what carbon black is and how it is made?

Carbon black is a single, inorganic carbon. It is produced in a reduced form and is essentially black in color. It is produced by burning carbon-containing materials at high temperatures in the absence of oxygen. Carbon black consists of extremely small particles of carbon that are produced by the combustion of hydrocarbons. When carbon black is added to rubber, it interacts with the rubber molecules to improve the rubber's properties.

Surface Area (SA)

Surface area is simply the amount of carbon black surface available to interact with the rubber. Expressed in square meters per gram (m²/g), a higher surface area black will be easier to disperse in the rubber, meaning less time will be required to achieve a uniform dispersion. Carbon black's particle size is determined by its surface area. The larger the surface area of the carbon black, the smaller the first digit, the higher the surface area and the more reinforcing a black will be. In addition, a black with a high surface area is more likely to be contaminated with foreign particles, which can affect physical properties.

Dispersion

Dispersion is an important factor in the production of rubber compounds. It is the process of mixing carbon black with rubber to achieve a uniform distribution of the black throughout the rubber. Good dispersion is necessary to achieve good physical properties in the final product. Dispersion is typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Dispersions are typically measured using a technique called iodine absorption. The higher the iodine absorption number, the better the dispersion. Disper
use of special carbon blacks to gain unique properties and processing

specialized carbon blacks

Carbon Black is the most dependable, yet innovative, line in the rubber industry. While discerning why certain blacks may be better in particular applications, you will see how to make your compounds’ properties by not making use of carbon blacks that may provide better inventory another black. And this is understandable. But you should be aware that you have a choice, a lot of choice. In daily discussions with rubber chemists, it’s clear that only a few of these chemists take advantage of the extended properties of their blacks. Problems like surface appearance of extrusions or flex fatigue resistance may appear to be intractable. Two such blacks are Spheron 1416 and Sterling 1120.

Spheron 1416 black has the low surface area of an N762 but the high structure of a higher durometer standard grade. DBP (dibutyl phthalate) absorbs are used as a convenient abbreviation for this characteristic. The more DBP a black will absorb, the more it will resemble an LV. This is important! For example, consider blacking an oil well blowout preventers (BOP) where very good physicals (tensile and tear) are required in order to make sure that the rubber will not only meet spec but be unlikely to fail for unforeseen reasons. Cost should be a consideration, but it is rarely the key driver. A cost awareness will be a key factor when using a black in a high quality application. Each black has unique characteristics and capabilities. As you will see in the table of durometer grade black and tensile and tear, each carbon black has a unique blend of specific physical characteristics. For instance, a black with high structure and low DBP maintains a low hardness and lower modulus. This black may yield cleaner extrusions because it is easy to disperse. A high DBP black may yield better tensile and tear because it will absorb more oil. And a low DBP black may yield better hardness and lower modulus because it will absorb less oil. The numbers in the table stand for “as is” characteristics. This is important when you are looking for a black to use in a particular application.

- The cleanest carbon blacks in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The most dependably delivered carbon black. Cabot has the most advanced logistics system in the industry, assuring delivery within 10 days of order. 

• The fastest carbon black in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The cleanest carbon blacks in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The most dependably delivered carbon black. Cabot has the most advanced logistics system in the industry, assuring delivery within 10 days of order. 

- The fastest carbon black in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The cleanest carbon blacks in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The fastest carbon black in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The cleanest carbon blacks in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The fastest carbon black in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The cleanest carbon blacks in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.

- The fastest carbon black in the industry. Many rubber products require FDA-certified blacks. Other products require oil well black (LS). This makes sense as there may be a risk of carcinogenicity or radioactive materials being present if the black contains materials by other means contamination by crude oil, natural rubber, or even oil well gas. Others require high structure blacks for example form by burning petroleum oil. Thermal black and channel blacks are made from natural gas feedstock. In some instances, the black will be used for very high quality products. Custom made blacks such as Spheron 6630, 6631, 43 121 N550 – Sterling SO Seals, stripping, hose, belts, extruded profiles. The smoother black particle surface allows the rubber to “slip”, relieving energy buildup and preventing rupture. Certain products lend themselves to the use of low structure (LS) blacks. A black made from oil and natural gas feedstock may be needed in high quality products.
CARBON BLACK: continued

the specialty blacks available from Cabot Corporation. Akrochem represents Cabot Corporation,

better use of available standard ASTM carbon blacks and you will have an opportunity to see

blacks differ from ordinary blacks, we have to be sure everyone starts with the same basic

a black that more precisely fits the product can sometimes mean meeting a specification,

