

**CSU HOUSING & DINING SERVICES TECHNICAL STANDARDS  
DIVISION 07 – THERMAL & MOISTURE PROTECTION**

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- A. Roof design wind speeds:
  - 1. 100 mph – Main Campus, Central and South
  - 2. 110 mph – Foothills Campus
- B. A/E shall determine which FM Rating corresponds to specific building, location, configuration, and height parameters given the design wind speed. FM Rating and proposed roof system design shall be submitted to CSU Risk Management for evaluation. Minimum FM Rating I-90.
- C. Required Roof System Ratings:
  - 1. UL Class A fire rating for the applicable slope.
  - 2. FM Class 1 (A) fire rating for the applicable slope
  - 3. FM Class I-SH hail damage resistance rating.
- D. Single membrane roofs shall be fully adhered to a coverboard such as fiberglass-faced waterproof gypsum board or oriented strand panel board. Direct adhesive attachment to faced or unfaced rigid insulation is prohibited.
- E. Ballasted single membrane roofs are prohibited.
- F. Urethane foam roofs are not acceptable. Repairs or recoating of existing SPF roofs is allowed without complete replacement.
- G. All roofs must slope to drain. New building roofs shall slope a minimum of 1/4" per foot to drain, with 1/2" per foot minimum slopes preferred. Replacement roofs shall be rebuilt to provide a minimum slope of 1/4" per foot to drain. Where existing structure, openings or equipment makes this slope not feasible, the AE shall request a written waiver from the University Representative to permit use of a minimum of 1/8" slope to drain.
- H. Low slope roofs shall not have any residual areas of ponding within 24 hours of a rain event.
- I. Low slope roofs shall be warranted by the Manufacturer for the complete system, including all materials and labor, for a minimum term of 20 years, without proration. Roof coatings shall be warranted for material and labor for a minimum of 10 years, without proration. Roofing Contractor shall warrantee all work, material and labor for a minimum of 2 years.
- J. Steep slope roofs shall be warranted by the Manufacturer for the complete system, including materials and labor, for minimum term of 30 years. Roofing contractor shall warranty all work, material and labor for a minimum of 2 years.

**07 10 00 – DAMPPROOFING AND WATERPROOFING**

- A. All building foundation walls below grade shall waterproofed and have a perimeter drainage system. Damp proofing alone is not acceptable.
- B. Basement and crawl space walls shall have vertical drainage mat leading to the perimeter drain,

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which shall be at an elevation below the basement slab or crawl space grade.

- C. Crawl spaces shall have a continuous, fiber-reinforced 12 mil minimum polyethylene liner vapor barrier covering the earth and extended up the stem wall to exterior grade elevation or bottom of joist, whichever is lower. Edges shall be sealed to the stem wall with compatible double-sided seam tape and pinned 16" O.C. Field joints shall be taped with waterproof polyethylene tape. Use large liner widths to minimize field joints.

**07 20 00 – THERMAL PROTECTION**

- A. Project insulation R-value shall be approved by Facilities Management-Design and Construction through the University Representative
- B. Exterior foundation wall insulation shall be extruded polystyrene. Expanded polystyrene (beadboard) is not acceptable. Exposed insulation shall be covered or coated for protection.

**07 30 00 – STEEP SLOPE ROOFS**

- A. Asphalt Shingles: Fiberglass Dimensional Strip Shingles, Heavyweight: Mineral-surfaced, self-sealing, weighing not less than 240 lbs. per square, labeled Wind-Resistant, with system and warranty upgrade to meet roof wind design speed. Three-tab shingles are not acceptable.
- B. Roof Tiles – Vinyl tricolored mix as approved by the University architect are acceptable.

**07 50 00 - MEMBRANE ROOFING**

- A. All roofs shall have walking treads for access to equipment. Walking treads shall be compatible with the roof system. Set smooth side down and adhere to the roof membrane.
- B. All flashing joints, including equipment bases shall be waterproofed.
- C. Roof systems shall be cold applied or heat weldable.
- D. Required Warranties:
  - 1. A 5-year (minimum) labor guarantee of roofing installation by the Contractor.
  - 2. A 20-year (minimum) roofing system material and labor guarantee by the manufacturer with no dollar limit.
- E. EPDM Single Membrane Roofing (Ethylene Propylene Diene Monomer):
  - 1. Specify Carlisle SynTec Systems, Firestone, and Johns Manville only. Manufacturer shall be the substrate supplier. Second-tier roofing manufacturers or suppliers are not allowed.
  - 2. A 60 mil membrane is acceptable for roof with minor maintenance traffic. A 90 mil membrane shall be used on roofs with mechanical equipment.
  - 3. Provide a second adhered layer of membrane per manufacturer's requirements around all kitchen HVAC exhaust fans containing grease laden vapors.
  - 4. White EPDM membrane is not acceptable due to limited longevity. The roof system manufacturer's approved white roof coating shall be applied to black EPDM for reflectivity and protection from solar and heat degradation. Minimum dry thickness 15 mils.

