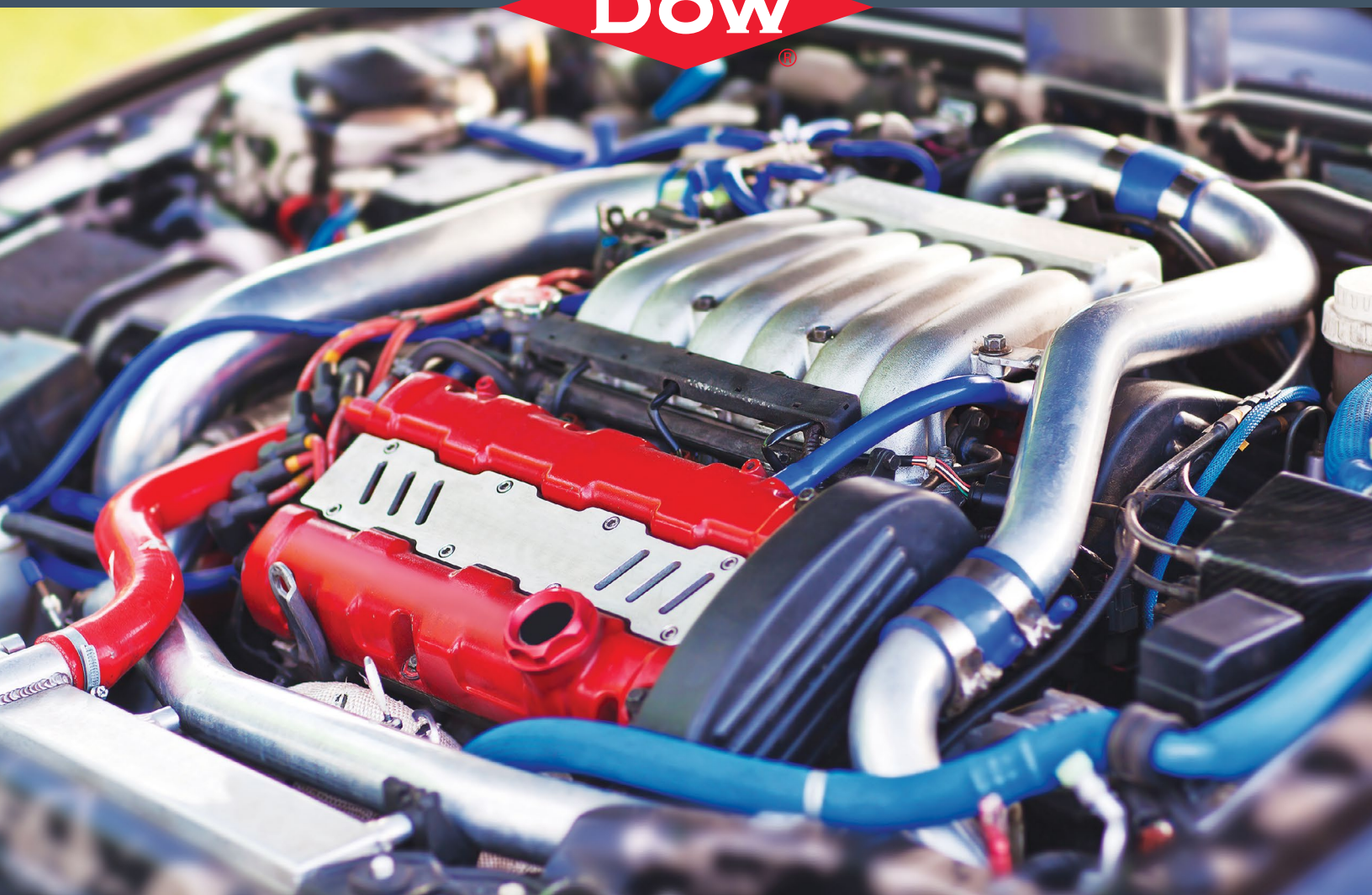
AUTOMOTIVE AND TRANSPORTATION

Can smart science drive design innovation?

Silicone options for vehicle powertrain systems

DOW®



Help increase performance reliability with silicone powertrain solutions

Breakthrough technologies are driving notable innovation in advanced vehicle powertrain systems. In addition to potential increased electrification, key design trends include targeted improvements in fuel or energy efficiency, component durability, driving experience, and optimized reliability, as well as addressing increasing under-the-hood temperatures. Dow Performance Silicones can help you meet these challenges with a wide range of successful, effective materials to help drive powertrain design.