In daily discussions with rubber chemists, it's clear that only a few of these chemists take

use of special carbon blacks to gain

• Unusual morphology or modifications to the black to make it more viable in molded

properties. Upside-down mixing of EPDM with Spheron 5000A results in an exceedingly

Spheron 5000A black that has the low surface area of an N762 but the high structure of

that lend themselves to properties unobtainable with standard blacks. An example is

goods. How many carbon blacks do you know of that are specially designed for use in

DBP

60

80

0

N990

S5630/SVH (N650)

N754

SP6000

SNS1 (N762)

SP1416

Dispersion,

Crack Initiation

Good Flow,

Modulus,

Green Strength

V6LM (N231

V6 (N220)

N762

N326

N231

N220

N550 – Sterling SO Seals, stripping, hose, belts, injection molded parts

3420 30 65 N762 – Sterling NS-1 Wiper blades/o-rings, hose, thin-wall, dynamic parts

6630 43 121 N550 – Sterling SO Seals, stripping, hose, belts, injection molded parts

Sterling Iodine DBP Replacing Applications

time and time again. But the major advantage of using special carbon blacks is that you

Certain products intend to be price-competitive at low volume but are actually high-performance

For example, N762 is a high performance black that has good dispersion, low swelling, and
to high volume manufacturing. Also, because special carbon blacks are more expensive,

certain coatings, tires, hot melts, hot melts, etc., utilizing these carbon blacks. Also due to their
cleanliness, these blacks have contributed

to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks

do not affect physical


to be evident for months) to justify the slightly higher cost of cleaner blacks.

because the desire to use cleaner, more benign blacks is also growing. Viable blacks

Similarly, a low structure black will tend to give you more stretch and swell. High structure
do not affect physical

Sometimes there is no characterization of carbon black that stands or falls in terms of functional

carbon black and they make it in their product line. By marketing either property or blends of

carbon black. Every rubber chemist should have a few blacks of each range in their tool box.

cleaner blacks. Viable blacks will make rubber chemists more productive and the use of

a convenient abbreviation for this characteristic. The more DBP a black will absorb, the more

higher viscosity, higher modulus, and higher electrical conductivity. Higher volatility blacks

Spheron 5000A is a black that is a tradeoff in between those characteristics. Although it isn't

improve

Therefore, blacks that have either low or high DBP will improve the process. Low DBP blacks

influences, but a high DBP black has a lower viscosity and a high modulus. The use of these

Here is a table showing some of these and the grades of blacks included:


to high volume manufacturing. Also, because special carbon blacks are more expensive,

those easy to process blacks will often be used. But the results can be rather surprising. In


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks

less obvious than some of the other physical and processing properties, but it is very important

do not affect physical

sometimes be associated with lower mixing stress and cost. However, the use of these type of

For example, N762 is a high performance black that has good dispersion, low swelling, and
do not affect physical

cannot be expressed as their composition, but it is a very important characteristic. The cost of


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks


do not affect physical


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks


do not affect physical


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks


do not affect physical


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks


do not affect physical


to rework/milling of rubber stock. A very hard-to-remedy problem if some of these blacks


do not affect physical
Carbon black is simply elemental carbon. Carbon is nature's most flexible element – it comes in pure forms that can radically differ like diamonds and graphite. Carbon black is a spherical particle with a mean diameter of 0.05 to 0.1 microns. It has a high density, typically 1.7 to 2.3 g/cm³. Carbon black is used in rubber, plastics, adhesives, coatings, and inks.

Carbon black is made by burning coal, oil, or gas at high temperatures in the presence of air or oxygen. The resulting black powder is then treated and sized to meet the desired properties for a particular application. Carbon black is carbonized at high temperatures and is produced in different grades to meet the requirements of various industries.

Carbon black is a vital component in the automotive industry, where it is used in tires, brake linings, and engine parts. It is also used in the manufacturing of rubber products such as gloves, hoses, and belts, as well as in the production of plastics, adhesives, and inks. Carbon black is an essential material for the electronics industry, where it is used in the production of solar panels, LED lighting, and in the manufacturing of electronic components.

The unique properties of carbon black make it a valuable material for a wide range of applications. Carbon black has good electrical conductivity, high thermal stability, and excellent resistance to friction and wear. It is also highly resistant to ultraviolet light and has good oxidation resistance. Carbon black is a versatile material that can be used in a variety of industries, making it a vital component in the modern economy.

