

## **075000 Roofing Systems**

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### **PART 1 - GENERAL**

#### **1.1 REFERENCE STANDARDS**

##### **A. Roof Design Standards:**

- 1. Florida Building Code
- 2. American Society of Civil Engineers – Minimum Design Loads for Buildings and Other Structures (ASCE 7-02, or edition referenced by the current edition of the Florida Building Code).

##### **B. Roof Industry Guidelines: All roofing installations shall comply with following industry resources and guidelines:**

- 1. The NRCA Roofing and Waterproofing Manual, current edition, published by the National Roofing Contractors Association
- 2. Architectural Sheet Metal Manual published by SMACNA (Sheet Metal and Air Conditioning Contractors' National Association, Inc.)
- 3. FM Global RoofNav (Factory Mutual Systems Approval Guide)
- 4. Underwriters Laboratory (UL) Building Materials Directory
- 5. UL Fire Resistance Directory
- 6. American Society for Testing and Materials (ASTM) Annual Book of Standards Volume 4.04 for Roofing, Waterproofing and Bituminous Materials
- 7. Metal Roofing System Association (technical details).
- 8. Concrete and Clay Roof Tile Installation Manual published by the Florida Roofing, Sheet Metal and Air Conditioning Contractors Association, Inc. (FRSA) and the Tile Roofing

institute (TRI) formerly known as Roof Tile Institute

9. FEMA Guidelines for Buildings to be Used as Public Shelters
10. NRCDA Guidelines for installing LWIC

## 1.2 **ROOF SYSTEM DESIGN**

- A. Registered Architect or Engineer Required: All new and replacement roofing projects shall have plans and specifications developed by a registered architect or engineer licensed by the State of Florida. The professional consultant shall have a minimum of ten (10) years direct experience in roofing design and analysis of roof systems.
- B. Design Criteria: Design of **low-slope** roofing systems shall consider **all adjacent flashings**, wind uplift resistance, primary drainage, secondary emergency drainage, and insulation to provide thermal resistance.
  1. **Adjacent Flashings: Design of roof system replacement should include consideration of adjacent flashing details and conditions consisting of physical inspection and/or consultation with maintenance entity.**
  2. Wind Design: Design roof systems to resist extreme wind forces. Structural analyses are required to verify the integrity of all roof components. Wind uplift design shall comply with the most stringent requirements of applicable codes and the latest edition of American Society of Civil Engineers – Minimum Design Loads for Buildings and Other Structures (ASCE 7, edition referenced by the current edition of the Florida Building Code).
  3. The designer shall specify roof systems and system components that have current Florida Building Code Product Approval or Miami-Dade Notice of Acceptance (NOA) indicating that the system has been satisfactorily tested to resist wind uplift design pressures determined by the project structural engineer. The wind uplift design pressures shall be indicated on the plans according to the Florida Building Code.
  4. Roof Drainage Design: Florida Plumbing Code, current edition.
- C. Design Details: All requirements of this Standard and referenced standards shall be strictly adhered to. All penetrations and conditions be shall detailed (including fan bases, power supply, equipment, corners, terminations, drains, scuppers, overflows, edges, flashings and slopes) according to the recommended procedures provided in the latest edition of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual and installed per manufacturer's instructions. The details in the Manual show standard conditions that shall be adapted to suit each individual project.

## 1.3 **SPECIAL CONSIDERATIONS**

- A. Contractor Qualifications: All roofing contractors working on University facilities shall have a current State of Florida license and be certified/approved as a roofing contractor by the manufacturer for the system being installed or repaired. Roofing contracting firms shall have a minimum of five (5) years of experience installing the type of system specified. This experience shall have been earned by the firm proposing the work, not by individual employees. In addition, the job site superintendent shall have a minimum of five (5) years of

experience installing the type of system specified.

- B. Protection Plans: The specifications shall require a specific protection plan for all reroofing projects to describe the means of maintaining the building in a safe and watertight condition throughout the construction period. Existing and newly installed roof systems shall be considered in the protection plan to ensure roofing operations do not damage them. Areas where the roof deck/structure are (or may be) damaged or deteriorated shall only be re-roofed when the occupied spaces below are unoccupied. Other potential phases of reroofing operations can be hazardous to the facility and its occupants and shall be carefully reviewed during design bidding and at appropriate phases during construction.

1. Contractor shall employ whatever measures are necessary to prevent or limit strong odors from entering the building. Special consideration should be given to fresh air intakes and any actions to limit their airflow shall be coordinated with UF Project Manager and Facility Services Work Management.