Range of high-performance silicone materials

Silicones are remarkably versatile materials that can be produced in different forms for many uses. These materials can be formulated to meet specific process and performance requirements. For current and emerging vehicle powertrain systems, Dow offers:

- Engineered elastomers for fabricated components, seals and gaskets
- Adhesives and sealants for assembly bonding and component sealing

With excellent resistance to extreme heat, cold and aggressive fluids, these silicones from Dow have shown to be effective design solutions in a wide range of powertrain applications.

Potential applications: Silicones for powertrain reliability

Advanced silicone materials from Dow can help drive design innovation for increasing component durability and improving powertrain reliability. Potential applications include:

- Cooling and climate-control component seals
- Coolant and heater hoses
- Fabricated CVJ boots, engine mounts and exhaust hangers
- Transmission, gearbox and differential cover seals
- Engine seals and gaskets for manifolds, oil pans and rocker covers
- Flexible diaphragms for EGR valves and fuel systems
- Molded fuel line quick-connectors
- Turbocharger hoses and intercooler hoses

SILASTIC™ silicone elastomers by DOW

DOWSIL™ silicones by DOW

Selection guide: Advanced silicone materials for vehicle powertrain systems design

Powertrain application need	Design needs	Potential solutions	Regional availability[1]				Selection criteria
			NA	LA	EMEAI	APAC	
Cooling, climate control: Fan clutch seals	• Seal in torque transfer fluid • Easily dispense seal material • Provide adhesive/gap-sealing performance	DOWSIL™ 3-0100 Automotive Sealant	●	●	●	●	• Process ease for formed-in-place gasketing • Noncorrosive, self-priming with room temperature cure • Excellent adhesion to different substrates
		DOWSIL™ 3-0105 Automotive Sealant	●	●	●		
		DOWSIL™ 3-0115 Automotive Sealant	●	●	●	●	
Cooling, climate control: Thermostat housing seals	• Provide reliable sealing on plastics and metals • Withstand pressures up to 20 psi and temperatures from -55 to 185°C • Low compression set	**Compression seal (2 part):**					• Choose one-part RTV or two-part heat-cured materials • Meet specific process and performance requirements • Speed production with automatic (robotic) dispensing
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
		Adhesive seal (1 part):					
		DOWSIL™ 3-0100 Automotive Sealant	●	●	●	●	
		DOWSIL™ 3-0105 Automotive Sealant	●	●	●		
		DOWSIL™ 3-0115 Automotive Sealant	●	●	●	●	
Cooling, climate control: Low-pressure heater hoses	• Good chemical/solvent resistance • Durable high-temperature performance • Easy processing for calendering or extrusion	SILASTIC™ 27788-Z BLU Silicone Rubber Blue	●	●	●	●	• Choice of colors • Processing options for calendering or extrusion • Application-matched performance properties
		SILASTIC™ 27788-Z RED Silicone Rubber Red	●	●	●	●	
		SILASTIC™ 27790-Z GRN Silicone Rubber Green	●				
Cooling, climate control: Radiator seals	• Seal in coolant • Maintain sealing performance from -50 to 200°C and at pressures up to 20 psi • Provide compression gasket for engineered groove	**Cure-in-place compression gasketing for end caps:**					• Meet compression set requirements • Easy processing with 1:1 mix ratio of two-part heat-cured materials • Extrusion rate options
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
		XIAMETER™ RBL-2004-70 Liquid Silicone Rubber	●		●	●	
Cooling, climate control: Radiator and coolant hoses	• Good chemical/solvent resistance • Durable high-temperature performance • Easy processing for calendering or extrusion	SILASTIC™ HCE-65-1030-NP HCR Silicone Rubber	●				• Silicone rubber bases for custom compounding to meet specialized needs • Fully formulated custom high-consistency rubber compounds to meet performance and processing requirements • Choice of colors and performance properties to meet application specifications • Efficient processing with range of cure times and temperatures • Enhanced elongation and tear strength
		SILASTIC™ HCE 65-4815 V4 Black	●	●	●	●	
		SILASTIC™ HCE-70-1026-NP HCR Silicone Rubber	●				
		SILASTIC™ 20031-D BLU Silicone Rubber (Blue)	●				
		SILASTIC™ 20032-D RED Silicone Rubber (Red)	●				
		SILASTIC™ 20039-D GRN Silicone Rubber (Green)	●				
		SILASTIC™ 20063-L BLK Silicone Rubber (Black)	●				
		SILASTIC™ 20093-T RED Silicone Rubber	●				
		XIAMETER™ RBB-2100-60 Base	●	●	●	●	
		XIAMETER™ RBB-2100-70 Base	●	●	●	●	
		XIAMETER™ RBC-7022-70 Compound E-Blue Coil	●				
		XIAMETER™ RBC-7023-70 Compound E-Green Coil	●				
		XIAMETER™ RBC-7024-70 Compound E-Red Coil	●				

