



**DESIGN & CONSTRUCTION GUIDELINES**

**DIVISION 07 THERMAL & MOISTURE PROTECTION**

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**SECTION 07 01 00 WATERPROOFING****1.1 MEMBRANE WATERPROOFING**

- A. The following are the minimum requirements to assure adequately designed waterproofed floors for machine and equipment rooms and other areas subject to flooding from equipment failure or seepage from exterior sources:
1. DRAWINGS shall fully detail the installation of the membrane. Continuous membrane risers shall be provided above the finished floor surface at vertical walls, pads, curbs, pipes, and ducts through the slab. Risers shall be at least as high as the lowest curb and shall be bonded to the vertical surface. Concrete foundation walls around elevator pits and around basements, from grade to footings, shall be treated with 60 mil minimum membrane waterproofing. When elevators open into areas subject to flooding, opening sills must be above the membrane riser height to keep flood water out of elevator shaft. If water is present, construction of work slab (mud slab) is recommended to receive water proofing membrane.
  2. SPECIFICATIONS shall provide for a heavy duty, permanent waterproofing type of membrane capable of adjusting to building movements without breaking the membrane seal. When rubber or plastic membranes are specified, a ten (10) year installer experience clause with written documentation shall be required by the specification.
  3. TIMING OF INSTALLATIONS: When surface applied membrane waterproofing is specified, the specification must prohibit scheduling of installation until after the majority of work of all other trades has been completed. Inaccessible surfaces under equipment and housing foundations, pads, and curbs may be waterproofed in advance of floor areas. Surface membrane must be protected until acceptance of the space by the University. Surface applied membrane, except under equipment, must be accessible for repair.
  4. TESTING: Specifications shall provide for the testing of waterproofed membrane floors by flooding. Floors shall be filled with water to within 1/4 inches of top of lowest curb for a period of 6 hours and closely inspected for leaks; tests shall be witnessed by designated representatives of the University. The test shall not relieve the contractor of maintaining a leak free floor until the end of the warranty period.
  5. MAINTENANCE GUARANTEE: The General Contractor, manufacturer and installing subcontractor shall furnish a written three (3) year guarantee on the complete membrane waterproofing installation. Submit the guarantee in triplicate. The guarantee shall begin at substantial completion and accepted for use by the Owner. The guarantee shall cover, at no cost to the Owner, all labor, materials, and equipment required for repair or replacement to correct leaks, faulty materials or workmanship, and reestablishing all conditions and finishes equal to condition prior to repair.

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END OF SECTION 07 01 00

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**SECTION 07 11 00 DAMPPROOFING****1.1 BITUMINOUS TYPE**

- A. Surfaces of exterior cavity walls shall be primed and applied with self-adhering bituminous damp proofing prior to installation of furring. Liquid applied bituminous damp proofing is approved only for brick cavity walls with appropriate brick anchors and ties, and no other penetrations. Surfaces of exterior walls below grade, shall be primed and coated with bituminous damp proofing.

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END OF SECTION 07 11 00

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**SECTION 07 18 00 TRAFFIC COATINGS****1.1 THIS SECTION INCLUDES**

- A. Pedestrian and vehicular traffic coatings for application to the specific type of deck indicated on the drawings.

**1.2 DESCRIPTION OF SYSTEM**

- A. The pedestrian and vehicular deck coatings shall be a complete system of compatible materials including cold liquid applied elastomeric coatings supplied by an approved manufacturer to create a seamless waterproof membrane.

**1.3 QUALITY ASSURANCE**

- A. The pedestrian and vehicular traffic coatings shall be rated Class "A" by American Society for Testing and Materials (ASTM E108) / Underwriter Laboratories (UL790); containers to bear Underwriters label.
- B. Materials used in both coating systems shall meet applicable Volatile Organic Compound (VOC) regulations.

**1.4 PREPARATION**

- A. Apply coatings over previously cleaned, etched surfaces. Treat cracks and joints as directed by the manufacturer's written instructions.

**1.5 APPLICATION**

- A. Apply primer, base coat, wearing surface coat, and previously graded, broadcasted, hard aggregate at the rates recommended by the manufacturer's written instructions. Provide the required system's dry film thickness.

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END OF SECTION 07 18 00

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**SECTION 07 21 00 INSULATION****1.1. BUILDING INSULATION**

- B. Meet Florida State Energy Code Requirements and submit calculations to the University. Do not use loose fill type insulation.

