**SECTION 07500 (00 00 00)**

**ROOF ASSEMBLY (RA)**

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*SPECIFIER:* *All roof-related items above or outside the structural roof deck, including such work as blocking, insulation, membrane, sheet metal, hatches, vents, curbs, edge guards and rain-leaders are components of the Roof Assembly.*

*The entire Roof Assembly carries a special warranty by the roof membrane producer, as specified here.*

*Definitions, ASTM references, overall standards, and special warranty provisions that apply to many or all of the components of the Roof Assembly have been placed in this lead section to avoid repeating (and possible errors) from placing in several sections.*

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1. **PART 1 GENERAL**

**1.1 RELATED DOCUMENTS**

A. This section 07500 is the lead section that specifies overall requirements common to and governing all Roof Assembly (RA) sections of the Specifications.

B. Coordinate all Roof Assembly components with work before and after. See especially:

1. Venting properties of steel roof deck 05310

2. Items of rooftop-mounted equipment Mechanical and electrical sections

3. Storm Drainage 02720 (33 40 00)

4. Storm Water Piping 15105 (22 10 10)

5. Lightning Protection System 13100 (26 41 00)

C. List of Roof Assembly component sections.

1. 07500 Roof Assembly (RA)

2. 07501 RA Special Warranty Forms

3. 07502 RA Lightweight Insulating Concrete (LWIC)

4. 07551 RA Modified Bitumen Roofing

5. 07600 RA Flashing and Sheet Metal

6. 07631 RA Gutters and Downspouts

7. 07716 RA Roof Expansion Joints

8. 07721 RA Supports For Rooftop Equipment

9. 07722 RA Roof Scuttles and Automatic Fire Vents

**1.2 DEFINITIONS APPLYING TO COMPONENTS OF ROOF ASSEMBLY**

A. Roof Assembly: Thermal and moisture protection work above and beyond each structural roof deck, as needed for optimal performance of the roof membrane and its flashings and to prevent the entry of moisture, air, heat, high winds, rain and storm-driven water.

1. Roof Assembly work includes providing and warranting of such items as roof insulation, steel roof blocking (SRB), SBS modified bitumen roof membrane and base ply flashings, vents, walkway treads and pads, counter-flashings, surface-mounted flashings, stucco stops, edge strips, copings, cleats, cants, crickets, scuppers, roof drains, gutters, conductor heads, downspouts, roof drain flashings, expansion joint assemblies, rooftop penetration flashings, rooftop umbrellas & hoods, loose curbs and rooftop pipe supports, and flashing for items that pass through the roof membrane.

2. Roof Assembly work also includes the roof membrane producer’s and installer’s coordinating, supplying, setting, fastening, making waterproof and warranting of roof-related work such as roof drains, roof hatches/scuttles, smoke vents, edge guards, as well as downspouts that carry roof water to the storm sewer or other point of discharge.

3. Roof Assembly work also includes the roof membrane producer’s and installer’s coordinating and flashing of roof-related work such as rooftop equipment supports

and curbs, penetrating items (such as pipes, ducts and conduit), the setting of rooftop equipment such as fans, screens and antennas, and the setting of rooftop equipment having integral curbs, all in such a way that the waterproof quality of their installation is covered in the Special Warranty of the roof assembly.

4. Special Warranty. The Roof Assembly Producer and producers of Roof Assembly components shall warrant the Roof Assembly to the extent specified in the Roof Assembly sections.

B. Terminology

1. HVHZ: High-Velocity Hurricane Zone, as defined in FBC 202 for Miami-Dade and Broward Counties.

2. SBS mod bit: Styrene-butadiene-styrene modified bitumen plies as specified in 07551.

3. Torched: Heat welded.

4. S/s or s/s: Stainless steel.

5. Steel roof blocking (SRB): S/s-clad galvanized steel roof items such as roof edge blocking, copings, scuppers, and expansion joints, and s/s accessory, cover, or extension items such as umbrella closures, 2-piece and 3-piece expansion joint closures, surface mounted counter-flashings, as specified in 07600.

6. Other roofing sheet metal (SM): Sheet metal for roof assembly and exterior walls other than SRB and RPF items, including such work as

a. S/s gutters, conductor heads, downspouts;

b. S/s window and door head flashings, door hoods, stucco stops, stucco stops with counter-flashings, crickets;

c. S/s flashings and counter-flashings for canopy structures;

d. Custom s/s penetration flashings not made by SBC;

All as specified in 07600.

