DIVISION VII - THERMAL AND MOISTURE PROTECTION

SECTION 07200 - BUILDING INSULATION

PART 1 - SCOPE

A. This Section includes all labor, materials, equipment and related items required to complete the work of building insulation as shown on the drawings and as specified.

PART 2 - SUBMITTALS

A. Certificates of Compliance with applicable Federal Specifications shall be submitted to the architect for approval prior to delivery of any building insulation to the project. "R" values of insulation proposed to be furnished shall be included in certifications.

B. Samples in duplicate of each type of building insulation shall be submitted to the architect for approval if requested.

PART 3 - MATERIALS

A. Batt insulation shall be semi-rigid, spun glass fiber blankets, R-19.

1. Non-exposed blankets shall be enclosed on one side with strong asphalted paper vapor barrier. Blankets shall be as wide as required to fit into stud, by longest available lengths.

2. Exposed blankets for installation in exterior wall space shall be nominal 6" thick, Fiberglass batt faced (FSK-25)(Class A), having minimum material thermal resistance (R) of 19.

B. Sound attenuation blankets for areas where noted shall comply with requirements of ASTM C665-84, Type I. Same shall be 3" "Thermofiber", as manufactured by United States Gypsum; 3" "Thermal-Acoustical Batts", as manufactured by Johns-Manville; 3½" "Noise Barrier Batt Insulation", as manufactured by Owens/Corning; or an approved equal.

PART 4 - INSTALLATION

A. Batt insulation shall be installed in stud, in strict accordance with manufacturer's installation instructions, securely fastened to framing members by nailing or stapling, with paper vapor barriers to inside face of stud. Insulation shall have full coverage in spaces involved, with tightly fitted butt joints where necessary and free from voids.

1. Install insulation to the outside of any water piping occurring in exterior walls. In these cases, no insulation shall occur between water piping and wall finish.

B. Install Vapor Retarder (DuPont Tyvek® stucco wrap water-resistant barrier or approved equal) on the outside face of the exterior gypsum sheathing.

END OF SECTION

SECTION 07212 - BOARD INSULATION

PART 1 - GENERAL

1.01 Work Included

A. Board insulation at foundation wall.

1.02 Related Work

A. Section 04330 - Reinforcement Unit Masonry System

1.03 References

A. FS HH-I-524 - Insulation Board, Thermal (Polystyrene).

1.04 System Description

A. Materials of this Section shall provide a continuous thermal barrier at building exterior wall.

PART 2 - PRODUCTS

2.01 Acceptable Insulation Manufacturers

A. Styrofoam Brand

B. AMOCO

C. Foamular - R

D. Substitutions: Under provisions of Section 01600, 01630.

2.02 Insulation Materials

A. Insulation Extruded Cellular Polystyrene; thermal resistance "R" per inch of 5.0; minimum compressive strength of 30 psi water absorption by volume in accordance with ANSI/ASTM D2842 0.3 percent square.

2.03 Acceptable Adhesive Manufacturers

A. Max Bond, by H.B. Fuller Company
B. Liquid Nails, LN 601, Macco Adhesives
C. Foam Adhesive by Franklin Int.

2.04 Adhesive Materials

A. Adhesive Type recommended by insulation manufacturer for application.

PART 3 - EXECUTION

3.01 Preparation

A. Verify substrate and adjacent materials and insulation boards are dry and ready to receive insulation and adhesive.

B. Verify substrate surface is flat, free of honeycomb, fins, irregularities, materials that will impede adhesive bond.

C. Verify insulation boards are unbroken, free of damage.

3.02 Installation - Perimeter Insulation

End of Section

SECTION 07270 - FIRESTOPPING

PART 1 - GENERAL

1.01 DESCRIPTION

A. Provide all material, labor, equipment and services necessary to provide firestopping as follows:

1. Through-penetration firestopping in fire rated construction.

2. Construction-gas firestopping at connections in the same or different materials in fire rated construction.

3. Construction-gap firestopping occurring within fire rated wall, floor or floor-ceiling assemblies.

4. Construction-gap firestopping occurring at the top of fire rated walls.

5. Through-penetration smoke-stopping in smoke partitions.

6. Construction-gap smoke-stopping in smoke partitions.

B. Firestopping specified in other Sections of these specifications:

1. Plumbing Penetrations: Section 15

2. Fire dampers and manufactured devices: Section 15

3. Raceway seals and manufactured electrical devices: Section 16

C. Alternates: Refer to "Description of Alternates" pages for description of alternates affecting work of this Section.

1.02 REFERENCES

A. Underwriters Laboratories

1. U.L. Fire Resistant Directory

a. Through-penetration firestop devices (XHCR)
b. Fire resistance ratings (BXUV)
c. Through-penetration firestop systems (XHEZ)
d. Fill, void or cavity material (XHHW)

B. American Society for Testing and Materials Standards:

1. ASTM E814-88: Standard Test Method for Fire Tests of Through-Penetration Firestops.

1.03 DEFINITIONS

A. Assembly: Particular arrangement of materials specific to given type of construction described or detailed in referenced documents.

B. Barriers: Time rated fire walls, smoke barrier walls, time rated ceiling/floor assemblies and structural floors.

C. Firestopping: Methods and materials applied in penetrations and unprotected openings to limit spread of heat, fire, gasses and smoke.

D. Penetration: Opening or foreign material passing through or into barrier or structural floor such that full thickness of rated materials is not obtained.

E. Construction Gaps: Gaps between adjacent sections of walls, exterior walls, at wall tops between top of wall and ceiling, and structural floors or roof decks; and gaps between adjacent sections of structural floors.

F. System: Specific products and applications, classified and numbered by Underwriters Laboratories, Inc., to close specific barrier penetrations.

G. Sleeve: Metal fabrication or pipe section extending through thickness of barrier and used to permanently guard penetration. Sleeves are described as part of penetrating system in other sections and may or may not be required.

1.04 SYSTEM DESCRIPTION

A. Design Requirements:

1. Fire-rated construction: Maintain barrier and structural floor fire resistance ratings including resistance to cold smoke at all penetrations, connections with other surfaces or types of -construction, at separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

2. Smoke barrier construction: Maintain barrier and structural floor resistance to cold smoke at all penetrations, connections with other surfaces and types of construction and at all separations required to permit building movement and sound or vibration absorption, and at other construction gaps.