**1.2 ROOF DECK INSULATION**

- A. Meet Florida State Energy Code Requirements. Submit calculations to the University All insulating materials shall be non-hygroscopic. Protect roof insulation with roofing manufactured recommend cover board.
- B. Gypsum cover board must have primed glass facer.

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END OF SECTION 07 21 00

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**SECTION 07 31 00 SHINGLES AND ROOFING TILES****1.1 GENERAL REQUIREMENTS**

- A. Follow Standard Practice for Roofing Systems at University of South Florida (USF Roofing Standard) at the end of [Division 7, Thermal & Moisture Protection](#).

**1.2 ASPHALT ROOF SHINGLES**

- A. Specify only wind resistant type. Fire-resistant rating shall be UL Class A.

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END OF SECTION 07 31 00

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**SECTION 07 40 00 PREFORMED ROOFING AND SIDING****1.1 GENERAL REQUIREMENTS**

- A. Follow USF Roofing Standard, included at the end of this [Division 7, Thermal & Moisture Protection](#).

**1.2 PREFORMED WALL AND ROOF PANELS**

- A. Finish materials and colors for roof structures and rooftop equipment screens are subject to the approval of the USF Facilities Management (USF-FM).

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END OF SECTION 07 40 00

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**SECTION 07 50 00 MEMBRANE ROOFING****1.1 GENERAL REQUIREMENTS**

- A. **DESIGN REQUIREMENTS FOR MEMBRANE ROOFING:** Follow USF Roofing Standard, included at the end of this section. Roof decks or tapered insulation must provide a minimum slope of 1/4 inch/foot toward drains; crickets shall be minimum 1/2 inch/foot. Dead level roofs are prohibited. Scupper openings shall be provided through parapet walls. Insure that drains are truly at low points of roofed area. Install "crickets or saddles" to divert water flow around curbs so as to avoid interference with designed drainage system. Reroofing projects will require individual assessment for design to provide adequate drainage slope. Drain sumps should be 8' x 8'.
- B. **OBSERVATION OF INSTALLATION BY UNIVERSITY PERSONNEL:** The University shall be given two (2) weeks advance notice of intent to start installation of roofing materials. Designated University personnel must be permitted to perform a pre-installation inspection of roofing materials and equipment, to be present throughout roofing installation to observe installation techniques for compliance with specifications, and to participate in final inspection. A pre-roofing conference should be included in specifications.
1. **CUTTING OF TEST PANELS:** The University reserves the right to cut test panels from the finished roof in order to determine that minimum requirements have been met. The roofer shall repair, at his own expense, the roof where test panels were taken.
  2. Pull Test may be requested to verify system performance according to specified uplift by a certified third-party testing agency.
- C. **COORDINATION OF INSTALLATIONS:** The roofer shall install all flashings required to make a complete waterproof installation. For this reason, it is preferred that specifications for roofing, flashing, and sheet metal work be combined into one section. Although certain counter-flashings or similar materials may be provided by other contractors, the roofer shall be made responsible for their proper installation.
- D. **ROOFING AND FLASHING WARRANTY:** The General Contractor, Roofing Subcontractor and the manufacturer(s) of materials used shall jointly furnish a written twenty (20) year warranty on the complete roof installation. Submit the warranty in triplicate and in an electronic format. The warranty shall begin when the project is completed and accepted by the Owner. The warranty shall cover, at no cost to the Owner, all labor and materials required to repair or replace roofing, flashings, sheet metal and copings as necessary to fully correct leaks, faulty workmanship or defective materials.
- E. **STORAGE OF MATERIALS:** Roofing felts, membranes and insulation are to be stored in a dry trailer or inside a dry building when available; or stored on skids fully covered under tarpaulin strapped against wind. Asphalt or coal tar pitch may be stored outside if kept under a tarpaulin or plastic film. All materials are to be stored on appropriate dunnage. When stored on a roof properly protect the roof membrane and avoid concentrated loading on roof.
- F. **WET MATERIALS:** Roofing felts or insulation which became wet before or after installation must be removed and replaced. Wet materials shall not be dried or used. Wetted membrane materials must be thoroughly evaluated to determine the effect on adhesion, lap seals or blister potential. Remove any such material if there is any possibility of failure.
- G. **ROOF MOISTURE SURVEY:** Conduct infrared scan before and after completion of existing membrane reroofs. Infrared scan at completion of job is to be completed by a certified third-party agency and submitted as part of the close out documents.
- H. **CLEAN UP:** Emphasize that debris not be allowed to accumulate on roof during construction. All debris to be totally removed at completion of project.
- I. **METAL DECKS:** When securing at end of work day: use expanding foam insulation to plug all metal deck flute/voids; and overhang base sheet minimum of 3' from the edge of installed insulation boards.
- J. **CONCRETE DECKS:** When securing at end of work day: use expanding foam insulation to seal bottom edge of insulation boards against the concrete deck; apply roof cement/adhesive on all exposed edges of the insulation boards and overlap base sheet minimum of 3' beyond the edge of installed work; adhere 6" of base/cap sheet directly to concrete deck; and weigh down the loose end of base sheet.