- C. Roof Access: All roof areas ~~not accessible by "high reach" manlift equipment~~ shall be permanently equipped with a ~~safe and~~ reasonable means of access for purposes of maintenance of the roof system and any roof-mounted equipment. Provide non-public interior access to all roof areas. In buildings of two or more stories with mechanical equipment on the roof, provide stairwell access. In one-story buildings, provide roof hatches with ladders located in separate closets; do not install in offices, classrooms or other publicly accessible spaces. Exterior built-in ladders from main roof may be used to provide access to remote roof areas. Roof access to any roof area via a built-in ladder from the ground outside the building is prohibited.

~~4. Access Door Thresholds: The breach height of access door thresholds to the roof or roof hatches shall be 8" 12" above the adjacent roof surface. Breach height is defined as the elevation at which flooding water would enter the roof system. An acceptable walking surface shall be installed immediately outside the access door threshold on the roof system.~~

- a. ~~During reroofs all door thresholds within or in contact with roof system shall be removed and reworked, preferably with liquid flashing.~~

2. Walk Pads:

- a. Provide walk pads from all roof access points to ~~and surrounding~~ all ~~serviceable~~ roof-mounted equipment.
- b. Pads shall extend around each piece of equipment, wide enough for workmen to lay out tools and work.
- c. Provide a minimum of a 3' x 3' walk pad at all electrical outlets and water spigots.
- d. Pads shall be compatible with the roof membrane systems.

3. Roof Hatches: Roof hatch covers shall be prefabricated and installed ~~on curbs~~ ~~approximately 12" above the surface of the roof membrane,~~ with a breach height of 8" above the adjacent roof surface. Breach height is defined as the elevation at which flooding water would enter the roof system.

- a. Roof Hatches shall be oriented to allow for adequate clearance for fall protection gates and people.
- b. Where possible, roof hatches shall be minimum of 36"x36".
- c. All roof hatches shall have a system installed to provide a positive handhold for the user to enter and exit the ladder.
  - i. This handhold shall not be fiberglass.

- ii. The preferred system is externally mounted grab bars
- iii. An alternative is an extendable pole mounted to the ladder.

D. Roof-Mounted Equipment: Roof-mounted equipment is not acceptable if other locations for placement can be found. All roof-mounted equipment shall be provided with roof surface walkway access rated for the heaviest piece of removable equipment to allow ease of maintenance and minimize roof surface damage. If necessitated by design, roof-mounted equipment shall be consolidated to minimize number of curbed areas. Roof mounted equipment in excess of 50 pounds shall have a means of removal (e.g. elevator rated for the heaviest piece of equipment or a davit assembly mounted over the loading dock area).

1. All roof-mounted equipment when approved, including skylights, shall be set on curbs, and attached to resist area wind loads. Flat skylights are not allowed. Skylights are strongly discouraged.
2. Roof-mounted antennae and satellite / cellular dishes, lightning protection anchorage, lab equipment and exhaust fans, or scientific devices shall be located in areas specifically designed for that purpose. Roof loads, walking surfaces, anchoring devices, mounting pads, equipment stands, curbs, or utility needs shall be designed and provided using appropriate details, adapted as required, from the NRCA Roofing and Waterproofing Manual. The number of roof penetrations shall be kept to a minimum.

E. Fall Protection: All roof surfaces where a fall of six feet or more is possible must include OSHA-compliant fall protection. ~~in the form of guardrails, parapet walls, or anchor points for personal fall arrest systems (PFAS).~~ Any design for these systems shall be reviewed through the normal review process with Facilities Services.

1. The preferred order of preference for these protection systems are as follows:

- a. Parapet Walls
- b. Guardrails
- c. Fall restraint
- d. Fall arrest

2. Parapet walls shall be 39 inches or higher.

3. Guardrails shall comply with OSHA requirements as defined in 29 CFR 1910.29.

4. Anchor points must be spaced and oriented such that all roof areas and equipment are accessible without interfering with the PFAS lanyard.

- a. The quantity of anchor points must be sufficient to accommodate the number of workers/employees required to service the roof and/or roof-mounted equipment.

5. Cable systems are allowed and preferred where possible over anchor points.

- a. For roof mounted cable systems they shall be
  - i. A minimum of 10 feet from roof edges.
  - ii. Have reflective tape on the bases.
- b. For wall mounted cable systems there are no restrictions by these standards.
- c. All instances or uses of a cable system that does not follow this standard shall be reviewed by a Committee consisting of members of Facilities Services, EH&S and Gainesville Fire and Rescue.