1.05 SUBMITTALS

A. Comply with all requirement of Section 01300, Submittals.

1.06 QUALITY ASSURANCE

A. Installer's qualifications: Firm experienced in installation or application of systems similar in complexity to those required for this Project, plus the following:

1. Acceptable to or licensed by manufacturer, State or local authority where applicable.

2. At least two (2) years experience with systems.

3. Successfully completed at least five (5) comparable scale projects using this system.

B. Local and State regulatory requirements: Submit forms or acceptance for proposed assemblies not conforming to specific UL Firestop System numbers, or UL classified devices.

C. Materials shall have been tested to provide fire rating at least equal to that of the construction.

1.07 DELIVERY, STORAGE AND HANDLING

A. Packing and shipping:

1. Deliver products in original unopened packaging with legible manufacturer's identification.

2. Coordinate delivery with scheduled installation date, allow minimum storage at site.

B. Storage and protection: Store materials in a clean, dry, ventilated location. Protect from soiling, abuse, moisture and freezing when required. Follow manufacturer's instructions.

1.08 PROJECT CONDITIONS

A. Existing conditions:

1. Verify existing conditions and substrates before starting work. Correct unsatisfactory conditions before proceeding.

2. Proceed with installation only after penetrations of the substrate and supporting brackets have been installed.

B. Environmental requirements:

1. Furnish adequate ventilation if using solvent.

2. Furnish forced air ventilation during installation if required by manufacturer.

3. Keep flammable materials away from sparks or flame.

4. Provide masking and drop cloths to prevent contamination of adjacent surfaces by firestopping materials.

5. Comply with manufacturing recommendations for temperature and humidity conditions before, during and after installation of firestopping.

1.09 GUARANTEE

A. Submit copies of written guarantee agreeing to repair or replace joint sealers which fail in joint adhesions, co-adhesion, abrasion resistance, weather resistance, extrusion resistance, migration resistance, stain resistance, or general durability or appear to deteriorate in any other manner not clearly specified by submitted manufacturer's data as an inherent quality of the material for the exposure indicated. The guarantee period shall be one (1) year from date of substantial completion.

PART 2 - PRODUCTS

2.01 THROUGH-PENETRATION STOPPING OF FIRE-RATED CONSTRUCTION

A. Systems or devices listed in the U.L. Fire Resistance Directory under categories XHCR and XHEZ may be used, providing that it conforms to the construction type, penetrant type, annual space requirements and fire rating involved in each separate instance, and that the system is symmetrical for wall applications. Systems or devices must be asbestos-free.

1. Additional requirements: Withstand the passage of cold smoke either as an inherent property of the system, or by the use of a separate product included as a part of the U.L. system or device, and designed to perform this function.

2. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance directory for the U.L. System involved and as further defined in the Systems And Applications Schedule.

3. All firestopping products must be from a single manufacturer. All Trades shall use products from the same manufacturer.

2.02 CONSTRUCTION-GAP FIRESTOPPING OF FIRE-RATED CONSTRUCTION

A. Firestopping at construction gaps between edges of floor slabs and exterior wall construction.

B. Firestopping at construction gaps between tops of partitions and underside of structural systems.

C. Firestopping at construction gaps between tops of partitions and underside of ceiling or ceiling assembly.

D. Firestopping of control joints in fire-rated masonry partitions.

E. Firestopping expansion joints.

F. Acceptable manufacturers and products: Those listed in the U.L. Fire Resistance Directory for the U.L. System involved and as further defined in the Systems and Applications Schedule.

2.03 SMOKE-STOPPING AT SMOKE PARTITIONS

A. Through-penetration smoke-stopping: Any system complying with the requirements for through-penetration Firestopping in fire-rated construction, as specified in The Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

B. Construction-gap smoke-stopping: Any system complying with the requirements for construction-gap Firestopping in fire-rated construction, as specified in the Systems and Applications Schedule is acceptable, provided that the system includes the specified smoke seal or will provide a smoke seal. The length of time of the fire resistance may be disregarded.

2.04 ACCESSORIES

A. Fill, void or cavity materials: As classified under category XHHW in the U.L. Fire Resistance Directory.

B. Forming materials: As classified under category XHKU in the U.L. Fire Resistance Directory.

PART 3 - EXECUTION

3.01 EXAMINATION

A. Verification of conditions: Examine areas and conditions under which work is to be performed and identify conditions detrimental to proper or timely completion.

1. Verify barrier penetrations are properly sized and in suitable condition for application of materials.
2. Do not proceed until unsatisfactory conditions have been corrected.

3.02 CLEANING SURFACES

A. Clean surfaces to be in contact with penetration seal materials, of dirt, grease, oil, loose materials, rust or other substances that may affect proper fitting, adhesion or the required fire resistance.

3.03 INSTALLATION

A. Install penetration seal materials in accordance with printed instructions of the U.L. Fire Resistance Directory and in accordance with manufacturer's instructions.

B. Seal holes or voids made by penetrations to ensure an effective smoke barrier.

C. Where floor openings without penetrating items are more than 4" in width and subject to traffic or loading, install firestopping materials capable of supporting same loading as floor.

D. Protect materials from damage on surfaces subject top traffic.

E. Place firestopping in annular space around fire dampers before installation of damper's anchoring flanges which are installed in accordance with fire damper manufacturer's recommendations.

F. Where large openings are created in walls or floors to permit installation of pipes, ducts, cable tray, bus duct or other items, close unused portions of opening with firestopping material tested for the application. See U.L. Fire Resistance Directory.

G. Install smoke stopping as specified for firestopping.

H. Where rated walls are constructed with horizontally continuous air space, double width masonry, or double stud frame construction, provide vertical, 12" wide fiber dams for full thickness and height of air cavity at maximum 15' intervals.