The properties of carbon black are determined by its structure, which is influenced by the production method. Different grades of carbon black are produced to meet the specific requirements of various applications. Carbon black is an essential material for the modern economy, and its unique properties make it a valuable component in a wide range of industries.
Carbons Black: 11 Black is an essential component in the rubber industry, providing unique properties such as dispersion, particle size, and surface area. Selecting the right type of carbon black is crucial to achieving desired performance characteristics. This section discusses the importance of understanding carbon black properties and how they impact rubber compounds.

**Surface Area (SA)**

Surface area is a critical parameter in determining the dispersion characteristics of carbon black. A high surface area allows for improved dispersion, but it can also result in reduced particle size and increased processing costs. Surface area measurements are typically expressed in terms of the BET (Brunauer-Emmett-Teller) method.

**Structure (S)**

Structure refers to the arrangement of carbon black particles within a compound. Different structures offer varying degrees of reinforcement and processability. High structure blacks provide better reinforcement but may be more difficult to disperse. Low structure blacks are easier to process but offer less reinforcement.

**Tensile and Tear Properties**

Tensile and tear properties are essential for determining the performance of rubber compounds. These properties are influenced by factors such as carbon black structure, particle size distribution, and processing conditions. Understanding these relationships is crucial for optimizing compound performance.

**Abrasion and Weathering Resistance**

Abrasion and weathering resistance are important for applications that experience high wear or exposure to harsh environments. Carbon black properties, such as hardness and structure, play a significant role in these characteristics. Proper selection of carbon black can help ensure durability and longevity in demanding applications.

In summary, understanding carbon black properties is critical for achieving optimal performance in rubber compounds. By carefully selecting and optimizing carbon black, rubber manufacturers can create compounds that meet the specific requirements of various applications while minimizing costs and improving overall quality. The future of rubber technology will continue to harness the power of carbon black to drive innovation and meet the evolving needs of the industry.
From the morphology map you can see this is another “in-between” black. Sterling 1120 is the closest on the ASTM system, this would be classified as an N762 as well as having a very high 11.8 Tensile. From this graph below, you can see the dispersion and how bad mixing becomes on the N990 while still getting adequate reinforcement and very low n=1000 units.

- Lower cost possible by adding additional oil to the batch.
- The high structure along with slightly smaller particle size allows more oil to be added with no fall-off in properties compared to N990. Grinding is easier due to higher loadings.
- This is a multipurpose black. Spheron 5000 has the surface area of an N700 black but the structure of an N550. The 6000 has the surface area of an N800 but the structure of an N650. The 6000 black has the surface area of an N800 but structure like an N650. These are dual personality blacks. Spheron 5000 has the surface area of an N700 but the structure of an N550. The 6000 black has the surface area of an N800 but structure like an N650.

- Molds remain clean longer. Reduces downtime for mold cleaning.
- Designed for injection molded O-rings, seals and gaskets, and intricate molded parts.
- Can create higher-loaded stocks with the 6000 that extrude like N550 and N650 but are lower cost.
- Can create higher-loaded stocks with the 6000 that extrude like N550 and N600 but are lower cost.
- The low surface area and high structure makes for faster mixing. Some two-pass mixes are offered by 1120.

- High duro parts can be made with manageable viscosities. N990 has so little reinforcement and tear that resembles an N300 grade. The 1120 reinforces better while maintaining a workable viscosity. Sterling 6740 on its own can even exceed the high duro for HNBR and has good properties.
- While 6740 and 1120 would be slightly less tear, a lot less cost than any other black and better part handling. The 1120 is more difficult to use unless you add an N300 or higher than the Flex. There are no problems like Bishop, Hapala, or Pyroflex and problems can be made in the high duro range and yield properties identical to N710.

Spheres IR 1070

Another specialty black designed for high zero cycle, action and IR/EPDM parts. High structure to permit dispersion plus a special addition included at the compounder does not permit better IR in N990. For N754 it also improves molded densities. Where the IR compounder added carbon blacks to the mix, the 1120 is the perfect addition for toning.

- Physicals like N650 or N550.

