



SPECIALTY CARBON BLACKS

SPECIALTY CARBON BLACKS FOR PLASTIC MOLDED PARTS





Performance and leadership in black plastics

Cabot Corporation is a global performance materials company and we strive to be our customers' commercial partner of choice. We have been a leading manufacturer of carbon black and other specialty chemicals for more than 130 years, and we have supplied additives to the plastics industry since its inception.

Our global reach enables us to work closely with customers to meet the highest standards for performance, quality and service. Our global production network and three applications development facilities provide our customers with global service capabilities as well as the latest technical innovations.

Global reach

We support customers around the world in our global production and applications development centers

◆ North America

Canada
Mexico
United States

◆ South America

Argentina
Brazil
Colombia

◆ Europe, Middle East & Africa

Belgium
Czech Republic
France
Germany
Italy
Latvia
Norway
Switzerland
The Netherlands
United Arab Emirates
United Kingdom

◆ Asia Pacific

China
India
Indonesia
Japan
Korea
Malaysia
Singapore

With approximately 4,500 employees worldwide, we continue to create a diverse environment rooted in values and sustainability.

We operate 44 manufacturing sites in 21 countries, all with local management teams. We have a global footprint in order to serve our customers throughout the world.

Delivering product performance through superior color

We offer a range of specialty carbon blacks that provide superior color for molded parts (including injection or blow molded parts) used in the consumer, industrial and automotive markets. Our specialty carbon blacks can be used in a wide range of polymers ranging from polyolefins to engineering thermoplastics, providing long lasting color or opacity. In addition, we ensure that our specialty carbon blacks are characterized by high purity and physical cleanliness to help produce excellent aesthetic quality for your final products.

This document provides information related to consumer, industrial and automotive non-conductive molded parts. For information on our offerings for extrusion-formed products (e.g., film and sheet), food-contact applications, or conductive applications, please refer to our respective literature.

Our brands

We supply a diverse product range of specialty carbon black products to meet performance and processability requirements across many industries and end uses. Offered in pellet and powder form, our long-established products for plastics include VULCAN[®], ELFTEX[®] and BLACK PEARLS[®] specialty carbon blacks. While some products have performed successfully in plastic applications for more than 50 years and are top choices for the plastics industry, we continue to innovate and develop new products to further improve our customers' product performance.



Featured products for color in molded parts

Our specialty carbon blacks are broadly designed for three main end-uses:

- ◆ Consumer goods
- ◆ Industrial and automotive applications
- ◆ General purpose and utility applications

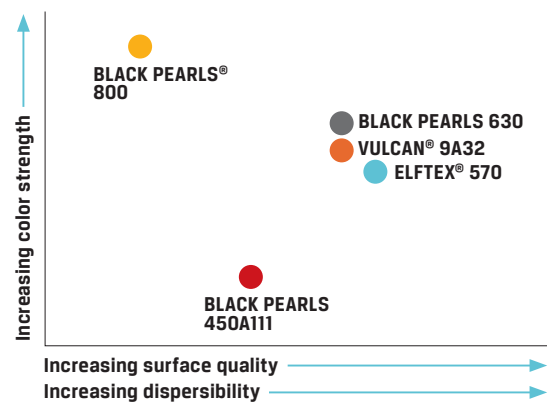
Among these grades, we offer products that meet EU and U.S. FDA requirements for food contact compliance. Please contact your Cabot representative for information regarding food contact and other applications not covered in this brochure.

Color performance for consumer goods

Many consumer goods such as appliances, electronics equipment (e.g. mobile phones, tablets) and packaging (including food contact) need to meet the increasingly stringent aesthetic requirements of consumers who require deep black color balanced with appealing bluetone. For these types of applications where components are visible to end-customers, color performance is critical. Surface smoothness, dispersibility and mechanical performance are also required to meet the performance requirements of the end-use product. In addition, an ever-increasing range of polymers are used; these include basic polymers such as polyolefins, polystyrene and PVC, as well as high performing polymers such as ABS, nylon and PC. Blends and composites are also increasingly used. We offer a full portfolio of specialty blacks to meet both basic and highly demanding applications (Figure 1).



