

Minor Repairs To Asphalt Roll-Roofing Or Built-Up Roofing

Built-Up Asphalt Roofing System

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PART 1---GENERAL

1.01 SUMMARY

- A. This procedure includes guidance on making minor repairs to asphalt and built-up roofing membranes. Some problems include open lap joints, blisters, splits, holes, ridges, undulations, wrinkles and cracks.

1. Ridges:

NOTE: RIDGES SHOULD BE REPAIRED AS SOON AS POSSIBLE. CONTINUAL STRESS ON A RIDGE CAN LEAD TO SPLITTING OF THE MATERIAL.

- a. Ridges are firm and do not yield under pressure. They may result from the substrate being uneven before the felt was laid, or from moisture distorting the substrate.
 - b. Ridging usually occurs over or near joints between boards. The ridges expand as entrapped moisture vaporizes. Ridges become a problem when they interfere with drainage or when the roof begins to leak.
2. Undulations:
- a. Unlike ridging, undulations will yield to pressure.
 - b. Distortions of felts may result from the way the rolls were stored (flat instead of on end), inadequate pressure applied while laying, poor application of bitumen compound, or if entrapped moisture becomes vaporized.
3. Blisters:
- a. Blisters will yield to pressure.
 - b. Blisters begin with the expansion of trapped air and/or moisture pockets and can result from inadequate pressure during laying.
 - c. Full Membrane Blistering: Usually occurs when no separating layer is provided between the asphalt and the substrate.
 - d. Inter-layer Blistering:
 1. When large blisters result from additional air and water drawn in from outside through the top layer of the felt.
 2. Not a common problem, but can result if the 2nd layer does not adhere well to the 1st layer due to the accumulation of dirt or dust.

3. -OR-
- 4.
5. If a blow develops in the 1st layer, the 2nd layer become thin at that point and allow air and moisture to penetrate between the layers. This can create the potential for a blister to develop.
6. A blister ususally develops under the cap sheet of the membrane.
7. Inter-layer blistering is most common with unsurfaced or mineral surfaced felts on vertical or sloping surfaces. However, high performance membranes can reduce the incidence of this occurring.

4. Top Pitting:

NOTE: NO REMEDIAL TREATMENT IS RECOMMENDED, AS THIS TYPE OF BLISTERING SHOULD NOT AFFECT THE EFFICIENCY OF THE WATERPROOFING.

- a. Miniature surface blistering of the bitumen coating (especially with BS747 Type 1E and 2E mineral-surfaced felts).
 - b. The blisters may range in size from 1mm to 3mm.
 - c. Top pitting may be caused by:
 1. Trapped air and/or moisture in the manufacture of the material.
 2. Oliensis: Incompatibility of the saturating bitumen with the coating bitumen (i.e. oils from the coating separate as an incompatible reaction with the saturant bitumen).
 - d. If numerous across the surface, the coating may separate from the membrane and result in a loss of surfacing.
2. Cockling:
- a. Rounded ridging usually in line with the length of the material.
 - b. Cockles sometimes develop as a result of thermal expansion (especially with Polyester felts, which are heat sensitive). The heat from the bonding bitumen during application can create minor wrinkling or cockles which usually disappears as the material settles.
 - c. Most common in fiber and asbestos base felts as they tend to expand when their moisture content increases.
 - d. Cockling is less likely in coated felts especially those with a glass or polyester base.
3. Blowing:
- a. Blows are bubbles that develop on the surface from gas moving through the asphalt. The heat of the asphalt during application causes the air to expand and creates steam by raising the temperature of the moisture.

- b. Where there is no separating layer between the asphalt and the substrate.
- b. Problems with mineral-surfaced, asphalt roll roofing and built-up roofing membranes are usually related to sun exposure, and excessive moisture. Exposure to the sun may cause the asphalt to dry out, resulting in cracking of the surface, separation of plies, and may eventually require replacement of the entire membrane.
- c. The repairs described in this procedure are ONLY temporary. For roofs that are near the end of their useful life, these repairs may provide an extra 3 to 4 years of service, enough time to start planning for a new roof. For roofs that are relatively new, these techniques will provide protection while the cause of the problem is being investigated and more permanent repairs are planned.