3.04 FIELD QUALITY CONTROL

A. Examine penetration sealed areas to ensure proper installation before concealing or enclosing areas.

B. Keep areas of work accessible until inspection by applicable code authorities.

C. Perform under this Section, patching and repairing of firestopping cause by cutting or penetration by other Trades.

3.05 ADJUSTING AND CLEANING

A. Clean up spills of liquid components.

B. Neatly cut and trim materials as required.

C. Remove equipment, materials and debris, leaving area in undamaged, clean condition.

END OF SECTION

SECTION 07420 - EXTERIOR INSULATION AND FINISH SYSTEM

PART 1 - GENERAL

A. RELATED DOCUMENTS:

Drawings and general provisions of Contract, including General and Supplementary Conditions and Division-1 Specification sections, apply to work of this section.

B. DESCRIPTION OF WORK:

1. This section includes all labor, materials, equipment and related items required to complete the work of Exterior Insulation and Finish System. Work of this section includes the installation of a complete system including Gypsum Board Sheathing, Insulation Board, Vinyl Copolymer Adhesives, Acrylic Copolymer Finishes and associated hangers, fasteners, etc. required for proper and complete installation as shown on the Drawings and specified herein.

2. Excluded from work of this section is the preparation or construction of primary structural components to which system is attached.

C. QUALITY ASSURANCE:

1. Gypsum Panels - shall conform to Federal Specification, Class 2; ASTM C-79

2. Polystyrene Insulation Board - shall comply with Federal Specification HH-I-524B, Type I, Class A.

3. Glass-Fiber Reinforcing - shall comply with M1L-Y-114OC.

4. Portland Cement - shall comply with ASTM C-150, Type 1.

D. MANUFACTURERS:

1. Component Products comprising a total system shall be provided by a single manufacturer.

E. PRODUCT HANDLING:

1. Deliver products to job site in properly marked factory sealed containers. Store in protected tempered environment at not less than 40 degrees F. Protect gypsum panels from exposure to rain or high humidity.

F. WARRANTY:

1. Provide manufacturer's warranty against defective material or workmanship, for a period of three years. Necessary corrections and replacements shall be made at no cost to the Owner during the guarantee period.

PART 2 - PRODUCTS

A. GENERAL:

1. System or products specified herein are based upon standard manufactured components by nationally recognized manufacturers. Where proprietary systems are specified, they are for the purpose of establishing quality standards and are not intended to exclude equivalent systems by other nationally recognized producers.

B. EXTERIOR GYPSUM SHEATHING:

1. Exterior Gypsum panels shall be nominal 5/8" thick x 4' wide x longest practicable length with Fiberock brand sheathing, Aqua Tough, water-resistant gypsum core encased in specially treated water-repellent fiber paper, by U.S. Gypsum Company, or equivalent products manufactured by nationally recognized producers. Install to metal studs with Durock brand exterior screws.

C. EXTERIOR WALL INSULATION AND FINISH SYSTEM:

1. For the purpose of this specification "Senturion System I" exterior wall insulation and finish system as manufactured by Senergy, Inc., has been specified. Equivalent systems are as manufactured by Dryvit Inc., or approved equal.

2. Insulation Board shall be rigid expanded polystyrene, minimum 3/4" thick x largest practicable size with an average density of 1 pound per cubic foot.

3. Adhesive shall be a vinyl copolymer dispersion with a quartz sand aggregate formulated to be mixed in equal parts with Type 1 Portland cement.

4. Reinforcing fabric shall be balanced open weave fiberglass fabric made from twisted multi-end strands and treated for compatibility with other system components.

5. Surface finish system shall be an acrylic copolymer dispersion of hardening air-cured materials made with quartz sand aggregates and shall be Sahara Finish. Color shall be Frappe 3063.

PART 3 - EXECUTION

A. GENERAL:

1. System shall be installed by one installer, certified by the systems manufacturer as experienced in the application process specified herein.

2. Contractor shall examine substrate and enclosures to determine that conditions effecting proper installation are satisfactory. No work shall commence until area to receive finish system is fully enclosed and "weathered-in" to prevent accumulation of moisture on Gypsum Board panels. Commencement of work by the Contractor shall signify his acceptance of conditions effecting the installation whereupon he shall become solely responsible for damage or defects in materials and workmanship.

B. FURRING SYSTEM:

1. Do not bridge building expansion joints with support system, frame both sides of joints with furring and other supports as required.

2. Secure hangers to structural support by connecting directly to structure where possible, otherwise connect to inserts, clips or other anchorage devices or fasteners as necessary. Space hangers as 4'-0" o.c. maximum. Fasten perimeter members into masonry to provide resistance to wind uplift of 30 psf. minimum.

3. Level main runners to a tolerance of 1/4" in 12'-0", measured both lengthwise on each runner and transversely between parallel runners.

4. Wire-tie or clip furring members to structural supports.

5. Space furring members 24" o.c., maximum, except as otherwise required to form a maximum 24" x 24" grid.

6. Install auxiliary framing at termination of grid and at openings for light fixtures and similar work, as required for support of both gypsum base and other work indicated for support thereon.

C. GYPSUM SHEATHING:

1. Install gypsum sheathing on metal stud system.

2. Stagger joints on succeeding courses and interlock at corners.

3. Allow approximately 1/4" expansion joint around perimeter of installation.

4. Apply moisture protection barrier over gypsum sheathing.

D. EXTERIOR INSULATION & FINISH SYSTEM:

1. Installation of system shall begin only after minimum ambient temperature of 40 degrees F. has been obtained and can be maintained for a minimum 24 hours after installation.

2. Inspect gypsum board surface for irregularities before commencing application. Remove and replace damaged or deteriorated gypsum board panels and repair any planar irregularities greater than 1/4". Surface to be covered shall be free of hot spots, releasing agents and other residue.

3. Mix Primus/Adhesive in clean container adding Type 1 Portland cement at a ratio of one-pound Portland cement to one-pound Primus/Adhesive. After adhesive has set or become stiff or unworkable, do not retemper. Discard unsuitable material and prepare new mixtures.

4. Precut insulation board as required to fit openings, projections, etc. Stagger end joints between boards (and between board and gypsum panels). By trowel or extrusion apply a ribbon of mixed Primus/Adhesive approximately 2" wide by 3/8" thick to the entire perimeter of each board. Apply 4" wide by 3/8" thick ribbons to the interior area approximately 8" on center. Apply pressure over the entire surface of the board to insure uniform contact and high initial grab. Provide supplemental mechanical fasteners as recommended by the system manufacturer to retain board in place until adhesive has set. Abut all joints tightly to insure an overall level surface. Sand or rasp smooth any surface irregularities greater than 1/16". Allow to dry a minimum of 24 hours.

