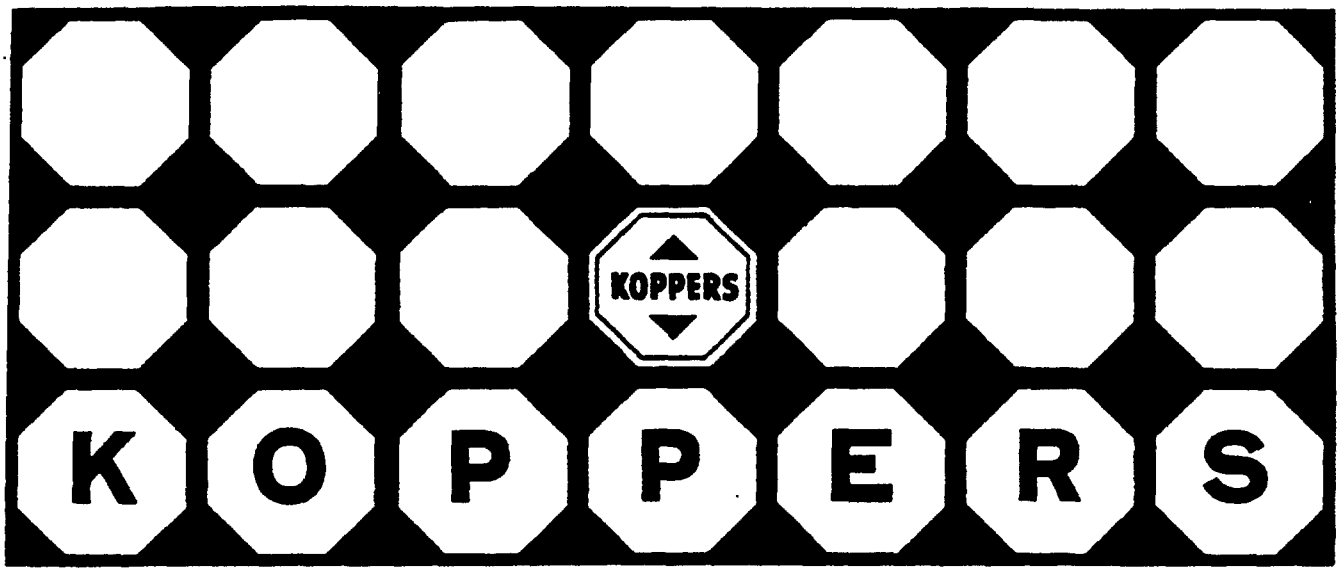


BUILT-UP ROOFING SPECIFICATIONS MANUAL 1966

FOR ARCHITECTS, ENGINEERS & CONTRACTORS

KOPPERS Coal Tar built-up roofing

Koppers coal tar built-up roofing provides one of the most durable roofing membranes known. The advantages are found in the inherent superior characteristics of coal tar pitch, the only time-proven waterproofing material for low-slope roofs.

Coal tar pitch has a natural resistance to water, and even air and water vapor penetration. A tight molecular structure enables coal tar pitch to permanently withstand water penetration and further prevents oxidation of the roof surface. Koppers water-cooled roof specifications take advantage of the unique water-resistant characteristics of coal tar pitch to give you maintenance-free roofing.

Another unique feature of Koppers coal tar roofing is its permanent self-healing ability. Alligatoring and hairline cracks common to most materials, eventually cause damage to the roofing membranes. Coal tar pitch has a property known as "cold-flow," which automatically corrects these conditions before serious damage takes place. This "cold-flow" feature even heals small mechanical fractures at normal temperatures, stopping trouble before it starts.

When you specify a Koppers coal tar roof, you are assuring your building owner-client of long-term roof performance at no extra cost. And you'll be covering your building with nature's finest protective material.

INDEX

For decks or insulations not covered in these specifications consult Koppers Supplemental Built-Up Roofing Specifications or your Koppers Representative.

KOPPERS COMPANY, INC.

KOPPERS slag or gravel surfaced roofs

A Koppers Slag or Gravel Surfaced Roof consists of layers of tarred felt cemented with pitch to form a continuous skin over the entire roof deck. The actual waterproofing agent is the pitch. The number of layers or "plies" of tarred felt required varies from 3 to 5 and depends on the type of deck and the length of service desired. The number of plies used does not affect the impermeability of the roofing, but a greater number does prolong its life. Either slag or gravel provides a satisfactory surface.

GENERAL REQUIREMENTS

This manual contains roofing specifications and procedures which are based on the many years of Koppers experience and generally accepted good roofing practice. They are intended to provide the architect, engineer, general contractor and roofer with the proper information to plan and construct the best built-up roof with the most time-proven materials available today.

The intent of these specifications is to provide a watertight roof. The quantities of materials shown are for estimating purposes only. The specified number of plies of felt must be used. The methods of construction outlined in these specifications must be followed for bonded roofs unless modifications are allowed by Koppers Company, Inc.

The applicable following requirements are part of the detailed specifications contained in the succeeding pages. For additional information, see *Koppers Supplemental Specifications.*

KOPPERS ROOFING BONDS

onds on Koppers Roofing and Flashings are issued by Koppers ompany, Inc., and its surety on roofs constructed according to oppers specifications and when applied by roofing contractors approved in writing by Koppers Company, Inc. The Koppers bond guarantees that, in accordance with the terms of the bond, Koppers will make repairs to the roof which are necessitated by ordinary wear and tear by the elements to keep that roof in watertight condition.

Standard Koppers bonds are available for 10-, 15-, or 20-year terms as described in each individual specification in this manual. A twenty-five (25) year bond is available for all standard twenty (20) year specifications when it is specified. Further details are available in Koppers current price bulletin.

Koppers will issue its standard roofing bond for flat roofing and will bond such steep roofing as required in conjunction with the flat roofing, provided the steep roofing does not exceed 50% of the roofing to be bonded, and provided all roofing is constructed in conformance with Koppers specifications.

The Koppers bond is not available on roofs over private residences. It does not cover the installation or replacement of any decking, vapor barrier materials, insulation or metal work nor is it an effective instrument when abuse has caused damage to the roofing.

The Koppers bond assures that standard proven specifications will be followed, quality materials will be used, a Koppers approved roofer will apply the roof and provides for inspection service.

NOTE —(1) Koppers Company, Inc., will issue Roofing Bonds in such portions of the United States as are covered by its inspection service.

(2) Flashings can be bonded for periods up to but not exceeding the term for which the roofing is bonded.

DECKS

ll decks shall be installed in accordance with the deck manucturer's specifications. They shall be properly graded to drain outlets and shall be clean, smooth, completely dry, rigid, and free of debris. Any deck defect shall be corrected before application of roofing.

In approving any deck as satisfactory to receive a Koppers roof, only the deck surface is accepted. It is the responsibility of the building designer and deck manufacturer to provide for expansion and contraction, for support of maximum anticipated loads, and the selection of the deck material and construction details as related to their ability to contain bitumens. Koppers will not assume responsibility for bitumen seepage.

The placing of conduits, bolt heads, etc., above the roof deck and below the roofing membrane is not recommended.

On decks such as wood fiber decks, poured gypsum, poured insulating decks or fills where insulation is specified, an effective approved vapor barrier should be used.

Decks of questionable dryness should be checked prior to roofing application. A pint of the bitumen which will be applied to the deck surface as the adhesive layer (coal tar pitch or steep asphalt) should be heated to application temperature and poured on a representative area of the deck. If the material foams or bubbles, the deck is not considered to be satisfactory for roofing. After it has cooled to ambient temperature, the coating should be tested for adhesion. If any portion of it can be easily stripped clean of the deck, application should not be permitted.

All poured decks (except standard concrete and lightweight insulating concrete) must have provisions for venting and drying from the underside. Koppers will not accept insulating fills applied over a vapor barrier, unvented metal decks, poured concrete or any type of substrate which will not permit the fill to vent or dry from the underside.

Low sloped tapered edge cants are recommended in conjunction with gravel stops at roof perimeters. Low sloped cants are more desirable than excessive sloped cants which cannot be surfaced with gravel and sometimes present problems of felt slippage.

All projections or openings in the deck shall have been completed prior to the application of roofing.

TEMPORARY ROOFING

A temporary roof should be applied to the deck prior to laying of any insulation or roofing until all danger of damage has been eliminated.

Temporary roofing, applied for obvious reasons, should be removed after it has served its purpose and the permanent roof installed.

Consult your Koppers representative for recommended specifications over various type decks for temporary roof construction.

OLD STYLE PITCH

Koppers Old Style Pitch is manufactured to meet the following standard specifications:

Federal Specification R. P. 381 Type I
ASTM D-450 Type A.
Underwriters' Laboratories, Inc.

Old Style Pitch is available in metal containers, 450 to 500 lbs., and in bulk.

The softening point of Koppers Old Style Pitch is 140°F-155°F by the Cube-in-Water method of test.

Pitch shall not be heated above 400°F and should not be maintained under heat for sustained periods.

Advantages of Coal Tar Pitch for Flat Roofs

Two important questions should be asked about any roofing to be applied on flat decks:

1. Can it resist prolonged contact with water without deteriorating?
2. Does it have the ability to heal itself automatically?

Roofs built with Old Style Pitch and Approved Tarred Felt DO resist water and they DO heal themselves.

Resistance to Water

Today, due to developments in past years, construction methods and roof assembly design have changed and unless a roof is designed to be water cooled, drainage should be incorporated wherever possible. This will facilitate repairs when necessary, reduce the possibility of insulation becoming saturated and add a degree of protection for building contents.

Prolonged contact with water, caused by poor drainage, low spots or settlement of the building, is a condition almost impossible to avoid on low sloped roofs. Service records of over 50 years of coal tar pitch roofs with little or no attention prove the resistance of tar to water. Old Style Pitch is practically insoluble in water, none of its constituents having more than a slight water solubility. Koppers coal tar pitch roofing is waterproof.

The Self-Healing Property

Weathering and rapid changes in atmospheric conditions can cause cracks in the top surfaces of some types of roofing. However the vital consideration is whether these cracks are permanent if they do appear. Old Style Pitch has a property technically known as "cold flow" and even at ordinary temperatures cracks in the surface heal themselves. This can clearly be seen in photomicrographs which show the sides of the cracks moving slowly together until complete fusion takes place and the pitch again forms a continuous layer. Old Style Pitch Roofs readily conform to slight irregularities in the deck and yet remain waterproof.

The Extra-Heavy Top Pouring

Additional protection is given a Koppers Roof by the extra top covering of roofing pitch which is poured on (not mopped).

NOTE: Charts headed, "For Convenience in Estimating, Use These Material Quantities" which are shown for each individual specification, show total approximate pitch quantities per 100 square feet. Broken down, pitch quantities should be approximately 25 lbs. per layer with a top pouring of approximately 75 lbs.

THE AGGREGATE SURFACE

Into the extra-heavy top ppuring of pitch, slag or gravel shall be embedded. The slag or gravel acts as an armor coat to protect the membrane against hail, driving rain, sleet, snow, etc. Slag or gravel also provides weight against the lifting action of wind currents. Specified quantities must be adhered to and must be applied while the pitch is hot to insure embedment.

The top pouring of pitch with slag or gravel must be applied as soon as possible after the application of felts. If a delay is anticipated, particularly in winter weather, a glaze coating of pitch is to be applied to protect the felts until the pouring of pitch and slag or gravel is applied. Ideally, all work should be slagged or gravelled in and all necessary flashing installed as work progresses.

Koppers Company, Inc., will approve the use of slag or gravel meeting A.S.T.M. Specification D1863-64 which lists the following sieve size requirements:

Sieve Size	Total Passing, Percent
¾"	100
½"	90-100
⅜"	40- 70
No. 4	0- 15
No. 8	0- 5

In addition to sieve analysis requirements, A.S.T.M. D1863-64 stipulates the following physical requirements:

Moisture, maximum, percent	
Crushed stone and gravel	0.5
Crushed roofing slag	5.0
Unit weight (loose), minimum, lb. per cu. ft.	60
Dust, maximum, per cent	0.5
Hardness, maximum percentage passing a No. 6 (3.36 mm) sieve	20

A.S.T.M. Specification D1863-64 covers aggregates specified both for use in road construction and built-up roofing and should be commercially available throughout the country.

WOOD NAILING STRIPS

All non-nailable decks require wood nailing strips at eaves, edges, walls, roof openings, etc., for proper securing of metal flanges and for decks which will have insulation installed.

Nailers must be securely and firmly attached to the deck c. through it to its supporting members.

Nailers should be treated to preserve their condition and hence their nail retentive power for the expected life of the roofing.

Roofing felts for all decks having a slope of one (1) inch per foot or more must be back-nailed and therefore, non-nailable decks must be furnished with wood nailers.

CAULKING AND TAPING

Whether joints of various precast deck materials are grouted or not, consideration should be given by the architect to caulking and taping of all joints. The application of flashing cement and a felt strip approximately 6" wide will minimize the deleterious effects on the roofing membrane of movement, moisture transmission through an open joint, joints which are not level and possible bitumen seepage. Refer to page 7 for details of caulking and stripping.

APPLICATION OF FELTS

All roofing is to be built up in place with alternate moppings and layers of felt over the proper preliminary work as specified in this book under the several subheads for various types of deck construction and slope. Application is to be made by experienced workmen only and in the manner hereinafter described. The finished roof is to consist of the number of plies and type of surfacing as specified under the proper subhead in the specifications.

Apply the roofing so that the direction of the flow of water is over and not against laps. Broom or press all plies of felt into the hot pitch and lay without wrinkles, buckles or kinks, so that the finished roof is free from pockets or blisters. Each solid mopping shall completely cover the area to which it is applied. Overlap ends of all connecting plies of felt not less than 10 inches. End-stripping or taping of these laps is not permitted.

The widths of felt are laid shingle fashion, not only because this method produces a stronger membrane but because it also makes it possible to construct a roof of any desired number of plies in a single progressive operation. This is accomplished by varying the widths of the edge laps. Three-ply roofing, for example, is achieved by lapping each ply approximately two-thirds over the preceding ply; for 4 plies, a lap of approximately three-fourths the width is required.

For treatment of felts at eaves, vertical surfaces, cants and other projections, refer to Flashing Specifications and Details in this manual.

When beginning a membrane roofing installation, appropriate width starting strips of felt shall be used at the starting point to achieve the specification ply build up at that point, so that successive plies laid shingle fashion will produce the ply requirements.

In all cases the plies of felt must be laid shingle fashion. Application of felts in a method where two plies are laid over two plies, three plies over one ply, or any combination other than all plies in shingle fashion will not be permitted at any time except as may be specifically provided for in our printed specifications.

Koppers requires that all felts be backnailed when the slope of the deck is one (1) inch per foot or more.

MATERIALS PROTECTION

Roll roofing materials and insulation should be stored indoors if possible, otherwise it shall be protected by raised platforms and covered with suitable weatherproof protective coverings such as tarpaulins, plastic sheeting, etc.

KOPPERS NO. 15 TARRED FELT

Koppers Tarred Felts are sold in standard size rolls, 36 inches wide and containing 432 square feet, except when otherwise specified. Koppers Approved Tarred Felt, the highest grade of roofing and waterproofing felt and the grade used in Koppers Bonded Roofs, has a minimum weight of 13 lbs. per 100 square feet or an approximate minimum weight of 56 lbs. per roll.

Koppers Approved Tarred Felt is manufactured to meet the following specifications:

Federal Specification HH-R-595 Type I, Class 1
A.S.T.M. D-227
Underwriters' Laboratories, Inc.

KOPPERS STEEP ROOFS

Koppers slag or gravel surfaced steep roofs for slopes from two (2) inches to three (3) inches per foot are constructed of asphalt saturated felts set in steep asphalt. A top coating of steep asphalt, into which either slag or gravel is embedded, completes this type construction.

Koppers mineral surfaced steep roofs for slopes from three (3) inches to nine (9) inches per foot are constructed of Koppers Asphalt Felts set in Koppers Steep Asphalt. The surface material is composed of Koppers Selvage Edge Mineral Surface roofing, a heavy asphalt saturated felt thirty-six (36) inches in width, of which nineteen (19) inches are bare and seventeen (17) inches of the top surface is covered with granules. This is embedded in Koppers steep asphalt with each sheet lapping the preceding sheet nineteen (19) inches, thereby presenting to the elements a continuous tough granule surface.

Koppers smooth surfaced steep roofs for slopes from two (2) inches to six (6) inches per foot are constructed of perforated asbestos felts thoroughly impregnated with specially refined asphalt firmly embedded in Koppers Steep Asphalt. Koppers Perforated Asphalt Saturated Asbestos Felts produce a long-lasting weather-resistant roof.

NOTE: For detailed specifications regarding *smooth surfaced steep asbestos roofs* refer to Koppers Supplemental Built-Up Roofing Manual.

ROOFING AND FLASHING BRIEF SPECIFICATION

Roofing and flashing shall be installed by a roofing contractor approved by Koppers Company, Inc., and he shall apply the roofing and flashing in strict accordance with Koppers Specifications and requirements for 10, 15 or 20 year bonds, and subject to Koppers inspection and approval. Upon completion of the work, the contractor is to furnish Koppers Roofing and Flashing Bond to the owner.

UNDERWRITERS' LABORATORIES, INC.

