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® performance silica and HI-SIL® 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	Dispers-ibility	Rein-forcing Capability	CTAB Surface Area (m^2/g)	N_2 (BET-5) Surface Area (m^2/g)	SH, Weight %	Carbon, Weight %	pH	Residual Salt Type	Physical Form
Agilon 400G	High	High	140	75	0.5	4.0	6.5	Na_2SO_4	Granule
Agilon 454G	High	High	200	140	0.5	4.0	6.5	Na_2SO_4	Granule
Agilon 458G	High	High	200	115	0.5	6.0	6.5	Na_2SO_4	Granule

Agilon Performance Silica Literature

Agilon 400 Performance Silica

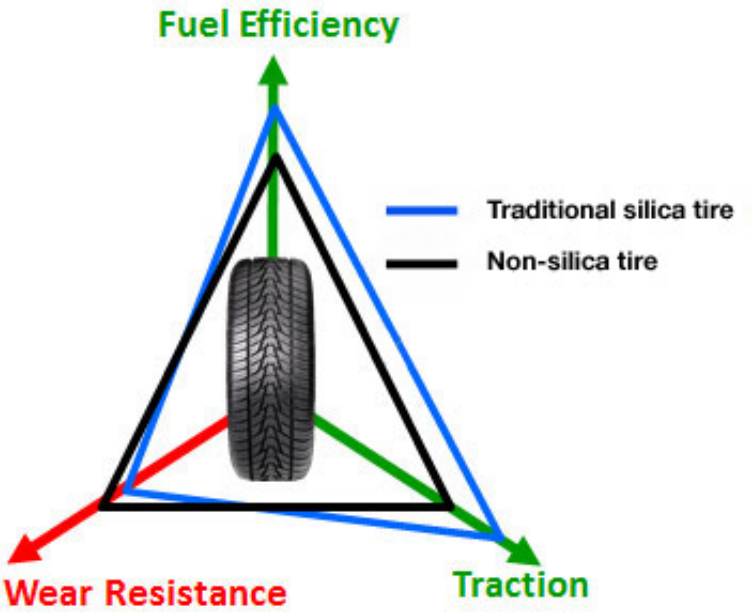
Agilon 454 Performance Silica for Truck Tires

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^2/g)	N_2 (BET-5) Surface Area (m^2/g)	pH	Residual Salt Type	Physical Form
Hi-Sil EZ120G	High	Medium	125	125	7.0	Na_2SO_4	Granule
Hi-Sil EZ160G	High	High	160	160	6.5	Na_2SO_4	Granule
Hi-Sil HDP320G	High	High	160	160	6.5	Na_2SO_4	Granule
Hi-Sil 190G	High	High	170	195	7.0	Na_2SO_4	Granule
Hi-Sil EZ200G	High	High	200	300	7.0	Na_2SO_4	Granule
Hi-Sil 210	Classical	Medium	N/A	135	7.0	NaCl	Pellet

Hi-Sil 243LD	Classical	Medium	N/A	135	7.0	NaCl	Granule
Hi-Sil 134G	Classical	High	160	180	6.3	Na_2SO_4	Granule

Hi-Sil Reinforcing Silica – Europe

Product	Dispersibility	Reinforcing Capability	CTAB Surface Area (m^2/g)	N_2 (BET-5) Surface Area (m^2/g)	pH	Residual Salt Type	Physical Form
Hi-Sil EZ120G-D	High	Medium	125	125	7.0	Na_2SO_4	Granule
Hi-Sil EZ160G-D	High	High	160	160	6.5	Na_2SO_4	Granule
Hi-Sil 190G-D	High	High	170	195	7.0	Na_2SO_4	Granule
Hi-Sil EZ200G-D	High	High	200	300	7.0	Na_2SO_4	Granule
Hi-Sil 315G-D	Classical	Medium	125	125	7.0	Na_2SO_4	Granule
Hi-Sil 255CG-D	Classical	High	167	175	6.3	Na_2SO_4	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

Related Resources

Agilon Performance Silica Overview

Hi-Sil Silica for Tire Overview – North America

Hi-Sil Silica for Tire Overview – Europe

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