



ADVANCED MATERIALS

Fine Precipitated Aluminum Hydroxides for Tire Tread Compounds



Improving Tire Tread
Performance



Huber Fine Precipitated Aluminum Hydroxides (FPH): Improving Tire Tread Performance

Huber Advanced Materials is a global leader in aluminum hydroxides, magnesium hydroxides, aluminum oxides, specialty fire retardants and smoke suppressants, organic matting agents and carriers, and thermal management solutions.

Our materials are used in numerous applications which improve the safety of millions of people around the world while protecting our environment. The automotive value chain is a core market segment for Huber Advanced Materials. Our array of innovative materials can be found in practically every corner of the car.



In the development of tire technology over the years, precipitated silica replaced carbon black as the main reinforcing filler, significantly improving rolling resistance and wet grip. With the e-mobility revolution, challenges for tire developments have further increased due to higher wear from the powerful, instant torque of the electric motor and the additional weight of EVs from heavy battery packs. In addition, the need for increasing the driving range of EVs is pushing the boundaries of tire development needs. This is significant as relative energy losses from tires are considerably higher for EVs compared to internal combustion engine vehicles.

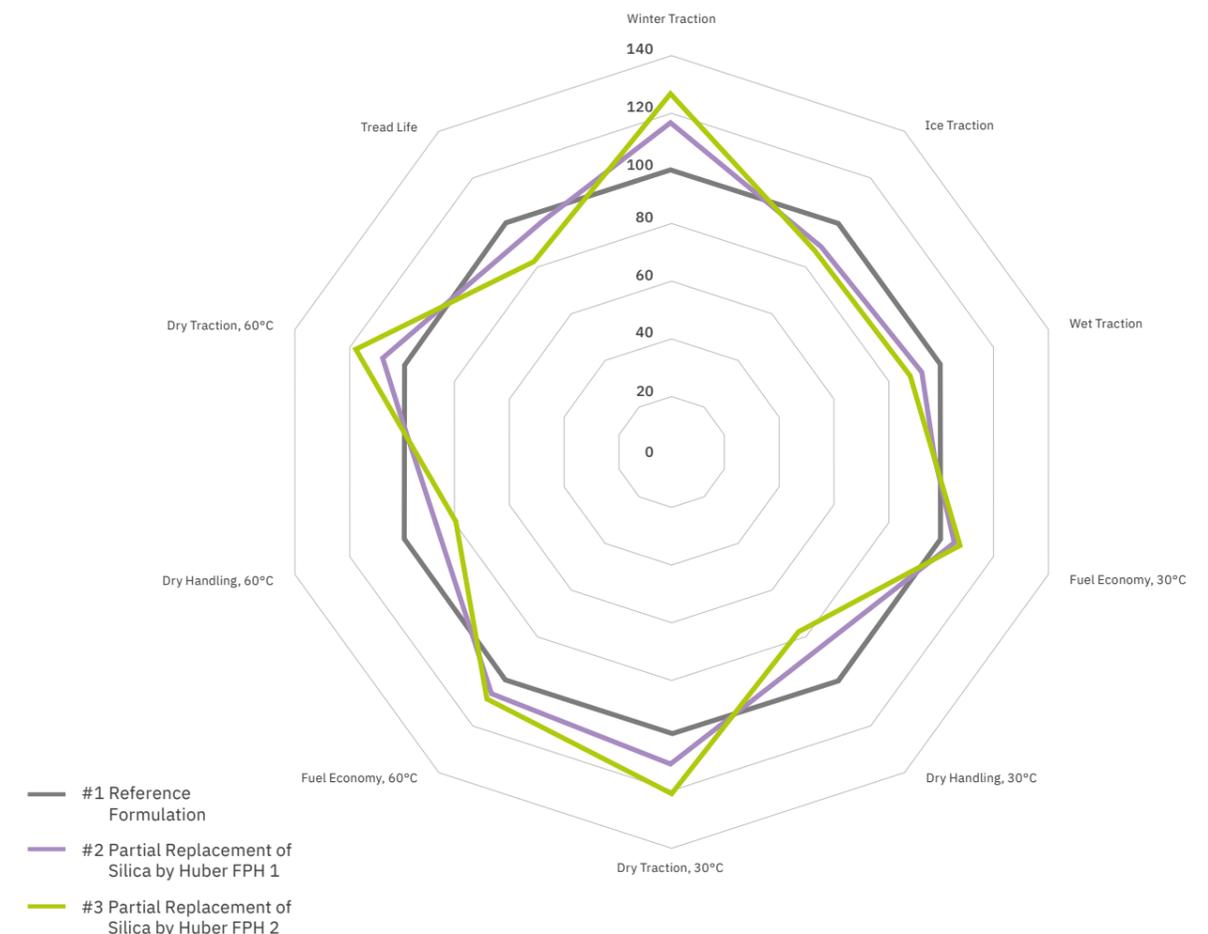
Partial replacement of silica with fine precipitated aluminum hydroxide (FPH) from Huber Advanced Materials can help tire manufacturers address some of these challenges.

