Chapter 4-7: Thermal and Moisture Protection

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4-7.01 General

4-7.01A Work Included

Division 07, *Thermal and Moisture Protection*, deals with materials and applications that prevent moisture from entering the building area, such as moisture barriers and roofing. It also covers materials that help to protect the building area from excessive heat and cold, such as insulation and sprayed-on fire protection.

The work described in Division 07 will normally include: bituminous waterproofing, sheet waterproofing, water repellent coating, water repellent sealant, insulation general, batt insulation, insulation for pre-engineered steel buildings, rigid wall insulation, loose fill insulation, rigid roof insulation, sprayed-on fireproofing and through-penetration firestopping, asphalt shingle roofing, wood shingle roofing, wood shake roofing, clay tile roofing, concrete tile roofing, metal roof and siding, metal roofing, built-up roofing, sheet metal flashing, roof specialties, skylights, joint sealant, and caulking.

Helpful information, including a more extensive glossary of roofing and waterproofing terms, can be found in the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual.

Review any Standard Special Provisions (SSPs) from Section 99[1], *Building Construction,* Division 07, *Thermal and Moisture Protection*, that have been included in the project *Special Provisions*, since much of the information therein typically will not be repeated in the following sections of this chapter.

4-7.01B Tips & Suggestions to Prepare for Inspection of Thermal and Moisture Protection

1. Confirm wood nailers, stops, furring, and battens have been provided, as required, in the locations where rigid insulation is to be installed.
2. Confirm vapor barrier seals on the insulation for both roof and walls are installed at all gravel stops, roof edges, walls, and openings in the walls.
3. Confirm installation is completed in accordance with the manufacturer's recommendations and that the fasteners are of the type, style, and size specified or recommended by the manufacturer.
4. Rigid insulation joints should be staggered, except where the joints are to be taped.

[1] Caltrans internal link only

5. When two layers of ridge insulation are required, the vertical joints should be installed offset from each other. Insulation should be covered by roofing or otherwise protected at the completion of each day's work.
6. Confirm components for fire-rated assemblies are installed in accordance with the project plans, *Special Provisions*, and Fire Code.
7. Confirm the insulation is of adequate width to fit snugly between the framing members and is of specified thickness or R-value.
8. Confirm the facing or vapor barrier is in accordance with the project plans and *Special Provisions*. Insulation should be properly secured in place with wires or fasteners in accordance with the manufacturer's recommendations.
9. Reflective vapor barrier material is to be installed with the reflective material in the correct direction. Refrigerated spaces will reverse the installation.

4-7.02 Waterproofing

4-7.02A Bituminous Waterproofing

This work shall consist of furnishing and applying a bituminous waterproofing membrane. Bituminous waterproofing membrane shall consist of a coating of primer; a bonded, continuous membrane composed of two layers of asphalt-saturated glass fabric and three moppings of waterproofing asphalt.

4-7.02B Sheet Waterproofing

This work shall consist of furnishing and installing a pre-molded bituminous sheet waterproofing system. The pre-molded membrane waterproofing system shall consist of an adhesive or primer coating, a pre-molded bituminous sheet, mastic for sealing the edges of the sheet, and a protective covering attached to the exposed bituminous sheet. This work should include an informational submittal which shows the type of system the Contractor plans on using.

4-7.02C Water Repellent Coating

This work shall consist of cleaning and placing a silane sealant on exterior concrete surfaces and on those interior concrete surfaces that will not be covered by insulation, framing, paneling, or other construction materials.

These materials are usually used on masonry block or concrete walls. They consist of chemical coatings that can be applied to the walls with spray equipment, rollers, or brushes. The products should be as authorized in the submittals and be applied at the specified rates as required. The best way to do this is to calculate the wall area and determine the quantity required for each building. It is important to clean the walls before application by water blasting or other methods.

4-7.02D Water Repellent Sealant

This work shall consist of furnishing and applying water repellent coating to concrete or masonry surfaces. The water repellent coating must be applied to all exterior concrete or masonry surfaces and exposed aggregate surfaces.

4-7.03 Insulation

4-7.03A Insulation (General)

There may be a variety of insulating materials shown on the project plans, such as the following:

1. Flexible - batt and blanket, as shown in Figure 4-7.1.
2. Loose-fill - pellets, mineral wool, or wood products.
3. Reflective - similar to flexible, but with a reflective cover.
4. Rigid - usually a fiberboard material manufactured in sheets, which is made from processed wood or sugarcane; see Figure 4-7.3. Can also be materials such as polystyrene or chemical foam, which becomes rigid.



