SECTION 07 21 19

FOAMED IN PLACE INSULATION

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\*\* NOTE TO SPECIFIER \*\* BASF Corporation - Spray Foam; spray polyurethane foam insulation.  
This section is based on the products of BASF Corporation - Spray Foam, which is located at:1703 Crosspoint Ave.Houston, TX 77054Toll Free Tel: 888-900-FOAMFax: 713-383-4590Email: [request info (SPF.TECHSALES@BASF.COM)](https://arcat.com/rfi?action=email&company=BASF%252BCorporation%252B-%252BSpray%252BFoam&message=RE%253A%2520Spec%2520Question%2520(07219bsf)%253A%2520&coid=43296&spec=07219bsf&rep=&fax=713-383-4590)  
Web: <https://spf.basf.com>   
 [ [Click Here](https://arcat.com/company/basf-corporation-spray-foam-43296) ] for additional information.  
BASF manufactures both closed-cell and open-cell spray polyurethane foam products for residential and commercial construction, providing the right SPF system for any type of well-engineered building envelope. The BASF two component application process features a wide range of specially formulated polyurethane spray foam offerings that meet specific site and surface requirements.  
Additionally, BASF also offers a number of waterproofing or damp-proof coating materials resulting in high performance, durable BASF SPF Roofing Systems for any climate that stand the test of time.  
Due to the technical skill required, these systems must only be applied by trained contractors within BASF's approved applicator network.  
SPF is part of the BASF Performance Materials Construction division, which provides better, faster and more cost effective construction solutions. Whether new construction, retrofit or restoration, BASF higher-performing materials improve energy efficiency, increase durability, and help speed construction, while also offering a lower lifecycle cost and reduced environmental impact.

1. GENERAL
   1. SECTION INCLUDES

\*\* NOTE TO SPECIFIER \*\* Delete items below not required for project.

* + 1. Spray polyurethane foam insulation.
    2. Thermal barrier (fire resistive) coating.
    3. Spray-applied closed cell polyurethane foam (ccSPF) insulating air barrier system for exterior wall assemblies.
  1. RELATED SECTIONS

\*\* NOTE TO SPECIFIER \*\* Roof Decks: This section should not be used to specify foam insulation on the exterior side of a roof -- use a true foam roofing specification for that. Delete any sections below not relevant to this project; add others as required.

* + 1. Section 03 30 00 - Cast-in-Place Concrete.
    2. Section 04 20 00 - Unit Masonry.
    3. Section 06 10 00 - Rough Carpentry.
    4. Section 06 16 36 - Wood Panel Product Sheathing
    5. Section 07 21 19 - Foamed-In-Place Insulation
    6. Section 07 27 19 - Plastic Sheet Air Barriers .
    7. Section 07 50 00 - Membrane Roofing
    8. Section 07 84 13 - Penetration Firestopping.
    9. Section 07 91 23 - Backer Rods.
    10. Section 09 96 13 - Abrasion-Resistant Coatings.
    11. Section 05 36 00 - Composite Metal Decking.
    12. Section 07 14 00 - Fluid-Applied Waterproofing.
    13. Section 07 27 23 - Board Product Air Barriers.
    14. Section 07 81 00 - Applied Fireproofing.
    15. Section - .
    16. Division 15 - Mechanical: Plumbing and HVAC components penetrating insulation.
    17. Division 16 - Electrical: Electrical components penetrating insulation.
  1. REFERENCES

\*\* NOTE TO SPECIFIER \*\* Delete references from the list below that are not actually required by the text of the edited section.

* + 1. Air Barrier Association of America (ABAA):
       1. ABAA Quality Assurance Program.
    2. American Society for Testing and Materials (ASTM):
       1. ASTM C518 - Standard Test Method for Steady-State Thermal Transmission Properties by Means of the Heat Flow Meter Apparatus.
       2. ASTM C1029 - Standard Specification for Spray-Applied Rigid Cellular Polyurethane Thermal Insulation.
       3. ASTM C1177/C1177M - Standard Specification for Glass Mat Gypsum Substrate for Use as Sheathing.
       4. ASTM C1325 - Standard Specification for Non-Asbestos Fiber-Mat Reinforced Cementitious Backer Units.
       5. ASTM C1338 - Standard Test Method for Determining Fungi Resistance of Materials and Facings.
       6. ASTM D1621 - Standard Test Method for Compressive Properties of Rigid Cellular Plastics.
       7. ASTM D1622 - Standard Test Method for Apparent Density of Rigid Cellular Plastics.
       8. ASTM D1623 - Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics.
       9. ASTM C1848 - Standard Practice for Installation of High-Pressure Spray Polyurethane Foam Insulation for the Building Enclosure.
       10. ASTM D2126 - Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging.
       11. ASTM D2842 - Standard Test Method for Water Absorption of Rigid Cellular Plastics.
       12. ASTM D4541 - Standard Test Method for Pull-Off Strength of Coatings Using Portable Adhesion Testers.
       13. ASTM D6226 - Standard Test Method for Open Cell Content of Rigid Cellular Plastics.
       14. ASTM E84 - Standard Test Method for Surface Burning Characteristics of Building Materials.
       15. ASTM E96 - Standard Test Method for Water Vapor Transmission of Materials.
       16. ASTM E119 - Standard Test Methods for Fire Test of Building Construction Materials.
       17. ASTM E283 - Standard Test Method for Determining Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen.
       18. ASTM E970 - Standard Test Method for Critical Radiant Flux of Exposed Attic Floor Insulation Using a Radiant Heat Energy Source.
       19. ASTM E2178 - Standard Test Method for Air Permeance of Building Materials.
       20. ASTM E2357 - Standard Test Method for Determining Air Leakage of Air Barrier Assemblies
    3. International Code Council Evaluation Services:
       1. AC-377 Acceptance Criteria for Spray-Applied Foam Plastic Insulation.
       2. International Building Code, 2015, 2012, 2009.
       3. International Residential Code, 2015, 2012, 2009.
       4. International Energy Conservation Code, 2015, 2012, 2009.
    4. California Department of Public Health (CDPH) Section 01 35 00 - Special Procedures:
       1. CDPH Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers.
    5. Center for Polyurethane Insulation (CPI):
       1. Health and Safety Training Course.
    6. International Code Council-Evaluation Service (ICC-ES):
       1. ICC-ES AC 377 - Acceptance Criteria for Spray-Applied Foam Plastic Insulation.
       2. ICC-ES AC 71 - Acceptance Criteria for Foam Plastic Sheathing Panels Used as Weather-resistive Barriers.
       3. ICC-ES AC 148 - Acceptance Criteria for Flexible Flashing Materials.
    7. National Fire Protection Association (NFPA):
       1. NFPA 259 (UBC 26-1) - Standard Test Method for Potential Heat of Building Materials.
       2. NFPA 275 - Standard Method of Fire Tests for the Evaluation of Thermal Barriers.
       3. NFPA 285 - Standard Fire Test Method for Evaluation of Fire Propagation Characteristics of Exterior Non-Load-Bearing Wall Assemblies Containing Combustible Components.

