

MAKING THE TRANSITION TO OUR LP SERIES OF LOW PAH CARBON BLACKS

Our LP carbon black series was designed to provide our customers with a choice of products to be used as alternatives to traditional ASTM carbon blacks in applications requiring lower PAH content. In some cases, making the transition to our LP carbon black series may require a PHR loading adjustment to achieve the desired rubber compound characteristics. Cabot's Technical Services Team works closely with our customers to help solve this challenge by leveraging our decades of knowledge in carbon black material science, elastomer formulation and production, and manufacturing techniques for a wide variety of industrial rubber product applications. Contact your Cabot Technical Service representative to learn more about our LP series of low PAH carbon blacks to achieve EU and CN industry specifications/requirements. For more information on our products or to request samples, please contact Cabot at one of the telephone numbers below.

KEY PERFORMANCE ATTRIBUTES: LP SERIES OF LOW PAH CARBON BLACKS

SPHERON® S0-LP carbon black	<ul style="list-style-type: none">◆ Controlled and very low PAH content and toluene extraction◆ Easy dispersion and very good extrusion characteristics
SPHERON® 4000-LP carbon black	<ul style="list-style-type: none">◆ Controlled and very low PAH content and toluene extraction◆ Improves processing of high viscosity, high hardness rubber compounds◆ Can reduce cost in comparison to expensive elastomers◆ Unique morphology enables higher loading than ASTM N500, N600 and N700 series carbon black
VULCAN® 6-LP carbon black	<ul style="list-style-type: none">◆ Controlled and very low PAH content and toluene extraction◆ Designed for rubber applications requiring high abrasion and tear resistance

Learn more about our LP series of low PAH carbon blacks at cabotcorp.com/industrialrubberproducts

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Product Brochure

LP SERIES: LOW PAH CARBON BLACKS

Global Products



SPECIFIC REGULATIONS, AND GUIDELINES AND RECOMMENDATIONS ARE IN PLACE OR IN PROGRESS IN THE EU AND CHINA THAT RESTRICT PAH CONTENT IN CERTAIN RUBBER PARTS USED IN CONSUMER ARTICLES, AND FOOD AND POTABLE WATER CONTACT APPLICATIONS

Actions have been taken by both regulators in the European Union (EU) and by businesses to reduce the concentration of polycyclic aromatic hydrocarbons (PAH) in plastic or rubber parts sold in the EU after December 27, 2015. These rubber and plastic articles include a variety of consumer goods such as sporting equipment, household items, tools, clothing, footwear, and accessories, as well as toys and childcare items. In addition, regulations in China (CN) and guidelines and recommendations in EU countries are in place or in progress that restrict the PAH content and toluene extraction for carbon blacks used in rubber parts that come into contact with food, and the PAH content for carbon blacks that come into contact with drinking water.

Carbon black is a substantial component of most rubber goods, playing an important role in the manufacture of rubber compounds by delivering a variety of performance properties to the final product. Our LP carbon black series is engineered to provide customers with carbon black products that meet stringent specifications while at the same time reducing the overall PAH concentration of the final article to help ensure compliance with new regulatory requirements for rubber and plastic articles and quality certifications for end-use products.

CARBON BLACK AND PAH

PAH are a group of chemicals composed of multiple aromatic rings. They are found naturally in the environment but also can be formed during the burning of fossil fuels or other organic matter. Some PAH have the potential to cause adverse human health effects.

PAH absorbed on the surface of carbon blacks are created during the manufacturing process as a result of the incomplete combustion of oil or natural gas. A number of scientific studies have concluded that these PAH are firmly bound to the carbon black surface under normal handling and use¹. They can only be extracted from the surface of the carbon black under rigorous laboratory conditions with strong solvents at elevated temperatures.

Although the PAH that are adhered to the carbon black surface strongly resist transfer to other surfaces and are not readily available for human exposure, actions have been taken by both EU regulators and businesses to reduce the total concentration of PAH in consumer goods.

In 2013, the European Commission issued Regulation No 1272 limiting the content of eight PAHs in plastic or rubber parts sold in the EU after December 27, 2015. The regulation affects rubber or plastic components that come into direct and prolonged contact with human skin or the oral cavity under normal or reasonably foreseeable conditions of use.

In addition:

- Quality certifications like the Geprüfte Sicherheit (GS) voluntary safety mark in Germany also encourage the reduction of PAH content in certain consumer-based rubber products.
- Regulations in China (GB 9685/2016) and guidelines and recommendations in EU countries (for example in Germany and the Netherlands) restrict the PAH content and toluene extraction for carbon blacks used in rubber parts that come into contact with food, and the PAH content for carbon blacks that come into contact with drinking water.