Figure 1:
Carbon blacks for consumer goods

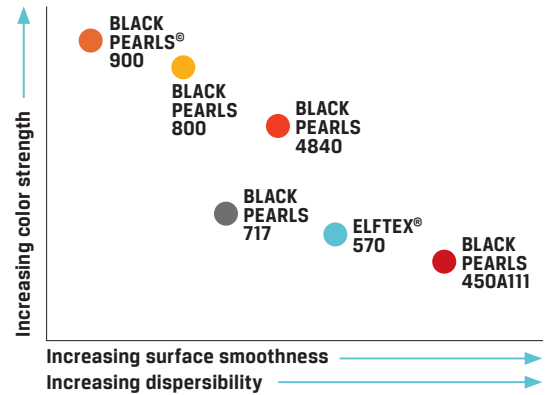


Color performance for industrial and automotive applications

Industrial and automotive moldings that require carbon black for coloration include machinery housings, automotive parts and other moldings used in industrial and automotive applications. While color performance remains the most important attribute of a carbon black, physical cleanliness is very important because the presence of contaminants (e.g. grit) can concentrate stresses, erode mechanical properties and degrade surface quality.

For more information, please contact your Cabot representative.

Figure 2: Carbon black products for industrial and automotive applications



Product performance

Specialty carbon blacks provide a number of important functionalities to molded parts including:

- ◆ Pigmentation to provide **deep color**
- ◆ Surface smoothness to ensure **aesthetic quality**
- ◆ Physical cleanliness to **maintain mechanical properties** of the overall part

We offer products for a variety of systems, including polyolefins and engineering plastics.



Color

Color is measured along three scales:

- ◆ **L*** (color strength or masstone) values represent white-to-black or light-to-dark scale
- ◆ **a*** values represent the red-to-green scale; and
- ◆ **b*** values represent the yellow-to-blue scale

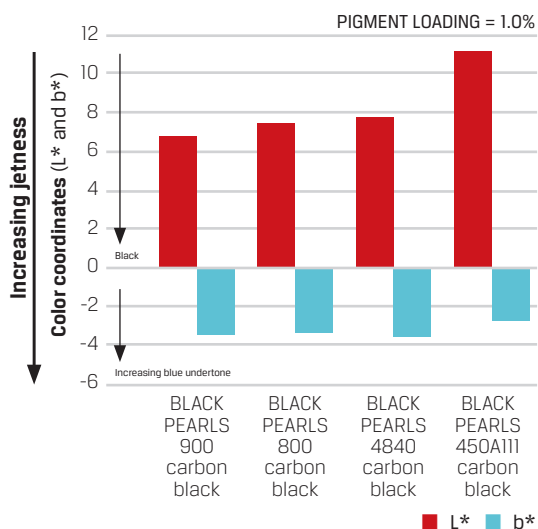
With respect to carbon black, L* and b* are the most relevant values. Low L* values are preferable, as they indicate a darker, or more black color. Increasingly negative b* values indicate a bluer undertone. Our products for molding have been specifically selected to deliver these performance characteristics.

We offer four families of carbon blacks to meet the varying color requirements of the plastics industry:

Carbon black family	BLACK PEARLS® products
High color black	BLACK PEARLS 1300
Medium color black	BLACK PEARLS 900, 800, 717, 4840
Regular color	BLACK PEARLS 450A111, BLACK PEARLS 630
Utility blacks	BLACK PEARLS 280, 160, 120

Note: Carbon blacks having similar morphology to BLACK PEARLS 1300, 900, 800, 717, 280 and 120 carbon blacks are also available in fluffy form under our MONARCH® brand.

Figure 3:
Color strength and blue tone in ABS



Illustrative color strength performance data for select products is presented in Figures 3 and 4 for different polymers. For questions related to other specific products, please contact your Cabot representative.

Surface smoothness / quality

Consumers demand high quality parts requiring specialty carbon blacks that achieve a very low rate of surface defects. As shown in the Figure 5, poor dispersion leads to only partial de-agglomeration of particles, causing surface defects. In contrast, excellent dispersion achieves full de-agglomeration, minimizes surface defects, delivers strong color performance and avoids deterioration of mechanical properties.

