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.

Frequently asked questions
1. Is a permit required to re-roof my house?
   Yes. Please contact your Building Department for requirements 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.

4. How many layers of roofing are allowed?
   Contact your building department.

5. May nail guns be used?
   If it is properly adjusted and is used correctly, a nail gun is allowed. (Refer to requirements under fasteners.)

6. What should be done with the existing roof jacks, vents and flashing?
   Roof jacks/vents must be raised to the level of the new roof and replaced if they are in poor condition, badly rusted or otherwise deteriorated.

7. What if my roof slope is less than 4:12?
   Contact your Building Department to learn about the requirements for low slope applications.

8. What about chimneys?
   A cricket or saddle shall be installed on the ridge side of any chimney greater than 30” inches wide.

   Roof Sheathing Preparation (For Complete Tear Offs)
   - The roof sheathing must provide a rigid surface.
   - Repair or replace all boards or sheathing which are warped, cracked or delaminated between supports.

   Underlayment (For Complete Tear Offs)
   - Apply new, minimum 15# asphalt saturated felt underlayment over a DRY deck.
   - 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, modified bitumen may be used.

   Fasteners (For All Roofs)
   - 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.
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Roofing material installation checklist for the successful installation and longevity of your new roof

Shakes and Wood Shingles
- Felt interlace on shakes shall be 18" type 30 installed at twice the weather exposure of the material. Example: 24" shakes with 10" exposure, felt is applied at 20" from the butt.
- Install type 30 felt under hip and ridge.
- Replace any damaged or rusted metal.
- Starter course at eaves shall be doubled.
- Minimum shake width of 4" required.
- Offset gaps from course to course with a minimum 1 1/2" side lap.
- Provide a 1/4" to 3/8" gap for shingles.
- Provide a 3/8" to 5/8" gap for shakes.
- Step flashing must be interlaced at roof to sidewall junctions.
- Raise flashing at jack vents and sidewall junctions.
- For hip and ridge caps double the first cap and alternate the overlaps. 10" exposure for 24" shakes and 7 1/2" for 18".
- A minimum 1 1/2" edge and 1" eave overhang is required. Two fasteners per shingle/valley 1" in from edge 2" up from exposure line.
- Shakes/shingles in valleys must be angle cut.
- Limit the number of exposed fasteners.
- Defective shakes, i.e. bark, knots, curling and thin areas are not permitted.

3 Tab or Laminate Shingles
- A starter course with factory adhesive at the eave line or a manufactured starter with a tar sealant is required.
- Fasten with 4 nails per strip shingle and 6 nails in high wind areas. Do not nail into the factory applied adhesive. Locate fasteners per manufacturer's instructions.
- There should be no tab offset joints closer than 4" between adjacent rows.
- Install all roof 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 down the lower edge.
- At roof to vertical junctions, shingle under the flashing.
- An edge and eave overhang of 3/8" - 1/2" is required.
- Closed, woven or open valleys must be properly installed.
- Replace any damaged or rusted metal.
- Nail heads must be flush with shingle surface, not penetrating the shingles or above shingle surface.

Modified Bitumen Roofing
- Check with manufacturer for proper underlayment and or substrate
- Check attachment for wind speed
- Use asphalt primer on metal
- Have installation instructions on site
- At side and head wall intersections, terminate cap sheet vertically and behind connecting 4" flashing

Tile, Metal & Special Roofs
- An engineered analysis of the roof structure is required if the roofing material type exceeds 7.5 pounds per square foot.
- These roofs must be applied as per manufacturer's specifications.
- A mid roof inspection may be required.
- A complete copy of the manufacturer's specifications and installation instructions must be on site and available for the installers and the building inspector.

Rolled Roofing
- Some rolled roofing is allowed for low slope roofs with a pitch as low as 2:12.
- Some rolled roofing may be used on a slope as low as 1:12 if it is installed using the concealed nail method or the double coverage method as per the manufacturer's installation instructions.
- For low slope applications, please contact your Building Department.
- An edge and eave overhang of 3/8" - 1/2" is required.

It is recognized that it may not be possible to satisfy all specific rules and regulations in all cases, particularly when re-roofing. If you have questions please call your Building Department.

