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## Rubber TIRES



### Precipitated Silica Products for High-Performance Tire Formulations

In the 1930s, PPG introduced the first reinforcing fillers formulated from precipitated silica. Since that time, PPG has worked hand-in-hand with global tire makers – not just to advance and refine the sciences of rubber-making and tire-making – but to fulfill the demands of tire manufacturers for virtually every type of vehicle, from passenger cars and motorcycles, to trucks and heavy-duty equipment.

Today, through its AGILON<sup>®</sup> performance silica and HI-SIL<sup>®</sup> silica product lines, PPG is more engaged than ever in the mission it shares with its customers, which is to challenge the limits of the industry's "magic triangle," by designing and manufacturing silica products that contribute to production of the safest, longest-lasting and most fuel-efficient tires possible.

#### **Agilon Performance Silica Products**

The most recent culmination of PPG's commitment to the tire industry is the breakthrough development of *Agilon* performance silica. Based on a revolutionary platform of chemically modified precipitated silica, these patented materials are engineered to help customers extend the tire industry's "magic triangle" by lowering rolling resistance for improved vehicle fuel economy and reduced greenhouse gas emissions, while increasing traction for improved safety and handling, especially in wet, snowy, or icy conditions, and improving wear resistance compared to traditional in-situ silica + silane mixing.



*Agilon* performance silica also helps the industry address the productivity and environmental challenges associated with manufacturing high-value tires that require silica-filled treads. By enabling a simpler, more efficient mixing process, *Agilon* performance silica reduces manufacturing complexity and capital investment by increasing mixing throughput, reducing energy consumption, and eliminating essentially all alcohol-related VOC emissions that result from the conventional silica/silane mixing process. Additional benefits of *Agilon* performance silica include:

- High-temperature mixing without increased viscosity or premature vulcanization
- Elimination of porosity-related extrusion inefficiencies
- Extended shelf life for uncured rubber
- Improved coupling in natural rubber applications
- Lower temperature mixing to avoid natural rubber degradation

### ***Agilon* Performance Silica**

Product	Dispersibility	Reinforcing Capability	CTAB Surface Area (m <sup>2</sup> /g)	N <sub>2</sub> (BET-5) Surface Area (m <sup>2</sup> /g)	SH, Weight %	Carbon, Weight %	pH	Residual Salt Type	Physical Form
<i>Agilon</i> 400G	High	High	140	75	0.5	4.0	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Agilon</i> 454G	High	High	200	140	0.5	4.0	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Agilon</i> 458G	High	High	200	115	0.5	6.0	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule

### ***Agilon* Performance Silica Literature**

[Agilon 400 Performance Silica](#)

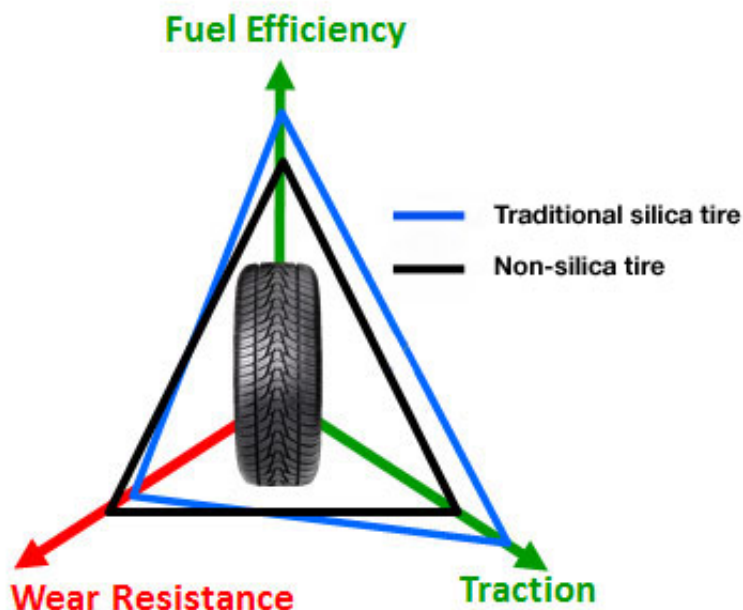
[Agilon 454 Performance Silica for Truck Tires](#)

### ***Hi-Sil* Silica Products**

When they were introduced in the 1970s, *Hi-Sil* silica products were among the first to be used in tire

applications, primarily for rubber reinforcement.

Since those developments nearly 50 years ago, tire manufacturers have consistently relied on PPG to push the boundaries of quality and innovation. While silica remains critical for rubber reinforcement, the newest generation of classical and highly dispersible *Hi-Sil* silica materials is helping to redefine the tire industry's "magic triangle".



From low-surface-area materials for improved winter tire traction and hysteretic properties in non-tread applications, to high-surface-area materials for improved treadwear and uncompromised rolling resistance, PPG works incessantly with tire formulators around the world to develop new *Hi-Sil* silica materials that meet their specific production and performance requirements.

Typically used in combination with silane coupling agents, these proven, popular tire additives:

- Improve wet traction and fuel efficiency, balancing wear resistance
- Enhance cut-, chip-, chunk-, tear- and cut-growth resistance
- Promote adhesion to brass-coated wire and fabric cord
- Enhance stiffness in the bead area and other non-tread applications

### *Hi-Sil* Reinforcing Silica - North America

Product	Dispersibility	Reinforcing Capability	CTAB Surface Area (m <sup>2</sup> /g)	N <sub>2</sub> (BET-5) Surface Area (m <sup>2</sup> /g)	pH	Residual Salt Type	Physical Form
<i>Hi-Sil</i> EZ120G	High	Medium	125	125	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> EZ160G	High	High	160	160	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> HDP320G	High	High	160	160	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> 190G	High	High	170	195	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> EZ200G	High	High	200	300	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> 210	Classical	Medium	N/A	135	7.0	NaCl	Pellet

<i>Hi-Sil</i> 243LD	Classical	Medium	N/A	135	7.0	NaCl	Granule
<i>Hi-Sil</i> 134G	Classical	High	160	180	6.3	Na <sub>2</sub> SO <sub>4</sub>	Granule

### ***Hi-Sil* Reinforcing Silica – Europe**

Product	Dispersibility	Reinforcing Capability	CTAB Surface Area (m <sup>2</sup> /g)	N <sub>2</sub> (BET-5) Surface Area (m <sup>2</sup> /g)	pH	Residual Salt Type	Physical Form
<i>Hi-Sil</i> EZ120G-D	High	Medium	125	125	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> EZ160G-D	High	High	160	160	6.5	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> 190G-D	High	High	170	195	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> EZ200G-D	High	High	200	300	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> 315G-D	Classical	Medium	125	125	7.0	Na <sub>2</sub> SO <sub>4</sub>	Granule
<i>Hi-Sil</i> 255CG-D	Classical	High	167	175	6.3	Na <sub>2</sub> SO <sub>4</sub>	Granule

### ***Hi-Sil* Silica Literature**

[Hi-Sil 134G Silica](#)

[Hi-Sil 190G & Hi-Sil 190G-M Silica](#)

[Hi-Sil 255CG-D Silica](#)

[Hi-Sil HDP-320G Silica](#)

[Hi-Sil EZ160G-D Silica brochure](#)

[Hi-Sil EZ200G Silica brochure](#)

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### **Related Resources**

[Agilon Performance Silica Overview](#)

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[Hi-Sil Silica for Tire Overview – North America](#)

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[Hi-Sil Silica for Tire Overview – Europe](#)

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