

# APPLICATION GUIDE

foamsulate™

## FOAMSULATE HFO 2.0

### CLOSED CELL FOAM

Foamsulate HFO 2.0 is suitable for application to most construction materials including but not limited to wood, masonry, concrete, and metal. All surfaces to be sprayed with foam should be clean, dry, and free of dew or frost. All metal to which the foam is to be applied must be free of oil, grease, etc. See spray process section for pass thickness. Allow ten minutes between each pass or until the surface temperature reaches 100°F or ambient to allow for cooling. Multiple layers can be applied to reach the desired thickness and R-value. As with all spray polyurethane foam systems, improper application techniques should be avoided. Examples of improper techniques include, but are not limited to, excessive thickness of spray polyurethane foam, off ratio material and spraying into or under rising foam. Potential results of improperly installed spray polyurethane foam include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate. Improperly installed foam must be removed and replaced with properly installed spray polyurethane foam. It is the responsibility of the applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

APPLICATION PARAMETERS	
STORAGE TEMPERATURE	50°F – 80°F
IN USE TEMPERATURE	70°F – 80°F
AMBIENT AIR TEMPERATURE	30°F – 120°F Based on Grade Used
SUBSTRATE TEMPERATURE	30°F – 120°F Based on Grade Used
MOISTURE CONTENT OF SUBSTRATE	Less Than 19%
MAXIMUM LIFT PER PASS	Not to Exceed 4"

AMBIENT/SUBSTRATE TEMPERATURES	
REGULAR GRADE	50°F – 120°F
WINTER GRADE	30°F – 70°F

\*Wind Chill or other conditions may influence your decision on which grade of material you might apply. Physical properties will stay the same.

PRODUCT	PASS	MAX LIFT
FOAMSULATE HFO 2.0	Single	4"
	Double	3" + 2.5"

MIXING REQUIREMENTS	
RESIN (B SIDE)	DO NOT MIX

PROCESSING REQUIREMENTS
All material must be a minimum of 70°F before dispensing.

EQUIPMENT SETTINGS		
PRE-HEATERS: (A) COMPONENT - ISO	105°F – 135°F	These are recommended "Initial" Settings. Settings may vary based on the type of equipment used and the substrate temperatures at the time of the application.
PRE-HEATERS: (B) COMPONENT - RESIN	105°F – 135°F	
HOSE HEAT	105°F – 135°F	
FLUID PRESSURE	1,000–1,500 psi - Dynamic	
MIXING RATIO	1:1 By Volume	
RECOMMENDED MIX CHAMBER/ MODULE SIZE:	10–15 Lbs./Minute (i.e. 01-GRACO AR4242)	

**APPLICATION GUIDELINES:** Polyurethane foam systems should be processed through commercially available spray equipment designed for that purpose by a qualified professional applicator. The proportioning equipment must be capable of maintaining all designated ratios, temperature settings, etc. as shown in the settings chart. The gun should be of the internal mix type, which provides thorough blending of the two components. The equipment shall be of the heated airless type capable of maintaining 160°F at the gun by use of both primary heaters and heated hoses. The use of 2:1

transfer pumps is recommended for supplying the liquid components to the Proportioner. It is the responsibility of the professional applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.

**PROPER STORAGE OF RAW MATERIALS:** Shelf life is six (6) months from date of manufacture when stored in original unopened containers at 50°F to 80°F. Store in a dry and well-ventilated area.

Raw materials must be kept warm. Cold chemicals can cause poor mixing, pump cavitation, or other process problems due to higher viscosity at lower temperatures. The material will need to be conditioned between 70°F to 80°F for 48 hours before use. Avoid storing drums on concrete or metal floors in cold (winter) conditions. Do not store in direct sunlight. Keep drums tightly closed when not in use.

**MATERIAL HANDLING:** Due to the reactive nature of these components respiratory protection is mandatory. The vapors and liquid aerosols present during application and for a short period thereafter must be considered – and appropriate protective measures taken – to minimize potential risks from overexposure through inhalation, skin, or eye contact. These protective measures include adequate ventilation, safety training for installers and other workers, use of appropriate personal protective equipment, and a medical surveillance program. It is imperative that the applicator read and become familiar with all available information on proper use and handling of spray polyurethane foam. Additional Information is available at [carlislefi.com](http://carlislefi.com) or by contacting the Technical Services dept. of Carlisle Spray Foam Insulation.

**PERSONAL PROTECTION EQUIPMENT:** Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized particles must be avoided.

Spraying of polyurethane foam results in the atomizing of the components to a fine mist. Inhalation and exposure to the atomized droplets must be avoided. Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high- pressure spray foam application. Precautions include, but are not limited to:

- a. Full-face mask or hood with fresh air source
- b. Fabric coveralls
- c. Non-permeable gloves
- d. Solvent-resistant gloves when handling new materials and cleaning solvents.

