The industry-driven transition from traditional thermoset rubber hoses for internal combustion engine (ICE) vehicles to thermoplastic solutions is supported by the change in requirements for BEV thermal management systems compared to ICEs in terms of **temperature, pressure, level of vibration and length**, while the desire to reduce weight and cost remains. Dow’s polyolefin portfolio offers a full range of polyethylene products, polyolefin elastomers, EPDM and functional polyolefins, coupled with Dow’s expertise in polymer design and engineered polymer modification to allow the **development of new materials for the long-term optimization** of BEV glycol fluid pipe and hose systems.

For current incumbent polypropylene/adhesive/polyamide multilayer BEV coolant pipes, Dow has a variety of solutions overcoming challenges in each individual layer:

<table>
<thead>
<tr>
<th>Layers in BEV hose</th>
<th>Challenges</th>
<th>Dow Solutions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Polyamide layer</td>
<td>Toughness, Flexibility, Hydrolytic stability</td>
<td>FUSABOND™ Functional Polymers, ENGAGE™ Polyolefin Elastomers</td>
</tr>
<tr>
<td>Adhesive layer</td>
<td>Adhesion, Processability, Toughness</td>
<td>BYNEL™ Adhesive Resins</td>
</tr>
<tr>
<td>Polypropylene layer</td>
<td>Toughness, Processability</td>
<td>ENGAGE™ Polyolefin Elastomers, INFUSE™ Olefin Block Copolymers</td>
</tr>
</tbody>
</table>

**BYNEL™ 50E571 Adhesive Resin** is qualified in multilayer thermoplastic coolant hoses for electric vehicles.

**Dow multilayer thermoplastic (MLT) prototype**

BYNEL™ Adhesive Resin versatility is demonstrated by the MLT prototype, a combination of PE/PA tie layer technology (BYNEL™) with high-temperature polyethylene technology (DOWLEX™ PE-RT) for optimized flexibility and cost/performance.

**Key offerings**

- Tie layer and adhesive resin chemistry
- Polyethylene solutions in pipes and hoses
- Elastomers with flexibility and high temperature resistance

**Multilayer thermoplastic hoses for BEV glycol fluid systems**

Enabling new hose structures to deliver the evolving design requirements of battery electric vehicles (BEV) for Scope 3 carbon emission reduction

©™ Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
Climate protection

- Enhanced tie layer performance in toughness and temperature resistance with BYNEL™ Adhesive Resin for bonding polyolefin layers to polar layers like polyamide
- Combined with high-temperature polyethylene technology (DOWLEX™ PE-RT) for optimized flexibility and cost-performance balance
- Long-term optimization of BEV coolant hose structures through wide range of high-performance material options and expertise in polyethylene and elastomers
- Enabling design for flexibility, temperature resistance, processability and recyclability

About Dow
Dow (NYSE: DOW) combines global breadth; asset integration and scale; focused innovation and materials science expertise; leading business positions; and environmental, social and governance leadership to achieve profitable growth and help deliver a sustainable future. The Company’s ambition is to become the most innovative, customer centric, inclusive and sustainable materials science company in the world. Dow’s portfolio of plastics, industrial intermediates, coatings and silicones businesses delivers a broad range of differentiated, science-based products and solutions for its customers in high-growth market segments, such as packaging, infrastructure, mobility and consumer applications. Dow operates manufacturing sites in 31 countries and employs approximately 37,800 people. Dow delivered sales of approximately $57 billion in 2022. References to Dow or the Company mean Dow Inc. and its subsidiaries. For more information, please visit www.dow.com or follow @DowNewsroom on Twitter.

Dow Europe GmbH
Bachtobelstrasse 4
8810 Horgen
Switzerland

US
Toll Free  800 441 4DOW
          989 832 1542

International
Europe / Middle East  + 800 36 94 63 67
Italy       + 800 783 825
Asia / Pacific + 800 77 76 77 76
          + 60 37 958 3392
South Africa + 800 99 5078

dow.com

Notice: No freedom from infringement of any patent owned by Dow or others is to be inferred. Because use conditions and applicable laws may differ from one location to another and may change with time, the Customer is responsible for determining whether products and the information in this document are appropriate for the Customer’s use and for ensuring that the Customer’s workplace and disposal practices are in compliance with applicable laws and other governmental enactments. Dow assumes no obligation or liability for the information in this document. No warranties are given; all implied warranties of merchantability or fitness for a particular purpose are expressly excluded. This document is intended for global use.

® ™Trademark of The Dow Chemical Company (“Dow”) or an affiliated company of Dow
Form No. 777-176-01-0523PN