[1]Products may not be available in all countries within a region. Visit **dow.com** to see specific buying options, or contact your local representative for more information.

The graphic representations are presented here for illustrative purposes only and should not be construed as product specifications.

Powertrain application need	Design needs	Potential solutions	Regional availability[1]				Selection criteria
			NA	LA	EMEAI	APAC	
Driveline: CVJ boots	• High flex-fatigue life • Durable flexibility over a wide temperature range • Good resistance to lubricants and road contaminants	SILASTIC™ HC M 60-1225 Gray	●	●	●	●	• High-consistency rubber; fully compounded for application needs • Range of durometer hardness • Economical processing
		SILASTIC™ HCM 1102 Coil Black	●				
		SILASTIC™ WS 178-60-03 Black	●	●	●	●	
		SILASTIC™ WS 190-60-01 Silicone Rubber Black			●		
Driveline: Transmission seals	• Seal in transmission fluids at temperatures from -50 to 200°C • Provide adhesive seal for engineered groove • Facilitate automatic/robotic dispensing with various cure profiles	**Compression sealing (2 part):**					• Choose one- or two-part RTV or heat-cure materials • Achieve very thin bond line thicknesses, potential cost savings with low-density options • Speed production with automatic (robotic) dispensing
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
		Adhesive seal (1 part):					
		DOWSIL™ Q3-1566 Heat-Resistant Adhesive/Sealant	●	●	●	●	
		DOWSIL™ 3-0100 Automotive Sealant	●	●	●	●	
		DOWSIL™ 3-0105 Automotive Sealant	●	●	●		
		DOWSIL™ 3-0115 Automotive Sealant	●	●	●	●	
		DOWSIL™ 7091 Adhesive Sealant	●	●	●	●	
		Inspection cover exposed to fluid splash only:					
		SILASTIC™ RBL-9694-20P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ 3-8186 Thixotropic Foam	●	●	●	●	
Driveline: Differential, axle cover seals	• Reliably seal gear lubricant • Withstand service temperatures from -50 to 200°C • Provide compression and/or adhesive sealing • Allow automatic/robotic dispensing	**Compression seal (2 part):**					• Select one- or two-part materials • Meet processing requirements with different cure profiles • Match application needs with specific performance properties
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
		Adhesive seal (1 part):					
		DOWSIL™ 3-0100 Automotive Sealant	●	●	●	●	
		DOWSIL™ 3-0105 Automotive Sealant	●	●	●		
		DOWSIL™ 3-0115 Automotive Sealant	●	●	●	●	
		DOWSIL™ 732 Multi-Purpose Sealant	●	●	●	●	
		DOWSIL™ 737 Neutral-Cure Sealant	●	●	●	●	
		DOWSIL™ 7091 Adhesive Sealant	●	●	●	●	
Engine: Air intake manifold gasket	• Oil resistance • Good resistance to compression set	**Cured-in-place gasketing (CIPG):**					• Versatile two-part, heat-cure LSR kits especially suitable for FIPG seals • Successful, effective performance
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
Engine: Air intake, induction system seals	• Seal out moisture, dust and contaminants • Seal in pressure • Provide either compression seal or adhesive seal	**Compression seal:**					• Silicone rubber foam especially suited for low-force seals • Two-part LSR with heat cure • One-part, ready-to-use sealant with room temperature cure
		SILASTIC™ RBL-9694-20P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ 3-8186 Thixotropic Foam	●	●	●	●	
		Adhesive seal:					
		DOWSIL™ 736 Heat-Resistant Sealant	●	●	●	●	