Roofing constructed according to Koppers specifications in most instances carries a Class A rating by Underwriters' Laboratories, Inc.

COLD STORAGE & FREEZER BUILDINGS

Koppers Company will not bond its roofing over these structures if insulation and/or vapor barrier is installed over the deck and unless there is an adequately ventilated air space between the insulated refrigerated area and the underside of the roof deck.

See Koppers Supplemental Specifications for further information.

WALKWAYS

Where periodic foot traffic patterns such as paths to or around equipment and other similar situations where the roofing may be subjected to anticipated unusual treatment, the roofing membrane should be protected. Walkway systems should never be placed directly on a slag or gravel surface. Areas of the roofing membrane which are to act as the bearing surface for a walkway should be given additional protection. Although there are a number of methods which can be employed, Koppers recommends one of the following:

1. **Treated Wooden Walkways.** Over the designated walkway areas and directly on the existing coal tar pitch and tarred felt membrane (prior to aggregate surfacing), lay two additional plies of tarred felt in solid moppings of pitch.

Treated wooden sleepers should then be set on the reinforced area in a solid pouring of coal tar pitch followed by aggregate surfacing embedded in the pouring over the entire surface up to all sides and ends of sleepers. Treated wood planking bridging the sleepers will provide the walkway surface.

2. **Traffic Pads.** Over the areas of the roofing membrane to be protected prior to the top pouring and aggregate surfacing, lay in a solid application of coal tar pitch approved protective pads. Pads should be approximately 72" x 36" x ½" minimum thickness of a homogeneous core of bitumen, plasticizers and inert fillers bonded under heat and pressure between two saturated and coated sheets with the bottom side plain and the top wearing surface of well-bonded ceramic granules.

Following this operation the top pouring of coal tar pitch and aggregate surfacing of the roof should be completed up to all edges of the installed pads.

Refer to page 26 of this manual.

If other methods are considered, consult your local Koppers representative concerning the protection of the roof system which is proposed.

NAILS & FASTENERS

All fastening devices must provide adequate retention in the deck structure. Nails must be driven through flat tin discs or be of an approved type fastener with an integral cap. Nail lengths and type of nails or fasteners depend on the deck material used and the thickness of same. (For insulation applications where nailing is required, nails must be of sufficient length to penetrate the insulation and provide the retention necessary.)

The following recommendations will serve as a guide for the installation of roofing for the decks as listed:

Metal Decks. For securing felts to insulation use soft nosed roofing nails ¾ inch longer than the thickness of the insulation, designed to clinch or hook on the underside of the insulation such as manufactured by Independent Nail Corporation or Simplex Tube-Lok nail or approved equal. Insulation must have sufficient nail retentive ability to meet general requirements for nailable decks.

Poured Gypsum and Poured Lightweight Aggregate Decks (When Not Thoroughly Dry). Use Simplex Gypsum Roof Deck Nail or Screw-Tite Squarehed Cap Nail or Capped E/S Nail or square cut unfinished nails through flat tin discs.

Precast Nailable Lightweight Decks (Gypsum Plank and Dry Poured Gypsum). Use Simplex Tube-Lok Nail or square cut steel nail with head (Wheeling LaBelle or equal).

Preformed Composition Decks. Use Stronghold Annular Threaded Squarehed Cap Nail or Simplex Tube-Lok Nail or Capped E/S nail or approved equal. Deck density is particularly critical and must have required retentive ability.

Wood Decks. Use Simplex flat head roofing nail or Stronghold Annular Threaded Squarehed Cap Nail or barbed roofing nails through flat tin discs.

Plywood Decks. Use annular ring shanked nails through flat tin discs or Simplex Annular Threaded nails or equal. (Refer to Douglas Fir Plywood Association Laboratory Bulletin 61-B dated March 20, 1961.)

Shredded Wood Fiber Decks. For nailing applications use Simplex Tube-Lok Nail. Refer to page 7 of this manual.

NOTE: Nailing frequency is recommended in the individual application specifications which follow in this manual.

Should the manner of attachment as recommended above conflict with the specifications of the nail, insulation or deck manufacturer, these manufacturers' specifications should be followed.

Roofing over nailable decking where the underside of the deck is exposed shall be nailed on centers at one-half the spacing specified to provide additional protection against wind uplift.

For reference:

E/S Products, Inc., New Rochelle, N. Y.
Independent Nail Corp., Bridgewater, Mass.
Simplex Nail & Manufacturing Corp., Americus, Ga.
Wheeling Steel Corp., Wheeling, W. Va.

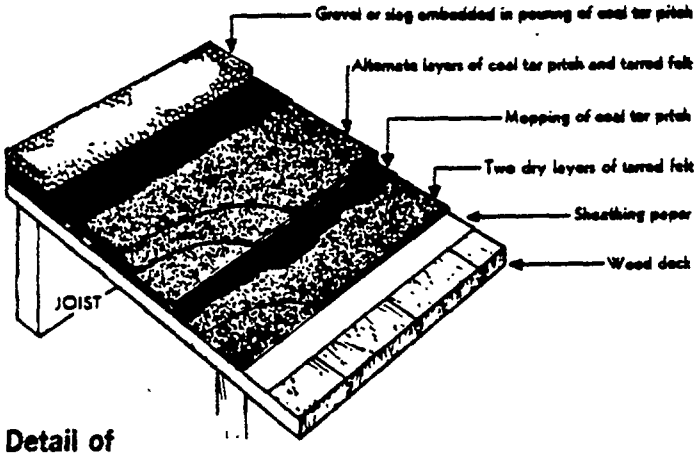
NOTE: This roofing specification manual contains the latest and best available information as derived from Koppers long experience in the roofing industry. The design criteria and details contained herein have been compiled and are offered as a guide for consideration to assist the architect, owner and roofer in an attempt to provide the best roof possible for long, trouble-free service. Responsibility, however, for design of any roofing system, remains with the architect or engineer and building owner. The contents of this manual are subject to change at the discretion of Koppers Company as future developments and experience are achieved.

deck construction

WOOD PLANK / PLYWOOD

SLOPE • Up to 2 in. per ft.

SURFACE • Aggregate



Detail of Specification No. 1

Spec. No. 1—5 ply—20 year

Spec. No. 2—4 ply—15 year

Spec. No. 30—3 ply—10 year

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 1	Spec. No. 2	Spec. No. 30
Sheathing Paper	5 lbs.	5 lbs.	5 lbs.
Tarred Felt	75 lbs.	60 lbs.	60 lbs.
Coal Tar Pitch	150 lbs.	125 lbs.	125 lbs.
Gravel OR Slag	400 lbs OR 300 lbs.	400 lbs. OR 300 lbs.	400 lbs. OR 300 lbs.

Hot bitumen should never be applied directly to a wood deck. Sandwiched between the heat from above and the heat from below, such material finds its way through the boards into the building. Good practice demands the cushioning and blotting effect of a layer of sheathing paper followed by layers of dry felt. Shiplap and square edge boards should be avoided where possible. If the underside of the roof deck is exposed to air pressure created from open doors or windows, tongue-and-grooved lumber should be used.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply roofing to any surface which is not reasonably smooth and free from projections or holes which might cause rupture of roofing membrane. Lumber shall be seasoned and dry and preferably treated. Immediately before the application of the roofing, thoroughly clean the surface. Roof deck shall be properly graded to outlets.

NOTE: Refer to Koppers Supplemental Specifications for additional information for plywood deck construction.

Application of Roofing Materials

1st. Lay one ply of rosin sized or other approved sheathing paper weighing not less than five (5) lbs. per 100 square feet lapping each sheet two (2) inches and nail sufficiently to hold in place.

2nd. Spec. No. 1 • Spec. No. 2

Apply over the entire surface of the sheathing paper, two (2) dry plies of Koppers Approved Tarred Felt. Lap plies nineteen (19) inches. Nail on twelve inch centers, 2" in from edge lap with nails thru flat tin discs or approved nails with integral caps. Nail shanks are to be of required length for maximum withholding power.

2nd. Spec. No. 30

Apply over the sheathing paper, one (1) dry ply of Koppers No. 30 Tarred Felt. Lap ply four (4) inches. Nail on twelve (12) inch centers, 2" in from edge lap with nails thru flat tin discs or approved nails with integral caps. Nail shanks are to be of required length for maximum withholding power.

3rd. Mop with Old Style Pitch the entire surface, preceding the application of additional plies of felt and apply over the entire surface as follows.

4th. Spec. No. 1

Apply three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches.

4th. Spec. No. 2 • Spec. No. 30

Apply two (2) plies of Koppers Approved Tarred Felt, lapping plies nineteen (19) inches.

Mop solidly between plies with Old Style Pitch so that in no place shall felt touch felt.

On slopes one (1) inch per foot or more nail each sheet of felt with Simplex flat head or one (1) inch barbed roofing nails through flat tin discs, two (2) inches from the back edge on twenty-four inch centers.

5th. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation and Vapor Barrier

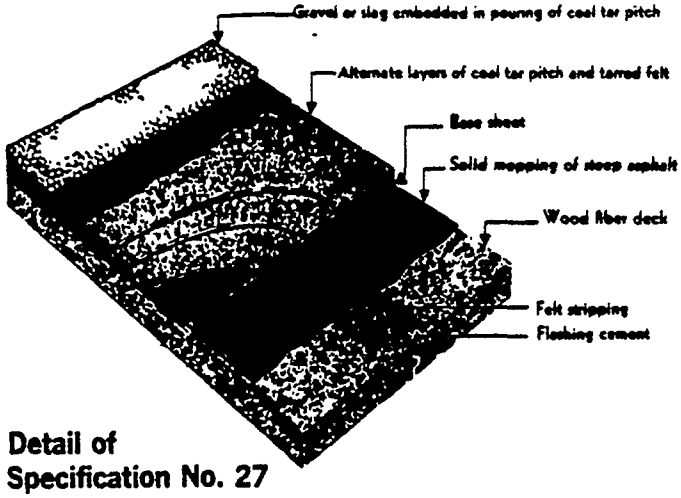
1. Insulation without vapor barrier—See Specification No. 200 on page 21.
2. Insulation with vapor barrier—See Specification No. 201 on page 21.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of these specifications and must be adhered to where applicable.

deck construction

WOOD FIBER

SLOPE • Up to 1 in. per ft.
JRFACE • Aggregate



Detail of Specification No. 27

Spec. No. 27—4 ply—20 year

Spec. No. 28—3 ply—15 year

Spec. No. 28—may be bonded for 10 years

For convenience in estimating use these material quantities:

MATERIALS per 100 sq. ft.	Spec. No. 27	Spec. No. 28
Koppers Steep Asphalt	20 lbs.	20 lbs.
Coal Tar Pitch	150 lbs.	125 lbs.
Base Sheet	43 lbs.	43 lbs.
Tarred Felt	45 lbs.	30 lbs.

All decking must be installed in strict accordance with the particular deck manufacturer's recommendations for installation. Deck material must be protected during shipment, job site storage and prior to roofing application. No planks which have become structurally weakened due to moisture, fractures or utilated edges may be used. All joints must be level and eferably grouted full and level with plank surfaces as recom-..ended by the deck manufacturer. All planks must be well anchored to supporting members to resist movement in a fashion recommended by the deck manufacturer. Any planks which bow or deflect or do not seat securely must be replaced. Responsibility for the selection of a particular type of wood fiber deck, its installation, provision for expansion and contraction, its suitability to job requirements, and its ability to support anticipated loads in its environment rests with the designer and deck manufacturer.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply roofing to any deck which is not reasonably level or free from excessive voids or projections or where deck surface fibers are loose, spongy or separating. Deck must be clean of debris, cuttings, dirt and other foreign matter.

All end and side joints of deck planks, whether grouted or not, must be caulked and stripped. Apply a sufficient quantity of trowel-grade asphaltic plastic cement to continuously seal all joints. A bead of the cement shall protrude above the top of the joint but shall not be feathered out on the deck surface. All joints shall then be covered with a 6" wide strip of No. 15 Asphalt Saturated Felt centered over the joint and adhered to the plastic cement.

Perimeter wood nailers must be installed and all adjacent decking must fit close and level. Wood nailers are necessary at all locations where anchoring of metal flanges etc., are required.

Application of Roofing Materials

1st. Install one ply of Koppers coated base sheet with minimum ir (4) inch side and six (6) inch end laps in a solid mopping . minimum 190°F softening point steep roofing asphalt. All side and end laps shall be continuouslу sealed the full width of the lap.

ALTERNATE: *As an alternate to mopping, lay one (1) ply of rosin-sized sheathing paper lapped two (2) inches minimum and nail to hold in place. Then lay one (1) ply of Koppers coated base sheet lapped not less than four (4) inches and nail along center of lap not less than nine (9) inches on center and thru the center of each sheet on eighteen (18) inch centers with mechanical clinching type fasteners as recommended by the Structural Wood Fiber Products Association or designer such as Simplex Tube-Lok nails.*

For bonded roofing applications, fasteners, other than Tube-Lok nails, must be acceptable to Koppers. Fasteners shall be applied at the minimum rate of one (1) per square foot as recommended by the Structural Wood Fiber Products Association.

2nd. Solidly mop the entire surface with Old Style Pitch.

3rd. Spec. No. 27

Apply three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches.

3rd. Spec. No. 28

Apply two (2) plies of Koppers Approved Tarred Felt, lapping plies nineteen (19) inches.

Mop solidly between plies with Old Style Pitch so that in no place shall felt touch felt.

4th. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation and Vapor Barrier

1. **Insulation without vapor barrier.** Install insulation in steep asphalt in conformance with 1st paragraph. Nailable insulation not exceeding one (1) inch thick may be installed using 1¾ inch Simplex Tube-Lok nails at all four corners and at center of board. Installation of roofing over insulation shall be as per specification outlined above with base sheet mopped solidly to the insulation.

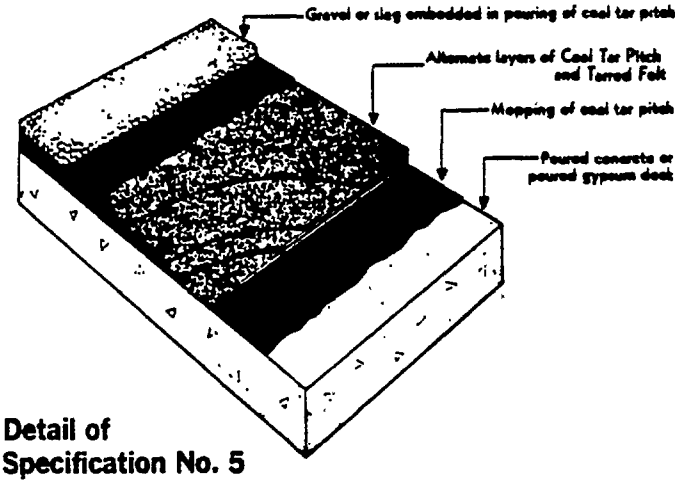
2. **Insulation with vapor barrier.** Install two (2) plies of No. 15 asphalt felt lapped nineteen (19) inches in steep asphalt as per 1st paragraph of this specification. Both plies shall be mopped solidly so that in no place shall felt touch felt. Install insulation in solid mopping of steep asphalt. Roofing over insulation is to be in accordance with the details of the specification above with base sheet mopped solidly to the insulation.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of these specifications and must be adhered to where applicable.

deck construction

POURED CONCRETE
POURED GYPSUM (thoroughly dry)

SLOPE • Up to 2 in. per ft.
SURFACE • Aggregate



Detail of Specification No. 5

Spec. No. 5—4 ply—20 year

Spec. No. 7—3 ply—15 year

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 5	Spec. No. 7
Coal Tar Pitch—		
Poured Concrete	175 lbs.	150 lbs.
Poured Gypsum	165 lbs.	140 lbs.
Tarred Felt	60 lbs.	45 lbs.
Gravel or	400 lbs.	400 lbs.
Slag	300 lbs.	300 lbs.

Poured concrete decks sometimes cause trouble because the built-up roofing is laid before the deck is thoroughly dry—such as might happen when the general contractor is anxious to get the building under cover and so urges the roofing contractor to begin work shortly after the deck has been poured. When this happens the result is a blistered and buckled membrane or, just as serious, insulation curls and makes an unsatisfactory job. The roofing contractor, backed by the architect, should insist on a thoroughly dry deck before beginning work. He should also see to it that the deck is free of loose sand, frozen scale and other foreign matter. Projections should be removed, low points filled with cement grout or other suitable material, and all cracks pointed up.

A poured gypsum deck, especially, should be inspected for moisture content, the characteristic of this material being such that even after pouring it quickly takes on a dry appearance. The dryness, however, actually extends only a little distance below the surface, the large mass of the gypsum being very moist. Refer to General Requirements on page 3, paragraph 5 under Decks.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply built-up roofing to any surface which is not reasonably smooth and free from projections or holes which might cause rupture of roofing membrane. Surfaces must be dry. Immediately before the application of the roofing, thoroughly clean the surface of dust and loose materials. Roof deck shall be properly graded to outlets.

Decks with inclines of one (1) inch per foot or more shall permit nailing, or treated wooden nailing strips must be installed prior to roofing. Nailing strips should be placed not more than three (3) feet apart on center and be run parallel with the slope of the roof and not across it.

Application of Roofing Materials

1st. **(A) Over Poured Concrete:** Mop deck completely with Old Style Pitch.