\*\* NOTE TO SPECIFIER \*\* SPRAYTITE SP is not approved for this application. Delete if not required.

* + - 1. NFPA 286 - Standard Methods of Fire Tests for Evaluating Contribution of Wall and Ceiling Interior Finish to Room Fire Growth.
    1. Occupational Safety and Health Administration, U.S. Department of Labor (OSHA):
       1. Health and Safety Practices for SPF Applications.
    2. Spray Foam Coalition, of the Center for the Polyurethanes Industry (SFC):
       1. Guidance on Best Practices for the Installation of Spray Polyurethane Foam.
       2. Ventilation Considerations for Spray Polyurethane Foam.
    3. United States Environmental Protection Agency (EPA):
       1. Ventilation Guidance for Spray Polyurethane Foam Application.
    4. Underwriters Laboratories (UL):
       1. UL 263 - Fire Tests of Building Construction and Materials.
       2. UL 723 - Standard for Test for Surface Burning Characteristics of Building Materials.
       3. UL 1715 - Fire Test of Interior Finish Material.
    5. UL Environment (Ule):
       1. UL 2818 - GREENGUARD Certification Program for Chemical Emissions for Building Materials, finishes and Furnishings.
       2. UL 2821 - GREENGUARD Certification Program Method for Measuring and Evaluating Chemical Emissions for Building Materials, Finishes and Furnishings.
    6. Additional Testing, Approvals and Certifications:
       1. California Green Building Codes Standards, 2006 Title 24, Part 11.
       2. National Green Building Standard, ICC -700, 2015, 2012, 2008.
       3. LEED v4, Point potential for, Environmental Product Recommendation, Raw Material Source and Extraction Reporting and Recycled Content.
       4. GREENGUARD and GREENGUARD Gold Certification for VOC emissions and formaldehyde.
    7. Other Organizations:
       1. American Association for Laboratory Accreditation (AALA).
       2. International Accreditation Service Inc. (IAS).
       3. International Standards Organization (ISO).
       4. Center for the Polyurethanes Industry - Health and Safety Product Stewardship Workbook for High Pressure application of Spray Polyurethane Foam, June 2016. See [www.spraypolyurethane.org](http://www.spraypolyurethane.org) for industry guidelines.
  1. SUBMITTALS
     1. Submit under provisions of Section 01 30 00 - Administrative Requirements.
     2. Product Data: Manufacturer's data on products to be installed including:
        1. Technical data sheets.
        2. Safety data sheets.
        3. Application or installation instructions.
        4. Listing, classification, and approval certifications.
        5. Safety and handling instructions for storage, handling and use of the materials.
     3. Code Research Reports including:
        1. ICC-ES (International Code Council Evaluation Service) http://www.spf.basf.com/evaluation\_reports.php.
        2. Intertek CCRR (Code Compliance Research Report) www.spf.basf.com/evaluation\_reports.php.
     4. Certifications: If manufacturer's published data sheets do not indicate compliance with all specification requirements, provide letter of certification that all products comply with the specification requirements; include primers (if required), foam, vapor retarder and thermal barriers.
  2. QUALITY ASSURANCE
     1. Comply with standards referenced the "References"Article in Part 1.
     2. Source Limitations: Provide each type of product from a single manufacturing source to ensure uniformity.
     3. Manufacturer Qualifications: Company specializing in manufacturing products specified in this section with a minimum five years documented experience.
        1. Spray Foam System Compounder shall be a member of CPI and ISO 9001 Certified.
        2. Provide foam products which comply with applicable regulations controlling the use of volatile organic compounds (VOC), with a maximum VOC content less than 50 g/L.
     4. Installer Qualifications: Company specializing in performing Work of this section with minimum two years documented experience with projects of similar scope and complexity.

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraph if not required. The Spray Polyurethane Foam Alliance (SPFA) conducts an Accreditation Program for improvement of quality in the application of spray polyurethane foams. The list of accredited individuals and firms is available from SPFA.

* + - 1. Approved by the foam manufacturer as qualified to install the specified system or be certified by the Spray Polyurethane Foam Alliance SPFA) Professional Certification Program (PCP).
      2. Provide information concerning projects similar in nature to the one proposed including location and person to be contacted.

\*\* NOTE TO SPECIFIER \*\* Delete the following paragraph if ABAA certification is not required.

* + - 1. Currently accredited by ABAA and whose applicators are certified in accordance with the ABAA Quality Assurance Program.
      2. Completion of manufacturer's training program for installation of specified air barrier, and not less than 5 installations similar in size and complexity in the past 3 years.
      3. Installers shall have their photo identification certification cards in their possession and available on the project site, for inspection upon request.

\*\* NOTE TO SPECIFIER \*\* Include mock-up if the project size or quality warrant the expense. The following is one example of how a mock-up on might be specified. When deciding on the extent of the mock-up, consider all the major different types of work on the project.

