Tough challenges. Exciting opportunities.

How can we develop better, more sustainable premium tile flooring?

Getting better, **all the time.**

Throughout the world, change is happening. Even forward-thinking industries, like premium tile flooring, must figure out better, more sustainable ways to meet consumer and business needs. Together, we can do that and more. We can create advanced, new generations of vinyl-free luxury polyolefin tile (LPT), luxury vinyl tile (LVT), and carpet tile. Find new answers that not only offer outstanding performance and appearance, but also take critical steps forward – helping address the difficult challenges we face.

flooring solutions by DOW

Engage™ polyolefin elastomers | Infuse™ olefin block copolymers | Elvaloy™ copolymers for alloys | Affinity™ GA polyolefin elastomers | Amplify™ functional polymers

Opportunities for innovation

Our flooring solutions offer materials science expertise, advanced polymer technology, and global capabilities in an open, collaborative environment to help create innovative, custom formulations. Formulations that can help deliver strong sustainability profiles – as well as excellent abuse and abrasion resistance, exceptional processability, and potential reductions to overall costs.

Supporting sustainability initiatives

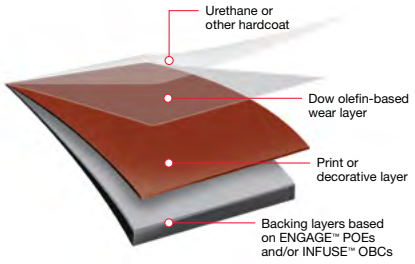
Our readily recyclable, olefin-based products also help enable the development of "free-from" flooring (e.g., phthalate-free, polyvinyl chloride-[PVC-] free, bitumen-free, styrene-free). As a result, many of the polymers featured here are well suited to help meet a variety of global standards and certifications[1], including but not limited to:

- Cradle to Cradle Certified[2]
- Green Label and Green Label Plus[3]
- LEED Certification and Credits[4]

Multiple processing options

Our rich product portfolio can be used in extrusion, hot melt, foam, embossing, and other processes required for the manufacture of premium tile flooring.

Figure 1: Deconstructed LPT



Resilient flooring options

Luxury polyolefin tile (LPT)

This innovative, resilient flooring solution enables production of halogen- and plasticizer-free alternatives to luxury vinyl tile, which is typically made with PVC. ENGAGE™ Polyolefin Elastomers (POEs) and INFUSE™ Olefin Block Copolymers (OBCs) are a great fit for LPT base layers due to their:

- Excellent temperature stability, which allows multiple re-extrusions for easier recyclability while maintaining processability and physical properties
- Ability to accept multiple cycles of re-extrusion with little to no impact on viscosity (Figure 2) or tensile properties (Figure 3)
- Acceptance of up to 85 percent filler (depending on process) while also maintaining physical properties
- Low density, which translates to
  - Fewer pounds needed to produce the same amount of backing
  - Lighter weight than halogenated materials
- Low volatile organic compounds (VOCs) and odor for enhanced indoor air quality
- Compatibility with curbside recycling streams

AFFINITY™ GA POEs and maleic anhydride (MAH) grafted AMPLIFY™ GR Functional Polymers can also be incorporated into LPT backing to help enhance adhesion, functionality, and/or temperature stability. These proven materials allow regrind, fillers, and other additives to be easily incorporated while maintaining processability and key properties. We also offer a variety of olefin-based wear layer technologies and products to meet your performance and fabrication process needs.

Figure 2: Recyclability – effect of re-extrusion on viscosity[5]

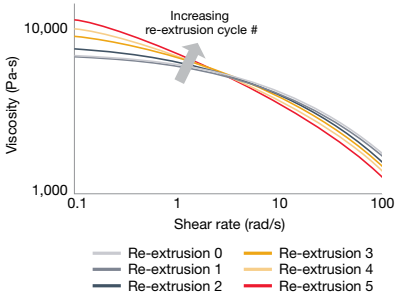
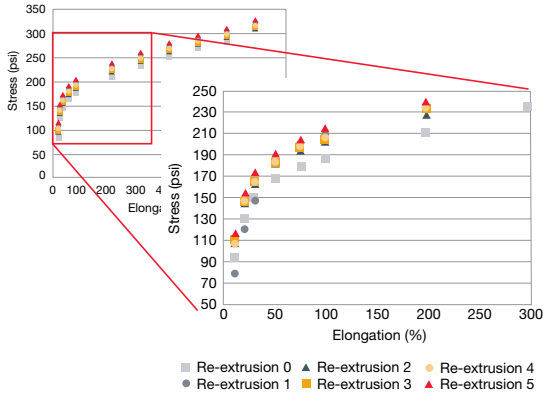