(B) Over Poured Gypsum: If poured gypsum is thorough dry, strip-mop the deck with approximately 12-inch wide moppings of Old Style Pitch spaced approximately six (6) inches apart. If poured gypsum deck is not thoroughly dry, roofing shall be applied according to Specification No. 12 for 20 years or Specification No. 13 for 15 years as listed on page 10 of this manual. Applicable portions of Koppers Supplemental Specification "Food Establishments" apply.

2nd. **Spec. No. 5**

Apply over the entire surface, four (4) plies of Koppers Approved Tarred Felt, lapping plies twenty-seven and one-half (27½) inches. Mop solidly between each 27½ inch lap with Old Style Pitch so that in no place shall felt touch felt.

2nd. **Spec. No. 7**

Apply over the entire surface three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches. Mop solidly between each 24-2/3 inch lap with Old Style Pitch so that in no place shall felt touch felt.

Where slope of deck is one (1) inch per foot or more and deck permits nailing, nail along back or upper edge of each sheet on twenty-four (24) inch centers. Where deck does not permit nailing, nailing strips are required and each sheet nailed along back or upper edge at spacings to assure penetration of nailers.

3rd. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch, into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation and Vapor Barrier

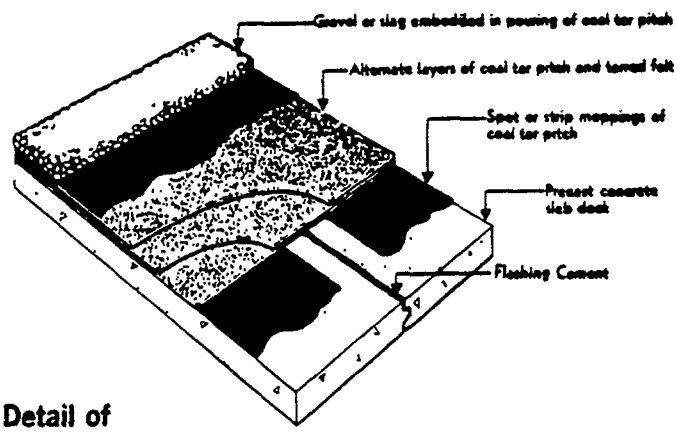
1. Insulation without vapor barrier—See Specification No. 20° on page 21.

2. Insulation with vapor barrier—See Specification No. 201 for poured gypsum or No. 203 for poured concrete on page 21.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

PRECAST CONCRETE

SLOPE • Up to 2 in. per ft.
SURFACE • Aggregate



Detail of Specification No. 11

Spec. No. 10—4 ply—20 year

Spec. No. 11—3 ply—15 year

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 10	Spec. No. 11
Coal Tar Pitch	165 lbs.	140 lbs.
Tarred Felt	60 lbs.	45 lbs.
Gravel OR Slag	400 lbs. OR 300 lbs.	400 lbs. OR 300 lbs.

recast concrete slab decks should receive the same careful .crutiny recommended for poured concrete or gypsum decks, although as a rule the possibility of moisture being present due to insufficient drying time is not likely to be encountered. However, the contractor will often find one or more slabs resting unevenly which results in edges projecting above the surface. This may have been due to poor workmanship in laying the slab and should be corrected by resetting or leveling off. Where it is necessary to fill low areas, the use of cinder aggregate is not permitted since this material traps air and moisture, causing it to expand and crack when covered. The result is a badly blistered built-up roofing surface. All joints, whether grouted or not, should be caulked with trowel-grade asphaltic plastic cement. Sides and ends of slabs should be square. Slabs must rest firmly and evenly on supporting members.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply built-up roofing to any surface which is not reasonably smooth and free from projections or holes which might cause rupture of the membrane. Surfaces must be dry. Immediately before the application of the roofing, thoroughly clean the surface of dust and loose material.

All joints between precast concrete slabs whether grouted or not shall be caulked with plastic cement which shall be applied so that the top surface is level with the deck. (Felt strips four (4) to six (6) inches wide may be set in the trowelling of cement for additional protection when so specified by the architect. Felt stripping in flashing cement assists in leveling uneven joints and bridges the joint opening providing a better base for the roofing materials.)

Decks with inclines of one (1) inch per foot or more shall ermit nailing, or treated nailing strips must be set in the deck ush with the surface. Where insulation is specified, nailing strips may be secured to the deck surface and shall be level with the surface of the insulation. These strips should be spaced not more than three (3) feet apart and placed up and down and not across the slope of the roof. Roof deck shall be properly graded to outlets.

Application of Roofing Materials

1st. Each slab shall be spot or strip mopped with Old Style Pitch, keeping pitch moppings back at least four (4) inches from all edges of each slab joint.

2nd. Spec. No. 10

Apply over the entire surface four (4) plies of Koppers Approved Tarred Felt, lapping plies twenty-seven and one-half (27½) inches. Mop solidly between each 27½ inch lap with Old Style Pitch so that in no place shall felt touch felt.

2nd. Spec. No. 11

Apply over the entire surface three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches. Mop solidly between the 24-2/3-inch lap with Old Style Pitch so that in no place shall felt touch felt.

Where slope of deck is one (1) inch per foot or more and deck permits nailing, nail along back or upper edge of each sheet on twenty-four (24) inch centers. Where deck does not permit nailing, nailing strips shall be installed and each sheet nailed along back or upper edge at spacings to assure penetration of nailers.

3rd. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch, into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation and Vapor Barrier

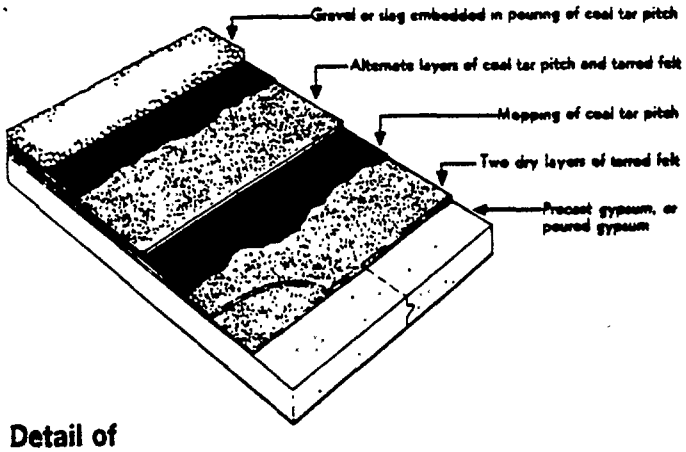
1. Insulation without vapor barrier—See Specification No. 202 on page 21.
2. Insulation with vapor barrier—See Specification No. 203 on page 21.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

deck construction:

PRECAST GYPSUM
POURED GYPSUM (not thoroughly dry)

SLOPE • Up to 2 in. per ft.
SURFACE • Aggregate



Detail of Specification No. 13

Spec. No. 12—5 ply—20 year

Spec. No. 13—4 ply—15 year

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 12	Spec. No. 13
Coal Tar Pitch	150 lbs.	125 lbs.
Tarred Felt	75 lbs.	60 lbs.
Gravel OR Slag	400 lbs. OR 300 lbs.	400 lbs. OR 300 lbs.

The same recommendations applying to precast concrete slabs apply to precast gypsum slabs and gypsum metal bound planks. All uneven slabs should be reset or leveled off so that the roof will be laid on a flat and even surface, free from projections and low areas. Because these slabs are precast, the possibility of a high moisture content being present is more remote than in the poured gypsum deck.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply built-up roofing to any surface which is not reasonably smooth and free from projections or holes which might cause rupture of the membrane. Surfaces must be dry. Immediately before the application of the roofing, thoroughly clean the surface of dust and loose material. All joints between precast gypsum slabs shall be properly grouted; grouting not required on gypsum metal bound plank. Roof deck shall be properly graded to outlets.

Application of Roofing Materials

1st. Apply over the entire surface two (2) dry plies of Koppers Approved Tarred Felt. Lap plies nineteen (19) inches. Nail at lap on twelve (12) inch centers. If poured gypsum deck is thoroughly dry, roofing may be applied according to Specification No. 5 for 20 years or Specification No. 7 for 15 years as listed on page 8 of this manual. Applicable portions of Koppers supplemental specification "Food Establishments" apply.

Alternate: *Apply over entire surface one (1) ply of Koppers coated base sheet, lapping each sheet four (4) inches over preceding sheet and nailing at lap no less than nine (9) inches, and down center of each sheet on eighteen (18) inch centers.*

3rd. Spec. No. 12

Apply three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches. Where slope of deck is one (1) inch per foot or more, nail each sheet of felt six (6) inches from the back edge on twenty-four (24) inch centers. All laps shall be mopped with pitch the full twenty-four and two-thirds (24-2/3) inches, so that in no place shall felt touch felt.

3rd. Spec. No. 13

Apply two (2) plies of Koppers Approved Tarred Felt, lapping plies nineteen (19) inches. Where slope of deck is one (1) inch per foot or more, nail each sheet six (6) inches from the back edge on twenty-four (24) inch centers. All laps shall be mopped with pitch the full nineteen (19) inches so that in no place shall felt touch felt.

4th. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch, into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation and Vapor Barrier

Precast

1. Insulation without vapor barrier—See Specification No. 200 on page 21.
2. Insulation with vapor barrier—See Specification No. 201 on page 21.

Poured

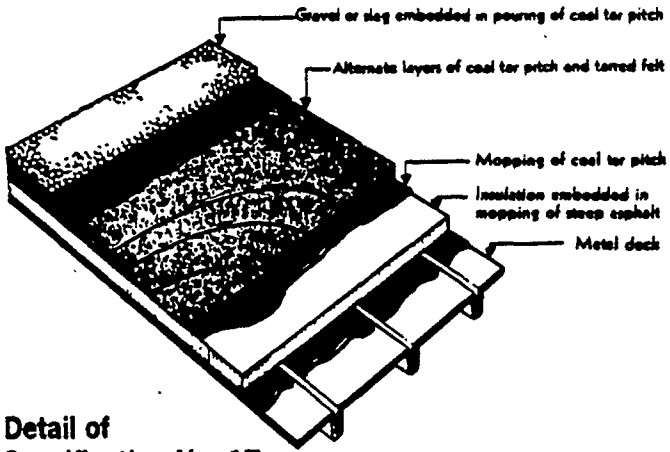
1. Insulation without vapor barrier—See Specification No. 202 on page 21.
2. Insulation with vapor barrier—See Specification No. 201 o page 21.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

deck construction:

METAL DECKS (Insulation Required)

SLOPE • Up to 2 in. per ft.
URFACE • Aggregate



Detail of Specification No. 17

Spec. No. 17—4 ply—20 year

Spec. No. 18—3 ply—15 year

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 17	Spec. No. 18
Steep Asphalt	*12-15 lbs.	*12-15 lbs.
Tarred Felt	60 lbs.	45 lbs.
Coal Tar Pitch	175 lbs.	145 lbs.
Slag OR Gravel	300 lbs. OR 400 lbs.	300 lbs. OR 400 lbs.

*Depends on width of rib and insulation used. When more than one layer of insulation is installed and asphalt is mopped between layers, add 25 pounds per square approximately for mopping between layers.

It is absolutely necessary to install insulation on a metal deck before the built-up roofing is applied in order to obtain a Koppers Roofing Bond.

A metal deck must be clean, smooth, and properly anchored to the steel purlins and all joints correctly lapped and fastened.

Type of metal deck, flute opening and various other factors determine the type and thickness of insulation required. Consult your Koppers representative for recommendations.

Metal roof decks shall be designed so that they will not have a deflection exceeding 1/240 of clear span under all types of roof traffic conditions including mechanical equipment used for roof application.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Metal roof decks shall be dry, clean and free from rust or oily substances. Immediately before the application of the insulation, thoroughly clean the surface of rust and loose material. Roof deck shall be properly graded to outlets.

Application of Insulation and Roofing Materials

1st a. Insulation shall be dry and of an approved type with the thickness dependent upon the width of the flute openings of the metal deck.

b. No more insulation shall be installed at any one time than can be protected by pitch and felt in case of sudden weather changes.

c. All abutting edges of insulation shall be fitted closely together but shall not be forced into place.

d. Install insulation in steep asphalt applied to deck at rate of 12 to 15 lbs. per 100 sq. ft. and place insulation while steep asphalt is still molten to provide good adhesion.

e. If slope of deck is one (1) inch per foot or more, insulation must be able to retain nails and, in addition to being set in steep asphalt, insulation must be fastened to the metal deck with approved mechanical fasteners placed at all four (4) corners and the center of each sheet. If two layers of insulation are specified, top layer joints shall not coincide with joints of bottom layer. Fasteners shall be driven after the top layer of insulation is installed.

f. For additional information refer to Koppers Supplemental Specifications for metal decks and specific insulations for bonding information.

g. If U.L. and F.M. requirements are a factor for insurance rating, insulation must be listed and approved in accordance with their current data.

2nd. Mop a uniform coating of Old Style Pitch over the insulation preceding the application of roofing membrane.

3rd. **Spec. No. 17**

Apply over the entire surface, four (4) plies of Koppers Approved Tarred Felt, lapping plies twenty-seven and one-half (27½) inches.

Mop solidly between each 27½ inch lap with Old Style Pitch so that in no place shall felt touch felt.

3rd. **Spec. No. 18**

Apply over the entire surface, three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches.

Mop solidly between each 24-2/3 inch lap with Old Style Pitch so that in no place shall felt touch felt.

Alternate: 2nd and 3rd. *As a substitute for the first ply of tarred felt apply one ply of Koppers coated base sheet in a solid mopping of steep asphalt directly over insulation lapping each sheet four (4) inches over preceding sheet. Mop entire surface with uniform coating of Old Style Pitch.*

Spec. No. 17

Apply over the base sheet three (3) plies of tarred felt, lapping plies twenty-four and two-thirds (24-2/3) inches and mopping solidly between each ply with Old Style Pitch.

Spec. No. 18

Apply over the base sheet two (2) plies of tarred felt, lapping plies nineteen (19) inches and mopping solidly between each ply with Old Style Pitch.

If slope of roof is one (1) inch per foot or more, each ply of felt shall be nailed along the back or upper edge on twenty-four (24) inch centers. If base sheet alternate is used, each ply of base sheet shall be nailed two (2) inches from the back or upper edge on twenty-four (24) inch centers.

4th. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch into which, while hot, embed not less than four hundred (400) pounds of gravel or three hundred (300) pounds of slag for each one hundred (100) square feet.

Insulation with Vapor Barrier

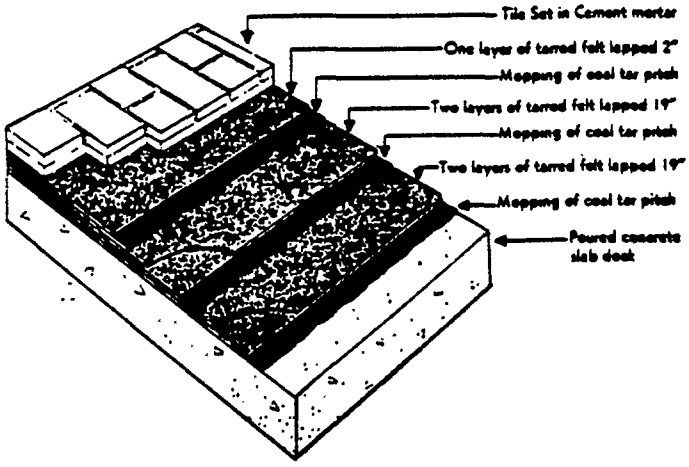
See Specification No. 204 on page 22.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

surface:

PROMENADE TILE SURFACING

SLOPE • Up to 1 in. per ft.
Deck Construction • Poured Concrete



Spec. No. 20—5 ply—10 year

Use Flashing Specification No. 100 for Bonded Roofs

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 20
Coal Tar Pitch	125 lbs.
Tarred Felt	75 lbs.

Although it is practical to set promenade tiles in bitumen or mastic, it is not recommended if tile is to be exposed to long periods of sunlight since heat will cause the material to come up through the joints to the surface. This is not only expensive but difficult to remedy. In order to insure against damage due to expansion and contraction, expansion joints should be provided for all surfaces exceeding 400 square feet.

After tile has been laid all traffic should be barred for at least 24 hours, after which the tile should be thoroughly scoured and flushed with water.

When any other traffic surfacing materials are applied to a roof, the roofing is considered waterproofing. A bond is not available for such construction.

Note

1. Roofing with promenade tile surfacing is only bondable when applied over poured concrete roof decks.
2. Consult Koppers manual on Waterproofing and Dampproofing for other membrane systems where waterproofing is required beneath other types of wearing surfaces.

SPECIFICATIONS

Condition of Surface to Receive Waterproofing

Do not apply built-up membrane to any surface which is not smooth and free from projections and holes which might cause rupture of the membrane. Surfaces must be dry. Immediately before the application of the roofing, thoroughly clean the surface of dust and loose material. Roof deck shall be properly graded to outlets.

Application of Waterproofing Material

1st. Mop deck completely with Old Style Pitch.

2nd. Apply over the entire surface two (2) plies of Koppers Approved Tarred Felt, lapping each ply nineteen (19) inches. Mop Old Style Pitch solidly between each 19 inch lap so that in no place shall felt touch felt.

3rd. Mop the entire surface of the first two plies of felt preceding the application of additional plies with Old Style Pitch.

