

**DIVISION 07 01 50.61:
GACOFLEX™ U91 & GACOFLEX U92 OVER
SEAMLESS SPRAYED-IN-PLACE POLYURETHANE FOAM ROOFING**

PART 1 – GENERAL
1.1 SUMMARY

This specification provides for a fire-resistant roof covering system which meets Class A, non-combustible deck requirements under ASTM E-108 Class “A”. Suitable substrates include concrete, gypsum board, metal, and certain heavy wood decks. For re-roofing over BUR or other roof coverings, including single-ply membranes and modified bitumen systems, application according to this specification will not alter the existing fire resistance rating. Surfaces to receive the roof covering system must comply with applicable building codes.

Sprayed-in-place polyurethane foam is applied at a desired thickness (1 in (25 mm) minimum)) to fulfill thermal insulation requirements and to provide seamless monolithic surface over a variety of roof designs, shapes and draining slopes.

When properly applied, the GacoFlex Roof Coating System provides a weatherproof seal that protects the polyurethane foam from degradation caused by ultraviolet light, water, and other normal weathering hazards. This application incorporates the optional application of granules. The thickness of the foam can be varied to provide a desired thickness to create a positive slope to the drain. The appearance of the system depends on the finished surface of the polyurethane foam which normally has slight undulations in thickness. Sprayed-in-place polyurethane foam mirrors the contour of the substrate and will reflect projections and depressions.

- A. The GacoFlex Roof Coating System discussed in this specification has a moderate rate of water vapor transmission. The GacoFlex Roof Coating System is not recommended for use on cold storage or cryogenic structures that may have constant high-water vapor drive causing long-term accumulation of moisture in the roofing system that serves as a substrate for the GacoFlex Roof Coating System. Contact Technical Services for recommendations.
- B. This specification is intended only as a guide for the development of a project specification. The suitability of this specification for a particular project must be determined by a qualified representative of the owner.

CONDITIONS TO CHECK AND CORRECTIONS TO CONSIDER ARE:

- The sprayed-in-place polyurethane foam roofing substrate must be well adhered and intact.
- The structural decking must be sound.

Elements of this specification may require modification in order to clearly delineate project requirements. Sections that are not pertinent may be deleted.

1.2 RELATED SECTIONS

A. Cast-In-Place Concrete:	Division 03 30 00	F. Vapor /Air Barriers:	Division 07 25 00
B. Flashing/Sheet Metal:	Division 07 60 00	G. Board Insulation:	Division 07 22 00
C. Roof Accessories:	Division 07 72 00	H. Skylights:	Division 08 60 00
D. Rough Carpentry/Wood Blocking:	Division 06 10 00	I. Metal Decking:	Division 05 30 00
E. Drains, Vents and Penetrations:	Division 07 72 00		

1.3 SUBMITTALS

- A. **PRODUCT DATA:**
Submit manufacturer's standard submittal package including specification, installation instructions and general information for each waterproofing material.
- B. **APPLICATOR QUALIFICATIONS:**
Submit current Letter of Good Standing from the specified waterproofing manufacturer.
- C. **SAMPLE:**
Two physical samples reflecting the completed installation, i.e., finish, color, must be submitted to the owner / owner's representative. Size of these samples shall be 12 in x 12 in (304.8 mm x 304.8 mm) minimum.
- D. **SUBSTRATE CONDITIONS:**
1. Applicator to present to owner a completed inspection form verifying substrate condition and any noted defects not specifically addressed in regard to the installation of the coating.
 2. Surface shall be free from loose dirt, stone, debris, moisture, and shall be in stable condition. Any work on the area to receive this application shall be completed prior to the installation of the coating.
 3. Applicator shall complete a substrate inspection prior to the start of the installation of the coating. The architect/owner and applicator shall accept the substrate. Start of the work constitutes acceptance.