**WARNING: EXPOSURE MAY OCCUR EVEN WHEN NO NOTICEABLE ODOR IS ENCOUNTERED.**

Applicators must use personal protective equipment recommended by the Center for Polyurethanes Industry for use in high-pressure spray foam application. Please visit [www.spraypolyurethane.org](http://www.spraypolyurethane.org) for additional information on appropriate personal protection equipment selection and use.

**SAFE HANDLING OF LIQUID COMPONENTS:** When removing bungs from containers use caution, contents may be under pressure. Loosen the small bung first and let any built-up gas escape before completely removing. Avoid prolonged breathing of vapors. For further information refer to “MDI-Based Polyurethane Foam Systems: Guidelines for Safe Handling and Disposal” publication AX-119 published by the Alliance For The Polyurethanes Industry, Arlington, VA.

**DISSIMILAR RESINS:** When changing the “B” side (resin) to another type of spray polyurethane foam it is very important that the supply hoses and pumps are completely drained. Any resin on the drum pump must be completely removed prior to insertion into the drum of the new material. Mixing of dissimilar product types (particularly closed cell into open cell) will contaminate the resin in the new drum. It is the responsibility of the applicator to follow this guideline to avoid contaminating the resin.

**MECHANICAL VENTILATION REQUIREMENTS:** Carlisle Spray Foam Insulation requires that a mechanical ventilation system be utilized in a workplace where Foamsulate spray polyurethane foam is applied. The requirement for this ventilation system is at a minimum ventilation rate during spray application and for a period of 24 hours after the spray application is complete. The mechanical ventilation system to be used in the workspace needs to be able to exhaust air directly to the exterior of the building at a minimum rate of 0.3 Air Changes per Hour (ACH). The volume of the workspace would need to be determined for system design. If, for example, the volume of the workspace is 4,000 ft<sup>3</sup> then the minimum capacity of the ventilation system equals 4,000 ft<sup>3</sup> x 0.3 ACH = 1,200 ft<sup>3</sup>/h = 20 ft<sup>3</sup>/min (cfm).

Note that 0.3 ACH is a minimum ventilation rate at which most commercial ventilation fans can easily achieve. It is recommended that this level be exceeded. More ventilation utilized in the workspace the better.

Further information can be found in the “Guidance on Ventilation During Installation of Interior Applications of High-Pressure Spray Polyurethane Foam” available from the American Chemistry Council, Spray Foam Coalition.

**SPRAY PROCESS:** This spray system may be applied in passes of uniform thickness from a minimum of one half (½) inch to a maximum of four (4) inches. Foamsulate HFO 2.0 shall not be sprayed at more than 4" in a single pass, or at a multiple pass of 3" + 2.5" to equal a combined 5.5. Additional passes after double pass will need recommended cooling time. If this thickness is exceeded, it will adversely affect the quality and physical properties of the finished product and the internal temperature building up within the foam may cause charring or thermal degradation. Under certain conditions, applications exceeding this thickness may cause spontaneous combustion of the foam to occur, even hours after product was applied.

For Foamsulate HFO 2.0 you want a .5–1 second brown time when spraying a dot on your substrate. If you spray a dot on the substrate and the chemical hits as white foam you are too hot and losing your blowing agent into the air, reducing yield. Turn your temps down in 2–3 degree increments until you have a consistent .5–1 second brown time. If you spray a test dot on your substrate and the chemical hits as brown and runny before turning into white foam, then you are too cold. Bring your temps up in 2–3 degree increments until you have your correct brown time.

Allow ten minutes between each pass or until surface temperature reaches 100°F or ambient to allow for cooling. Multiple layers can be applied to reach the desired thickness and R-value.

As with all spray polyurethane foam systems, improper application techniques should be avoided. Examples of improper techniques include, but are not limited to, excessive thickness of spray polyurethane foam, off ratio material and spraying into or under rising foam. Potential results of improperly installed spray polyurethane foam include dangerously high reaction temperatures that may result in fire and offensive odors that may or may not dissipate.

Polyurethane foam not applied at the correct equipment settings and application parameters (off-ratio) will result in polyurethane foam with poor physical and adhesion properties. Any polyurethane foam applied off-ratio must be completely removed and replaced with properly installed spray polyurethane foam.

**It is the responsibility of the applicator to thoroughly understand all equipment technical information and safe operating procedures that pertain to a spray polyurethane foam application.**

Spray polyurethane foam insulation is combustible. High intensity heat sources such as welding or cutting torches must not be used in close proximity to any polyurethane foam. Large masses of spray polyurethane foam should be removed to an outside safe area, cut into smaller pieces, and allowed to cool before discarding into a trash receptacle.

