

DIVISION 7 - THERMAL AND MOISTURE PROTECTION

I. GENERAL

A. This division contains the following elements:

1. Waterproofing and Vapor Retarders.
2. Insulation.
3. Fireproofing and Firestopping.
4. Roofing.
5. Flashing and Sheet Metal.
6. Roof Specialties, Accessories, and Skylights.
7. Joint Sealers.

B. This division includes roofing systems and manufacturers accepted by M-DCPS. Select a roof system from the options listed in M-DCPS Design Criteria and Master Specification Guidelines. The A/E has sole responsibility of designing and specifying roofing system best suited for the project, when considering the following:

1. Cost.
2. Life cycle.
3. Longevity.
4. Aesthetics.
5. Maintenance.
6. Warranty.
7. Adjacent existing roofs.
8. Safety of occupants.
9. Weight of existing roof/condition of existing structure.
10. Resistance to vandalism and maintenance traffic.

C. Roofing systems and roofing components shall comply with:

1. Florida Department of Education, Office of Educational Facilities State Requirements for Educational Facilities - 1999 (SREF).
2. Florida Building Code (FBC), including FBC - Roofing Application Standards (RAS), and FBC - Test Application Standards (TAS).

D. M-DCPS special requirements and experiences with various materials and installations have led to adopted procedures and practices.

E. Concerns of M-DCPS for recycling and other environmental matters apply to roofing systems and their manufacturing process.

F. Specify job safety standards according to SREF, M-DCPS Safety, Environment, and Hazards Management, and OSHA, including 29 CFR 1910.

II. WATERPROOFING AND VAPOR RETARDERS (07120 - 07190)

A. Fluid Applied Waterproofing.

1. Provide waterproofing protection at floors and walls below grade to prevent water infiltration to the building interior caused by hydrostatic pressure or other water conditions.
2. Provide waterproofing at the inside face of planter walls or planter floors where the outside face is exposed or part of a finished wall or ceiling assembly.
3. One component moisture curing or two component urethane type waterproofing are suitable for covered, non-traffic, below grade locations.
4. At concrete covered walkways, canopies, eyebrows, and other areas with not more than one dimension exceeding 15 feet, use either:
 - a. Accepted fluid applied waterproofing systems with stainless steel edge drips and fabric reinforcement. Fluid applied waterproofing systems shall not be used at roofs with parapets
 - b. Accepted roofing systems complying with roofing requirements with edge drips or parapets.

B. Vapor and Radon Retarders.

1. Comply with FBC - Florida Standard for Radon-Resistant New Commercial Building Construction and EPA Handbook for Sub-Slab Depressurization for Low Permeability Fill Material, both obtained from Department of Health Bureau of Environmental Toxicology Radon and Indoor Air.
2. Specify 10 mil polyethylene films to provide a continuous barrier between compacted fill and the building ground floor slab. Provide details of perimeter, penetrations, and joint conditions. Lap edges at least 12 inches and seal with duct tape. Six mil polyethylene films may be used at exterior slabs.

III. INSULATION (07210)

- A. Select the appropriate insulation system to comply with SREF regarding insulation and moisture protection, FBC - Energy Efficiency, and FBC High Velocity Hurricane Zones - Roof Insulation.
- B. Design the thermal insulation system to fully protect the building's envelope.
- C. At reroofing projects, coordinate insulation installation with FPL roofing insulation rebate program and M-DCPS.
- D. Accepted thermal wall insulation materials include:
 1. Plastic foam board wall insulation.
 - a. According to the Florida Building Code (FBC), foam plastic insulation requires

separation from the building interior by a thermal barrier of unpainted finished 1/2" gypsum wallboard or accepted equivalent. Lay-in ceilings do not qualify as an accepted thermal barrier.