- Carbon Black Compared to N990 and N762 in NR at 75 Duro

<table>
<thead>
<tr>
<th>Physicals</th>
<th>N990</th>
<th>N762</th>
<th>N400</th>
<th>N300</th>
<th>N1120</th>
</tr>
</thead>
<tbody>
<tr>
<td>100% Modulus (MPa)</td>
<td>3.2</td>
<td>3.7</td>
<td>4.3</td>
<td>4.6</td>
<td>4.16</td>
</tr>
<tr>
<td>Elongation @ Break (%)</td>
<td>450</td>
<td>427</td>
<td>393</td>
<td>363</td>
<td>348</td>
</tr>
<tr>
<td>Tensile Strength (MPa)</td>
<td>11.2</td>
<td>11.8</td>
<td>2.93</td>
<td>5.18</td>
<td>5.78</td>
</tr>
<tr>
<td>Shore A (3 sec.)</td>
<td>70</td>
<td>70</td>
<td>140</td>
<td>95</td>
<td>80</td>
</tr>
<tr>
<td>Min Torque (dNm)</td>
<td>1.2</td>
<td>1.4</td>
<td>0.9</td>
<td>0.8</td>
<td>0.7</td>
</tr>
<tr>
<td>Curing Scorch 1 (m.m.)</td>
<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
<td>0.9</td>
<td>1.0</td>
</tr>
<tr>
<td>Extrusion</td>
<td>16/16</td>
<td>9/16</td>
<td>11/16</td>
<td>11/16</td>
<td>7/16</td>
</tr>
</tbody>
</table>

**Note:** These data are not intended to replace actual testing, as actual results can vary. Always test samples under real end-use conditions to ensure proper end-use performance. These data are not intended to replace actual testing, as actual results can vary. Always test samples under real end-use conditions to ensure proper end-use performance.
Sterling 1120

Another specialty black designed for high volume, injection-molded EPDM parts. High structure and low viscosity make this grade the perfect choice for applications that need lower hysteresis and higher tensile properties. Sterling 1120 is FDA-compliant and offers twice the injection molding cycles between cleanings (see chart below) compared to N990. This makes it an ideal choice for high-volume applications. It provides good reinforcement, tear resistance, and abrasion resistance while maintaining excellent dispersion and low temperature sensitivity. This black is a great choice for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.

<table>
<thead>
<tr>
<th>Property</th>
<th>Sterling 1120</th>
<th>N990</th>
<th>N330</th>
<th>N700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>18.39 MPa</td>
<td>18.25 MPa</td>
<td>16.60 MPa</td>
<td>16.39 MPa</td>
</tr>
<tr>
<td>Hardness Shore A</td>
<td>76</td>
<td>74</td>
<td>74</td>
<td>73</td>
</tr>
<tr>
<td>Die C Tear</td>
<td>48.34 kN/m</td>
<td>49.91 kN/m</td>
<td>48.16 kN/m</td>
<td>50.79 kN/m</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Tan Delta</td>
<td>1.1</td>
<td>1.3</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>

Spheres IRX 1072

Another specialty black designed for high volume, injection-molded FKM parts. High structure and low viscosity make this grade the perfect choice for applications that need lower hysteresis and higher tensile properties. Spheres IRX 1072 is FDA-compliant and offers twice the injection molding cycles between cleanings (see chart below) compared to N990. This makes it an ideal choice for high-volume applications. It provides good reinforcement, tear resistance, and abrasion resistance while maintaining excellent dispersion and low temperature sensitivity. This black is a great choice for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.

<table>
<thead>
<tr>
<th>Property</th>
<th>Spheres IRX 1072</th>
<th>N990</th>
<th>N330</th>
<th>N700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>18.39 MPa</td>
<td>18.25 MPa</td>
<td>16.60 MPa</td>
<td>16.39 MPa</td>
</tr>
<tr>
<td>Hardness Shore A</td>
<td>76</td>
<td>74</td>
<td>74</td>
<td>73</td>
</tr>
<tr>
<td>Die C Tear</td>
<td>48.34 kN/m</td>
<td>49.91 kN/m</td>
<td>48.16 kN/m</td>
<td>50.79 kN/m</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>0.5</td>
<td>0.6</td>
<td>0.8</td>
<td>0.9</td>
</tr>
<tr>
<td>Tan Delta</td>
<td>1.1</td>
<td>1.3</td>
<td>1.5</td>
<td>1.5</td>
</tr>
</tbody>
</table>


discrete blacks. When compared to traditional carbon blacks, such as N330, these blacks are more uniform in size and shape, leading to better dispersion and improved mechanical properties. The morphology of these blacks is optimized to provide the best balance of reinforcement, tear resistance, and abrasion resistance, while minimizing temperature sensitivity and hysteresis. These blacks are ideal for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.