**1.2 PERFORMANCE REQUIREMENTS****A. ROOFING SYSTEM SHALL COMPLY WITH THE FOLLOWING:**

1. National Roofing Contractors Association (NRCA) Manual for Low-Slope Roofing Construction Details (Last Edition).
2. Sheet Metal & Air Conditioning Contractors' National Association (SMACNA) Manual (Latest Edition).
3. American Society of Civil Engineers (ASCE) 7 and Safety Equipment Institute (SEI) Standards, Chapter 6.

**1.3 SUBMITTALS****A. SHOP DRAWINGS:** Include plans, sections, details in compliance with above referenced Performance Requirements and attachments to other work, for the following:

1. Base flashings, cants, and membrane terminations.
2. Cellular insulating concrete, including slopes.
3. Crickets, saddles, and tapered edge strips, including slopes.
4. Engineering calculations must be submitted for taper design, curbs, support stands and lightning protection system.

**1.4 QUALITY ASSURANCE**

- A. **MANUFACTURER:** Manufacturer shall provide inspection services with written reports provided in assurance of warranty issuance.
- B. Photographic record of existing conditions, anomalies observed, exemplars of each phase of work during progress (minimum weekly), completion of each phase of roof installation, and record of final completion shall be provided to the USF Project Manager. Photos must be of high resolution; and document location and day recorded.
- C. Wireless Weather Stations should be used to monitor and record weather events and account for rain days. If not used the Project Manager will rely of NOAA weather reports.

**1.5 MULTI-PLY MODIFIED BITUMEN ROOFING**

- A. Multi-ply system shall consist of 160 mil APP dual reinforced (polyester-fiberglass) base ply and a minimum 180 mil APP dual reinforced granulated cap sheet. Cap sheet shall be cool-roof granule meeting an initial Solar Reflective Index (SRI) of 92 per ASTM.
- B. Torch Applied and Cold Process are acceptable methods of installation. Design team must review job conditions to recommend the best solution.
- C. A peel and stick base sheet is to be used on combustible substrates if torch applied.

**1.6 TOTALLY ADHERED MEMBRANE ROOFING**

- A. Shall not be installed directly over lightweight concrete decks.

**1.7 METAL ROOF**

- A. Consult USF-FM before designing such roofs. Written USF-FM approval is required.

**1.8 FLUID APPLIED ROOFING**

- A. Consult USF-FM before designing such roofs. Written USF-FM approval is required.

**1.9 THERMOPLASTIC ROOFING**

- A. Specifying Thermoplastic Roofing (TPO) roofing require written USF-FM approval. If TPO is approved for use:
  1. Use of pre-molded inside and outside corner flashing is required; use pre-molded flashing of next higher mil thickness (when available) than specified for the roof membrane.
  2. Provide textured (or embossed) TPO walkway pad of contrasting color.

**1.10 KETONE ETHYLENE ESTER ROOFING**

- A. Specifying Ketone Ethylene Ester (KEE) roofing require written USF-FM approval. If KEE is approved for use:
  1. Use of pre-molded inside and outside corner flashing is required; use pre-molded flashing of next higher mil thickness (when available) than specified for the roof membrane.