The diagram at right and on the following page proves that partial replacement of precipitated silica by untreated FPH in tire tread formulations can bring benefits in terms of tire performance:

- **Reduced rolling resistance and better fuel economy**
- **Enhanced dry traction**
- **Improved winter traction**



Effect of Partial Substitution of Silica with FPH on Tire Performance:

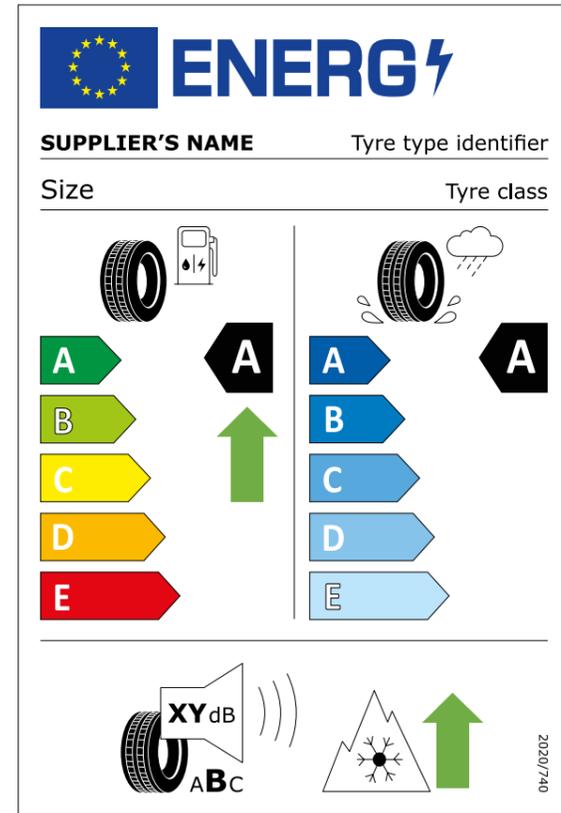


Key benefits:

Fine Precipitated Aluminum Hydroxide (FPH) in tire tread formulations can lead to improved tire labeling



Reduced rolling resistance



Other benefits

✓ The higher tamped bulk density of FPH compared to silica is beneficial for processing due to better powder flow, ease of compounding, and increased compounding throughput, especially in batch mixers.

✓ The hardness of FPH (Mohs hardness) is significantly lower than silica, which reduces compounding equipment wear. In addition, partial replacement of silica with FPH helps to reduce compound viscosity. FPH has been used extensively in rubber and polymer compounding without any equipment wear problems – especially at a very fine particle size.

While there are less desirable impacts related to tread life and dry handling, they can be overcome by adjustments in the tire tread compound formulation.

*Note that the labels are for illustration purposes only, as different formulations and tread designs would determine the actual ratings that can be achieved. Our investigation had indicated that addition of FPH can improve tire performance in certain aspects.



Technical support

Our team is looking forward to providing further insight in developing tailored FPH solutions for your tire tread formulation.



The automotive value chain is core for Huber Advanced Materials.
 You'll find our solutions in every corner of your car.