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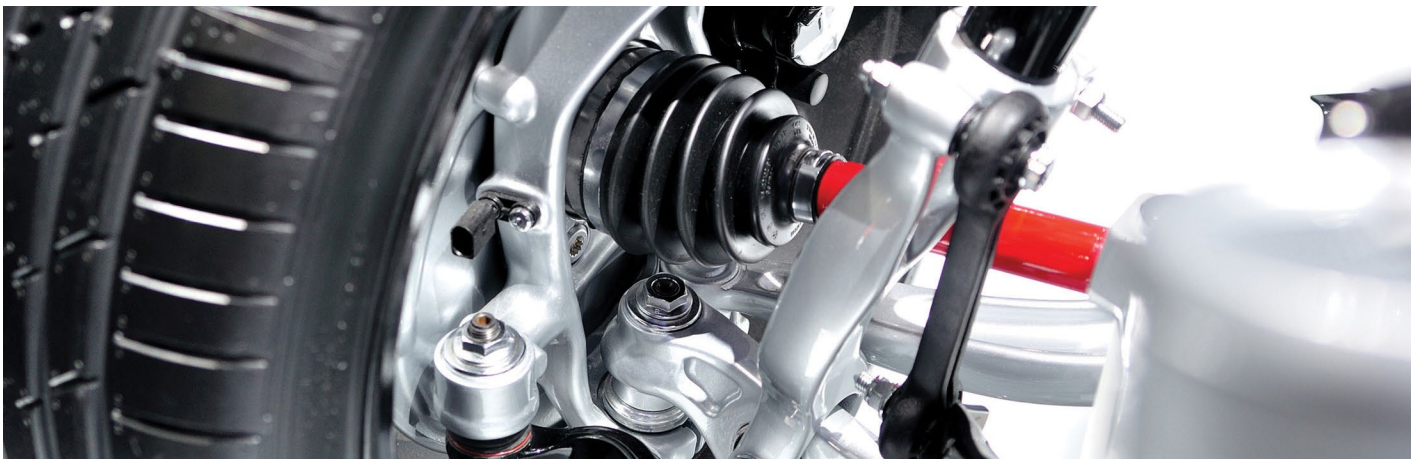

Powertrain application need	Design needs	Potential solutions	Regional availability[1]				Selection criteria
			NA	LA	EMEAI	APAC	
Engine: Anti-drainback oil filter valve	• Stable mechanical properties • Resistance to engine oils, including synthetics • Resistance to hardening or softening over a wide range of service temperatures	SILASTIC™ LSR 9390-70 Liquid Silicone Rubber	●	●	●	●	• Application-matched, proven sealing materials • Resistance to compression set, cracking and leaking • Easy processing/fabricating
		XIAMETER™ 21068-V Silicone Rubber Red	●				
Engine: Engine mounts, exhaust hangers	• High tear strength • Stable mechanical properties • Long-term resistance to extreme heat and cold	**Rubber compounds for fabricated parts:**					• High-consistency silicone rubber compounds to meet specific application requirements • Range of engineered elastomers with successful, effective performance
		SILASTIC™ EHX55MHS11 Grey 7035	●	●	●	●	
		SILASTIC™ HCM 65-5047 HS Green	●	●	●	●	
		SILASTIC™ 21058-V Red Silicone Rubber Red	●				
		XIAMETER™ HCM 75-4731 HCR Silicone Rubber	●	●	●	●	
		XIAMETER™ 24104-V Silicone Rubber Brown	●				
		XIAMETER™ 24140-V Silicone Rubber Brown	●				
		XIAMETER™ 24142-V HCR Silicone Rubber	●				
Engine: EGR valve diaphragms	• Good fuel resistance • Durable flexibility in high service temperatures	**Fluoro-liquid silicone rubber (F-LSR):**					• Meet application requirements with excellent fuel/exhaust resistance • Range of hardness, tear strength and elongation levels available • Choice of fluoro-liquid silicone rubber for injection molding or FSR compounds for other process options
		SILASTIC™ FL 30-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ FL 40-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ FL 60-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		Fluorosilicone rubber compounds (FSR):					
		SILASTIC™ EFX70MLC00 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ 28075HD-V Fluorosilicone Rubber	●				
Engine: Fuel delivery diaphragms	• Long-term fuel resistance • Good flexibility over a wide range of service temperatures	**Fluoro-liquid silicone rubber (F-LSR):**					• F-LSR compounds for high-volume injection molding processes • FSR compounds customized to meet range of application requirements
		SILASTIC™ FL 30-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ FL 40-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ FL 60-9201 Fluoro Liquid Silicone Rubber	●	●	●	●	
		Fluorosilicone rubber compounds (FSR):					
		SILASTIC™ EFX20MHS00 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ EFX30MHS00 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ EFX60MHS00 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ EFX60MLC00 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ FCM 55-1241-FX Fluorosilicone Rubber-Red	●				
		SILASTIC™ FCM 60-1278 FX FSR Rubber Red	●		●		
		SILASTIC™ 28075HD-V Fluorosilicone Rubber	●				
		SILASTIC™ 28819-V Fluorosilicone Compound	●				
		SILASTIC™ 38640-V Fluorosilicone Rubber	●		●	●	
Engine: Fuel delivery quick-connector seals	• Fuel resistance • Good flexibility in heat/cold • Good permeation resistance • Good compression set resistance and stress relaxation properties • Low swell • High tear strength	SILASTIC™ EFX70MLC00 Fluorosilicone Rubber	●	●	●	●	• Customized compounds for fabricated parts • Options in viscosity, cure rates and hardness • Match performance properties to application requirements
		SILASTIC™ EFX75MLC10 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ FCM 75-4955 LC Yellow	●	●	●	●	
		SILASTIC™ FCM 75-4955 Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ 28075HD-V Fluorosilicone Rubber	●				
Engine: Fuel system bonding and sealing	• Seal in fuel over a wide range of temperatures and pressures • Minimal acceptable flange widths	**Adhesive seal:**					• One-part fluorosilicone with excellent heat stability • Fast extrusion rate and tack-free time • Good mechanical and dielectric strength
		DOWSIL™ 730 FS Solvent-Resistant Sealant	●	●	●	●	