2. Provide textured (or embossed) KEE walkway pad of contrasting color.

**1.11 SINGLE PLY MEMBRANE ROOFING, GENERALLY**

- A. With the exception on Thermoplastic Olefin (TPO) and Ketone Ethylene Ester (KEE) roofing, on project specific basis; all other thermoset and thermoplastic membrane roofing systems are prohibited. Prohibited single ply membrane roofs to include, but not limited to:
  1. Chlorinated Polyethylene (CPE)
  2. Chlorosulfonated polyethylene (CSPE)
  3. Copolymer Alloy (CPA)
  4. Epichlorohydrin (ECH)
  5. Ethylene Interpolymer (EIP)
  6. Ethylene Propylene Diene Terpolymer (EPDM)
  7. Neoprene (CR)
  8. Nitrile Alloys (NBP)
  9. Polyisobutylene (PIB)
  10. Polyvinyl Chloride (PVC)
  11. Tripolymer Alloy (TPA)

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END OF SECTION 07 50 00

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**SECTION 07 60 00. FLASHING AND SHEET METAL****1.1 GENERAL REQUIREMENTS**

- A. MAINTENANCE WARRANTY: Warranty requirements apply to this work. Refer to [Section 07 50 00, Subparagraph 1.1.D, Roofing & Flashing Warranty](#).

**1.2 MATERIALS**

- A. METAL FLASHING AND COUNTER FLASHING: Copper, soft temper stainless steel or aluminum. Galvanized steel is prohibited.
- B. JOINTS. Continuously welded joints are preferred over riveted or crimped joints. Submit full scale mocked up of alternate joints and splices, if used, for approval by USF-FM and Designer.
- C. COPING. Continuous cleat coping with concealed splice and internal gutter system is preferred. Submit full scale mocked up of alternate coping, if used, for approval by USF-FM and Designer.
- C. GUTTERS AND DOWNSPOUTS: Copper, stainless steel or aluminum. No galvanized steel.
- D. CLEATS. Provide continuous cleats (FM 1-49) of same material as associated sheet metal.
- E. EXPOSED FASTNERS. Use stainless steel screws with neoprene washers. Apply dollop of caulk over screw head and washers.
- F. FASCIAS AND GRAVEL STOPS: Copper, stainless steel or aluminum. Aluminum sections, if used, must be extruded, to be used for appearance and not function as part of the weatherproofing. Use of aluminum is prohibited due to excessive expansion rate.
- G. PITCH PAN OR POCKETS: Use of pitch pans or pockets is prohibited.
- H. PRE-FABRICATED CURB FLASHINGS: Pre-fabricated polymer curb flashings are prohibited.
- I. REINFORCED FLUID APPLIED FLASHINGS: All fluid applied flashing must be reinforced. A secondary rain collar with caulk tray or counterflashing is required.
- J. LEAD OR RUBBER PIPE BOOT FLASHING: Use of lead or rubber pipe flashing is discouraged. USF-FM approval is required for exception.
- K. ROOF VENT PIPE EXTENSIONS: Solid-wall PVC fitting consisting of pipe and splice sleeve inserts, configured for insertion and sealing to existing plumbing vent piping, sized to fit inside diameter of plumbing vent piping, enabling extension of piping to field-determined height. (Basis of design TUBOS)

**1.3 SHEET METAL FABRICATION**

- All sheet metal design and fabrication shall conform with [Architectural Sheet Metal Manual](#) of the [Sheet Metal and Air Conditioning Contractors' National Association \(SMACNA\)](#),

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END OF SECTION 07 60 00

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**SECTION 07 71 00 ROOF SPECIALTIES AND ACCESSORIES****1.1 WALKWAYS**

- A. Provide walkways from roof access point to all roof top equipment that requires regular maintenance; extend walkways to all maintenance access points of each equipment. Install additional three 3-feet wide adhered layer of roofing (in contrasting color) as walkway. The walkway layer may be segmented to allow for improved drainage.

**1.2 LIGHTNING PROTECTION SYSTEM**

- A. Lightning Protection system is required for all new construction and addition in compliance with the [Section 26 4113, Lightning Protection for Structures](#). For renovations and additions, [Lightning Protection System Engineer](#) may modify the original [UL Lightning Protection System Master Label](#).
- B. Required installation of sacrificial pad and conductors:
1. Place and adhere an adhesive base (cable hold down clip) underneath every buckle, clamp, splice, cable ends, etc. for added protection against abrasion and puncture. Ensure all threaded ends of bolts are turned up to protect against puncture.
  2. Provide sacrificial pad under each adhesive base (cable hold down clip / cable fasteners), turnbuckle, clamp, splice connector, ends of conductors, etc. resting on roof membrane. The sacrificial pad should be cut from the cap sheet and fully cemented in place. Minimum 4 times the size of the adhesive base.
  3. Do not suspend conductors in clothesline style, ensure it is fully rested on horizontal surfaces or fully attached in vertical surfaces using sufficient number and location of adhesive base cable fasteners.

