Increased Durability for Footwear Foams

INFUSE™ OBCs Offer Improved Recovery and Reduced Compression Set Over Time

Recovery and compression set are critical elements in the performance of athletic footwear midsoles. If the foam midsole stays compressed and doesn't "bounce back" sufficiently, a shoe's ability to cushion the foot from the repeated stresses of running or other athletic activities can be severely impaired.

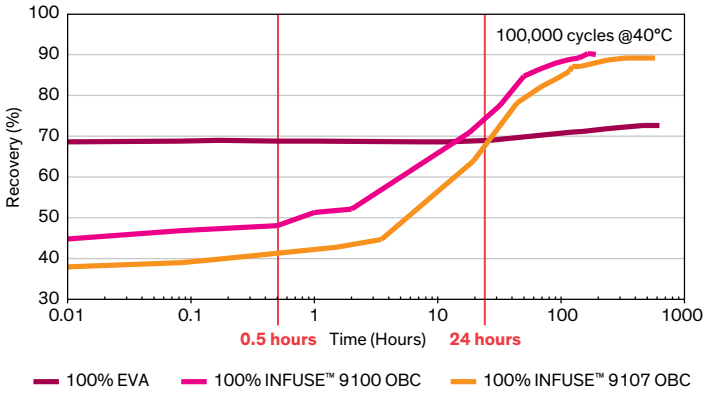
For decades, midsole foams based on ethylene vinyl acetate (EVA) have been the low-cost choice of athletic footwear manufacturers. However, consumer demand for better foam performance has led to the development of **INFUSE™ Olefin Block Copolymers (OBCs)**, which offer opportunities for improved performance and other benefits across the value chain.

Longer, Stronger Recovery

Figure 1 shows the results of dynamic fatigue tests conducted on foams made from 100 percent EVA and 100 percent INFUSE™ OBCs. The samples tested were placed in an environmental chamber between parallel plates at 40°C and exposed to a cyclic loading/unloading routine using 180 lbs. of force for 100,000 cycles. The percentage of original thickness recovered was then measured over the course of 1,000 hours.

Although the density of the three samples is similar, the increased hardness of the EVA-based foam results in less loss of thickness after dynamic testing – and no change in thickness after the initial 30 minutes of recovery. In contrast, the softer foams based on INFUSE™ OBCs compress more readily and show greater loss of thickness. They begin to recover slowly, but eventually peak at roughly 90 percent of their original thickness.

Figure 1: Recovery After Dynamic Fatigue[1]



[1] Data per tests conducted by Dow. Additional information available upon request. Properties shown are typical, not to be construed as specifications. Users should confirm results by their own tests.

MIDSOLE FOAMS MADE WITH INFUSE™ OBCS OFFER THE POTENTIAL FOR OUTSTANDING DURABILITY AND SUPERIOR RECOVERY.

Infuse™
olefin block copolymers

Setting the Bar

Figure 2 compares the static compression set of three foam formulations (see Table 1) after 30 minutes and 24 hours of recovery time. It's easy to see that the compression set for the 100 percent OBC formulation is significantly lower than the two formulations that feature EVA/OBC blends. Equally important, however, is the fact that compression set is lower after 24 hours than after 30 minutes in all three formulations.

Foams made with INFUSE™ OBCs show a strong tendency to recover over time after dynamic and static compressive testing. This is believed to be an indicator of the materials' ability to provide extended durability in midsole foams compared to EVA. While the best results are typically achieved with 100 percent OBC formulations, it's important to note that improvements can also be made with blends of OBC and EVA.

Collaborate with Dow

The results shown here are based on "stock" INFUSE™ OBC products. By working closely with Dow, you can fine tune not only the materials selected but also your formulation for optimal results.

For more information on how INFUSE™ Olefin Block Copolymers can help improve your performance athletic footwear or other foam applications, contact your Dow Elastomers representative, visit www.dowfootwear.com, or call the nearest location listed below.

Figure 2: Effect of Recovery Time on Compression Set[1]

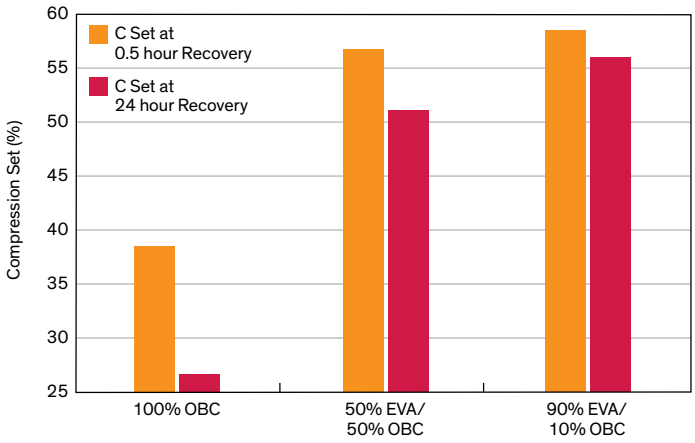


Table 1: Formulations Tested[1]

Formulation	100% OBC	50% EVA / 50% OBC	90% EVA / 10% OBC
EVA (1.5 MI, 21% VA)	—	50	90
INFUSE™ OBC (5 MI, 0.885 g/cc)	100	50	10
Peroxide	2.5	2.0	1.6
Blowing Agent	2.8	2.8	3.0
Properties			
Density with Skin, g/cc	0.23	0.23	0.24
Hardness with Skin, Asker C	58	57	56

[1] Data per tests conducted by Dow. Additional information available upon request. Properties shown are typical, not to be construed as specifications. Users should confirm results by their own tests.

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