**ENVIRONMENTAL AND SUBSTRATES CONDITIONS:** Applicators must recognize and anticipate climatic conditions prior to application. Ambient air, substrate temperature and moisture are all critical determinants of foam quality. Variations in ambient air and substrate temperature will influence the chemical reaction of the two components, directly affecting the expansion rate, amount of rise, yield, adhesion and the resultant physical properties of the foam insulation.

It is the foam applicator's responsibility to ensure the system is being applied within physical parameters. Proper applications may require adjustments to one or more of the following: spray techniques, substrate, application, or job site temperature.

Foamsulate HFO 2.0 is suitable for application to most construction materials including wood, masonry, concrete, and metal. All surfaces to be sprayed with foam should be clean, dry and free of dew or frost. Metal substrate must be free of any surface residue such as oil, grease, etc.

Substrate temperature at the time of the Foamsulate HFO 2.0 application should be between 30°F to 120°F, the warmer the surface, the better the adhesion. For temperatures outside of these ranges the applicator must contact the Carlisle Spray Foam Insulation technical services department prior to application.

The presence of moisture will greatly affect the physical characteristics of the polyurethane foam. The moisture content of the substrate should not exceed 19%. Polyurethane foam cannot be applied to any substrate that has surface moisture such as rain, condensation, dew, frost, etc. The moisture acts as a blowing agent that will react with the "A" side of the system. This can result in off-ratio polyurethane foam with poor physical and adhesion properties. Any polyurethane foam applied during these conditions must be completely removed and the substrate allowed to thoroughly dry prior to a new application.

**Cold weather temperature application may require changing of spray technique, material temperatures, application temperatures, substrate preparation and environmental conditioning. Consult a Foamsulate Technical Representative for details.**

**PROXIMITY TO HEAT SOURCES:** Keep a minimum distance of three (3) inches between Foamsulate HFO 2.0 and heat sources such as combustion appliance flues, recessed light fixtures, insulation contact rated (IC) light fixtures, fireplace flues, etc.

**FINISHED FOAM PROTECTION:** The finished surface of the sprayed polyurethane foam should be protected from the adverse effects of direct exposure of ultraviolet light from the sun. This exposure will cause dusting and discoloration. Protective coatings designed for use with polyurethane foams are available from Carlisle Spray Foam Insulation.

**SKIN EXPOSURE:** Immediately remove any clothing soiled by the product. Immediately wash skin with water and soap and rinse thoroughly. Remove breathing apparatus only after contaminated clothing have been completely removed. In case of irregular breathing or respiratory arrest provide artificial respiration. First Aid responders should pay attention to self-protection and use the recommended protective clothing.

**INHALATION:** Supply fresh air or oxygen; call for doctor.

**EYE CONTACT:** Immediately rinse opened eye for several minutes under running water. Consult a doctor and the SDS sheet for proper treatment.

**AFTER SWALLOWING: Immediately call a doctor.** Do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person.

**ENVIRONMENTAL PRECAUTIONS:** Inform the relevant authorities if the product has caused environmental pollution. Do not allow material to enter sewers/ surface or ground water systems.

**MATERIAL SPILL CONTAINMENT AND CLEAN UP:** Isolate area. Keep unnecessary and unprotected personnel from entering the area. Spilled material may cause slipping hazard. Ensure adequate ventilation. Contain spilled material if possible. Absorb with materials such as: dirt, sand, sawdust. Collect in suitable and properly labeled containers. Contact local and state government for proper cleanup and disposal procedures.

**WASTE DISPOSAL:** Dispose of raw chemical in a licensed disposal facility. Do not discharge into waterways or sewer systems. Contact Chemtrec (800) 424-9300 or Clean Harbors (800) 444-4244.

**CONTAINER DISPOSAL:** Steel drums must be emptied (as defined by RCRA, Section 261.7 or state regulations that may be more stringent) and can be sent to a licensed drum re-conditioner for reuse, a scrap metal dealer, or an approved landfill. Drums destined for a scrap dealer or landfill must be punctured or crushed to prevent reuse.

**TECHNICAL ASSISTANCE:** For additional assistance please contact the Technical Services dept. of Carlisle Spray Foam Insulation at (844) 922-2355.

**DISCLAIMER:** To the best of our knowledge, all technical data contained herein is true and accurate as of the date of issuance and subject to change without prior notice. User must contact Carlisle Spray Foam Insulation to verify correctness before specifying or ordering. We guarantee our products to conform to the quality control standards established by Carlisle Spray Foam Insulation. We assume no responsibility for coverage, performance or injuries resulting from use. Liability, if any, is limited to replacement of the product. **NO OTHER WARRANTY OR GUARANTEE OF ANY KIND IS MADE BY CARLISLE SPRAY FOAM INSULATION. EXPRESSED OR IMPLIED, STATUTORY, BY OPERATION OF LAW, OR OTHERWISE, INCLUDING MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.**