## PART 2 - PRODUCTS

### 2.1 LOW SLOPE MEMBRANE SYSTEMS

- A. Modified bituminous 3-ply membrane system over lightweight insulating concrete fill or rigid insulation:
1. The 3-ply system shall consist of one mechanically-fastened base sheet, one modified bituminous interply sheet, and one modified bituminous cap sheet.
  2. The cap sheet shall have a white granular or white reflective surfacing.
  3. The following application methods may be used:
    - a) Torch application
    - b) Cold adhesive or cold process
- B. Torch application: Torch application of roofing and flashing materials requires the use of a fire watchman and roofing contractor employees who are currently certified under the NRCA / MRCA CERTA (Certified Roof Torch Applicator) Program.
- C. Plaza decks or Green roofs with vegetation are not preferred: If they are used, they must have the following...
- i. Proper insulation for the application, waterproofing membranes, and protection board systems.
    1. Waterproofing membranes shall be satisfactorily flood tested and protected during construction until the over burden material is applied over the membrane assembly.
  - ii. If a project proposes a green roof the project team shall supply a plan to address the long term maintenance of the planting materials.
  - iii. Meet all parts of section 3.1 of this document as they are considered roofs.
  - iv. Removal of overburn must be included in Manufacture Roof Warranty.
- D. Single-ply roofs are allowed, but only for low-traffic roofs (i.e., roofs that have a limited amount of do not house equipment requiring annual or more frequent maintenance).
- i. Single-ply Performance Specs
    1. Material Type: PVC meeting ASTM 4434 Or ASTM 6754
    2. Minimum Thickness above scrim: 30 mils
    3. Considerations shall be made to specify a KEE (Ketone Ethylene Ester) material if the roof will be visible to reduce organic growth.
    4. TPO and EPDM roof materials are not preferred.
- E. Temporary dry in membrane: If necessary when re-roofing, a “dry-in” membrane of two plies of a smooth modified sheet may be applied directly to a primed structural concrete deck or other suitable substrate to keep the building dried in. Decks exposed to weather over occupied spaces are prohibited.
- F. Approved Roofing Materials: The selection of roofing materials shall be limited to those manufacturers with a 15-year history of satisfactory manufacture and installation of at least 250,000 squares of their roof system, and who provide a minimum 20-year unlimited warranty/guarantee for labor and materials, including metal finishes.

G. Membrane system manufacturers: Preferred manufacturers include the following, but ANY and ALL manufacturers shall comply with the warranty provisions covered in Part 3:

1. Johns Manville
2. Siplast
3. Tremco
4. Sika / Sarnafil
5. Soprema
6. Fibertite

H. Aggregate Surfacing: The use of gravel or slag surfacing or loose stone ballast is discouraged.

I. Roof Coatings: (UF facilities Services is rewriting this section on roof coatings. They can still be used, but type and application shall be approved in writing from UF Facilities Services Roofing Subject matter expert prior to design)

1. No silicon coatings without written approval from Facilities Services

2. **All Coatings systems shall:**

- a) Have Sole-Source-Manufacture-Warranty
- b) Have UL Class A Fire Rating or maintain the roof system Class A Fire Rating
- c) Perform and document an adhesion test.
- d) Perform daily wet mil test with photo documentation
- e) Prevent bleed-through and discoloration
- f) Have all flashings, penetrations, scuppers/drains included in flashing details.
- g) Protect Lightning Protection during installation. Coating must be applied under and not onto the Lightning Protection.
- h) Protect all surrounding surfaces from coating material
- i) Provide walkway with anti-slip surfacing in accordance with UF Construction Standards 075000 Roofing System 1.3, C, 2.
- j) All sealants associated with roof system flashings must be replaced including but not limited to counter flashing, termination bar, gravel stop, etc.
- k) Where possible, all accessories must be removed and coated underneath including but not limited to drain clamping rings, pipe stands, etc.
- l) All locations with more than 24 hours of ponding water must be coated with a product that does not have a ponding water limitation, such as a PMMA or equivalent.
- m) Have adequate coverage rates as specified below.

3. Surfacing Only

- a) Minimum 30 mil thickness
- b) Minimum 10-year warranty

4. Roof Recovery

- a) Minimum 80 mil thickness with minimum 40 mil above reinforcing material
- b) Minimum 20-year NDLEAK free warranty
- c) Shall have full reinforcement
- d) Shall have all drains reworked and included in warranty
- e) Shall have all flashings, penetrations, and drains in warranty
- f) Coating must extend behind counter flashings minimum 1"
- g) Shall have a moisture survey and replacement of all compromised insulation
- h) All compromised roof membrane and insulation shall be replaced with like kind and in accordance with the manufacture's warranty requirements for the project.

i) If the compromised insulation exceeds 33% the roof shall be replaced.

- J. Alternative Roof Systems: If the Architect/Engineer proposes a specific alternative roof system, i.e. a unique or non-traditional system, the request to install an alternative roof system shall be in writing and include justification data. Written approval from the UF Design & Construction Standards Steering Committee shall be obtained prior to using an alternative system.
- K. Base Flashing: All base flashing shall extend a minimum of eight (8) inches from the top of the roof membrane to the top of the base flashing up the vertical sides of curbs, walls, or roof penetrations.