1.02 REFERENCES

- A. American Society for Testing and Materials (ASTM)
- B. www.astm.org

1.03 DEFINITIONS

- A. Asphalt--A dark brown to black semi-solid hydrocarbon obtained from crude petroleum. See ASTM D 312-78.
- B. Asphalt cement--Trowelable black asphaltic mastic used for flashing and roof repairs. Contains fiber additives to thicken the mixture so that it will not run down vertical surfaces. Also called roofing cement, flashing cement, plastic asphalt cement, plastic cement, roofing tar, bitumen and elastic cement.
- C. Bitumen--A semi-solid mixture of complex hydrocarbons derived from coal or petroleum, as coal-tar pitch or asphalt; before application, usually dissolved in a solvent, emulsified, or heated to a liquid state.
- D. Built-up roofing--A continuous roof covering made up of laminations or plies of saturated or coated roofing felts, alternated with layers of asphalt or coal-tar pitch and surfaced with a layer of gravel or slag in a heavy coat of asphalt or coal-tar pitch or finished with a cap sheet; generally used on flat or low-pitched roofs.
- E. Bituminous coating--An asphalt or tar compound used to provide a protective finish for a surface.
- F. Coal tar bitumen--A dark brown to black, semi-solid hydrocarbon, a residue distillation of coal tar. It is used for the construction of low-pitch built-up roofs. It differs from coal tar pitch because of a different volatility. See ASTM D, 450, Type III.
- G. Coal tar pitch--Similar to coal tar bitumen. Used for dead-level or low-slope built-up roofs. See ASTM D 450, Type I.
- H. Lap cement--Thinner than asphalt cement, this is used to make watertight joints at the laps of roll-roofing.

- I. Roof restorant--The restorant penetrates the existing roofing felts and plasticizes the age hardened bitumen to its originally installed state. It will not, however, stop or seal leaks. In addition, a deep coating on the surface provides a weathering surface and a binder for the replacement aggregate. Also called roof coating or roof paint.

1.04 DELIVERY, STORAGE AND HANDLING

A. Storage and Protection:

1. Store roof system materials in a dry location. Outside, they should be placed on platforms off the ground or roof deck, covered with waterproof coverings which will not produce condensation.
2. Store roll materials on end to prevent their becoming deformed or damaged. Remove moisture, dirt, snow or ice from roofing bitumens before they are heated.
3. Replace lids on cans of material stored on the job site.
4. Protect water based materials from freezing.

1.05 PROJECT/SITE CONDITIONS

A. Environmental Requirements:

1. It is extremely important that the roof deck be dry at the time roofing operations commence, to avoid later problems with water vapor trapped under the membrane. A deck should not be roofed when rain, snow, or frost is present in or on the deck material.
2. Cold temperatures: Apply roofing materials only when correct bitumen temperatures can be maintained. "Wind chill" and surface temperature affects application temperatures. Keep surface temperature and asphalt thermometers at the work site.
3. Hot temperatures: In hot weather the bitumen will cool slowly, which can lead to sticking, making the membrane susceptible to physical damage from mechanical equipment and foot traffic.
4. Wind: Wind can blow hot materials, mastics and coatings causing damage to surrounding property and making the handling of roll materials difficult.

PART 2---PRODUCTS

2.01 MATERIALS

- A. Sand and/or gravel to match existing or historic appearance
- B. Asphalt Roof Felts:
 1. BS747 Type 1 fiber base felts - suffer from inter-layer blistering.
 2. Type 2 Asbestos base felts - inter-layer blistering is less common.
 3. Type 3 Glass fiber felts - Extremely resistant to blistering.
 4. Polyester felts - some resistance to blistering
- C. Asphalt cement (also called, among others, flashing cement or roofing cement)
- D. Roof Coating (also called roof paint and roof restorant)

- E. 1-1/2" Flathead galvanized roofing nails
- F. Turpentine

2.02 EQUIPMENT

- A. Utility knife or hook-nosed linoleum knife
- B. Hammer
- C. Trowel
- D. Stiff bristle brushes (non-metallic)
- E. Long handled brush or broom
- F. Ladders, scaffolding as required

PART 3---EXECUTION

3.01 EXAMINATION

- A. Inspect the surface for obvious cracks, blisters, or ridges in the membrane.
- B. Check also for bald spots, areas where the gravel (built-up roof) or mineral granules (roll roofing) are missing.
- C. Be especially diligent inspecting where the roof meets parapets, chimneys, vents, and other vertical surfaces.
- D. If possible, check the underside of the rafters and decking for water stains or rot which would indicate water infiltration, realizing that water can migrate through layers of roof plies from distant points.
- E. Check the interior, especially ceilings and around fireplaces and vent pipe locations, for clues as to the location of any leaks.
- F. See also roofing section of 01800-01-S, "Checklist for the Routine Inspection of Buildings".

3.02 PREPARATION

- A. Protection:
 - 1. When transporting liquid bitumen to the roof, protect adjacent surfaces and permanent equipment by providing masking or covering. Secure covering without the use of adhesive backed tape or nails. Impervious sheeting which produces condensation should not be used.
 - 2. Keep a portable fire extinguisher on hand where work is being done.
 - 3. At the end of each work day provide temporary roofing when existing roof is being opened for repair or replacement. Provide an effective way to divert water runoff away from open roof.
- B. Surface Preparation:
 - 1. Sweep exposed felts clean of loose aggregate, dirt and silt with stiff bristled brush or broom. Sweep at least six inches into embedded aggregate in all directions. Clean all roof surfaces, including parapets, copings, and flashings. Sometimes this can be done using a long-handled push broom. In the case of a

tar and gravel roof, you may have to cut the gravel off by hand or use a gravel removing machine. Parapet cleaning should include brushing of any efflorescence from the brickwork using stiff, non-metallic bristle brushes. Do not begin repair of flashings until completion of all pointing or resetting of parapet units and repair of coping joints.