4th. Apply over the entire surface two (2) plies of Koppers Approved Tarred Felt, lapping plies nineteen (19) inches. Mop Old Style Pitch solidly between each 19 inch lap so that in no place shall felt touch felt.

5th. Before laying the tile, the membrane surface shall be thoroughly cleaned and the membrane mopped with Old Style Pitch into which, while hot, embed one (1) layer of tarred felt, lapping each sheet two (2) inches over the preceding sheet. Only part of the membrane surface shall be covered with the last ply of felt at one time, the tile then being laid over that portion at once.

6th. The vitrified clay tile should be set in not less than three-quarters (3/4) inch of Portland Cement Mortar (1 to 3 mix). The joints should be grouted full with Portland Cement Mortar (1 to 2 mix). The tile should be laid to show three-sixteenths (3/16) inch to one-fourth (1/4) inch joints. Expansion joints three-quarters (3/4) inch wide filled with plastic mixture, which must be approved by the architect, shall be provided between the tile and all flashings. Either metal or mastic expansion joints should be provided throughout the roof surface as may be necessary. Expansion joints should extend through to the roofing and should be spaced not more than twenty (20) feet apart in any direction. They should also be installed at all walls, skylights, curbs, etc.

Note

a. If insulation is required, use rigid type.
b. Tile should be applied just as soon as possible after application of membrane. During freezing weather, exposed felt surfaces shall be glazed with a mopping of pitch.
c. The waterproofing is to be applied by a roofing contractor approved by Koppers Company, Inc., who should apply the waterproofing in strict accordance with Koppers Specification No. 20, and requirements, and subject to Koppers inspection and approval.
d. Koppers Company, Inc., will not be responsible or liable for leaks due to the installation, contraction or expansion of Promenade Tile and will not be responsible for the taking up and replacing of tile in order to locate leaks through the waterproofing.

Insulation and Vapor Barrier

1. Insulation without vapor barrier—See Specification No. 20. on page 21.
2. Insulation with vapor barrier—See Specification No. 203 on page 21.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

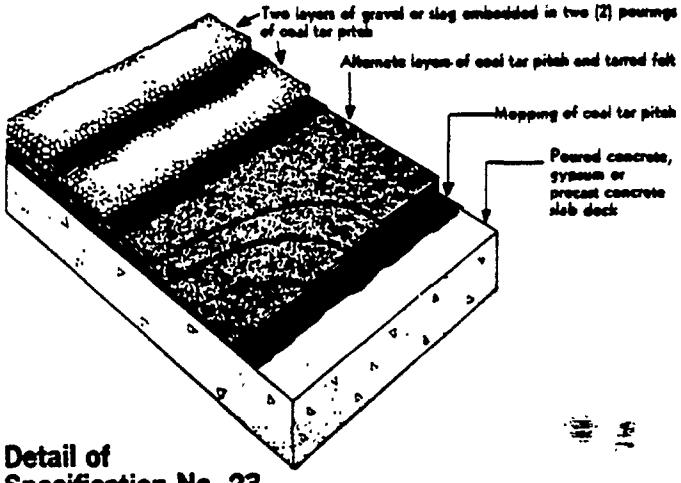
deck construction: Poured Concrete • Poured Gypsum • Precast Concrete

WATER COOLED ROOFS

8a
Ko

SLOPE • Up to 1 in. per ft.

SURFACE • **Double Aggregate** (with double pour)



Detail of Specification No. 23

Spec. No. 23—4 ply—20 year

Spec. No. 24—3 ply—15 year

Use flashing specification No. 110 for bonded roofs

For convenience in estimating use these material quantities:

MATERIALS per 100 Sq. Ft.	Spec. No. 23	Spec. No. 24
Coal Tar Pitch	260 lbs.	235 lbs.
Tarred Felt	60 lbs.	45 lbs.
Gravel OR Slag	700 lbs. OR 500 lbs.	700 lbs. OR 500 lbs.

Koppers will only bond Water Cooled Roofs when applied over Poured Concrete, Gypsum or Precast Concrete Decks. A Koppers Roof Bond will not be issued over Metal, Wood, Shredded Wood Fiber, or similar decks if they are designed for a water cooling system.

Water cooling of a built-up roof may be accomplished by either a spray or ponding system. Since BTU dissipation is directly related to evaporation, a light spray of water has proven to be the better method to accomplish cooling. If a quantity of water is permitted to pond so as to cover the slag or gravel completely, considerably less cooling results because of the lesser area exposed for evaporation. Over 90% of the heat ordinarily entering through the roof can be excluded by the use of the least quantity of water designed to continuously keep the roof surface damp.

Regardless of the cooling method used, it is mandatory that the system be closed down and the roof drained prior to cold weather. Neither the roofing nor the structure will withstand the expansion caused by ice formations.

The water cooled roof may be used alone or in conjunction with air conditioning equipment. When it is an adjunct of an air conditioning system, less refrigeration will be required for cooling within the building. Water required for air conditioning may be piped from the condenser to the roof for use in the roof cooling system. If water should be expensive or scarce, it should be noted that it is possible and practical to have it recycled from the roof to the air conditioning equipment with proper screening.

SPECIFICATIONS

Select clauses as required. Optional clauses in italic.

Condition of Surface to Receive Roofing

Do not apply built-up roofing to concrete surfaces which are not reasonably smooth and free from projections and holes which might cause rupture of the membrane. Surfaces must be dry. Immediately before the application of the roofing, thoroughly clean the surface of dust and loose material.

Application of Built-up Roofing

1st. Mop deck completely with Old Style Pitch.

2nd. **Spec. No. 23**

Apply over the entire surface four (4) plies of Koppers Approved Tarred Felt, lapping plies twenty-seven and one-half (27½) inches. Mop solidly between each 27½ inch lap with Old Style Pitch so that in no place shall felt touch felt.

2nd. **Spec. No. 24**

Apply over the entire surface three (3) plies of Koppers Approved Tarred Felt, lapping plies twenty-four and two-thirds (24-2/3) inches. Mop solidly between each (24-2/3) inch lap with Old Style Pitch so that in no place shall felt touch felt. All felt shall be turned up not less than four (4) inches at vertical surfaces.

3rd. Pour over the entire surface of the roofing membrane a uniform coating of approximately seventy-five (75) pounds of Old Style Pitch, into which, while hot, embed not less than four hundred (400) pounds of clean dry gravel or three hundred (300) pounds of slag for each 100 square feet.

4th. All loose gravel or slag shall be swept from surface and a second uniform pouring of approximately eighty-five (85) pounds of Old Style Pitch shall be applied over the gravel or slag, into which, while hot, shall be applied a second layer of three hundred (300) pounds of gravel or two hundred (200) pounds of slag for each 100 square feet. The entire surface shall then be thoroughly broomed free from all loose gravel or slag. It is advisable to roll the finished surface with a light roller so that aggregate is thoroughly embedded.

Note

a. At points where water pressure from the spray may be excessive, the roof surface should be protected with treated board platforms or other suitable construction to break the force of the water. These platforms should be laid on top of the roof surface and not fastened to the deck.

b. Insulation under a water cooled roof should be of a type which is rigid, dimensionally stable with high compressive strength and of a sealed cellular structure such as Foamglas.

c. At all points where roofing membrane meets a vertical surface, Koppers Flashing Specification No. 110, listed on page 18 must be applied.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

STEEP ROOFS

SLOPE • 2 in. minimum—3 in. maximum
SURFACE • Aggregate

deck construction:

Spec. No. 300A—5 ply—20 year
See paragraphs A-1, B-1, C-1 & D

Spec. No. 2500A—4 ply—15 year
See paragraphs A-1, B-1, C-2 & D

WOOD, PRECAST or POURED GYPSUM DECKS

Spec. No. 800A—4 ply—20 year
See paragraphs A-2, B-2, C-3 & D

Spec. No. 3200A—3 ply—15 year
See paragraphs A-2, B-2, C-4 & D

PRECAST or POURED CONCRETE and METAL DECKS

Estimating Quantities per 100 sq. ft.

MATERIALS	Spec. No. 300A (20 Year)	Spec. No. 2500A (15 Year)	Spec. No. 800A (20 Year)	Spec. No. 3200A (15 Year)
Koppers Asphalt Primer (except on metal)			1 gal.	1 gal.
Koppers No. 15 Asphalt Felt	75 lbs.	60 lbs.	60 lbs.	45 lbs.
Koppers Steep Asphalt	125 lbs.	100 lbs.	150 lbs.	125 lbs.
Roofing Gravel or	400 lbs.	400 lbs.	400 lbs.	400 lbs.
Roofing Slag	300 lbs.	300 lbs.	300 lbs.	300 lbs.

SPECIFICATIONS

Condition of Surface to Receive Roofing

FOR WOOD DECKS: Same as described under Spec. No. 1.

FOR POURED AND PRECAST GYPSUM: Same as described under Spec. No. 12.

FOR POURED AND PRECAST CONCRETE: Same as described under Spec. No. 5 and Spec. No. 10 respectively except that on decks not permitting nailing, treated nailing strips should be spaced not more than twenty-four (24) inches apart.

FOR METAL DECKS: Same as described under Spec. No. 17 (For application of insulation see Spec. No. 17). The insulation must be a type that can retain nails and must be fastened securely to the deck by means of approved mechanical fasteners which shall be placed at each corner and at the center of each sheet of insulation. When more than one layer of insulation is applied fasteners shall be driven after top layer of insulation is applied.

Application of Roofing Materials

1st **A-1** **(Spec. No. 300A and Spec. No. 2500A)** Over the entire surface lay two (2) plies of Koppers No. 15 Asphalt Felt. Lap each sheet nineteen (19) inches over preceding sheet. Nail in place.

A-2 **(Spec. No. 800A and Spec. No. 3200A)** Over Poured Concrete: Coat entire surface with Koppers Asphalt Primer. Over Precast Concrete: Hold asphalt primer back two (2) inches from all slab joints.

2nd **B-1** **(Spec. No. 300A and Spec. No. 2500A)** Mop entire surface with Koppers Steep Asphalt into which, while hot, shall be applied the felts.

B-2 **(Spec. No. 800A and Spec. No. 3200A)** Over Poured Concrete: Mop deck completely with Koppers Steep Asphalt. Over Precast Concrete: Mop deck with Koppers Steep Asphalt holding back two (2) inches from all joints. Over Metal Decks: Mop insulation completely with Koppers Steep Asphalt.

3rd **C-1** **(Spec. No. 300A)** Over the entire surface lay three (3) plies of Koppers No. 15 Asphalt Felt, lapping each sheet twenty-four and two-thirds (24-2/3) inches over the preceding sheet. Mop the full width under each ply with Koppers Steep Asphalt and nail through flat tin discs two (2) inches from the upper edge on nine (9) inch centers.

C-2 **(Spec. No. 2500A)** Over the entire surface lay two (2) plies of Koppers No. 15 Asphalt Felt, lapping each sheet nineteen (19) inches over the preceding sheet. Mop the full width under each ply with Koppers Steep Asphalt and nail through flat tin discs two (2) inches from the upper edge on nine (9) inch centers.

C-3 **(Spec. No. 800A)** Over the entire surface lay four (4) plies of Koppers No. 15 Asphalt Felt, lapping each sheet twenty-seven and one-half (27½) inches over the preceding sheet. Mop the full width solid under each sheet with Koppers Steep Asphalt and nail through flat tin discs on nine (9) inch centers. On precast concrete decks the first mopping is to be held back two (2) inches from all joints.

C-4 **(Spec. No. 3200A)** Over the entire surface lay three (3) plies of Koppers No. 15 Asphalt Felt, lapping each sheet twenty-four and two-thirds (24-2/3) inches over the preceding sheet. Mop the full width solid under each sheet with Koppers Steep Asphalt and nail through flat tin discs on nine (9) inch center. On precast concrete decks the first mopping is to be held back two (2) inches from all joints.

4th **D** Over the entire surface apply a uniform coating of Koppers Steep Asphalt into which, while hot, embed not less than 400 lbs. gravel or 300 lbs. of slag for each one hundred (100) square feet.

General

Koppers Steep Asphalt shall not be heated above 475°F and shall not be applied to the roof at a temperature of less than 400°F.

At junction of steep and flat roofing, the roofing on the flat surface shall be carried up the inclined surface not less than twenty-four (24) inches before the steep roofing is applied. Application of steep roofing shall start at the point of junction with the flat roof.

NOTE: Koppers Company, Inc., will issue roofing bonds when roofing is applied according to Specifications Nos. 300A, 800A. 2500A, and 3200A, in accordance with General Requirement

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of this specification and must be adhered to where applicable.

STEEP ROOFS

SLOPE • 3 in. minimum—9 in. maximum
SURFACE • Mineral

8a
Ko

deck construction:

Spec. No. 31A—15 year
See paragraphs A-1, B-1, C

Spec. No. 4A—10 year
See paragraphs B-2 & C

WOOD DECKS

Spec. No. 33A—15 year
See paragraphs A-2, B-1 & C

POURED CONCRETE

Spec. No. 9A—10 year
See paragraphs A-2, B-3 & C

POURED GYPSUM

Spec. No. 34A—15 year
See paragraphs B-1 & C

PRECAST GYPSUM

Spec. No. 35A—10 year
See paragraphs B-2 & C

PRECAST CONCRETE

Estimating Quantities per 100 sq. ft.

MATERIALS	Spec. No. 31-A (15 year)	Spec. No. 4-A (10 year)	Spec. No. 33-A (15 year)	Spec. No. 9-A 10 year)	Spec. No. 34-A (15 year)	Spec. No. 35-A (10 year)
Koppers Asphalt Primer			1 gal.			
Red Rosin Sheathing	5 lbs.					
Koppers Steep Asphalt	90 lbs.	60 lbs.	120 lbs.	90 lbs.	90 lbs.	60 lbs.
Koppers No. 15 Asphalt Felt	30 lbs.	30 lbs.	30 lbs.	30 lbs.	30 lbs.	30 lbs.
Koppers Selvage-Edge Rfg.	110 lbs.	110 lbs.	110 lbs.	110 lbs.	110 lbs.	110 lbs.

Condition of Surface to Receive Roofing Materials

WOOD DECKS: Same as described under Spec. Nos. 1, 2 and 30.

POURED CONCRETE AND POURED GYPSUM: Same as described under Spec. Nos. 5 and 7.

PRECAST CONCRETE: Same as described under Spec. Nos. 10 and 11.

PRECAST GYPSUM AND GYPSUM METAL BOUND PLANKS: Same as described under Spec. Nos. 12 and 13.

Application of Roofing Materials

A. Preliminary Procedure

A-1 (Spec. No. 31-A) Apply at right angles to incline of roof one (1) thickness of twenty-five (25) pound (5 pounds per 100 sq. ft.) sheathing paper over the entire surface of the deck lapping each sheet one (1) inch over the preceding sheet. Nail to hold in place.

A-2 (Spec. Nos. 33-A and 9-A) Apply to the entire surface of the deck a priming coat of Asphalt Primer and allow to dry for a period of not less than six (6) hours. Then:

(a) Over Poured Concrete: Mop deck completely with Koppers Steep Asphalt.

(b) Over Poured Gypsum: Strip mop the deck with six (6) inch wide moppings of Koppers Steep Asphalt.

B. Application of Asphalt Felts

B-1 (Spec. Nos. 31-A, 33-A and 34-A) Apply at right angles to the incline over the entire surface, two (2) plies of Koppers No. 15 Asphalt Felt, lapping plies nineteen (19) inches. Nail each ply of felt two (2) inches from upper edge eighteen (18) inches o.c., with one and one-half (1½) inch barbed roofing nails through flat tin discs (or with staples for gypsum decks). Mop solidly between plies with Koppers Steep Asphalt.

B-2 (Specs. Nos. 4-A and 35-A) Apply at right angles to the incline over the entire surface, one (1) ply of Koppers No. 30 Asphalt Felt, lapping ply four (4) inches. Nail each ply edge on eighteen (18) inch centers with one and one-half (1½) inch barbed roofing nails through flat tin discs (or with staples for gypsum decks).

B-3 (Spec. No. 9-A) Apply at right angles to the incline over the entire surface, one (1) ply of Koppers No. 30 Asphalt Felt, lapping sheets six (6) inches.

Mop solidly each 6-inch lap with Koppers Steep Asphalt.

Nail each ply two (2) inches from lower edge on eighteen (18) inch centers.

When nailing strips are used, the felt shall be secured with three (3) one (1) inch barbed roofing nails through flat tin discs, two (2) inches, ten (10) inches, and eighteen (18) inches respectively from the upper edge at each nailing strip.

C. Application of Mineral Surfaced Roofing
(Spec. Nos. 4-A, 9-A, 31-A, 33-A, 34-A and 35-A)

Beginning at the low point, thoroughly mop a portion of the asphalt felt surface with Koppers Steep Asphalt, into which, while hot, embed a sheet of selvage edge mineral surface roofing, this to run across the slope of the roof. Selvage should be on upper edge. Nail in double staggered course along selvage with one (1) inch barbed roofing nails through flat tin discs, kept two (2) inches from the mineral surfacing and twelve (12) inches o.c. for each course. Mop the selvage of the sheet just laid and the adjacent area of asphalt felt surface with steep asphalt and into this, while hot, embed thoroughly the next sheet of mineral surfaced roofing, taking care that the lower edge meets the edge of the mineral surfacing of the sheet below. Nail as described for previous sheet. Repeat the process of laying sheets of mineral surfaced roofing shingle fashion until the entire area has been covered. Lap ends six (6) inches, nailing the underlying sheet with six (6) one (1) inch barbed roofing nails through flat tin discs, starting one (1) inch from the lower edge, spaced five (5) inches o.c. Coat the underside of mineral surfaced roofing at each end lap with Steep Asphalt and firmly embed in the surface of the underlying sheet. Carefully rub down edges. Where incline exceeds four (4) inches to the foot, roofing may be applied up and down the slope instead of across it.