5. At all areas where system abuts other materials or where openings or penetrations occur, apply Primus/Adhesive and wrap with reinforcing mesh along all exposed sides. Hold board back approximately 1/2" from abutting dissimilar surfaces to allow caulking under other sections of the Specifications.

6. Using a stainless steel trowel, apply mixed Primus/Adhesive to the entire surface of the insulation Board to a uniform thickness of approximately 1/16 inch. Immediately place the Reinforcing Mesh against the wet Primus coating and by troweling from the center to the edges, totally embed the mesh into the coating. Reinforcing Mesh shall be continuous and lapped not less than 2-1/2 inches at fabric edges. Avoid wrinkles in embedding the Reinforcing Mesh. The finished thickness of the Primus coating shall be such that the Reinforcing Mesh is fully embedded. Allow to dry a minimum of 24 hours.

E. INSPECTION AND CLEAN-UP:

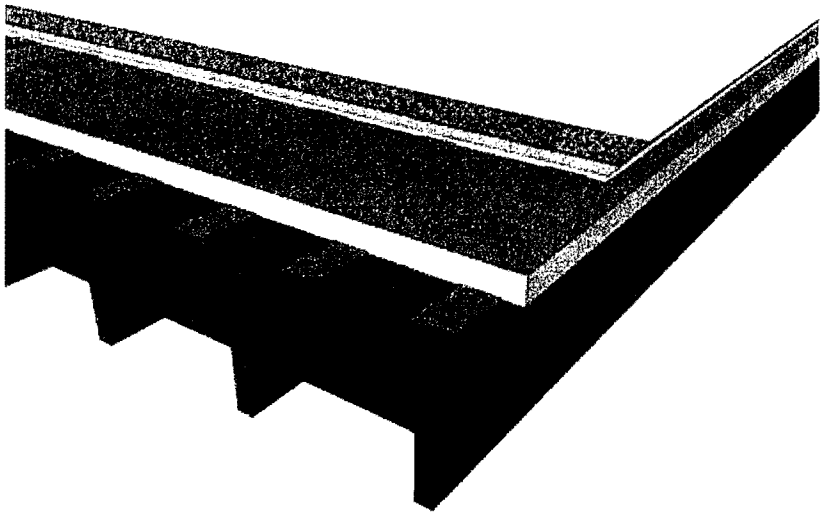
1. Upon completion of work, inspect finish surfaces for uniform color and texture. Cut out surface irregularities, discolored or otherwise damaged areas and repair in accordance with manufacturer's printed instructions.

2. Clean out joints at intersection of dissimilar materials to receive caulking. Inspect sides and edges of installation for proper coverage.

3. Clean adjacent surfaces, remove waste material and containers from job site and leave in first class condition.

End of Section

SECTION 07540 - Polyvinyl-Chloride Roofing



Roof Assembly Description

- **PVC thermoplastic membrane with fleece**

  Membrane Thickness: 60 mil nominal (78 mil including fleece)

  Color: White

  Attachment: Adhered with fleece membrane adhesive, splatter applied

- **Fiberglass-faced primed roof board**

  Thickness: ¼ inch

  Attachment: Attached with insulation adhesive

- **Polyisocyanurate (flat)**

  Attachment: Attached with insulation adhesive

- **5/8 inch Plywood Roof Deck**

SECTION 07540 - Polyvinyl-Chloride Roofing

PART 1 GENERAL

1.1 SECTION INCLUDES

A. PVC thermoplastic membrane with fleece adhered with fleece membrane adhesive, splatter applied.

B. Fiberglass-faced primed roof board, attached with insulation adhesive.

C. Polyisocyanurate (flat), attached with insulation adhesive.

D. Prefabricated flashings, corners, parapets, stacks, vents, and related details.

E. Fasteners, adhesives, and other accessories required for a complete roofing installation.

F. Traffic Protection.

1.2 REFERENCES

A. NRCA - The NRCA Roofing and Waterproofing Manual.

B. ASCE 7 - Minimum Design Loads For Buildings And Other Structures.

C. UL - Roofing Materials and Systems Directory, Roofing Systems (TGFU.R10128).

D. ASTM C 1289 - Standard Specification for Faced Rigid Cellular Polyisocyanurate Thermal Insulation Board.

E. ASTM D 751 - Standard Test Methods for Coated Fabrics.

F. ASTM D 4434 - Standard Specification for Poly(Vinyl Chloride) Sheet Roofing.

G. ASTM E 108 - Standard Test Methods for Fire Tests of Roof Coverings.

H. ASTM E 119 - Standard Test Methods for Fire Tests of Building Construction and Materials.

1.3 SYSTEM DESCRIPTION

A. General: Provide installed roofing membrane and base flashings that remain watertight; do not permit the passage of water; and resist specified uplift pressures, thermally induced movement, and exposure to weather without failure.

B. Material Compatibility: Provide roofing materials that are compatible with one another under conditions of service and application required, as demonstrated by roofing membrane manufacturer based on testing and field experience.

C. Physical Properties:

G. Roof product must meet the requirements of Type III PVC sheet roofing as defined by ASTM D 4434 and must meet or exceed the following physical properties.

H. Thickness: 60 mil (78 mil including fleece), nominal, in accordance with ASTM D 751.

I. Thickness Over Scrim: $\geq$ 32 mil in accordance with ASTM D 751.

J. Breaking Strengths: $\geq$ 554 lbf. (MD) and $\geq$ 408 lbf. (XMD) in accordance with ASTM D 751, Grab Method.

K. Elongation at Break: $\geq$ 34% (MD) and $\geq$ 85% (XMD) in accordance with ASTM D 751, Grab Method.

L. Heat Aging in accordance with ASTM D 3045: 176 °F for 56 days. No sign of cracking, chipping or crazing. (In accordance with ASTM D 4434).