Figure 4:
Carbon black color strength in PA6

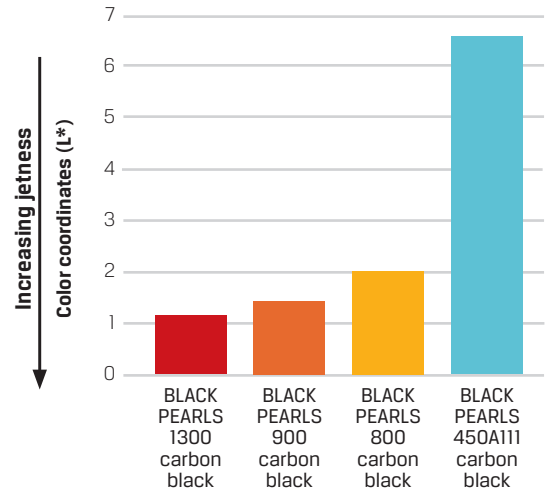
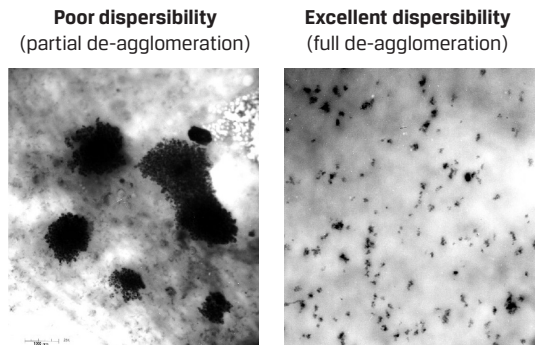


Figure 5:
Dispersibility comparison



Physical cleanliness

While dispersion is key to achieving a high level of surface smoothness, physical cleanliness, or elimination of physical contaminants within carbon blacks, is also critical to enabling high levels of surface quality and mechanical properties. The presence of physical contaminants, or ash and grit, can cause degradation of both aesthetic properties and mechanical properties. Our BLACK PEARLS® specialty carbon blacks feature high levels of cleanliness as measured by the 325-mesh delta-P test.



Processability

Processability refers to the ease with which a customer can incorporate the carbon black into a formulation. It is a key design consideration and we understand the need to create products that provide the proper performance benefits as well as a high level of processability as measured along three dimensions:

- ◆ Dispersibility
- ◆ Masterbatch dilutability
- ◆ Polymer compatibility

Dispersibility

As discussed previously, adequate dispersion of carbon black within polymers is necessary for proper final product performance and high quality surface finishes. Regardless of whether compounders utilize carbon black powder, pellets, or masterbatch, the selection of the appropriate carbon black is important.

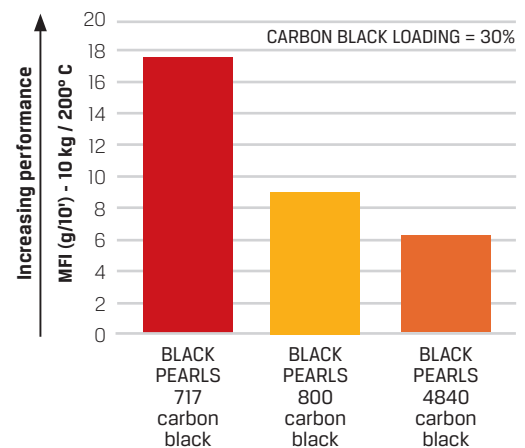
Masterbatch dilutability

Our carbon blacks are often formulated into masterbatches that are then used by compounders. Masterbatch dilutability is a measure of how easily a masterbatch can be distributed in, or mixed with, the dilution polymer. When masterbatch dilution is inadequate, non-homogenous pigmentation, lower UV performance, and poor mechanical properties may occur.

Dilutability of a masterbatch is directly linked to its viscosity as measured by the melt flow index (MFI). At a standard dosage in a masterbatch, all carbon blacks will reduce MFI and increase viscosity of the neat polymer, but by selecting the most appropriate carbon black, masterbatch formulators and customers can obtain a masterbatch with dilutability that meets their needs and saves substantial formulation cost.