* + 1. Mock-Up: Construct a mock-up with actual materials in sufficient time for Architect's review and to not delay construction progress. Locate mock-up as acceptable to Architect and provide temporary foundations and support.
       1. Intent of mock-up is to demonstrate quality of workmanship and visual appearance.
       2. If mock-up is not acceptable, rebuild mock-up until satisfactory results are achieved.
       3. Retain mock-up during construction as a standard for comparison with completed work.
       4. Do not alter or remove mock-up until work is completed or removal is authorized.
       5. Approval of mock-ups does not constitute approval of deviations from the Contract Documents contained in mock-ups unless Architect specifically approves such deviations in writing.
       6. Approved mockups may become part of the completed work if undisturbed at time of Substantial Completion.

\*\* NOTE TO SPECIFIER \*\* Delete the mock-up tests if insulation air barrier, Waltite LWP Spray Foam is not required.

* + - 1. Mock-Up Tests for Air and Water Infiltration: Test mock-up for air and water infiltration as prescribed by the Project requirements.
         1. Sequence: Perform the air leakage and water penetration tests of mock-up prior to installation of cladding and trim but after installation of all fasteners for cladding and trim and after installation of other penetrating elements.
         2. Deficiencies: If deficiencies are observed, reconstruct mock-up and retest until satisfactory results are obtained. Deficiencies include air leakage beyond limits specified for project requirements, uncontrolled water leakage, and unsatisfactory workmanship.
      2. Mock-Up Tests for Adhesion: Test mock-up of materials for adhesion and material compatibility in accordance with manufacturers' recommendations. Perform test after curing period recommended by the manufacturer. Record mode of failure and the area(s) which failed to meet the project requirements of 16 psi when tested in accordance with the ASTM D4541 standard. When the air barrier material manufacturer has established a minimum adhesion level for the product on the substrate, the inspection report shall indicate whether this requirement has been met.

\*\* NOTE TO SPECIFIER \*\* Delete the remaining paragraphs if insulation air barrier, Waltite LWP Spray Foam is not required.

* + 1. Accredited Laboratory Testing for Materials: Engage laboratory accredited by AALA or IAS for in-field mock-up testing, performance standards, and assembly tests listed in the "PERFORMANCE REQUIREMENTS and 2.3 CLOSED CELL SPRAY FOAM AIR BARRIER SYSTEM" article in Part 2.
  1. PRE-INSTALLATION CONFERENCE
     1. Convene a conference approximately two weeks before scheduled commencement of the Work. Attendees shall include Architect, Contractor and trades involved. Agenda shall include schedule, responsibilities, critical path items and approvals.
  2. DELIVERY, STORAGE, AND HANDLING
     1. Provide materials packaged in the manufacturer's original, tightly sealed containers or unopened packages, clearly labeled with the manufacturer's name, product identification, safety information, and batch or lot numbers where appropriate. Where materials are covered by a referenced specification, the labels shall bear the specification number, type, and class, as applicable.
     2. Comply with the manufacturer's written instructions for the storage, handling, and protection of products, both prior to and during installation.
     3. Store materials in their original undamaged packages in a clean, dry, protected location out of the weather and out of direct sunlight in locations where the temperatures are within the limits specified by the manufacturer.
     4. Remove empty containers, excess materials, and debris from site as soon as possible for recycling or disposal in accordance with applicable local, state, and federal regulations.

\*\* NOTE TO SPECIFIER \*\* Select first option in paragraph below for Division 01 reference, or second option for basic regulatory requirements.

* + - 1. Follow recycling and disposal requirements specified in appropriate Division 01 Specifications.
      2. Follow applicable regulatory requirements for recycling and disposal of waste materials.
  1. PROJECT CONDITIONS
     1. Maintain environmental conditions (temperature, humidity, and ventilation) within limits recommended by manufacturer for optimum results. Do not install products under environmental conditions outside manufacturer's recommended limits.
  2. WARRANTY
     1. Manufacturer's standard 3 year limited warranty from Date of Substantial Completion unless indicated otherwise.

\*\* NOTE TO SPECIFIER \*\* Verify with Owner's counsel that warranties stated in this Article are not less than remedies available to Owner under prevailing local laws. Delete the remaining paragraphs if insulation air barrier, Waltite LWP Spray Foam is not required.

* + 1. General: The Contractor shall warrant the sprayed foam air barrier to be free of defects in accordance with the General Conditions. This warranty shall be extended by the following manufacturer and installer warranties:
       1. Material Warranty: Provide manufacturer's warranty indicating the sprayed foam air barrier will be free of defects in materials.
          1. Warranty Period: 3 years from Date of Substantial Completion of spray foam air barrier installation.
       2. Installation Warranty: Provide installer's warranty that the sprayed foam air barrier installation is free of defects in workmanship, including all components of the sprayed foam air barrier manufacturer's air barrier assembly.

1. PRODUCTS
   1. MANUFACTURERS
      1. Acceptable Manufacturer: BASF Corporation - Spray Foam, which is located at:1703 Crosspoint Ave.Houston, TX 77054Toll Free Tel: 888-900-FOAMFax: 713-383-4590Email: [request info (SPF.TECHSALES@BASF.COM)](https://arcat.com/rfi?action=email&company=BASF%252BCorporation%252B-%252BSpray%252BFoam&message=RE%253A%2520Spec%2520Question%2520(07219bsf)%253A%2520&coid=43296&spec=07219bsf&rep=&fax=713-383-4590);Web: <https://spf.basf.com>

\*\* NOTE TO SPECIFIER \*\* Delete one of the following two paragraphs; coordinate with requirements of Division 1 section on product options and substitutions.

* + 1. Substitutions: Not permitted.
    2. Requests for substitutions will be considered in accordance with provisions of Section 01 60 00 - Product Requirements.

\*\* NOTE TO SPECIFIER \*\* Delete article not required.