## **2.2 STEEP SLOPE ROOF SYSTEMS**

- A. Steep slope roofing is considered any roof with a pitch equal to or greater than 3/12 and includes shingle, slate, tile and metal roof systems. All steep slope roofing systems shall use self adhering waterproof membrane as an underlayment over the entire roof. Under no circumstances, shall slate or tile be installed on roofs with slopes of equal to or less than two (2) inches per foot.
- B. Clay Tile Roofs: Tile shall be flat slab clay tile. Size, shape and edges shall match existing where possible. Tile shall meet Grade 1 requirements of ASTM C1167, latest edition. Installation shall be based on the Concrete and Clay Roof Tile Installation Manual published by the Florida Roofing, Sheet Metal and Air Conditioning Contractors Association, Inc. (FRSA) and the Tile Roofing institute (TRI).
  - 1. Acceptable Manufacturer: Ludowici
  - 2. Tile Color: Summer Rose or Santiago Rose
- C. Existing Clay Roof Tile: The University may require the salvage of any unneeded and unbroken clay roofing tile, having it neatly stored on pallets and delivered to the Physical Plant Division storage yard. Attic stock of new tile shall be contained inside the building for which its use is intended.
- D. Metal Roofs: Metal roofs may be used for special conditions with prior written approval from the Director of the responsible University maintenance entity. Metal roofs shall have true standing seams with concealed clips and fasteners and a high performance coating. The use of panels with exposed fasteners is discouraged. Design and construction of longer panels must accommodate expansion and contraction. Flashings shall be isolated from copper flashings required by other sections of this specification.
- E. Shingle Roofs: Shingle roofs are not preferred, except on small projects, and may be used for special conditions with prior written approval from the Director of the responsible University maintenance entity. Use minimum 235 pound Class A, self-sealing tab, fiberglass shingles, with a 25-year warranty, rated for wind speed of current building code.

## **2.3 ENERGY EFFICIENCY AND ROOF INSULATION**

- A. New and replacement roofs shall meet or exceed the following Solar Reflectance Index (SRI) values:
  - 82 for low-sloped roofs (2:12 or less)
  - 39 for steep-sloped roofs (greater than 2:12)

- B. Energy Management: Roof system design shall be consistent with energy management requirements of the University of Florida, Florida Statutes and applicable Codes. Insulating values of the finished roof system shall be designed on the basis of economic life cycle return on investment when evaluated against fuel costs.
- C. Insulation Requirements: Insulation materials shall comply with the Florida Building Code and ASHRAE 90.1. Additional insulation or improved thermal performance materials and systems may be required to achieve energy efficiency goals or requirements for sustainability certification, such as LEED, FGBC, or Green Globes.
- D. Minimum Slope: A minimum final slope of  $\frac{1}{4}$ " per foot shall be required on all new roof systems. The roof surface shall have positive slope with no ponding after 24 hours. Areas exhibiting ponding shall be reworked, not merely have the number of plies increased.
- E. Temporary Roofs: Temporary roofs may be left in place under the roof insulation, where practical.
- F. Lightweight Insulating Concrete: (LWIC)
  - 1. Lightweight insulating concrete shall have a minimum compressive strength of 300 psi. Aggregate based or non aggregate based LWIC is allowed.
  - 2. Applicable Standards: All lightweight insulating concrete systems shall meet the following standards:
    - a) Current Florida Building Code Product Approval (or Miami-Dade Notice of Acceptance (NOA)) indicating that the system has been satisfactorily tested for wind uplift design pressures determined by the project structural engineer.
    - b) Tested by Underwriters Laboratories in accordance with the procedures of ASTM E-119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory;
    - c) Tested by Factory Mutual Research and listed in the most recent Factory Mutual Approval Guide as non-combustible or Class 1;
    - d) Tested by Factory Mutual Research for windstorm classification I-120 and listed in the most recent Factory Mutual Approval Guide.
  - 3. Ventilation of Lightweight Insulating Concrete: If lightweight insulating concrete is installed over slotted or perforated galvanized steel roof deck, additional ventilation may not be required. If lightweight insulating concrete is installed over a non-ventilated deck like structural concrete, non-slotted metal deck or over existing roof assemblies, temporary membranes or vapor barriers, additional ventilation is required. If one-way vents are used to provide additional ventilation, they must be insulated, spun aluminum roof vents having a one-way valve design. The vents must be furnished by roofing material manufacturer and specifically included in the manufacturer's warranty. Roof vents constructed of PVC are not acceptable.
- G. Rigid Insulation:
  - 1. Rigid thermal insulation shall consist of polyisocyanurate foam insulation.
  - 2. A rigid Glass-faced gypsum board shall be applied over all rigid insulation. ( Densdeck or



- alternate)
  - a. This rigid board shall be a minimum of ½” thick.
  - b. Perlite shall NOT be used in this application.
- 3. Provide tapered insulation and crickets to develop proper roof slope.
- 4. Do not **mop adhere** rigid insulation directly to wood decks. Provide mechanically fastened base sheets over rosin paper.