We offer carbon black products that can be used in almost all polymer systems, though certain products are most suitable for particular applications. Figure 6 provides typical MFI data for three of our products in polystyrene.

Figure 6:
Carbon black melt flow index in polystyrene



Technical data

Specialty carbon black product	Description
BLACK PEARLS® 120 MONARCH® 120	General purpose low color specialty black with low to medium weatherability; ideal for color adjustments, allows higher loadings in concentrates.
BLACK PEARLS 160	General purpose low color specialty black suitable for a broad range of tinting applications, easy to disperse, this economical specialty black allows higher loadings in most systems.
BLACK PEARLS 280	General purpose carbon black suitable for a variety of tinting, coloring, and UV applications.
BLACK PEARLS 450A111	All purpose regular color specialty black that is easy-to-process and can be used in high loading masterbatches.
ELFTEX® 570	Multi-purpose regular color black for coloration and UV / weatherability performance across a range of plastics applications.
BLACK PEARLS 630	Offers a balance of jetness and bluetone without sacrificing ease-of-dispersion characteristics for use in a broad range of polymers.
VULCAN® 9A32	Provides excellent UV protection in plastic applications where weathering and cleanliness are paramount.
BLACK PEARLS 717 MONARCH 717	Easy to process medium color specialty black offering a balance of high loadability and jetness.
BLACK PEARLS 4840	Medium color, easy to disperse specialty black specifically for engineering resins.
BLACK PEARLS 800 MONARCH 800	Offers an optimal balance of properties including high jetness, blue undertone, excellent UV protection and low viscosity in applications for plastics.
BLACK PEARLS 900 MONARCH 900	Offers a balance of color and viscosity where superior jetness is required for interior/exterior automotive, electronic, appliance and business machine applications.
BLACK PEARLS 1300	Provides very high color jetness in some automotive engineering polymers, especially in various polyamide applications.
BLACK PEARLS 4350	Specialty black offering medium jetness with excellent dispersibility and masterbatch dilutability; suitable for use in plastic materials that are intended to comply with U.S. Food & Drug Administration (FDA) requirements. ^{1,2}
BLACK PEARLS 4750 MONARCH 4750	Specialty black offering very high jetness and blue undertone; suitable for use in plastic materials that are intended to comply with U.S. Food & Drug Administration (FDA) requirements. ^{1,2}

Note: For specialty carbon black products offered in both pellet and fluffy form, MONARCH is the fluffy form.

The data in the table above are typical test values intended as guidance only, and are not product specifications. Product specifications are available from your Cabot representative.

1. Information current at publication. For assurance that a carbon black product can be used in food contact applications, a Cabot issued food contact certification statement is required. Please contact your local Cabot representative.

2. This product meets U.S. Food and Drug Administration (FDA) requirements (21 CFR 178.3297) for contact with food when used as a colorant in polymers.

Typical applications			Physical properties		Representative physical properties				
					ASTM D-1510	ASTM D-2414	ASTM D-3265	ASTM D-1514	ASTM D-1513
Consumer goods	Industrial applications	General purpose and utility	Pellets	Fluffy	Iodine number (mg/g)	OAN (cc/100g)	Tint (%)	325 mesh residue (ppm)	Pellet density (kg/m ³)
		•	•	•	30	65	58	<200	510
		•	•		36	90	60	<200	450
		•	•		43	121	60	<200	365
		•	•		82	73	109	<25	450
•	•	•	•		121	114	115	<50	345
•		•	•		136	98	121	<25	380
•		•	•		142	118	120	<30	352
•	•		•	•	181	57	137	<200	495
•	•		•		205	90		<100	430
•	•		•	•	258	71	152	<200	430
•	•		•	•	258	67	153	<200	425
•	•		•		-	96	121	<100	433
•			•		116	70	121	<100	443
•			•	•	260	120	145	<200	307

Additional references

This Product Application Guide provides specific information about our specialty carbon blacks for use in non-conductive molding applications. For other application-specific product recommendations and broader product portfolio information, please visit cabotcorp.com or contact your Cabot representative.

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