* 1. SPRAY POLYURETHANE FOAM INSULATION (SPRAYTITE)

\*\* NOTE TO SPECIFIER \*\* Most published data is run on laboratory produced samples, not in-place material. The thickness of polyurethane foam sprayed, number of passes, temperature of substrate, ambient temperatures, etc., all affect properties. The following values are for BASF's product in-place.

* + 1. Foam: BASF Corporation SPRAYTITE (178, 81206, SP) Series Insulation; sprayed-in-place two-component closed-cell polyurethane foam system utilizing an EPA-approved, zero ozone depleting blowing agent. SPRAYTITE foam products are designed for use in in residential and common commercial insulation applications, made by combining an isocyanate (A) component with a polyol (B) component, with the following physical characteristics:
       1. ASTM C1029 - Type II Compliant.
       2. Density in Place: 2.0 to 2.3 lbs per cu ft (32.04 to 36.84 kg per cu m), when tested in accordance with ASTM D1622.
       3. Compressive Strength: 20 to 25 psi (138 to 172 kPa), when tested in accordance with ASTM D1621.
       4. Closed Cell Content: Greater than 90 percent, when tested in accordance with ASTM D6226.
       5. R-Value: 6.7 per 1 inch (25 mm), when tested in accordance with ASTM C518.
       6. Vapor Permeance: 1.39 Perms at 1 inch (25 mm) thickness, when tested in accordance with ASTM E96. Note, if SPRAYTITE SP, permeance is 1.09 at 1 inch (25 mm) thickness.

\*\* NOTE TO SPECIFIER \*\* From a fire safety standpoint, polyurethane foams can be used safely. It is important, however, that all persons associated with the design, fabrication, storage, and installation understand the materials and environments involved. Polyurethane foam insulation is combustible and should be treated as such. Flame spread ratings provided for polyurethane products using small scale tests are not intended to reflect the hazards presented by this or any other materials under actual fire conditions. Care must be taken to ensure that the foam is not exposed to heat or flame. See product specific technical data sheets for additional physical data [www.spf.basf.com/technical\_data.php](http://www.spf.basf.com/technical_data.php)

* + - 1. Flame Spread Index per ASTM E84: Less than or equal to 25.
      2. Smoke Developed Index per ASTM E84: Less than or equal to 450.
      3. Air Leakage per ASTM E283: Less than 0.005 L per sec per sq m at 75 Pa.

\*\* NOTE TO SPECIFIER \*\* A thermal barrier (fire resistive) is normally required over polyurethane foam exposed on the interior of the building. Typically, the minimum thermal barrier is a material that constitutes 15 minutes of fire protection for the foam. Materials that have been used include sprayed cementitious or fiber material (such as fireproofing) and gypsum board.

* + 1. Thermal Barrier: Gypsum Board or Intumescent Coating or Sprayed-in-place cementitious materials or Sprayed-in-place cellulose fiber, applied to achieve fire resistance rating of 15 minutes over spray polyurethane foam in accordance with NFPA 275 or NFPA 286 or UL 1715.

\*\* NOTE TO SPECIFIER \*\* Delete primers if not required.

* + 1. Primers: - Primer to be applied must be selected for the given substrate to be primed and must be compatible with the spray polyurethane foam.
       1. Wood: Chlorinated rubber, modified alkyds, others.
       2. Steel: Modified alkyds, epoxy, acrylics, others (typically including rust inhibitors).
       3. Galvanized: Vinyl copolymer acrylic, "vinyl wash primer," modified alkyds, others.
       4. Concrete/masonry: Chlorinated rubber, vinyl copolymer acrylic, asphaltic, other.
    2. Fire Resistant assemblies available, tested in accordance with UL 263.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. SPRAY POLYURETHANE FOAM INSULATION (ENERTITE)

\*\* NOTE TO SPECIFIER \*\* Most published data is run on laboratory produced samples, not in-place material. The thickness of polyurethane foam sprayed, number of passes, temperature of substrate, ambient temperatures, etc., all affect properties. The following values are for BASF's product in-place.

* + 1. Foam: BASF Corporation ENERTITE G Insulation; sprayed-in-place two-component open-cell polyurethane foam system. ENERTITE G foam products are designed for use in in residential and common commercial insulation applications, made by combining an isocyanate (A) component with a polyol (B) component, with the following physical characteristics:
       1. Density in Place per ASTM D1622: 0.5 to 0.6 lbs per cu ft (8.01 to 9.61 kg per cu ft), when tested.
       2. Open Cell Content per ASTM D6226: Greater than 90 percent.
       3. R-Value per ASTM C518: 3.9 per 1 inch (25 mm).
       4. Vapor Permeance: 16.9 Perms at 5.5 inches (140) thickness, when tested in accordance with ASTM E96.

\*\* NOTE TO SPECIFIER \*\* From a fire safety standpoint, polyurethane foams can be used safely. It is important, however, that all persons associated with the design, fabrication, storage, and installation understand the materials and environments involved. Polyurethane foam insulation is combustible and should be treated as such. Flame spread ratings provided for polyurethane products using small scale tests are not intended to reflect the hazards presented by this or any other materials under actual fire conditions. Care must be taken to ensure that the foam is not exposed to heat or flame. See product specific technical data sheet for additional physical data http:/www.spf.basf.com/technical\_data.php

* + - 1. Flame Spread Index per ASTM E84: Less than or equal to 25.
      2. Smoke Developed Index per ASTM E84: Less than or equal to 450.
      3. Air Leakage per ASTM E283: Less than 0.04 cfm per 1.57 lbs per sq ft (0.02 L per sec per sq m at 75 Pa).

\*\* NOTE TO SPECIFIER \*\* A thermal barrier (fire resistive) is normally required over polyurethane foam exposed on the interior of the building. Typically, the minimum thermal barrier is a material that constitutes 15 minutes of fire protection for the foam. Materials that have been used include sprayed cementitious or fiber material (such as fireproofing) and gypsum board.

