

## *Application Specification:*

**GacoProFill FR6500R  
Half Pound Open Cell Foam  
April 2015**

**Division: 07 21 19  
GacoProFill FR6500R Open-Cell  
Spray Polyurethane Foam Insulation  
GUIDE SPECIFICATION**

### **PART 1 – GENERAL**

This guide specification discusses the application of GacoProFill FR6500R, a .5 pound, open cell spray polyurethane foam for use in a variety of empty cavities in retrofit applications in residential and commercial buildings and as part of the GacoProFill SYSTEM for use in new construction. This guide specification is intended as a starting point for professionals to develop more complete specifications. Each project should be assessed on an individual basis.

#### **1.01 SCOPE OF WORK**

Furnish all labor, materials, tools and equipment necessary for the application of Gaco Western's polyurethane foam. This includes accessory items subject to the general provisions of the contract.

#### **1.02 RELATED SECTIONS**

- A. Unit Masonry Division 6 Section 042000
- B. Metal Decking Division 5 Section 053100
- C. Rough Carpentry Division 6 Section 061000
- D. Thermal Insulation, Other Division 7 Section 072100
- E. Foamed-In-Place Division 7 Section 072119
- F. Waterproofing Division 7 Section 071400
- G. Weather Barriers Division 7 Section 072500
- H. Fireproofing Division 7 Section 078100
- I. Metal Support System Division 9 Section 09110
- J. Gypsum Board Division 9 Section 09250

#### **1.03 References**

1. ASTM- E-84 Standard Test Method for Surface Burning Characteristics of Building Materials
2. ASTM- C518 Standard Test Method for Steady-State Thermal Transmission Properties
3. ASTM- E283 Standard Test Method for Determining Rate of Air Leakage
4. ASTM- D1622 Standard Test Method for Apparent Density of Rigid Cellular Plastics
5. ASTM- D1623 Standard Test Method for Tensile and Tensile Adhesion Properties of Rigid Cellular Plastics
6. ASTM- D2126 Standard Test Method for Response of Rigid Cellular Plastics to Thermal and Humid Aging
7. ASTM- E96 Standard Test Methods for Water Vapor Transmission of Materials
8. ASTM- 2856 Standard Test Method for Open Cell Content of Rigid Cellular Plastics
9. ASTM- G21 Standard Test Method for Fungus Resistance

## 1.04 PERFORMANCE REQUIREMENTS

- A. Material Performance: Provide materials which have an air permeance not to exceed 0.012 cubic feet per minute per square foot under a pressure differential of 0.35 in. water when tested according to ASTM E 283.
- B. Connections to Adjacent Materials: Provide connections to prevent air leakage migration at the following locations:
  - 1. Foundation and walls, including penetrations, ties and anchors.
  - 2. Walls, windows, curtain walls, storefronts, louvers or doors.
  - 3. Different 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. Walls, floors and roof to utility, pipe and duct penetrations.
  - 8. Seismic and expansion joints.
  - 9. All other leakage pathways in the building envelope.

## 1.05 QUALITY ASSURANCE

All work is to be performed by applicators skilled in the application of Gaco Western polyurethane foam systems. Applicators shall have completed 5 similar projects over the last 5 years and shall provide a list of these projects to the owner or owner's representative upon request.

## 1.05 SUBMITTALS

### 1.1 A. SUBMITTALS

- A. Submittals: Submit in accordance with Division 1 requirements.
- B. Quality Assurance Program: All work is to be performed by contractors certified by Gaco Western and meet the Gaco Western applicator requirements.
  - 1) A member of the company must register for the SPFA PCP and pass the Assistant, Installer and Master Installer SPFA PCP written exams.
  - 2) The company's installation techniques and experience must be approved by a member of the GacoWallFoam Technical Service team.
  - 3) All Installers and Assistants must pass the free CPI On-line Health and Safety course.
- C. Product Data: Submit material Manufacturer's Product Data, material manufacturer's instructions for evaluating, preparing, and treating substrate, temperature and other limitations of installation conditions, Technical Data, and tested physical and performance properties.
  - 1. Submit letter from primary air barrier material manufacturer indicating approval of materials that are proposed to be used that are not currently listed in the accessories section of this specification for that manufacturer's material.
  - 2. Include statement from the primary air barrier material manufacturer that the materials used in their air barrier assembly which will be used to adhere to the underlying substrate are chemically compatible to the substrate material.
  - 3. Samples: Submit clearly labeled samples, three (3) inch by four (4) inch [75 mm by 100 mm] minimum size of each material specified.
- D. Shop Drawings of Mock-Up: Submit Shop Drawings of proposed mock-ups showing plans, elevations, large-scale details, and air barrier transitions and terminations.
- E. Field Test Results of Mock-Up: Submit test results of air leakage test and water leakage test of mock-up in accordance with specified standards, including retesting if initial results are not satisfactory.