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END OF SECTION 07 71 00

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**SECTION 07 84 00 FIRESTOPPING****1.1 PENETRATIONS**

A. Provide rated through-penetration firestop systems with ratings indicated by ASTM E814.

**1.2 JOINT SEALANTS**

A. Provide fire-resistive joint sealants with fire-resistance ratings as determined per ASTM E119.

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END OF SECTION 07 84 00

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**SECTION 07 92 00 SEALANTS****1.1 GENERAL REQUIREMENTS**

- A. The following conditions shall be included in the specifications:
1. **WARANTY:** Provide written warranty that the General Contractor and sealant installer jointly guarantee to replace, at no cost to the University, any or all joints which fail within five (5) years after acceptance.
  2. **QUALIFICATIONS OF APPLICATOR:** Sealants shall be applied by specialists in the application of sealants; minimum five (5) years of experience required. Applicator is subject to the A/E approval.
  3. **RESPONSIBILITY FOR SATISFACTORY APPLICATION:** Inspect work of other trades prior to application of sealing material. If any joint or space cannot be put into proper condition to receive the material by specified methods, immediately notify the A/E in writing, or assume responsibility for and rectify unsatisfactory results.
  4. **TIME AND TEMPERATURE REQUIREMENTS:** Apply sealants as late as possible in the construction, preceding painting, and following cleaning operations. Do not apply sealants when air temperature is below 40 degrees F.
  5. **DO NOT SPECIFY CAULK OR CAULKING:** Caulks are limited to interior application only.
  6. **QUALITY ASSURANCE:**
    - a. Joint sealants are required to maintain permanent airtight and waterproof seal of joints.
    - b. Perform Adhesion Field Test ASTM C1521 in quantities and locations as directed by the A/E of Record and USF-FM.
    - c. Horizontal sealant joints are not to be exposed to weather; provide weather shield (e.g. metal cap flashing).
    - d. Horizontal sealant application on precast or metal panel joints exposed to weather is not permitted; provide weather shield (e.g. unit or continuous metal cap flashing).

**1.3 SEALANTS**

- A. Provide schedule indicating type of joints to be sealed. (i.e., precast panel to precast panel, masonry joints, etc.)
1. **INTERIOR:** Use acrylic type suitable for application of paint.
  2. **EXTERIOR:** Use two-part polyurethane, or as approved.
- B. Substrate preparation must be in accordance with manufacture published guidelines and be free of contaminates.

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END OF SECTION 07 92 00

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**SECTION 07 95 00 EXPANSION CONTROL****1.1 EXPANSION JOINTS**

- A. Carefully design and locate to prevent surface damage due to expansion and contraction of building materials.
- B. Provide areas of intense solar exposure with joints over and above number required by standardized tables and industry standards.
- C. Provide joints through parapet walls near corners.
- D. Provide additional joints in exterior wythe of masonry cavity walls and secure to substrate with flexible anchors. Recommend aligning interior wythe joints with exterior joints whenever possible.
- E. Provide horizontal joints for steel shelf angles in masonry walls.
- F. Separate partitions at top and bottom with expansion joint material in structures where deflection might cause damage to partition.
- G. Provide expansion joints in long linear building elements such as:
  - 1. Handrails.
  - 2. Fascia.
  - 3. Gravel stops.
  - 4. Gutter System.
  - 5. Plate glass window walls.
  - 6. Paving.
  - 7. Where low mass meets high mass of building.
  - 8. At wings and intersections of “L”, “I”, and “U” shaped buildings.
  - 9. At long buildings, maximum length between joints 200 feet.
  - 10. Back-prime dissimilar materials in contact with each other.
- H. Avoid “bridging” over expansion joints with railing, window framing, or other rigid construction.

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END OF SECTION 07 95 00

**STANDARD PRACTICE FOR ROOFING SYSTEMS AT UNIVERISTY OF SOUTH FLORIDA****1.1 Roof System Components**

The roof system includes the following basic components: roof deck or substrate, insulation, waterproofing membrane, protective surfacing, flashing, counter flashing, roof cants where applicable, caps and copings, perimeter fascia/gravel stops, sealants, roof expansion and control joints, roof walkway systems, roof hatches, skylights, roof drains, emergency overflow protection, roof drain flashing, scuppers, gutters, downspouts, and ballast material where applicable. These components and all types of roofing material, including metal and tile, are subject to the requirements of this USF Roofing Standard (Standard). Patios and decks constructed on roofs require special design consideration and shall not violate the roofing requirements of this Standard.