M. Factory Seam Strength: ≥ 322 lbf. in accordance with ASTM D 751, Grab Method.

N. Tearing Strength: ≥ 50 lbf. (MD) and ≥ 200 lbf. (XMD) in accordance with ASTM D 751, Procedure B.

O. Low Temperature Bend (Flexibility): Pass at -40 °F in accordance with ASTM D 2136.

P. Accelerated Weathering: No cracking, checking, crazing, erosion or chalking after 5,000 hours in accordance with ASTM G 154.

Q. Linear Dimensional Change: ≤ 0.11% (MD) and 0.00% (XMD) in accordance with ASTM D 1204 at 176 ± 2 °F for 6 hours.

R. Water Absorption: ≤ 2.4% in accordance with ASTM D 570 at 158 °F for 166 hours.

S. Static Puncture Resistance: ≥ 33 lbs. in accordance with ASTM D 5602.

T. Dynamic Puncture Resistance: ≥ 14.7 ft-lbf. in accordance with ASTM D 5635.

D. Cool Roof Rating Council (CRRC):

1. Membrane must be listed on CRRC website.
   a. Initial Solar Reflectance: ≥ 87%
   b. Initial Thermal Emittance: ≥ 89%
   c. Initial Solar Reflective Index (SRI): ≥ 110

E. Insulation

1. Provide overall thermal resistance for roofing system as follows:
   a. Minimum Thickness: 6 inch.
2. Install using a minimum of two layers.
3. Configuration as indicated on the Drawings.

1.4 SUBMITTALS

A. Submit under provisions of Section 01300.

B. Data sheets on each product to be used, including:

1. Preparation instructions and recommendations.
2. Storage and handling requirements and recommendations.
3. Installation methods.
4. Maintenance requirements.

C. Shop Drawings: Indicate insulation pattern, overall membrane layout, field seam locations, joint or termination detail conditions, and location of fasteners.

D. Verification Samples: For each product specified, two samples, representing actual product, color, and finish.

1. 4 inch by 6 inch sample of roofing membrane, of color specified.
2. 4 inch by 6 inch sample of walkway pad.

3. Termination bar, fascia bar with cover, drip edge and gravel stop if to be used.
4. Each fastener type to be used for installing membrane, insulation/recover board, termination bar and edge details.

E. Installer Certification: Certification from the roofing system manufacturer that Installer is approved, authorized, or licensed by manufacturer to install roofing system.

F. Manufacturer's warranties.

1.5 QUALITY ASSURANCE

A. Perform work in accordance with manufacturer's installation instructions.

B. Manufacturer Qualifications: A manufacturer specializing in the production of PVC membranes systems and utilizing a Quality Control Manual during the production of the membrane roofing system that has been approved by and is inspected by Underwriters Laboratories.

C. Installer Qualifications: Company specializing in installation of roofing systems similar to those specified in this project and approved by the roofing system manufacturer.

D. Source Limitations: Obtain components for membrane roofing system from roofing membrane manufacturer.

E. There shall be no deviations from the roof membrane manufacturer's specifications or the approved shop drawings without the prior written approval of the manufacturer.

1.6 REGULATORY REQUIREMENTS

A. Conform to applicable code for roof assembly wind uplift and fire hazard requirements.

B. Fire Exposure: Provide membrane roofing materials with the following fire-test-response characteristics. Materials shall be identified with appropriate markings of applicable testing and inspecting agency.

1. Exterior Fire-Test Exposure:
   a. Class A; ASTM E 108, for application and roof slopes indicated.
2. Fire-Resistance Ratings: Comply with ASTM E 119 for fire-resistance-rated roof assemblies of which roofing system is a part.
3. Conform to applicable code for roof assembly fire hazard requirements.

C. Wind Uplift:

1. Roofing System Design: Provide a roofing system designed to resist uplift pressures calculated according to the current edition of the ASCE-7 Specification *Minimum Design Loads for Buildings And Other Structures*.

1.7 PRE-INSTALLATION MEETING

A. Convene meeting not less than one week before starting work of this section.

B. Review methods and procedures related to roof deck construction and roofing system including, but not limited to, the following.

1. Meet with Owner, Architect, Owner's insurer if applicable, testing and inspecting agency representative, roofing installer, roofing system manufacturer's representative, deck installer, and installers whose work interfaces with or affects roofing including installers of roof accessories and roof-mounted equipment.
2. Review and finalize construction schedule and verify availability of materials, installer's personnel, equipment, and facilities needed to make progress and avoid delays.
3. Examine deck substrate conditions and finishes for compliance with requirements, including flatness and fastening.
4. Review structural loading limitations of roof deck during and after roofing.
5. Review base flashings, special roofing details, roof drainage, roof penetrations, equipment curbs, and condition of other construction that will affect roofing system.
6. Review governing regulations and requirements for insurance and certificates if applicable.
7. Review temporary protection requirements for roofing system during and after installation.
8. Review roof observation and repair procedures after roofing installation.

1.8 DELIVERY, STORAGE AND HANDLING

A. Deliver roofing materials to Project site in original containers with seals unbroken and labeled with manufacturer's name, product brand name and type, date of manufacture, and directions for storing and mixing with other components.

B. Store liquid materials in their original undamaged containers in a clean, dry, protected location and within the temperature range required by roofing system manufacturer. Protect stored liquid material from direct sunlight.

C. Protect roof insulation materials from physical damage and from deterioration by sunlight, moisture, soiling, and other sources. Store in a dry location. Comply with insulation manufacturer's written instructions for handling, storing, and protecting during installation.

D. Store roof materials and place equipment in a manner to avoid permanent deflection of deck.

E. Store and dispose of solvent-based materials, and materials used with solvent-based materials, in accordance with requirements of local authorities having jurisdiction.

1.9 WARRANTY

A. Contractor's Warranty: The contractor shall warrant the roof application with respect to workmanship and proper application for two (2) years from the effective date of the warranty issued by the manufacturer.

B. Manufacturer's Warranty: Must be no-dollar limit type and provide for completion of repairs, replacement of membrane or total replacement of the roofing system at the then-current material and labor prices throughout the life of the warranty. In addition the warranty must meet the following criteria:

1. Warranty Period: 20 years from date issued by the manufacturer.
2. No exclusion for damage caused by ponding water.
3. No exclusion for damage caused by biological growth.
4. Issued direct from and serviced by the roof membrane manufacturer.
5. Transferable for the full term of the warranty.