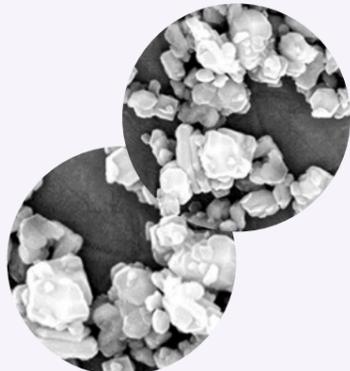
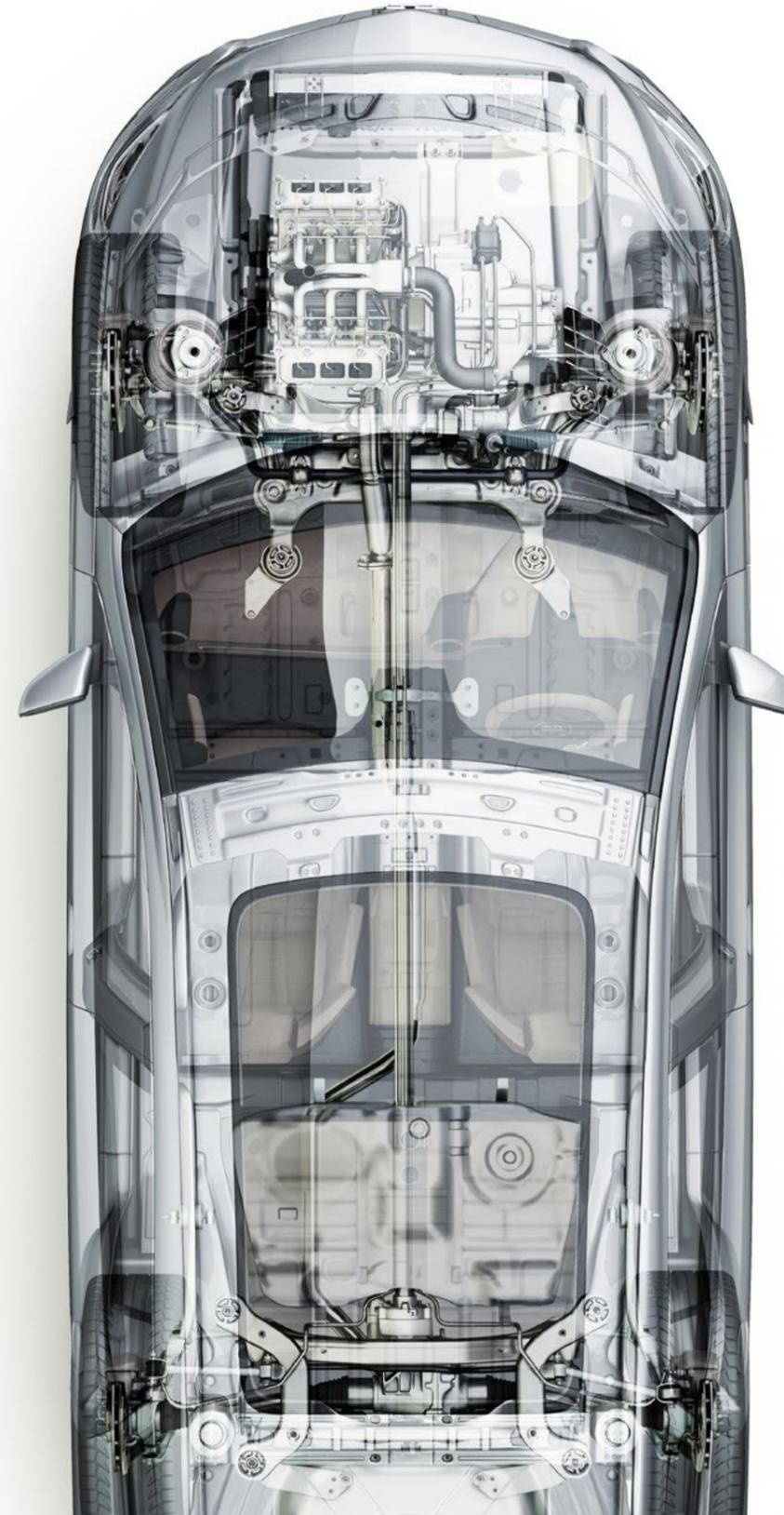
The Solutions: Huber's Martinal® and Hydral® Fine Precipitated Aluminum Hydroxides (FPH)

Huber Advanced Materials produces two primary FPH brands for use in tire applications. **Martinal® and Hydral® fine precipitated aluminum hydroxides** from Huber Advanced Materials are world-renowned for its various product properties:

- High bulk density
- Non-abrasive
- High chemical purity
- Regular crystal shape with narrow particle size distribution
- Outstanding thermal conductivity
- Good arc-track resistance
- Colorless, thus no effect on pigmentation
- Lightweight
- Halogen-free
- Non-corrosive
- Non-flammable
- Non-hygroscopic
- UV-resistant

Huber Advanced Materials' FPH products are in compliance with REACH and do not contain any substances of very high concern (SVHC).

Property	Typical Value
Physical Form	Powder
Particle Morphology	Hexagonal Platelet
Color	White
Specific Gravity g/cm ³	2.42
pH Value	9-10
Hardness, Mohs	2.5-3.5
Refractive Index	1.57
Temperature of Decomposition	220 °C/428 °F
Heat of Decomposition, cal/g	280
Theoretical Loss on Ignition, %	34.6

- Tire**
Additives for improved tire performance
- Spark Plugs**
Ceramics for strength and electrical insulation
- Polishing**
Materials for brilliant surfaces
- Fire Retardants**
Portfolio of materials for increased fire safety
- Thermal Management**
Thermally conductive fillers for heat dissipation
- Brake Pads**
Ceramics for strength and durability
- Li-ion Batteries**
Materials for battery reliability and safety
- Coatings**
Additives for Improved appearance and durability
- Emission control**
High performance materials for catalysts

Our global footprint

Huber Advanced Materials is the largest producer of fine precipitated aluminum hydroxides (FPH) with manufacturing facilities in both Europe and North America and two modern R&D research facilities in Germany and the US.

All Huber production sites are certified according to ISO 9001:2015 quality management system. Our European plants Martinswerk (Bergheim, Germany) and Magnifin (Breitenau, Austria) are additionally certified in OH&S ISO 45001:2018 and environment

management ISO 14001:2015. Martinswerk also holds an energy management certificate ISO 50001:2018.

In addition to its wide array of FPH offerings, Huber Advanced Material provides unsurpassed technical support and offers customer service second-to-none. We look forward to working with you. For more information or to order Martinal® and Hydral® FPH samples, contact us today.

Americas

Fairmount, GA
Atlanta, GA
Kennesaw, GA
Marblehead, IL
Bauxite, AR

Europe

Bergheim, Germany
Breitenau, Austria

Asia Pacific

Qingdao, China



2

R&D Centers

6

Manufacturing Plants

3

Customer Care Centers

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