When nailing strips are installed, sheets shall be nailed along the selvage edge with three (3) inch nails driven through flat tin discs, spaced five (5) inches apart, at each nailing strip and set back two (2) inches from the mineral surface.

General

Mineral surfaced roofing is to be cut in strips not exceeding twenty (20) feet in length prior to using, and is to be stacked flat for a sufficient time to permit these strips to become perfectly flat. Asphalt felt and mineral surfaced roofing shall be laid without wrinkles or buckles.

Steep Asphalt shall not be heated above four hundred seventy-five (475) degrees F.

At junction of steep and flat roofing, the roofing on the flat surface is to be carried up the inclined surface not less than twenty-four (24) inches before steep roofing is applied. Application of steep roofing shall start at the point of junction with the flat roof.

General Requirements on pages 3 through 5 and Detailed Specifications on pages 20 through 26 are a part of these specifications and must be adhered to where applicable.

KOPPERS FLASHING SPECIFICATIONS

Specification Number	Applicable Notes	General	Classification	Brief Description
107	6, 7, 8	Metal Cap Composition Base Mineral Surface	20 year Type	Asphalt primer 4 plies No. 15 asphalt felt 1 ply 90# Mineral surface All plies set in steep asphalt or flashing cement Top nailed every 10" o.c. maximum Metal cap and pointing
106	6, 7, 8	Metal Cap Composition Base Mineral Surface	15 year Type	Asphalt primer 3 plies No. 15 Asphalt felt 1 ply 90# Mineral surface All plies set in steep asphalt or flashing cement Top nailed every 10" o.c. maximum Metal cap and pointing
110	1, 2, 6, 7	Metal Cap Asbestos Base Tar Coated Surface	20 year or 15 year Type	Concrete priming oil (coal-tar) 2 plies No. 15 tarred felt 2 plies No. 15 tarred asbestos felt All plies set in tar base cement Top nailed every 10" o.c. maximum Heavy top coat of tar base cement Metal cap and pointing
108	3, 6, 7	Metal Cap Reinforced Asbestos Base Asphalt Coated Surface	20 year Type	Asphalt primer 1 ply No. 15 asphalt asbestos felt 1 ply reinforced asphalt asbestos felt Both plies set in flashing cement Top nailed every 8" o.c. max. plus all end laps at top and into cant above cant mid-point. Strip all end joints Heavy top coat of flashing cement Metal cap and pointing
101	4, 6, 7, 8	Metal Cap Composition Base Mineral Surface	10 year Type	Asphalt primer 2 plies No. 15 asphalt felt 1 ply 90# Mineral surface All plies set in steep asphalt or flashing cement Top nailed every 10" o.c. maximum Metal cap and pointing
100	5, 6, 7	Metal Cap Metal Base Metal Surface	Not Bonded	2 plies No. 15 tarred felt Both plies set in solid trowelings of tar base cement Prior to setting metal base, coat vertical and horizontal of flashing with tar base cement Set metal base and nail flange 4" o.c. maximum 2 strips of No. 15 tarred felt over flange in coal tar pitch Top pouring of coal tar pitch and aggregate surfacing Metal cap and pointing

NOTES:

1. This specification *must* be used in conjunction with Koppers bonded water cooled roofs.
2. This specification is recommended for use with any coal tar pitch roof specification where ponded or standing water will lay in contact with the flashing.
3. This specification may be used as an alternate to Specification Nos. 107, 106 and 101 *when so specified by the architect.*
4. A cant strip may be used with this flashing construction.

GENERAL

Flashings must be installed at all intersections formed by vertical surfaces. Their importance cannot be stressed too strongly—the value of a good roof installation will be completely lost if inadequate or poorly installed flashings are employed.

Koppers flashings are an integral part of a Koppers roof. Designed for flexibility so that slight movements do not dislodge them and fastened securely to the wall, they give many years of service.

Flashing is not only affected by expansion and contraction of the material itself, but also by the expansion and contraction of the construction to which it is attached.

It is particularly important that the top edges of the flashing be protected by counter-flashing which will insure a diversion of the water away from any opening that might develop between flashing and wall.

Flashing should be installed as roofing progresses. Metal counter flashing should be installed as flashing progresses. If a delay is anticipated, the top of the flashing must be trowelled with flashing cement to prevent water from entering behind the flashing until the counter flashing is installed.

All Koppers flashings except where indicated require a metal cap flashing to be inserted in the raggle immediately upon completion of base flashing. The cap flashing is to extend into the raggle not less than two (2) inches and is to have not less than a four (4) inch exposed apron extending down over the base flashing. Completely fill the raggle with Koppers flashing cement.

NOTE:

1. If bonded flashing is required, it must be installed in conjunction with a Koppers bonded roof and can be bonded for standard periods up to but not greater than the period for which the roofing is bonded.

2. If a Koppers 25-year bonded roof is specified, Flashing Specification No. 110 shall be used in lieu of Flashing Specification No. 107.

3. Koppers asphalt primer and asphalt flashing cement may substituted for primer and steep asphalt in Flashing Specifications No.'s 107, 106 and 101.

4. Metal Cap flashings are not bondable and are not included under any flashing bond.

5. Metal work of any description used as flashing or a part of a flashing system is not bondable and is not included under any flashing bond.

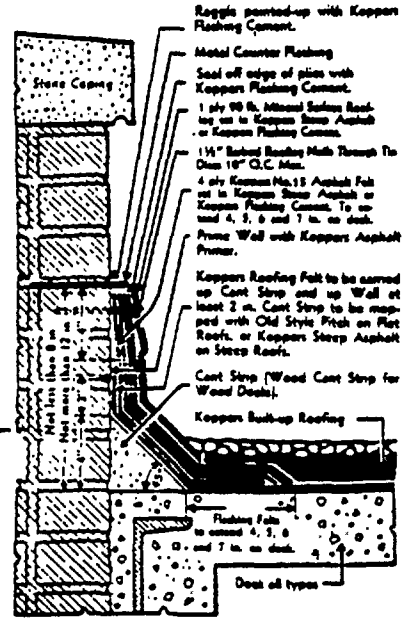
Materials	Plies or Coats Required	Units	For 100 LF x 12'–1 Square Approximate Quantity Required
Asphalt primer	1	Gal.	½ Gal.—(basis 300 sq. ft. per gallon)
No. 15 Asphalt Felt	4	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	1 Roll
90# Mineral Surface	1	1 sq. rl. (3' x 36 LF= 108 sq. ft.)	1 Roll
Steep Asphalt	5	Lbs.	100 lbs.—(basis 5 x 20 lbs. per 100 sq. ft.)
or	or		
Flashing Cement	5	Lbs.	200 lbs.—(basis 5 x 40 lbs. per 100 sq. ft. at 1/16" per coat)
Asphalt Primer	1	Gal.	½ Gal.—(basis 300 sq. ft. per gal.)
No. 15 Asphalt Felt	3	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	¾ Roll
90# Mineral Surface	1	1 sq. rl. (3' x 36 LF= 108 sq. ft.)	1 Roll
Steep Asphalt	4	Lbs.	80 lbs.—(basis 4 x 20 lbs. per 100 sq. ft.)
or	or		
Flashing Cement	4	Lbs.	160 lbs.—(basis 4 x 40 lbs. per 100 sq. ft. at 1/16" per coat)
Concrete Priming Oil	1	Gal.	½ Gal.—(basis 300 sq. ft. per gallon)
No. 15 Tarred Felt	2	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	½ Roll
No. 15 Tarred Asbestos Felt	2	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	½ Roll
Tar Base Cement	5	Lbs.	264 lbs.—(basis 4 x 44 lbs. per 100 sq. ft. at 1/16" per coat interply) (basis 1 x 88 lbs. per 100 sq. ft. at ⅛" per coat top coat)
Asphalt Primer	1	Gal.	½ Gal.—(basis 300 sq. ft. per gal.)
No. 15 Asphalt Asbestos Felt	1	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	¼ Roll
Reinforced Asphalt Asbestos Felt	1	1 sq. rl. (3' x 36 LF= 108 sq. ft.)	1 Roll
Flashing Cement	3	Lbs.	240 lbs.—(basis 3 x 80 lbs. per 100 sq. ft. at ⅛" per coat)
Asphalt Primer	1	Gal.	½ Gal.—(basis 300 sq. ft. per gal.)
No. 15 Asphalt Felt	2	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	½ Roll
90# Mineral Surface	1	1 sq. rl. (3' x 36 LF= 108 sq. ft.)	1 Roll
Steep Asphalt	3	Lbs.	60 lbs.—(basis 3 x 20 lbs. per 100 sq. ft.)
or	or		
Flashing Cement	3	Lbs.	120 lbs.—(basis 3 x 40 lbs. per 100 sq. ft. at 1/16" per coat)
No. 15 Tarred Felt	2	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	½ Roll
Tar Base Cement	3	Lbs.	132 lbs.—(basis 3 x 44 lbs. per 100 sq. ft. at 1/16" per coat)
No. 15 Tarred Felt Stripping for stripping metal flange	2 strips	4 sq. rl. (3' x 144 LF= 432 sq. ft.)	¼ Roll—(2 strips over flange)
oal Tar Pitch	2	Lbs.	25 lbs.—(setting strips—does not include top pour)

5. This is metal work and therefore flashing is not bondable. This specification should be used with Promenade Tile roofs, No. 20 when bonded roofing is required.
6. All End laps of plies of flashing systems must be staggered or broken with underlying plies.
7. Nailing strips must be provided where necessary to assure maximum holding power.
8. Flashing Specification No. 108 may be used as an alternate when specified by the architect.

Specification No. 107 • 106

20 year type
15 year type

METAL CAP
COMPOSITION BASE
MINERAL SURFACE



Application

Extend plies of roofing felts and pitch moppings up all walls, parapets and curbs for a distance of two (2) inches above cant strip.

A raggle not less than eight (8) inches above the roof deck is to be provided.

Prime all masonry walls from top of roofing felts to raggle with Koppers Asphalt Primer. Allow to dry thoroughly. Mop on with Koppers Steep Asphalt a strip of No. 15 Asphalt Felt extending from the raggle to not less than four (4) inches on the roof deck.

On top of this apply a second strip of Asphalt Felt with moppings of hot Steep Asphalt, extending the felt onto the roof deck one (1) inch beyond the preceding strip. Mop on additional strips in a similar fashion until a four-ply 20 year Specification No. 107 or a three-ply 15 year Specification No. 106 reinforcement has been obtained.

Mop on with Koppers Steep Asphalt a strip of 90 pound mineral surface roofing felt of sufficient width to extend from the raggle to the surface of the deck. Nail with one and one-half (1½) inch barbed roofing nails through flat tin discs at upper edge approximately ten (10) inches o.c. (For brick or block construction, nail into vertical mortar joints. For concrete construction, nail to treated wood nailing strips set in flush with the surface.)

Asphalt felts are not to exceed ten feet three inches (10'3") in length. Ends of connecting strips are to overlap three (3) inches and are to break at least twenty-four (24) inches with end laps of underlying strip. End laps shall be thoroughly mopped with steep asphalt.

The strips of Mineral Surfaced Roofing shall be cut from across the roll so that the end of each strip shall have a two (2) inch selvage. The two (2) inch selvage shall be coated with Flashing Cement and shall be overlapped by the overlying sheet and be thoroughly pressed into place. All plies of felt shall be firmly pressed into moppings of steep asphalt so that there will be no wrinkles in the finished surface.

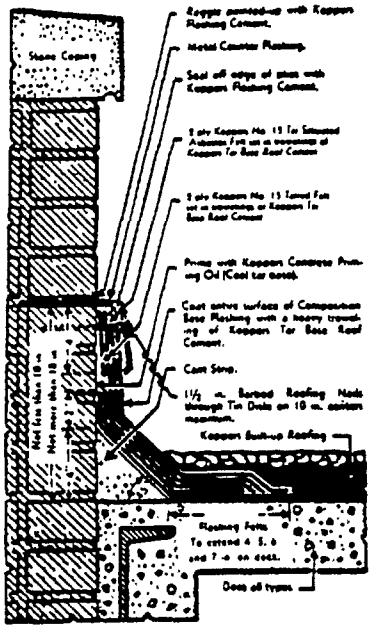
Install metal cap flashing.

Specification No. 110

20 & 15 year type

(for water cooled roofs)

METAL CAP
COMPOSITION BASE (2+2)
COATED SURFACE



Application

Cant strips shall be installed at the angle between the roof deck and the parapet wall or any other similar perpendicular surfaces.

Extend plies of roofing felts and pitch moppings up all walls for a distance of two (2) inches above cant strip.

A raggle of not less than ten (10) inches above the roof deck is to be provided.

Prime all masonry walls from top of roofing felts to raggle with Koppers Concrete Priming Oil (coal tar base). Allow to dry thoroughly.

Set two plies of Koppers Approved Tarred Felt in trowelings of Koppers tar base roof cement. Have plies extending from the bottom of the raggle; the first extending out onto the deck not less than four inches from the bottom of the cant strip, and the second, one inch beyond the first. Over this apply two layers of tar saturated asbestos felt similarly imbedded in Koppers Tar Base Roof Cement, each ply extending onto the deck one inch beyond the preceding ply.

Nail with one and one-half (1½) inch barbed roofing nails through flat tin discs at upper edge approximately ten (10) inches o.c. (For brick or block construction, nail into vertical mortar joints. For concrete construction, nail to treated wood nailing strips set in flush with the surface.)

Felts are not to exceed ten feet three inches (10'3") in length. Ends of connecting strips are to overlap three (3) inches and are to break at least twenty-four (24) inches with laps of underlying strip.

All plies of felt shall be firmly pressed into the trowelings of Koppers Tar Base Roof Cement so that there will be no wrinkles in the finished surface.

Coat the entire surface of the composition base flashings with a heavy troweling of Koppers Tar Base Roof Cement.

Install metal cap flashing.

NOTE: This specification must be followed for flashing of 20 or 15 year term Koppers bonded water cooled roofs.

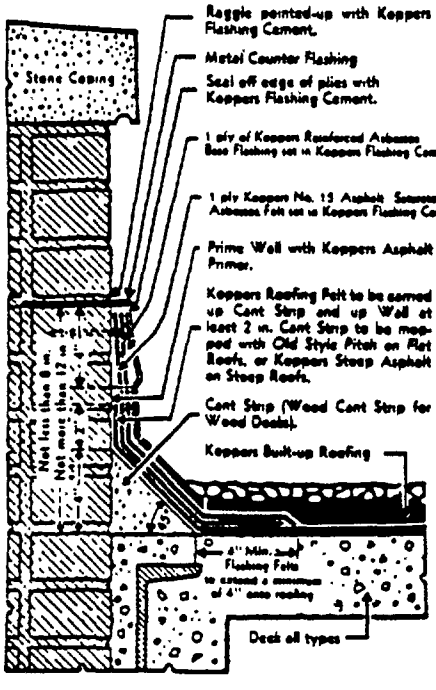
It may be specified for use with any Koppers bonded roof in lieu of standard flashing specification where additional protection against water laying in contact with flashing is anticipated except Specification No. 20.

Specification No. 108

20 year type

(reinforced asbestos)

METAL CAP
ASBESTOS BASE (1+1)
COATED SURFACE



Application

Extend plies of roofing felts and pitch moppings up all walls, parapets and curbs for a distance of two (2) inches above cant strip.

A raggle not less than eight (8) inches or more than twelve (12) inches above the roof deck is to be provided.

Prime all masonry walls from top of roofing felts to raggle with Koppers Asphalt Primer. Allow to dry thoroughly.

In a uniform coating of Koppers Flashing Cement, install one (1) ply of Koppers No. 15 Asphalt saturated asbestos felt extending from the raggle to not less than four (4) inches from the base of the cant onto the roof. On top of this apply a second uniform coat of Koppers Flashing Cement into which embed one (1) ply of Koppers reinforced asbestos base flashing (reinforced fabric side down). Nail with one and one-half (1½) inch masonry roofing nails through flat tin discs along upper edge eight (8) inches o.c. maximum into mortar joints. For concrete construction, nail to treated wood nailing strips set in flush with the surface with appropriate nail through flat tin discs.

End laps for the two (2) plies shall be not less than three (3) inches and staggered not less than twenty-four (24) inches. End laps of reinforced base shall be nailed vertically a minimum of once into the wall at upper edge and once into the cant at a point not lower than the mid point of the cant.

End laps of reinforced base after nailing shall be covered with a strip of Koppers asbestos felt not less than four (4) inches wide set in a coating of Koppers Flashing Cement.