Figure 4-7.1. Batt Insulation in Walls

Insulating materials are rated by R-value. The “R” stands for resistance and is a number that expresses the resistance of a material to the transmission of heat. It is the inverse of the thermal conductivity (“U”) of the material. The higher the R-value, the better the material is as an insulator. All materials have an R-value. Drywall, 1/2-inch thick, will have an R-value of 0.45. A piece of 1/2-inch plywood sheathing has an R-value of 1.32.

Most building materials are permeable to water vapor. In cold weather, water vapor may pass through walls and ceilings and condense in the walls or in the attic. This condensation will damage both the exterior paint and interior finish. To prevent this damage, a material highly resistant to vapor transmission, called a vapor barrier, shall be used on the occupied side of the wall or ceiling. Among effective vapor-barrier materials are asphalt laminated paper, aluminum foil, or plastic film. Most batt and blanket insulations have a vapor barrier on one side.

4-7.03B Batt & Blanket Insulation

Batt insulation shall include faced and unfaced batts in walls and ceilings, acoustical batts for sound control, and exposed batt or blanket insulation for ceilings and walls, as shown in Figure 4-7.2.

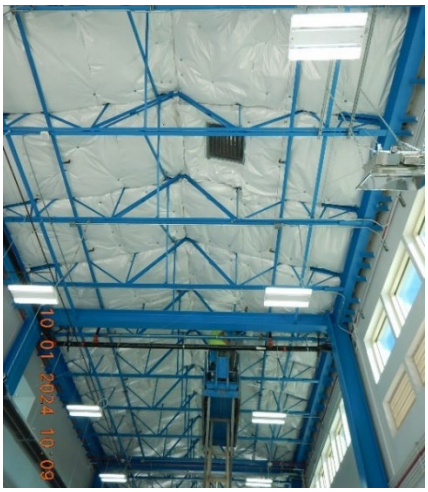


Figure 4-7.2. Batt Insulation in Ceiling

Fiberglass batts or blankets usually have R-values that range from R-13 to R-30 and come in widths that fit standard stud or joist spacings of either 16 or 24 inches. In addition to fiberglass, batts and blankets may be made from rock wool, wood fiber, or cotton. Project architects may specify that the insulation have a vapor barrier on one side. This usually consists of aluminum foil, asphalt, or plastic-laminated paper. The vapor barrier is always placed on the side of the wall or ceiling where the temperature is controlled and the room occupied by people.

Blankets come in rolls of varying widths and lengths, depending on where and how they are to be used in the system. These blankets are usually used in pre-engineered steel buildings. The batts are faced with either a vinyl or foil vapor barrier. Because of their size, they are also usually reinforced. Manufacturers will provide product data bulletins and other instructions to detail the installation and to direct how the facing on the blankets is to be sealed. They will often provide an adhesive tape that will provide continuity to the vapor barrier. In some instances, the blankets or the vinyl face material will drape between the purlins in the roof system to allow for the installation of additional

unfaced batts to be placed on top of the blankets to fill the voids in the purlins and provide an R-30 rated roof system.

The Project Architect will often design a wood or metal stud framed wall system on the side walls of pre-engineered steel buildings. In these instances, conventional batt insulation will be installed in the cavity between the wood studs, and the wood studs are then faced with plywood sheathing. This provides a more durable wall finish to the inside of the space.

When checking the installation of insulation, make sure the Contractor is using the correct insulation in the correct locations. All spaces in walls and ceilings must be filled. Proper insulating tapes and sealers must be used around doors, windows, pipes, and receptacles. Verify that the proper 3-inch clearance is maintained around heat-producing electrical fixtures.

Exposed insulation is typically seen in storage areas or shops. A white plastic vapor barrier is usually specified to control moisture and keep the insulation in place. This vapor barrier is supported on wires of specified spacing, pins, or as per the project *Special Provisions*.

Some materials with high reflective properties, such as aluminum foil, sheet metal with tin coating, or paper product coated with a reflective oxide composition, can be used to retard heat transmission by radiation and reflect heat back into the room.

4-7.03C Insulation for Pre-Engineered Steel Buildings

Insulation for pre-engineered steel buildings will normally be blanket insulation for ceilings and walls. Insulating materials and details of fastening and support systems shall be compatible with the pre-engineered building being furnished and shall be of a type approved by the building manufacturer.

Vapor retarder requirements may be waived for certain alternative systems that have a suitable finish on the exposed surfaces. Additional information may be found in SSP 99-13121, *Pre-engineered Steel Building*.

