

DIVISION 7**THERMAL AND MOISTURE PROTECTION**

7.1 Roof Systems: Many different types of roofing systems have been utilized at the Airport. The acceptable choice and application of a particular roofing system will depend on the type, use, location and configuration of the building. Roof systems meeting the minimum criteria outlined below may be specified on new construction or as roof replacement on existing buildings. Acceptable roof systems for consideration include, but are not limited to, on low-slopes (up to 1-1/2 in. per foot): certain EPDM, thermoplastic, modified bitumen, metal, or built-up roof systems. For steep slopes (over 1-1/2 in per foot), properly designed and fastened or adhered EPDM or thermoplastic roofs are acceptable. Standing seam metal roof systems may be selected with prior approval from the Airport Contact. Key considerations in the selection, design and specification of roofing systems follow:

7.1.1 The roofing assembly and its components must be capable of withstanding and accommodating all of the service conditions to which they will be exposed, including rain, snow, hail, ice, wind, sun, thermal shock, service traffic and applied loads. The roof system components must provide optimum thermal resistance to heat gain or loss within the building, consistent with good roofing practices.

7.1.2 Drainage: Ponding is defined as standing water on roofs for more than 24 hours and is the frequent source of leaks and the cause of premature failure of roof systems. Roof system manufacturers recognize the seriousness of this common problem and generally exclude leaks or failure caused by ponding water from their warranties. Ponding water is not acceptable.

7.1.3 Minimum Standards and Recommendations Included by Reference: Roof system selection, design, detailing and specification shall, at a minimum, comply with the requirements and recommendations of the following standards:

7.1.3.1 National Roofing Contractors Association (NRCA), Roofing and Waterproofing Manual, 4th Edition.

7.1.3.2 Architectural Sheet Metal Manual, Fifth Edition, Sheet Metal and Air Conditioning Contractors National Association (SMACNA).

7.1.4 New Construction or Roof Replacement on Existing Buildings: Criteria outlined below are common for both new construction and for roof replacement.

7.1.4.1 Roofs adjacent to aircraft ramps (i.e. terminals, cargo and hanger structures, electrical vaults etc.) shall be smooth surfaced, coated, or paver ballasted. Gravel and rock ballast surfaces are not permitted, since high winds may displace rock material onto operational surfaces, causing damage to aircraft and aircraft engines.

7.1.4.2 Roof attachment shall equal or exceed Factory Mutual I-60 wind uplift rating on most buildings. Acceptable uplift rating for high exposed roofs or roofs subject to jet blast must be calculated from FM Loss Prevention Data Sheets.

7.1.4.3 Roof materials and assemblies shall be listed by Underwriters Laboratories as a Class A roofing material or roof assembly.

7.1.4.4 Provide insulation thickness to achieve thermal resistance of R-14 minimum, but in no case less than that required by the Energy Code.

7.1.4.5 Where different roof types join together, provide proper seams, parapets, area dividers, or expansion joints.

7.1.4.6 Provide roof traffic protection at all parapets, around equipment and at all areas subject to frequent wear.

7.1.4.7 Minimum flashing heights shall be 8 inches above roof surface to the extent possible by existing design conditions, but in no case shall flashing height be less than required by the roof system manufacturer for the applicable warranty. For ballasted roofs, “roof surface” is defined as the surface of the rock, paver, or gravel surface.

7.1.4.7.1 Internal gutters are not allowed.

7.1.4.7.2 Warrantees and Guaranties for Board Maintained Roofs:

- a. Require Roof Manufacturer’s “Total System, No Dollar Limit (NDL)” warranty for maximum time limit available (15 - 30 year, depending on roof system). Warranty shall cover wind speeds up to 72 miles per hour. Roofing contractor shall provide 2-year guarantee against leaks and defects in workmanship.
- b. Roof related sheet metal, copings, edge strips and metal edges: Contractor shall provide 5-year guarantee against leaks and defects in materials and workmanship. Sheet metal exposed to public view shall have a factory-applied finish with a 20-year warranty covering fading, discoloration, peeling or other defects.

7.1.4.7.3 Preference is given to “Energy Star” roofing materials (i.e. white in color, solar radiation reflective). Reflective roof system finishes must comply with FAA guidelines.

