Building Guide

Colorado Chapter of the International Code Council

Single Family Residential Re-roofing

This handout addresses the frequently asked questions regarding re-roofing and to list the typical inspection and installation requirements for common types of roofing materials.

Things to be aware of before starting

- Many jurisdictions have additional application requirements because of high winds or snow and ice buildup.
- Fire Resistant roofing materials may be required by your Building Department.
- If there is a Homeowners Association and a change in roof covering material is planned, it is advisable to contact them.
- Roof ventilation is required to meet IRC R 806, by most manufacturers for re-roofs.

Frequently asked questions

1. Is a permit required for a re-roof ?

Yes. Please contact your Building Department or the Authority Having Jurisdicition (AHJ) for requirments specific to your area.

2. May I, as a homeowner, do the re-roof myself?

Yes.

3. Will my roof be inspected?

Yes, the permit holder must call for inspection(s) required by jurisdictions.

The Colorado Chapter of the International Code Council is a professional organization seeking to promote the public health, safety and welfare to building construction. We appreciate your feedback and suggestions. To obtain a master copy of this building guide, please write to the Colorado Chapter of the International Code Council, P.O. Box 961, Arvada, CO 80001.
http://www.coloradochaptericc.org

Follow chapter 9 and referenced sections in the IRC for all re-roofs.

4. How many layers of roofing are allowed?

Contact your local building department or AHJ.

5. What should be done with the existing Pipe jacks, vents and flashing?

- Replace damaged, rusted, or deteriorated flashings.
- Be careful not to dislodge flue vents.
- Loose flue vents are to be secured or strapped.

Common Steep Slope Roof Details

1. Sheathing

- Repair or replace warped, cracked, or delaminated boards or plywood sheathing.
- Gaps between sheathing should be no more than 1/4-inch or per the manufacturers requirements.
- Ensure sheathing is nailed to meet IRC Section R803.

2. Drip Edge

- Drip edge shall cover any gap between the roof sheathing and fascia by a minimum of 2-inches onto the roof deck.

3. Underlayment (felt)

- Apply new, approved asphalt impregnated felt or synthetic underlayment over DRY roof sheathing.

Underlayment (continued)

- For roofs with slopes of 4:12 or greater, one layer of underlayment is required. For roofs with slopes between 2:12 and 4:12, 19" laps of underlayment is required, starting with a 19" strip, then full sheets.
- For roofs with slopes of less than 2:12, a low slope roof membrane is required as approved by the AHJ.

4. Fasteners

- Fasteners must be long enough to penetrate through the total thickness of the roofing and a minimum of 3/4" into the decking material.
- For open soffits, contact your Building Department.
- Nails must not be over or under driven, the head must be flush with the shingle surface and located per the package instructions. Nails must be driven in perpendicular to the roof surface.

5. Attic Ventilation

- Roof ventilation is required in enclosed attics and rafter spaces (roof cavity) on new roofs and by most manufacturers on reroofs. Roof ventilation shall be installed per IRC R806.2 Minimum Vent Area. This equals 1 SF of net free ventilation per 150 SF of vented attic space.
- The minimum vented area can be reduced to 1/300 by following IRC section R806.2 for intake and exhaust ventilation requirements. A vapor retarder is required in climate zones 6, 7, and 8 to use 1/300.
- Refer to IRC R806.5 for unvented roof assemblies.
- Verify requirements with your AHJ.

6. Ice Barrier

- Ice barrier shall be installed in accordance with IRC R905.1.2 in areas where there has been a history of ice dams or ice build up at the eaves.
- Ice barrier should also be installed over roof sheathing in areas on an existing structure that have leaked due to ice dams or ice build up.
- Check with your AHJ for requirements on ice barrier.

For further important information, please refer to the manufacturer's installation instructions.

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Roofing material installation checklist for the successful installation and longevity of your new roof

Asphalt or Synthetic Shingles (3-Tab, Dimensional, Laminate, Thermoplastic, etc.)

Sheathing: Asphalt shingles shall be installed into solidly sheathed roof decking. Refer to the manufacturers installation instructions for requirements.

