

## **Explanation of Expansion Rate for One-Component (OCF) and Two-Component Foams**

The "expansion rate" or percentage of expansion for one-component and two-component polyurethane foams is often quoted for marketing or technical purposes. Currently, there is no single consistent testing method that all manufacturers use to measure expansion, therefore it is often misused or misunderstood. This Technical Bulletin will further qualify and explain this property.

### **Two-Component Polyurethane Froth Foam**

Handi-Foam Two-Component Froth Foam, as supplied in disposable kits and refillable cylinders, is said to have an "8 to 1" expansion ratio. This ratio is a generalized statement, and is meant to indicate that two-component froth foam will expand rapidly at a greater rate than one-component foam, and, in its cured state, may be as much as 8 times the dispensed volume (depending on cavity size, thickness of the sprayed coating, etc.). However, because froth foams are "pre-expanded" to some degree when dispensed, the observed expansion percentage will usually be three to five times the perceived applied volume in most applications. For example, a thin coat of foam (~1/4") spray-applied to a vertical surface will visibly expand to a thickness of about 1".

**Based on the explanation above, a more accurate description of two-component froth foam expansion is as follows; "foam will expand upon chemical reaction of A component and B component to a final volume that is 3 to 5 times the dispensed volume, in typical applications, and may be as much as 8 times the dispensed volume in specific applications, depending on various factors such as cavity size, ambient conditions, etc."**

In some industry segments, manufacturers will quote the expansion ratio of their foam as the volume of the initial liquid (e.g. 55 gal. drum) compared to the final expanded volume of foam. This method will lead to expansion ratios many times larger than typical froth foams, and are descriptive of liquid applied systems such as packaging foams or open-cell insulation. Unlike froth foams, such systems are not packaged in pressurized containers where the liquid and gas are mixed, thus producing a "froth foam" (similar to shaving cream) when such a foam is dispensed from the pressurized containers. Using this method, the liquid components in Handi-Foam froth foam systems would yield expansion ratios of 40 times, or more, depending on foam density.

### **One-Component Polyurethane Foam (OCF)**

Typically, expanding one-component foam will be said to expand at a "3 to 1" ratio. This means that the foam will expand slowly during the curing process to a final volume that is approximately 200% larger than the dispensed volume. Operating instructions will typically instruct to fill the cavity only 1/3 to 40% full, in order to allow for this expansion, which will occur slowly over the first several hours of curing, depending on atmospheric moisture content, etc...

A "minimally expanding" one-component foam will expand less, typically 0%-75%, depending on a variety of factors, such as ambient humidity and temperature, dispensing method, etc. The "pressure build" of a one-component foam is often more critical than the expansion ratio, especially when sealing windows and doors.

Testing standards for the expansion and pressure build of one-component foam are currently being developed by organizations such as ASTM and AAMA.