

# PPG AGILON<sup>®</sup> 400

## Performance Silica



TIRE

Designed to improve the performance and processing of highly dispersible silica (HDS) green tire tread formulations, PPG AGILON<sup>®</sup> 400 performance silica supports the tire industry's need for safer, more environmentally responsible products by lowering rolling resistance and improving tire handling and traction. PPG *Agilon* 400 silica eliminates the need for a silane coupling agent, thus increasing manufacturing efficiency and reducing associated volatile organic compound (VOC) emissions.

*Agilon* 400 performance silica drives top-line results through improved tire performance, while streamlining the manufacturing process for bottom-line cost savings.

### Benefits

- Enables tire makers to develop new and differentiated technologies
- Improves tire performance (rolling resistance, handling and traction)
- Reduces VOC emissions for a more environmentally responsible manufacturing process
- Increases production efficiencies by eliminating the in-situ silica/silane mixing step
- Enables high-temperature mixing without increasing viscosity or causing premature vulcanization
- Eliminates extrusion inefficiencies due to porosity concerns
- Improves shelf life of uncured rubber



### PPG *Agilon* Performance Silica – Typical Properties

CTAB Surface Area, m <sup>2</sup> /g	140
N <sub>2</sub> (BET-5) Surface Area, m <sup>2</sup> /g	75
SH, Wt. %	0.5
Carbon, Wt. %	4.0
pH	6.5
Residual Salt Type	Na <sub>2</sub> SO <sub>4</sub>
Physical Form	Micro-granule

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### Product Safety and Regulatory Information

For the latest product safety and regulatory information, please reference the Product Safety Sheets at [www.ppgsilica.com](http://www.ppgsilica.com).

### Samples

Samples are available per request from customer service.

### Packaging

Standard packaging includes small bags and Flexible Intermediate Bulk Containers (FIBCs). Bags are unitized for shipping on pallets which are stretch wrapped with clear plastic film. FIBCs are single or double stacked on wood pallets. Please consult Customer Service or your Sales Representative regarding additional packaging options including custom package sizes and bulk shipments.

### Storage

To ensure product integrity, PPG recommends that its silica products be stored under dry, clean conditions, protected against exposure to direct sunlight and other substances, and used within twelve months of the date of manufacture.

### Safety and Health Effects

PPG recommends that, before use, anyone using or handling this product thoroughly read and understand the information and precautions on the label, as well as in other product safety publications such as the Product Safety Sheet. Any health hazard and safety information contained herein should be passed on to your customers or employees, as the case may be. The products mentioned herein can be hazardous if not used properly. Like all potentially hazardous materials, this product must be kept out of the reach of children.

### Typical Green Tire Tread Formulation

Conventional HDS	PPG <i>Agilon</i> 400 Performance Silica
103 / 25 Oil Extended Solution SBR / BR	103 / 25 Oil Extended Solution SBR / BR
Equivalent Specific Gravity	Equivalent Specific Gravity
Equivalent Sulfur Cure Package (Sulfur, CBS & DPG)	Equivalent Sulfur Cure Package (Sulfur, CBS & DPG)
Added TESPT Coupling Agent	No Added Coupling Agent
2 non-productive & 1 productive	1 non-productive & 1 productive
Non-productive mix = 16 minutes	Non-productive mix = 9 minutes
Dump Temperature = 160 °C	Dump Temperature = 170 °C

In typical green tire tread formulations, sufficient heat is needed to create the chemical reaction between the polysulfide silane and the HDS. Not only is a VOC-contributing alcohol by-product produced during the reaction, but at elevated temperatures, the polysulfide silanes generate sulfur in the reaction mixture (in-situ), which increases viscosity and can lead to premature curing. As a result, multiple non-productive mixing steps and associated cooling periods are needed to ensure the compound remains within an optimum temperature range.

PPG *Agilon* 400 performance silica eliminates the need for these polysulfide silanes by connecting the silica core to the rubber matrix only after adding curatives (i.e., in the cure press). By eliminating the associated VOC-contributing alcohol, as well as the requirement to maintain a given temperature range for the compound, PPG *Agilon* 400 silica requires only a single non-productive, non-VOC contributing mixing step and allows mixing temperatures that range as high as 190°C.

### Typical Laboratory Properties

	Conventional HDS	PPG <i>Agilon</i> 400 Silica
<b>Non-Cured</b>		
Mooney Scorch (130 °C), TS5, minutes	9	24
Mooney Viscosity (100 °C), ML (1+4)	80	61
MDR Cure Time (150 °C), TC90, minutes	29	22
<b>Cured (150 °C TC90 + 5 or 10 minutes)</b>		
Dispergrader Dispersion, %:	99.6	99.6
Shore A Hardness	64	62
300% Modulus, MPa	17.4	17.3
300%/100% Modulus Ratio	6.4	6.2
<b>Dynamic Properties</b>		
Strain Sweep, 30 °C, 1 Hz, G', 0.5%, MPa	1.91	1.48
Temperature Sweep, 1 Hz, 2% strain		
Tan Delta, -15 °C	0.53	0.80
Tan Delta, 0 °C	0.24	0.30
Tan Delta, 60 °C	0.06	0.04



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