2. Go over the entire roof area with roofer's chalk, marking areas where repair work is to be done.

3.03 EXECUTION, INSTALLATION, APPLICATION

A. Repairing open lap joints on roll roofing:

1. Force lap cement or asphalt cement under open seam. Weight it down with heavy weight until it is dry.
2. If it pops again, slit wrinkle being careful not to cut sound layers of roofing below.
 - a. Using 1-1/2 inch galvanized roofing nails secure both sides of the slit.
 - b. Using 90-lb. roofing felt, cut a patch large enough to cover the nail heads with a 2 inch overlap on all sides.
 - c. Coat the back of the patch with asphalt cement and press it into place over the nails.
 - d. Nail the edges of the patch with nails spaced about 1 inch apart and cover the nail heads with more asphalt cement.
 - e. Finish the patch by sprinkling light colored fine gravel or sand over the wet cement. **DO NOT ELIMINATE THIS LAST STEP. THE GRAVEL OR SAND REFLECTS SUNLIGHT THUS SLOWING THE DRYING OUT PROCESS.**

B. Repairing Small Blisters:

1. If no leaks are evident, apply a solar reflective treatment (see Section 3.03 B.3. below).
2. -OR-
3. Starcut the blister with a hook-nosed linoleum knife or a utility knife to release trapped air;
 - a. If the felt layers beneath the surface are dry proceed with the repair.
 - b. If they are damp, deepen the cut down to the wood sheathing and let the roofing dry out before proceeding. A portable electric heater-fan or hair dryer can be used to speed up the process.
 - c. Patch the area and apply a solar reflective treatment (see Section 3.03 B.3. below).
 - d. -OR-
 - e. Release entrapped moisture by installing drying units with evaporation tubes (see manufacturer's instructions for installation procedures).

4. If leaks are present, allow entrapped moisture to dry and then remove the felts and replace with new.
5. To Prevent Blistering: Apply chippings over the surface (a form a solar reflective treatment): Chippings are usually light colored, of limestone, granite, gravel, calcite or feldspar, 6-10 mm in size set in bitumen compound after the asphalt is laid.
 - a. Advantages of chippings:
 1. Helps cool the membrane.
 2. Helps hold down the membrane.
 - b. Disadvantages of chippings:
 1. Outlets may become blocked.
 2. Leaks in roof are difficult to locate and bonded chippings are difficult to remove.
 3. Alternatives of chippings include mineral-surfaced roofing and liquid-applied surface coatings (very effective on top of glass-base felts, but not so effective with others).

C. Repairing Undulations:

1. One alternative is to remove and relay the roof with new felts.
2. If not a serious problem, that is the problem will not be exacerbated by foot traffic on the roof, then an application of solar reflective treatment should aid in reducing the spread of undulations.

D. Repairing larger damaged areas on either built-up or roll roofing:

1. Cut out damaged plies leaving sound layers in tact.
2. Dip knife in turpentine periodically while cutting to keep the blade free of tar and felt fibers, and pull out the layers of felt individually.
3. If water has soaked the felt, remove all the roofing within the rectangle, down to the sheathing and dry the area thoroughly.
4. With the damaged area removed, apply asphalt cement under loose edges of cuts and over the entire cut out area.
5. Using 90-lb. roofing felt, cut out patches the same size as the cut-out. Press first patch into asphalt cement. Apply another coating of asphalt cement to cut-out and press another patch into place. Repeat process until the patch is even with the surrounding roof. The number of layers will depend on the depth of the cut-out.
6. Cut a final patch of either roofing felt or mineral roll roofing which will overlap the cut-out area by 2 inches on all sides. Cover the bottom of the final patch with asphalt cement, press in place, and nail edges with nails spaced about 3/4 to 1 inch apart. Cover nail heads with asphalt cement and sprinkle fine gravel or sand over, as in A.3. above.

E. Repairing cracks in Asphalt Flashing:

1. Clean the area of any gravel or other debris.
2. Coat area around crack with asphalt cement extending 6 inches beyond crack in all directions.
3. Lay a piece of 90-lb. roofing felt in the cement maintaining the 6 inch overlap.
4. Repeat steps (2) and (3).
5. Finish patch with a final coat of asphalt cement and lay sand or gravel on the horizontal surfaces.

F. If there are simply bald spots on the surface, sweep up any dirt and debris; paint area with roof coating and re- spread or add more gravel.

G. NOTE: DO NOT use reflective paints instead of sand or gravel, except on vertical portions of flashing. Though it is not fully understood why, reflective paints encourage wrinkling, a potentially serious form of deterioration.

H. Inspect patch at least twice a year to make sure it is still sound.

END OF SECTION