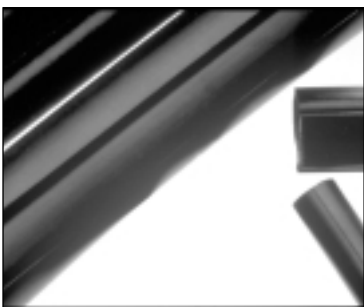


SPHERON® 6000A



SPHERON® 6000A is one of the carbon blacks from CABOT's "A" grade family.

Description

The surface appearance of extruded automotive profile and window channels is very important today. Class "A" automotive surface applications demand a very low level of particles that could cause visible surface imperfections leading to rejects or 'scrap'. In response to that market requirement, a family of carbon blacks appropriately identified by the suffix "A", was developed by Cabot to address carbon black related extruded surface imperfections.

All "A" grades are free from inorganic calcium salts and have a very low metallic particle content. The "A" carbon black series are produced via a special process resulting in a very low amount of impurities often referred to in the past as "grit". The benefits of the reduced impurities can be directly measured via a new test developed by Cabot known as the "MDP" test (Macro Defect Predictor). MDP is a new, by CABOT developed 120 Mesh sieve residue test that is more sensitive and less destructive than the traditional ASTM grit test. The MDP test better reflects the performance of the "A" grades in class "A" extruded surface applications.

Furthermore, some members of the "A" grade family have a unique morphology, which considerably improves the speed of dispersion and ease of mixing compared to well known standard carbon grades like the ASTM N500, N600 and N700 series. The cleanliness and morphology features together drastically reduce the extruded surface defects normally associated with carbon black.

The large particle size and medium C-DBPA of SPHERON 6000A facilitates the manufacture of rubber compounds with higher carbon black loading at equal hardness or viscosity. Compared to ASTM N500, 600, 700 and even SPHERON 5000A, SPHERON 6000A based compounds will exhibit improved downstream processing and higher electrical resistivity. Reinforcement is lower, but still much higher than Lamp or Medium Thermal Black.

Applications

SPHERON 6000A carbon black gives very smooth surfaces in extruded profiles. The black is particularly of interest for the production of low viscosity compounds and low hardness articles, since SPHERON 6000A disperses quicker and easier than higher surface area semi reinforcing grades.

The ability to compound with higher loading at equal viscosity or hardness compared to FEF type carbon blacks facilitates improved processing and extrusion in polymer rich compounds such as sponge profiles. SPHERON 6000A carbon black has been found to significantly improve the compound resistance to electrochemical degradation in radiator hose compounds, without compromising on other physical or processing parameters.

SPHERON 6000A carbon black can also be used in some injection or compression molded rubber articles requiring good dispersion and very clean carbon blacks.