Figure 3: Recyclability – effect of re-extrusion on tensile properties[5]



[1] The flooring manufacturer is responsible for ensuring the final product meets the requirements for any standard and/or certification.
[2] Cradle to Cradle Certified is a certification mark licensed exclusively for the Cradle to Cradle Products Innovation Institute.
[3] Green Label and Green Label Plus are registered trademarks of the Carpet and Rug Institute (CRI).
[4] LEED – an acronym for Leadership in Energy and Environmental Design™ – is a registered trademark of the U.S. Green Building Council®.
[5] 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.

Luxury vinyl tile (LVT)

LVT is a highly respected, widely used resilient flooring solution that requires a plasticizer to maintain long-term flexibility and durability in the PVC component. Liquid plasticizers, however, tend to migrate within LVT systems or from the backing layer into the installation adhesive. The result can be loss of adhesion, or even damage to other layers.

ELVALOY™ Polymer Modifiers are proven to offer excellent performance as a non-migrating plasticizer. In fact, any LVT layer that exhibits plasticizer migration can potentially be improved with ELVALOY™.

To help demonstrate this – and the impact of plasticizer migration on adhesive strength – tests were conducted based on ASTM D7888. Three formulations (Table 1) were used with a typical retail DIY adhesive to bond two PVC plaques. The assembled samples were then wrapped in aluminum foil and oven aged for 15 days at 60°C. After aging, the samples were cooled, then clamped into an Instron tensile tester and pulled apart vertically at a rate of 1 inch/minute. As seen in Figure 5, the samples using ELVALOY™ as the plasticizer exhibited the best adhesion of the materials tested, with greater force and extension required to pull them apart.

Figure 4: Deconstructed LVT

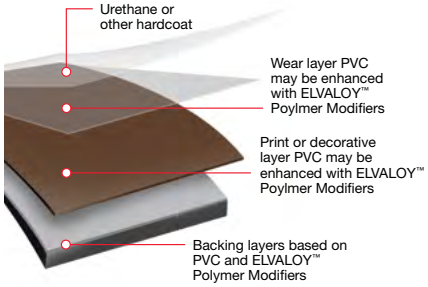


Figure 5: Adhesive strength pull test[1]

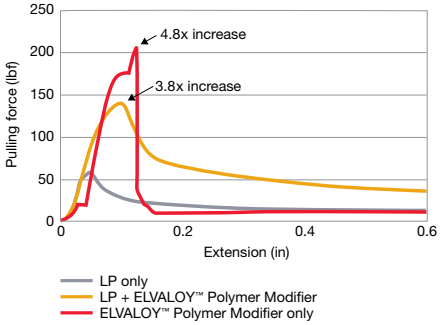


Table 1: Formulations tested (parts per 100 parts PVC by weight)[1]

	Formulation/Plasticizer		
Ingredient	**Liquid plasticizer (LP)**	**LP + ELVALOY™**	**ELVALOY™**
PVC (K=69)	100	100	100
ELVALOY™ 741 Polymer Modifier	-	30	50
DOTP	35	15	-
$CaCO^3$ filler	400	400	400
Other ingredients	9	9	9

Table 2: Product offerings for LPT and LVT flooring[1, 2]

Product	Density (g/cc)	Melt index (g/10 min.)	MAH functionality	Recommended use
LPT				
ENGAGE™ 8401 POE	0.885	30	-	Tune backing layer formulation dimensional stability (growth with temperature) with density and formulation viscosity with melt index. Allow regrind, fillers, and other additives to be incorporated while maintaining processability and key properties.
ENGAGE™ 8402 POE	0.902	30	-	
INFUSE™ 9007 OBC	0.866	0.5	-	
AFFINITY™ GA 1875 POE	0.870	1,250	-	
AFFINITY™ GA 1900 POE	0.870	1,000	-	
AFFINITY™ GA 1950 POE	0.874	500	-	
AFFINITY™ GA 1000R POE	0.878	660	Yes	Bind fillers to polymer matrix in backing layers using same principles stated above.
AMPLIFY™ GR 204 Functional Polymer	0.953	12	Yes	
AMPLIFY™ GR 216 Functional Polymer	0.870	1.3	Yes	
LVT				
ELVALOY™ 741 Polymer Modifier	1.00	35	-	Any layer that exhibits plasticizer migration.
ELVALOY™ 742 Polymer Modifier	1.02	35	-	
ELVALOY™ HP661 Polymer Modifier	0.960	12	-	Potentially improve clear or light-colored layers that exhibit plasticizer migration.