**1.2 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 for labor and materials, including metal finishes.

**1.3 Registered Architect or Engineer Required**

All new, repair, and replacement roofing projects shall have plans and specifications developed by a registered Architect/Engineer (A/E) licensed by the State of Florida. The engineer shall be a professional engineer, with a minimum of ten (10) years direct experience in design and analysis of roof systems.

**1.4 Steep Slope Roofing**

Steep slope roofing includes slate, tile and metal roof systems. Steep slope roofing shall not be utilized on University facilities on slopes less than 4 inches/foot unless a waterproof underlayment system is utilized beneath the steep roofing components. Under no circumstances shall slate or tile be installed at slopes less than 2 inches/foot.

**1.5 Energy Management**

Roof system design shall be consistent with energy management requirements of the State University System, 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.

**1.6 Roofing Work Carried Out By University Personnel**

Roofing projects carried out by University personnel shall be performed in a manner approved by the roof system manufacturer or one of its licensed roofing contractors. Repairs to low slope roofs shall be accomplished in accordance with the National Roofing Contractors Association (NRCA) Repair Manual for Low-Slope Membrane Roof Systems or manufacturer's requirements to maintain warranty.

**1.7 Roof Membrane Penetrations**

All penetrations of the roof membrane shall be detailed according to the recommended procedures provided in the latest National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual and installed per manufacturer's instructions. The details in the permit documents shall show standard and existing conditions which should be adapted to suit each individual project.

**1.8 Expansion Joints**

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.

**1.9 Utility Supply Lines**

Utility supply lines (electrical, water, gas, etc.) to roof-mounted equipment shall be installed within the supporting curb of that equipment. All conduit must be ridged and minimum 12 inches in length.



**1.10 Through-Wall Flashings**

Architects/Engineers designing new facilities shall be cautioned to carefully locate through-wall flashings at sufficient elevation 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 re-roofing of the facility. Such components as siding, window sills (above roof level), equipment supports, stucco facades, etc. can greatly hamper appropriate installation of roofing components and thus have a significant impact on the costs and feasibility of reroofing. Do not flash directly to stucco, if needed install 3/4" minimum plywood.

**1.11 Emergency Overflow Protection**

All 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 structural components of a roof system shall be reviewed by a licensed professional structural engineer to ensure that any water, which accumulates on a roof system in the event of failure of the primary system, will not overstress the structure. Water shall not be allowed to accumulate to a depth greater than 4 inches. Must provide engineering calculations.

**1.12 Internal Gutters**

Internal gutters are prohibited on new facilities. Internal gutters on existing facilities shall be eliminated during reproofing projects to the extent practicable.

**1.13 Roof Access.**

All roof areas shall be permanently equipped with a reasonable means of access for purposes of maintenance of the roof system and any roof mounted equipment. Access can be in the form of internal roof scuttles. External wall mounted ladders may only be considered if no other means of access is available and only where safety and security can be maintained. Exterior ladders shall be provided with ladder guard with latch for security locks.

**1.14 Roof-Mounted Equipment**

Roof-mounted equipment is not acceptable if other locations for replacement can be found. All roof-mounted equipment shall be provided with roof surface walkway access to allow ease of maintenance and minimize roof surface damage. Roof-mounted antenna, lightning protection anchorage, lab equipment, or scientific devices shall be located in areas specifically designed for that purpose. Roof loads, walking surfaces, anchoring devices, mounting pads, curbs, or utility needs shall be designed and provided using appropriate details, adapted as required, from the NRCA Roofing and Waterproofing Manual.

A. No Unistrut or all thread rod to penetrate directly through roof.

B. All guy wire tie-downs must be welded steel tubing.

C. All penetrations are to be a minimum 12" apart from each other and wall flashings.

**1.16 Roof Coatings**

Specific roof coatings shall be considered for re-roofing projects only where the A/E and the USF-FM demonstrates that their use is appropriate and when specific and acceptable monitoring and control measures are carried out throughout the design and construction periods. When replacement of a roof is required, criteria for the replacement roof shall be in full compliance with this Standard.

**1.17 Minimum Slope**

A minimum slope of 1/4 inch/foot shall be required on all areas of a new roof system before final acceptance of that roof system by the University. On existing roofs where it is impractical to attain the required 1/4 inch slope, a minimum slope of 1/8 inch may be permitted if other provisions are made to ensure that the integrity of the roof and drainage systems are maintained. Overflow protection shall be provided.

