metal pan and insert to extend 4" down the roof and 2" up the side of the studs.

On new roofs, omit the roof boards on the dormer overhang until the main courses of the shingles are applied. On old roofs, provide a space of ½", in order to secure the proper clearance for the application of the new shingles on the main roof at points where the dormer overhang occurs. See detail No. 10, 11, 12 and 13.



No. 10



No. 11

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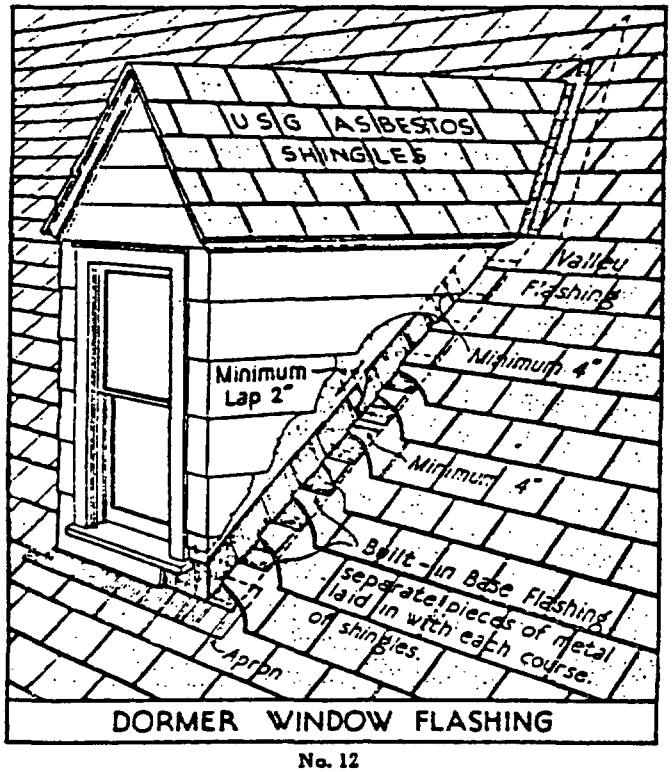
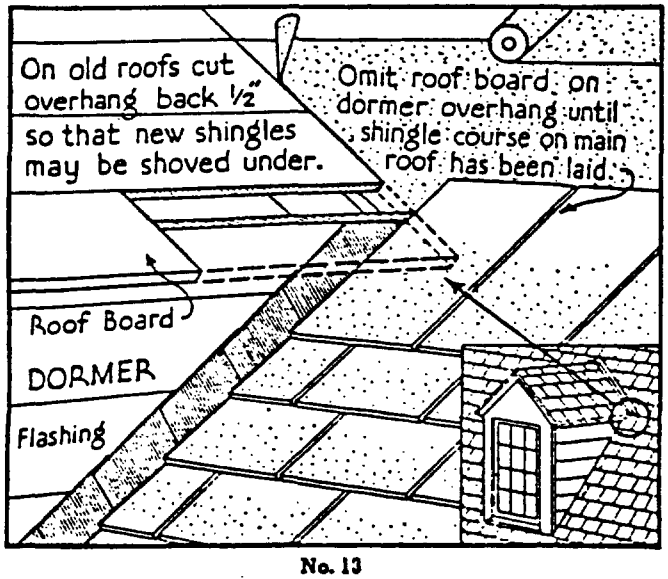
GENERAL APPLICATION DETAILS



DORMER WINDOW FLASHING

No. 12



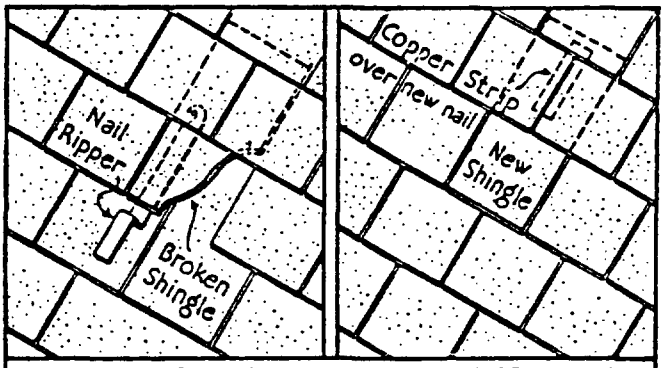
No. 13

REMOVING AND REPLACING BROKEN SHINGLES

Little or no maintenance is required on asbestos cement shingles. Occasionally shingles become broken and must be replaced.

U S G American Method Shingles

To remove USG American Method Shingles easily, slip a nail ripper under the broken shingle; hook it around the nails and strike the offset. This will cut or draw the nails. Remove the old shingle and secure a new one in place by driving one nail through a hole punched in the center of the shingle. Then slip a small piece of copper over the nail head and bend slightly to hold in place. See detail No. 14.

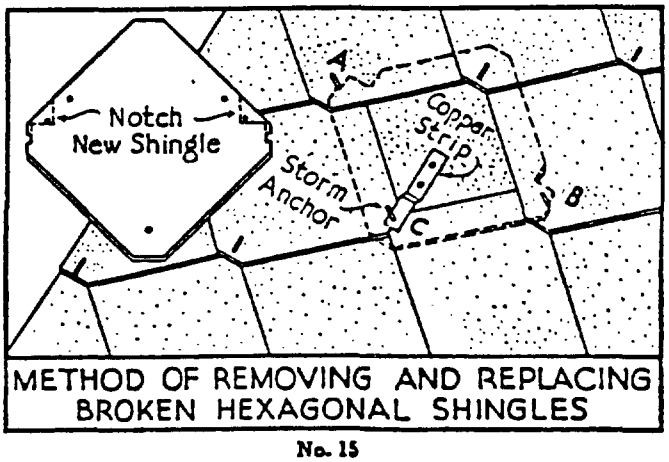


METHOD OF REMOVING AND REPLACING BROKEN AMERICAN METHOD SHINGLES

No. 14

U S G Hexagonal Shingles

With hexagonal shingles, straighten up the storm anchors as shown in detail No. 15. Slip the ripper up under the broken shingle and hook around the nails, then strike the offset with a hammer and the nails will be cut off or drawn. Place a small piece of sheet copper over the storm anchor at "C" and nail it to the roof. Notch new shingle as shown, slip it in place and then bend down the storm anchors.



METHOD OF REMOVING AND REPLACING BROKEN HEXAGONAL SHINGLES

No. 15

U S G Dutch Lap Shingles

With Dutch Lap Shingles, bend up the storm anchors at "A" and "B". See detail No. 16. Shatter the broken shingles by a hammer blow on the center, then remove the pieces. Insert the ripper under overlaying shingle and remove or cut off nails "C".