[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.
[2] Consult your Dow representative for other grade recommendations based on application needs.

Great looks are **only the beginning.**

Antique wood. Pockmarked granite. Rich Italian marble. These are just a few of the stunningly realistic LPT and LVT finishes that can be produced at a fraction of the cost of real materials. And, by combining our ideas, we can take both residential and commercial flooring even further. Enhanced durability, flexibility, processability, and sustainability help lay the groundwork for great things to come.

Making better carpet. **Layer by layer.**

We understand the unique challenges of premium carpet tile. By teaming up, we can create optimized solutions that look fantastic, with virtually seamless appearance, incredibly intricate patterns, and excellent coloring. Equally important, they can meet and exceed expectations for sustainability, durability, and processability.

Proven choices for premium flooring

Carpet tile

Similar to LPT applications, ENGAGE™ POEs and INFUSE™ OBCs bring a long list of performance- and sustainability-related benefits to carpet tile backing. By providing an alternative to the PVC and bitumen traditionally used, these materials help enable the formulation of "free-from" flooring solutions that permit reprocessability and help reduce VOC levels while enhancing durability and dimensional stability.

AMPLIFY™ GR Functional Polymers can also help improve functionality, temperature stability, and/or adhesion. Plus, manufacturers who prefer an all-olefin backing system can use a high performance pre-coat based on Dow polyolefin dispersion technology to replace the conventional, styrene-based latex.

Likewise, ELVALOY™ Polymer Modifiers can help boost long-term durability and reduce plasticizer migration in PVC-based carpet backing, just as they do for LVT applications.

Figure 6: Deconstructed carpet tile

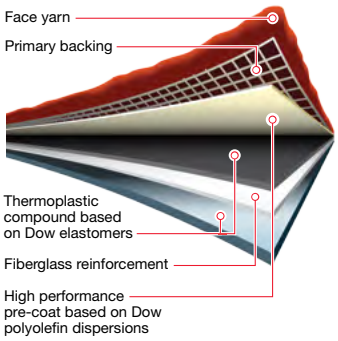


Table 3: Product offerings for carpet tile flooring[1, 2]

Product	Density (g/cc)	Melt index (g/10 min.)	MAH functionality	Recommended use
Carpet tile				
ENGAGE™ 8401 POE	0.885	30	-	Backing layer extrusion grade; tune backing layer formulation dimensional stability (growth with temperature) with density and formulation viscosity with melt index.
ENGAGE™ 8402 POE	0.902	30	-	
INFUSE™ 9900 OBC	0.880	30	-	Backing layer hot melt grade.
AMPLIFY™ GR 204 Functional Polymer	0.953	12	Yes	Bind fillers to polymer mix in backing layer.
AMPLIFY™ GR 216 Functional Polymer	0.870	1.3	Yes	
ELVALOY™ 741 Polymer Modifier	1.00	35	-	Recommended for highly-filled applications.
ELVALOY™ 742 Polymer Modifier	1.02	35	-	
ELVALOY™ HP661 Polymer Modifier	0.960	12	-	Recommended for premium performance in clear or light-colored applications.

Keep moving forward

We're always investing in innovation. Continually working to improve our flooring solutions. Collaborating with customers and other value chain members to enable more advanced, sustainable premium tile flooring systems. We hope you'll join us as we continue to discover exciting new answers to the toughest flooring challenges.

Please contact your Dow representative, call the nearest location on the following page, or visit **www.dow.com** for more information.

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About Dow

The Dow Chemical Company (Dow) combines science and technology knowledge to develop premier materials science solutions that are essential to human progress. Dow has one of the strongest and broadest toolkits in the industry, with robust technology, asset integration, scale, and competitive capabilities that enable it to address complex global issues. Dow's market-driven, industry-leading portfolio of advanced materials, industrial intermediates, and plastics businesses deliver a broad range of differentiated technology-based products and solutions for customers in high-growth markets such as packaging, infrastructure, and consumer care. More information can be found at **www.dow.com**.

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