

## Built-Up Roofing (Modified) – (07 52 16)

1. All applicable parts of the General Roofing Specification (section 07 30 00) shall be included in this section.
2. Assessment of Built-Up Roof (BUR) (Modified) roofs
  - 2.1. A BUR roofing system shall be determined as a failed roof when any of the following conditions exist:
    - 2.1.1. When the existing structure is overstressed.
    - 2.1.2. When there is existing moisture within the system.
    - 2.1.3. When there is damage to the existing roof deck – rust, rot, spalling, etc.
    - 2.1.4. If there is significant loss of ply adhesion.
3. Roof Slope Use as defined in Part 7, General Roofing Specification (07 30 00)
  - 3.1. A BUR (Modified) roof can be used on the following roof slopes:
    - 3.1.1. Low Slope
    - 3.1.2. Transitional Slope with special fastening
  - 3.2. All roof cricket slopes shall be twice that of the main roof slope, if possible.
  - 3.3. Special conditions for slope of system
    - 3.3.1. The minimum slope for new building construction is  $\frac{1}{4}$  unit vertical in 12 units horizontal.
    - 3.3.2. The recommended minimum slope for new roofing on existing buildings is  $\frac{1}{4}$  unit vertical in 12 units horizontal.
    - 3.3.3. The absolute minimum slope for new roofing on existing buildings is “positive roof drainage”. Ponding in excess of 48 hours is not acceptable.
4. Repair or replacement of roof, not to contradict Part 6, General Roofing Specification (07 30 00)
  - 4.1. If a roof does not meet condition(s) for repair / restore / ~~rejuvenation~~ then roof replacement is the only required and allowed action.
  - 4.2. If the BUR system must be replaced, the existing BUR roofing shall be removed to the structural deck before any new roofing system is installed. Core Sample Analysis (or any other consistent method) will be the only deciding criteria to determine if the roofing system will be removed till the roof deck. If the Core Samples show enough adhesion between the layers by bearing the required moisture-less properties beneath the roofing membrane.

then only the roofing membrane will be replaced. This will be based on discussions between the Assessor and the SFB Staff in the Scope Confirmation Meeting.

4.2. -

- 4.3. For existing BUR with tapered insulation that does not contain excessive moisture the Registered Professional has the option to remove the existing roofing to the insulation or to the deck, if the existing tapered insulation is in good condition, dry and has properly been attached to the deck to meet wind uplift requirements it may remain and does not have to be removed. These decisions will be taken in the Scope Confirmation Meeting.
- 4.4. Additional information regarding what constitutes a failed BUR roofing system can be found in Part 2 of this section.
5. Demolition requirements
  - 5.1. All items as found in Part 10, General Roofing Specification (07 30 00).
  - 5.2. No special demolition requirements for BUR roofing systems.
  - 5.3. Protection of interior surfaces is required.
  - 5.4. Verification of conduit or through deck fasteners at exposed structures.
6. Back of parapet treatment
  - 6.1. BUR system shall be adhesively applied to the back of parapets as required.
    - 6.1.1. Height of the BUR membrane system applied to the back of parapets shall not exceed manufacturer's specified requirements.
  - 6.2. At locations where the membrane does not extend for the full height of the parapet, the surface shall be sealed with materials suitable to the substrate. The surface shall be weather sealed in a fashion appropriate for that type of wall.
7. High wall treatment
  - 7.1. BUR system shall be adhesively applied to high walls as required by manufacturer.
    - 7.1.1. Height of the BUR membrane system on high walls shall not exceed manufacturer's specified requirements.

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- 7.2. The BUR membrane on high walls shall not extend to a height where the material can be seen from the ground.
- 7.3. At locations where the membrane does not extend for the full height of the high wall, the surface shall be waterproofed with materials suitable to the substrate.
8. Components of a BUR system
- 8.1. ~~Rigid board insulation~~ Insulation or Substrate Board
- 8.1.1. Acceptable types are polyisocyanurate foam board, polystyrene board insulation and composite board insulation, thickness as determined by the Professional Registrant. R value will be determined based on the IECC for the new construction. For the existing construction, the scope will be determined in the Scope Confirmation Meeting.
- 8.2. Coverboard
- ~~8.2.1. A coverboard shall be used in all BUR assemblies.~~
- ~~8.2.2.8.2.1.~~ 8.2.1. Coverboards are required to provide the following functions:
- ~~8.2.2.1.8.2.1.1.~~ 8.2.1.1. To separate incompatible material.
- ~~8.2.2.2.8.2.1.2.~~ 8.2.1.2. To minimize thermal drift.
- ~~8.2.2.3.8.2.1.3.~~ 8.2.1.3. To protect rigid board insulation and provide rigid support for the roof membrane.
- ~~8.2.2.4.8.2.1.4.~~ 8.2.1.4. To provide system fire rating if required.
- ~~8.2.3.8.2.2.~~ 8.2.2. Acceptable types of coverboards will be:
- ~~8.2.3.1.8.2.2.1.~~ 8.2.2.1. Gypsum based coverboard
- ~~8.2.3.2.8.2.2.2.~~ 8.2.2.2. High density wood fiber.
- ~~8.2.3.3.8.2.2.3.~~ 8.2.2.3. Paper faced gypsum board shall not be used as a cover board.
- ~~8.2.4.8.2.3.~~ 8.2.3. The BUR system is acceptable as an overlay over an existing roofing system, as determined by the Professional Registrant and allowed per the local building code.
- 8.3. Modified Built-Up Roofing Roofing
- 8.3.1. The Modified BUR system shall meet ASTM Standard Specification test methods – ASTM D5147 and ASTM D2523.