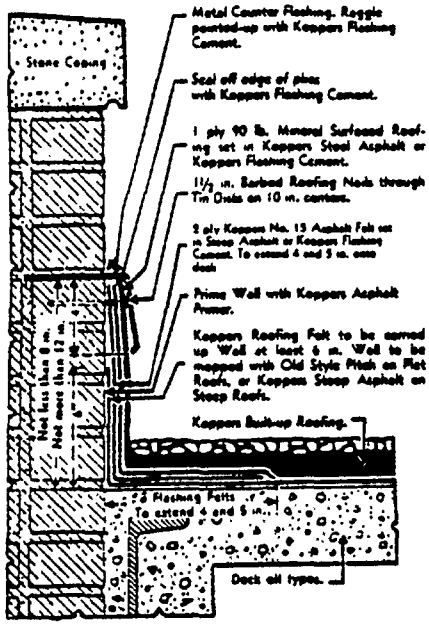
Coat entire surface of flashing with Koppers Flashing Cement (including nail caps along top edge of flashing as well as top edges of felts to seal at wall).

Interply and top coatings shall be troweled uniformly, full height and continuously approximately one-eighth (⅛) inch thick. Plies must be laid in smoothly with no pockets, wrinkles or buckles.

Install metal cap flashing.

Specification No. 101 10 year type

METAL CAP
COMPOSITION BASE
MINERAL SURFACE



Application

Extend plies of roofing felts and pitch moppings up all walls, parapets and curbs for a distance of not less than six (6) inches above the roof deck.

A raggle of not less than eight (8) inches above the roof deck is to be provided.

Prime all masonry walls from top of roofing felts to raggle with Koppers Asphalt Primer. Allow to dry thoroughly. Mop on with Koppers Steep Roofing Asphalt a strip of No. 15 Asphalt Felt extending from a height of not less than eight (8) inches on the vertical surface to four (4) inches out on the roof deck. On top of this apply a second strip of Asphalt Felt with moppings of hot steep asphalt, extending the roofing felt onto the roof deck one (1) inch beyond the preceding strip.

Mop on with Hot Steep Roofing Asphalt a strip of 90-pound mineral surface roofing felt of sufficient width to extend from the raggle to the surface of the deck. Nail with one and one-half (1½) inch barbed roofing nails through flat tin discs at upper edge approximately ten (10) inches o.c.

(For brick or block construction, nail into vertical mortar joints. For concrete construction, nail to treated wood nailing strips set in flush with the surface.)

Asphalt felts are not to exceed ten feet three inches (10'3") in length. Ends of connecting strips are to overlap three inches and are to break at least twenty-four (24) inches with end laps of underlying strips. End laps shall be thoroughly mopped with steep asphalt.

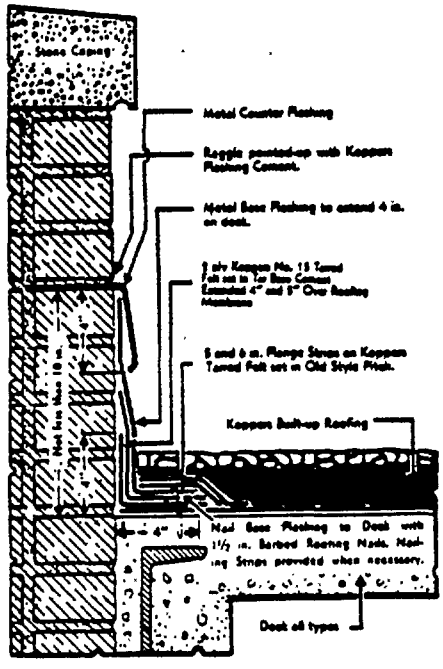
The stripe of Mineral Surfaced Roofing shall be cut from across the roll so that the ends of each strip shall have a two (2) inch selvage. The two (2) inch selvage shall be coated with Flashing Cement and shall be overlapped by the overlying sheet and be thoroughly pressed into place.

Install metal cap flashing.

NOTE: Cant strip may be specified for use with this specification.

Specification No. 100 All metal

METAL CAP
COMPOSITION UNDERLAYMENT
METAL BASE
METAL SURFACE



For Wood and Precast Gypsum Decks:

Extend first two (2) plies of dry roofing felt up vertical surfaces for a distance of not less than four (4) inches and cut off the remaining plies at the angle of the roof deck.

Felt Underlayment

Felt reinforcement is required with all metal base flashing at walls, skylight curbs and at any other vertical surface above the roof level which is to be flashed with metal base flashing.

Prior to installing the metal base flashing, set two (2) plies of No. 15 tarred felt in solid trowelings of Koppers tar base cement. Plies shall extend from the bottom of the raggle or not less than a point six (6) inches in height, down the vertical wall and out on to the deck for a distance of not less than four (4) inches and five (5) inches respectively.

Coat the entire surface of the top ply with tar base cement before installing the metal base flashing.

End laps of the two underlayment plies shall be staggered and thoroughly sealed.

Installation of Metal Base and Counter Flashing

A raggle of not less than ten (10) inches above the roof deck is to be provided.

The metal base flashing shall extend up the vertical surface not less than ten (10) inches and onto the roof deck not less than four (4) inches. Nail base flashing to the deck with one and one-half (1½) inch barbed roofing nails, one (1) inch from outer edge of metal flange on four (4) inch center. For concrete deck, a nailing strip of treated wood shall be set in the concrete flush with the surface. Over the part of the metal base flashing extending onto the roof, apply two (2) strips of tarred felt with alternate moppings of roofing pitch.

Metal cap flashing shall be installed immediately so as to prevent seepage of water behind base flashing.

Metal cap flashing shall extend into the raggle not less than two (2) inches and shall have a four (4) inch exposed apron extending down over the top edge of metal base flashing. After the metal cap flashing has been installed, completely fill the raggle groove with Koppers flashing cement.
Install metal cap flashing.

NOTE: Metal base flashing requires felt underlayments at all wall angles, skylight curbs and other vertical surfaces before metal base flashing is installed.

INSULATION SPECIFICATIONS
with and without vapor barrier

General

The following specifications for the installation of insulation are recommended so as to provide and insure the owner the maximum effect and life of the insulation.

Should the manner of attachment as specified by the individual insulation manufacturer conflict with the following, the insulation manufacturer's specification shall be followed.

Koppers Company, Inc., Guarantee Bond Covering Built-Up Roofing and Flashing does not cover roof insulation nor will Koppers Company, Inc. be responsible for any damage caused by or the result of the use of insulation or its manner of attachment to the substrate.

Selection and use of insulations and vapor barriers rest with the designer of the complete system, however, Koppers reserves the right to accept or reject any materials used in conjunction with a bonded roofing membrane. Acceptance of materials or method of installation *shall not* be construed as a guarantee. Applicable portions of General Requirements on pages 3 through 5 are a part of these specifications.

1. Insulation

The roofing insulation must be kept dry at all times and be of an approved type.

All roof insulation shall be dry when installed. It should not be applied over anything but a completely dry substrate nor should it be applied when subsequent traffic from roofing crews, other trades, and equipment may damage it.

Broken or damaged sheets must not be used except after squaring and then only used as fill in pieces.

If the deck slope is one (1) inch per foot or more the insulation must be able to retain nails, or wood nailers must be installed perpendicular to the slope at each course of insulation. Provision for wood nailers in this fashion will provide both a surface for anchoring of roofing felts which shall be laid perpendicular to the wood nailers as well as an insulation stop. Spacing of nailers must be such that the insulation fits snugly with the nailers but must not be force fitted.

No more insulation shall be laid at any one time than can be protected by pitch and felt in case of sudden weather changes. Edges of insulation shall be brought closely together and shall not be forced into place. Where insulation joins vertical surfaces the insulation shall be cut in a neat manner allowing at least one-half (½) inch clearance.

When more than one (1) layer of insulation is used, joints in each layer shall not coincide. All layers shall be parallel to preceding layers.

2. Vapor Barrier

Vapor barriers are normally used where high humidity conditions are to be expected inside the structure for various reasons.

The desirability or necessity for a vapor barrier depends on many variables such as climatic conditions, soil conditions, building occupancy, etc. The proper design and specification of such vapor barrier, or the omission of such vapor barrier, thus becomes the sole responsibility of the designer or owner. Any subsequent failures, due to either the installation or lack of such installation, will not be Koppers responsibility. This will also apply if it appears desirable to install such vapor barrier to the underside of the entire roofing assembly.

3. Water Stops (Temporary Protection)

Water stops consisting of two (2) plies of tarred felt and moppings of Old Style Pitch for flat roofs or asphalt felt and asphalt for steep roofs extending onto the deck at least six (6) inches and four (4) inches on top of the insulation, shall be applied at the end of each day's work over exposed edges of insulation.

Water stops shall be continuous and tight.

This temporary protective measure *must* be removed cleanly when work is resumed.

4. Cut-offs (Permanent Installation)

Venting of roof insulation at walls, curbs, eaves, etc., is recommended. Therefore, cut-offs should not be installed at edges of insulation adjoining these areas for venting purposes.

Cut-offs may be installed, however, provided they are constructed to run in one direction continuously to vented edges and provided no section of the roofing is isolated or blocked from venting.

5. Nails and Fasteners

Nails for use with insulation shall be of sufficient lengths to pass through the insulation and make a maximum penetration into the deck without protruding through it (except for metal decks).

If other varieties of fasteners such as clips or cleats are desired, they shall be as recommended by the deck manufacturer, however, Koppers reserves the right to approve or reject these when used in conjunction with its bonded roofing. Acceptance does not imply guarantee.

Nails shall be galvanized and driven through minimum one (1) inch diameter sturdy gauge tin caps or shall be acceptable integral capped nails such as "Simplex" or equal.

Approved mechanical fasteners should be used for securing insulation to metal decks when required.

6. Wood Nailers

Wood nailing strips must be provided to form a solid retentive base for anchoring all metal flashing aprons and flanges. Nailers shall be the full and accurate thickness of the insulation used or exceed it by the dimension of a preformed tapered edge piece.

Nailers shall extend not less than one (1) inch beyond the apron or flange and must be anchored securely to the roof deck or roof deck supporting member directly thereunder.

Nailers should be treated for preservation.

Wood nailers, installed on or in non-nailable decks for slopes one (1) inch per foot or more or when insulation is required of a non-nailable type, shall be run in the direction perpendicular to the direction in which the felts are to be laid.

7. Cant Strips

Cant strips are required at all places where the plane of the roof meets a vertical surface requiring flashing. Cant strips reduce what would otherwise be one sharp 90° bend at the flashing and roofing juncture to two (2) 45° angles.

Cant strips on wood decks shall be set on top of the insulation and secured to the deck by nailing through the insulation or cut with a shoulder to accommodate the thickness of the insulation and attached directly to the deck.

Cant strips normally are of wood or preformed fiber board. Cant strips for poured gypsum or poured concrete decks may be formed by a poured cant provided a shoulder is formed to accommodate the thickness of the insulation which will abut it. However, a treated nailer may be installed in poured gypsum or to poured concrete decks to accommodate the insulation thickness to which a standard cant can be nailed securely.

Cant strips on steel deck installations must be anchored securely to a wood nailer which has been anchored securely to the steel deck or steel deck supporting member.

Cant strips must be a minimum of 4" x 4" with a 45° sloped face.

8. Edge Strips

Tapered edge strips of fiberboard with a maximum incline of 2" slope designed for perimeter use to contain water are recommended. They shall be placed on top of the insulation and abut a wood nailer shoulder which has been constructed to accommodate the thickness of the insulation plus the thickness of the tapered edge strip.

9. Lightweight Insulating Fills

Application of a Koppers Bonded Roof over these types of fill varies according to the characteristics of the fill and the condition under which the roofing material is to be applied. Consult Koppers Supplemental Specifications or contact your Koppers representative for roofing specifications over the type of insulating fill to be used. A Koppers representative must inspect and approve the condition of the lightweight fill before roofing is applied.

In general, a lightweight insulating fill must be able to vent itself and thereby dry, otherwise serious effects to the roofing membrane will result. Koppers will not accept a vapor barrier beneath a lightweight fill nor a fill over a type of substrate that will not permit adequate venting from below such as poured concrete, unvented metal decks, etc.

Provisions should be made wherever possible to provide additional venting such as notched wood perimeter nailers, etc., in conjunction with the venting from the underside of the deck. If board type insulation is to be applied over a lightweight fill, a vapor barrier is necessary between the fill and the board insulation to prevent fill moisture from affecting the insulation and roofing.

10. Additional Information

Koppers will not bond its roofing over insulations such as Foamglass and Fiberglas when nailing of the insulation or felts over the insulation is required. On wood decks with inclines under one (1) inch per foot, use Specification No. 201 when installing these insulations.

For information concerning these and other insulations, consult Koppers Supplemental Specifications.

NOTE:

1. Insulations to comply with Underwriters' Laboratories, Inc., Class A, B or C roof coverings must be listed under Underwriters' Laboratories Guide No. 360 018 of their Building Materials List. For metal deck roofs, insulation must also be listed under their Guide No. 360 R 13.13.
2. Methods of installing insulation are discussed in Koppers Supplemental Specifications.

INSULATION SPECIFICATION NO. 200

(Normal Conditions—without vapor barrier)
Wood—Precast Gypsum—Metal Bound Gypsum Plank

Application of Insulation

The roof deck shall be covered with one (1) layer of approved rosin-sized sheathing paper weighing approximately five (5) pounds per one hundred (100) square feet. Sheathing paper shall be lapped two (2) inches and secured to the deck by nailing. Over Precast Gypsum and Gypsum Metal Bound Plank Decks sheathing paper may be omitted.

On decks having inclines up to two (2) inches per foot, each sheet of insulation shall be secured to the deck by nails at each of the four corners and on inclines exceeding two (2) inches per foot, additional nails are to be spaced one (1) foot apart, and stagger-nailed through the longitudinal center of each sheet. All nails shall penetrate the deck at least three-fourths (¾) inch.

Nailing of two layers of insulation shall be through the second or top layer only.

Application of Roofing Above Insulation

If more than one layer of insulation is installed and joints broken, or if ship-lap type is used, roofing above insulation shall be constructed according to Koppers Specifications Nos. 5, 7, 8-A, 9, 32-A, 33, 41-A, 800-A or 3200-A, depending upon the slope of the roof.

If only one layer of insulation is installed, or if ship-lap type is not used, the roofing shall be applied according to Koppers Specifications Nos. 1, 2, 3-A, 4, 25-A, 30, 31, 40-A, 300-A or 2500-A on wood decks, with the exception that the red rosin paper may be omitted provided it has been installed below the insulation.

INSULATION & VAPOR BARRIER SPECIFICATION NO. 201

(Humidity Conditions—with vapor barrier) Wood—Poured or Precast Gypsum—Metal Bonded Gypsum Plank

Application of Membrane Below Insulation

1. The wood roof deck shall be covered with one (1) layer of approved rosin-sized sheathing paper weighing approximately five (5) pounds per one hundred (100) square feet. The sheathing paper shall be lapped two (2) inches and secured to the deck by occasional nailing. On poured, precast gypsum or gypsum metal bound plank, sheathing paper may be omitted. If joints are not tongue and grooved, they shall be stripped with felt and plastic cement.
2. Two full thicknesses of Tarred Felt shall be laid over the entire surface, lapping each sheet nineteen (19) inches over the preceding sheet and nailing the sheets in place. On decks having inclines two (2) inches to six (6) inches per foot, use No. 15 Asphalt Felt.
3. Follow (2) in Specification No. 203 for 2-ply vapor barrier.
4. Extend all felts up vertical surfaces and cut off at height of insulation.

Application of Insulation

1. Mop the entire surface with a uniform coating of Old Style Pitch into which, while hot, firmly embed the insulation. When roofs have an incline of from two (2) inches to six (6) inches per foot, use Steep Roofing Asphalt.
2. On decks having inclines two (2) to six (6) inches per foot, each sheet of insulation shall be secured to the deck by nails at each of the four corners, and on inclines exceeding six (6) inches per foot, nails are to be spaced one (1) foot apart along edges and stagger-nailed through the longitudinal center of each sheet. All nails shall penetrate the deck at least three-fourths (¾) inch. Nailing of two layers of insulation shall be through the second or top layer only.

When insulation is laid in two layers, mop the entire surface of the first layer with Old Style Pitch on flat roofs and Steep Asphalt on steep roofs into which, while hot, embed the second layer of insulation. (This is optional as layers may be clipped together with mechanical fasteners.)

Application of Roofing Above Insulation

Roofing shall be applied according to Koppers Specifications Nos. 5, 7, 8-A, 9, 32-A, 33, 41-A, 800-A or 3200-A, depending upon the slope of the roof.

INSULATION SPECIFICATION NO. 202

(Normal Conditions—without vapor barrier)
Poured Concrete—Poured Gypsum—Precast Concrete

FOR FLAT DECKS

Application of Insulation

1. Apply a uniform coating of Old Style Pitch to the deck. If precast concrete slab or tile deck, strip mop with Old Style Pitch up to four (4) inches from the edge of each joint. While the pitch is hot immediately embed the insulation.
2. If there are two (2) layers of insulation, mop the entire first layer with Old Style Pitch into which, while hot, embed the second layer of insulation.

FOR STEEP DECKS (Incline 2 to 6 inches per foot)

Application of Insulation

1. Apply a uniform coating of Steep Roofing Asphalt to the deck into which, while hot, embed the insulation.

On precast tile or slab deck, strip mop with Steep Roofing Asphalt up to four (4) inches from the edge of each joint.