2. Foil faced fiber or fiberglass blanket insulation between wall furring.
 3. Other insulation materials or methods at locations where blanket or board insulation cannot be used and accepted by M-DCPS on a per condition basis.
- E. Foamed in-place insulation, in-core styrofoam inserts, or loose fill insulation at concrete block cores are not allowed.
- F. Accepted roofing insulation materials include:
1. Cellular glass roof insulation.
 2. Lightweight insulating concrete according to Division 3.
 3. HCFC isocyanurate foam board insulation permanently bonded to roofing felt facer sheets.
 - a. Insulation shall have a value of at least $R = 5.6$ per inch.
 - b. For roof deck insulation, only $R = 5.6$ per inch shall be used in calculations for design and submittals.
 - c. Roof deck insulation shall be calculated as a uniform minimum thickness, not an average thickness, to achieve a minimum R value of 20 with $R = 5.6$ per inch. Additional tapered insulation to achieve slope shall not be included in calculations.
- G. Perlite is not allowed. Use a primed glass faced gypsum roof board as a recover or overlayment board if approved by the roof system manufacturer.
- H. Particleboard, wood fiber, or wood composite boards shall not be used in a roofing assembly.

IV. FIREPROOFING AND FIRESTOPPING (07255 - 07270)

- A. Fireproofing and firestopping methods shall be UL approved and shown with UL listings, complete specifications, and details in construction documents.
- B. Interior steel structural surfaces requiring fireproofing shall receive non-fibered spray applied fire resistive materials.
- C. Specify fire resistive sealers at penetrations through fire rated assemblies as required by applicable codes.

V. ROOFING (07255-07533)

A. General.

1. Design 20 year, no dollar limit manufacturer warranted, styrene butadiene styrene

- (SBS) modified bitumen mineral surfaced roofing flat roofs. M-DCPS acceptance to use sloping roofs is required on a per condition basis before starting roof design.
2. Roof designs shall comply with the following:
 - a. SREF.
 - b. Florida Building Code (FBC), including FBC - Roofing Application Standards (RAS), and FBC - Test Application Standards (TAS).
 - 1) The entire roofing assembly shall be tested to comply with the missile impact requirements of SSTD 12-99.
 - c. Miami-Dade County Product Control.
 - d. Underwriters Laboratories UL-790 and ASTM E-108 requirements for Class "A" fire rating for roof coverings.
 - e. American Society of Civil Engineers (ASCE) 7-98.
 - 1) Uplift requirements based on the basic wind velocity pressures for the project according to the following:
 - a) Provide calculations, signed and sealed by a Florida registered professional engineer, establishing wind velocity pressure values for the specific project according to ASCE 7-98 a map wind speed of 146 mph.
 - b) Use ASCE 7-98 Exposure Category "C" for wind design at M-DCPS additions and new construction.
 - c) According to ASCE 7-98 occupancy types, educational facilities are classified as Category 3 and shall have a wind load importance factor of 1.15.
 - d) SREF recommendations to use map wind speed plus 40 mph and a wind importance factor of 1.0 are not to be used.
 - f. Roofing manufacturer's specifications.
 - g. Factory Mutual requirements for Class I rated assembly and FM uplift classifications as determined by American Society of Civil Engineers (ASCE) 7-98.
 3. Limit roofing materials to one roofing system at a facility. Use of an additional roofing system requires M-DCPS approval on a per condition basis.
 - a. Different roofing systems shall be separated by a parapet, change of elevations, or any other means of termination to define warranty/liability limits and maintenance concerns.
 4. Provide proper disposal of rainwater from roofs by scuppers, overflow scuppers, gutters, and downspouts complying with FBC - Plumbing requirements.

