

# ATTACHMENT A

## ROOF SYSTEM PERFORMANCE SPECIFICATIONS

### PERFORMANCE

#### A. Basic Function:

1. Provide built elements and modifications as required to fulfill needs described in the project program.
2. The complete project comprises the following elements:
  - a. Superstructure: Roof system
3. Environmentally Responsible Design: In addition to other requirements, provide design and construction that minimizes adverse effects on the exterior environment, and minimizes consumption of energy, construction materials, and other resources.

#### B. Health and Safety:

1. Health Hazards: Design to prevent growth of fungus, mold, and bacteria on surfaces and in concealed spaces.
2. Electrically-Operated Equipment / Fixtures: UL listed for application or purpose to which they are put; suitable for wet locations listing for exterior use.

#### C. Structure:

1. Dead Loads: Accommodate loads from weights of building materials, and construction itself.
2. Live Loads: Accommodate loads from use and occupancy of the building, either uniformly distributed loads as prescribed by code or concentrated loads, whichever are more demanding structurally.
3. Environmental Loads: Accommodate loads from all environmental forces in accordance with code.
  - a. Wind load: Basic wind speed of 105 mph. Refer to plans shown on attachment C.
4. Structural Design: In addition to the requirements of the code, design to comply with ASCE 7-2005.

#### D. Durability:

1. Corrosion Prevention: Use corrosive resistant metal elements, sufficient to prevent corrosion completely for the service life of the element without maintenance.
2. Moisture Resistance of Members: Use materials that are not damaged by contact with water or moisture vapor.
3. Decay resistance: Members that are exposed to weather shall be preservative treated or be from the heartwood of a naturally durable wood.

#### E. Maintenance:

1. Ease of Maintenance: Minimize the amount of maintenance required; by use of materials that require no or minimal maintenance.

## **ELEMENTS**

- A. In addition to requirements specified in other Sections, provide elements that comply with the following.
1. Where neither types of products nor performance criteria are specified, use products that will perform well within the specified life span of the building.

## **ROOF INSULATION AND COVER BOARDS:**

### A. System:

Polyisocyanurate Board Insulation: Closed cell Polyisocyanurate foam with black glass reinforced mat laminated to faces, complying with ASTM C 1289 Type II Class 1, with the following additional characteristics:

1. Size: 48 inches (1220 mm) by 96 inches (2440 mm), nominal.
    - a. Exception: Insulation to be attached using adhesive or asphalt may be no larger than 48 inches (1220 mm) by 48 inches (1220 mm), nominal.
  2. R-Value: **R-30**
  3. Compressive Strength: 20 psi (138 kPa) for 2.5 ISO and 120 psi for cover board when tested in accordance with ASTM C 1289.
  4. UL-Classified and FM-approved for direct to steel deck applications.
  5. Ozone Depletion Potential: Zero; made without CFC or HCFC blowing agents.
  6. Recycled Content: 19 percent post-consumer and 15 percent post-industrial, average.
- B. Insulation Fasteners: Type and size as required by roof membrane manufacturer and for structural requirement for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.
- C. Cover Board: ASTM C 1177/C 1177M, glass-mat, water-resistant gypsum substrate, 1/2 inch (13 mm) thick.

## **ROOF ACCESSORIES:**

### A. Basic Function:

Install roofing accessories in accordance with roofing manufacturer's published instructions and recommendations for the specified roofing system. Where manufacturer provides no instructions or recommendations, follow good roofing practices and industry standards. Comply with federal, state, and local regulations. No pitch pockets will be allowed.

1. Aluminum Termination Bar: Continuous 6063-T6 alloy aluminum extrusion with pre-punched slotted holes; miters welded; injection molded EPDM splices to allow thermal expansion.

2. Anchor Bar Cleat: 20 gage, 0.036 inch (0.9 mm) G90 coated commercial type galvanized steel with pre-punched holes.
3. Fasteners: Factory-provided corrosion resistant fasteners, with drivers; no exposed fasteners permitted.
4. Special Shaped Components: Provide factory-fabricated pieces necessary for complete installation, including miters, scuppers, and end caps; minimum 14 inch (355 mm) long legs on corner pieces.
5. Scuppers: Aluminum or stainless steel Welded watertight.
6. Accessories: Provide matching wall cap, downspout, extenders, and other special fabrications.
7. Roof Walkway pads: 30 inches wide rolls with patterned traffic bearing surface, fully adhered to roof membrane per manufacturer's installation requirements.
8. Molded Flashing Accessories: Unreinforced TPO membrane pre-molded to suit a variety of flashing details, including pipe boots, inside corners, outside corners, etc.;
9. Seam Plates: Steel with barbs and Galvalume coating; corrosion-resistance complying with FM 4470.
10. General Purpose Sealant: EPDM-based, one part, white general purpose sealant.
11. Bonding Adhesive: Nitrile rubber based fluid, formulated for compatibility with the membrane backing and insulation surfaces, specific existing roof surfaces, and other substrates including wood, metal, and masonry.
12. Cut Edge Sealant: Synthetic rubber-based, for use where membrane reinforcement is exposed.
13. Walkways Pads: Factory-formed, nonporous, heavy-duty, slip-resisting, surface-textured walkway pads or rolls, approximately 3/16 inch (5 mm) thick, and acceptable to membrane roofing system manufacturer.