8.3.2. Performance Criteria: Tensile strength and tear strength are extremely important relative to the long term performance of low slope roofing systems in Arizona. ~~Surfacing sheet information (data) available from participating manufactures tested per ASTM D5147 at 2 in./min @ 73.4 ±3.6° F, range from:~~

M i n i m u m	Tensile Strength MD	Tensile Strength XMD
	40 lbf./in.	50 lbf.
M i n i m u m	Tear Strength MD	Tear Strength XMD
	50 lbf./in.	50 lbf.
M a x i m u m	Tensile Strength MD	Tensile Strength XMD
	1000 lbf./in.	1100 lbf.
M a	Tear Strength MD	Tear Strength XMD

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<del>8.3.2.1-8.3.1.1.</del> <del>Given the tensile and tear performance range in the industry, it makes sense that the middle of the road performance would be good minimum criteria. This would result in the performance criteria shall be</del>	<del>850 lbf. in Tear Strength and 500 lbf./in in Tensile Strength, for a single ply, which is consistent with other manufacturers that are developing these materials; if a manufacturer does not meet the minimum performance criteria established for a single ply, they would have the opportunity to provide</del>	<del>multiple plies with combined performance that meets the minimum criteria. In a multi-ply BUR assembly, not to exceed three layers, the sum/composite of all layers must meet or exceed 1200</del>
<del>850 lbs. of tear strength and 800-500 lbs. of tensile strength in both machine direction (MD) and cross machine direction (XD) when tested per ASTM D5147 at 73.4 +/- 3.6 Degrees Fahrenheit, with no single layer being of less than 500 lbs. of tear strength and 340 lbs of tensile strength in both machine direction (MD) and cross machine direction (XD) when tested per ASTM D5147 at 73.4 +/- 3.6 Degrees Fahrenheit.</del>	<del>1750 lbf./in.</del>	<del>1800 lbf.</del>

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~~8.3.3-8.3.2.~~ The BUR design, specification and installation shall provide a 20-year minimum life. Proper installation is particularly important to the life of this roofing system and will require both third part quality assurance and quality control inspections as well as enhanced manufacturer inspections during the construction.

~~8.3.3. A hot applied membrane is recommended, but attachment with cold process is to be determined on a project basis as determined by the Professional Registrant. The determination of hot asphalt, cold adhesive or self-adhered membrane systems is a subject of discussion between the Assessor, Professional Registrant and the SFB Staff in the Scope Confirmation Meeting.~~

~~8.3.4.~~

~~8.3.4.1-8.3.3.1.~~ Fastener length for mechanically attached insulation or base sheet shall not exceed manufacturer requirements.

~~8.3.5-8.3.4.~~ The BUR roofing system shall have a twenty (20) year, no dollar limit (NDL) material and labor warranty to be provided by ~~the manufacturer~~ the manufacturer for all the types of roofing failures which will include roof leaks, blisters, ponding, sliding materials, loss of granules etc.

~~8.3.6-8.3.5.~~ A two year minimum material and labor warranty shall be provided by the Contractor.

~~8.3.7-8.3.6.~~ All materials shall meet low VOC standards.

~~8.3.8-8.3.7.~~ All products used shall not contain asbestos, lead, or other hazardous materials.

~~8.3.9-8.3.8.~~ All penetrations, curb flashings and corner flashings to be factory-fabricated. No field fabricated components permitted.

8.4. Roof mounted equipment / accessories

8.4.1. All materials to be compatible with the BUR roofing material.

9. Closeout Documents

9.1. All items as found in Part 16, General Roofing Specification (07 30 00).

10. Preventative Maintenance Criteria

10.1. All items as found in Part 17, General Roofing Specification (07 30 00).

11. Budgeting cost ranges

11.1. This part shall apply only to SFB budgeting and economic projections and analysis. Not to be used for anything else.

11.2. Budget costing for the Modified BUR roofing system is as follows:

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11.2.1. Low-range: \$10.00 - \$14.00 per square foot.

11.2.2. Mid-range: \$14.00 – \$16.00 per square foot.

11.2.3. High-range: \$16.00 - \$18.00 per square foot.

11.2.4. System assumption – metal deck with ¼” min. slope, 6” iso, (mechanical fasten first layer and adhere the second layer) adhere 1/2” coverboard, multi-ply modified BUR roofing system covered with thermal coating. Minimal equipment, non-tapered insulation, 100,000 square feet of roof area, does not include interior roof drains. Does not include tear off. New construction prices are based on complexity of the roof. Assumes no under deck insulation.

11.3. Based on 100,000 square feet the life cycle cost would be \$1.23 per square foot per year.

12. Expected End of Life (EOL) for the specified BUR (Modified) system should be no less than 20-years if properly maintained and inspected regularly.