- a. Interior roof drains are not allowed.
 - b. Ponding is not allowed.
5. Products containing asbestos are not allowed.
 6. Design and locate traffic pads from roof scuttles and access doors to roof mounted equipment requiring maintenance or repair. Provide a fully adhered nonskid surface of a suitable M-DCPS accepted different color than the roof deck.
 7. See Division 5 and FBC - Roof Assemblies and Rooftop Structures for equipment framing support requirements.
 8. Membrane lap seams shall be positioned to expel water.
 9. Specify the contractor, at project completion, to furnish roofing material to M-DCPS for 100 square feet of replacement roof for each type of system installed.
 10. Provide secure anchorage with continuous cleats and fastenings at edge drip and parapet coping flashing conditions according to the most stringent applicable code requirements.
 11. Parapets.
 - a. Limit parapet heights so parapet wall flashing felt shall not exceed a height of 24 inches above the finished roof deck.
 - 1) Roof membrane flashing shall cover the interior face of the parapet, wrap wood nailers secured to the top of the parapet, and be covered by a metal coping cap.
 - 2) Use roofing systems manufacturer's recommended primer at wall areas receiving bitumen type felts.
 - 3) Coping shall have outer hold-down cleats and be face fastened at inward facing parapet components with removable grommet type fasteners.
 - 4) Slope top of parapets, nailers, and copings 1 inch per foot down to interior face.
 - 5) Provide term bars at the upper felt flashing vertical edge according to RAS 111 where required.
 - b. Existing parapet walls over 24 inches shall have roof membrane flashing between 8 to 24 inches in height above the finished roof deck and supplemental flashing or waterproofing/felt installation beginning from new metal counterflashing with a flat profile flange and cover the interior face of the parapet, wrap wood nailers secured to the top of the parapet, and be covered by a metal coping cap.
 - 1) Seal built-up roof flashing with cold bitumen and roofing tape according to manufacturer's requirements.
 - 2) Provide term bars at the upper felt flashing vertical edge according to RAS 111.

12. Parapets at precast and tilt wall construction shall comply with required parapet flashing and the following.
 - a. Tilt wall panel joint sealant shall be in place before parapet wall flashing or waterproofing/felt installation.
 - b. For existing parapet walls over 24 inches in height, use roofing sealants compatible with the tilt wall sealants for closure at the tilt wall joints and counterflashing flange before waterproofing/felt installation.
 - c. Provide wood nailers and coping between panel joints and allow for expansion/contraction.
 - d. Slope top of precast parapets 1 inch per foot down to interior face.

13. Provide 24 inch high maximum roof membrane flashing when flashing is required at adjacent building walls.
 - a. Waterproofing is required for remaining vertical stucco or precast surfaces.

- B. Mopped down roof systems, or any other systems using asphalt as an adhesive, over concrete roof decks shall have means to provide proper venting to eliminate blistering.
 1. No roof system shall be mopped directly to a concrete deck.
 2. A concrete primer and a vented base ply or insulation over interior or exterior spaces shall be included in the manufacturer's rated FM uplift classifications as determined by American Society of Civil Engineers (ASCE) 7-98.
 3. Lightweight concrete roof decks shall receive a nailed vented base sheet.

- C. Provide metal roof vents, according to roofing system manufacturer's recommendations, on lightweight concrete roof decks at a rate of 1 vent per 900 square feet for any roofing membrane or as approved by the roofing system manufacturer.
- D. Flat Roofs.
 1. Flat roofs at new construction shall be SBS modified bitumen polyester reinforced membranes of the granular mineral surfaced cap sheet over one modified polyester reinforced smooth surface inner ply all fully adhered with asphalt. A base sheet shall be included if required by FM listing.
 - a. Roof slopes shall not exceed 2-1/2:12. Verify Class "A" fire rating for proposed slope and comply with FBC - Table 1519.3A.
 - b. Comply with SREF, FBC, and roofing manufacturer's specifications. SBS roof slopes, including crickets, shall be at least 1/4" per foot.
 2. Slopes at reroofing solutions of SBS or single-ply materials, including crickets, shall be at least 1/8" per foot to existing drains or scuppers. Ponding shall be corrected according to FBC High Velocity Hurricane Zones - Roofing Considerations.

3. Single-ply thermoplastic membranes, fully adhered with heat welded seams and over proper substrates can only be used at reroofing projects with structural concerns and written acceptance from M-DCPS Roofing Department.
 - a. Single-ply membrane roof slopes, including crickets, shall be 1/4" per foot.
 - b. Separate SBS and single ply roofing systems with a curb, expansion joint, or other means of terminations to define warranty/liability limits and maintenance concerns.
 - c. Do not use at areas exposed to vandalism, heavy traffic, or corrosive atmospheres.
 - d. Membranes with rubber composition or applied with hot asphalt are not accepted by M-DCPS.
 - e. Repair membrane for fleece backed membrane systems shall be without fleece backing.
4. Base sheets are required for the following conditions:
 - a. At lightweight concrete roof decks and other nailable substrates, provide a mechanically attached channel vented base sheet.
 - b. If required for manufacturer's FM uplift certification, provide a fully adhered base sheet over a proper substrate.
5. At granular mineral cap sheets, provide matching granules to cover exposed bitumen.
6. Torch applications of roofing materials require acceptance by M-DCPS on a per condition basis.
7. An SBS cap sheet with other than a mineral granule topping requires prior acceptance by M-DCPS on a per condition basis.