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Powertrain application need	Design needs	Potential solutions	Regional availability[1]				Selection criteria
			NA	LA	EMEAI	APAC	
Engine: Oil pan gasket	• Good resistance to engine oils, including synthetics • Resist compression set and retain flexibility across service temperature range	XIAMETER™ Q4-2918 Black Silicone Rubber Compound	●				• Successful, effective performance • Easy-to-use compounds to meet process requirements
		XIAMETER™ Q4-2918LV Dark Black Silicone Rubber Compound	●				
Engine: Rocker cover gasket	• Good oil resistance • Good compression set resistance and compression stress relaxation	**Rubber compounds for fabricated parts:**					• Application requirements met with customized rubber compounds for either fabricated or FIPG seals • High-consistency rubber compounds with choice of mechanical properties • Easy processing with 1:1 mix ratio of two-part heat-cured materials • Extrusion rate options
		XIAMETER™ MX 4108 HCR Silicone Rubber	●	●	●	●	
		XIAMETER™ Q4-2918 Black Silicone Rubber Compound	●				
		XIAMETER™ Q4-2918LV Dark Black Silicone Rubber Compound	●				
		XIAMETER™ 24048-V HCR Silicone Rubber	●	●	●	●	
		XIAMETER™ 24057-V DBLK Silicone Rubber Black	●		●		
		XIAMETER™ 24096-V Silicone Rubber Gray	●				
		XIAMETER™ 24097-V HCR Silicone Rubber	●		●		
		Cured-in-place gasketing (CIPG):					
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
Engine: Static engine seals	• Seal in oil or coolant • Withstand temperatures from 50 to 200°C and pressures under 10 psi • Serve as compression gasket or adhesive seal	**Compression gasket (2 part):**					• Meet different processing needs for formed-in-place gaskets and seals • Choose one-part RTV or two-part heat-cured materials • Speed production with automatic (robotic) dispensing • Meet application requirements for specific performance properties
		SILASTIC™ RBL-9694-30P A&B Liquid Silicone Rubber	●	●	●	●	
		SILASTIC™ RBL-9694-45M A&B Liquid Silicone Rubber	●	●	●	●	
		Adhesive seal with on-line pressure check (1 part):					
		DOWSIL™ 3-0105 Automotive Sealant	●	●	●		
		DOWSIL™ 3-0115 Automotive Sealant	●	●	●	●	
		Adhesive seal without on-line pressure check (1 part):					
		DOWSIL™ 3-0100 Automotive Sealant	●	●	●	●	
		DOWSIL™ 737 Neutral Cure Sealant	●		●	●	
		DOWSIL™ 1080 Oxime Sealant	●	●	●	●	
		DOWSIL™ 7091 Adhesive Sealant	●	●	●	●	
		DOWSIL™ Q3-1566 Heat-Resistant Adhesive/Sealant	●	●	●	●	
Engine: Turbocharger hoses, intercooler hoses	• Withstand a wide range of service temperatures • Good resistance to fuel, oil and exhaust gases • Good interlayer adhesion without cracking or peeling • High mechanical strength	**Silicone rubber compounds for outer layers:**					• Meet specified requirements for peel strength, interlayer adhesion, fuel resistance and other performance properties • Options for co-extrusion and calendering • Successful, effective performance compared with non-silicone options
		SILASTIC™ HCC 65-1027-NP HCR Silicone Rubber	●				
		SILASTIC™ HCC 70-1012-GP Silicone Rubber Black	●		●		
		SILASTIC™ HCC 70-1031-NP HCR Silicone Rubber	●				
		SILASTIC™ HCE 65-1299 Black	●				
		SILASTIC™ HCE 65-4815 Black	●	●	●	●	
		Self-adhesive rubber compounds:					
		Intermediate layer SILASTIC™ HCE 70-4770 SA HCR Silicone Rubber	●	●	●	●	
		Fluorosilicone rubber compound for hose liners:					
		SILASTIC™ FCC 40-4725	●	●	●	●	
		SILASTIC™ FCC 55-1047-FX Fluorosilicone Rubber	●	●	●	●	
		SILASTIC™ FCE 50-4948 SA RED Fluorosilicone Rubber	●	●	●	●	