4-7.03D Rigid Wall Insulation

Rigid insulation systems shall include the insulation boards, wood nailers, fasteners, and any other materials not explicitly mentioned that are required for a complete installation of the system.

4-7.03E Loose-Fill Insulation

This work shall consist of furnishing and pneumatically placing loose-fill insulation in existing stud walls; this is commonly referred to in the field as “blown-in insulation.”

4-7.03F Rigid Roof Insulation

Rigid insulation systems shall include rigid insulation boards, underlayment, wood nailers, fasteners, and any other materials not mentioned that are required for a complete installation of the system; see Figure 4-7.3. Materials and installation shall be coordinated with the roof covering system to meet the requirements for a Class 1 Factory Mutual approved assembly. Follow manufacturer’s recommendations for installation.



Figure 4-7.3. Rigid Roof Insulation on Metal Decking

4-7.04 Fireproofing

4-7.04A Sprayed-on Fireproofing

Steel framing loses its strength when subjected to extreme heat. To protect the steel from fire damage, a thickness of one inch or more of sprayed-on fireproofing is applied on the steel members. For this type of work, in most cases, a certified fireproofing inspector will be required. The applicator will also be required to furnish a certificate of compliance for the application.

Sprayed-on fireproofing is normally not required. In the event it should be specified, please contact the Project Architect for any special points of inspection to be made. Those requirements may call for the cleaning of all surfaces to receive the sprayed-on fireproofing so they are free of oils, grease, paints, primers, loose mill scale, dirt, or other foreign substances that might impair adhesion of the fireproofing.

The depth or thickness of the material must be in accordance with the *Special Provisions* to obtain the required fire protection rating.

4-7.04B Through-Penetration Firestopping

This material consists of a fireproof caulking to fill the void around a penetration through a fire-rated wall. It is important to use the proper type of caulking that is authorized. The State Fire Marshal will usually want to inspect this work, so coordinate inspection with the Contractor.

4-7.05 Roofing

4-7.05A Asphalt Shingle Roofing

Shingle roofing consists of asphalt-impregnated fiberglass shingles with a mineral wearing surface on top (also known as granules). Underlayment is generally required. A successful roof installation depends on the proper exposure (the portion of each shingle exposed to the weather) and the proper flashing around edges and projections through the roof.

4-7.05B Wood Shingle Roofing

Reserved

4-7.05C Wood Shake Roofing

Reserved

4-7.05D Clay Tile Roofing

Clay tile roofing shall consist of tile units, accessory tiles, underlayment, fasteners, sealants, flashings, roof jacks, and other components necessary to provide a waterproof installation. Workers who walk on the roof after laying this type of tile must become familiar with how to walk/step to avoid breaking tiles.

4-7.05E Concrete Tile Roofing

Concrete tile roofing shall consist of tile units, accessory tiles, underlayment, fasteners, sealants, flashings, roof jacks, and other components necessary to provide a waterproof installation. These materials are very heavy. The color and style must agree with the authorized submittal. Make sure that the materials are free from defects when placed. Underlayment must be placed horizontally as specified. Flashings must have the proper overlap with the tile materials. Workers who walk on the roof after laying this type of tile must become familiar with how to walk/step to avoid breaking tiles.

4-7.05F Metal Roof & Siding

Metal roof and siding systems shall consist of underlayment, prefinished metal roof and siding panels, gutters, downspouts, fasteners, sealants, snow guards, and other accessories and components required for a complete, securely fastened, and weather-tight installation. It is very important to use the proper type of fasteners for this type of roofing, so that the final product is waterproof.

4-7.05G Metal Roofing

Reserved

4-7.05H Built-Up Asphalt Roofing System

This type of roof is usually considered to be “hot-mopped asphalt” roll roofing. It is usually used at locations where there is not enough pitch (slope) on the roof for other types of roofing to work properly. It is made up of several layers of asphalt-impregnated material. Each layer is bonded to the layer below and along the seams with hot bitumen material, also known as asphalt. It is important that the material, when rolled out, has the proper overlap and that the temperature of the bitumen be as required by the *Special Provisions*. It is important to have a thoroughly cleaned surface before work begins and that flashings and projections are properly sealed with hot bitumen.

Verify the asphalt or pitch is not being overheated. To do this, check the kettle sheet metal flashing thermometer and confirm temperatures are within the manufacturer’s recommendations. If asphalt is being used, the heated requirements should be plus or minus 25 degrees Fahrenheit at the point of application. The kettle should not be heated above the flash point; check the material’s safety data sheet for information.

