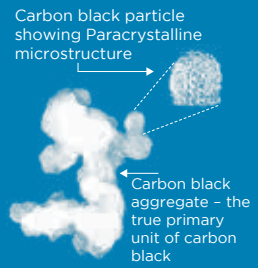
BIRLA CARBON
SPECIALTY BLACKS

Raven® and **Conductex®** Carbon Blacks for Specialty Applications

FUNDAMENTAL PROPERTIES OF CARBON BLACK

A carbon black's application performance is determined by its fundamental properties and the level of dispersion achieved. The most important physical and chemical properties include particle size, porosity, structure, and surface chemistry. The level of dispersion in any given matrix is strongly influenced by the mixing equipment, formulation (including dispersant selection), and physical form.



PARTICLE SIZE is the primary influence on color properties. Particle size is measured by electron microscopy (EM). Mean particle size is certified via statistical thickness surface area (STSA) correlation according to ASTM D3849-14. Smaller particle diameter gives rise to higher surface area and tinting strength. High surface area is usually associated with greater jetness, higher conductivity, improved weatherability, and higher viscosity, but requires increased dispersion energy.

STRUCTURE is a measure of the three-dimensional fusion of carbon black particles to form aggregates. Highly structured carbon blacks provide higher viscosity, greater electrical conductivity and easier dispersion. Measures of aggregate structure may be obtained from shape distributions from EM analysis, oil absorption (OAN) or void volume analysis.

POROSITY is indicated by comparing a carbon black's external surface area predicted by STSA to the total surface area value obtained with the BET NSA method. Conductive carbon blacks tend to have a high degree of porosity.

SURFACE CHEMISTRY of carbon blacks generally refers to the oxygen-containing groups present on a carbon black's surface. Oxidized surfaces improve pigment wetting, dispersion, rheology, and overall performance in selected systems. In other cases, oxidation increases electrical resistivity and makes carbon blacks more hydrophilic. The extent of surface oxidation is measured by determining the quantity of the "volatile" component on the carbon black. High volatile levels are associated with low pH.

PHYSICAL FORM is important in matching a carbon black to the equipment by which it is to be dispersed. Powdered carbon blacks are recommended in low-shear dispersers and on three-roll mills. Beaded carbon blacks are recommended for shot mills, ball mills and other high energy equipment. Beading provides lower dusting, bulk handling capabilities, and higher bulk densities, while powdered carbon blacks offer improved dispersibility.

PROPERTY	INFLUENCE OF PROPERTY ON PERFORMANCE
Particle Size Distribution 	**Smaller Particle Size (Higher Surface Area)** • Increases Jetness • Increases Tint • Increases UV Protection • Increases Electrical Conductivity • Increases Vehicle Demand and Viscosity • Reduces Dispersibility
Structure – Aggregate Size/ Shape Distribution 	**Higher Structure (Increasing Oil Absorption)** • Reduces Jetness and Tint • Improves Dispersibility • Increases Vehicle Demand and Viscosity • Increases Electrical Conductivity
Porosity – Pore Size Distribution 	**Higher Porosity (Higher Ratio of NSA/STSA)** • Increases Vehicle Demand and Viscosity • Increases Electrical Conductivity • Enables Reduced Loadings in Conductive Applications
Surface Chemistry – Surface Functionality Distribution 	**Higher Surface Functionality (Higher Volatile Content)** • Improves Vehicle Wetting • Reduces Viscosity of Liquid Systems • Lowers Electrical Conductivity

Additional Properties:

- Other Constituents – Sulfur, Ash, Residue, etc.
- Physical Form – Beads or Powder

SPECIALTY CARBON BLACK APPLICATIONS

Specialty blacks are used in a wide variety of applications including coatings, printing inks, plastics, and sealants. The selection of a specific product for an application depends on the end-use requirements as well as processing conditions.

ULTRA® CARBON BLACKS

Birla Carbon products are high performance pigments targeted for use in demanding applications. Carbon black purity and consistency of performance, always important, are now recognized as being critical to continuing quality improvement. Birla Carbon has developed products that provide the highest level of purity available. These products, referred to as Ultra carbons, serve as industry benchmarks in various application segments. Ultra products benefit various application systems by providing greater uniformity, increased compatibility, improved dispersion, better processing, longer screen life, enhanced color development, and reduced scrap.