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Powertrain application need	Design needs	Potential solutions	Regional availability[1]				Selection criteria
			NA	LA	EMEAI	APAC	
Ignition: Coil plug	• Electrical insulation for high voltages • High service temperatures	XIAMETER™ 25065-V Blk Silicone Rubber Black	●				• High-consistency silicone rubber compounds to meet specific application requirements • Available in black and white colors
		XIAMETER™ 25065-V Wht Silicone Rubber White	●				
Ignition: Coil wire	• Weatherability • Wide range of service temperatures	XIAMETER™ 39020-T Wht Silicone Rubber White	●				• High-consistency silicone rubber compounds to meet specific application requirements

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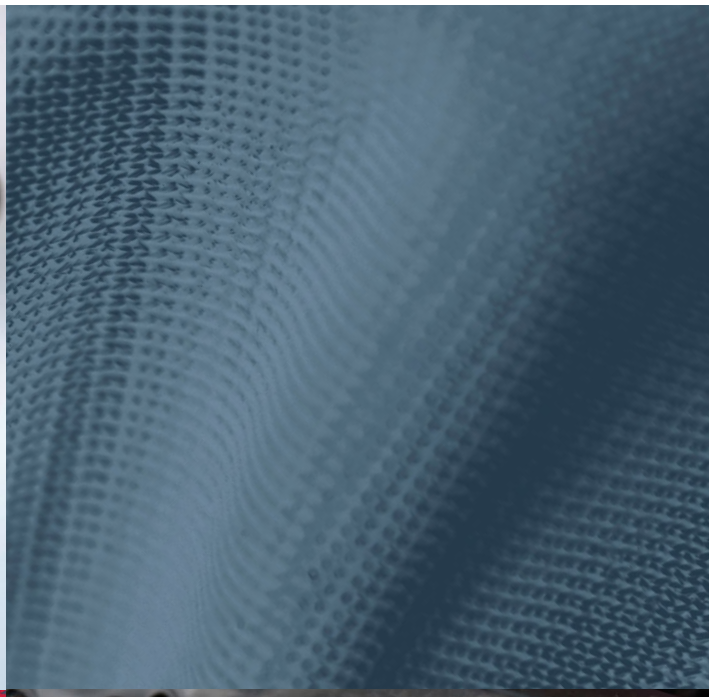