This handout was developed by the Colorado Chapter of the International Code Council as a basic plan submittal under the 2012 International Residential Code. It is not intended to cover all circumstances. Check with your Department of Building Safety for additional requirements.
CHAPTER 9
ROOF ASSEMBLIES

SECTION R901
GENERAL
R901.1 Scope. The provisions of this chapter shall govern the design, materials, construction and quality of roof assemblies.

SECTION R902
ROOF CLASSIFICATION
R902.1 Roofing covering materials. Roofs shall be covered with materials as set forth in Sections R904 and R905. Class A, B or C roofing shall be installed in areas designated by law as requiring their use or when the edge of the roof is less than 3 feet (914 mm) from a property line. Classes A, B and C roofing required to be listed by this section shall be tested in accordance with UL 79O or ASTM E 108. Roof assemblies with coverings of brick, masonry, slate, clay or concrete roof tile, exposed concrete roof deck, ferrous or copper shingles or sheets, and metal sheets and shingles, shall be considered Class A roof coverings.

R902.2 Fire-retardant-treated shingles and shakes. Fire-retardant-treated wood shakes and shingles shall be treated by impregnation with chemicals by the full-cell vacuum-pressure process, in accordance with AWPA C1. Each bundle shall be marked to identify the manufacturer unit and the manufacturer, and shall also be labeled to identify the classification of the material in accordance with the testing required in Section R902.1, the treating company and the quality control agency.

SECTION R903
WEATHER PROTECTION
R903.1 General. Roof decks shall be covered with approved roof coverings secured to the building or structure in accordance with the provisions of this chapter. Roof assemblies shall be designed and installed in accordance with this code and the approved manufacturer's installation instructions such that the roof assembly shall serve to protect the building or structure.

R903.2 Flashing. Flashings shall be installed in such a manner so as to prevent moisture entering the wall and roof through joints in copings, through moisture permeable materials, and at intersections with parapet walls and other penetrations through the roof plane.

R903.2.1 Locations. Flashings shall be installed at wall and roof intersections; wherever there is a change in roof slope or direction; and around roof openings. Where flashing is of metal, the metal shall be corrosion resistant with a thickness of not less than 0.019 inch (No. 26 galvanized sheet).

R903.3 Coping. Parapet walls shall be properly coped with noncombustible, weatherproof materials of a width no less than the thickness of the parapet wall.

R903.4 Roof drainage. Unless roofs are sloped to drain over roof edges, roof drains shall be installed at each low point of the roof. Where required for roof drainage, scuppers shall be placed level with the roof surface in a wall or parapet. The scupper shall be located as determined by the roof slope and contributing roof area.

R903.4.1 Overflow drains and scuppers. Where roof drains are required, overflow drains having the same size as the roof drains shall be installed with the inlet flow line located 2 inches (51 mm) above the low point of the roof, or overflow scuppers having three times the size of the roof drains and having a minimum opening height of 4 inches (102 mm) shall be installed in the adjacent parapet walls with the inlet flow located 2 inches (51 mm) above the low point of the roof served. The installation and sizing of overflow drains, leaders and conductors shall comply with the International Plumbing Code.

Overflow drains shall discharge to an approved location and shall not be connected to roof drain lines.

SECTION R904
MATERIALS
R904.1 Scope. The requirements set forth in this section shall apply to the application of roof covering materials specified herein. Roof assemblies shall be applied in accordance with this chapter and the manufacturer's installation instructions. Installation of roof assemblies shall comply with the applicable provisions of Section R905.

R904.2 Compatibility of materials. Roof assemblies shall be of materials that are compatible with each other and with the building or structure to which the materials are applied.

R904.3 Material specifications and physical characteristics. Roof covering materials shall conform to the applicable standards listed in this chapter. In the absence of applicable standards or where materials are of questionable suitability, testing by an approved testing agency shall be required by the building official to determine the character, quality and limitations of application of the materials.

R904.4 Product identification. Roof covering materials shall be delivered in packages bearing the manufacturer's identifying marks and approved testing agency labels when required. Bulk shipments of materials shall be accompanied with the same information issued in the form of a certificate or on a bill of lading by the manufacturer.