**1.18 Base Flashing**

All base flashing shall extend a minimum of 10 inches up the vertical surface of curbs, walls, or roof penetrations. The dimension is from the top of the membrane (or ballast) to the top of the base flashing. All flashings will have a counter flashing installed. The use of a termination bar alone is unacceptable regardless of roof system.

**1.19 Cants**

Reinforced APP modified cant strip shall be required around all vertical interruptions of the roof system, such as curbs or walls. Basis of design: Derbigum Derbicant. Any substitution must have written approval by USF FM.

**1.20 Access Door Thresholds**

Access door thresholds to the roof or roof hatches shall be 12 inches above the adjacent roof surface. An acceptable walking surface shall be installed immediately outside the access door threshold on the roof system.

**1.21 Roofing Contractors**

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 5 years of experience installing the type of system specified. 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 5 years of experience installing the type of system specified.

**1.22 Roofing Over Existing Roofs**

The application of new roof materials over an existing roof will not be permitted until an infrared scan (or other acceptable method of moisture detection) has been completed. All wet areas detected by that scan/method shall be removed. After the new roof is installed, roof scans are to be made to record the condition of the new roof and compliance with specifications. Scan is to be performed by a certified third-party agency.

**1.23 Roof Scans**

All new roofing projects shall require acceptable infrared roof scans to ensure satisfactory compliance with specifications. Scan is to be performed by a certified third-party agency.

**1.24 Insulating Light-Weight Concrete**

Insulating light-weight concrete over vented (perforated) metal roof decking is permitted. Insulating light-weight concrete over structural concrete slabs as part of the roof system or over existing roof assemblies is acceptable provided:

- A. Insulating light-weight fill thickness (over substrate or insulation board) is a minimum 1 inch, not to exceed 1-1/2 inches;
- B. Insulating light-weight concrete is aggregate based and has a minimum compressive strength of 300 PSI;
- C. Roof vents through the membrane will be acceptable provided they are insulated, spun aluminum roof vents having a one-way valve design. Roof vents constructed of PVC are not acceptable.
- D. Tested by Underwriters Laboratories in accordance with the procedures of ASTM E 119 and listed in the most recent Underwriters Laboratories Fire Resistance Directory;
- E. Tested by Factory Mutual Research (FM) and listed in the most recent FM Approval Guide as non-combustible or Class 1; and,
- F. Tested by FM for windstorm classification I-120 and listed in the most recent Factory Mutual Approval Guide.

**1.25 Restaurants**

Restaurants are not acceptable for rejuvenation of an existing built-up roofing system.

**1.26 Galvanized Metal Flashing**

The use of galvanized metal flashing is not acceptable. Must have written approval by USF FM.

**1.27 Asbestos**

A Florida Department of Business and Professional Regulation (FL DBPR) licensed roofing contractor may move, remove, or dispose of asbestos-containing roofing material as long as at least one (1) trained supervisor (e.g., foreman or management-level worker) employed by the roofing contractor company is present at any site where regulated asbestos-containing roofing material is stripped, removed, or otherwise disturbed by renovation or demolition activities. Required supervisor training to perform roof asbestos work includes completion of a FL DBPR approved On-Site Roofing Supervisor course. Evidence of course completion must be made available at the roof renovation/demolition site and On-Site Roofing Supervisor refresher training must be completed every two (2) years. Removal of asbestos-containing roofing material must be conducted in accordance with the Environmental Protection Agency's Asbestos National Emission Standards for Hazardous Air Pollutants (NESHAP), Florida Statutes, Florida Department of Environmental Protection regulations, and current applicable requirements of the Florida Department of Business and Professional Regulation. It is also the FL DBPR licensed roofing contractor's responsibility to ensure Occupational Safety and Health Administration (OSHA) compliance at all times while on-site.

**1.28 Codes and Standards**

The University shall ensure that all architects, engineers, specifiers, consultants, inspectors, installers, and University maintenance personnel utilize the following resources: the latest edition of all applicable Building Codes, the Underwriters Laboratory (UL) Building Materials Directory; the UL Fire Resistance Directory; the American Society for Testing and Materials (ASTM) Board of Standards Volume for Roofing, Waterproofing and Bituminous Materials; the Architectural Sheet Metal Manual by the Sheet Metal and Air Conditioning Contractors' National Association (SMACNA); recommended standards and technical details of the National Roofing Contractors Association (NRCA) Roofing and Waterproofing Manual. The USF Project Manager (USF-PM) shall emphasize to the A/E the need to design roof systems to resist extreme wind forces. Structural analyses shall be 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 (ASCE) – Minimum Design Loads for Buildings and Other Structures (ASCE 7-10). The A/E shall also be required to consider long-term serviceability in the design of all roof systems.