7. Roof penetration flashings (RPF): S/s flashings for such penetrations of the roof membrane as vents, piping, conduit, ducts, and roof equipment supports, as specified in 07600.

8. Downspouts and rain-leaders. To distinguish s/s downspouts and rain-leaders, these terms must be used consistently in Drawings and Specifications:

a. Downspouts. S/s conductors of rainwater from conductor heads to a downspout or to a splash block at a lower roof or at grade. Downspouts do NOT discharge directly to a sewer below-grade, as specified in 02720.

b. Rain-leader: Pipe conductors from s/s downspouts or conductor heads and/or internal storm drains that discharge into a storm sewer below grade or to a splash-block with gravel outfall at grade, as specified in 02720/15105.

9. Product Approval: Certificate of product acceptance or approval from BCCO, the authority having jurisdiction (AHJ) for use in per FBC.

10. BOD: Basis of design, as described in PART 2 for products in some sections.

11. Correct: Repair or replace defects or defective work (products, installation or both) to follow the requirements of the Construction Documents without diminishing warranty provisions.

12. Defect, defective work: Work that is of poor or damaged quality, incomplete, substituted without approval, not functional, not properly performing, rejected by the A/E, or which otherwise does not follow requirements of the Construction Documents.

**1.3 REFERENCES APPLYING TO COMPONENTS OF ROOF ASSEMBLY**

A. American Society for Testing and Materials (ASTM): Specifications or Test Methods for:

1. A240-04a Stainless Steel, Chromium and Chromium-Nickel Plate, Sheet and Strip.

2. A653-04a Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

3. B32-04 Solder Metal.

4. C138-01a Density, Yield, and Air Content (Gravimetric) of Concrete.

5. C150-04a Portland Cement.

6. C332-99 Lightweight Aggregates for Insulating Concrete.

7. C495-99a Compressive Strength of Lightweight Insulating Concrete.

8. C518-04 Steady State Thermal Transmission Properties by Heat Flow Meter.

9. C578-06 Rigid, Cellular Polystyrene Thermal Insulation.

10. C612-04 Mineral Fiber Block and Board Thermal Insulation.

11. C869-99 Foaming Agents for Preformed Foam in Cellular Concrete.

12. D41-05 Asphalt Primer Used in Roofing.

13. D312-00 Asphalt Used in Roofing.

14. D2027-04 Cutback Asphalt (Medium Curing Type)

15. D4586-06 Asphalt Roofing Cement, Asbestos Free.

16. D4601-04 Asphalt-Coated Glass Fiber Base Sheet Used in Roofing.

17. D6152-05 SEBS-Modified Mopping Asphalt Used in Roofing.

18. D6162-05 SBS Modified Bituminous Sheet Materials, Polyester & Glass-fiber Reinforced.

19. D6164-05 SBS Modified Bituminous Sheet Materials, Polyester Reinforced.

20. E108-04 Fire Tests of Roof Coverings.

**1.4 OVERALL STANDARDS FOR COMPONENTS OF ROOF ASSEMBLY**

A. Roofing Application Standards (RAS) of the Florida Building Code (FBC). Follow:

1. 111 Attachment of Perimeter Wood Blocking and Metal Flashing.

2. 117 Mechanical Attachment of Base Sheets to Substrate.

3. 128 Determining Applicable Wind Design Pressures for Low Slope Roofs.

B. Test Application Standards (TAS) of the FBC. Follow:

1. 105 Field Withdrawal Resistance Testing.

2. 110 Roof Membranes and Other Roofing Components.

3. 114 Roof Assemblies in High Velocity Hurricane Zone (HVHZ) Jurisdiction.

4. 117 A, B and C: Withdrawal, Pull-Through and Pull-Off Performance of Mechanical Fasteners Used in Roof Assemblies.

5. 121 Roofing Adhesives, Mastics and Coatings.

6. 132 Sealants.

C. Miami-Dade County Test Protocols. Follow PA 105, 114, 117, and Appendices A, B.

D. American Society of Civil Engineers (ASCE) 7, Minimum Design Loads for Buildings and Other Structures.

1. ASCE 7 has been followed in the A/E’s calculations (signed and sealed by a Florida registered professional engineer) of required positive and negative (±) wind load resistances shown in the Drawings’ wind pressure diagrams which are based on applicable Risk Category of the Florida Building Code.