- F. Shop Drawings: Submit Shop Drawings showing locations and details of all typical conditions, intersections with other envelope assemblies and materials, membrane counter-flashings, and details showing how gaps in the construction will be bridged, how inside and outside corners are negotiated, how materials that cover the materials are secured with air-tight condition maintained, and how miscellaneous penetrations such as conduits, pipes, electric boxes and similar items are sealed.
  - 1. Include VOC content of each material, and applicable legal limit in the jurisdiction of the project.
  - 2. Include statement that materials are compatible with adjacent materials proposed for use.
- G. Compatibility: Submit letter from primary material manufacturer stating that materials proposed for use are permanently chemically compatible and adhesively compatible with adjacent materials proposed for use. Submit letter from material manufacturer stating that cleaning materials used during installation are chemically compatible with adjacent materials proposed for use.
- H. Accredited Laboratory Testing for Materials: Laboratory accredited by International Accreditation Service Inc. (IAS), American Association for Laboratory Accreditation (A2LA), or the Standards Council of Canada (SCC).
- I. VOC Regulations: Provide products which comply with applicable regulations controlling the use of volatile organic compounds.
- J. Preconstruction Meeting: Convene a minimum of two weeks prior to commencing Work of this Section. Agenda shall include, at a minimum, construction and testing of mock-up, sequence of construction, coordination with substrate preparation, air barrier materials approved for use, compatibility of materials, coordination with installation of adjacent and covering materials, and details of construction and chemical/fire safety plans. Attendance is required by representatives of related trades including covering materials, substrate materials and adjacent materials.

#### **1.07 MATERIALS, DELIVERY AND STORAGE**

- A. Materials shall be delivered in the manufacturers original, tightly sealed containers or unopened packages clearly labeled with the manufacturer's name, product identification, safety information, approvals, and lot numbers where applicable.
- B. Containers shall be stored out of the weather and away from direct sunlight in a cool dry place at temperatures between 50 and 70 degrees F within the limits specified by the materials manufacturer.
- C. All materials shall be stored in compliance with local fire and safety codes.

#### **1.08 ENVIRONMENTAL CONDITIONS**

- A. 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 absolute limits. Do not install spray polyurethane foam before the roof assembly has been sufficiently installed to prevent an accumulation of water in the interior of the building.
- B. Do not apply the polyurethane foam when substrate or ambient air temperatures are below 40 degrees F (4.4 degrees C)
- C. Or above 120 degrees F (49 degrees C) and relative humidity is greater than 85 percent unless advance means and methods are recommended by the manufacturer.
- D. Do not apply polyurethane foam when wind velocity exceeds 15 miles per hour unless advance means and methods are recommended by the manufacturer. Use precautions to prevent damage to adjacent areas from fugitive overspray.

## 1.09 SEQUENCE OF SCHEDULING

In new construction projects, Gaco Western sprayed in place insulation system is installed when the primary structure of the walls and roof are in place to prevent the accumulation of water in the interior of the building and in coordination with other building trades.

## 1.10 SAFETY REQUIREMENTS

1. All non-essential personnel are restricted from access to the area where the Gaco Western Sprayed in place Insulation is applied.
2. Fire extinguishers shall be provided in the spray foam equipment area and the area where the spraying is being performed.
3. Review MSDSs with spray foam personnel and be familiar with chemicals and their hazards.
4. Post warning signs at all work area entrances to restrict entry by unauthorized personnel.
5. There shall be no welding or open flame within 100 feet of sprayer.
6. Attention should be paid to ground equipment to prevent sparking.
7. Seal off work area from adjacent rooms and ventilation ducts.
8. Restrict access of non-application personnel including other trades using caution tape.
9. All personnel involved with spraying shall wash hands thoroughly before eating or drinking.
10. Do not eat, drink, or smoke in work area.
11. Use engineering controls to ventilate the area if possible.
12. Wear Personal Protective Equipment (PPE) for breathing, body, exposed skin and eye protection during application.
13. Ventilation shall be provided in confined areas as needed for 24 hours minimum after the spraying has been completed.
14. Contact Gaco Western for guidance on ventilation time and re-occupancy for the formulation you are using.
15. Be aware of general safety regulations and recommendations when working around Electric, Hydraulic, Pneumatic and combustion equipment such as portable generators.
16. Apply Thermal Barriers and Vapor Retarders (if required) in accordance with local building code requirements.