Confirm lapping, nailing, and the quantity of pitch or asphalt applied are in accordance with the manufacturer’s recommendations. Sufficient material should be applied between layers so that underlayment does not touch the underlayment beneath it, and that there are no bare spots.

Each day, all underlayment placed shall be hot mopped by the end of that day. This is required to ensure that both the deck under the underlayment and the underlayment material are not subjected to moisture before the next day’s work.

4-7.05I Sheet Metal Flashing

Reserved

4-7.05J Shingles & Roofing Tiles

Check all sub-surfaces and decking for cleanliness and defects before installation to confirm proper installation of the shingles and roofing tiles. Also verify that knot holes, splits, and other imperfections in the decking have been covered. Exposure and fastening of shingles and tile are to be in accordance with the authorized submittals. Provide starter courses where required by the project plans and the *Special Provisions*. Confirm manufacturer's recommendations for construction of valleys, open and closed hips, ridges, and required venting.

Check all flashings and counterflashings to ensure they are installed in accordance with the project plans and *Special Provisions*.

Fasteners for roofing materials shall not penetrate the underside of the decking material.

Confirm the underlayment and membrane are installed in accordance with the manufacturer's recommendation on the authorized submittals. Ambient temperature should be 40 degrees F and rising for the installation of roofing.

Confirm manufacturer's recommendations for underlayment and construction of valleys, hips, and ridges for concrete and clay tiles.

Confirm the requirement for mortar-set tile at hips and ridges.

Inspect the tiles carefully for broken, chipped, or cracked corners and pieces. Only whole, sound tile shall be acceptable for use.

4-7.05K Roofing & Siding Panels

When standing seam roof panels are specified as the roofing material, submittals and product data bulletins for the proposed materials will be submitted and authorized. Refer to the authorized submittals for specific details concerning the installation of the panels selected. Each manufacturer has different installation methods and procedures required to provide the necessary uplift and weather tightness warranties. Each manufacturer may also differ with items such as color fastness of the finishes, related flashings, counterflashing, and trim. Review the authorized submittals to become aware of the areas critical for your inspection.

Metal roof panels will likely require an underlayment to be installed between the roof sheathing and the underside of the roof panels. If required, check the nailing of the roof sheathing to verify it conforms to the requirements of the project plans and *Special Provisions* before allowing the underlayment to be installed.

The underlayment will start at the low eave and run horizontally along the roof. Each subsequent course will lap over the lower row so that any moisture migration will run off under the metal roof sheathing and not penetrate the occupied space. Refer to the authorized submittals to determine the requirements for the type and spacing of the fasteners used to secure the underlayment material.

The roof sheathing will generally include a channel-like trim member to be located next to the ridge into which the roof panels will terminate. There will be special requirements for caulking and sealing this trim member at the ridge.

Each assembly will normally have a pre-manufactured, pre-finished ridge cap, which will span across the ridge and attach to the channel accessory on each side of the ridge where the roof sheets terminate.

There will normally be an eave trim specified for the low eave of every roof sheet system. This low eave trim will normally attach directly on top of the roof sheathing, under the underlayment and under the roof sheet panel. That trim will normally have a 90-degree angle turning down the face or fascia of the low eave and provide a hemmed drip edge.

Additional flashings may continue down the fascia, and that will be shown on the fascia detailed drawings in the project plans and included in additional authorized submittals.

Every roof manufacturer will have a trim for the rake edge of each roof, which will provide for a starter panel. Any additional amount of metal components for the fascia at the rake of the roof will be shown on the project plans and in the authorized submittals.

All of the individual roofing systems will provide for a project-specific gutter system with downspouts that are compatible with their roof panels. Depending on location and condition, each gutter system may be attached differently.

Roof panels and all accessories will be pre-finished normally with a coil-coated material. That finish will be included as part of the submittals for authorization and will be the same for all the roof panels and all the accessories of a manufacturer’s roof system. It will be important to confirm that the delivered materials, the color of the panels, and the trim match the color samples per the authorized submittals.

It is important to review the authorized submittals for the metal roof assemblies to gain further insight into the construction process.

Authorized submittals for metal wall panels will contain information about the pre-finish, the accessories for trim, and closure of the wall panel system.

Assembled fascia and soffit systems, if specified, will have authorized submittals by the Project Architect prior to the start of the work. Those materials will also be pre-finished in the same manner as the roof panels. Product data bulletins should be reviewed, and the material matched against the authorized submittals. The authorized submittals will also have all the details for assembly of the fascia and soffit panel systems.