COATINGS

Coatings may be formulated with an extremely wide range of products such as Raven 410 for utility finishes, Raven 1255 for various medium color industrial coatings, and Raven 5000 Ultra II for high quality, extremely jet, blue undertone automotive topcoat applications. Specialty blacks primarily used for tinting have low surface areas and broad particle size distributions. Products with these properties provide good economics coupled with a desired blue tone and best resistance to flooding and flocculation. Raven 14 Powder, an easily dispersed post-treated carbon black, is the industry standard for blue undertone and tinting in paints and coatings.

INKS

Specialty blacks for inks are generally medium to coarse in particle size and are used for full color rather than tinting properties. In liquid ink applications such as publication and packaging gravure, the Raven 400 and Raven 500 series products are widely used because of their rheology, ease of dispersion, and blue tone. Raven L Ultra is used when the masstone requirements are higher. Depending on specific requirements, high quality inks are formulated with products such as Raven 760 Ultra, Raven 1000, and Raven 1035.

PLASTICS

Carbon black may be incorporated into thermosets or thermoplastics for color, tint, or functional reasons. Masstone color plastic applications can employ the entire available range of carbon black particle sizes. Selection will depend upon loading, dispersion, and cost. The coarser products are excellent choices in applications where blue tone, tinting strength, and ease of dispersion are preferred. Conductex blacks provide different degrees of electrical conductivity for a wide range of plastics requirements. Conductex 7055 Ultra and Conductex K Ultra offer optimum conductivity with minimal contribution to viscosity in applications such as wire and cable, ESD, as well as conductive coatings. For applications requiring very high jetness such as engineering plastics, Raven 2000, Raven 2350 Ultra, and Raven 2500 Ultra are recommended. For ultraviolet protection, Raven UV Ultra and Raven PFEB are industry standards for jacketing, film, and pipe applications.