* + 1. Thermal Barrier per with NFPA 275 or NFPA 286 or UL 1715: Gypsum Board or Intumescent Coating or Sprayed-in-place cementitious materials or Sprayed-in-place cellulose fiber, applied to achieve fire resistance rating of 15 minutes over spray polyurethane foam.

\*\* NOTE TO SPECIFIER \*\* Delete primers if not required.

* + 1. Primers: - Primer to be applied must be selected for the given substrate to be primed and must be compatible with the spray polyurethane foam.
       1. Wood: Chlorinated rubber, modified alkyds, others.
       2. Steel: Modified alkyds, epoxy, acrylics, others (typically including rust inhibitors).
       3. Galvanized: Vinyl copolymer acrylic, "vinyl wash primer," modified alkyds, others.
       4. Concrete/masonry: Chlorinated rubber, vinyl copolymer acrylic, asphaltic, other.
    2. Fire Resistant assemblies available, tested in accordance with UL 263.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. SPRAY CLOSED CELL POLYURETHANE FOAM (CCSPF) INSULATING AIR BARRIER SYSTEM FOR EXTERIOR WALL ASSEMBLIES
     1. Performance Requirements:
        1. Air Permeance per ASTM E2357: Not to exceed 0.42 cfm per sq ft of surface area at 1.57 lbf per sq ft (0.2 L per s per sq m of surface area at 75 Pa).
        2. System Performance per ASTM 2357: Substantiate air barrier material used as or in a system assembly, has an air permeance not exceeding 0.42 cfm per sq ft of surface area at 1.57 lbf/sq. ft. (0.2 L per s per sq m of surface area at 75 Pa).

\*\* NOTE TO SPECIFIER \*\* Review the following paragraph as it may not apply if your wall assembly is not required to be a fire-resistant assembly.

* + - 1. Wall Assembly:
         1. Exterior Wall Assembly: Comply with NFPA 285.
         2. Wall must have a potential heat of 1961 BTU per sq ft (22.3 MJ per sq m) or less, per inch (25 mm) of thickness when tested in accordance with NFPA 259.
         3. Fire Resistant Assemblies: If a fire-resistance rating is required for the wall assembly, then the wall must be tested in accordance with ASTM E 119 or UL 263 or have substantiation in the form of an Engineering Judgment based on results from tested assemblies.
      2. Connections to Adjacent Materials and Assemblies: Provide connections to prevent air leakage at the following locations:
         1. Foundation and walls, including penetrations, ties, and anchors.
         2. Wall and building fenestrations e.g., doors, storefronts, windows, curtain walls, and louvers.
         3. Dissimilar wall assemblies and fixed openings within those assemblies.
         4. Wall and roof connections.
         5. Floors over unconditioned space.
         6. Walls, floor and roof across construction, control, and expansion joints.
         7. Utility, pipe, and duct penetrations.
         8. Seismic and expansion and control joints.
         9. Leakage pathways in the building envelope.
    1. Closed Cell Spray Polyurethane Foam Air Barrier System:
       1. Foam: Walltite LWP at manufactured by BASF. Comply with ASTM C1029, Type II. Low global warming potential spray foam air barrier system.
          1. Properties:

Density pr ASTM D1622: Nominal 2.0 lbs per cu ft (32 kg per cu m).

Closed-cell Content per ASTM D6226: 90 percent minimum.

Design R-Values per ASTM C518: R 6.6 per 1 inch (25 mm) thickness. R 27 at 4 inches (102 mm) thick.

Flame Spread per ASTM E84: 25 or less.

Smoke Developed per ASTM E84: 450 or less.

Compressive Strength per ASTM D1621: 26 psi (0.18 MPa) minimum.

Tensile Strength per ASTM D1623 Type C: 62.4 psi (0.43 MPa) minimum.

Water Vapor Transmission per ASTM E96: 1.09 perm-inch (79.6 ng per Pa per sec de sq m at 25 mm) thick.

Blowing Agent: EPA approved, zero ozone-depleting, low global warming potential HFO blowing agent.

Fungi Resistance per ASTM C1338: Pass.

* + 1. Auxiliary Materials:
       1. Sealant at Transitions in Substrate and Connections to Adjacent Elements: One-component, high-performance, very low-modulus, high-movement, non-sag, fast-curing, hybrid sealant
       2. Transition Membrane: For use between spray polyurethane foam air barrier and roofing and other adjacent materials. Use to flash around building fenestrations, wall penetrations, and similar conditions, in accordance with local building codes.
          1. Comply with both general recommendations for air barriers and with air barrier material manufacturer's recommendations.
          2. For a list of compatible transition membranes please contact BASF Technical Dept. at 800-706-0712 x2, or spf.techsales@basf.com
       3. Foam Stop Angle: Metal or plastic angle used for foam stop.
          1. Metal: Cold rolled galvanized steel, aluminum, or stainless steel angle.
          2. Plastic: Extruded thermoplastic angle, 60 mils (1.52 mm) thick, "Jam-Ex" EXO-TEC Manufacturing, Inc.; or approved substitution.
       4. Primers: Air barrier manufacturer's recommended primers to enhance foam adhesion to certain substrates, including penetrating water-based epoxy primer/sealer, SKYTITE A-1601, or elastomeric acrylic primer, SKYTITE 1800.
       5. Portable SPF Application Units: Kit foam containers with closed cell SPF, Class 1, nominal 2 lbs per cu ft (907 grams per 0.028 cu m) density, for incidental use; one of the following:
          1. Touch n' Seal - DAP Products Inc.
          2. HandiFoam - ICP Building Solutions Group.
       6. One-Component Foams: Air barrier manufacturer's suggested one component product for use around windows and doors; one of the following:
          1. Touch n' Seal - DAP Products Inc.
          2. HandiFoam - ICP Building Solutions Group.
          3. Approved equivalent.

\*\* NOTE TO SPECIFIER \*\* Brick ties and their manufacturers shown below are examples of those which are acceptable to BASF for use with the specified sprayed foam air barrier system; do NOT specify in this Section of the Work.