E. Sloped Roofs.

1. Use the following systems for roofs with slopes of 3-1/2:12 or greater:
 - a. Flat cement tile or Spanish "S" cement tile with integral color throughout.
 - b. Barrel, flat, or Spanish "S" clay tile for historical buildings when accepted by M-DCPS on a per condition basis.
 - c. Asphalt shingles, only to match existing conditions.
2. Minimum slopes shall comply with FBC Table 1515.2.
3. Metal roofs are not allowed except for prefabricated metal walkway covers in Division 10.

F. Re-Roofing Procedures.

1. Comply with FBC High Velocity Hurricane Zones - Reroofing.

2. The A/E will receive a work order, from M-DCPS, for the re-roofing/testing of a specific facility and a M-DCPS re-roofing data sheet.
3. Identify defective portions of roof decks to be replaced before re-roofing.
4. The re-roofing data sheet shall be submitted to M-DCPS before roofing system selection and furnish the following:
 - a. Roof condition.
 - b. Age of roof.
 - c. Verification of existing insulation.
 - d. Verification of working and non-working exhaust vents and other mechanical equipment.
 - e. Type of existing structural deck.
 - f. Type of existing roof system.
 - g. Comment on failure of existing roof system.
 - h. Visual verification-of slope/drainage.
 - i. Type of expansion joints.
 - j. Amount of roof work.
 - k. Recommendation of an overlay versus removal of the roof.
 1. Existing cracking of roof or structure noted and subsurface conditions noted.
 - m. Existing cracking or leaks of parapet walls noted and parapet repair added to scope of work.
5. Schedule an on-site pre-design conference with M-DCPS Maintenance Roofing Department, M-DCPS Facilities Operations project manager, M-DCPS Facilities Operations roofing foreman, and the school principal to review project data sheet and recommendations. Record discussions and agreements and provide the minutes to the M-DCPS representatives.
6. Identify defective portions of roof decks to be replaced before reroofing.
7. Request from M-DCPS and schedule necessary tests including, but not limited to the following core samples to verify:
 - a. Existence of asbestos roofing materials.
 - b. Number of existing roof systems.
 - c. Existence of insulation, value of thermal quality, and moisture content of insulation.
 - d. Type and condition of existing structure to verify structural capacity and if capable of supporting an overlay.
8. After receiving satisfactory test results and if an overlay system is recommended by the A/E, an uplift test and applicable fastener pull out test are necessary to verify compliance with the uplift requirements for the basic wind speed for the project location per the Florida Building Code (FBC).
9. Coordinate insulation installation with FPL roofing insulation rebate program and M-DCPS.

10. A roof deck shall not carry more than 2 roof systems.
11. A total system removal requires an adequate temporary seal to ensure weather tightness.
12. Roof Membrane Flashing.
 - a. Where walls cannot be felt wrapped or waterproofed:
 - 1) Clean and prime, according to roof system, the exposed wall to receive new wall flashing membrane according to this Division.
 - 2) Seal built-up roof flashing felt with cold bitumen according to manufacturer's requirements and roofing tape over term bar and fasteners.
 - 3) Seal and fasten single-ply roofs with accepted sealant and term bar.
 - 4) Seal upper edge of metal counterflashing with approved sealant.
 - 5) Verify expansion joint locations to determine flashing requirements.
 - 6) At low parapets not on the building perimeter, wrap completely with roof flashing material.
 - 7) Continue roof flashing to underside of adjacent higher roof deck edge metal.