GLOBAL SPECIALTY BLACKS PRODUCT PORTFOLIO

BIRLA CARBON
SPECIALTY BLACKS

Raven® and Conductex® Carbon Blacks	D6556 NSA Surface Area m^2/g	D6556 STSA Surface Area m^2/g	D2414 OAN Oil Absorption $cm^3/100g$ Beads	D2414 OAN Oil Absorption $cm^3/100g$ Powder	D3265 Tinting Strength	2A-700 Volatile Content %	Producing Country	Typical Applications
Raven 5000 Ultra II[1]	583	350	95	95	135	10.5	U.S.	Automotive topcoat, architectural coatings; piano black applications
Raven 5000 Ultra 3[1]	583	350	95	95	135	10.5	U.S.	
Raven 3500[1]	375	212	105	105	145	5.0	U.S.	
Raven 3000 Ultra	260	235	65	67	145	-	Korea	High jetness plastics; industrial and powder coatings; inkjet ink
Raven 2900 Ultra	254	215	65	67	145	-	Korea	
Raven 2800 Ultra	257	205	95	100	145	-	Korea	
Raven 2500 Ultra	270	206	65	67	147	-	U.S.	
Raven 2350 Ultra	195	180	60	62	140	-	Korea	
Raven 2000	194	168	65	70	144	-	U.S.	
Raven 1300 Ultra	115	105	95	-	128	-	U.S.	Fine denier synthetic fibers
Raven 1255[1]	122	119	66	66	135	2.7	U.S.	Premium offset ink and specialty coatings
Raven 1250	113	102	55	60	128	-	U.S.	Coatings and plastics
Raven 1200	106	104	55	60	128	-	U.S.	
Raven 1190 Ultra	113	100	57	-	125	-	U.S.	Inks, coatings, and fiber
Raven 1185 Ultra[1]	100	97	-	100	124	2.5	U.S.	Premium offset ink, specialty coatings, and toner
Raven 1180[1]	110	97	-	60	128	2.7	U.S.	
Raven 1170	107	101	55	60	124	-	U.S.	Inks, coatings, and plastics
Raven 1100 Ultra[1]	101	95	72	72	120	2.4	U.S.	High quality inks including heatset, sheetfed, UV, and packaging; coatings
Raven 1080 Ultra[1]	79	77	60	60	109	1.6	U.S.	
Raven 1060 Ultra[1]	66	65	50	50	102	1.6	U.S.	
Raven 1040[1]	90	86	100	100	115	2.6	U.S.	
Raven 1035[1]	91	91	65	65	125	2.4	U.S.	
Raven 1020	95	90	58	60	121	-	U.S.	Inks, coatings, and plastics
Raven 1010	95	91	-	58	126	-	Korea	
Raven 1000	92	91	58	63	126	-	U.S.	
Raven 900	82	81	-	108	102	-	Korea	
Raven 890	69	68	-	102	97	-	U.S.	Sealants and coatings
Raven 880 / Raven 880 Ultra	78	76	102	-	102	-	Korea / Canada	Geomembrane, film, and molding
Raven 860 Ultra	48	48	48	50	91	-	U.S.	High quality inks including heatset, sheetfed, and packaging
Raven 850	63	63	-	75	101	-	U.S.	Coatings, inks, and plastisol
Raven 820	73	71	120	-	100	-	Canada	Flexographic ink
Raven 790 Ultra	64	64	-	105	95	-	U.S.	Sealants
Raven 780 Ultra	89	77	58	60	109	-	U.S.	Toner and specialty inks
Raven 760 Ultra	64	64	48	50	102	-	U.S.	High quality inks including heatset, sheetfed, and other; coatings
Raven 525	43	42	121	-	55	-	China	Plastic color concentrate for film, pipe, and molding
Raven 520 / Raven 520 Ultra	40	39	121	-	58	-	U.S.	
Raven 510 Ultra	38	38	90	-	57	-	U.S.	
Raven 500	44	44	75	80	69	-	U.S.	Plastic color concentrate for film and molding; blue undertone and tinting in coatings
Raven 475	40	39	60	-	70	-	Korea	
Raven 450	35	34	63	65	61	-	U.S.	
Raven 430 Ultra	31	31	75	78	58	-	U.S.	
Raven 425	29	29	72	75	54	-	Korea	
Raven 420	28	28	72	75	50	-	U.S.	
Raven 410 / Raven 410 Ultra	26	26	65	68	47	-	U.S.	
Raven 415 / Raven 415 Ultra	32	32	65	-	61	-	U.S. / Spain	News ink and plastic color concentrate
Raven 22	28	27	-	113	44	-	U.S.	Blue undertone and tinting in coatings; solid carbon and metallurgical
Raven 16	30	29	-	105	46	-	U.S.	
Raven 14[1]	44	44	-	111	66	1.7	U.S.	Blue undertone and tinting in coatings
Raven FC1	115	100	100	-	112	-	Korea	U.S. FDA 21 CFR 178.3297 indirect food-contact plastics
Raven L / Raven L Ultra	85	85	72	78	110	-	Korea / U.S.	Inks, coatings, and plastics
Raven M	78	76	102	-	102	-	China	
Raven P	155	109	113	-	107	-	Italy	Conductive and film
Raven P5 Ultra	109	100	112	117	115	-	Korea	Sealant, pipes, film, and fiber
Raven P7 Ultra	90	85	96	-	105	-	Italy	Pipe, film, and fiber
Raven PFEB	107	91	98	-	105	-	Hun. / Ita. / Kor.	
Raven UV Ultra	124	112	114	-	118	-	Korea	UV protection, cable jacketing, and fiber
Conductex SC Ultra	205	124	115	115	123	-	U.S.	Wire and cable, ESD, and other conductive applications
Conductex K Ultra	185	125	141	-	115	-	Korea	
Conductex 7097 Ultra	85	82	160	-	97	-	Korea	
Conductex 7093	75	73	140	-	98	-	China	
Conductex 7067 Ultra	63	54	140	-	65	-	Korea	
Conductex 7060 Ultra	63	56	156	-	70	-	Canada	
Conductex 7055 Ultra	55	50	170	-	61	-	Canada	
Conductex 7051 Ultra	43	42	121	-	55	-	Canada	Wire and cable insulation shield
Conductex 7054 Ultra	43	42	122	-	60	-	Korea	
Conductex 7090	43	42	121	-	55	-	China	
Conductex 7095 Ultra	39	39	121	-	58	-	Spain	

1 – Surface oxidized, "Treated" product
Treated products typically range in pH from 3.0–3.5
Non-treated products typically range in pH from 6.5–8.0
OAN and tint strength are measured prior to treatment
2 – Industry specific treatment for enhanced dispersion and handling properties

Color Index No. 77266, Pigment Black 7, CAS No. 1333-86-4

THE ONLY SPECIALTY BLACKS SOLUTION YOU NEED, FROM THE WORLD LEADER IN CARBON BLACK. CONTACT US TODAY.

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