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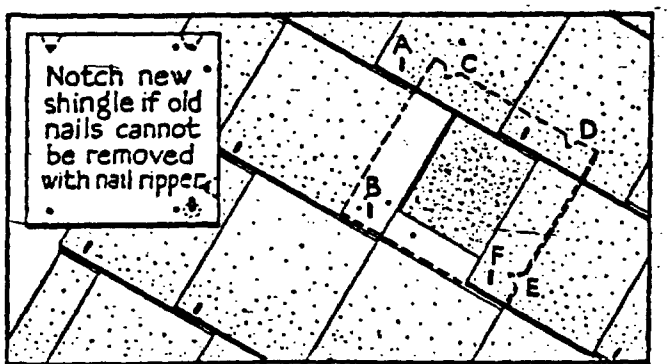
GENERAL APPLICATION DETAILS



METHOD OF REMOVING AND REPLACING BROKEN DUTCH LAP SHINGLES

No. 16

"D" and "E". Insert a new storm anchor in a new shingle. If it has been found that the old nails cannot be withdrawn, notch the new shingle at nail holes as shown. Slide the new shingle into place over storm anchor at "B", raising overlaying shingle to allow insertion at "F" of new storm anchor in new shingle, then bend down storm anchors at "A", "B" and "F," completing the job.

RIDGES AND HIPS

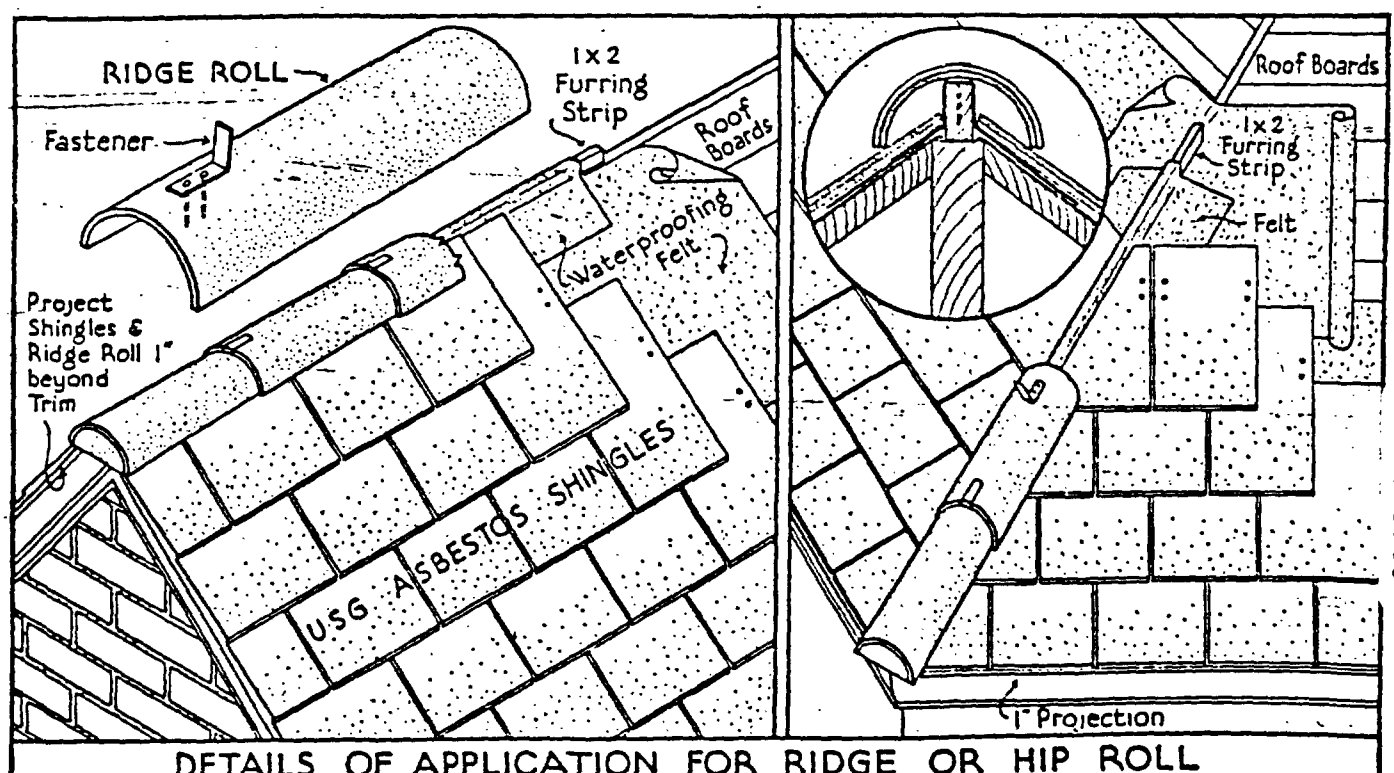
Ridge and Hip Roll Construction

Apply one 1"x2" furring strip, edgewise, centered on ridge or hip. The furring strip shall be high enough to give proper support to the ridge or hip roll but not raise it off the surface of the shingles. Project the strip 1" beyond the ridge or lower ends of the hips. The main body shingles on each side of the ridge or hip should be cut to fit snugly against each side of the furring strip. Cover the ridge or hip with a narrow strip of waterproofing felt, projecting the felt out on each side and under the adjacent shingles. See detail No. 17.

Application of Ridge or Hip Roll

The first section of the ridge or hip roll is set at the lowest point and secured with two nails, one near the lower end, and one at the upper or small end. At the latter point, nail through a copper ridge or hip roll clip, nail them at the upper end and then all following sections of ridge or hip roll are placed as follows: Set them in position against the ridge or hip roll clip, nail them at the upper end and then bend the copper clip down into position as shown. The lower end of the hip may be filled with Asbestos Slaters' Cement or a piece of shingle cut to fit.

On ridges, start the application of the ridge or hip roll at the end opposite the direction of prevailing winds or storms; on dormers, start at the front, and on hips at the lowest point.