2. If there are two (2) layers of insulation, the entire first layer shall be coated with Steep Roofing Asphalt into which, while hot, embed the second layer of insulation. Each sheet of insulation shall be secured in place by nailing. If two (2) layers of insulation are used nailing shall be through the top layer only. Nails shall be spaced one (1) foot apart and shall penetrate the deck at least three-quarters (¾) of an inch and shall be spaced along the edge and stagger-nailed through the longitudinal center of each sheet of insulation.

When the deck will not permit nailing (which necessitates nailing strips), insulation shall be secured to each nailing strip with nails spaced approximately one (1) foot apart.

Application of Roofing Above Insulation

The roofing shall be applied according to Koppers Company, Inc. Specifications Nos. 5, 7, 8-A, 9, 20, 23, 24, 32-A, 33, 41-A, 800-A or 3200-A, depending upon the slope of the roof.

INSULATION & VAPOR BARRIER SPECIFICATION NO. 203

(Humidity Conditions—with vapor barrier)
Poured Concrete—Precast Concrete

Application of Membrane Below Insulation

1. Apply a uniform coating of Old Style Pitch to the deck. On precast concrete slab or tile deck, strip mop with Old Style Pitch up to four (4) inches from the edge of each joint.
2. Lay over the entire surface two (2) full thicknesses of Koppers Approved Tarred Felt, lapping each sheet nineteen (19) inches over the preceding sheet—mopping with Old Style Pitch the full nineteen (19) inches so that in no place shall felt touch felt.
3. Extend all plies of felt up vertical surfaces and cut off at height of insulation.

Application of Insulation

Apply a uniform coating of Old Style Pitch over the entire surface into which, while hot, embed the insulation. If there are two (2) layers of insulation mop the entire surface of the first layer with Old Style Pitch into which, while hot, embed the second layer of insulation.

Application of Roofing Above Insulation

The roof shall be applied according to Koppers Company, Inc.'s Specifications Nos. 5, 7, 20, 23 or 24.

FOR STEEP DECKS (Incline 2 to 6 inches per foot)

Application of Membrane Below Insulation

1. Apply a uniform coating of Steep Roofing Asphalt to the deck. On precast concrete or tile, strip mop with Steep Asphalt up to four (4) inches from the edge of each joint.

2. Lay over the entire surface two (2) full thicknesses of Koppers No. 15 Asphalt Felt at right angles to the incline of the roof lapping each sheet nineteen (19) inches over the preceding sheet.

Each sheet shall be nailed with one (1) inch barbed roofing nails through flat tin discs eight (8) inches from the upper edge and nails shall be spaced not more than one (1) foot apart. Where nailing strips are used the felt shall be nailed with two (2) nails through flat tin discs at each nailing strip placed six (6) inches and eight (8) inches respectively from the upper edge of each sheet.

3. Extend all plies of felt up vertical surfaces and cut off at height of insulation.

Application of Insulation

Apply a uniform coating of Steep Roofing Asphalt over the entire surface into which, while hot, embed the insulation. Each sheet of insulation shall be secured in place by nailing. Nails shall be spaced approximately one (1) foot apart and shall penetrate the deck at least three-fourths (¾) of an inch and shall be placed along edge and stagger-nailed through the longitudinal center of each sheet of insulation.

When the deck will not permit nailing (which necessitates providing nailing strips), insulation shall be secured to each nailing strip with nails spaced approximately one (1) foot apart. Nailing of two layers of insulation shall be through the top layer only.

Application of Roofing Above Insulation

The roofing shall be applied according to Koppers Company, Inc.'s Specifications Nos. 8-A, 32-A, 41-A, 800-A or 3200-A, depending upon the slope of the roof.

INSULATION & VAPOR BARRIER SPECIFICATION NO. 204

(Humidity Conditions—with vapor barrier)
Metal Decking

NOTE: Koppers Company, Inc., will not bond roofing over metal decks unless the metal deck is insulated with approved type insulation and thickness. Refer to Koppers Supplemental Specifications.

Application of Membrane Below Insulation

A. Felt Type

Coat the ribs of the metal deck with Steep Asphalt and then install two (2) full thicknesses of Koppers No. 15 Asphalt Felt, lapping each sheet nineteen (19) inches over the preceding sheet, mopping with Steep Asphalt the full width of the nineteen (19) inch lap. Extend all felt up vertical surfaces and cutoff at height of insulation.

B. Vinyl Type

Fire resistant adhesive and vinyl-type vapor barrier as listed by and applied as specified by Underwriters' Laboratories, Inc., and Factory Mutual may be used. Adequate adhesion of the vapor barrier to the deck and adhesion of the insulation to the vapor barrier for securing the entire system against wind uplift and movement, must be attained.

NOTE: 1. Care must be exercised so that the vapor barrier is not ruptured during installation, particularly in areas over the flutes of the steel deck.

NOTE: 2. Vapor barrier method A. above is not rated by U.L. or F.M. for insurance purposes.

Application of Insulation

A. Felt Type

Apply a continuous, uniform coating of Steep Asphalt into which, while hot, embed the insulation.

B. Vinyl Type

Apply approved adhesive over approved vapor barrier in ribbons at rate specified by U.L. and F.M. and place insulation.

NOTE: When more than one (1) layer of insulation is applied, the top surface of each layer shall be coated with Steep Asphalt into which, while hot, embed the succeeding layer.

When the incline of the roof is one (1) inch per foot or more, the insulation shall be secured to the deck through the top layer with the proper devices which are in accordance with recommended procedures of the deck and insulation manufacturer.

Application of Roofing Above Insulation

The roofing shall be applied according to Koppers Company, Inc.'s Specifications Nos. 8-A, 17, 18, 32-A, 41-A, 800-A or 3200-A, depending upon the slope of the roof.

RE-ROOFING SPECIFICATIONS

Due to varying conditions of the roof deck and surface of the old roofing, it will be necessary for a representative of Koppers Company, Inc., to approve the type of specifications for re-roofing if a Koppers Roofing Bond is to be issued. No bond will be issued without prior approval from Koppers.

Moisture trapped within an old roofing system will seriously and quickly affect a new membrane.

No bond will be issued over any old insulated roof regardless of condition unless old roofing and insulation are removed to the deck prior to application of new roofing materials. No exception to this requirement will be permitted unless explicit permission is obtained from the Technical Department of Koppers Company, Inc., Tar & Chemical Division.

In general, we recommend the following practice and specifications for re-roofing work.

NOTE: Koppers Company, Inc., Guarantee Bond does not cover roof insulation or failure of roof deck. The application of a Koppers Bonded Roof over an old roof shall not constitute a waiver of these conditions.

1. Original deck must be checked to determine that it is structurally sound, smooth and in a condition to perform satisfactorily for the term expected of the new roofing membrane.

If it is not, provisions must first be made to accomplish this vital requirement.

2. All wood nailers, metal flashings, drains and flanges, sign supports, flag poles, etc., must be checked to determine their structural soundness and anchorage, again, to insure they will perform for the term expected of the new roofing membrane. If unsatisfactory or questionable, they must be replaced.

3. Assuming there is no insulation involved, the existing roofing membrane must be checked thoroughly.

a. If it has disintegrated to the extent that it has little value or that its adherence to the deck is questionable (possible blow-off or uplift damage), then all of the old roofing membrane must be removed.

b. If items one (1) and two (2) above are considered satisfactory, and the existing membrane can be made smooth and clean, it will not be necessary to remove the existing membrane.

c. On old roofing, repair all buckles and blisters by cutting open, remopping, and applying 2 plies of felt before new roofing is installed according to re-roofing specifications. Before the application of new roofing, the surface of old roofing shall be made smooth and clean. In places where surface is slightly rough, apply a flood coat of Coal Tar Pitch (for pitch roofs). Asphalt (for asphalt roofs) may be applied to level the surface. When such procedure does not provide a suitable base for new roofing, install insulation in steep asphalt, over asphalt roofs or pitch, over pitch roofs.

d. Application of new roofing

Over Tarred Felt and Pitch Roofing

New roofing shall be applied according to Koppers Specifications for over poured concrete decks with the exception that on wood decks, 2 plies of dry felt shall be applied at all places where there is a possibility of pitch seepage through the deck before the application of new built-up roofing.

Over Asphalt Roofing on Decks Where Nailing is Possible

Roofing shall be applied according to Koppers wood deck specifications with the exception that the approved rosin-sized paper may be eliminated. If insulation is installed, apply roofing according to Koppers Specifications for over poured concrete decks, setting insulation in asphalt.

Over Asphalt Roofing on Decks Where Nailing is Not Possible

Roofing shall be applied according to Koppers concrete deck specifications with the exception that each bottom sheet of felt shall be strip mopped to the old roofing, and these strip moppings shall be not less than 6 inches apart. If new insulation is applied, set in mopping of asphalt to old roofing.

Application of New Flashing

All old built-up flashing must be removed and new built-up composition flashing installed according to Koppers Specifications.

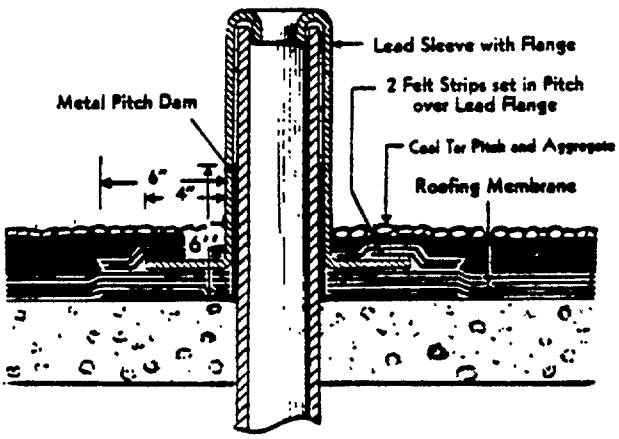
FLASHING DETAILS

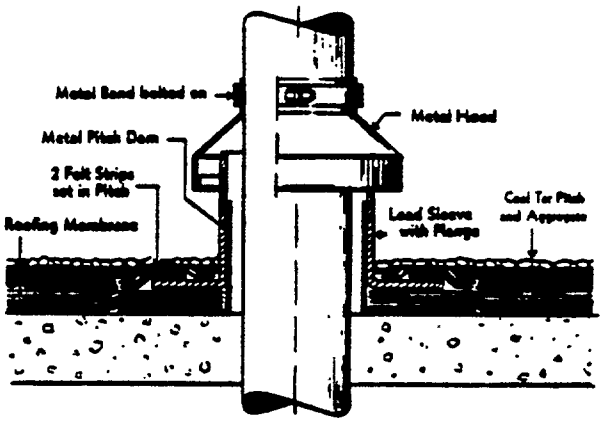
There are numerous flashing details that have been proven by experience over the years. There are normally a number of acceptable construction details for accomplishing one purpose. The architect should select a detail that best serves the purpose under the various and different conditions concerned with the specific job at hand. In certain cases, slight modifications are necessary to adjust a proven detail to job conditions or one method may serve better than another.

The details shown in this manual are some suggestions based on experience. Space limitations prohibit listing many others. Design or selection is a responsibility of the architect.

Koppers representatives are available to review flashing details to assist the architect in providing the best details for specific jobs.

Vent Pipes, Stacks, Flagpoles, and Other Projections

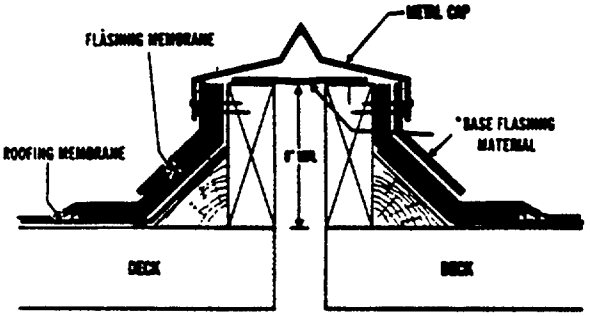




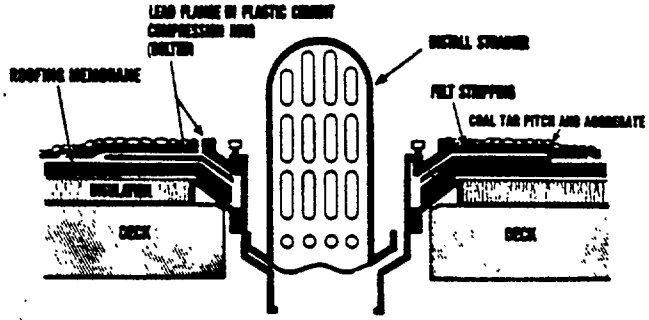
All vent pipes, stacks, flagpoles, or other projections penetrating the built-up roofing, whether indicated on drawings or not, must have a proper metal sleeve flashing with flange, pan flashing with flange or other flanged flashing installed.

Behind metal sleeve and beneath roofing membrane next to deck install metal pitch dam as shown in detail. The sheet metal flange must be cemented to the surface of the felt with a mopping of hot coal tar pitch. Over flange apply, with alternate moppings, two (2) reinforcing plies of tarred felt so that the first extends not less than three (3) inches beyond the outer edge of the flange and the second not less than six (6) inches.

Curbed Expansion Joint



Roof Drain



Curb expansion joints are to be flashed in accordance with Koppers specifications for parapet walls and must provide nailing to hold metal cap and flashing membrane in place. Metal cap must be designed to expand so as not to disturb flashing.

It is the responsibility of the designer of the building to provide for adequate expansion joints.

For the protection of the roofing system against splits caused by expansion and contraction, Koppers recommends that an expansion joint be installed: (1) on large roof areas at least every 200 feet in each direction, (2) at all places where the structural supports and roof assembly change direction, (3) where type of deck material changes, (4) where control, expansion, or contraction joints are provided in structural steel, deck material, or deck system.

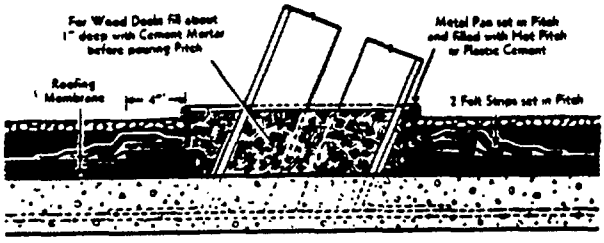
All roof drains shall be provided with metal roof drain flashing flanges which extend at least 12" beyond drain opening and shall be stripped with felt in accordance with drain detail. All drains should be provided with expansion joint sleeves.

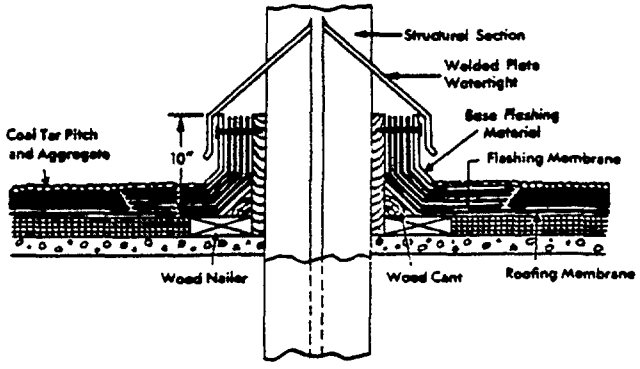
The sheet metal flange furnished with the drain must be cemented to the surface of the felt with hot coal tar pitch or flashing cement. Over the flange apply, with alternate moppings or trowelings, two (2) reinforcing plies of tarred felt so that the first extends not less than three (3) inches beyond the outer edge of the flange, and the second not less than six (6) inches.

Roof drains must be of a type provided with a wide lead or copper flange. Strainer construction should provide adjustment for meeting variations in roof level or slope.

FLASHING DETAILS (continued)

Future Columns, Sign Supports and Angle Irons





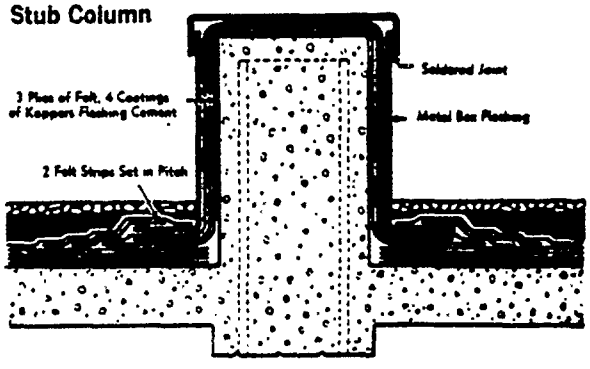
At all locations where future columns, sign supports and angle irons are to penetrate built-up roofing, pitch pockets should be provided with a flanged metal pan.

The sheet metal flange must be cemented to the surface of the felt with hot coal-tar pitch or flashing cement. Over the flange apply, with alternate moppings, two (2) reinforcing plies of tarred felt so that the first extends not less than three (3) inches beyond the outer edge of the flange and the second not less than six (6) inches.

Fill metal pan with hot coal-tar pitch or flashing cement. Paint exposed sections of all reinforcing rods with dampproofing paint.

As an alternate to the installation of pitch pockets wooden curbed base units with cant strips can be installed to accept a standard built-up composition-base flashing. Intricate metal cap flashings for this unit must be fabricated and continuously welded to the projection to assure a watertight metal cap.

