HUNTSMAN
BUILDING SOLUTIONS

In-Place Core Density of Heatlok® HFO Pro and HFO High Lift

Technical Bulletin

Date: November 17, 2026
Audience: Customers, design professionals and building officials

Subject: Expected variation in field-measured core density for Heatlok® HFO Pro and Heatlok® HFO High Lift closed-cell spray polyurethane foams.

Legal Disclaimer: *This Document is provided for informational purposes only. It does not modify, replace or supersede the current Heatlok® HFO Pro or Heatlok® HFO High Lift technical data sheets, the applicable evaluation reports (ICC-ES ESR-4073 and IAPMO UES ER-565), or HBS's terms and conditions of sale, and it is not a warranty, express or implied. Field-measured density depends on installation and testing conditions outside HBS's control. Final acceptance of any installation rests with the authority having jurisdiction.*

Purpose

Heatlok® HFO Pro and Heatlok® HFO High Lift are two-component, closed-cell, spray-applied rigid polyurethane foams, each with a published core density of 2.0 lb./ft³ (ASTM D1622). Heatlok® HFO High Lift is evaluated in ICC-ES ESR-4073 at a nominal density of 2.0 pcf (32 kg/m³). Heatlok® HFO Pro is evaluated in IAPMO UES ER-565 at the same nominal density. Nominal density is the average target core density for each product, 2.0 lb./ft³, as published on its technical data sheet (TDS) and in its evaluation report. It is the reference value against which measured densities are compared. Because spray foam is manufactured in the field, the in-place density of a properly installed product will vary within an expected range around that nominal value. This statement explains the range Huntsman Building Solutions (HBS) considers consistent with the nominal density and the conditions that range depends on. **The density is variable, even in foam that has been properly processed and fully reacted. This variability depends on the conditions described throughout this document, and field-measured density results are not absolute. The sections on properly processed foam, density at altitude, pass thickness, and multiple lifts and skins work together, and no single section or table should be relied on alone. This document is informational and does not modify the TDS or the evaluation reports.**

Code and evaluation basis

The International Residential Code (IRC) Section R316.3 requires foam plastic insulation to be tested for surface-burning characteristics "in the maximum thickness and density intended for use." The IRC does not publish a numeric density tolerance. Product recognition under the code is established through an evaluation report, which for spray foam insulation is issued under ICC-ES AC377, Acceptance Criteria for Spray-applied Foam Plastic Insulation.

HBS position

HBS considers properly processed Heatlok® HFO Pro and Heatlok® HFO High Lift with a measured core density of 1.9 to 2.2 lb./ft³ to be within acceptable range of the nominal (declared) density of 2.0 lb./ft³ on which its technical data sheet and evaluation report are based. Densities outside this range do not necessarily define improperly processed foam, nor does it mean the foam will not perform as intended. Because spray polyurethane foam is manufactured at the point of application in the field, rather than under controlled laboratory conditions, HBS Research and Development and Quality Control have established a tolerance around the tested and declared core density of 2.0 lb./ft³. The 1.9 to 2.2 lb./ft³ range is acceptable and is the range within which field-measured core density is considered consistent with the nominal density. The range reflects expected variation in field-applied foam. It is not a separate performance specification and does not change the declared density of 2.0 lb./ft³ published on the technical data sheets and in the evaluation reports.

Item	Value
Nominal core density (TDS, ESR-4073, UES ER-565)	2.0 lb./ft³ (32 kg/m³)
Field-measured range considered consistent with nominal density	1.9 to 2.2 lb./ft³
Test method	ASTM D1622 core samples with skins removed

This range applies only to foam that is properly processed and fully reacted, as described below. A density result inside the range does not by itself demonstrate a conforming installation, and a result outside it should be investigated before the work is approved by the authority having jurisdiction.

Properly processed, fully reacted foam

For the purposes of this statement, properly processed foam is foam that was:

- Applied with fixed 1:1 by volume, positive-displacement proportioning equipment, with any ratio assurance monitoring showing no more than the 5% maximum ratio variance HBS accepts. Any deviation beyond that must be corrected before continuing the installation.
- Processed within the chemical, hose and primary heater temperatures and pressures on the current technical data sheet for Heatlok® HFO Pro or Heatlok® HFO High Lift, with drums conditioned to the stated temperatures.
- Sprayed onto clean, dry substrates within the ambient and substrate temperature limits on the technical data sheet.
- Fully reacted and cured, with no unreacted chemical. The foam must show no wet, oily, tacky or liquid areas, no crystalline or brittle zones, no discoloration typical of off-ratio material, and no persistent chemical odor after curing.
- Cell structure must be uniform and fine, with good adhesion and cohesion and no voids, delamination, shrinkage, cracking or charring.