VI. FLASHING AND SHEET METAL (07600)

- A. Comply with RAS 111 and FBC High Velocity Hurricane Zones - Weather Protection and Materials.
- B. Flash sheet metal for new and existing roofs shall comply with FM 1-49 Loss Prevention Data - Perimeter Flashing.
- C. PVC/teflon for single-ply membrane roof systems shall be specified with the membrane roof specification.
- D. Flashing metal shall comply with SMACNA, latest standards:
 1. New and re-roofing installations: Type 302 or 304 - 22 gage stainless steel.
 2. Historical buildings: Type 302 or 304 - 22 gage stainless steel or metal to match existing as accepted by M-DCPS, on a per condition basis.
- E. Flashing shall have an 8 inch minimum vertical height above finished roof system surface and be at roof openings, parapet walls, curbs, mechanical equipment, and any other surfaces intersecting the roof plane. Except at curbs and other roof mounted items designed to receive 8 inch high flashing, extend other surfaces intersecting the roof plane at least 14 inches from the finished roof membrane. Coordinate with Divisions 15 and 16,
- F. Gutters and Downspouts:
 1. Comply with RAS 111 and FBC High Velocity Hurricane Zones - Weather Protection.
 2. Provide downspouts for rainwater disposal from roofs.
 3. Provide gutters and downspouts at edge of roof perimeters. Built-in gutters behind parapets and parapet top gutters are not allowed.

4. Gutters, downspouts, scuppers, and conductor heads shall be stainless steel. Comply with SMACNA - Architectural Sheet Metal Manual, latest edition.
5. Downspouts within 9 feet of finish grade or a slab shall be ductile iron or Schedule 80 PVC. Coordinate connections to stainless steel components.
6. Connect downspouts to storm drain systems.
7. Downspouts shall be connected to a drainage system. Downspouts discharging on grade require M-DCPS acceptance on a per condition basis. At ground surface, use poured in place concrete pads, not precast splashblocks.
8. Paint downspouts to match adjacent wall color.
9. Solder lap joints. Sealant at joints is not allowed. Provide expansion joints for thermal expansion and contraction.
10. Provide strap reinforcement with hemmed edges and no sharp edges.

VII. ROOF SPECIALTIES, ACCESSORIES, AND SKYLIGHTS (07716 - 07900)

A. Roof Expansion Joints.

1. Comply with FBC High Velocity Hurricane Zones - Roof Coverings with Slopes less than 2:12.
2. Allow for expansion and contraction to minimize cracking and deterioration of building component materials.
3. Design and locate flexible, weathertight, and durable expansion joints to allow for movement and to relieve stresses.
4. Roof expansion joints shall be compatible and according to the roofing manufacturer's specifications and recommendations.
5. Expansion joints shall be high profile.

B. Roof Scuttles.

1. At new facilities, provide safe and secured access by scuttles or access doors to each flat roof if the roof deck or parapet exceeds 13 feet above adjacent finish grade or ground floor exterior slabs.
 - a. Access, by scuttle or access door, is required to adjacent roofs if more than 42 inches above accessible roofs.
 - b. Fixed external ladders are not allowed.
2. Locate roof scuttles, at least 30 inches wide by 54 inches long, over M-DCPS accepted means of roof access in mechanical rooms, electrical, custodial storage rooms, or other custodial controlled lockable spaces.
 - a. See Division 5 for ladders.
 - b. Coordinate with roof framing for unobstructed access.

3. Roof scuttles shall be connected to the building security system and have a hasp at the interior.

C. Skylights.

1. Skylight use is not allowed.
2. Existing skylights shall be removed at re-roofing projects unless otherwise directed by M-DCPS. Provide and match existing structural deck and substrate.

D. See Division 5 - Metals for equipment framing supports and clearances.

E. Wood.

1. Use one piece solid wood plates to secure coping to parapet walls.

VIII. JOINT SEALERS (07900)

A. Detail and specify the appropriate joint sealer and backing at the following interior or exterior locations.

1. Vertical and horizontal surfaces.
2. Traffic areas.
3. Kitchen areas for vermin protection.

B. Specify single source responsibility for each joint material type.

C. Joint sealers, fillers, and other related materials shall be compatible with one another, joint substrate, adjacent materials, and different assemblies including finishes.

END OF DIVISION