SECTION R905
REQUIREMENTS FOR ROOF COVERINGS
R905.1 Roof covering application. Roof coverings shall be applied in accordance with the applicable provisions of this section and the manufacturer's installation instructions.

R905.2 Asphalt shingles. The installation of asphalt shingles shall comply with the provisions of this section.
R905.2.1 Sheathing requirements. Asphalt shingles shall be fastened to solidly sheathed decks.

R905.2.2 Slope. Asphalt shingles shall only be used on roof slopes of two units vertical in 12 units horizontal (2:12) or greater. For roof slopes from two units vertical in 12 units horizontal (2:12) up to four units vertical in 12 units horizontal (4:12), double underlayment application is required in accordance with Section R905.2.7.

R905.2.3 Underlayment. Unless otherwise noted, required underlayment shall conform with ASTM D 226, Type I, or ASTM D 4869, Type I.

Self-adhering polymer modified bitumen sheet shall comply with ASTM D 1970.

R905.2.4 Asphalt shingles. Asphalt shingles shall have self-seal strips or be interlocking, and comply with ASTM D 225 or D 3462.

R905.2.5 Fasteners. Fasteners for asphalt shingles shall be galvanized steel, stainless steel, aluminum or copper roofing nails, minimum 12 gage [0.105 inch (2.67 mm)] shank with a minimum V/4 inch (9.5 mm) diameter head, ASTM F 1667, of a length to penetrate through the roofing materials and a minimum of V/4 inch (19.1 mm) into the roof sheathing. Where the roof sheathing is less than V/4 inch (19.1 mm) thick, the fasteners shall penetrate through the sheathing. Fasteners shall comply with ASTM F 1667.

R905.2.6 Attachment. Asphalt shingles shall have the minimum number of fasteners required by the manufacturer. For normal application, asphalt shingles shall be installed on the roof with no less than four fasteners per strip shingle or two fasteners per individual shingle. Where the roof slope exceeds 20 units vertical in 12 units horizontal (20:12), special methods of fastening are required. For roofs located where the basic wind speed per Figure R301.2(4) is 110 mph (177 km/h) or greater, special methods of fastening are required. Special fastening methods shall be tested in accordance with ASTM D 1961, modified to use a wind speed of 110 mph (177 km/h).

Shingles classified using ASTM D 3161 are acceptable for use in wind zones less than 110 mph. Shingles classified using ASTM D 3161 modified to use a wind speed of 110 mph are acceptable for use in all cases where special fastening is required.

R905.2.7 Underlayment application. For roof slopes from two units vertical in 12 units horizontal (17-percent slope), up to four units vertical in 12 units horizontal (33-percent slope), underlayment shall be two layers applied in the following manner. Apply a 19-inch (483 mm) strip of underlayment felt parallel to and starting at the eaves, fastened sufficiently to hold in place. Starting at the eave, apply 36-inch-wide (914 mm) sheets of underlayment, overlapping successive sheets 19 inches (483 mm), and fastened sufficiently to hold in place. For roof slopes of four units vertical in 12 units horizontal or greater, underlayment shall be one layer applied in the following manner. Underlayment shall be applied shingle fashion, parallel to and starting from the eave and lapped 2 inches (51 mm), fastened sufficiently to hold in place. End laps shall be offset by 6 feet (1829 mm).

R905.2.7.1 Ice protection. In areas where the average daily temperature in January is 25°F (-4°C) or less or when Table R301.2(1) criteria so designates, an ice barrier that consists of at least two layers of underlayment cemented together or of a self-adhering polymer modified bitumen sheet, shall be used in lieu of normal underlayment and extend from the eave's edge to a point at least 24 inches (610 mm) inside the exterior wall line of the building.

Exception: Detached accessory structures that contain no conditioned floor area.

R905.2.7.2 Underlayment and high wind. Underlayment applied in areas subject to high winds [greater than 110 mph (177 km/h)] per Figure R301.2(4)] shall be applied with corrosion-resistant fasteners in accordance with manufacturer's installation instructions. Fasteners are to be applied along the overlap not farther apart than 36 inches (914 mm) on center.