2. The A/E will follow ASCE 7 procedures for calculating gravity, uplift, overturning loads, and hold-down fastenings for items of rooftop equipment and their supports.

E. Factory Mutual Research Corp. (FM, FMA, FMG). Follow:

1. Standard 4470, Approvals Standard for Class I Roof covers.

2. 1-49, Loss Prevention Data Sheet for Perimeter Flashings.

3. 1-29, Loss Prevention Data Sheet for Above-Deck Roof Components.

4. Loss Prevention Data Sheets 1-7, 1-28, 1-28R, 1-29, 1-29R, 1-49.

5. Windstorm Classification 1-150.

6. Combustibility Class A.

F. Underwriters Laboratories, Inc. (UL): Follow:

1. Roofing Materials and Systems Annual Directory, latest edition.

2. Fire Resistance Directory, latest edition.

G. National Roofing Contractors Association (NRCA): Follow Roofing and Waterproofing Manual, latest edition, where not in conflict with the above standards.

H. Sheet Metal and Air Conditioning Contractors’ National Association (SMACNA): Architectural Sheet Metal Manual, latest edition.

**1.5 QUALITY ASSURANCE**

A. Qualifications of each Roof Assembly installer. Each installer of each component of the Roof Assembly in sections 07500 through 07722 shall:

1. Have 5 years of successful experience in the installation of that roof component.

2. Be currently listed in the SBBC Pre-Qualified Roofing Contractor List.

3. Be currently licensed or certified by the producer of that part of the Roof Assembly.

B. Insurer Certification. Assist Board in preparing roofing acceptance certification as needed for the fire and extended coverage insurance on the Roof Assembly.

C. Pre-Installation Meeting. At least 6 weeks before installation of Roof Assembly, the Contractor shall conduct a meeting at the worksite with installers of each component of the Roof Assembly, affected installers of other work, A/E, AHJs, and Board representatives.

1. Contractor shall require attendance by each subcontractor performing part of the Roof Assembly work.

2. Contractor shall notify the following Board staff and representatives: SBBC District Maintenance Roofing Supervisor, Building Code Inspectors, & Project Manager.

3. A/E shall record discussion, agreements and action items, and shall supply a copy of the meeting minutes to each participant within 1 week after meeting.

**1.6 SUBMITTALS Follow 01330**

A. Roof Assembly Producer’s Notice of Intent to Issue Special Warranty (NOI).

1. Prepare the NOI following the form shown in Specifications 07501, in duplicate, with signatures.

2. Submit the NOI for to A/E for approval, no more than 30 days after Contractor’s receipt of Notice to Proceed, for approval by A/E and Board.

B. Statement of Producer’s Bonding Capacity.

1. The Roof Assembly’s SBS roof membrane producer shall certify that it has the bonding capacity not just for provision of the membrane component but for the total amount of all Subcontracts in the Roofing Assembly.

2. This letter of certification shall be approved by the Contractor and submitted by the Contractor to the A/E and Board within 45 days after the Contractor’s receipt of Notice to Proceed with the Work:

C. Producer’s Proposed Roof Assembly Warranty.

1. Prepare the Roof Assembly Special Warranty for this Project, including provisions of the Special Warranty specified in 07501, in duplicate, with signatures.

2. Insert the Required Additions and Required Modifications specified in Special Warranty from Roof Assembly Producer below into the Producer’s customary warranty.

3. For reference and comparison, attach a sample of the Producer’s roofing warranty type.

4. Submit the proposed Special Warranty to A/E for approval, no more than 60 days after Contractor’s receipt of Notice to Proceed, for approval by A/E and Board.

D. Special Warranties from Producers and Installers of Roof Assembly components. See Special Warranties from RA Component Producers and Installers and other Roof Assembly sections for the Special Warranty obligations for major components.

E. Approval of Component Installers. Submit letter from RAP approving producers and installers of lightweight insulating concrete, SBS roof membrane, steel blocking / sheet metal, rain-leaders, and roof hatches/smoke vents.

F. Submittals at Time of Closeout.

1. Report of producer’s representative present during installation of Roof Assembly.

2. Signed Special Warranties on producer’s letterhead.

**1.7 SPECIAL WARRANTY FROM ROOF ASSEMBLY PRODUCER (RAP) Follow 01790, 01500**

1. By Roof Assembly Producer (RAP). Provide a 20-year written Special Warranty from the roof membrane producer covering correction of defects in the Roof Assembly.