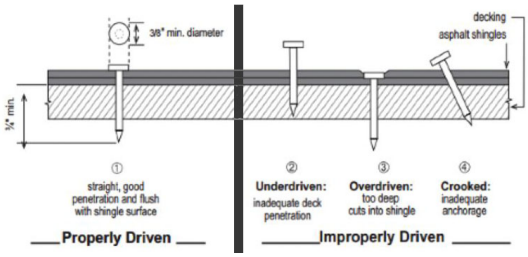
Underlayment: Install underlayment and/or ice barrier onto the roof deck and at roof to vertical wall transitions as specified by the manufacturer.

Starter Course: A full starter course with factory adhesive is required at the eave line fastened per the manufacturers installation instructions . to resist weather. Some manufactures may also require a starter course to be installed at the rakes or gables.

Shingle Offsets: Follow the manufacturer's shingle offset specifications.

Shingle Fastening: Fasten shingles with 4 nails per strip and 6 nails per strip in high wind areas (designated wind speed over 90 MPH).

- DO NOT nail into the factory applied adhesive.
- Locate fasteners per manufacturer's installation instructions.
- Fasteners are to be driven flush and not at an angle, under-driven, or over-driven.
- Seal exposed nails on asphalt shingles with asphalt cement or other sealant approved by the manufacturer.



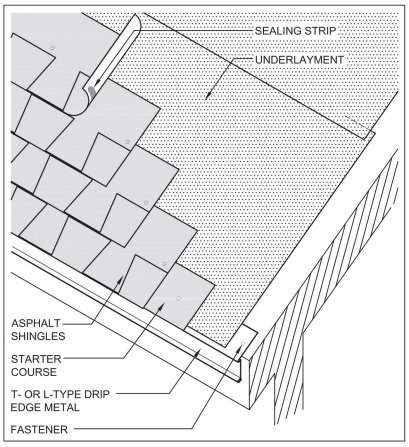
Flashings: Install flashings per 2021 IRC R903.2 at all wall and roof intersections, wherever there is a change in roof slope or direction and around roof openings.

- Replace any damaged or rusted metal flashings.Kick-out flashings: are required at the end of all side walls and shall extend a minimum of 2 inches past the wall.
- Penetrations: Install all pipe jacks and vents so that shingles are underneath the lower edge of the flange -- shingle over the top and sides at least past the point of roof penetration. Fasten at the top, sides, and lower edge. Seal exposed fasteners.

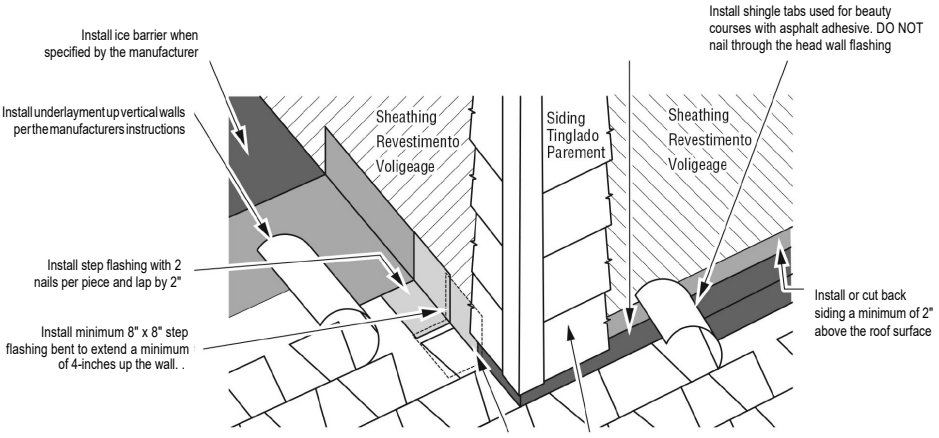
Valleys: Valleys are to be installed to meet the manufacturers installation instructions.

- Closed Cut Valleys: Are specified and preferred by most manufacturers for single laminate shingles.
- Open Valleys: Are specified and installed for heavier dual or triple laminate and some synthetic shingles. Verify application with the manufacturer.
- California Valleys: For those manufacturers that allow California style valleys using a bleeder shingle up the valley. The valley bleeder shingle must be fully sealed at the valley line along with the exposed tabs on overlying shingles.
- Metal pan flashing is not allowed to be installed in closed valleys by most manufacturers.

Chimneys: A cricket or saddle shall be installed on the ridge side of any chimney greater than 30" inches wide.