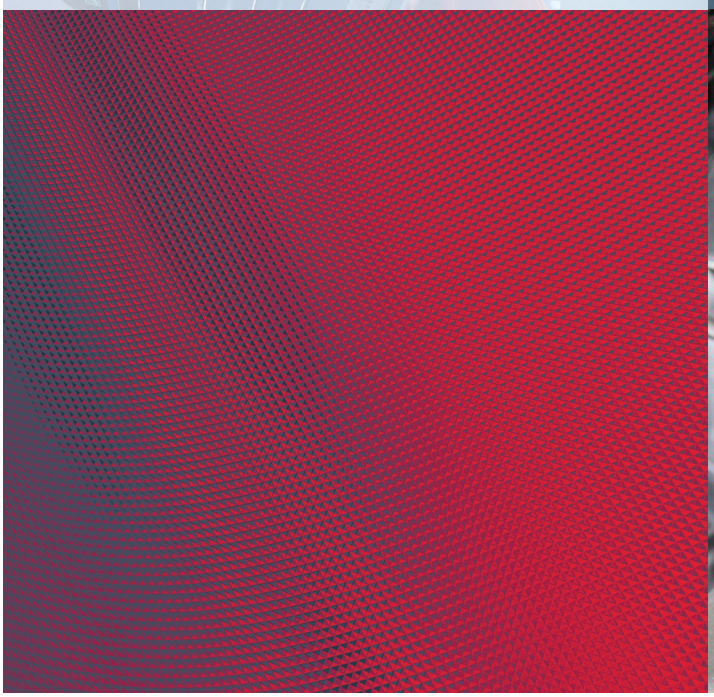

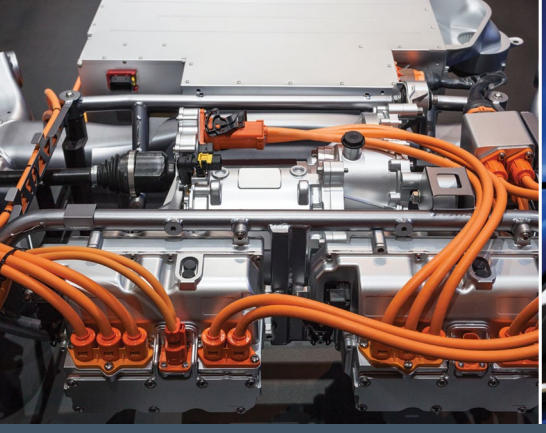

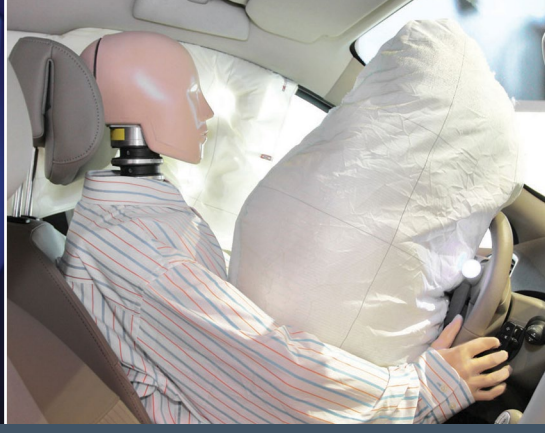

Silicone solutions from Dow for other vehicle systems

In addition to driving innovation for added component durability and improved powertrain systems reliability, advanced silicone materials from Dow are proven, effective solutions for a diverse range of applications in other vehicle systems. Our smart science in silicone elastomers, adhesives and sealants can help you meet challenging design needs in these other automotive systems:

Electrical | Lighting | Safety (airbags)

Be part of the conversation: Contact us

Learn more about Dow's industry-leading portfolio of advanced silicone-based materials for driving design innovation on vehicle powertrain systems. Meet your application requirements with SILASTIC™ engineered elastomers, DOWSIL™ adhesives and sealants, and other high-performance silicones. Contact your Dow Technical Representative or visit **dow.com/auto**.

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Product Stewardship

Dow has a fundamental concern for all who make, distribute, and use its products, and for the environment in which we live. This concern is the basis for our product stewardship philosophy by which we assess the safety, health, and environmental information on our products and then take appropriate steps to protect employee and public health and our environment. The success of our product stewardship program rests with each and every individual involved with Dow products – from the initial concept and research, to manufacture, use, sale, disposal, and recycle of each product.

Customer Notice

Dow strongly encourages its customers to review both their manufacturing processes and their applications of Dow products from the standpoint of human health and environmental quality to ensure that Dow products are not used in ways for which they are not intended or tested. Dow personnel are available to answer your questions and to provide reasonable technical support. Dow product literature, including safety data sheets, should be consulted prior to use of Dow products. Current safety data sheets are available from Dow.

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