* + - 1. Brick Ties: Ties should be compatible for use with Spray Polyurethane Foam applications. The following are examples of approved brick ties to be used with continuous SPF insulation:
         1. BL-407 - Blok-Lok, a Hohmann & Barnard Company.
         2. CTP-16 - Construction Tie Products.

1. EXECUTION
   1. GENERAL
      1. Comply with the instructions and recommendations of the foam and other material manufacturers.
      2. Familiarize all installers with correct and safe application and handling procedures:
         1. Workbook for High Pressure application of Spray Polyurethane Foam, June 2016. See www.spraypolyurethane.org for industry guidelines.
         2. Refer to appropriate Safety Data Sheets (SDS) and Technical Product Data Sheets for additional safety information http:/www.spf.basf.com/technical\_data.php.
         3. Installers must be able to provide documentation that they have completed the Spray Polyurethane Foam Chemical Health and Safety Training from the Center for Polyurethanes Industry, which can be found on the following website: www.spraypolyurethane.org.
   2. EXAMINATION
      1. Do not begin installation until substrates have been properly constructed and prepared.
      2. If substrate preparation is the responsibility of another installer, notify Architect in writing of unsatisfactory preparation before proceeding.
      3. Examine substrates, areas, and conditions under which the air barrier system will be installed, with installer present, for compliance with requirements.
         1. Verify surfaces and conditions are suitable prior to commencing Work. Notify Architect or designated representative in writing of anticipated problems using air barrier over substrate prior to proceeding. Do not proceed with installation until unsatisfactory conditions have been corrected.
         2. Verify concrete is visibly dry and has cured and aged for minimum time recommended in writing by concrete design engineer and producer.
            1. General contractor is responsible for ensuring the surface to receive spray foam is dry enough for proper foam adhesion.
         3. Ensure the Following Conditions are Met:
            1. Surfaces are sound, dry, even, and free of oil, grease, dirt, excess mortar, or other contaminants.
            2. Concrete surfaces are cured and dry, smooth without large voids, spalled areas, and sharp protrusions.
            3. Masonry surfaces are smooth or have been suitably prepared by others unless preparation is performed under this Section of the Work.
            4. Masonry joints are flush and filled with mortar, and excess mortar on masonry ties has been removed.
            5. Substrate areas meet requirements of transition membrane manufacturer.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. PREPARATION (SPRAYTITE and ENERTITE)

\*\* NOTE TO SPECIFIER \*\* Delete any preparation requirements below not relevant to this project; add others as required.

* + 1. Familiarize all installers with correct and safe application and handling procedures:
    2. Remove loose rust and unsound primer from shop-primed iron and steel surfaces by scraping or wire brushing.
    3. Primed Steel: If the surface is free of loose scale, rust, weathered or chalking paint, it can be cleaned using compressed air jet vacuum equipment and hand or power tools to remove loose dirt. Remove oil, grease, form release agents, laitance, and other contaminants using proper cleaning solutions.
    4. Previously Painted Steel: Clean using hand or power tools to remove loose scale and dirt. Remove oil, grease, form release agents, laitance, and other contaminants using proper cleaning solutions.
    5. Galvanized Steel and Unpainted Steel: Clean as recommended by primer manufacturer.
    6. Ferrous Metal: Sandblast iron and steel surfaces, which are not primed, shop painted, or otherwise protected in accordance with SSPC SP-6. Comply with the instructions and recommendations of the foam and other material manufacturers.
    7. Non-Ferrous Metal: Clean galvanized metal, aluminum, and stainless-steel surfaces as recommended by the manufacturer of materials to be applied.
    8. New Concrete: Allow to cure for 28 days prior to the application of primer or foam, and loose dirt and any other contaminants removed.
    9. Remove loose dirt, dust, and debris by using compressed air, vacuum equipment, or brooming. Remove oil, grease, form release agents, laitance, and other contaminants using proper cleaning solutions. Do not wash wood or porous materials with water.
    10. Grout, tape, or calk all joint openings that exceed 1/4 inch (6 mm) in width.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. PREPARATION (WALLTITE)
     1. Clean, prepare, and treat substrate in accordance with manufacturer's written instructions. Provide clean, dust-free, and dry substrate for air barrier application.
        1. Ensure that penetrating work is in place and clean-up by other trades is complete.
        2. Prepare surfaces by air blast, vacuum, brushing, scrubbing, scraping, or grinding to remove loose mortar, dust, oil, grease, oxidation, mill scale and other contaminants which will affect adhesion and integrity of the spray polyurethane foam.
        3. Metal: Wipe down metal surfaces to remove release agents and other non-compatible coatings, using clean sponges or rags soaked in a cleaning material compatible with the spray polyurethane foam. If necessary, prime metal to receive spray polyurethane foam to ensure adhesion.
        4. Ensure masonry veneer anchors are in place and compatible with the spray foam.
     2. Prime substrate for application of transition membrane strips as recommended by manufacturer and as follows:
        1. Prime masonry and concrete substrates with appropriate conditioning primers.
        2. Prime glass-mat-faced gypsum sheathing with an adequate number of coats to achieve required bond, and adequate drying time between coats.
        3. Prime wood, metal, and painted substrates.
        4. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and at protrusions. Provide termination bar and sealant if necessary.
        5. Read material safety data sheets, if applicable, for materials being installed and coordinate requirements with other trades.
        6. Discuss the spray areas and plans for safely protecting workers performing the application and keeping others out of that area during the application, spraying.
     3. Protect adjacent construction and materials from spray-applied materials as follows:
        1. Mask and cover adjacent areas to protect from over spray.
        2. Ensure that required foam stop or back-up material are in place to prevent over spray and achieve complete seal.
        3. Shut down and seal off existing ventilation equipment. Install temporary ducting and fans to ensure adequate ventilation of work area. Consult EPA's "Ventilation Guidance for Spray Polyurethane Foam Application" document available at the following link:
           1. http://www.epa.gov/dfe/pubs/projects/spf/ventilation-guidance.html.
        4. Additional guidance on ventilation can be found in the Spray Foam Coalition, of the Center for the Polyurethanes Industry, "Ventilation Considerations for Spray Polyurethane Foam" document available at the following link:
           1. http://polyurethane.americanchemistry.com/Spray-Foam-Coalition/Guidance-on-Ventilation-During-Installation-of-Interior-Applications-of-High-Pressure-SPF.pdf.
        5. Erect barriers, isolate and restrict access to work area and post warning signs to advise non protected personnel to avoid the spray area.
  2. INSTALLATION
     1. Foam and Thermal Barrier Application: (Spraytite, Enertite, and Walltite)