#### **METAL CAP FLASHING FOR PARAPET:**

##### **A. General Requirements:**

1. Install aluminum sheet metal flashing and trim to withstand wind loads, structural movement, thermally induced movement, and exposure to weather without failing, rattling, leaking, and fastener disengagement. Fabricate and install copings and other sheet metal capable of resisting forces in accordance with ASCE 7. Install sheet metal wall flashing to intercept and exclude penetrating moisture according to SMACNA recommendations.
2. Exposed Finishes: Apply the following coil coating:
  - a. Factory Prime Coating: Where painting after installation is indicated, provide pretreatment and white or light-colored, factory-applied, baked-on epoxy primer coat; with a minimum dry film thickness of 0.2 mil (0.005 mm).

##### **B. Thermal Movements:**

Provide sheet metal flashing and trim that allow for thermal movements resulting from the following maximum change (range) in ambient and surface temperatures by preventing buckling, opening of joints, hole elongation, overstressing of components, failure of joint sealants, failure of connections, and other detrimental effects. Provide clips that resist rotation

and avoid shear stress as a result of sheet metal and trim thermal movements. Base engineering calculation on surface temperatures of materials due to both solar heat gain and nighttime-sky heat loss.

Temperature Change (Range): 120 deg F (67 deg C), ambient; 180 deg F (100 deg C), material surfaces.

C. Water Infiltration:

Provide sheet metal flashing and trim that do not allow water infiltration to building interior.

**ROOF MEMBRANE:**

A. Roofing System:

1. Membrane: Reinforced Thermoplastic olefin (TPO) with fleece backed.
2. Thickness: 80 mil membrane plus fleece backing for a total of 120 mil min thickness.
3. Membrane Attachment: Fully adhered.
4. Color: White
4. Comply with applicable local building code requirements.
5. Provide assembly having Underwriters Laboratories, Inc. (UL) Class A Fire Hazard Classification.
6. Provide assembly complying with Factory Mutual Corporation (FM) Roof Assembly Classification, FM DS 1-28 and 1-29, and meeting minimum requirements of FM 1-90 wind uplift rating.

B. Membrane Description: Flexible, heat weldable sheet composed of thermoplastic polyolefin polymer and ethylene propylene rubber; complying with ASTM D 6878, with polyester weft inserted reinforcement and the following additional characteristics:

1. Polyester fleece backing.
2. Sheet Width: Provide the widest available sheets to minimize field seaming.
3. Puncture Resistance: 265 lbf (1174 N), minimum, when tested in accordance FTM 101C Method 2031.
4. Solar Reflectance: 0.79, minimum, when tested in accordance with ASTM C 1549.

C. Membrane Fasteners: Type and size as required by roof membrane manufacturer for roofing system and warranty to be provided; use only fasteners furnished by roof membrane manufacturer.

D. Curb and Parapet Flashing: Same material as membrane, with encapsulated edge which eliminates need for seam sealing the flashing-to-roof splice; precut to 18 inches (457 mm) wide.

E. Formable Flashing: Non-reinforced, flexible, heat weldable sheet, composed of thermoplastic polyolefin polymer and ethylene propylene rubber.

1. Thickness: 0.060 inch (1.52 mm) plus/minus 10 percent.
2. Tensile Strength: 1550 psi (10.7 MPa), minimum, when tested in accordance with ASTM D 638 after heat aging.

3. Elongation at Break: 650 percent, minimum, when tested in accordance with ASTM D 638 after heat aging.
4. Tearing Strength: 12 lbf (53 N), minimum, when tested in accordance with ASTM D 1004 after heat aging.

## **PRODUCTS**

### A. Manufacturers:

1. Johns Manville
2. Firestone
3. Carlisle Syntec Inc.

## **SUBSTANTIATION**

### A. Products:

1. In the Proposal:
  - a. Identify product types for each system, assembly, or element.
  - b. For each product type, provide brief descriptive or performance specifications.
2. During Construction:
  - a. Identify actual brand name products used for every product, except commodity products specified by performance or description.
  - b. Where a product is specified by performance requirements with test methods, and if so specified, provide test reports showing compliance.
  - c. Provide manufacturer's product literature for each brand name product.
  - d. Provide the manufacturer's certification that the product used on the project complies with the contract documents.
3. Before End of Closeout:
  - a. Provide copies of all manufacturer warranties.

**END OF SECTION**