B. Edit the typical limited warranty text shown in 07501 to include the following additions in the Special Warranty for the Roof Assembly.

1. Conditions at Worksite: State that the Producer’s Representative is aware of Broward County weather conditions, the Project’s surroundings and environment, and the design for construction underlying and adjacent to the roofing.

2. Construction Documents: State that the Producer’s Representative has examined the Board’s Construction Documents (Drawings, procurement requirements, Conditions of the Contract and Specifications) for the Project before the bid date.

3. Repairs by Owner: Board shall have the right to make emergency repairs to stop leaks (active or incipient) to prevent damage to building and its contents without voiding this Roof Warranty.

4. Notification: Board will notify the Producer’s roofing installer of its requests for both leak repairs and non-emergency repair of defects. Board will keep a record of such notifications.

5. Eleventh month inspection by Producer: Producer’s Representative and Roofing Installer shall conduct a post-construction field inspection between 11 and 12 months after date of Substantial Completion of the Project, in the presence of the A/E and Board. Producer shall submit copies of the written report within 7 days of inspection to the Board’s Maintenance Department.

6. Participation of Surety: The Producer’s Surety shall participate in ensuring execution of this Roof Assembly Producer’s Intent to Issue Roof Warranty as well as the Roof Assembly Producer’s Warranty.

7. Approval of Installer for this Project: The Producer states that the installer listed below has been approved as qualified to install steel blocking, roof membrane and sheet metal parts of the Roof Assembly and to coordinate the installation of other parts such as insulation, hatches, curbs, supports, and penetrations.

C. Edit the typical limited warranty text shown in 07501 to make the following modifications for the Roof Assembly’s Special Warranty.

1. Delete uplift-resistance limitations for gale, hurricane, and tornado winds up through applicable Risk Category of the Florida Building Code. Only damage from winds above the applicable Risk Category may be excepted from warranty.

2. Retain design criteria of Risk Category of the Florida Building Code as applicable (all as defined in ASCE 7 wind uplift resistance requirements).

3. Delete restrictions to use of lightweight concrete. Delete restriction against application of roofing over the lightweight insulating concrete / styrene board assembly. (The properties of the LWIC assembly are specified in section 07502 of the Specifications.)

4. Include 20 year warranty on Roof Assembly: Provide 20 year warranty, with no dollar limit, no deductibles, with single source responsibility, and that includes all products, accessories, equipment and labor needed to repair or replace defects in Roof Assembly.

5. Include list of components of Roof Assembly as listed in Definition of Roof Assembly above.

6. Include extent of warranty: Cover total labor, equipment and material for the limited warranty period, including cost of repairing or replacing damage to the Roof Assembly, down to the roof deck, for such damage as from water leaks, wind uplift, and any other causes except those specifically excluded below.

7. Include causes of damage that are NOT included in extent of limited warranty repair. The Producer may, in its limited warranty, add any or all of the following exclusions of responsibility for:

a. Major repairs or modifications to the Roof Assembly after installation for which the Producer has not been notified nor given approval

b. Failure of Board to give Producer written notice within 30 days after a leak or major defect is discovered or should have been discovered exercising normal diligence.

c. Failure of the Board to exercise ordinary care to limit damage after a leak or major defect is discovered and before the Producer can reasonably be expected to assess damage and make repairs.

d. Failure of the Board to maintain the Roof Assembly by regularly removing plants, vegetation, leaves, trash, debris and other foreign objects, failure to keep drains unclogged, failure to prevent more than necessary traffic across the roof, failure to maintain flashings in watertight condition.

e. Defects, movement and failures in structure that harm roof performance.

f. Damage from accident, fire, lightning, chemical / oil / grease attack, abuse, misuse, vandalism, rodent / insect infestation, and lack of maintenance.

g. Damage to the roof membrane caused by falling objects, dropped heavy equipment, or objects that are blown on the roof by winds over the applicable Risk Category of the Florida Building Code.

h. Damage to roof membrane resulting from installation of non-Roof Assembly structures, insulation, machinery or equipment without notification of and approval by Producer.

i. Damage to roof membrane resulting from Board’s use of the roof as a storage, eating, instructional, or recreational area.

j. Change in a school facility’s use to storage or industrial purposes.

k. Consequential damages to building interior from roof leaks and storms.

l. If repair by Producer is needed, Board shall bear the expense of removing and replacing structures, equipment and traffic surfaces built over the roof membrane.