## PART 2 – PRODUCTS

### 2.01 Spray Polyurethane Manufacturer

- A. Acceptable Manufacturer: Gaco Western LLC, which is located 1245 Chapman Drive, Waukesha WI, 53186
- B. Substitution not permitted without approval
- C. Requests for substitutions will be considered in accordance with provisions of section 016000.

### 2.02 POLYURETHANE FOAM

A. The GacoProFill FR6500R sprayed in place insulation shall be a two component system made by combining an isocyanate (A) component with a polyol (B) component and shall possess the following typical physical properties:

B. GacoProFill FR6500R Physical Properties

- a. Core Density (ASTM D1622) .55 lb/ft<sup>3</sup>
- b. Thermal Resistance (ASTM C518) R-4.04 at 1” ; R-15.5 at 3.93”  
R-13.8 at 3.5” (R-3.93/in at >3.5”)
- c. Air Permeance @75Pa (ASTM E283) 0.012 at 3.5” L/sM<sup>2</sup>
- d. Water Vapor Transmission (ASTM E96-Method A) 14 Perm-inch
- e. Open Cell Content (ASTM D2856): 92%
- f. Bio-Based Content (ASTM D6866) 8.9%

C. Fire Performance Testing

- a. Surface Burning Characteristics (ASTM E84):  
Flame Spread Index 25  
Smoke Developed Index 400

D. Indoor Air Quality: GREENGUARD Gold Certified (29167-410, 29167-420) This program demands strict certification criteria and considers safety factors to account for sensitive individuals (such as children and the elderly), and ensures that a product is acceptable for use in environments such as schools and healthcare facilities.

E. Fire Safety Requirements: See API Bulletin AX-119, “MDI - Based Polyurethane Foam Systems: “Guidelines for Safe Handling and Disposal.”

### 2.03 RELATED PRODUCTS

A. Single Component Polyurethane Foam Sealants and caulks for use around windows, doors, etc. shall be as approved by Gaco Western. Transitional membranes in solid and liquid form shall be approved by Gaco Western.

## **PART 3 – EXECUTION**

### **3.01 APPLICATION OF PRODUCTS**

The products intended for use in the building envelope insulation system must be applied within the manufacturer's guidelines for temperature, humidity and other atmospheric conditions. In addition, they must be sequenced so as to take into consideration substrate preparation, proper cure times and inter-pass adhesion.

- A. GacoProFill FR6500R foam plastic insulation is intended for installation in walls, ceiling and floors. The insulation must be separated from living spaces by ½" gypsum board or approved thermal barrier.
- B. GacoProFill FR6500R is approved for installation on attic floors without a protective coating or ignition barrier based on testing in accordance with NFPA 970
- C. GacoProFill FR6500R is approved for contact with ducts in accordance with 2012 IRC Section M1601.3 based on test ASTM C411.
- D. GacoProFill FR6500R may be used to insulate open cells in concrete masonry units where the application is not exposed to bulk water or high moisture conditions.

### **3.02 Examination**

The spray foam contractor shall examine substrates, areas, and conditions under which the air barrier assembly will be installed, with General Contractor, for compliance with the following requirements.

- A. Confirm site access logistics and scheduling requirements, including but not limited to use of scaffolding, lifts and staging.
- B. At the end of each working day the General Contractor shall provide weather protection at the top of parapet walls and non finished roofs to prevent moisture migration into walls and damage to installed air barrier systems.
- C. Verify that surfaces and conditions are suitable prior to commencing work of this section. Do not proceed with installation until unsatisfactory conditions have been corrected.
- D. Ensure that the following conditions are met:
  - a. Surfaces are sound, dry, even, and free of excess mortar or other contaminants.
  - b. Inspect substrates to be smooth without large voids or sharp protrusions. Inform General Contractor if substrates are not acceptable and need to be repaired by the concrete sub-trade.
  - c. Inspect masonry joints to be reasonably flush and completely filled, and ensure all excess mortar sitting on masonry ties has been removed. Inform General Contractor if masonry joints are not acceptable and need to be repaired by the mason sub-trade. Verify substrate is visibly dry and free of moisture. Test for capillary moisture by plastic sheet method according to ASTM D4263 and take suitable measures until substrate passes moisture test.
- E. Verify sealants are compatible with the proposed for use. Perform field peel-adhesion test on materials to which sealants are adhered.
- F. Notify Architect in writing of anticipated problems using closed cell, medium density spray