Fiberglass reinforced panels (FRP), if specified, will be called for on the finished schedule for the wet areas, such as small bathrooms and janitor closets. FRP is installed over the finished drywall, and the FRP system will include trim members for the top of the panels, joints between the panels, corners (both inside and outside), and base of the panels. Refer to the authorized submittals for the manufacturer's recommended procedures for installation. These panels are primarily attached with adhesive. The authorized submittals will include the type and make of adhesives and the manner in which the adhesive should be spread to secure the panels to the wall.

4-7.05L Membrane Roofing

Confirm that all deck surfaces are clean and free of foreign materials, wood nailers and sub-base are adequately secured, and surfaces are dry and ready for the application of hot materials. Test for moisture of the substrate if specified by the project plans and the *Special Provisions*.

All penetrations should be firmly in place, flashed, and ready for roofing. All sheet metal and roof accessories should also be in place before the roofer begins the installation.

Confirm materials are the type and quality specified per the authorized submittals, project plans, and *Special Provisions*. Roll roofing material should be stored upright on end and kept free of contact with the earth or moisture. Confirm the size, spacing, and type of fasteners required. Most submittals for fasteners and other related parts will be informational submittals; follow the manufacturer's recommendations for these items.

Each underlayment layer should be laid flat to prevent air pockets, wrinkles, or buckles. Broom layers as required.

Glass felts should not be broomed. Underlayment should not be "flopped", except for the application of cap sheets.

Confirm all surfaces are kept moisture-free during the installation.

A walking pad from the roof access ladder to the HVAC system on the roof is essential for built-up and membrane roofing. Asphalt breakdown often occurs when the roof materials are hot, soft, and stretched. Service personnel walking with heavy equipment can make permanent imprints and shorten the life of the roofing system.

4-7.05M Gutters & Down Spouts

Confirm the gutters are adequately supported and allow for movement. Check the size, type, and location of hangers to ensure conformance with the project plans, *Special Provisions*, and the authorized submittals. Gutters should be pitched (sloped), as required, to provide drainage to the outlets at the downspouts. Gutter joints should be lapped in the direction of flow.

Expansion joints, if specified, whether concealed or standing, should be provided midway between the outlets, downspouts, or as otherwise required on the project plans.

Confirm the scuppers are installed low enough not to dam water on the roof. Also confirm that overflow drains and scuppers are installed as required by the project plans and the *Special Provisions*.

Slip joints in the downspouts should be installed in the direction of flow. Confirm that hangers and straps are installed as recommended by the manufacturer in accordance with the authorized submittals.

Downspouts must be installed plumb and true, with the proper accessories for heads, scuppers, or linings. The downspout should terminate at drainage lines or at finished grade surfaces that will allow for positive drainage away from the buildings.

Keep in mind that only aluminum gutters can be painted. Galvanized gutters are paintable only after proper preparation.

4-7.06 Flashing

4-7.06A Sheet Metal Flashing

Confirm that the materials provided are of the type, shape, metal, gauge, fabrication, finish, and priming as specified in the authorized submittals.

Ensure that dissimilar metals are isolated. Copper and aluminum flashings are not to be in contact with each other or other metals. Copper and aluminum flashings are to be fastened with nonferrous metal screws. Verify the flanges are embedded in plastic cement, asphalt, or asphalt primed.

Confirm that expansion joints are provided and installed as called for on the project plans. The location of joints should be offset from drains, downspouts, scuppers, corners, or other outlets.

Confirm that flashing and counterflashing are coordinated with the structural section of the project plans.

Edge metal and sheet metal flashings should be lapped no less than 4 inches and attached with fasteners staggered at no more than 12-inch centers.

Laps in edge metal should be coated with a sealant on the horizontal flange and the vertical rise. The coating should cover the entire lap and be sandwiched between the members.

Ensure the Contractor coordinates the installation of flashing and counterflashing with the roofing and siding installation.

Confirm cant strips or nailers provided for fastening flashing to the roof deck are of the proper material and are secured properly. Also verify they provide venting if required. Flashings should be embedded and installed over the roof membrane assembly without additional roof membrane material.

Confirm the anchoring required for the lower edge of fascia metal. Also confirm the alignment and stiffness are acceptable.

Gravel stops should be flush with the roof deck unless otherwise specified.