DETAILS OF APPLICATION FOR RIDGE OR HIP ROLL

No. 17 No. 18

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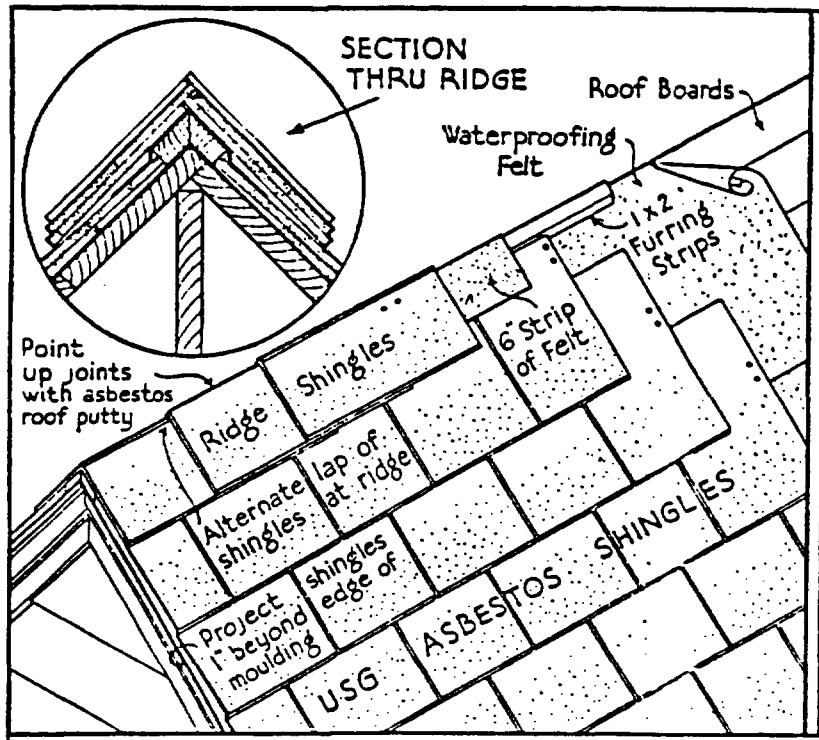
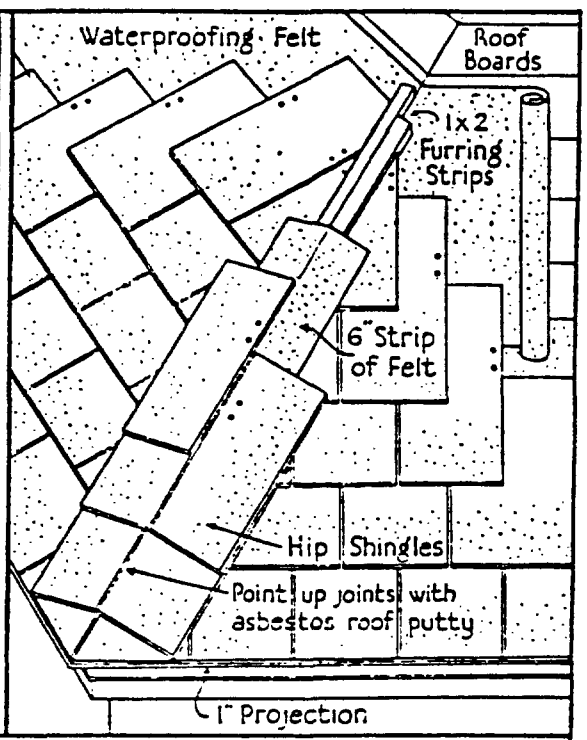
GENERAL APPLICATION DETAILS

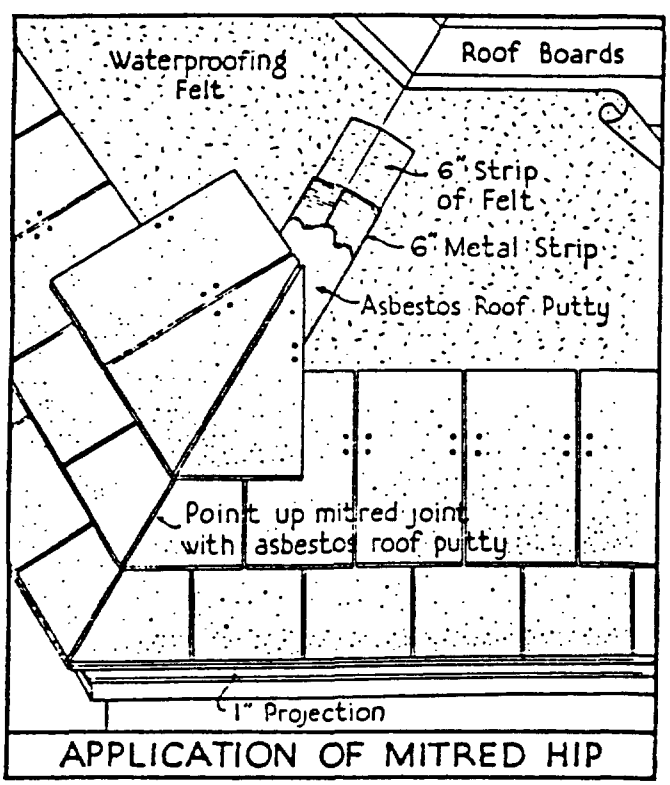




DETAILS OF APPLICATION FOR BOSTON RIDGE OR HIP

No. 19

No. 20



APPLICATION OF MITRED HIP

No. 21

Boston Ridge or Hip

Apply two 1"x2" furring strips, flatwise, one on each side of the ridge or hip. Cut main body shingles to fit against the sides of the strips. Then apply a 6" strip of waterproofing felt and lap the ridge or hip shingles over it. Allow a 2" head lap and 7" weather exposure on the shingles. Alternate or "weave" the long edges of the shingles and secure each with two nails. Point up all joints with Asbestos Slaters' Cement. See detail No. 19 and 20.

Mitred Hip

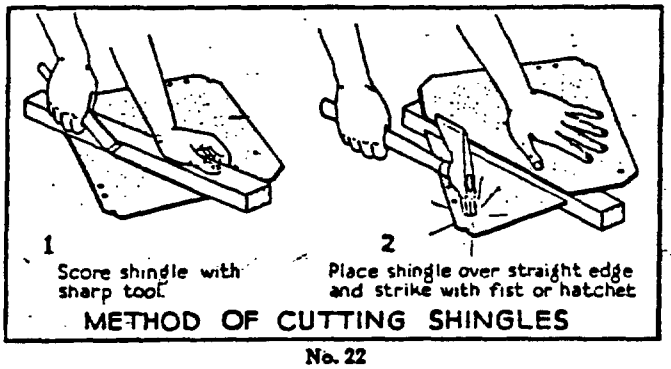
When this construction is used the hip should be reinforced with extra flashing strip of waterproofing felt, or preferably, sheet metal (copper). Shingles must be carefully mitred and applied in a bed of Asbestos Slaters' Cement and carefully pointed up with the same material. See detail No. 21.