### **3.03 SURFACE PREPARATION**

- A. The spray foam contractor shall ensure the substrate is clean, dust-free, dry and prepared in accordance with the air barrier material manufacturer's written instructions. The General Contractor shall be notified if this is not the case.
  - a. Ensure that penetrating work by other trades is in place and complete.
  - b. Prepare surfaces by brushing, scrubbing, scraping, grinding or compressed air to remove loose mortar, dust, oil, grease, oxidation, mill scale, rust and other contaminants which will affect adhesion of the closed cell, medium density spray polyurethane foam.
  - c. Wipe down metal surfaces to remove release agents or other non-compatible coatings using clean sponges.

- d. Prime substrate for installation of sheet membrane transition strips if required by material manufacturer and as follows:
  - i. Prime masonry, concrete, glass-fiber surfaced gypsum sheathing, wood, metal, structural steel, sheet metal, and painted substrates with primers.
  - ii. Prepare, treat, and seal vertical and horizontal surfaces at terminations and penetrations through air barrier and protrusions.
- e. Protection from Spray Polyurethane Foam:
  - i. Mask and cover adjacent areas and materials that aren't being sprayed to protect from over-spray.
  - ii. Ensure any required foam stop or back up material are in place and complete to prevent over spray and achieve complete seal.
  - iii. Seal off existing ventilation equipment. Install temporary ducting and fans to ensure exhaust fumes are removed from the spray location to exterior of the building. Provide for make-up air.
  - iv. Erect barriers, isolate area and post warning signs to advise non-protected personnel to avoid the spray area.

**B. Substrate preparation for spray polyurethane foam:**

- 1. Wood
  - a. Wood and wood structural panels shall contain no more than 18% water.
  - b. Most untreated and unpainted wood surfaces need not be primed. Spray polyurethane foam can be applied directly to the dry wood. Priming may be required in certain cases. Contact Gaco Western for further information.
- 2. Steel
  - a. Primed: If the primed metal surface is free of scale, rust or oils it normally does not require priming. Remove loose dirt or contaminants by power washing prior to application of Gaco Western's polyurethane foam. Stainless Steel requires primer. Contact Gaco Western for recommendations.
  - b. Previously painted: Clean the painted metal surface using hand or power tools to remove loose scale and rust. Grease, oil and other surface contaminants can be cleaned using a power washer.
  - c. Galvanized: Galvanized metals shall be clean and free of oils. Galvanized metal does not typically require primer. Where required primers shall be as recommended by Gaco Western.
- 3. Concrete and Masonry:
  - a. Must be cured, dry, and loose dirt and any other contaminants, including asphaltic materials removed. Where required primers shall be as recommended by Gaco Western.
- 4. Gypsum and other sheathing.
  - a. Most sheathing do not require priming; where required, primers shall be as recommended by Gaco Western.

**3.04 EQUIPMENT**

Equipment shall be capable of maintaining 800-1200 psi of pressure or higher and maintaining a minimum of 130 degrees at the A, B and Hose heaters. Equipment shall be capable of maintaining 1:1 ratio of A and B components on a continuous basis. Equipment shall be Graco, Gusmer, GlasCraft, PMC or other approved types of pumps and proportioners. Additional equipment required would be Kit with staplers, membrane and pour tip attachments.

**3.05 STORAGE OF MATERIALS**

Materials shall be protected from freezing and should be stored in a controlled environment at a temperature of 50° - 100°F.

A and B chemical drum temperatures must be 60° - 80°F before and during spraying for the drum to be serviceable (ready to spray). Material temperatures below 60°F can result in proportioning errors and/or insufficient heat at the spray gun.