**1.8 SPECIAL WARRANTIES FROM ROOF ASSEMBLY COMPONENT PRODUCERS AND INSTALLERS Follow 01790, 01500**

1. By each of the Roof Assembly Component Producers and Installers: Provide Special Warranties covering correction of defects in Roof Assembly components as follows. Sign and submit to Roof Assembly Producer (provider of the roof membrane) for transmittal to the A/E.

B. Lightweight concrete roof insulation under 07502:

1. Scope: Repair or replace when notified by the Board that any of these defects appears in LWIC products or installation:

a. Actual resistance to heat flow through the insulation is less than 80% of specified R-value (thermal resistance) a measured at the average insulation thickness;

b. The insulation does not remain intact and in place after a windstorm, even if the roof membrane sustains wind damage;

c. The insulation softens, crumbles, loosens or if it lifts in rain, from dampness, or in winds of less than found in the applicable Risk Category of the Florida Building Code.

d. The insulation is not in re-roofable condition when the roof membrane needs replacement, exclusive of damage caused by removing fasteners.

2. Duration of Special Warranty: From time of installing insulation until 10 years after date of Substantial Completion of the Work.

3. Response time: As soon as extent of defect is known and overlying roofing has been removed, in time to prevent further damage to building interior, but in no case more than 15 days after notification.

4. Limit of insulation producer and installer’s responsibility: No dollar limit; no deductible amount.

C. Steel blocking and sheet metal under 07600:

1. Scope: Repair or replace SRB, SM, and RPF when notified by the Board that a defect in products or installation has appeared.

2. Duration of special warranty: From time of installing roofing assembly steel blocking and sheet metal until 10 years after date of Substantial Completion of Work.

3. Response time: As soon as extent of defect is known and overlying roofing has been removed, repair in time to prevent damage to building interior, but in no case more than 15 days after notification.

4. Limit of roof assembly steel blocking and sheet metal producer and installer’s responsibility: No dollar limit; no deductible amount.

D. Stainless Steel downspout to storm drain under 07600.

1. Scope: Repair or replace downspout assembly when notified by the Board that a defect in products or installation has appeared.

2. Duration of special warranty: From time of installing stainless steel downspout assembly work until 10 years after date of Substantial Completion of Work.

3. Response time: As soon as extent of defect is known and installer has been notified, correct within 15 days.

4. Limit of Stainless steel downspout assembly installer’s responsibility: No dollar limit; no deductible amount.

E. Supports for rooftop equipment under 07721:

1. Scope: Repair or replace defects as soon as notified by Board of their appearance, in time to prevent further damage to the interior of the building.

a. Structural failure;

b. Leaks or entry of water in any manner through support;

c. Failure of protective coatings that allows rusting of steel;

d. Failure of resilient seals to remain flexible and leak-free.

2. Exceptions:

a. Steel framed roof supports (05500) are not covered by this special warranty.

b. Integral curbs fabricated as part of items of rooftop equipment shall be part of the warranty of those items of equipment are not covered by this special warranty.

c. Condensate line supports are only partly covered by this special warranty (see 07721).

3. Duration of special warranty: From time of installation of supports until 5 years after date of Substantial Completion of the Work.

4. Response time: As soon as extent of defect is known and installer has been notified, repair in time to prevent damage to building interior, but in no case more than 15 days.

5. Limit of supports producers and installer’s responsibility: No dollar limit; no deductible amount.

F. Roof hatches, smoke vents, and edge guards under 07722.

1. Scope: Repair or replace roof hatches, smoke vents, and edge guards when notified by the Board that a defect in products or installation has appeared. Defects:

a. Leaks or weld failure within units,

b. Failure of units to remain closed in winds speeds as specified in the applicable Risk Category of FBC,

c. Failure of units to open and close smoothly and quietly,

d. Failure of leafs to lock or properly align (with rim or with each other);

e. Failure of electrical devices provided by hatch and vent producer.

2. Duration of special warranty: From time of installing roof hatches, smoke vents, and edge guards until 5 years after date of Substantial Completion of the Work.

3. Response time: As soon as extent of defect is known and installer has been notified, repair in time to prevent damage to building interior, but in no case more than 15 days.

4. Limit of roof hatch, smoke vent, and edge guard producers’ and installers’ responsibility: No dollar limit; no deductible amount.

**END OF SECTION**