PART 2 PRODUCTS

2.1 MANUFACTURER

A. All roofing system components to be provided or approved by roof system manufacturer.

B. Acceptable Manufacturers:

1. Duro-Last, Inc.
2.
3.

2.2 ROOFING SYSTEM COMPONENTS

A. Roofing Membrane: PVC thermoplastic membrane with fleece conforming to ASTM D 4434, type III, fabric-reinforced, PVC. Membrane properties as follows:

1. Thickness:
   a. 60 mil nominal (78 mil including fleece).
2. Exposed Face Color:
   a. White.

B. Accessory Materials: Provide accessory materials supplied by or approved for use by roof system manufacturer

1. Sheet Flashing: Manufacturer's standard reinforced PVC sheet flashing.
2. Vapor Barrier: Duro-Guard Sporavap'r.
3. Factory Prefabricated Flashings: manufactured using Manufacturer's standard reinforced PVC membrane.
   a. Stack Flashings.
   b. Curb Flashings.
   c. Inside and Outside Corners.
4. Sealants and Adhesives: Compatible with roofing system and supplied by roof system manufacturer.
   a. Fleece Membrane Adhesive.
   b. Low-Rise Foam Insulation Adhesive.
   c. Caulk.
   d. Strip Mastic.
5. Slip Sheet: Compatible with roofing system and supplied by roof system manufacturer.
6. Fasteners and Plates: Factory-coated steel fasteners and metal or plastic plates meeting corrosion-resistance provisions in FMG 4470, designed for fastening membrane and insulation to substrate. Supplied by roof system manufacturer.
   a. #14 Heavy Duty Fasteners.
   b. 3 inch Metal Plates.
7. Termination and Edge Details: Supplied by roof system manufacturer.

a. Termination Bar.

8. Vinyl Coated Metal: 24 gauge, hot-dipped galvanized, grade 90 metal with a minimum of 17 mil of PVC roofing membrane laminated to one side.

C. Walkways:

1. Provide non-skid, maintenance-free walkway pads in areas of heavy foot traffic and around mechanical equipment.

a. Walkway Pad.

2.3 ROOF INSULATION

A. General:

1. Provide preformed roof insulation boards that comply with requirements and referenced standards, as selected from manufacturer's standard sizes.

2. Provide preformed saddles, crickets, and other insulation shapes where indicated for sloping to drain. Fabricate to slopes indicated.

B. Polyisocyanurate Board Insulation: Complying with ASTM C 1289, Type II, felt or glass-fiber mat facer on both major surfaces. Material as supplied by roof system manufacturer.

1. Polyisocyanurate (flat).

2.4 ROOF INSULATION ACCESSORIES

A. General: Provide roof insulation accessories approved by the roof membrane manufacturer and as recommended by insulation manufacturer for the intended use.

B. Insulation Adhesive: Provide insulation adhesive for attaching insulation and/or insulation cover boards in conformance to specified design requirements.

C. Insulation Cover Board:

1. Glass-mat-faced, water-resistant gypsum substrate conforming to ASTM C 1177/C 1177M,DensDeck® Prime Roof Board as manufactured by Georgia-Pacific Corporation.

a. ¼ inch thick.

PART 3 EXECUTION

3.1 EXAMINATION

A. Verify that the surfaces and site conditions are ready to receive work.

B. Verify that the deck is supported and secured.

C. Verify that the deck is clean and smooth, free of depressions, waves, or projections, and properly sloped to drains, valleys, eaves, scuppers or gutters.

D. Verify that the deck surfaces are dry and free of standing water, ice or snow.

E. Verify that all roof openings or penetrations through the roof are solidly set.

F. If substrate preparation is the responsibility of another contractor, notify Architect of unsatisfactory preparation before proceeding.

3.2 PREPARATION

A. Clean surfaces thoroughly prior to installation.

B. Prepare surfaces using the methods recommended by the manufacturer for achieving the best result for the substrate under the project conditions.

C. Surfaces shall be clean, smooth, free of fins, sharp edges, loose and foreign material, oil, grease, and bitumen.

3.3 INSTALLATION

A. Install insulation in accordance with the roof manufacturer's requirements.

B. Insulation: Polyisocyanurate (flat).

1. Install insulation in accordance with the roof manufacturer's requirements.
2. Insulation shall be adequately supported to sustain normal foot traffic without damage.
3. Where field trimmed, insulation shall be fitted tightly around roof protrusions with no gaps greater than ¼ inch.
4. No more insulation shall be applied than can be covered with the roof membrane by the end of the day or the onset of inclement weather.
5. If more than one layer of insulation is used, all joints between subsequent layers shall be offset by at least 6 inches.

C. Insulation Cover Board: Fiberglass-faced primed roof board.

D. Roof Membrane: 60 mil, PVC thermoplastic membrane with fleece.

1. Use only membrane adhesive acceptable to the roof manufacturer's that meets the applicable design requirements.
2. Cut membrane to fit neatly around all penetrations and roof projections.
3. Unroll roofing membrane and positioned with a minimum 6 inch overlap along the selvage edge. Roll ends must be butted together and membrane of the same mil thickness, without fleece backing, must be used to form the end lap.
4. Apply adhesive in accordance with the roof manufacturer's requirements.
5. Apply adhesive in splatter pattern.
6. Follow guidelines outlined in the adhesive's Product Data Sheet.
7. Read the adhesive's Material Safety Data Sheet (MSDS) prior to using the adhesive.

E. Seaming:

1. Weld overlapping sheets together using hot air. Minimum weld width is 1-1/2 inches.
2. Check field welded seams for continuity and integrity and repair all imperfections by the end of each work day.

F. Membrane Termination/Securement: All membrane terminations shall be completed in accordance with the membrane manufacturer's requirements.

1. Provide securement at all membrane terminations at the perimeter of each roof level, roof section, curb flashing, skylight, expansion joint, interior wall, penthouse, and other similar condition.
2. Provide securement at any angle change where the slope or combined slopes exceeds two inches in one horizontal foot.

G. Flashings: Complete all flashings and terminations as indicated on the drawings and in accordance with the membrane manufacturer's requirements.