## **2.4 SHEET METAL FLASHING AND TRIM**

- A. Roof termination penetrations and flashing details shall be based in part by standard details prepared by SMACNA and NRCA. Construction documents shall include project specific details and fastener requirements.
- B. Acceptable materials and minimum thickness:
  - 1. Copper, 16- ounce
  - 2. Aluminum with factory applied finish coating, 0.032-inch
  - 3. Stainless Steel, 26-gage
  - 4. Lead flashing, 4-pound
  - 5. At concealed low-slope roofs and the back side of parapet walls, a liquid-applied flashing may be used, provided that incompatible materials are addressed as needed (e.g., copper flashing termination bar where alternate flashing meets silicone caulking).
- C. Galvanized metal is prohibited.
- D. Flashings shall always be separated from dissimilar metals.
- E. For buildings with steep slope tile roofs in the historic district, copper is required for all exposed flashing, gutters and downspouts.
  - a. All flashing joints on tile roofs shall be soldered.
- F. Roof detailing and sheet metal fabrications:
  - 1. Gutters:
    - a. Gutters (and all their components) shall be designed and fabricated to SMACNA standards.
    - b. Internal gutters are prohibited on new facilities.
      - i. Internal gutters on existing facilities shall be eliminated during reroofing or renovation projects to the extent practicable.
    - c. Shall be designed so that the front edge of the gutter is lower than the back with an elevation difference of 1/12 the gutter width or minimum of 1”.
    - d. Gutter sizing shall be based on drainage calculations with a minimum width of 6”.
    - e. All joints shall be soldered for stainless and copper gutter.
    - f. All joints shall be sealed with a material that has a minimum 15 year warranty for aluminum or painted gutters.
    - g. Shall have minimum of 1/8” pitch towards downspout.

- h. Strap and/or bracket sizing shall be based on SMACNA requirements with a minimum 1" wide and 3/16" thick.
    - i. Where used, strapping shall be placed minimum of 36" O.C.
  - i. Long gutter lengths shall have Expansion joints shall be included with maximum run between expansion joints being 50'. Where possible expansion shall be directed away from corners and downspouts.
  - j. Where possible gutters shall use lap type expansion joints
2. Downspouts:
- a. Rectangular shaped downspouts shall be sized based on drainage calculations.
  - b. Mount at least 1" out from the building wall.
  - c. Provide brass or stainless steel hardware cloth strainers at the top and splash blocks or underground drainage at the bottom.
  - d. Water from downspouts shall not be directed into the roof drainage system except through roof drains.
  - e. Provide access to allow for cleaning of downspout/underground connection.
  - f. Downspouts shall be constructed with conductor heads every 40' to admit air and prevent excessive vacuum.
  - g. Where possible, minimum of one downspout per 50' of gutter.
3. Roof Expansion Joint Covers: ~~Roof expansion shall be carefully considered, especially in membrane roofs. Locate membrane joints above plane of roof, with copper or stainless steel expansion cover instead of bellows type covers. Detail termination of expansion joints carefully. Structural expansion joints occurring in new construction shall be located at high points in the structure or roof insulation to the maximum extent practicable to allow water to flow away from them on the roof surface. Under no circumstances are expansion joints to be placed such that roof water must flow across them to reach drains.~~
- a. Expansion joint breach height shall be minimum of 8" above finished roof. Breach height is defined as the elevation at which flooding water would enter the roof system.
  - b. Expansion joints shall be metal with secondary waterproofing membrane installed under metal flashing.
  - c. Joints shall be soldered or installed with a backer and cover plate using a non-hardening sealant.
  - d. All conditions shall be detailed, including but not limited to, transitions, terminations, and expansion joints.
    - i. Design drawings are required for all expansion joints to include 3 dimensional details of ends and terminations.
  - e. Expansion joint location shall be considered when designing roof drainage so that it will not impede the flow of water.
4. Through-Wall Flashings. New facilities shall locate through-wall flashings at least 12-inches above anticipated finished roof level to ensure minimum base flashing heights as defined herein can be met. Elevations and accessibility of other components shall also be considered for their impact on roofing installation including reroofing of the facility. Such components are siding, windowsills (above roof level), equipment supports, stucco facades, etc.
5. Counterflashing: Counterflashing shall be two-piece with the receiver built into the wall. Stop the wall finish above the counterflashing receiver. Existing buildings may require the reglet to be cut into existing wall construction. Where surface mounted flashings are

necessary install a double flashing, both complete, one installed above the other. The top flashing protects the bottom.

