

Hi-Sil™ 532EP

Rubber Reinforcing Silica

Typical Properties and Characteristics

Hi-Sil™	Surface Area, BET-1	Surface Area, BET-5	pH	Na ₂ SO ₄ wt. %	Skeletal Density	Manufacturing Location
532EP	60 m ² /g	55 m ² /g	8	2.0 Max	~2.1 g/cm ³	USA
532EP	60 m ² /g	55 m ² /g	8	2.0 Max	~2.1 g/cm ³	Taiwan

Registration Numbers

CAS No. 112926-00-8	Synthetic Precipitated Amorphous Silica
231-545-4	European EINECS
CAS No. 7631-86-9	TSCA Chemical Substance Inventory (SiO ₂)



Mechanical Rubber Goods

The benefits of using Hi-Sil™ 532EP in colored hose cover, wire insulation, sporting goods, and cable jacketing applications are fast extrusion and calendaring, firmness of uncured stocks, smooth surfaces, flexibility, and resilience..

Fast, smooth extrusions, excellent flow

Because of its lower surface area, Hi-Sil™ 532EP does not exhibit an increase in stiffness and processing viscosity normally encountered with higher surface area silica products.

Faster curing

Rubber compounds using Hi-Sil™ 532EP exhibit cure rates much faster than those compounds using higher surface area silica products. Lower surface area silica is typically less reactive. This lower activity is less reactive to amines and zinc oxide that can reduce accelerator and activator effectiveness.

Improved dynamic properties

Hi-Sil™ 532EP has a unique structure that gives rubber products a high dynamic modulus with low stiffness, high resilience, low compression set, and low heat build up.

Rubber Processing Recommendations

For all Hi-Sil™ silica forms, it is recommended that the silica be added as early as possible in the mixing schedule. Ideally, the silica should be added at the same time as the polymer(s) and before the addition of process oil to allow time for silica incorporation into the polymer(s). For high loadings of silica, split additions are recommended...first addition with the polymer(s) and the second with the process oil. For loadings of high density - low dust silica granules, a single addition can be made with the polymer/s and just before process oil addition.

Split oil additions are recommended to maintain a high viscosity as increased shear aids in silica dispersion. Granules and pellets tend to need slightly more mixing time to disperse than milled powders.

Note: Silica incorporation time and dispersion in rubber will vary based on internal mixer type and rotor design.

Hi-Sil™
532EP

Natural Rubber *This compound was mixed in a 2-wing lab internal mixer*

Formula (PHR): SMR CV60 – 100, Red Iron Oxide – 5, Hi-Sil™ – 50, Cumar R-13 – 5, Sylfat FA2 (tall oil) – 2, Agerite Stalite S – 1, ZnO – 5, RM Sulfur – 3, Santocure NS – 3

NR Summary: Both manufacturing sites provide Hi-Sil™ 532EP with similar processing and reinforcing capabilities. Hi-Sil 532EP provides good flow at processing and curing steps along with excellent rebound (resilience) and compression set resistance.

	Hi-Sil™	532EP	532EP		Hi-Sil™	532EP	532EP
		<u>USA</u>	<u>Taiwan</u>			<u>USA</u>	<u>Taiwan</u>
Processing				Rebound			
Mooney Plasticity				Rebound, Ambient Temp.		72%	75%
ML 1+4 @ 100°C, MU		47	44	Hardness, Ambient Temp.		68	68
Mooney Scorch				Rebound, 100° C		82%	84%
MS @ 121°C, T5 rise, min.		30+	30+	Hardness, 100° C		68	67
Specific Gravity (H ₂ O)		1.159	1.155				
Cure: MDR 2000 @ 150°C (1° arc)				Tensile Properties			
ML (dNm)		3	3	Tensile (MPa)		18	19
MH (dNm)		39	39	Elongation (%)		431	423
Ts2 (min.)		9	10	300% Modulus (MPa)		12	11
T90 (min.)		14	15	Hardness, Shore A		70	68
Compression Set (Method B)		67%	64%				

Nitrile Rubber *This compound was mixed in a 2-wing lab internal mixer*

Formula: Nipol 300 - 100, N-550 Carbon Black – 5, Hi-Sil™ – 50, Stearic Acid – 2, PEG 3350 – 1.5, Polycizer DOP – 7, ZnO – 5, RM Sulfur – 0.5, MBTS - 1.5, MBS – 1, TMTD – 0.7, TETD – 0.7

NBR Summary: Again both manufacturing sites provide Hi-Sil™ 532EP with similar processing and reinforcing capabilities. Hi-Sil 532EP provides good flow at processing and curing steps along with excellent rebound (resilience) and compression set resistance.

	Hi-Sil™	532EP	532EP		Hi-Sil™	532EP	532EP
		<u>USA</u>	<u>Taiwan</u>			<u>USA</u>	<u>Taiwan</u>
Processing				Rebound			
Mooney Plasticity				Rebound, Ambient Temp.		20%	20%
ML 1+4 @ 100°C, MU		67	66	Hardness, Ambient Temp.		71	70
Mooney Scorch				Rebound, 100° C		59%	60%
MS @ 121°C, T5 rise, min.		30+	30+	Hardness, 100° C		61	61
Specific Gravity (H ₂ O)		1.210	1.216				
Cure: MDR 2000 @ 150°C (1° arc)				Tensile Properties			
ML (dNm)		2	2	Tensile (MPa)		12	13
MH (dNm)		32	33	Elongation (%)		636	644
Ts2 (min.)		6	6	300% Modulus (MPa)		4	4
T90 (min.)		14	14	Hardness, Shore A		72	71
Compression Set (Method B)		31%	33%				

Packaging

Hi-Sil™ 532EP is packaged in 44 pound multi-wall kraft paper bags. The bags are palletized and stretch wrapped in clear plastic film. Shipments can be made in truckloads or railcars. Bulk shipments are also available in flexible intermediate bulk containers (FIBC).

Storage

To ensure product integrity PPG recommends that our silica products be stored under dry, clean conditions and protected against exposure to other substances.

Since silica may pick up moisture we also recommend that products that are stored more than one year, from date of manufacture, be re-tested for moisture content.

There is no shelf life limit when stretch-wrapped palletized units or bags are kept under the above stated conditions.

Safety and Health Effects



PPG Industries Inc. is committed to the safe handling of chemicals at every step of the process, from manufacturing and distribution through education of the end user. Our participation in the American Chemistry Council's *Responsible Care*® Program is evidence of our commitment to the health, safety and welfare of our employees and the industry. PPG Industries Inc. recommends thoroughly reading and understanding the product labels, Material Safety Data Sheets, and other safety information about the product prior to use or handling. Product health and safety information should be made available to your employees and customers.

Samples and Service

PPG's Technical Service specialists are available for consulting on the use, handling and storage of Hi-Sil™ 532EP.

Gallon containers and bag-size samples are available upon request from Technical Service.



PPG Industries, Inc.
Silica Products
440 College Park Dr.
Monroeville, PA 15146

Customer Service: 1-800-243-6745
Technical Service: 1-800-764-7369



Hi-Sil™ 532EP

Statements and methods presented in this publication are based upon the best available information and practices known to PPG Industries at present, but are not representations or warranties of performance, result or comprehensiveness, nor do they imply any recommendations to infringe any patent or an offer of license under any patent.

© 2011 by PPG Industries, Inc.
Hi-Sil is a trademark of PPG Industries.