SPHERON® 6000A

CARBON BLACK



CABOT

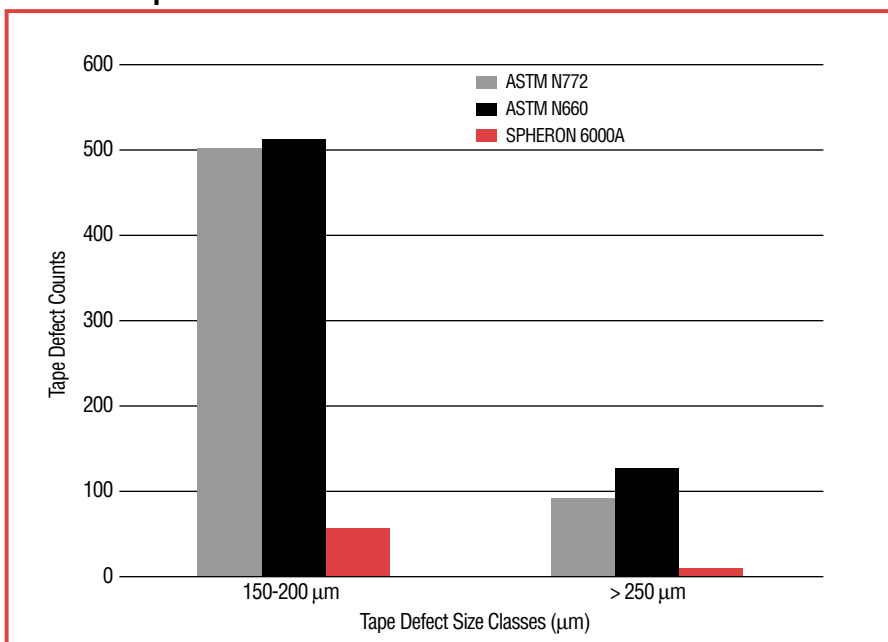
creating what matters

SPHERON 6000A has a similar structure as ASTM N660 carbon black, but a considerably lower surface area and contains less +120 Mesh size impurities. This results in a higher loading capability, higher electrical resistivity, better dispersion and much smoother extrusion. Reinforcement is somewhat less than for ASTM N600 and 700 type blacks, but SPHERON 6000A will demonstrate a much better and faster achieved dispersion level, particularly in soft compounds.

These SPHERON 6000A performance features are shown in the comparison below against ASTM N660 and N772 at equal hardness in an EPDM test formulation (100 phr EPDM, see table for phr carbon black, 75 phr oil):

Carbon Black Grade	SPHERON 6000A	ASTM N660	ASTM N772
Carbon Black Loading, (phr)	150	130	160
Viscosity @ 100° C			
ML (1+4), (MU)	59	54	53
Hardness			
Shore A, (3 sec.)	63	62	63
Volume Resistivity			
Cabot Method R (ohms.cm)	430	170	195
Tensile Properties			
Tensile Strength, (MPa)	11.3	13.4	12.2
Elongation @ Break, (%)	440	439	438
100% Modulus (MPa)	3.7	3.2	3.0
Tape Dispersion Rating			
Defect count size distribution:			
100-150 µm	300	1335	1544
150-200 µm	67	521	501
200-250 µm	12	173	155
>250 µm	6	130	90

Extruded Tape Defect Counts



Compound electrical conductivity is believed to play a role in the electrical chemical degradation ('ECD') phenomenon for radiator hoses. The SPHERON 6000A carbon black morphology offers the possibility to reduce the risk of this failure. The 4 photos below are taken from rubber dumbbell sample surfaces after 1 week submergence in a 50/50 cooling liquid/water blend at 80°C with an applied voltage of

10 Volt. As can be judged visually on the photos, the ASTM blacks N550 and N683, because of their higher surface area, exhibited more electrical chemical degradation than SPHERON 5000A and SPHERON 6000A in an equal 65 Shore A peroxide cured radiator hose formulation:

ASTM N550, 82 phr



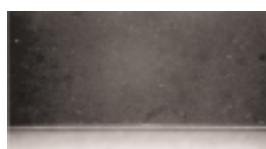
ASTM N683, 82 phr



SPHERON 5000A, 90 phr



SPHERON 6000A, 105 phr



Basic rubber properties of the 4 rubber compounds are listed below:

Carbon Black Grade	ASTM N550	ASTM N683	SPHERON 5000A	SPHERON 6000A
Viscosity ML (1+4) @100° C, (MU)	92	91	91	89
Hardness Shore A, (3 sec.)	65	64	64	63
Resistivity Rho (ohms.cm)	4000	8000	15000	40000
Initial Properties				
Tensile Strength, (MPa)	15	14.4	13.7	12.7
Elongation @ Break, (%)	360	370	360	340
Properties after 168 hrs ECD				
Tensile Strength, (MPa)	11.4	11.0	11.8	13.0
Elongation @ Break, (%)	280	290	300	340
Change after 168 hrs ECD				
Tensile Strength, (MPa)	-24	-24	-14	+2
Elongation @ Break, (%)	-22	-22	-16	0

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