6. Parapet Walls: Coping shall have a cover and a backer plate with non-hardening sealant, maintenance free raised rail concealed splices or standing seams. Stone coping may be used to match existing or adjacent architecture, but shall have continuous through wall flashing below it. Built-in flashing with cap and receiver is required. Consideration shall be given to the flow of water around and through parapet walls, especially masonry walls. Waterproof the roof side of parapet wall to preclude excessive weathering or leakage.
7. Pitch Pockets: Metal formed pitch pockets or pitch pans are specifically prohibited, including those filled with bituminous materials, urethane, butyl rubber, or similar pourable sealer. Alternate materials including cast urethane curbs with pourable sealers or liquid flashings with reinforcing fabrics may be used provided they are installed according to the manufacturer's written recommendations and specifically included in the roof membrane manufacturer's warranty.

## 2.5 **ROOF DRAINS**

- A. Sumped roof drains shall be required where possible. Sumps shall be a minimum of 4' in diameter or 2' from center of drain (if square), with a minimum slope of ½" per foot. All drain flashings shall be contained within the drain sump.
  1. Roof scuppers shall have a sump measuring minimum 2' from center with minimum ½" slope.
- B. Roof drains shall be factory painted cast iron drains assemblies with painted cast iron strainers. Drains shall be installed with factory furnished clamping rings and set in sumps below the surrounding roof level.
  1. All roof drains shall have metal strainers provided to protect from debris entering the drainage system.
    - a. Strainers shall be in place for all stages of construction.
- C. Emergency Overflow Protection: All low slope roof systems shall have a secondary means of evacuating water from the surface of the roof in the event the primary drainage system is blocked. The secondary system shall be totally independent of the primary system and may consist of overflow scuppers through walls, an independent internal overflow drainage system, or other suitable means. The overflow drain/scupper elevation must meet building code minimum above the elevation of the primary drain/scupper (if drain sump is present, elevation may be measured from roof membrane up to 2' from center of drain) OR the structural components of a roof system shall be reviewed by a licensed professional structural engineer to ensure that any water that accumulates on a roof system in the event of failure of the primary system will not overstress the structure.
  - a. A scupper overflow system shall not be used for roofs to drain onto other roofs.
- D. Internal Gutters: Internal gutters are prohibited on new facilities. Internal gutters on existing facilities shall be eliminated during reroofing projects to the extent practical.
  1. If the internal gutters cannot be eliminated they shall be incorporated into the roof warranty with a 20 year minimum leak free warranty.

## 2.6 **ROOF ACCESSORIES**

- A. Utility Supply Lines: Utility supply lines (electrical, water, gas, etc.) to roof-mounted equipment shall be installed within the supporting curb of that equipment to the extent practical.
- B. Condensate drain lines: Drain lines for roof top air conditioning units shall be supported on stands and routed to internal roof drains, not to scupper drains or other drains that discharge above grade.
- C. Lightning Protection System: Lightning air terminals, cables and accessories shall not be attached to or penetrate the base flashing.
- D. Cants:
  - 1. ~~Cants are not required for fluid-applied roofing and flashing systems.~~
  - 2. If cants are required by the manufacturer four-inch fiber or pressure-treated wood cants are preferred. ~~shall be provided for membrane roofs around all vertical interruptions of the roof system, such as curbs or walls.~~

## **PART 3 - EXECUTION**

### 3.1 **ROOF WARRANTIES AND CLOSEOUT REQUIREMENTS**

- A. Contractor's Warranties: Contractor shall provide a guarantee against defects in materials and/or workmanship for a period of two years from the date of overall project Substantial Completion.
- B. Manufacturer's Warranties: Manufacturers shall provide system warranties that meet the following criteria:
  - 1. Roofing system shall be guaranteed against defects in materials and/or workmanship for a period of 20-year ND (No-Dollar-Limit) warranty from the date of the Certificate of Substantial Completion. During this period, the manufacturer shall pay all costs of repairs to the roof system necessary to correct roof leaks resulting from any one of the following causes:
    - a) Improper workmanship in application of roofing system and substrate components.
    - b) Deterioration of roof membrane or flashing caused by ordinary weathering and/or exposure to ultra-violet light.
    - c) Blisters, buckles, ridges, wrinkles, fish mouths, and slips.
    - d) Damage to roofing system and substrate due to thermal shock (extreme temperature fluctuations).