**3.06 INSTALLATION**

- A. Transition Strip Installation: Install air barrier accessories and spray polyurethane foam to provide continuity throughout the building envelope. Install materials in accordance with manufacturer's instructions and the following (unless manufacturer requires other procedures in writing based on project conditions or particular requirements of their recommended materials):
- a. Apply primer for transition membrane at rate recommended by material manufacturer. Allow primer to dry completely before membrane application. Apply as many coats as necessary for proper adhesion.
  - b. Position subsequent sheets of membrane applied above so that it overlaps the membrane sheet below by a minimum of 2.0 inches (50 mm), unless greater overlap is recommended by material manufacturer. Roll into place with roller ensuring all transition membranes are free of fish-mouths, wrinkles, de-laminations, bubbles and voids.
  - c. Overlap horizontally adjacent pieces of membrane a minimum of 2.0 inches (50 mm), unless greater overlap is recommended by material manufacturer. Roll all areas of membrane including seams with roller.
  - d. Seal around all penetrations with termination mastic, extruded silicone sealant, membrane counter-flashing or other procedure in accordance with material Manufacturer's recommendations.
  - e. Connect air barrier in exterior wall assembly continuously to the air barrier of the roof, to concrete below-grade structures, to windows, curtain wall, storefront, louvers, exterior doors and other intersection conditions and perform sealing of penetrations, using accessory materials and in accordance with the manufacturer's recommendations.
  - f. To bridge gaps >1/8" (3 mm) in wall construction at changes in substrate plane or changes in adjoining materials, provide transition membranes or other material recommended by spray polyurethane foam material manufacturer.
  - g. Provide transition membrane, sealant, mastic, membrane counter-flashing or other material recommended by spray polyurethane foam manufacturer at 90 degree inside or outside corners. Follow spray polyurethane foam manufacturer's instructions for instructions on how to treat interlocked CMU or structurally-attached 90 degree cast-in place concrete corners.
  - h. Provide mechanically fastened non-corrosive metal sheet to span gaps greater than 1.0 inch (25 mm) in substrate plane and to make a smooth transition from one plane to the other. Membrane shall be continuously supported by substrate.
  - i. At through-wall flashings, provide an additional 6.0 inch (150mm) wide strip of manufacturer's recommended membrane counter-flashing to seal top of through-wall flashing to membrane. Seal exposed top edge of strip with bead of mastic or as recommended by manufacturer.
  - j. At deflection and control joints, provide backup for the membrane to accommodate anticipated movement.
  - k. At expansion and seismic joints provide transition to the joint assemblies.
  - l. Apply a bead or trowel coat of mastic along membrane seams at reverse lapped seams, rough cuts, and as recommended by the manufacturer when membrane will be exposed to the elements.
  - m. At end of each working day, seal top edge of self-adhered membrane to substrate with termination mastic if exposed.
  - n. Do not allow materials to come in contact with chemically incompatible materials.
  - o. Do not expose membrane to sunlight longer than as recommended by the manufacturer.
  - p. Ensure that membranes at terminations have a pull adhesive of 16 psi or greater.
  - q. Inspect installation prior to enclosing assembly and repair damaged areas with closed cell, medium density spray polyurethane foam as recommended by manufacturer.
- B. Installation of Spray Polyurethane Foam: Install materials in accordance with manufacturer's instructions and the following:
1. The Installer(s) and those within the work area shall use proper personal protective equipment (PPE) during the installation of material in accordance with US Government regulation 29 CFR 1910.134.
  2. The Installer(s) shall follow all OSHA requirements when working on a job-site.
  3. Warning signs shall be displayed on each job site in the spray area warning of health and safety hazards for those personnel who do not comply with the personal protective equipment as required by Federal law.

4. Equipment used to spray polyurethane foam shall comply with the manufacturer's instructions for the specific type of application and type of material being sprayed. Record equipment settings on the Daily Job Site Report.
5. Apply only when surfaces and environmental conditions are within limits instructed by the material manufacturer.
6. Apply in consecutive passes as required by material manufacturer to thickness as indicated on drawings.
7. Do not install open cell, low density spray polyurethane foam within 3.0 inches (75 mm) of heat emitting devices such as light fixtures and chimneys.
8. Finished surface of foam insulation to be free of voids and embedded foreign objects.
9. Remove masking materials and over spray from adjacent areas immediately after foam surface has hardened. Ensure cleaning methods do not damage work performed by other sections.
10. Trim, as required, any excess thickness that would interfere with the application of cladding/covering system by other trades.
11. Clean and restore surfaces soiled or damaged by work of the section. Consult with section of work soiled before cleaning to ensure methods used will not damage the work.
12. Complete connections to other air barrier components and repair any gaps, holes or other damage using material in a manner approved by primary air barrier material manufacturer.

### **3.07 FIELD QUALITY CONTROL**

- A. Owner's Inspection and Testing: Cooperate with Owner's testing agency. 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. Do not cover Work of this Section until testing and inspection is accepted.

### **3.08 PROTECTING AND CLEANING**

- A. Protect air barrier materials from damage during installation and the remainder of the construction period, according to material manufacturer's written instructions.
  1. Coordinate with installation of materials which cover the air barrier assemblies, to ensure exposure period does not exceed that recommended by the air barrier material manufacturer.
- B. 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.

END OF SECTION