Foam that shows any sign of unreacted A-side or B-side material, or off-ratio processing, is not covered by this statement regardless of its measured density.

Density at altitude

Elevation impacts in-place density, and the current technical data sheets for Heatlok® HFO Pro and Heatlok® HFO High Lift address it directly:

"At higher elevations, lower atmospheric pressure increases closed-cell foam expansion and may reduce in-place density by approximately 0.2 lb./ft³ per 3,000 ft, although actual results vary with ambient and substrate temperatures, equipment settings, and application technique. Low density can reduce dimensional stability and increase the risk of shrinkage, swelling, expansion, or buckling; therefore, adjust pass thickness and processing parameters as needed, periodically verify density and cell structure, and, if results fall outside specification or distortion occurs, reduce lift thickness and confirm chemical temperatures, pressures, mix chamber, substrate conditions, and application technique before continuing. Consult a Huntsman Building Solutions Technical Representative for altitude-specific recommendations."

Altitude (ft)	Ambient	Suggested lift / pass
3,000	15°F to 100°F	2 + 2 in. / 3.25 + 3.25 in.
5,280	15°F to 88°F	2 + 2 in.
7,000	15°F to 88°F	2 + 2 in.
10,000+	15°F to 88°F	2 + 2 in.

Where density measured at elevation falls outside the 1.9 to 2.2 lb./ft³ range, the contractor should adjust processing as described above and contact HBS Technical Service.

3315 East Division Street
Arlington, TX,76011
huntsmanbuildingsolutions.com

Pass thickness

Pass thickness also affects density, reaction heat and foam quality. Contractors must follow the pass thickness limits on the current technical data sheet:

Ambient temperature	Maximum single pass	Dual pass
70°F or less	6.5 in.	3.25 in. + 3.25 in.
70°F to below 80°F	4 in.	3.25 in. + 3.25 in.
81°F and above	3.25 in.	3.25 in. + 3.25 in.

Before any additional passes, the foam core temperature must drop below 100°F. Spraying sections too thick or too fast can char the foam and, in extreme conditions, start a fire.

Multiple lifts and skins

Field-measured density of foam applied in multiple lifts should be treated with caution. Each lift forms its own skin, and skins are denser than the foam core. A sample cut from a multi-lift installation can therefore include one or more skins or lift interfaces, which can raise the measured density and make the result suspect as an indication of the in-place core density.

Laboratory core density, including the nominal value on the technical data sheets, ESR-4073 and UES ER-565, is determined on specimens with the skins removed (ASTM D1622). Field samples must be prepared the same way, with skins and lift interfaces removed, before they are compared with the 1.9 to 2.2 lb./ft³ range in this statement. A density result from a sample that includes skins is not comparable to the laboratory value and should not be used on its own to accept or reject an installation.

What this document does not do

This document does not endorse or excuse poor application practice. The 1.9 to 2.2 lb./ft³ range describes expected variation in properly installed foam. It does not cover density deviations caused by off-ratio processing, unreacted chemical, excessive pass thickness, inadequate cooling between passes, application outside temperature limits, or processing outside the technical data sheet. Those conditions result in installations that do not conform to the technical data sheet, whatever the measured density, and they must be investigated and corrected.

As stated on the technical data sheet, it is the sole responsibility of the applicator to process and apply Heatlok® HFO Pro and Heatlok® HFO High Lift within the technical data sheet requirements. Final acceptance of any installation rests with the authority having jurisdiction.

References

- 2015, 2018, 2021 and 2024 International Residential Code, Section R316.3 (Surface Burning Characteristics) and Section R316.6 (Specific Approval)
- ICC-ES AC377, Acceptance Criteria for Spray-applied Foam Plastic Insulation, Section 3.6, as clarified by the ICC-ES policy letter of October 31, 2012
- ICC-ES Evaluation Report ESR-4073, Heatlok® HFO High Lift Spray Foam Insulation
- IAPMO UES Evaluation Report ER-565, Heatlok® HFO Pro Spray-Applied Polyurethane Foam Plastic Insulation
- Heatlok® HFO High Lift Technical Data Sheet (TDS)
- Heatlok® HFO Pro Technical Data Sheet (TDS)

For questions, contact Huntsman Building Solutions Technical Service at HBStechservice@huntsman.com.

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