Designation: D1765 – 13

Standard Classification System for Carbon Blacks Used in Rubber Products[1]

This standard is issued under the fixed designation D1765; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

This standard has been approved for use by agencies of the Department of Defense.

1. Scope

1.1 This classification system covers the classification of rubber-grade carbon blacks by the use of a four-character nomenclature system. The first character gives some indication of the influence of the carbon black on the rate of cure of a typical rubber compound containing the black. The second character gives information on the average surface area of the carbon black. The last two characters are assigned arbitrarily.

1.2 All rubber-grade carbon blacks for which a number is currently assigned at the time of publication of this classification system are listed in Table 1 together with some of their typical properties. ASTM classification numbers ("N" or "S" designation) not listed in Table 1 have either been withdrawn or are not currently assigned. The use of inactive or unassigned N or S designations is prohibited until such a time as the designation is officially reactivated or assigned by Subcommittee D24.41

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 *ASTM Standards:*[2]

D1508 Test Method for Carbon Black, Pelleted Fines and Attrition

D1510 Test Method for Carbon Black—Iodine Adsorption Number

D1513 Test Method for Carbon Black, Pelleted—Pour Density

D1514 Test Method for Carbon Black—Sieve Residue

D2414 Test Method for Carbon Black—Oil Absorption Number (OAN)

D3053 Terminology Relating to Carbon Black

D3265 Test Method for Carbon Black—Tint Strength

D3493 Test Method for Carbon Black—Oil Absorption Number of Compressed Sample (COAN)

D6556 Test Method for Carbon Black—Total and External Surface Area by Nitrogen Adsorption

3. Basis of Classification

3.1 The first character in the nomenclature system for rubber-grade carbon blacks is a letter indicating the effect of the carbon black on the cure rate of a typical rubber compound containing the black. The letter "N" is used to indicate a normal curing rate typical of furnace blacks that have received no special modification to alter their influence on the rate of cure of rubber. The letter "S" is used for channel blacks or for furnace blacks that have been modified to effectively reduce the curing rate of rubber. Channel blacks characteristically impart a slower rate of cure to rubber compounds. Thus, the letter "S" designates a slow cure rate. Blacks may vary considerably in "curing rate" within each of the two letter classifications.

3.2 The second character in the system is a digit to designate the average surface area of the carbon black as measured by nitrogen surface area. The surface area range of the carbon blacks has been divided into ten arbitrary groups, and each has been assigned a digit to describe that group. These groups are as follows:

Group No.	Average Nitrogen Surface Area, m^2/g
0	>150
1	121 to 150
2	100 to 120
3	70 to 99
4	50 to 69
5	40 to 49
6	33 to 39
7	21 to 32
8	11 to 20
9	0 to 10

NOTE 1—Some of the carbon blacks in Table 1 were assigned prior to

TABLE 1 Carbon Black Properties

NOTE 1—The iodine adsorption number and oil absorption number values represent target values. A target value is defined as an agreed upon value on which producers center their production process and users center their specifications. All other properties shown are averages of typical values supplied by several manufacturers. Typical properties are dependent upon the target values and may vary from producer to producer at the same iodine adsorption and oil absorption numbers because of the differences in processing equipment.

ASTM Classification	Target Values[A]		Typical Descriptive Values[A]				
	Iodine Adsorption No.,[B] D1510, g/kg	Oil Absorption No. D2414, 10^{-5} m³/kg	Oil Absorption No. Compressed Sample, D3493, 10^{-5} m³/kg	NSA Multipoint D6556, 10^3 m²/kg (m²/g)	STSA D6556, 10^3 m²/kg (m²/g)	Tint Strength, D3265	Pour Density, D1513, kg/m³ (lb/ft³)
N110	145	113	97	127	115	123	345 (21.5)
N115	160	113	97	137	124	123	345 (21.5)
N120	122	114	99	126	113	129	345 (21.5)
N121	121	132	111	122	114	119	320 (20.0)
N125	117	104	89	122	121	125	370 (23.0)
N134	142	127	103	143	137	131	320 (20.0)
N135	151	135	117	141	. . .	119	320 (20.0)
S212	. . .	85	82	120	107	115	415 (26.0)
N219	118	78	75	. . .	. . .	123	440 (27.5)
N220	121	114	98	114	106	116	355 (22.0)
N231	121	92	86	111	107	120	400 (25.0)
N234	120	125	102	119	112	123	320 (20.0)
N293	145	100	88	122	111	120	380 (23.5)
N299	108	124	104	104	97	113	335 (21.0)
S315	. . .	79	77	89	86	117	425 (26.5)
N326	82	72	68	78	76	111	455 (28.5)
N330	82	102	88	78	75	104	380 (23.5)
N335	92	110	94	85	85	110	345 (21.5)
N339	90	120	99	91	88	111	345 (21.5)
N343	92	130	104	96	92	112	320 (20.0)
N347	90	124	99	85	83	105	335 (21.0)
N351	68	120	95	71	70	100	345 (21.5)
N356	92	154	112	91	87	106	
N358	84	150	108	80	78	98	305 (19.0)
N375	90	114	96	93	91	114	345 (21.5)
N539	43	111	81	39	38	. . .	385 (24.0)
N550	43	121	85	40	39	. . .	360 (22.5)
N582	100	180	114	80	. . .	67	
N630	36	78	62	32	32	. . .	500 (31.0)
N642	36	64	62	39	. . .	. . .	
N650	36	122	84	36	35	. . .	370 (23.0)
N660	36	90	74	35	34	. . .	440 (27.5)
N683	35	133	85	36	34	. . .	355 (22.0)
N750	27	120	81	27	26	. . .	360 (22.5)
N754	24	58	57	25	24	. . .	
N762	27	65	59	29	28	. . .	515 (32.0)
N765	31	115	81	34	32	. . .	370 (23.0)
N772	30	65	59	32	30	. . .	520 (32.5)
N774	29	72	63	30	29	. . .	490 (30.5)
N787	30	80	70	32	32	. . .	440 (27.5)
N907	. . .	34	. . .	9	9	. . .	640 (40.0)
N908	. . .	34	. . .	9	9	. . .	355 (22.0)
N990	. . .	43	37	8	8	. . .	640 (40.0)
N991	. . .	35	37	8	8	. . .	355 (22.0)

[A] See note above. See also Terminology D3053.

[B] In general, Test Method D1510 can be used to estimate the surface area of furnace blacks but not channel, oxidized, and thermal blacks.

[C] New numbers are marked to designate that the requestor has a one-year period, starting from the number's approval date as shown in Footnote 1, to revise, by letter ballot, target and typical values.

the establishment of the surface area classification system and may fall outside of the specified ranges.

3.3 The third and fourth characters in this system are arbitrarily assigned digits.

4. Typical Properties of Carbon Blacks

4.1 Each of the standard grades of carbon black shall have target and typical physical properties prescribed in Table 1.

4.2 The properties enumerated shall be determined in accordance with the ASTM test methods shown in Table 1.

4.3 The following carbon black properties are not included in Table 1 but do have previously established maximum values.

4.3.1 *Sieve Residue*—Test Method D1514. Screen sizes 500 µm (No. 35), maximum 10 mg/kg (ppm), and 45 µm (No. 325), maximum 1000 mg/kg (ppm) for all grades.