Cutting and Punching

USG Asbestos Cement shingles may be cut by scoring with a sharp pointed awl and then breaking

CP004 0966

GENERAL APPLICATION DETAILS



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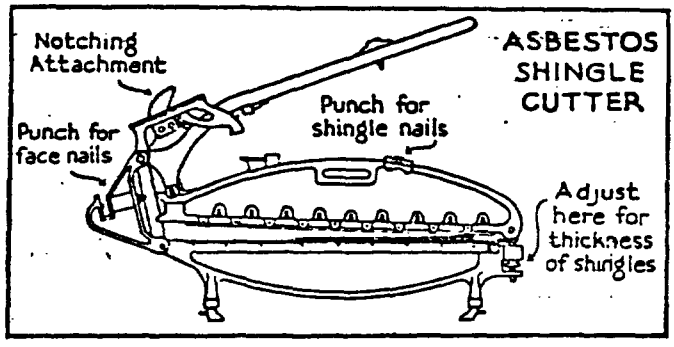


No. 23

over any square edged surface. See detail No. 22. Holes may be punched with a sharpened nail set or bored with a hand drill.

To make straight cuts, score the shingle with the point of a chisel or hatchet blade. Then place it over a straight-edge and strike the overhanging part several blows with a hatchet or the fist. (A saw may also be used for cutting but it involves unnecessary labor.) For circular or angular cuts, place the shingle on a firm, smooth surface and punch holes in it with a pointed nail punch along the lines to be cut.

Applicators should use an asbestos shingle cutter (see illustration No. 23) to cut and punch holes in shingles quickly, easily and accurately.

REROOFING

Old Wood Decks

All rotted, splintered or weakened roof boards should be removed and replaced with new roof boards. Draw down any roof boards that have warped or curled by renailing.

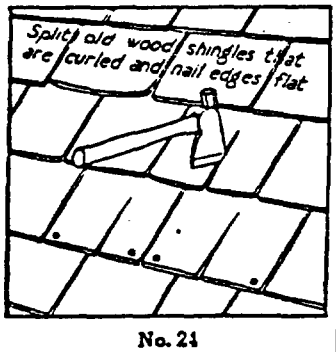
Old Wood Shingles

Before applying USG Asbestos Cement Shingles, all badly warped wood shingles should be removed and replaced with new shingles, inserted to provide a suitable anchorage for nailing USG Asbestos Cement Shingles. Curled shingles should be split and the corners securely nailed down. See detail No. 24.

Valleys should be filled to the level of the surface of the wood shingles with boards of the correct thickness before applying new valley construction. See detail No. 25.

Gables

Old shingles should be removed along overhanging gables and replaced with boards 4 inches wide of proper thickness to make the top surface level with the surface of the wood shingles. If desired, preformed sheet metal strips may be used, nailed on 6" centers ½" from the inner edge. See detail No. 26 and 27.



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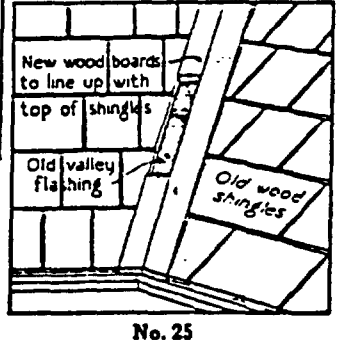

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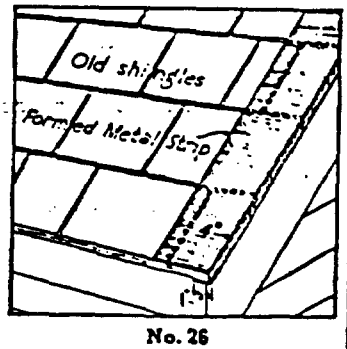
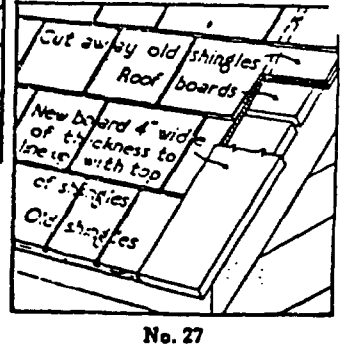


No. 26



No. 27

C1004 0967

GENERAL APPLICATION DETAILS

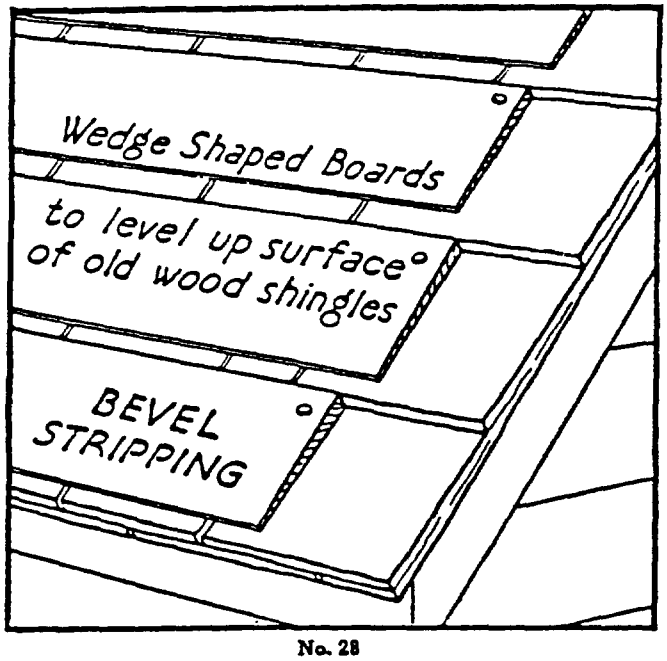
Old Roofs

Due to settling of the building, old roofs may be out of square. It is important when such conditions are encountered that the measurement lines to guide application are at right angle to the eaves line.

At the eaves allow only 1/2" overhang instead of 1", as when applying shingles directly to new roof decks.

Bevel Stripping

Where old wood shingles are in poor condition and the weather exposure of the new shingle does not coincide with that of the old shingles, apply 3/8"x 4" bevel strips to form even roof surface and to provide suitable nailing surface for the USG Asbestos Cement Shingles. See detail No. 28.



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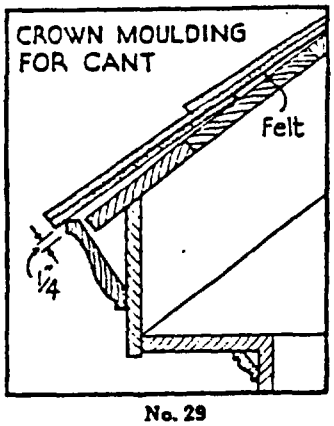

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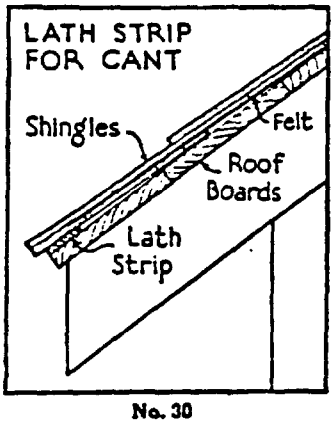


No. 30

Cant Strip

Remove existing eave or cornice moulding and replace it (or apply new moulding) so as to project 1/4" above the roof boards or old shingles from which the edges have been cut. See detail No. 29 and 30.