- e) Slippage of roofing system components.
  - f) Breaks in roofing system or substrate components.
  - g) The point of connection between bowl and roof shall be covered under roof manufacturer warranty
- C. During the warranty period, the Manufacturers and the Contractor agree that, within 24 hours of receipt of notice from the Owner, they will inspect and make immediate emergency repairs to defects or to leaks in the roofing system. They further agree that, within a reasonable time, they shall restore the affected items to the standard of the original specifications.
- D. All emergency work and permanent work done during the Warranty Period shall be done without cost to the Owner, except in the event it is determined that such leaks were caused by Owner abuse, vandalism, lightning, hurricane, tornado, hail storm or other cause typically excluded by warranty documents.
- E. Guarantee shall be in written form acceptable to the Owner and shall be made by an authorized representative the manufacturer of the roofing membrane system used and shall be for the full period of time as specified herein.
- F. Training: For non-standard systems, the Contractor shall provide training to instruct University maintenance personnel in proper care and maintenance of the roofing system. For major projects or roof projects greater than 5,000 square feet, training shall be a minimum of 4 hours.
- G. Roof Database: Provide data sheet to facilitate the addition of the roof system information and Warranty information to the Owner's Roof Asset Management database. Contact the maintenance group in charge of the facility for data input forms and more information.
- H. Engraved plastic plaque(s) shall be installed at all roof access locations to notify all people accessing the roof that the roof is under warranty.
- a. This plaque shall be a minimum of 6" by 6"
  - b. It shall be black lettering on a vibrant color background. The background color shall be a function of the mounting location color and shall stand out from that background color.
  - c. The plaque shall be mounted in such a way that it is not removable and shall stay in place for the life of the warranty.
  - d. Plaques can be purchased from Facilities Services sign shop
  - e. The layout and wording of the plaque shall be:

# ATTENTION

## Roof Under Warranty

Do Not Alter or Repair without written approval from Facilities Services

Manufacture: XYZ

Warranty Number: 123

Warranty End Date: January 1, 2000

For Immediate Assistance Contact Facilities Services  
Work Management 352-392-1121

### 3.2 **RE-ROOFING**

#### A. Design of Roof Replacement Systems

2. When replacement of a roof is required, criteria for the replacement roof shall be in full compliance with these Standards. Design for wind uplift, drainage and thermal insulation shall meet the current Florida Building Code criteria to the extent practical. Reroofing projects shall improve existing conditions without degrading the performance of surrounding construction (especially masonry weeps).
3. Roofing Over Existing Roofs: The application of new roof materials over an existing roof structure will not be permitted until a nuclear or infrared scan (or other acceptable method of moisture detection) of that roof has been completed by a certified independent third party vendor and all wet areas detected by that scan/method have been removed. After the new roof is installed, roof scans shall be made by a certified independent third party vendor to record the condition of the new roof and compliance with specifications.
4. Slope for Drainage: On existing roofs where it is impractical to attain the required  $\frac{1}{4}$ " slope, a minimum slope of 1/8-inch per foot may be permitted with prior written approval from the Facilities Services Roofing Subject Matter Expert, if other provisions are made to ensure that the integrity of the roof and drainage systems are maintained. A roofing product that has no ponding water warranty limitations (such as PMMA or equivalent coating) may be applied on flat areas where existing conditions prohibit installation of tapered materials and the roof system manufacturer shall issue the required warranty with no exclusion for standing water. ~~Overflow protection shall be provided.~~
  - a.) Overflow protection shall be provided

- b.) Shall not eliminate existing through wall flashing unless said flashing is replaced.
  - 1.) Surface mount or reglet flashing is not an acceptable substitute for through wall flashing.

- 5. Test Cuts: Roof replacement designs require test cuts to determine the composition of the existing roofing and insulation assembly. Fastener pull tests may need to be performed before a replacement roof is designed. Sampling and testing of suspect asbestos containing roofing and flashing materials may be required. Contact EH&S Asbestos Coordinator for further information. (352) 392-3393. or [www.ehs.ufl.edu](http://www.ehs.ufl.edu) .

- a.All test cuts to a roof shall be fully repaired per the roofing manufacturers practices and shall be inspected by the Facilities Services Operations Engineering Roofing inspector.

- 6. Laboratory Fume Hood Policy: All work on roof tops with fume hood exhausts shall be in compliance with the University's Fume Hood Policy issued by the Environmental Health & Safety Division. The project Architect shall consult with the University Environmental Health and Safety Division – Lab Safety Office to determine what substances existing roof mounted laboratory hood exhaust stacks are discharging, and then shall specify in the project construction documents what protective measures must be undertaken by the contractor and his/her sub-contractors to protect their workers.

- B. Construction of Roof Replacement Systems: When replacement of a roof is required, criteria for the replacement roof shall be in full compliance with these Standards. In addition to the other requirements in this Standard, the following points shall be included in the technical specifications section.

- 1. Generally, all University facilities should be considered to be occupied and must be protected from moisture intrusion during re-roofing operations. Provide protection for interior spaces, furnishings and equipment.
- 2. In the absence of prior active reported roof leaks, any leakage from the roof area into the building during re-roofing projects will be assumed to be the responsibility of the Contractor.
- 3. Prior to starting work of the project, the Contractor will verify that all roof drains are working. Report any blockages to the UF Project Manager prior to beginning work. Report all broken and missing roof drain part such as clamping rings, bolts, and drain strainers.
- 4. Do not allow water build-up on roof due to changed drainage patterns. Provide for roof drainage during re-roofing, either by direct drainage to roof drains or pumps. Do not discharge water from roof directly to grade without specific authorization from the UF Project Manager.
- 5. Existing lightning protection systems shall be carefully removed prior to re-roofing. After the lightning protection systems are reinstalled, they must be re-certified to comply with the Florida Building Code criteria for education facilities.
- 6. The Contractor shall be present at the job site during and immediately after heavy rains in order to identify and repair leaks clean up water and repair water damage. Immediately remove water from interior spaces and clean areas in order for the occupants to proceed with their daily duties without interruption or inconvenience.

