



If you're looking for breakthrough solutions,
the possibilities begin here



Engage® polyolefin elastomers,
the critical ingredient
for success



Staying at the top of your industry means constantly searching for new and better ways to meet the ongoing demand for higher levels of performance. Discover Engage® from DuPont Dow Elastomers. With versatile, flexible Engage® as a key enabling component in compounds and formulations, you'll realize benefits including improved processing and enhanced product performance. Not only that, but Engage® brings unique characteristics to your product, creating breakthrough solutions for you. Plus, you'll get this leading edge performance without increasing your costs. Let your vision and compounds based on Engage® introduce you to a new world of opportunity and success for your business.

EXCEPTIONAL PERFORMANCE ACROSS A SPECTRUM OF PROCESSES AND APPLICATIONS

Engage® polyolefin elastomers add enormous value when used as the primary polymer, as a modifier, or as a key compound component in blends with other polymers. When used as an impact modifier in TPOs, Engage® imparts a unique combination of processability and toughness, as well as providing softness and UV stability. In thermoplastic

molding and extrusion, compounds based on Engage® reduce weight and increase low temperature impact resistance. And in crosslinked applications, compounds based on Engage® improve heat aging properties and resistance to weathering.

Engage® is available in a wide range of grades with many variations in mechanical properties to meet or exceed your expectations in a number of critical processing and performance areas. And, because Engage® is engineered to process like a thermoplastic and perform like an elastomer, compounds based on Engage® excel in flexibility, hardness, elasticity and clarity.

Whether your business is automotive, flexible goods, wire and cable, or another industry that needs innovative solutions, choosing Engage® as the "neat" (primary) elastomeric polymer or as a modifying ingredient will give you a competitive edge. With the help of Engage® and DuPont Dow Elastomers, you can create innovative solutions for current applications, and capitalize on new growth opportunities quickly and cost effectively.





Engage® adds
the advantage
 from compound to finished product

AN IDEAL BALANCE OF PREDICTABLE, CONSISTENT PERFORMANCE IN BOTH PROCESSING AND IN CRITICAL PROPERTIES.

The Engage® family of elastomers is produced via state-of-the-art metallocene polymerization catalyst and manufacturing process technology. Because of this leading edge technology, you can expand your options in a wide range of applications including TPOs, thermoplastic materials, and crosslinked thermosets.

FORM FOLLOWS FUNCTION - PELLETS SIMPLIFY COMPOUNDING IN CONTINUOUS AND BATCH MIXES.

The unique form of Engage® is changing the way the industry mixes and extrudes material. Engage® is conveniently packaged for easy storage, transfer and handling.

The uniform-sized pellets allow you to upgrade twin screw compounding/extrusion mixing in addition to improving traditional Banbury mixing, producing faster cycle times and significantly reducing your labor handling and production costs. The pellets enhance mix dispersion, reduce waste, and allow for faster temperature rise and more uniform mixes in internal mixers or continuous compounders.

ENGAGE® POLYOLEFIN ELASTOMERS	
Typical properties*	Range of values
Density, g/cc, ASTM D-792	0.857 - 0.913
Flexural Modulus, 2% Secant, MPa, ASTM D-790	3 - 190
Tensile Strength, MPa, ASTM D-68	4 - 35
100% Modulus, MPa, ASTM D-412	1 - >5
Elongation, %, ASTM D-638	700+
Melting Point, °C	33 - 107
Hardness, Shore A, ASTM D-2240	50 - 95
Haze, %, ASTM D-1003 (1.78 mm injection molded plaque)	<10 - 20
Melt Index, I2 ASTM D-1238, dg/min	0.5 - 30
Low Temperature Brittleness, °C, ASTM D-746	Below -76

* These are typical properties of unfilled polymer only and are not to be regarded as sales specifications.



Engage® polyolefin elastomers improve TPO impact performance

SUPERIOR BALANCE OF PROPERTIES

When used as an impact modifier in TPOs, Engage® greatly improves the performance of the polymer it's replacing, including EPDM. Count on compounds based on Engage® to strike the ideal balance between the stiffness you want and the ductility you need. In fact, at equivalent loadings of elastomer, you can realize a higher modulus TPO at equivalent ductility. Even at -30°C, TPO compounds based on Engage® maintain their integrity in high-impact applications. The superior balance of properties allows you to produce parts that are lighter, thinner, more ductile and more resistant to weather and sunlight. So, you're not only getting better parts, you're getting better value too.