\*\* NOTE TO SPECIFIER \*\* Typical application of foam exists with a round pattern of material, applied 6 to 24 inch (152 to 610 mm) from the target surface. Smaller / tighter areas may need to be addressed with a single-component sealing foam. Specify in another section, as necessary.

* + - 1. Do not begin application of foam until all preparation requirements have been completed.
      2. Do not apply foam when the temperature is below that specified by the manufacturer for ambient air and substrate. Do not apply foam when temperature is within 5 degrees F (3 degrees C) of dew point.
      3. Apply foam in accordance with the BASF specifications and processing guidelines.
         1. Do not apply foam within 3 inches (76.20 mm) of heat-emitting devices such as light fixtures and chimneys.
      4. Apply foam to \_\_\_\_ inch (\_\_\_\_ mm) thickness,

\*\* NOTE TO SPECIFIER \*\* The following paragraph applies to Walltite LWP, Spraytite 178, and 81206. Delete if not required.

* + - * 1. Pass Thickness: 1/2 inch (13 mm) to 2 inches (50 mm).per pass.
        2. Pass thickness: Spraytite SP, 1/2 inch (12.7 mm) maximum thickness 4 inches (102 mm) per pass.
        3. Entertite: 1/2 inch (13 mm) to 6 inches (50 mm).

\*\* NOTE TO SPECIFIER \*\* The following paragraph applies to Enertite. Delete if not required.

* + - * 1. Allow cooling time of 5 minutes between passes.

\*\* NOTE TO SPECIFIER \*\* The following paragraph applies to Walltite LWP and Spraylite products. Delete if not required.

* + - 1. Allow cooling time of 10 minutes per inch applied between passes.
      2. Thermal Barrier:
         1. Cover interior surface of the spray polyurethane foam with a 15-minute rated thermal barrier (fire protection) as required by building codes, insurance, and industry standards.
         2. Certain areas such as sill plate/rim joists and attics/crawlspaces have specific exceptions per the building code. See Foam Plastics in your local building code for guidance.
         3. When required, apply thermal barrier in accordance with building code requirements and the manufacturer's specifications and instructions.
         4. As a standard, gypsum board meets this thermal barrier requirement for residential and commercial construction. See above for alternative materials.
         5. Apply thermal barrier over entire surface of foam in accordance with manufacturer guidelines.
         6. Allow thermal barrier to cure. Inspect for defects and repair defects prior to subsequent coats.
    1. Transition Membrane Installation: (Walltite)
       1. Transition Detail Strip Installation: Install transition strip materials including, but not limited to the air/water-resistive barrier and transition membrane material to provide continuity throughout the building envelope. Apply products in accordance with manufacturer's current application procedures and Project requirements.
       2. Transition Membrane:
          1. Install membrane and sealant in accordance with the Drawings and Specifications to form a seal with adjacent construction and maintain a continuous air/water-resistive barrier.

General Contractor:

Make provisions to coordinate the installation of air barrier with installation of roofing membrane and base flashing to ensure continuity of air barrier with roofing membrane.

Install strip on roofing membrane or base flashing. A minimum of 3 inches (75 mm) of coverage is required over both substrates.

* + - * 1. Primer and Self-Adhering Membrane Flashing:

Primer: Apply primer to substrates scheduled to receive transitions membranes and at required amount. Limit priming to areas to be covered with transition membrane on the same day. Re-prime areas exposed for more than 24 hours or as directed by manufacturer.

Membrane: Apply transition membrane as soon as possible after primer is dry and tacky. Using a weighted hand roller, firmly roll the transition membrane to the area being sealed.

Spray Foam Over Membrane: Application of spray foam over the transition membrane must be done following manufacturer's written application guidelines. Consult BASF Technical Dept. for additional information at 800-706-0712 x2, or at spf.techsales@basf.com.

* + - * 1. General Contractor:

Make provisions to connect and seal exterior wall air/water-resistive barrier membrane continuously to roofing membrane, concrete below-grade structures, floor-to floor construction, exterior door framing, storefront systems, glazed curtain wall systems, window systems, louvers, and other construction interfaces used in exterior walls, using accessory materials.

Apply joint sealants forming part of air/water-resistive barrier assembly within sealant manufacturer's recommended application procedures.

Fill gaps in perimeter frame surfaces of exterior door framing, storefront systems, glazed curtain wall systems, window systems, louvers, and miscellaneous penetrations of air/water-resistive barrier membrane with foam sealant.

* + - * 1. Flashing Membranes:

Primer: Apply primer to perimeter frame surfaces of exterior door framing, storefront systems, glazed curtain wall systems, window systems, louvers, and other construction interfaces used in exterior walls.

Apply transition membrane strip. A minimum of 3 inches (75 mm) of coverage is required over both.