1.4 QUALIFICATIONS

- A. Primary waterproofing materials shall be the products of a single manufacturer. Secondary materials shall be recommended by the primary manufacturer. The manufacturer shall have a minimum of ten (10) years' experience in the manufacture of materials of this type.
- B. Applicators shall have a minimum of five (5) years' experience in the application of waterproofing materials of the type specified. The Applicator shall possess a current Letter of Good Standing from the specified waterproofing manufacturer.
- C. **PRE-BID CONFERENCE:**
Ten (10) working days prior to the bid opening there is to be a mandatory Pre-Bid Conference. Those not attending the Pre-Bid Conference will not be allowed to bid the project. All products considered an equal to the specified product or any changes in the scope of work, installation, or specifications must be presented at the Pre-Bid Conference. If a change in the specifications is accepted, it will be considered as an alternate and will be presented as a bid addendum issued five (5) working days prior to the bid opening. No other changes to the specification or bid documents will be accepted.
- D. Materials other than those specified shall be submitted to the architect/owner for approval no later than ten (10) days prior to the bid date. In requesting prior approval, it shall be necessary to submit:
1. A letter of certification, signed by an officer of the manufacturer, stating that the alternate material is equal to or better than the specified product.
 2. Independent laboratory test data giving physical property values in comparison to the specified material
- E. **PRE-INSTALLATION CONFERENCE:**
Just prior to the commencement of the installation, meet at the jobsite with a representative of the coating manufacturer, Applicator, general contractor, architect, and other parties affected by this section. Review the methods and procedures, substrate conditions, scheduling, and safety.

1.5 DELIVERY, STORAGE AND HANDLING

- A. Deliver all materials in sufficient quantities as not to cause delays in the application of the roofing system. Owner/owner's representative shall reject damaged materials not conforming. Rejected materials shall be removed immediately from the job site and replaced at no additional cost to the owner.
- B. Store materials as recommended by the manufacturer and conforming to applicable safety regulatory agencies: town, state, and federal. Refer to all applicable data including, but not limited to Safety Data Sheets, Product Data Sheets, product labels, and specific instructions for personal protection.

- C. Provide adequate ventilation, protection from hazardous fumes, overspray potential to workers, and associated trades in close proximity of the application.

1.6 ENVIRONMENTAL REQUIREMENTS

- A. Proceed with the work of this section only when the existing and forecasted weather conditions will permit the application to be performed in accordance with the manufacturer's recommendations. **Do not** install polyurethane foam under the following conditions:
 1. When the surface temperature is below 50 °F (10 °C) or is above 160 °F (71 °C).
 2. When the relative humidity is above 80 % or temperature is within 5 °F (2.8 °C) of the dew point.
 3. When the wind velocity exceeds 15 mph (24 kph)
(Without the use of a wind screen)

1.7 WARRANTY

- A. Manufacturer warrants that the material supplied will meet or exceed physical properties as published. The Applicator guarantees that workmanship will be free of defects in coating application. Since performance of previously applied coatings is beyond the control of Manufacturer and Applicator, requests for additional warranty coverage shall be subject to prior approval by Manufacturer.
- B. **A TWENTY (20) YEAR LABOR AND MATERIAL WARRANTY MUST BE OBTAINED THROUGH THE MANUFACTURER.**
- C. **PROTECTION OF BUILDING AND OCCUPANTS:**
 1. All surfaces not to receive the coating specified shall be protected from overspray hazard, e.g., windows, doors, exterior surfaces and facades, parking lots, and vehicles. Protective coverings shall be secured against wind and shall be vented if used in conjunction with applications preventing collection and moisture.
 2. Applicator to post signs noting potential overspray hazard within 400 ft (121.90 m) of applications.
 3. All air intake ventilation equipment shall be turned off to prevent fumes from entering building.
 4. Surfaces damaged during application shall be restored at no expense to the owner.
 5. No smoking signs to be posted as mandated by local fire officials.
- D. **SUBSTRATE:**
Proceed with work as specified only after substrate construction, preparation, and detail work has been completed.
- E. **EQUIPMENT:**
All equipment used during operations shall be located so as not to adversely affect the daily operations or endanger occupants, structure, or materials on-site. All spray equipment must be grounded during operations.

PART 2 - PRODUCTS

2.1 MANUFACTURER

ACCEPTABLE MANUFACTURERS:

Gaco, www.gaco.com – Manufactured by Amrize Building Envelope LLC.
Other brands manufactured by Amrize Building Envelope LLC as noted.

2.2 MATERIALS

- A. **PRIMER:** **As required where the roofing substrate is rusted.*
GacoFlex E5320 2-Part Epoxy Primer/Filler

B. POLYURETHANE FOAM:

Shall be designed for a spray application resulting in high-quality, rigid polyurethane under the prevailing application conditions.