Storage areas, mechanical rooms and unoccupied areas shall be cleaned and repaired same as occupied areas. Proceed immediately with clean up as soon as discovered, do not wait for the next day to do this work.

7. The Contractor shall be aware that any expenditure by the University to repair or stop leaks or provide custodial services will be charged to the Contractor.
  8. Promptly repair all damage to University property, including vegetation and irrigation systems. It is the Contractor's responsibility to identify areas with subsurface irrigation and utility systems.
  9. Dig permits shall be obtained before installing fencing.
- C. Asbestos Containing Materials:
1. Prohibition on Use: The use of roofing and flashing materials containing asbestos is prohibited in the installation of new or the repair of existing roof systems.
  2. Removal Requirements: The removal of old roofing material shall not proceed until it is known whether it contains asbestos. The removal of roofing containing asbestos shall be carried out by State certified roofing Contractors. Asbestos roofing removal shall be conducted in accordance with all requirements of Environmental Protection Agency, Occupational Safety and Health Administration, and Florida Statutes; and all applicable rules of the Department of Business and Professional Regulation, Department of Environmental Protection, Department of Labor and Employment Security, or other state agencies having jurisdictional authority. Contact EH&S Asbestos Coordinator for further information ([www.ehs.ufl.edu](http://www.ehs.ufl.edu)).

### **3.3 ROOF REPAIRS**

- A. Existing Roof Warranties: Any new work on or through a warranted roof shall be done with the knowledge and permission of the warranty holder.
- B. Re-saturants. Re-saturants are not acceptable for rejuvenation of an existing built-up roof system.
- C. Roof Recovery systems. Recovery of roofs is an allowable form of maintenance and does not require professional documentation or permitting.

### **3.4 QUALITY CONTROL**

- A. Pre-Construction Conferences: The University shall coordinate a roofing preconstruction conference for all new and reroofing projects. Participants should include the University office responsible for administering the project, the University office responsible for maintaining the facility, the Architect/Engineer, Contractor, Roofing Contractor, Roofing Manufacturer's representative, and other related trades representatives.
- B. Quality Control: The installer shall be certified by the manufacturer and the manufacturer shall certify ~~the installation on completion.~~ that the roof system installation and materials meet all requirements for warranty upon completion.
- C. Building Commissioning: The University may employ an independent consultant to serve as



building envelope Commissioning agent. In such cases, the technical specifications should stipulate Commissioning procedures and requirements.

- D. Testing Requirements: Testing may include fastener resistance withdrawal tests for base sheet or rigid insulation fasteners, and compressive strength, unit weight or wet density tests for lightweight insulating concrete. Specifications shall stipulate test procedures and frequency and shall require the presence of the O&M entity during testing.
- E. Roof Construction Monitoring Requirements:
  - 1. Roof Construction Monitoring: The University reserves the right to provide independent roof construction monitoring whenever a roof is installed.
  - 2. Inspector Qualifications: The inspector shall be knowledgeable in roofing specifications and appropriate installation or repair procedures.
  - 3. Inspection Reports: The inspector shall be required to issue written reports on a daily basis which include, at a minimum: the name, address and phone number of the Roofing Contractor, the name of the roofing foreman/superintendent, description of the day's weather, number of roofers/sheet metal mechanics on project, location of the day's work, description of work accomplished, deficiencies observed in the work requiring correction, a description of materials incorporated into the work and those stored for later use, and a quantitative summary of unit price items incorporated into the day's work.
  - 4. Membrane Manufacturer Inspections: The project specifications the requirement that the roof membrane manufacturer make a minimum of three visits during application and one visit at the time of the substantial completion inspection with a written report of each visit to the Architect/Engineer and UF Project Manager. Manufacturer inspections shall be accomplished by technical representatives with a minimum of five (5) years direct working experience with the technical department of that manufacturer.

F. Roof Moisture Survey

After a minimum 90-day weatherizing period, all new roofing shall be scanned using infrared thermography or other approved methods by a certified independent third party vendor to verify that the new insulation has not been damaged by moisture intrusion. Test cuts to verify non-destructive survey results shall be repaired by the Contractor who installed the roof. The roof system manufacturer shall approve the repair methods.

- 1. Thermal scans are not acceptable on LWIC systems.

END OF SECTION