BETTER COMPATIBILITY WITH HIGH FLOW POLYPROPYLENE

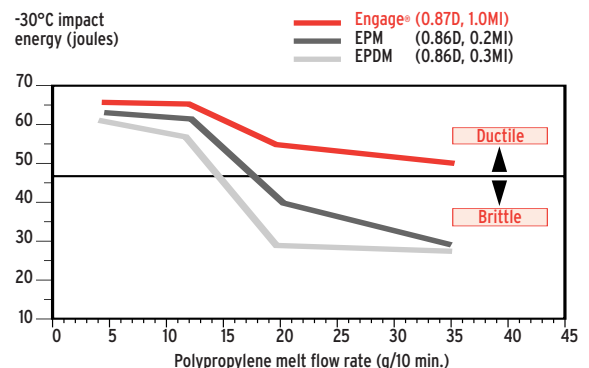
Polypropylene's characteristics make it difficult to impact modify with high viscosity materials such as EPDM. But, compounds based on Engage® have low molecular weight, good part fill and good flowability. You can rely on Engage® to bring better, more efficient processing characteristics to high flow polypropylene, while at the same time contributing improved knit (weld) line strength and durability to the manufactured product. The compatibility of Engage® with high flow polypropylene also contributes exceptional moldability to TPO blends.

IMPROVED IMPACT PERFORMANCE VS. EPDM IN TPOS

Feature	Benefit
Superior stiffness/ductility balance	Better value as an impact modifier Higher modulus TPOs with equivalent impact strength Maintains part integrity even at very low temperatures Allows use of thinner parts, reducing costs
Better and faster dispersibility	Improves impact performance of TPO blends Faster temperature rise and more uniform mixing in internal mixers Shorter cycle times in internal mixers or continuous compounders Reduces overall processing and part costs
Better compatibility with high flow PP	Produces better processing high toughness TPOs
Superior knit (weld) line strength	Improves durability of end products
Exceptional moldability	Realize faster cycle times and improved part quality
Available as pelletized elastomer	Enhanced dispersion Easier handling, transfer, storage Allows continuous extrusion/compounding capability Reduced labor handling cost vs. bales

IMPACT MODIFY HIGHER MELT FLOW POLYPROPYLENES VS. TRADITIONAL MATERIALS

Blend=70% PP + 30% Elastomer



Compounds based on Engage® in thermoplastic applications...

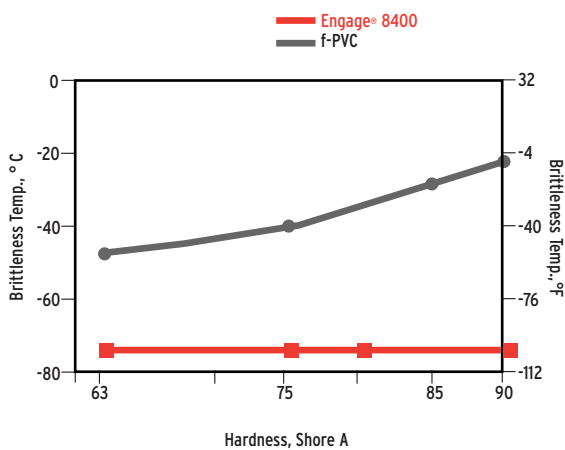
EXCELLENT COLD FLEXIBILITY

If your goal is improved flexibility under frigid conditions, then compounds based on Engage® will help your products remain tough yet flexible in temperatures below -40°C. Engage® resists low temperature brittleness better than f-PVC, which minimizes cracking, helps maintain part integrity during shipping and handling, and extends the service life of end products. Compounds based on Engage® can be engineered to offer specific levels of flexibility under extreme temperature conditions. Whether products need to perform during seasonal temperature drops or within industrial low temperature environments, you can rely on Engage® to provide tough yet flexible performance.