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5. Provide labeled materials which have been tested and listed by UL in "Building Materials Directory" with a "Class A" rating for the complete roofing system at the applicable roof slope.

F. Thermoplastic Single Membrane Roofing:

1. TPO (thermoplastic olefin) roof membrane designs are subject to approval by Facilities Management – Design and Construction. TPO may be considered during project design for exposed or protected application. Manufacturer must demonstrate 20 year installed longevity for its formulation in a similar high-altitude, high-insolation, and four-season climate. TPO will not be considered as a substitute for EPDM after contract documents are issued for bid. The manufacturer shall be responsible for quality assurance testing of heat weld seams. All typical corners and flashings shall be pre-formed by the manufacturer. Field-formed flashings are permitted only if a preformed flashing is not available or feasible.
2. Color will be tan.
3. Provide a second adhered layer of membrane per manufacturer's requirements around all kitchen HVAC exhaust fans containing grease laden vapors
4. PVC (polyvinyl chloride) is not acceptable for exposed application. It may be considered for vegetated roofs or roofs protected by pavers, subject to approval by Facilities Management – Design and Construction. Manufacturer must demonstrate 20 year installed longevity in a similar application, with measured plasticizer retention data and no embrittlement failure. PVC will not be accepted as a substitute for EPDM or TPO.

G. Aggregate-Surfaced Asphalt Built-Up Roofing:

1. Built-up roofing shall have base-sheet ply (ASTM D 2626, Type I) nailed if possible, otherwise mopped down with 20 lbs. (+/-25 percent) of steep asphalt (ASTM D 312, Type III).
2. A prime cementitious substrate shall be applied with 1.0 gal. per square of asphalt cutback primer (ASTM D 41) on non-nailable decks.
3. On nailable decks, base sheet shall be glass fiber felt nailed as per manufacturer's instructions. Asbestos base sheets are not permitted.
4. Three courses of ply sheets, each mopped down with 20 lbs. of asphalt (+/- 25 percent) of type indicated below.

Slopes to 1/4 inch:	Asphalt Type I (dead level)	ASTM D 312.
Slopes 1/4 inch to 1/2 inches:	Asphalt Type II (flat)	ASTM D 312.
Slopes 1/2 inch to 2 inches:	Asphalt Type III (steep)	ASTM D 312.

5. Plysheets shall be asphalt impregnated glass fiber mat ASTM D 2178, Type IV.
6. Aggregate surfacing course of 60 lbs. (+/- 25 percent) of asphalt (Type I, dead level), plus 500 lbs. of minimum 1/2 inch diameter gravel or crushed stone, cast in hot, fluid asphalt. Provide aggregate complying with ASTM D 1863, or if unavailable, provide with aggregate complying with ASTM D 448 gradations 6, 7, or 67, with maximum 3 percent moisture content and complying with all other requirements of ASTM D 1863.

H. Modified Bitumens:

1. Derbigum XPS-FR APP-modified bitumen or equal product with a glass mat along with a glass-polyester composite mat. Hot air welding only – torch application is not permitted.

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| Asphalt Primer   | ASTM D 41  |
| Asphalt Bitumen  | ASTM D 312   |
| Tensile Strength | ASTM D 6223, 200 lbf/in. @ 0°F<br>100 lbf/in. @ 77°F |
| Tear Resistance  | ASTM D 6223, 180 lbf/in. @ 77°F                      |
2. Johns Manville SBS modified bitumen or equal.

**07 60 00 – FLASHING AND SHEET METAL**

1. Sheet metal roofing is not a commonly used material on the Main Campus, but may be considered for certain projects elsewhere, subject to approval by Facilities Management-Design and Construction with concurrence of Housing and Dining Services.
2. Visible flashing and fascia shall be prefinished with a fluoropolymer baked enamel. Field painted flashing is not permitted.
3. Scuppers, downspouts and overflow drains shall be installed in a manner that allows water to run down the face of the building wall or across sidewalks.
4. Downspouts will be open face with interior color the same as the exterior.
5. Scuppers will have addition overflow outlets – trimmed and neat in appearance.
6. Roof curbs shall have a minimum of 12 inches height above finished roof membrane.

**07 70 00 – ROOF AND WALL SPECIALTIES AND ACCESSORIES**

- A. All roofs shall have a permanent means for egress.
- B. Roof hatches shall have a gas pressurized strut.
- C. Roof hatches shall have an OSHA approved extension to facilitate safe movement of personnel.
- D. Roof hatched shall have means to be locked with a padlock having a shackle diameter of 3/8”.

**07 80 00 – FIRE AND SMOKE PROTECTION**

- A. Fireproofing shall be free of asbestos.
- B. AE shall draw and specify a numbered UL assembly for each fireproofing and firestopping condition. Non-standard and complex firestopping details shall be shown in the drawings. Standard UL drawings for typical conditions shall be bound in the project manual.

**07 90 00 – JOINT PROTECTION**

- A. All building joints, including equipment bases, shall be sealed. AE shall indicate sealant joints in the drawings and provide detail drawings of typical and special joints.