Shingle Installation Detail



Wall Flashing Detail

This Building Guide is meant as a general guideline. Follow the manufactures installation instructions and the requirements and contact your local Building Department or AHJ if you have questions on what is allowed in that jurisdiction.

Installations above 7,500 feet in elevation shall be installed with additional measures taken to protect against ice and water. Such as full ice barrier and special flashing details, Check with the building department or AHJ and the manufacturer to make sure your meet these requirements.

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Tile, Metal, Stone Coated Steel, and Special Roofs

- All roof types are to be installed per manufacturer's specifications and installation instructions. A complete copy of these specifications and installation instructions must be on site and available for the installers and the building inspector.
- These types of roofs should be installed for a cold weather climate.
- An engineered analysis of the roof structure is required if the roofing material type exceeds 10 lbs. per sq. ft.
- A mid roof inspection may be required for these type of roofs. Check with your local building department or AHJ.
- Roof coverings must be fastened to meet the required design wind speeds. Check with the Building Department or AHJ for required wind speeds. Fastening patterns should be provided by a licensed engineer, registered roofing consultant, or approved by the manufacturer to meet the required wind speed.
- Cutting of concrete, ceramic, and clay tile are regulated by OSHA to reduce exposure to silica dust. Follow OSHA guidelines when handling and cutting these materials.
- Most tile roofs, along with some metal shingles, stone coated steel and other roofs are to be installed onto horizontal battens. When installing roof systems with horizontal battens, use treated elevated battens or battens over vertical lath in combination with vented eave riser to prevent moisture and debris from accumulating under these elevated roof systems.
- Roofs installed with battens required double flashing of all penetrations at the roof level and on top of the roof covering.
- These types of roof systems are commonly installed with open valley metal containing a splash diverter at the valley centerline. Such as W-Valley Metal for Metal, Synthetic Tiles, and Synthetic Shingles; or Ribbed Valley Metal as used for Tile and Stone Coated Steel Roofs.
- A vented eave riser is required at the eaves for Tile Roofs and some Stone Coated Steel roofs installed in cold weather climates.
- Tile roofs can leak from broken or dislodged tile. Metal roofs are conducive to condensation during the winter months in cold climates and can "sweat" during warm weather, As such, it is recommended they be installed with a class I vapor barrier (ice and water shield) or class II vapor retarder (synthetic underlayment) installed at the roof deck with flashing at all vertical walls, openings, and penetrations at the roof deck.
- Metal roofs require a high temperature underlayment and/or high temperature ice barrier.

Mineral Surfaced Rolled Roofing

- Mineral Surfaced Rolled Roofing shall not be installed on roof slopes below 1:12.
- When installed over living space on slopes from 1:12 to 2:12 it is recommended that rolled roofing be double lapped (19-inch lap) and fully adhered or embedded in asphalt cement.
- Mineral Surfaced Rolled Roofing shall be installed in accordance with 2021 IRC 905.5 and the manufacturers installation instructions.

Low Slope Membrane Roofs

- Low slope membranes are required for slopes below 2:12.
- Common low slope membranes are modified, TPO (thermoplastic polyolefin), PVC (poly vinyl chloride), and EPDM rubber (ethylene propylene diene monomer rubber).
- Granulated modified roof membranes are common on residential roofing, as the granules are often available for an approximate match to roof shingle colors. Granulated modified membrane is available as self adhered (SA), torch applied (GTA), or cold applied (CA). All modified membranes are required to be installed with a heavy base sheet that is adhered to the roof deck to meet the required wind ratings.
- Most manufacturers require self adhered modified membrane to be heated at the seams with a hot air welder and rolled with a heavy roller to ensure full adhesion. Fish mouths and seam failure can occur if the manufacturers installation instructions are not followed.
- During winter months when there is a risk of freezing; use only winter grade self adhered, torch applied, or cold applied modified membranes. Mechanically attached or ballasted TPO, PVC, or EPDM roof systems can also be installed during winter months.
- Low slope membranes are typically required to extend a minimum of 8-inches up all curbs and 12-inches up walls if being terminated without being covered by siding or cladding. Membrane can also be installed up and over curbs and parapet walls. Follow the manufacturers installation instructions and check with the local building department or AHJ for specific requirements.
- Membrane should be terminated under siding or cladding at exterior walls or by using termination bar with a sealed caulk joint or counter-flashing.
- Drainage on low slope roof systems must meet the requirements of **2021 IPC Section 1106 Size of Conductors, Leaders and Storm Drains**.
- Low slope roofs often require a mid roof inspection. Check with your local building department or AHJ.
- Follow the manufacturers installation instructions when installing low slope membrane roofs.