LIGHTER WEIGHT

Engage® can replace competitive thermoplastic materials in compounds to help reduce product weight and realize greater efficiency. For example, if you're trying to reduce part weight, Engage® can be 20 to 30 % lighter than f-PVC. With lower specific gravities than EVA, SBS and f-PVC, Engage® also produces more parts per pound of resin, which in turn improves operating efficiency, and reduces material and part costs. Your customers will benefit from lighter weight parts, whether they are developing more ergonomic shoes or more fuel-efficient cars.

LOW-TEMPERATURE BRITTLENESS STRENGTH*



*Brittleness: ASTM D746; Hardness: ASTM D2240

LIGHTER WEIGHT

	Typical Specific Gravity (g/cc)
Engage® Polyolefin Elastomers	0.86-0.91
f-PVC	1.20-1.40
SBS	1.0-1.1
EVA	0.92-0.95



...and crosslinked/thermoset truly outperform the competition

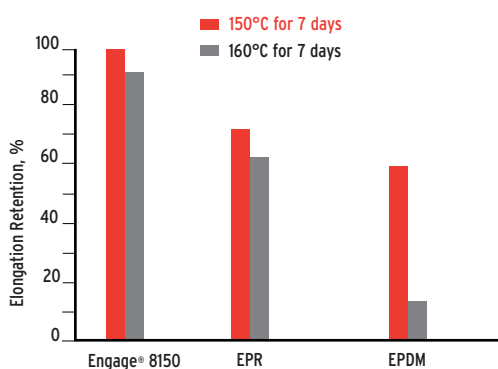
SUPERIOR HEAT RESISTANCE

Engage® can be used in high temperature formulations to provide retention of properties when exposed to temperatures above 150°C. Superior heat-aging properties versus crosslinked materials such as EPDM and EPR compounds also mean compounds based on Engage® resist heat longer without any significant sacrifice in properties. Thanks to the elastomer's ability to crosslink in rubber compounding and processing via peroxide, radiation or silane, parts based on Engage® have better heat resistance than other Class A products.

UNMATCHED WEATHER RESISTANCE

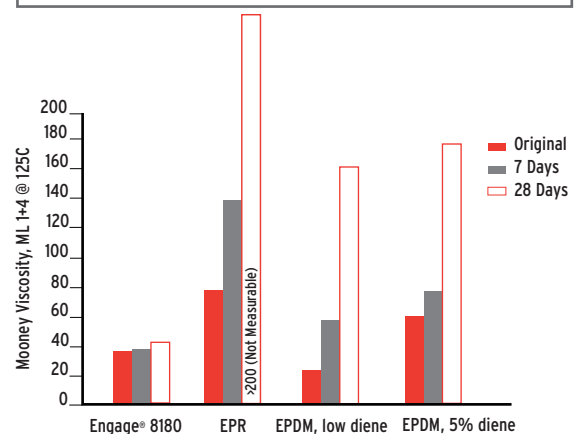
With a saturated backbone, compounds based on Engage® are inherently resistant to weathering in a way that cannot be matched by unsaturated materials such as SBS, IIR, SBR and NR. Engage® possesses a natural UV stability that results in very little degradation of molecular weight, giving you superior UV performance over EPDM and EPR materials. When high ozone resistance, resistance to other environmental effects, durability and long-term reliability are critical to performance, products based on Engage® can be counted on to provide the competitive edge.

SUPERIOR HEAT AGING PROPERTIES



Low-voltage insulation compound (peroxide crosslinked)

BETTER WEATHERABILITY



Weatherability of polymers exposed to ambient conditions



The missing ingredient that creates
superior solutions
 for your applications

Engage® can be used to replace competitive materials in compounds to improve all aspects of your business, from optimum performance in your compounding process to performance of the finished part. Engage® may be the perfect replacement ingredient in applications using f-PVC, EVA, SBS, SEBS,

EPDM, EPR, TPU and TPV. Engage® is compatible and can be easily dispersed with other polyolefins for effective blending and coextrusion. It is also compatible with existing machinery you already use for elastomers and thermoplastics processing for manufacturing efficiency.