R905.2.8 Flashing. Flashing for asphalt shingles shall comply with this section.

R905.2.8.1 Base and cap flashing. Base and cap flashing shall be installed in accordance with manufacturer's installation instructions. Base flashing shall be of either corrosion-resistant metal of minimum nominal 0.019-inch (0.483 mm) thickness or mineral surface roll roofing weighing a minimum of 77 pounds per 100 square feet (3.76 kg/m²). Cap flashing shall be corrosion-resistant metal of minimum nominal 0.019-inch (0.483 mm) thickness.

R905.2.8.2 Valleys. Valley linings shall be installed in accordance with manufacturer's installation instructions before applying shingles. Valley linings of the following types shall be permitted:

1. For open valleys (valley lining exposed) lined with metal, the valley lining shall be at least 24 inches (610 mm) wide and of any of the corrosion-resistant metals in Table R905.2.8.2.
2. For open valleys, valley lining of two plies of mineral surface roll roofing, complying with ASTM D 249, shall be permitted. The bottom layer shall be 18 inches (457 mm) and the top layer a minimum of 36 inches (914 mm) wide.
3. For closed valleys (valley covered with shingles), valley lining of one ply of smooth roll roofing complying with ASTM D 224 Type II or Type III and at least 36 inches (914 mm) wide or valley lining as described in Items 1 and 2 above shall be permitted. Specialty underlayment complying with ASTM D 1970 may be used in lieu of the lining material.
UNDERLAYMENT FOR SHINGLE ROOFING

UNDERLAYMENT FOR NORMAL SLOPES (4:12 and up)

Underlayment protects the roof sheathing from moisture absorption until the shingles are applied. Once the roofing is applied, the underlayment provides the sheathing with additional protection from wind-driven rain. The underlayment material should have low vapor resistance so that moisture does not accumulate between the underlayment and the roof sheathing. Only enough nails are used to hold the underlayment in place until the roofing shingles are applied.

Drip edges of corrosion-resistant metal protect the roof edge and allow water to drip free of the roof edge. They may be omitted on wood shingle and shake roofs since the shingles themselves form dries by projecting beyond the roof edge.

UNDERLAYMENT FOR LOW SLOPE ROOFS (3:12 - 4:12)

Eave Flashing is recommended whenever there is a possibility that ice might form along the eave and cause water to back up under the roofing shingle.

On normal slope roofs, eave flashing consists of 30 lb. smooth roll roofing extending up the roof to a point 24" inside the interior wall line.

On low slope roofs, an additional course of underlayment is cemented in place, and extended to a point 36" inside the interior wall line.

UNDERLAYMENT AND SHEATHING FOR SHINGLE ROOFS

<table>
<thead>
<tr>
<th>Roofing Type</th>
<th>Sheathing</th>
<th>Underlayment</th>
<th>Normal Slope</th>
<th>Low Slope</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fiberglass shingles</td>
<td>Solid</td>
<td>15 lb. asphalt saturated felt</td>
<td>4:12 and up</td>
<td>Single layer</td>
</tr>
<tr>
<td>Asphalt shingles</td>
<td>Solid</td>
<td>15 lb. asphalt saturated felt</td>
<td>4:12 and up</td>
<td>Single layer</td>
</tr>
<tr>
<td>Wood shakes</td>
<td>Spaced</td>
<td>30 lb. asphalt saturated felt (interlayment)</td>
<td>4:12 and up</td>
<td>Underlayment starter course; interlayment over entire roof</td>
</tr>
<tr>
<td>Wood shingles</td>
<td>Solid</td>
<td>30 lb. asphalt saturated felt (interlayment)</td>
<td>4:12 and up</td>
<td>Underlayment starter course; interlayment over entire roof</td>
</tr>
<tr>
<td>Wood shingles</td>
<td>Spaced</td>
<td>Not required</td>
<td>5:12 and up</td>
<td>Not required</td>
</tr>
<tr>
<td>Wood shingles</td>
<td>Solid</td>
<td>15 lb. asphalt saturated felt (interlayment)</td>
<td>5:12 and up</td>
<td>Not required but may be desirable to protect sheathing</td>
</tr>
</tbody>
</table>