1. Provide securement at all membrane terminations at the perimeter of each roof level, roof section, curb flashing, skylight, expansion joint, interior wall, penthouse, and other similar condition.

a. Do not apply flashing over existing thru-wall flashings or weep holes.

b. Secure flashing on a vertical surface before the seam between the flashing and the main roof sheet is completed.

c. Extend flashing membrane a minimum of 6 inches (152 mm) onto the main roof sheet beyond the mechanical securement.

d. Use care to ensure that the flashing does not bridge locations where there is a change in direction (e.g. where the parapet meets the roof deck).

2. Penetrations:

a. Flash all pipes, supports, soil stacks, cold vents, and other penetrations passing through the roofing membrane as indicated on the Drawings and in accordance with the membrane manufacturer's requirements.

b. Utilize custom prefabricated flashings supplied by the membrane manufacturer.

c. Existing Flashings: Remove when necessary to allow new flashing to terminate directly to the penetration.

3. Pipe Clusters and Unusual Shapes:

a. Clusters of pipes or other penetrations which cannot be sealed with prefabricated membrane flashings shall be sealed by surrounding them with a prefabricated vinyl-coated metal pitch pan and sealant supplied by the membrane manufacturer.

b. Vinyl-coated metal pitch pans shall be installed, flashed and filled with sealant in accordance with the membrane manufacturer's requirements.

c. Pitch pans shall not be used where prefabricated or field fabricated flashings are possible.

H. Roof Drains:

1. Coordinate installation of roof drains and vents specified in Section 15146 - Plumbing Specialties.

2. Remove existing flashing and asphalt at existing drains in preparation for sealant and membrane.

3. Provide a smooth clean surface on the mating surface between the clamping ring and the drain base.

I. Edge Details:

1. Provide edge details as indicated on the Drawings. Install in accordance with the membrane manufacturer's requirements.

2. Join individual sections in accordance with the membrane manufacturer's requirements.

3. Coordinate installation of metal flashing and counter flashing specified in Section 07620.

4. Manufactured Roof Specialties: Coordinate installation of copings, counter flashing systems, gutters, downspouts, and roof expansion assemblies specified in Section 07710.

J. Walkways:

1. Install walkways in accordance with the membrane manufacturer's requirements.
2. Provide walkways where indicated on the Drawings.
3. Install walkway pads at roof hatches, access doors, rooftop ladders and all other traffic concentration points regardless of traffic frequency. Provided in areas receiving regular traffic to service rooftop units or where a passageway over the surface is required.
4. Do not install walkways over flashings or field seams until manufacturer's warranty inspection has been completed.

K. Water cut-offs:

1. Provide water cut-offs on a daily basis at the completion of work and at the onset of inclement weather.
2. Provide water cut-offs to ensure that water does not flow beneath the completed sections of the new roofing system.
3. Remove water cut-offs prior to the resumption of work.
4. The integrity of the water cut-off is the sole responsibility of the roofing contractor.
5. Any membrane contaminated by the cut-off material shall be cleaned or removed.

3.4 FIELD QUALITY CONTROL

A. The membrane manufacturer's representative shall provide a comprehensive final inspection after completion of the roof system. All application errors shall be addressed and final punch list completed.

3.5 PROTECTION

A. Protect installed roofing products from construction operations until completion of project.

B. Where traffic is anticipated over completed roofing membrane, protect from damage using durable materials that are compatible with membrane.

C. Repair or replace damaged products after work is completed.

END OF SECTION

SECTION 07631 - GUTTERS AND DOWNSPOUTS

PART 1 - GENERAL

1.01 WORK INCLUDED

A. Prefabricated aluminum eave gutters and downspouts, with baked enamel finish, complete with required connecting pieces, roof aprons, end caps, anchorages, etc. as required for a complete installation.

B. Precast concrete splash pads.

1.02 REFERENCES

A. ASTM B209 - Aluminum Alloy Sheet and Plate

1.03 SUBMITTALS

A. Submit shop drawings of gutters and downspouts.

B. Clearly indicate general construction, configurations, jointing methods and locations, fastening methods and locations and installation details.

PART 2 - PRODUCTS

2.01 ACCEPTABLE MANUFACTURERS

A. Alcoa

B. Reynolds Metals

C. Kaiser

D. Substitutions: Reviewed equal.

2.02 MATERIALS

A. Gutters shall be made of 3005-H25 Aluminum Sheet.

B. Gutter shall be 6" .032" nominal with 3" x 4" downspouts .027".

C. Expansion joint to be aluminum, lined with neoprene.

D. Downspout Clip .014"

E. Gutter hangers shall be strap hangers.

F. All Accessories used shall be by the same manufacturer.

2.03 FABRICATION

A. Form gutters and downspouts of profiles and sizes indicated on Drawings and as required to properly collect and remove water. Fabricate complete with required connection pieces.

B. Form sections square, true and accurate in size, in maximum possible lengths and free of distortions and defects detrimental to appearance or performance. Hem exposed edges. Allow for expansion at joints.

PART 3 - EXECUTION

3.01 INSTALLATION

A. Before starting work, verify governing dimensions at building; examine, clean and repair, if necessary, any adjoining work on which this work is in any way dependent for its proper installation.

B. Upon completion, the contractor shall clean all aluminum work.

C. Dissimilar materials

1. Care must be exercised in placing aluminum in contact with metals or materials not compatible with aluminum.

2. Dissimilar materials shall be painted or otherwise protected when they are in contact with aluminum or when drainage from them passes over aluminum.

PART 4 - RIDGE VENT

A. When indicated on the Drawings, furnish and install at building roofs manufacturer's standard, continuous, ridge-type with minimum high impact copolymer vent such as shingle vent II Series SHFV203 as manufactured by Air Vent, Inc., Peroia, Illinois or reviewed equal with minimum net free area of 18 sq. inches per linear foot, and shall include end and connector plugs, weather baffles, joint covers, and aluminum screw shank nails as required by the installations or reviewed equal.

B. Installation shall be in accordance with manufacturer's printed instructions.

C. Colors to match roof.

D. Slant Vents

E. Furnish and install where shown on drawings, manufacturer's standard slant vent such as RV-61, net free area, 61 square inches, heavy-duty polypropylene construction with aluminum screen, nominal 19½"x16¼" size by the solar group, Taylorsville, Mississippi or reviewed equal.