* + - * 1. Repair: Repair punctures, voids, and deficient lapped seams in strips and transition strips. Slit and flatten fish mouths and blisters. Patch with transition strips extending 6 inches (150 mm) beyond repaired areas in strip direction.
      1. Install materials in accordance with BASF recommendations, and the following:
         1. Seal around penetrations with termination mastic, approved sealant, membrane counter flashing or other procedure in accordance with manufacturer's recommendations.
         2. Connect air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to exterior doors, storefront, curtain wall, windows, louvers, and other intersection conditions, and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.
         3. At changes in substrate plane, provide transition material (bead of polyurethane sealant, mastic, membrane counter flashing or other material recommended by manufacturer) under membrane to eliminate sharp 90-degree inside corners and to make a smooth transition from one plane to another.
         4. Provide mechanically fastened noncorrosive metal sheet to span gaps in substrate plane and to make a smooth transition from one plane to the other. Ensure substrate continuously supports membrane.
         5. At through-wall flashings, seal exposed top edge of strip with bead of mastic or approved sealant as recommended by manufacturer.
         6. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
         7. At expansion and seismic joints provide transition to the joint assemblies.
         8. Apply a bead of approved sealant or trowel coat of mastic along membrane seams at reverse-lapped seams, rough cuts, and as recommended by the manufacturer.
         9. At end of each working day, seal top edge of membrane to substrate with termination mastic or approved sealant.
         10. Do not allow materials to contact chemically incompatible materials.
         11. Do not expose membrane to sunlight longer than 180 days.
    1. Sprayed Foam Air Barrier System Application (Walltite)
       1. Spray-apply polyurethane foam materials in accordance with manufacturer's recommendations.
          1. Health and Safety: Follow industry health and safety practices as outlined on www.spraypolyurethane.org
          2. Equipment: Use equipment to spray polyurethane foam complying with the manufacturer's recommendations for the specific type of application.

Record equipment settings on the Daily Work Record in accordance with the ABAA Quality Assurance Program.

Each proportioner unit shall supply only one spray gun.

* + - * 1. Ambient Conditions: Apply only when surfaces and environmental conditions are within limits prescribed by the material manufacturer.
        2. Install the spray foam using a "picture frame technique" against studs or brackets. Use a "flash coat" of Walltite LWP installed over low melting asphalt or plastic based materials to avoid high exotherm temperatures. Allow the foam to cool down to the recommended temperature before adding successive lifts per design requirements.
        3. Apply in consecutive passes as recommended by manufacturer to thickness as indicated on Drawings, but not less than 1/2 inch (13 mm) unless feathering for tying into existing installed SPF, and not greater than 2 inches (51 mm). Perform detail work/thickness in accordance with manufacturer's recommendations.
        4. When applying to flexible plastic flashings and self-adhering flashings and membranes, the first application of SPF should be a flash coat of material.
        5. Install to specified thickness tolerances, but not more than plus 1/2 inch (13 mm) if it does not occlude the air cavity. Consideration must be given to designed air space; verify tolerances with design professional.
        6. Do not install spray polyurethane foam within 3 inches (76.20 mm) of heat-emitting devices such as light fixtures and chimneys.
        7. Finished surface of foam insulation shall be free of voids.
        8. Remove masking materials and overspray from adjacent areas as soon as reasonable. Ensure cleaning methods do not damage work performed by others.
        9. Trim excess thicknesses that would interfere with the application of cladding/covering system by other trades.
        10. Clean and restore surfaces soiled by work of this Section. Consult with manufacturers of the work soiled before cleaning to ensure methods used will not damage the work.
        11. Complete connections to other components and repair gaps, holes and other damage using material as recommended by the manufacturer.
        12. Use care to avoid installations that result in non-restrained edges of the SPF when applied over other construction materials that are not permanently and firmly bonded to the substrate, especially at openings.

\*\* NOTE TO SPECIFIER \*\* Delete article of not required.

* 1. FIELD QUALITY CONTROL (SPRAYTITE and ENERTITE)
     1. Field Inspection: Coordinate field inspection in accordance with appropriate sections in Division 01.

\*\* NOTE TO SPECIFIER \*\* Include if manufacturer provides field quality control with onsite personnel for instruction or supervision of product installation, application, erection, or construction. Delete if not required.

* + 1. Manufacturer's Services: Coordinate manufacturer's services in accordance with appropriate sections in Division 01.
    2. The installer shall complete the installation certificate documenting the foam type, manufacturer, product name, lot/batch number, as well as any fire protective products that have been used. The installation card shall be signed by the Insulation Contractor representative and delivered to the general contractor or building owner.

\*\* NOTE TO SPECIFIER \*\* Delete article if not required.

* 1. FIELD QUALITY CONTROL (Walltite)
     1. Field Quality Assurance: Implement the ABAA Quality Assurance Program requirements. Cooperate with ABAA auditors and independent testing and inspection agencies engaged by the Owner. Do not cover air barrier until it has been inspected, tested, and accepted.
     2. Installer Self-Inspection: Conduct daily inspections and record the results of these inspections on a Daily Work Record in accordance with the ABAA Quality Assurance Program. Make Daily Work Records available for review upon request.
     3. Owner's Inspection and Testing: Cooperate with Owner's testing agency, if utilized. Allow access to work areas and staging. Notify Owner's testing agency in writing, of schedule for Work of this Section to allow sufficient time for testing and inspection. Daily inspection and testing may be required. Do not cover Work of this Section until testing and inspection is accepted.
     4. ABAA Site Inspections: Arrange and pay for site audits by ABAA to verify conformance with the manufacturer's instructions, the ABAA Quality Assurance Program, and this Section of the Project Specifications.
        1. Perform audits in accordance with ABAA protocol. Forward written inspection reports to the Architect within 3 working days of the receipt of the audit report.
        2. If the inspections reveal defects, promptly remove, and replace defective work at no additional expense to the Owner.
  2. CLEANING AND PROTECTION
     1. Protect Installations from damage during application and remainder of construction period, in accordance with manufacturer's written instructions.

\*\* NOTE TO SPECIFIER \*\* the following paragraph refers to Walltite. Delete it not required.

* + - 1. Coordinate with installers and installation of materials which cover the SPF air barrier system, to ensure exposure period does not exceed that recommended by the air barrier manufacturer.
    1. Clean spillage and soiling from adjacent construction using cleaning agents and procedures recommended by manufacturer of affected construction and acceptable to the primary material manufacturer of the affected material.

END OF SECTION