

## **PART III – CSU FACILITIES PLANNING, DESIGN AND CONSTRUCTION STANDARDS**

### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

---

**Housing and Dining Facilities (HDS) has adopted amendments for all HDS facilities. Confirm applicable standards with Project Representative on a per Project basis. Refer to HDS amendments here – <https://housing.colostate.edu/about/construction/>.**

### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

#### **07 00 00 – GENERAL INFORMATION**

##### **A. Roof Design Wind Speeds:**

1. Shall follow current Office of the State Architect (OSA) Structural Engineers Association of Colorado (SEAC) Colorado Front Range Gust Map – ASCE 7–16 Compatible.

##### **B. A/E shall determine which FM Global Rating corresponds to specific building, location, configuration, and height parameters given the design wind speed.**

1. FM Global Rating and proposed Roof System design shall be submitted to Colorado State University (CSU) Risk Management for evaluation.
2. Minimum FM Global Rating I–90

##### **C. Required Roof System Ratings:**

1. UL Class A fire rating for the applicable slope
2. FM Global Class 1 (A) fire rating for the applicable slope
3. FM Global 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.**

1. Direct adhesive attachment to faced or unfaced rigid insulation shall be prohibited.

##### **E. Ballasted single membrane roofs shall be prohibited.**

##### **F. Urethane foam roofs shall be prohibited.**

##### **G. All roofs must slope to drain.**

1. New building roofs shall slope a minimum of 1/4" per foot to drain, with 1/2" per foot minimum slopes preferred.
2. Replacement roofs shall be rebuilt to provide a minimum slope of 1/4" per foot to drain.
  - a. Where existing structure, openings or equipment makes this slope not feasible, the A/E shall request approval from the Project Representative to permit use of a minimum of 1/8" slope to drain.

##### **H. Low slope roofs shall be guaranteed through a written warranty by the Manufacturer for the complete System, including all materials and labor, for a minimum term of 20 years, without proration.**

1. Roof coatings shall be guaranteed through a written warranty for material and labor for a minimum of ten years, without proration.

## **PART III – CSU FACILITIES PLANNING, DESIGN AND CONSTRUCTION STANDARDS**

### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

---

2. Roofing Contractor shall warrantee all Work, material and labor for a minimum of two years.
- I. Steep slope roofs shall be shall be guaranteed through a written warranty by the Manufacturer for the complete System, including materials and labor, for a minimum term of 30 years.
  1. Roofing Contractor shall warrantee all Work, material and labor for a minimum of two years.

#### **07 10 00 – DAMPPROOFING AND WATERPROOFING**

- A. All building foundation walls below grade shall be waterproofed and have a Perimeter Drainage System.
  1. Dampproofing alone shall not be acceptable.
- B. Basement and crawl space walls shall have vertical drainage mat leading to the perimeter drain, 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.
  1. Edges shall be sealed to the stem wall with compatible double–sided seam tape and pinned 16” oc.
  2. Field joints shall be taped with waterproof polyethylene tape.
  3. Use large liner widths to minimize field joints.

#### **07 20 00 – THERMAL PROTECTION**

- A. Exterior foundation wall insulation shall be extruded polystyrene.
  1. Expanded polystyrene (beadboard) is not acceptable.
  2. Exposed insulation shall be covered or coated for protection.

#### **07 30 00 – STEEP SLOPE ROOFING**

- A. Asphalt Shingles:
  1. 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.
  2. Three–tab shingles shall not be acceptable.

#### **B. Roof Tiles**

#### **07 50 00 – MEMBRANE ROOFING**

- A. All roofs shall have walking pads for access to equipment.
  1. Walking treads shall be compatible with the Roof System.