<table>
<thead>
<tr>
<th>Property</th>
<th>Sterling 7850</th>
<th>N330</th>
<th>N351</th>
<th>N700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>11.2 MPa</td>
<td>11.8 MPa</td>
<td>11.2 MPa</td>
<td>11.2 MPa</td>
</tr>
<tr>
<td>Hardness Shore A</td>
<td>74</td>
<td>73</td>
<td>74</td>
<td>73</td>
</tr>
<tr>
<td>Die C Tear</td>
<td>450</td>
<td>427</td>
<td>450</td>
<td>427</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Tan Delta</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Sterling 7850

Another specialty black designed for high volume, injection-molded FKM parts. High structure and low viscosity make this grade the perfect choice for applications that need lower hysteresis and higher tensile properties. Sterling 7850 is FDA-compliant and offers twice the injection molding cycles between cleanings (see chart below) compared to N990. This makes it an ideal choice for high-volume applications. It provides good reinforcement, tear resistance, and abrasion resistance while maintaining excellent dispersion and low temperature sensitivity. This black is a great choice for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.

<table>
<thead>
<tr>
<th>Property</th>
<th>Sterling 7850</th>
<th>N990</th>
<th>N330</th>
<th>N700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>11.2 MPa</td>
<td>11.8 MPa</td>
<td>11.2 MPa</td>
<td>11.2 MPa</td>
</tr>
<tr>
<td>Hardness Shore A</td>
<td>74</td>
<td>73</td>
<td>74</td>
<td>73</td>
</tr>
<tr>
<td>Die C Tear</td>
<td>450</td>
<td>427</td>
<td>450</td>
<td>427</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Tan Delta</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

Spheron 7850

Another specialty black designed for high volume, injection-molded FKM parts. High structure and low viscosity make this grade the perfect choice for applications that need lower hysteresis and higher tensile properties. Spheron 7850 is FDA-compliant and offers twice the injection molding cycles between cleanings (see chart below) compared to N990. This makes it an ideal choice for high-volume applications. It provides good reinforcement, tear resistance, and abrasion resistance while maintaining excellent dispersion and low temperature sensitivity. This black is a great choice for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.

<table>
<thead>
<tr>
<th>Property</th>
<th>Spheron 7850</th>
<th>N990</th>
<th>N330</th>
<th>N700</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tensile Strength</td>
<td>11.2 MPa</td>
<td>11.8 MPa</td>
<td>11.2 MPa</td>
<td>11.2 MPa</td>
</tr>
<tr>
<td>Hardness Shore A</td>
<td>74</td>
<td>73</td>
<td>74</td>
<td>73</td>
</tr>
<tr>
<td>Die C Tear</td>
<td>450</td>
<td>427</td>
<td>450</td>
<td>427</td>
</tr>
<tr>
<td>Abrasion Loss</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
<td>5%</td>
</tr>
<tr>
<td>Tan Delta</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
</tbody>
</table>

These blacks are designed for high volume, injection-molded FKM parts. High structure and low viscosity make this grade the perfect choice for applications that need lower hysteresis and higher tensile properties. These blacks are FDA-compliant and offer twice the injection molding cycles between cleanings (see chart below) compared to N990. This makes them ideal for high-volume applications. They provide good reinforcement, tear resistance, and abrasion resistance while maintaining excellent dispersion and low temperature sensitivity. These blacks are great choices for applications where you need a balance of reinforcement, tear resistance, and abrasion resistance, and where good dispersion is crucial.
CARBON BLACK: continued 7

Another specialty black designed for high polar uses, section and section of EPDM rubber. Higher structure to permit dispersion plus a special addition included for the promoter to better boost EPDM. For the uses in molded and injection moulded parts, when the reversion is improved in color properties, or to ‘plasticise’ the rubber for stretching.

Spheres IR-107

Sterling 7810

Because these features and so on looks like about 3 pages. There’s a bunch of text about these new ones before the old ones. The text does a good job of introducing the new ones, which makes sense. There’s more text about the old ones than the new ones. The text is not clear about the new ones. There’s a lot of text about the old ones. There’s a lot of text about the new ones. The text is not clear about the old ones.
Carbon Black: continued

- Disperses like an N550 but has properties close to N351. Can use in upside down mixed EPDM dynamic parts that need low hysteresis and excellent dispersion but also good reinforcement.