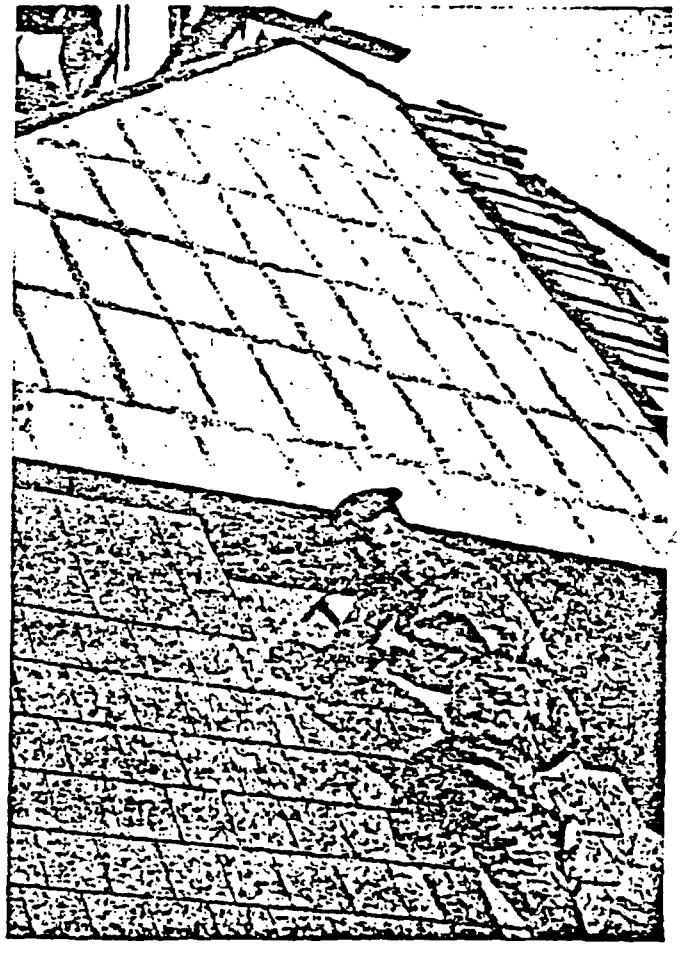
Over Gypsum Tile

Application of asbestos cement shingles to roofs of precast gypsum tile.

having a slope up to 60°, should be made with nails having not less than 2 in. penetration. When the slope of the roof is greater than 60° refer the problem to the United States Gypsum Company's engineers for special study and recommendations.

The roof deck should be thoroughly dry or as nearly so as can reasonably be obtained. Square cut cement coated Naval bronze nails have proved their superiority after a large number of tests on all types.

It is standard practice to use a sheet of waterproofing felt between the gypsum roof deck and the asbestos cement shingles.



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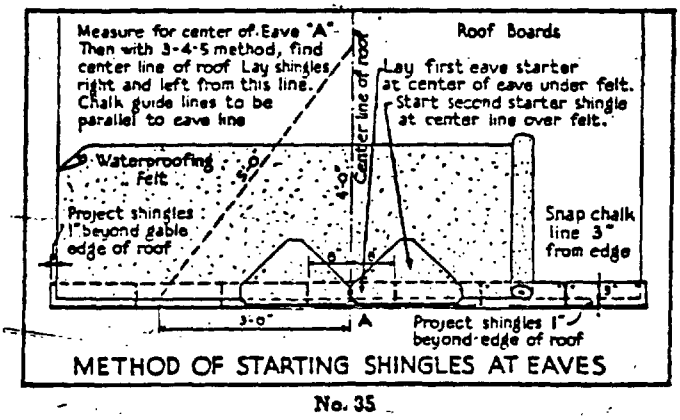
APPLICATION DETAILS FOR

NO. 100 HEXAGONAL

For instructions regarding preparation of roof deck and application of ..... Waterproofing Felt on new or reroofing work, see General Application Details.

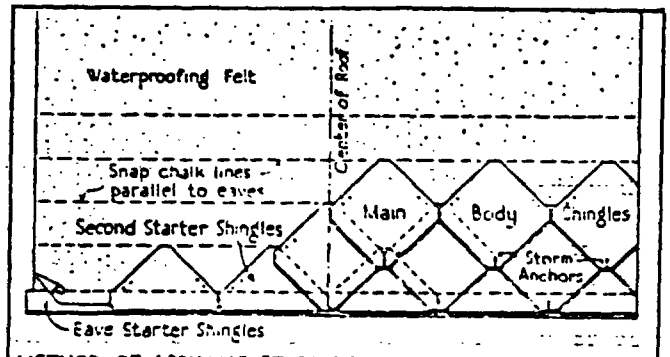
Hexagonal shingles must be lined up both horizontally and vertically. It is advisable to start work at the center of the eaves line. Having found the center by measuring, snap a chalk line at right angles to the eaves as shown on Detail No. 35 to mark the center line of the roof. This right angle for the center line can be easily found by the 3-4-5 method as shown on Detail No. 35. Do not measure off a distance on the ridge equal to one-half of the eaves length and snap the line between these two points, because roofs are often out of square. The center line would not be at right angles to the eaves and the shingles would not fit together as they should.



METHOD OF STARTING SHINGLES AT EAVES

No. 35

The first eaves starter shall be nailed to the sheathing board under the waterproofing felt and at the center of the eaves as shown on Detail No. 35. Work right and left from this shingle. Eaves starters shall extend one (1) inch beyond the eaves and one (1) inch beyond each gable end and are always laid with the long dimension parallel to the eaves line.