**1.29 Plan Review**

The USF Facilities Management (USF-FM) shall review plans, specifications, and shop drawings for compliance with USF Roofing Standard and ensure that the requirements of this Standard are met.

**1.30 Alternative Roof Systems**

If the A/E proposes a specific alternative roof system, i.e. a unique or non-traditional system, the USF-FM shall conduct a preliminary evaluation of the system. A request to install an alternative roof system shall be in writing and include justification data. The USF-FM will respond whether or not the request is approved.

**1.31 Pre-Construction Conferences**

The USF-PM shall ensure that a roofing preconstruction conference is conducted for all new and re-roofing projects at which the USF-FM staff, A/E, General Contractor, roofing contractor, roofing manufacturer's representative, and other related trades representatives are present.

**1.32 Protection Plans**

The University shall require a specific protection plan for all new and re-roofing 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 re-roofing operations can be hazardous to the facility and its occupants and shall be carefully reviewed with the A/E during design, with prospective contractors during bidding, and at appropriate phases during construction.

### 1.33 Inspection of Installation

#### A. USF Staff Roofing Inspection:

1. USF provides FBC required code inspections and quality management (QM) inspections for new and replacement roofing construction. The USF QM inspector(s) will conduct daily inspections in accordance with [USF Roofing QM Inspection Guide](#).
2. The roofing contractor shall prepare and document the daily construction activities using the [USF Roofing Inspection Form](#).

#### B. Roofing Inspection Consultant:

1. Under the direction of USF-FM, a project is approved or required to provide independent [Roofing Inspection Consultant \(Roofing Inspector\)](#) services, provide full-time inspection whenever the roof system is being installed (roofing, flashing, coping, etc.).
2. The Roofing Inspector shall be knowledgeable in roofing specifications and appropriate installation or repair procedures. 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. Roof system installation inspection may be acquired as professional services. The USF-FM shall require the A/E to include in the project specifications the requirement that the roof membrane manufacturer make a minimum of three (3) visits during application and one (1) visit at the time of the substantial completion inspection with a written report of each visit to the A/E and Owner. Manufacturer inspections shall be accomplished by technical representatives with a minimum of 5 years direct working experience with the technical department of that manufacturer. It is the contractor's responsibility to schedule the manufacturers inspections. USF FM and the A/E will be notified of the schedule and copied in on all reports.

### 1.34 Warranties

The University shall maintain copies of all roof warranties/guarantees and records of all roof maintenance work. The effective date of warranties is the date of substantial completion by Owner.

### 1.35 Comprehensive Roof Management Program

The University shall establish a comprehensive roof management program for each facility to include:

- A. **Historic Records and Roof Asset Information:** Listing the A/E, General Contractor, roofing contractor, manufacturer and supplier, type of roof system including all individual components, warranty/guarantee dates and data, history of repairs, regular surveys and inspections data, preventive and planned maintenance procedures, projected replacement and budget needs.
- B. **Periodic Roofing Inspections and Checklist:** At least one inspection per roof area per year by qualified independent roof technicians who are not affiliated with roofing contractors, roof system manufacturers or suppliers including descriptions of roof related defects in the surfacing, membrane, membrane flashings, metal flashings, penetrations, equipment, walls, etc.
- C. **Action Required:** Itemized descriptions of remedial work requirements with itemized cost estimates for each necessary to restore the integrity of the defective area to the service level of the overall roof system. A roof plan for each roof area or group of roof areas indicating the precise location of each remedial action necessary and the non-destructive testing results. A cumulative summary of all maintenance and repair costs.

- D. **Projected University Cost Summary:** An overall repair/replacement budget in tabular form summarizing the derived repair costs per facility. As part of this summary, maintenance costs are to be projected five (5) years from date of each inspection to provide anticipated budget requirements well in advance. Costs for roof replacement versus roof repair shall be included with respective costs by year.

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END OF STANDARD PRACTICE FOR ROOFING SYSTEMS AT UNIVERISTY OF SOUTH FLORIDA