## **PART III – CSU FACILITIES PLANNING, DESIGN AND CONSTRUCTION STANDARDS**

### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

---

2. Set smooth side down.
- 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 five 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. Ethylene Propylene Diene Monomer (EPDM) Single Membrane Roofing:
1. Specify Carlisle SynTec Systems, Firestone, and Johns Manville only
    - a. Manufacturer shall be the substrate supplier.
    - b. Second-tier Roofing Manufacturers or Suppliers shall not be allowed.
  2. Membrane
    - a. 60 mil membrane shall be used on roofs with minor maintenance traffic.
    - b. 90 mil membrane shall be used on roofs with mechanical equipment.
  3. White EPDM membrane shall not be acceptable due to limited longevity.
    - a. The Roof System Manufacturer's approved white roof coating shall be applied to black EPDM for reflectivity and protection from solar and heat degradation.
    - b. Minimum dry thickness 20 mils.
      - i. Shall be achieved by applying two 10 mil coats for a total of 20 mils.
      - ii. First coat shall be tinted and second coat shall be pure white to allow for visual identification of areas without two coats.
  4. 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. Thermoplastic Olefin (TPO):
    - a. Roof membrane designs shall be subject to approval by Facilities Management (FM) Planning, Design, Construction and Engineering.
    - b. TPO shall be considered during Project Design for exposed or protected application.
    - c. Manufacturer must demonstrate 20 year installed longevity for its formulation in a similar high-altitude, high-insolation, four-season climate.
    - d. TPO shall not be considered as a substitute for EPDM after Construction Documents are issued for bid.
    - e. The Manufacturer shall be responsible for quality assurance testing of heat weld seams.
    - f. All typical corners and flashings shall be pre-formed by the Manufacturer.
      - i. Field-formed flashings shall be permitted only if a preformed flashing is not available or feasible.
  2. Polyvinyl Chloride (PVC):
    - a. PVC is not acceptable for exposed application.
    - b. It may be considered for vegetated roofs or roofs protected by pavers, subject to approval by FM through the Project Representative.
    - c. Manufacturer must demonstrate 20 year installed longevity in a similar application, with

## PART III – CSU FACILITIES PLANNING, DESIGN AND CONSTRUCTION STANDARDS

### DIVISION 07 – THERMAL AND MOISTURE PROTECTION

---

measured plasticizer retention data and no embrittlement failure.

- d. PVC shall 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%) 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.
  - a. Asbestos base sheets are not permitted.
4. Three courses of ply sheets, each mopped down with 20 lbs. of asphalt (+/– 25%) of type indicated below.
  - a. Slopes to 1/4” – Asphalt Type I (dead level), ASTM D 312
  - b. Slopes 1/4” to 1/2” – Asphalt Type II (flat), ASTM D 312
  - c. Slopes 1/2” to 2” – 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%) of asphalt (Type I, dead level), plus 500 lbs. of minimum 1/2” diameter gravel or crushed stone, cast in hot, fluid asphalt.
  - a. 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% 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.
  - a. Asphalt Primer – ASTM D 41
  - b. Asphalt Bitumen – ASTM D 312
  - c. Tensile Strength – ASTM D 6223, 200 lbf/in. @ 0°F, 100 lbf/in. @ 77°F
  - d. 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 FM Planning, Design, Construction and Engineering.
2. Visible flashing and fascia shall be prefinished with a fluoropolymer baked enamel.
  - a. Field painted flashing shall not be permitted.
3. Scuppers, downspouts and overflow drains shall be installed in a manner that prevents water from running down the face of the building wall or across sidewalks.
4. Roof curbs shall have a minimum of 12” height above finished roof membrane.

## **PART III – CSU FACILITIES PLANNING, DESIGN AND CONSTRUCTION STANDARDS**

### **DIVISION 07 – THERMAL AND MOISTURE PROTECTION**

---

#### **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.

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

- A. Fireproofing shall be free of asbestos.
- B. A/E shall draw and specify a numbered UL assembly for each fireproofing and firestopping condition.
  - 1. Non-standard and complex firestopping details shall be shown in the Drawings.
  - 2. 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.
- B. A/E shall indicate sealant joints in the Drawings and provide Detail Drawings of typical and special joints.

**END OF DIVISION**