F. Color to match roof.

End of Section

SECTION 07900 - JOINT SEALERS

PART 1 - SCOPE

A. This Section includes all labor, materials, equipment, and related items required for the work of caulking as shown on the Drawings and as specified herein. Work under this Section includes but is not necessarily restricted to the following:

1. Caulking of exterior or interior expansion or control joints in concrete or masonry.

2. Other joints, exterior or interior, in the building construction shown, specified, or required to be caulked.

PART 2 - SUBMITTAL

A. Contractor shall submit to the Architect, in duplicate, for approval the following items prior to furnishing any materials at the job site.

1. Sample cards of all exposed caulking and sealant for color approval. Unless otherwise directed, apply samples in minimum 3" runs on cards.

2. One lineal foot of each type of backer material proposed.

PART 3 - PRODUCT HANDLING

A. Deliver caulking, and related accessories to the job site in factory sealed, unopened containers bearing manufacturer's name and product designation.

B. Store materials in unopened containers, following manufacturer's recommendations for storage temperature and shelf life.

C. Follow manufacturer's recommendation for handling products containing toxic substances. Keep flammable materials away from heat, sparks, and open flames. Use recommended solvents and cleaning agents for cleaning tools and equipment.

PART 4 - ENVIRONMENTAL CONDITIONS

A. Schedule caulking operations so that working joints are most likely to be normal size. Apply materials within manufacturer's recommended surface and ambient temperature range.

PART 5 - PROTECTION

A. Use masking tape where practicable to control lap of materials onto adjacent surfaces or to facilitate tooling. Remove tape immediately after caulking operation.

PART 6 - MATERIALS

A. General. All caulking, primers, and accessories shall be non-staining to adjacent exposed materials. Products having similar application and usage shall be of the same manufacturer and type. Unless otherwise specified, colors shall be selected from approved manufacturer's standard color sections. Use gun consistency compounds unless otherwise required by job conditions.

B. Exterior caulking shall be a one or two-component polysulfide base, elastic, synthetic rubber compound, conforming to Federal Spec. TT-S-00230, and shall be "Sonolastic" as manufactured by the Sonneborn Building Products, Inc., "Synthacalk" as manufactured by the Pecora Chemical Corp., or "Rubber Calk 500" as manufactured by the Products Research & Chemical Corp or an approved equal.

1. Colors shall be from manufacturer's standards as selected by the Architect.

C. Interior caulking for general use shall be a one-component acrylic latex compound, and shall be "Sonolac" as manufactured by the Sonneborn Building Products, Inc. "AC-20" as manufactured by the Pecora Chemical Corp., or "Latex Caulk" as manufactured by DAP, Inc.

D. Primers shall be as manufactured and recommended for each substrate by the manufacturer of each caulking compound used in the work.

E. Backer materials shall be as recommended for and compatible with each caulking used, and shall be as follows unless otherwise required to meet specific job conditions.

1. Backer rod for use in all joints requiring backer for caulking shall be a soft, closed cell polyethylene foam meeting requirements of AASHO Specifications M153-54, Type I and III, and shall be as manufactured by the Dow Corning Corp., Sonneborn Building Products, Inc., or Williams Products, Inc.

F. Release material, where required, shall be polyethylene film.

PART 7 - MIXING

A. Job mix multi-component sealants with suitable power operated equipment, following specific directions of sealant manufacturer.

B. Base and accelerator components of multi-part sealants shall have batch control numbers clearly indicated on containers. Control numbers for mixed components shall be identical.

PART 8 - CONDITION OF SURFACES

A. Inspect all surfaces to receive caulking materials, and report all defects. Starting work implies acceptance of surfaces as satisfactory. Verify that joints and spaces to be caulked are of proper width.

B. Concrete surfaces shall be thoroughly cured.

C. Apply no caulking materials in contact with surfaces contaminated with oil, grease, bituminous materials, form release agents, bond breakers, deleterious curing compounds, water repellents, and other special surface treatments. Aluminum surfaces shall be free of lacquer. Costs incurred by removal of such contaminants shall be borne by the trades responsible for their presence.

PART 9 - PREPARATION

A. Thoroughly clean all joints, removing all foreign matter such as dirt, dust, moisture, frost, rust, paint, lacquer, and protective coatings. Blow all joints free of loose particles.

B. Use no cleaning solvents which leave residue. Wipe joints free of solvent using clean, dry white cloths or white lintless paper. Do not permit solvent to air dry.

C. Follow manufacturer's directions for products and surfaces.

PART 10 - INSTALLATION

A. Unless otherwise required by these specifications, install materials in strict accordance with manufacturer's specifications and recommendations, using approved equipment.

B. Usage of various materials shall be as specified under Article 6 above.

C. Prime surfaces as recommended by the manufacturer's immediately prior to caulking or sealing. Make preliminary tests to ensure that primers will not stain exposed materials or deteriorate backer materials.

D. Unless otherwise required by caulking manufacturer's specifications and recommendations, use backer material to control caulking and sealant depth as follows (depths measured at bond face).

1. Polysulfide and Polyurethane Sealants. For joints up to 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.

2. Acrylic Sealant. For joints 1/2" wide and less, make depth equal to width but not less than 1/4". Joints over 1/2" wide shall be 3/8" deep.

3. Do not twist or stretch preformed backer materials during installation.

E. At joints subject to movement, where required by nature of backer material used or where sealant contacts back of joint, use release material between backer material or back or joint and sealer to confine adhesion to surfaces of materials being joined. Follow manufacturer's recommendation exactly.

F. Neatly tool joints to slightly concave surface using tooling agent recommended by sealant manufacturers. Repair any air pockets exposed by tooling. Tool so as to compress material and improve adhesion to surfaces joined.

PART 11 - PATCHING

A. Patch or replace defective or damaged sealants as directed by the Architect. Be responsible for damage to adjacent surfaces caused by caulking and sealing operations.

PART 12 - CLEANING

A. Clean adjacent surfaces soiled by caulking and sealing operations. Remove wet material before it "sets". Follow manufacturer's recommendations for cleaning procedures. Cleaning agents shall not stain or be injurious to exposed surfaces nor shall they be potentially dangerous to glass and metal surfaces due to wash-off by rain.

END OF SECTION