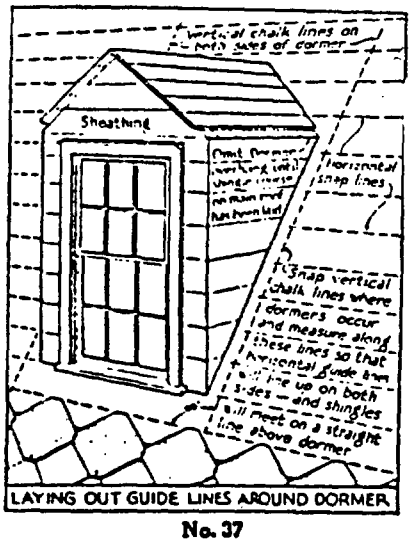


METHOD OF APPLYING STARTERS AND MAIN BODY SHINGLES

No. 36

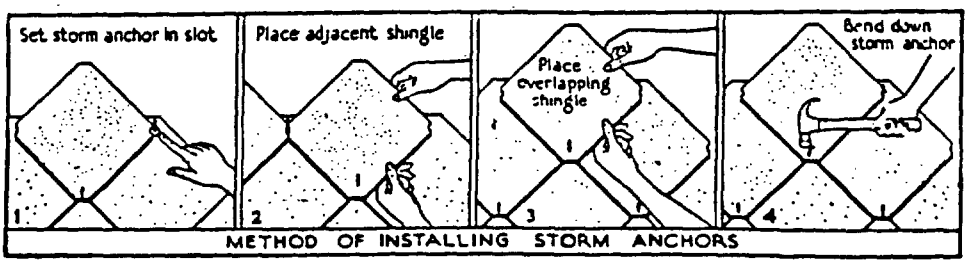
One second starter shingle is laid at each side of the center line of the roof, breaking joints with the eaves starter. A copper storm anchor is set between each two shingles into the slots in the corners. The shingles are then nailed in place with the lower edge flush with the eaves starter, using two nails to each shingle in the holes provided.

It will be found of great assistance in speeding up the work if horizontal chalk lines are snapped on the roof for each course of main body shingles. Lay the head of each course of shingles against this line as shown on Detail No. 36. When using a 16-inch shingle, allow 8 inches between lines. Several vertical chalk lines should be snapped to the right and left of the center line and parallel to it, running through the center of the eaves shingles.



LAYING OUT GUIDE LINES AROUND DORMER

No. 37



METHOD OF INSTALLING STORM ANCHORS

No. 38 No. 39 No. 40 No. 41

GF0044 0969

APPLICATION DETAILS FOR

NO. 200 AMERICAN METHOD TAPERED

For instructions regarding preparation of roof deck and application of Waterproofing Felt on new or reroofing work, see General Application Details —USG Asbestos Cement Shingles.

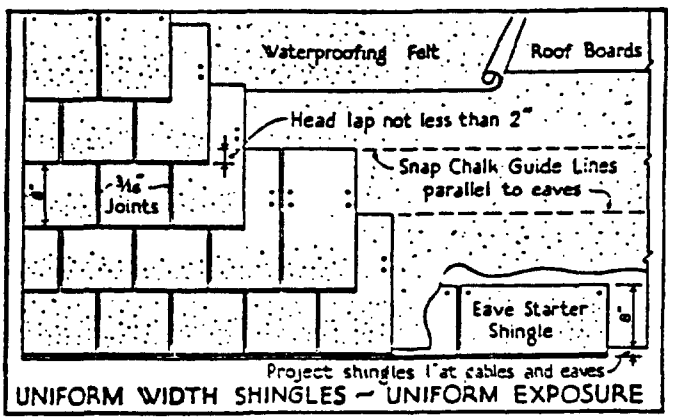
The waterproofing felt along the eaves should be raised and then placed over the starters after they have been applied.

Application of Starters

Snap a chalk line parallel with the eave, 8" from the edge of the eave. Use portion of starter for first unit to break joints with first course of shingles above. Allow starter to project 1" beyond eave and rake line to form drip edge. Apply succeeding starters similarly spacing them approximately 3/16" apart. Nail securely in nail holes provided.

Application of First and Succeeding Courses

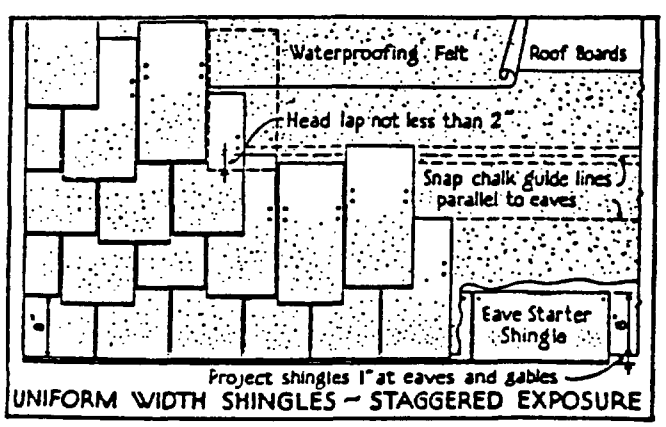
Apply full size shingle directly over the starter shingle with butt parallel with exposed eave edge of starter, continuing application of full size shingles and breaking joints with underlying starters and spacing shingles approximately 3/16" apart. (See detail No. 44). Begin the second course with a half shingle and proceed with full size shingles for the remainder of the roof, exposing each shingle 8" to the weather and securing each shingle to the roof deck with 1¼" galvanized or copper needle point nails, through nail holes provided.



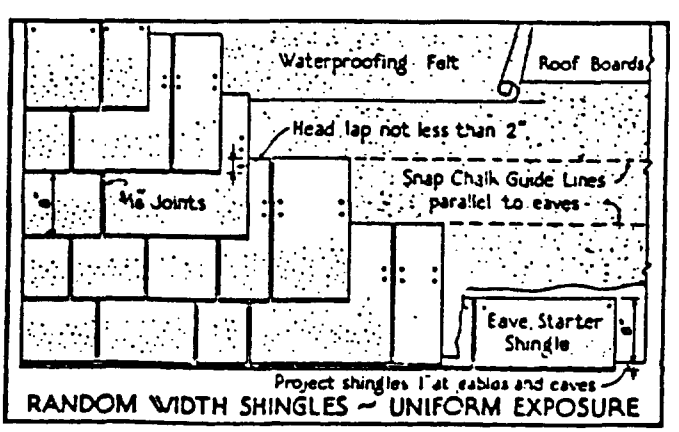
No. 44

Staggered Exposure and Random Width

USG American Method Tapered Shingles may be applied in random width or with staggered butt effect, or in combination. If applied in staggered butt effect a 2" minimum headlap must be maintained by one of two methods: A—For uniform width shingles: Snap chalk lines 8" on center, lay top of shingles to line or not more than 1" above or below line, but maintain a linear 16" between the butt of each shingle and corresponding shingle in second course below. B—For random width or uniform width shingles: Snap chalk lines 7½" on center and lay tops of shingles to the line or not more than ½" above or below line; or use lines 7" on center and keep within 1" above or below the lines. In either case a minimum 2" headlap will be maintained. Both "B" methods will require approximately 7% and 13% more shingles respectively. In laying random width shingles at least a 2" sidelap should be maintained over joints in the underlying course.