Market Segment	Applications	Material Classes	Compound/Processing: Engage® Improves...	Final Product: Engage® Improves...
Automotive	<ul style="list-style-type: none"> • Bumpers • Rub Strip • Interior-dashboard skins, door panels, arm rests 	<ul style="list-style-type: none"> • Flexible thermoplastics: molded, extruded, calendered 	<ul style="list-style-type: none"> • Reduced production costs • Processing efficiency and stability • Broad processing window 	<ul style="list-style-type: none"> • Impact performance • Haptics, sensory feel
Wire & Cable	<ul style="list-style-type: none"> • Jackets • Insulation • Shields • Bedding Compounds • Low smoke, non halogen jackets 	<ul style="list-style-type: none"> • Thermoset elastomers: molded, extruded • Thermoplastic compounds 	<ul style="list-style-type: none"> • More cost-effective handling • Crosslinks with peroxide, silane, radiation • Thermal stability for high temperature extrusion 	<ul style="list-style-type: none"> • Weatherability • Insulation
Flexible Goods	<ul style="list-style-type: none"> • Keypads • Pens • Garden Tools/Grips • Toothbrushes/Razors • Sporting Goods • Toys • Footwear (sandals, slippers, etc.) 	<ul style="list-style-type: none"> • Thermoplastic compounds: • Flexible foams 	<ul style="list-style-type: none"> • Lighter weight • Lower density • More parts per pound • Hot runner molds for efficiency of injection molded goods 	<ul style="list-style-type: none"> • Durability, toughness • Flexibility, haptics

AUTOMOTIVE

Compounds based on Engage® improve the haptics (feel) of soft TPO skins on instrument panels, dashboard components, door and console panels, arm rests and airbag doors. As the modifier or as the major ingredient in thermoplastic compounds, Engage® contributes important processing and product benefits:

- Engage® enables production of skins that are better looking and better performing than either PVC or PVC/ABS blends.
- Engage® adds impact resistance, endurance and long term performance to hard TPE compounds used in exterior trim, bumper fascia and fender flairs.
- Engage® is less expensive than TPUs.

Under the hood, Engage® crosslinked with TPE compounds provides a balanced combination of flexibility and colorability to wire and cable.

FLEXIBLE GOODS

When flexibility and cushioning need to join forces with durability and toughness, call on compounds based on Engage®. The thermal stability of Engage® allows the use of hot runner molds to enhance efficiency in the production of injection molded parts. Engage® is used in a wide variety of durable and consumer goods, including footwear, sporting goods and general rubber industry end uses.

WIRE AND CABLE

Engage® can be crosslinked with peroxide, silane or radiation to create high-performance electrical insulation and jacketing for low- and medium-voltage cable applications. Compounds based on Engage® are also used in thermoplastic applications such as bedding compounds and low-smoke, non-halogen jackets.





DuPont Dow Elastomers technical support,
committed to your success

DuPont Dow Elastomers is committed to ensuring that compounds and blends based on Engage® deliver the properties and performance you are looking for in your product. The company's resources are available to help you with all stages of your process, from idea through final production.

Count on DuPont Dow Elastomers for product knowledge, compound design assistance, extensive technical and processing expertise, as well as for practical hands-on experience. To ensure that products based on Engage® perform the way you want them to, the R&D facilities at

DuPont Dow Elastomers, equipped with state-of-the-art laboratories and machinery, can conduct characterization testing and simulated real-world testing of products across all applications and end uses.

As a global leader in elastomer technology and manufacturing, DuPont Dow Elastomers is constantly developing new products and new technologies to meet your needs. Look to DuPont Dow Elastomers for innovative products that solve today's business needs and fulfill your vision to meet tomorrow's performance goals.





HELPING YOU DEVELOP BREAKTHROUGH SOLUTIONS AND UNIQUE PRODUCTS

Add leading edge performance to compounds and formulations with Engage® polyolefin elastomers. It is the critical ingredient for improved processing efficiency and enhanced product performance when used as the primary ingredient or in blends with other polymers.



Visit www.dupont-dow.com/engage

or call **800-853-5515**

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11/00 (Replaces H-69216-01)
ENS-H90110-00-A1100



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