7.1.5 New Construction: The following criteria are minimum requirements that must be met by new building construction.

7.1.5.1 All criteria outlined in **B** and **C** above.

7.1.5.2 Slope: Provide a minimum ¼ inch per foot slope designed and built into the structure of the facility whenever possible. If it is not possible, the ¼ inch slope must be achieved using crickets, saddles, or a fully tapered insulation system.

7.1.5.3 Drains:

- a. Size and Quantity: As required by the Plumbing Code.
- b. Locate drains a minimum of 36 inches from equipment and perimeters to allow proper sump and flashing details.
- c. Provide crickets and saddles between drains with resultant ¼ in per foot slope to direct all water flow to the drain.
- d. Provide 36 inch by 36-inch minimum sump around each drain.
- e. Overflow drain systems must comply with the Plumbing and Building Codes.

7.1.5.4 Deck Types: Structural decks may be constructed of metal, or concrete. Deflection of the structural deck must be considered and should be limited to 1/240th of the span.

7.1.5.5 Metal Penetration Dams (Pitch Pans): Do not install metal penetration dams without prior approval of the Airport Contact. If a metal penetration dam must be used, a properly detailed and installed metal umbrella counter flashing cover is required.

7.1.5.6 Roof penetrations: Locate roof penetrations to allow for proper flashing installation.

7.1.6 Roof Replacement: The following criteria apply to roof replacement when the above criteria cannot be implemented.

7.1.6.1 Deck Conditions: Existing condition and type of deck (to the extent determinable by limited investigation), slope, and allowable superimposed load (if available from Airport archives) must be documented prior to roof system selection. Document ponding or other problem areas.

7.1.6.2 Drainage: In some cases, existing slope in the roof deck is less than ¼ in. per foot, and achieving ¼ in. per foot with tapered insulation is not possible without raising parapet heights to maintain 8 inch flashing height above the roof surface. These conditions must be addressed on a case-by-case basis to determine if the Airport Contact will permit raising parapets. Building maintenance projects (including roof replacement with like kind roofing) do not require increasing slope to ¼ in. per foot if the existing roof slope complies with the Building Code in force when the building was constructed.

7.1.6.3 Overflow Drains: Building maintenance projects (including roof replacement projects with like kind roofing) do not require upgrading the overflow drain system to meet current code if the drain system complies with the Building and Plumbing Codes in force when the building was constructed, and the overflow drainage system is not changed by the new roofing. However, new scuppers or internal overflow drainage should be added when deemed feasible.

7.1.6.4 Roof mounted equipment:

7.1.6.4.1 Accurately locate, size and measure existing flashing height above roof surface as defined above.

7.1.6.4.2 As designated by the Airport Contact, all obsolete equipment shall be removed, and penetrations through the deck shall be properly patched. Penetrations less than or equal to 6 inches in least dimension shall be covered with 10 gauge galvanized sheet metal extending 6 inches beyond the opening in each direction. Fasten to deck with approved fasteners 6 inches on center, minimum 2 per side. Penetrations larger than 6 inches shall be capped with a prefabricated metal curb covered by an approved deck material, insulation in the required thickness to achieve a thermal resistance of R-14, EPDM membrane and 24 gauge galvanized metal cap, sloped to drain.

7.1.6.4.3 All equipment with flashing height of less than 8 inches above the new roof surface shall be raised to a flashing height of 8 inches minimum.

7.1.6.4.4 Limit shutdown of roof mounted equipment to hours specified by the Airport Contact.

7.1.6.4.5 Metal counter flashing covering the top flashing edge by 2 inches minimum must protect all curb-mounted equipment flashing.

7.1.6.4.6 Walkway pads or concrete pavers shall be placed around all roof-mounted equipment requiring periodic service.

7.1.6.4.7 Antennas mounted on the roof shall be mounted on bases designed for this purpose. Antennas attached to piping or other equipment shall be removed.

7.1.6.5 Roof Penetrations:

7.1.6.5.1 All pipe and conduit penetrations shall be through covered metal pipe enclosures similar to SMACNA Figure 4-14A. Metal penetration dams (pitch pans) will be permitted only with the approval of the Airport Contact and must have metal umbrella counter flashing covers.

7.1.6.5.2 Lightning protection down leads shall be flashed with PVC pipe enclosures and capped with PVC domed caps.

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