1. GacoRoofFoam F2733RHFO Spray-In-Place Polyurethane Foam having the following minimum physical and performance properties

GacoRoofFoam F2733RHFO Spray-In-Place Polyurethane Foam		
PROPERTY	VALUE	TEST METHOD
NOMINAL DENSITY	2.7 - 3.4 lbs / ft ³ (40 - 48 kg / m ³)	ASTM D1622-93
CLOSED CELLS	98.2 %	ASTM D2856 C94
COMPRESSIVE	53.7 psi (0.34 bar)	ASTM D1621
INITIAL R-VALUE	6.5 (1.15 RSI)	ASTM C518

NOTE: It is Gaco's position that the use of foamed plastic insulation for interior application on walls or ceilings may represent an unreasonable fire hazard unless the foamed plastic insulation is covered with a thermal barrier and the resulting composite construction has a minimum fifteen (15) minute rating as listed by Factory Mutual Research Corporation or other equally accepted listing agency.

Fire rated coating systems for plastic foam insulation tested under ASTM E108 Class "A" Roof Composite Construction do not qualify for thermal barrier use on interior walls and ceilings.

C. BASE COATING:

GacoFlex U91 Single Component Urethane Base Coating has the following physical properties:

GacoFlex U91 Single-Component Moisture Cure Polyurethane Coating		
PROPERTY	VALUE	TEST METHOD
TENSILE STRENGTH	2600 psi	ASTM D412
ELONGATION	350%	ASTM D412
PERMANENT SET AT BREAK	7% Max	ASTM D412
TEAR RESISTANCE	360 pli	ASTM D624
HARDNESS	90 ± 5 Shore A	ASTM D2240
SOLIDS CONTENT	Volume 80%	ASTM D2697
VOC CONTENT	150 g/L	EPA METHOD 24
WATER VAPOR PERMEABILITY	0.02 Perm Inches	ASTM E96 Procedure B Max. 100% R.H. Difference @ 70 °F (27 °C)

D. BASE COATING:

GacoFlex U91C has the following physical properties:

GacoFlex U91C Single-Component Moisture Cure Polyurethane Coating (SCAQMD Compliant)		
PROPERTY	VALUE	
TENSILE STRENGTH - INITIAL	ASTM D412 2600 psi (17.9 MPa)	
TEAR RESISTANCE	ASTM D624	360 pli
SOLIDS CONTENT	Volume: 80 %	ASTM D2697
VOC	< 50 g / L	EPA Method 24
WATER VAPOR PERMEABILITY – 20 MILS DFT (INCH POUNDS)	ASTM E96	0.02 Perms

E. TOP COATING:

GacoFlex U92 Series Urethane Roof Coating has the following physical properties:

GacoFlex U92 Series		
PROPERTY	VALUE	
TENSILE STRENGTH - INITIAL	D2370	910 psi (6.27 MPa)
TEAR RESISTANCE	ASTM D624	60 minutes @ 223 lb / in (3.98 kg / mm)
SOLIDS CONTENT	Weight: 82 % Volume: 77 %	ASTM D1644 ASTM D2697
VOC	EPA Method 24 < 50 g/l (< 0.417 lb/gal)	

PART 3 - EXECUTION**3.1 EXAMINATION**

- A. Verify that the substrate is ready to receive the work; surface is clean, dry, and free of substances which could affect the bond.
- B. Cleaning of the roof should be accomplished by using power vacuum equipment, power sweepers, air blowers, power washers or other suitable means. Use GacoWash diluted 1 part of GacoWash with 9 parts of water when power washing.
- C. All associated construction (e.g., drain installation, edge flashing, penetrations, and mechanical apparatus) shall be completed prior to the commencement of the specified roof foam and coating system.
- D. Verify that all other work involved with this area, done under other sections, has been completed and accepted by the architect and general contractor prior to starting the waterproofing application.

3.2 PREPARATION

- A. Clean substrate to remove all oils and surface contaminants. Refer to Gaco's General Instructions GW-1-1, Surface Preparation.
- B. Mask off all adjoining areas that will not receive the roofing system.

3.3 INSTALLATION**A. TECHNICAL ADVICE:**

The installation of this system shall be accomplished with the advice of, the manufacturer's technical representative. Contact Technical Services for assistance.

NOTE: Surface should be clean and dry, remove all oils and other surface contaminants.

B. PRIMER:

No primer system is required unless rust is present. For areas that contain rust, apply GacoFlex E5320 2-Part Epoxy Primer/Filler at a rate of 1.0 gal / 300 ft² (3.78 L / 27.9 m²) to steel, aluminum, copper, and ferrous metal. The primer must be completely dry before starting the polyurethane foam application.