No. 43



No. 45

GF100M 0970

APPLICATION DETAILS FOR

NO. 300 DUTCH LAP METHOD

USG Dutch Lap Shingles may be applied with 1/4 or 1/3 lap. In working from right to left the eave starters and the shingles are reversed, bringing the nail holes adjoining the side edge to the left hand instead of to the right hand. See detail No. 46.

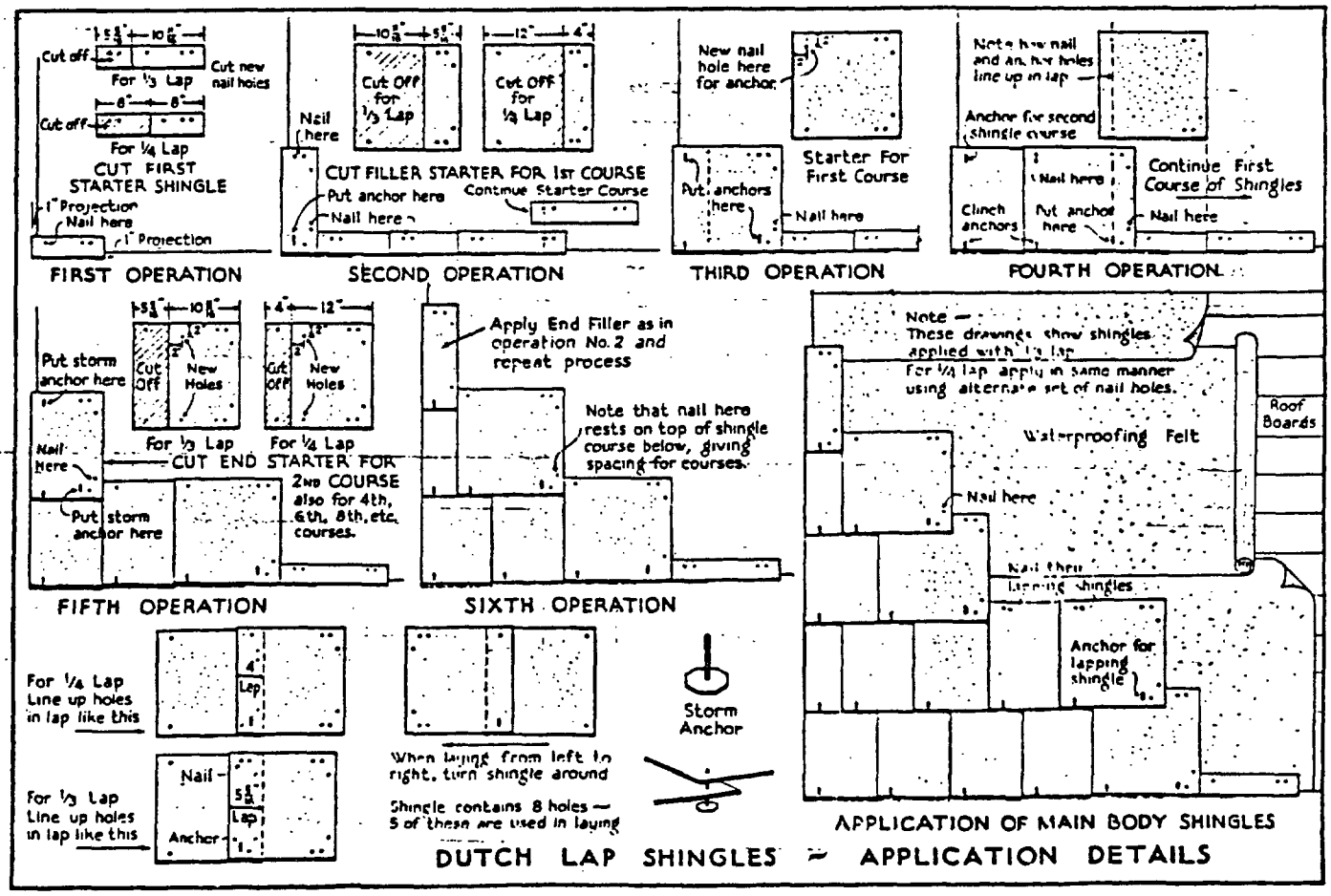
Eave starters shall be applied to overhang the eaves and gables one (1) inch. Each piece shall be laid to lap the preceding piece approximately one-third (1/3) or one-quarter (1/4) its length, depending upon lap desired.

Shingles are applied to completely cover the eave starters. The shingles are provided with eight holes. As applied, five of the eight holes are used: three for shingle nails and two for copper storm anchors. See detail No. 46. New holes must be drilled in cut shingles as required.

Starting at the end of the roof apply a shingle which has been cut to one-third (1/3) or one-quarter (1/4) its original width. Insert a copper storm anchor in hole provided and fasten the shingle with a nail. Completely overlapping the first shingle, apply a full size shingle with storm anchor inserted through hole provided and insert additional storm anchor in opposite hole. Press the shingle down firmly in place when clinching storm anchors. Proceed in similar manner to opposite end of roof.

The second course is started with shingle cut to two-thirds (2/3) or three-quarters (3/4) original width, drilling additional hole adjoining head of shingle. Insert copper storm anchor and proceed with application in manner before described. The third course is started with one-third (1/3) or one-half (1/2) width shingle. The fourth course is started with two-thirds (2/3) or one-quarter (1/4) shingle and continue application alternating as described.

Butt shingles at ridges, hips and valleys as required and finish roof with Asbestos Cement Ridge Roll or Dutch Lap Hip or Ridge Shingles.



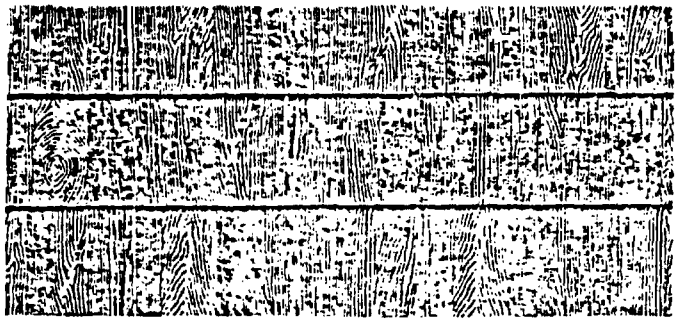
G1004 0971

Asbestos-cement Siding Shingles—To apply straight edge shingles, use USG SHADOW-LOCK Attachment System. Level a starter strip for base course of shingles. When top leg of USG SHADOW-LOCK channel is placed over starter strip, it is automatically aligned. Channel is fastened by nailing ¼" from top edge through starter strip (or through shingle in succeeding courses) and 25/32" WEATHERWOOD Sheathing into each stud. Use 11 ga., 2" galvanized roofing nails with 7/16" heads. Corner pieces are applied by first inserting them between the exposed legs of the lower channel and the asbestos siding. At the top, insert one leg of the corner piece between the channel and the siding. Apply next channel to the adjacent side of the corner—over both siding and corner.