Stub Column



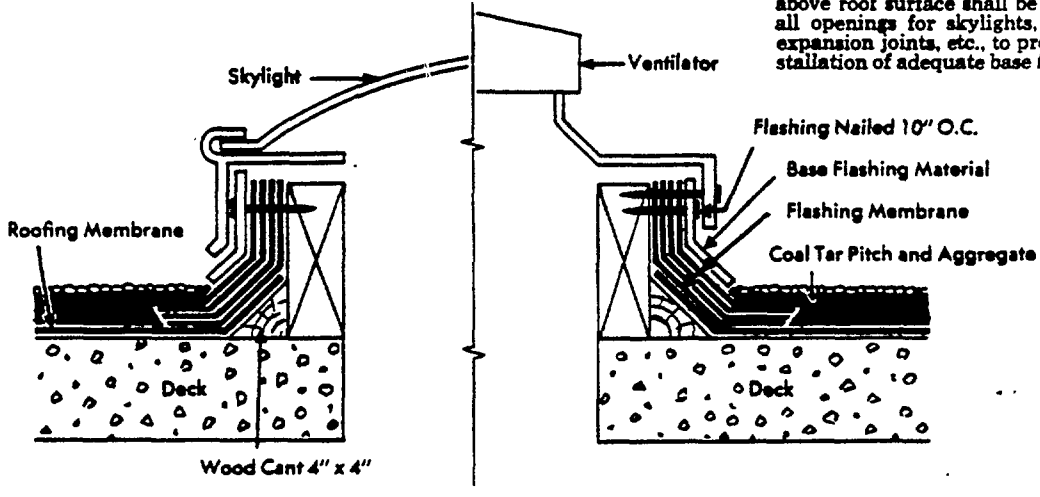
Exposed surface of all stub column projections must be protected with 3 plies of tarred roofing felt cemented on with a trowel application of Flashing Cement. Felt is to be carried out onto the surface of the roofing felts so that the first extends not less than three (3) inches, the second not less than four (4) inches, and the third not less than five (5) inches.

Trowel over the entire surface of felts just applied, one (1) coat of Flashing Cement.

All stub column projections must have a metal box flashing with flange furnished and installed over the cemented felts.

The flange of the metal box flashing must be cemented to surface of the roofing felts with a mopping of hot coal tar pitch. Over the flange apply with alternate moppings, two (2) reinforcing plies of tarred felt so that the first extends not less than three (3) inches beyond the outer edge of the flange and the second not less than six (6) inches.

Roof Opening

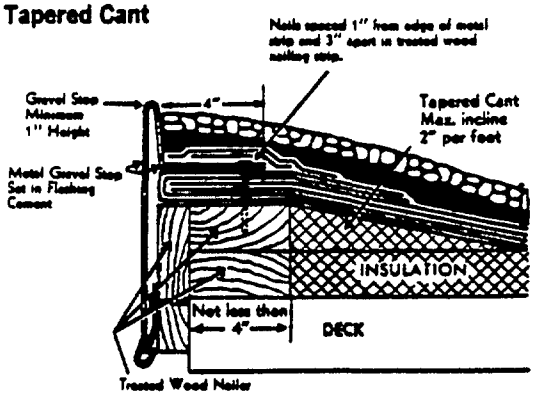


Curbs extending 8 inches to 12 inches above roof surface shall be provided at all openings for skylights, ventilators, expansion joints, etc., to provide for installation of adequate base flashing.

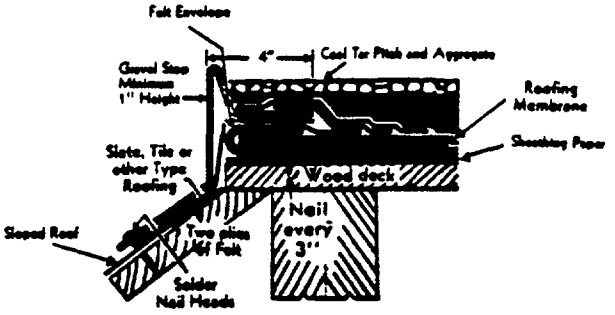
FLASHING DETAILS (continued)

EDGE DETAILS

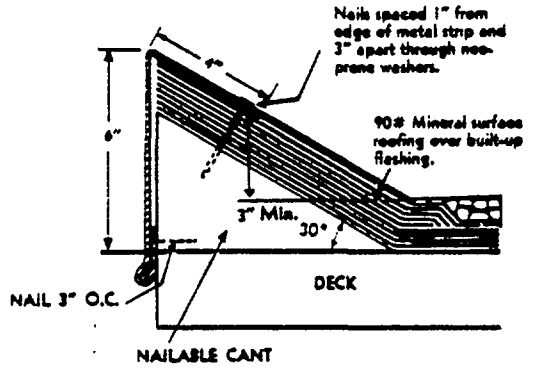
Tapered Cant



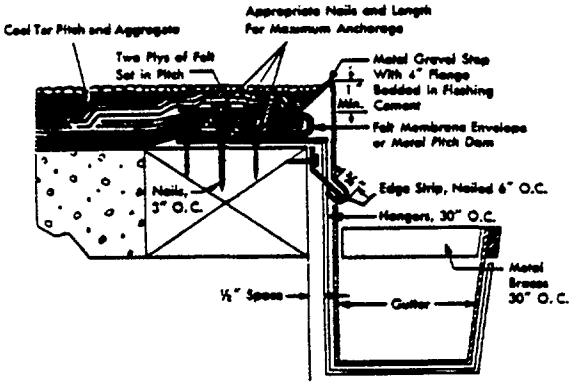
Flat and Steep Junction



Raised Edge

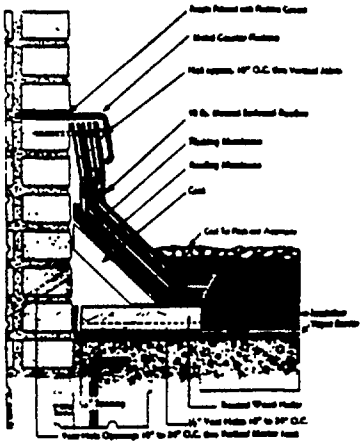


Hanging Gutter

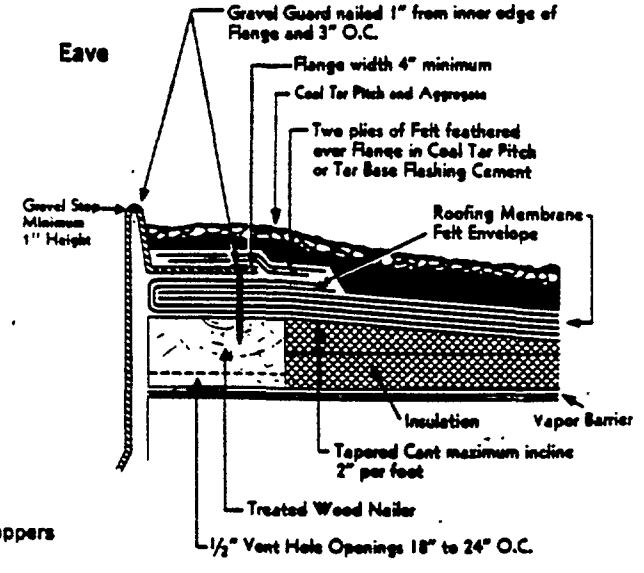


VENT DETAILS

Parapet Wall



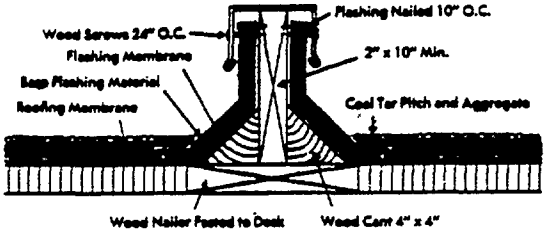
Eave



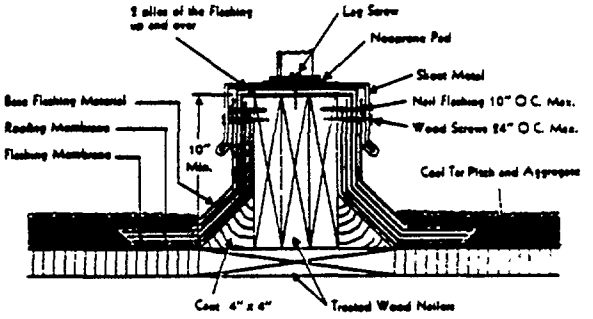
NOTE: For Mushroom Vent details, see page 26 and refer to Koppers Supplemental Specifications.

FLASHING DETAILS (continued)

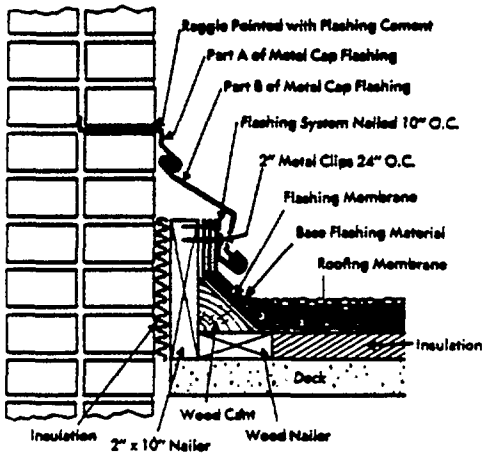
Relief Joint



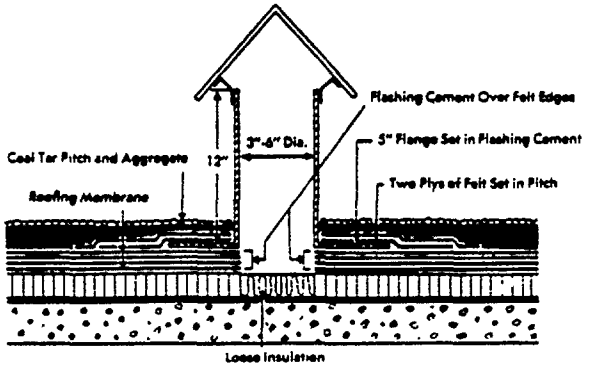
Equipment Support



Isolated Flashing For Movement

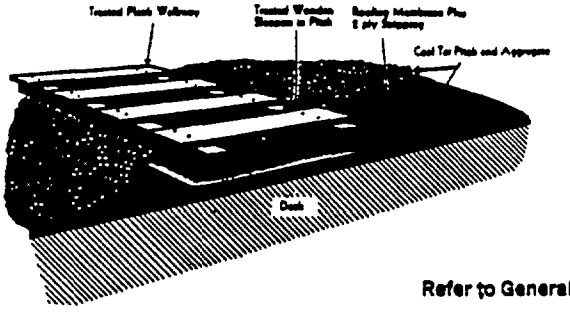


Roof Vent

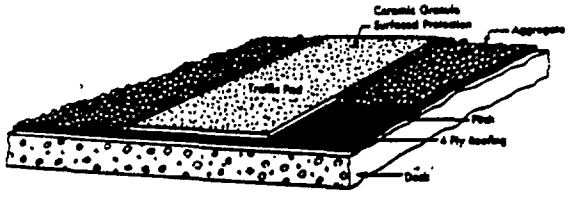


WALKWAYS

Treated Wood Walkway



Traffic Pad



Refer to General Requirements, page 5.

Waterproofing and Dampproofing

Waterproofing and dampproofing requirements vary from one project to another. No two sets of requirements are precisely the same. Selection of materials and reinforcement, if required, must be given considerable thought, since after installation there is little chance if any to correct an under-specified system or inadequate materials.

Experience has proven, that when difficult protection problems have been encountered, coal tar waterproofing and dampproofing systems have been selected and proven equal to the task.

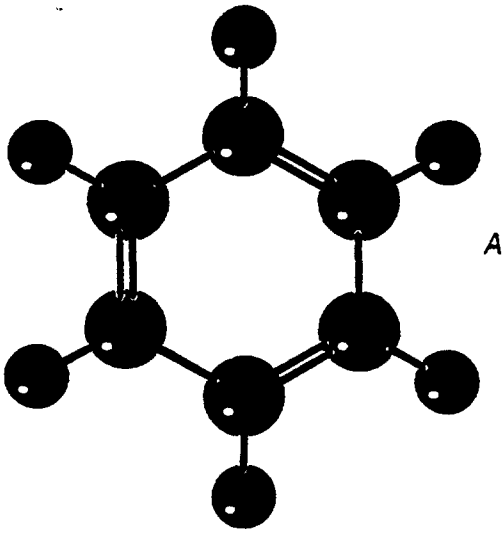
Various systems which can be tailored to the specific needs of a project are offered by Koppers Company, Inc. These systems are primarily based on the superior waterproofing characteristics of coal tar.

A copy of Koppers manual on Waterproofing and Dampproofing is available upon request.

Contact your local Koppers representative or the District office serving you listed on the back cover.

Koppers Built-Up Roofing Supplemental Specifications
A copy of this manual is available upon request. Contact your Koppers representative or the District office serving you listed on the back cover.

Benzene Ring . . .
building Block of Coal Tar



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Koppers Architectural Student Design Competition

Each year for a number of years Koppers has sponsored an architectural design competition. The competition is offered on a selective basis to various accredited schools of architecture, nationwide. It is intra-scholastic only, with separate and identical awards being made to the winning student at each participating school.

Participation is offered to fourth year or sub-senior students only. The program is designed to be incorporated into the regular fourth year curriculum in which all sub-senior students would be involved.

Awards consist of a $1,000 grant for tuition assistance at each of the several participating colleges and universities. In such cases where tuition costs may be less than $1,000, the balance of this fund is placed at the disposal of the head of the Department of Architecture for use in furthering the educational aims of his department.

Additional information and complete details can be obtained by writing Koppers Co. Inc., Architectural Student Design Competition.

flat roof design competition for architectural students

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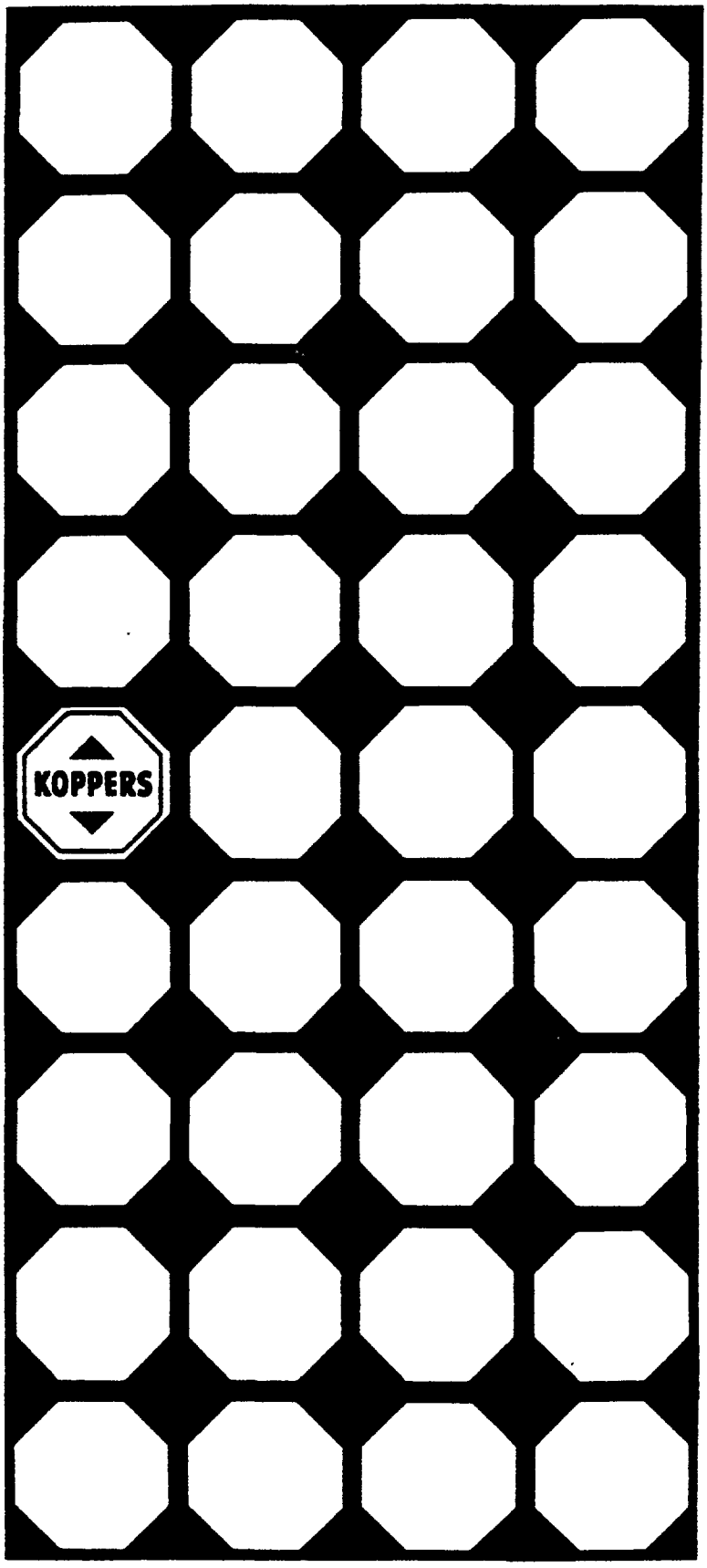

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