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City of Aurora Development Services Development

REROOFING & DECK SHEATHING REQUIREMENTS

Building Division • 15151 E. Alameda Parkway, Ste. 2400 • Aurora, CO 80012
303.739.7420 • Email: permitcounter@auroragov.org

To all parties involved with reroofing and deck sheathing requirements:

The city of Aurora Building Division acknowledges both the IBC and IRC roof code sections for "solidly sheathed decks" **as well as** the manufacturer's installation instructions for asphalt roofing materials. Solidly sheathed roofs include structural panels such as plywood and oriented strand board (OSB) with 1/8" gaps between panels as typically required by panel manufacturers. Wood boards (space decking) are also considered solidly sheathed, provided the spacing between boards complies with the manufacturer's installation requirements. The city of Aurora does not determine the scope of work as this would be the contractor's responsibility to follow the code and all installation instructions as required by the manufacturer who determines what is considered solid sheathing for their materials. Individual non-compliant sections of decking needing to be repaired or replaced will not result in the remainder of the decking system to be replaced if the installation will be compliant with the manufacturer's installation instructions of the roofing materials being installed.

City of Aurora Development Services Department

ENGINEERING DESIGN CRITERIA

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CLIMATIC AND GEOGRAPHIC CRITERIA FOR THE 2021 I-CODES:

Roof Snow Load - P_f P_s	Calculate per ASCE 7-16 chapter 7 (Pergola 20 psf)
Ground Snow Load - P_g	40 psf
Basic Wind Speed - V_{mph}	Houses 105-110 Risk Category II, 110-115 Risk Category III, 120-125 Risk Category IV, 100-105 Risk Category I *See ASCE Hazard Tool (ascehazardtool.org) for site specific values*
Linear Interpolation is permitted between contours.	
Special Wind Region	No
Topographic Effects	No
Exposure Category	IRC R301.2.1.4 or IBC 1609.4.3
Seismic Design Category (IRC)	B
Seismic Design Category Commercial	Per IBC chapter 16 /ASCE 7-16
S_s and S_1	Per IBC 1613, site specific geotechnical report, or ASCE Hazard Tool
Weathering	Severe
Minimum Frost Depth for Foundations	36 inches
Winter Design Temperature	1 DEGREE (F)
Ice Barrier Underlayment Required	Yes
Flood Hazard	Varies – See City Code Chapter 70
Air Freezing Index	712
Mean Annual Temperature	50 DEGREES (F)
Rain Loads / Rain Intensity	Calculated per IBC 1611 or ASCE Hazard Tool
Soil Lateral / Bearing - IRC New Home	Per site-specific geotechnical report
Soil Lateral / Bearing - IRC - Other	Per site-specific geotechnical report or Table R401.1.1
Soil Lateral / Bearing - Commercial	Per site-specific geotechnical report

City of Aurora Development Services Department

ROOF INSULATION REPLACEMENT GUIDE

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Clarification regarding replacing thermal roof insulation on low sloped roofs:

The City of Aurora Building Division acknowledges and applies the adopted International Existing Building Code when determining code requirements for re-roofing an existing low sloped roof assembly where insulation is installed on the deck as part of the building envelope. That along with the requirements of the manufacturer's listing and labeling, and installation instructions shall be followed by the contractor for compliance.

Determination:

When undisturbed existing insulation materials that were approved at the time of its original approved installation are deemed to be in good condition by the contractor without being damaged or deteriorated, it is permitted to apply a new covering without the need to remove all materials to the deck. If a portion of the insulation is damaged or deteriorated and is required to be replaced, equivalent R value insulation is permitted to be installed provided the new insulation is compliant with the specifications of the new roof covering materials. If all existing insulation is deemed to be damaged or deteriorated past reuse, then it must be removed to deck and replaced at minimum with the current R value initially installed ensuring the R value hasn't been reduced.