GT004 0977

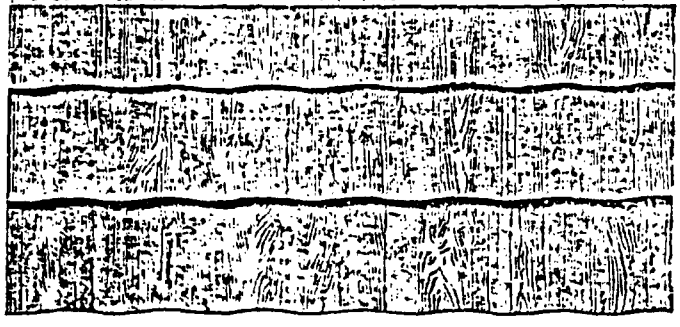
GLATEX

Asbestos-cement siding



No. 950 Clapboard Siding

Dimensions	12" x 27" x 5/32"
Approximate Weight per Square	178 Pounds
Weather Exposure	10½"
Overlap	1½"
Finish	Wood-grain Texture
Color	Satin White
Shingles per square	51
Shingles per bundle	17



No. 600 Wavy Butt Siding Shingle

Dimensions	12" x 27" x 5/32"
Approximate Weight per Square	175 Pounds
Weather Exposure	10½
Overlap	1½" Maximum, 1⅛" Minimum
Finish	Wood-grain Texture
Color	Satin White
Shingles per square	51
Shingles per bundle	17

Description

A siding material made of a combination of asbestos fibers and portland cement plus a baked-on mineral type coating, not unlike a vitrified enamel in appearance, instead of the ordinarily porous asbestos-cement surface. GLATEX Asbestos-Cement Siding is die-cut and made with a wood-grain texture in either a straight-edge or a wavy-edge butt, 5/32" thick in units 12" x 27". ADAPTABLE to both new construction and re-siding.

Conventional Construction—No special framing is required. It may be applied over wood, gypsum or insulation sheathing.

Resists Moisture and Dirt—The special-coated surface collects less moisture and dirt than ordinary asbestos-cement. Ordinary stains do not readily adhere to surface. GLATEX siding retains original freshness longer.

Fireproof—The combination of asbestos fiber and portland cement provides a surface that will not burn and which helps protect framing against fire hazard.

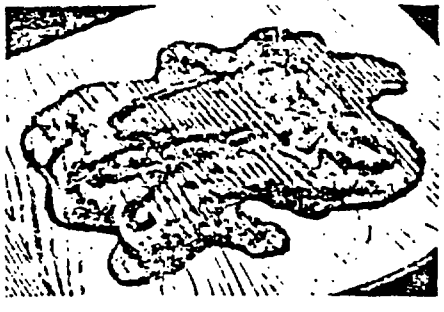
Economical—GLATEX siding never requires paint. It is easily and economically maintained and provides "life-long" service.

Cleanable—Surface grime can be cleaned from GLATEX siding by simply washing with soap and water.

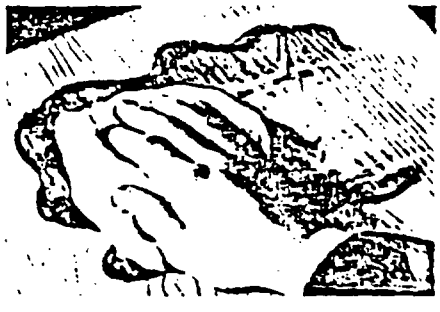
Attractive—Indented wood-grain effect enhances beauty of GLATEX siding.

Large Units—The 27" long units mean fewer joints, faster application and tighter walls.

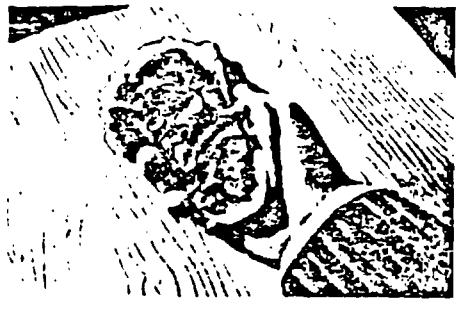
THE GLATEX SMUDGE TEST



Apply dirty oil or grease

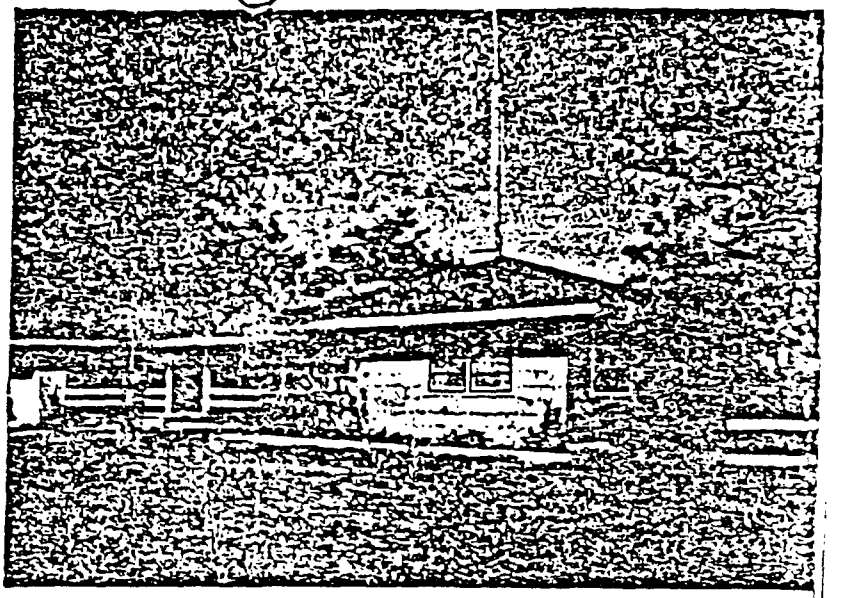


Wipes off without penetrating surface



Surface is restored—no stains remain

CF004 0978



ASBESTOS SIDING

There's no maintenance with asbestos cement shingles such as GLATEX. Available in white and three pastel colors, they need no paint, even under Oklahoma's rigorous temperature extremes. GLATEX shingles are easy to apply over existing wood walls, blend equally well with wood or masonry.

C1004 1001