As part of our ongoing commitment to address changing marketplace needs and deliver solutions to meet future product design and processing challenges, we have developed a suite of low PAH carbon blacks that help enable compliance with the EU limits and that can be used to achieve GS Mark certification for consumer goods under certain carbon black loading conditions, and with the guidelines that restrict the PAH content and toluene extraction for carbon blacks used in rubber parts that come into contact with food or drinking water.



OUR LP SERIES OF LOW PAH CARBON BLACKS OFFERS A SOLUTION

Helping our customers solve problems is what we do best. In response to changing marketplace requirements for very low PAH content in a variety of consumer goods, we have invented a series of low PAH carbon black products, identified by the suffix "LP." Our LP carbon black series features three products that are manufactured via a special process resulting in a controlled, very low level of PAH. PAH content are monitored during the production process to ensure high levels of product consistency and quality.

One or more of these Cabot carbon black products may be covered by one or more of the following patents and pending patent applications. **PATENTS:** AR063605B1, CA2668893, CN101573417B, EG26887, IN276762, JP0031241, JP6096399, KR101403171, MX305870, MY160001A, RU2450039, SA2916, TWI414564, US8034316B2, US8710136B2; **APPLICATIONS:** BRPI0718823-4, EP2087046A, TH100036A, UAEMP421/2009

PAH CONTENT *	TEST METHOD	UNITS	MAX VALUE
Benzo(a)pyrene	Cabot internal test	ppm	0.25
For each of 8 PAH included in EU list	Cabot internal test	ppm	1
For sum of 18 PAH included in GS Mark list**	Cabot internal test	ppm	20

* Cabot internal test method requires 48 hours toluene extraction (Soxhlet)

** For products certified after July 1, 2020, GS Mark has reduced the list of PAH to 15. Cabot will continue to report the sum of 18 PAH, which covers all GS Mark certifications.



LP SERIES OF LOW PAH CARBON BLACKS

Our series of low PAH products currently consists of two semi-reinforcing carbon blacks and one reinforcing carbon black.

1. SPHERON® SO-LP CARBON BLACK

This pelletized semi-reinforcing carbon black has a very high structure, is easy to disperse and provides very good extrusion properties to rubber compounds. SPHERON® SO-LP carbon black is used for rubber compounds that require a very low PAH and are currently based on standard ASTM N650, N683, N539 and N550 carbon blacks.

PROPERTY	TEST METHOD	UNITS	MAX VALUE
Iodine adsorption number	ASTM D1510	mg/g	43
STSA surface area	ASTM D6556	m ² /g	40
Oil absorption number (OAN)	ASTM D2414	ml/100g	121
OAN after crushing (COAN)	ASTM D3493	ml/100g	84

2. SPHERON® 4000-LP CARBON BLACK

This pelletized semi-reinforcing carbon black has a very low surface area and structure. It offers excellent rubber compound flowability by imparting low viscosity even at high loadings. SPHERON® 4000-LP carbon black is the product of choice for replacing ASTM N762, N772 and N774 carbon blacks in very low PAH content applications. Blends of SPHERON® SO-LP carbon black and SPHERON® 4000-LP carbon black can be used in very low PAH applications that require rubber reinforcement properties of ASTM N660 carbon black.

PROPERTY	TEST METHOD	UNITS	MAX VALUE
Iodine adsorption number	ASTM D1510	mg/g	31
STSA surface area	ASTM D6556	m ² /g	29
Oil absorption number (OAN)	ASTM D2414	ml/100g	51
OAN after crushing (COAN)	ASTM D3493	ml/100g	49

3. VULCAN® 6-LP CARBON BLACK

This pelletized reinforcing carbon black is used for rubber articles that require a very low PAH and higher reinforcement, strength, abrasion and tearing resistance level than is offered by semi-reinforcing carbon blacks. VULCAN® 6-LP carbon black can be blended with SPHERON® SO-LP or SPHERON® 4000-LP carbon blacks for very low PAH applications that require the rubber reinforcement properties of those offered by ASTM N300 series carbon blacks.

PROPERTY	TEST METHOD	UNITS	MAX VALUE
Iodine adsorption number	ASTM D1510	mg/g	121
STSA surface area	ASTM D6556	m ² /g	104
Oil absorption number (OAN)	ASTM D2414	ml/100g	114
OAN after crushing (COAN)	ASTM D3493	ml/100g	98

1. Borm P J, et. al., Formation of PAH-DNA adducts after in vivo and vitro exposure of rats and lung cells to different commercial carbon blacks; Toxicology and Applied Pharmacology, 2005 Jun.1; 205(2): 157-167.