Sheet metal shall include metal flashings, counterflashings, straps, gutters, downspouts, roof jacks, gravel stops, reglets, copings, scuppers, conductor heads, and screen-type vents. Premolded roof flashings may be used in lieu of sheet metal flashings where shown on the project plans.

4-7.06B Base Cap Flashing

Confirm that base flashings extend sufficiently up the vertical surfaces. The flange should be properly secured and embedded at least 4 inches above the roof membrane. Confirm that mopped underlayment or suitable membranes covering the flashings are provided.

Verify the seams are lapped, locked, or soldered as required.

Confirm flashings are securely anchored to the walls, pleats, or equipment mountings.

Counterflashing should be extended sufficiently into the adjoining walls (masonry or concrete) or into applied reglets and securely anchored and caulked.

Confirm that the ridge and hip flashings and venting are provided in accordance with the manufacturer’s recommendations per the authorized submittals. Check for the size,

gauge, anchorage, and laps, as well as the caulking and painting requirements set out in the product data bulletins. Confirm that valley flashings, whether opened or closed, are of the width, gauge, and are anchored, caulked, and painted in accordance with the project plans and the *Special Provisions*.

Confirm that stepped flashings are installed with the proper depth of insertion into the wall, the length of material attached to the deck, and that the laps are as specified. Plastic cement, as required, shall be used for all joints and connections between edges of roofing materials and flashings.

Ensure reglets are installed and anchored as specified in the project plans and *Special Provisions*. Confirm that the sheet metal penetration into the reglets is secure, tight, weatherproof, and caulked as specified by the project plans and *Special Provisions*.

Special flashings are provided for most louver and vent openings. Confirm they are installed in accordance with project plans and *Special Provisions*. Special flashings shall be watertight. Insect and bird screens, along with any shutters, should be provided as required by the project plans and *Special Provisions*.

Skylights, roof fans, hatches, and other equipment shall be installed in accordance with authorized submittals. These are normally mounted on their own curbs. Confirm that the flashing and counterflashing of the unit to curbs and the curbs to the roof are in accordance with the project plans and *Special Provisions*.

4-7.06C Metal Trim & Accessories

The metal roof and/or siding manufacturer will also provide a complete line of trim flashings, counterflashings, and other accessories. These will normally be pre-finished with the same coil coating procedure used for the roof panels. These accessories will include such items as complete rake and eave trim, gutters, downspouts, flashing, and counterflashing for door and window openings. Please refer to the manufacturer's data per the authorized submittals to determine how all of these trim members are to be installed. A complete assortment of caulking and sealants will also be included.

This material consists of prefabricated sections of pre-finished sheet metal, usually 24-gauge thickness. An underlayment is placed per project plans and *Special Provisions*. The direction of the underlayment is specified as horizontal; this is for wear resistance of the underside of the metal. The underlayment shall be placed with the specified overlap and be free of protruding nails. The metal sections shall be fastened with special clips as specified by the manufacturer. All flashings and projections through the roof need to be sealed as recommended by the manufacturer.

Flashing should have a high edge under the underlayment and a low edge over the underlayment. Ensure there is proper sealing around flashing.



Figure 4-7.4. Roof Jacks Placed in Shingle Roofing

4-7.07 Roof Specialties

Roof specialties shall include hatch-type heat and smoke vents, dome-type heat and smoke vents, roof hatches, prefabricated ridge ventilators, and prefabricated curb and equipment support units.

These are items such as vent stacks or roof jacks for plumbing, heating, and air conditioning, as illustrated in Figure 4-7.4. They are usually commercially available materials and must be made of the required gauge of metal. If there are no adequate markings on the materials to determine the correct metal thickness, a micrometer may be needed or a visual comparison to a metal of known thickness.

4-7.08 Skylights

These products are usually manufactured standard order items. The Contractor's authorized submittals will give the name of the manufacturer and the model number to be used. Installation will be in accordance with the manufacturer's recommendation.

Roof curbs are required for the support of all roof openings such as skylights. Those curbs will normally be designed to provide a minimum 8-inch-high curb above the upslope roof surface to allow for the installation of crickets and cants to be installed to change the roof slope and divert the water around the skylights, hatches, and other openings.

4-7.09 Joint Sealant

The sealed joint shall consist of tempered hardboard, expanded polystyrene, and a pourable joint seal.

4-7.10 Sealants

This work shall consist of furnishing and applying required sealants and caulking. These materials are to be used around windows, doors, and other openings in walls or roofs. They are generally off-the-shelf, commercially available materials. The Contractor shall verify the material meets the requirements of the *Special Provisions*.