- The 1120 gives dynamic parts that need low hysteresis and excellent dispersion but also good reinforcement. (Obviously N990 will give perfect physicals like N650 or N550.)

- While FKM loading of 1120 would be slightly less, it is still more than any other black for optimum dispersion along with moderate reinforcement. (Obviously N990 will give perfect physicals like N650 or N550.)

- High duro parts can be made with manageable viscosities. N990 has the highest ultimate tensile and fatigue properties but also has very high structure. N650 on the other hand has high HBU and more than likely is not a candidate for good dispersion in softer materials. The 1072 also improves mold cleanliness. Between the two improved molding properties, you see you get the dispersion and the heat buildup resistance of the N650 while still getting adequate mechanicals and low tear as measured on an N612 grade.

- The 1120 gives a compound with no barreling, no torque build build up, and no slow cure. A compound can be run at a higher duro and get equal flex-cracking or run a few compounders make good use. It provides very good reinforcement but also has very good dynamic properties (like N990) for oil field parts.

- Low viscosity is an advantage in high duro parts that have to be molded or extruded. High structure is required at high duro for torque build up and scorch. The lower viscosity may be an advantage in extrusion as it reduces viscosity build up (HBU) and extreme toughness. The only drawback is dispersion problems in softer materials, which do not have good dispersion along with moderate reinforcement. (Obviously N990 will give perfect physicals like N650 or N550.)

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.

- Improved flow means more complete cavity fills in less time. Improved flow is an advantage in extrusion of insulating foams and other foamed products. These foam products tend to have very low pressure levels, and therefore require high dosages of filler. Improved flow helps keep the maximum loading of filler below the maximum allowed for the product. This allows the supplier to make more money by getting more product to the customer.
From the morphology map you can see this is another "in-between" black. Sterling 1120 is the closest on the ASTM system, this would be classified as an intermediate grade with SA 21 and DBP 34. From the graph below, you can see how the 1120 provides many of the good properties of both N762 as well as N990. You get good loading close to N990, but tensile like N762. You see you get the dispersion and low heat buildup resistance of the N650 while also getting abrasion resistance.

- Dynamic parts that need low hysteresis and excellent dispersion but also good reinforcement.
- Helps overcome one of the weaknesses of N990: its lack of reinforcement. Most compounders have been limited to N762 and N990. The 1120 gives you a choice where you can have both.
- Lower HBU (heat build-up) and tan delta than blends of N990 and N762.
- Less severe shelf aging effect than N990.
- Improved flow means more complete cavity fills in less time.
- High duro parts can be made with manageable viscosity (N990 has high small molecule content which makes it hard to process). Sodium silicates are found in N550 to disperse poorly. This allowed mustard gas to permeate easier. Use of Sterling 1120 reduces this problem.
- Low electrical conductivity due to low surface area and low structure. Only N900 is better in this regard. Along with this, the cleanliness of the black (low metal content) means metal in contact with rubber part does not corrode as easily.
- The 1120 gives improved flow and offers dispersion plus a special additive included at the reactor that promotes better flow in dispersion plus a special additive included in the reactor that promotes better flow in dispersion. (Obviously N990 will give perfect transportability). Between the two improved molding properties, you get improved flow and better hot tear resistance. The Sterling 1072 also improves mold cleanliness. Between the two improved molding properties, you get a compound that disperse poorly. This allowed mustard gas to permeate easier. Use of Sterling 1120 reduces this problem.
- Other expensive polymers like Vamac, Hypalon, plus you get improved flow and better hot tear resistance. (See chart).
- Lower HBU (heat build-up) and tan delta than blends of N990 and N762.
- Good blacks for butyl dispersion. A maker of low permeation water tubing for gas masks that require good physicals and/or a near-perfect extrusion finish (Class A finish).
- High duro parts can be made with manageable viscosity. N990 has so little reinforcement that it has difficulty reaching the 90 duro level. The Sterling 7850 is a souped-up version of N351 that provides better dispersion. Structure is significantly higher (128 vs 120) but surface area is the same. If you need a tough, dynamic 70-duro compounder, Sterling 7850 is a good choice. It's very smooth and can be used at lower loadings than N990.
- Another specialty black designed for high volume, injection-molded EPDM parts. High structure and low viscosity permit dispersion plus a special additive included in the reactor that promotes better flow in dispersion. (Obviously N990 will give perfect transportability). Between the two improved molding properties, you get improved flow and better hot tear resistance.