C. FLASHING:

GacoFlashFoam is self-flashing and can be used at curbs, parapets, walls, and penetrations. Flashing at dynamically moving joints require GacoFlex NF621 Neoprene Sheet Flashing 1/16 in (1.6 mm) and VOC-Compliant General-Purpose Adhesive Contact a Gaco Representative for assistance and refer to product documentation available at Gaco.com for specific directions.

D. EXPANSION JOINTS:

As required, expansion joint covers will be treated with GacoFlex NF621 Neoprene Sheet, 1/16 in (1.6 mm) thick, in a width of "_____" (TO BE STATED IN THE PUBLISHED SPECIFICATION. IF THERE IS NONE STATED, THE BIDS WILL BE BASED ON 12 IN (304.8 MM) and adhered with GacoFlex N1207 Single-Component Neoprene-Based Adhesive.

E. SPRAYED-IN-PLACE POLYURETHANE FOAM:

As determined in "SECTION 2.2 MATERIALS – E. SPRAY-IN-PLACE POLYURETHANE FOAM" of this document, apply selected product at a thickness of no less than 1.0 inch (25.4 mm), and no greater than 1.5 inch (38mm) ± 0.25 in (6.4 mm). Neatly terminate the sprayed-in-place polyurethane foam on all vertical surfaces, (e.g., pipe penetrations, vents, mechanical equipment, parapet walls, etc.) a minimum of 3 inch (76.2 mm) or 2¹/₂ times as specified minimum foam thickness.

Note: When applying over coverboard/board insulation a minimum 1.75 inch (44.4 mm) ± 0.25 inch (6.4 mm) of foam is required.

Example: If 1 inch (25.4 mm) minimum is specified, all vertical terminations shall have a minimum of 2.5 inch (64 mm) sprayed up onto the vertical surface and canted to the horizontal surface.

THE FOLLOWING APPLICATION QUALITIES SHALL BE SATISFIED:

1. The polyurethane foam spray application shall be limited to an area which can be completed to full foam thickness in one day.
2. The completed polyurethane foam surface shall be smooth to an orange peel texture; a popcorn texture is not acceptable.
3. The completed polyurethane foam surface shall be free of pinholes and "glass windows" due to improper equipment calibration or climatic conditions.
4. Apply the protective coating to the polyurethane foam surface on the same day (2 hours minimum).

F. ROOF COATINGS:**1. BASE COAT:**

Apply one (1) coat of GacoFlex U91 at the average rate of 1.5 gal / 100 ft² (5.7 L / 9.3 m²) to obtain the required minimum 24 mil Wet Film Thickness (WFT) / 18 mil Dry Film Thickness (DFT). Coat all surfaces including expansion joint covers and flashings.

NOTE: Allow to dry for ten (10) – twelve (12) hours at 75 °F (24 °C) and 50 % RH. Dry time will be faster in warmer and more humid conditions, and slower in colder and dryer conditions.

2. FIRST TOPCOAT:

Apply one (1) coat of GacoFlex U92 at the average rate of 1.0 gal / 100 ft² (3.8 L / 9.3 m²) to obtain the required minimum 16 mil Wet Film Thickness (WFT) / 12 mil Dry Film Thickness (DFT).

3. **SECOND TOPCOAT:**

Apply one (1) coat of GacoFlex U92 at the average rate of 1.0 gal / 100 ft² (3.8 L / 9.3 m²) to obtain the required minimum 16 mil Wet Film Thickness (WFT) / 12 mil Dry Film Thickness (DFT).

NOTE: Allow to cure for a minimum of twenty-four (24) hours (depending on temperature and humidity).

3.4 FIELD QUALITY CONTROL

- A. The Applicator shall maintain the system to verify compliance with this specification.
 - 1. Thickness of polyurethane foam and applied coating shall be measured and recorded for each coat and the total protective coating system.
- B. The owner's representative has the option of taking core samples to verify compliance with the specification.
 - 1. Cut out sections shall be immediately repaired by the applicator at its expense.
 - 2. All costs of testing the core samples shall be paid for by the owner.
- C. Any variations from the specified limits found by the applicator or owner's representative shall be corrected by the Applicator.
- D. **MINIMUM DRY FILM THICKNESS (DFT) REQUIREMENT:**
Gaco recommends adding a 10 % variance factor to obtain the minimum DFT mil thickness required. It is the Applicator's responsibility to calculate the amount of coating needed to obtain the minimum DFT mil thickness required.
- E. No traffic shall be permitted on the completed surface for a minimum of three (3) days. Damage to the surface by other trades shall not be the responsibility of the Applicator.