



Designation: D1765 – 21

# Standard Classification System for Carbon Blacks Used in Rubber Products<sup>1</sup>

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 ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

*This standard has been approved for use by agencies of the U.S. 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 ASTM classification numbers (“N” or “S” designation) not listed in [Table 1](#) have either been withdrawn or are not currently assigned.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. The values given in parentheses are for information only.

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, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.5 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

## 2. Referenced Documents

2.1 *ASTM Standards:*<sup>2</sup>

- 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
- D7854 Test Method for Carbon Black-Void Volume at Mean Pressure

## 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.

<sup>1</sup> This classification system is under the jurisdiction of ASTM Committee D24 on Carbon Black and is the direct responsibility of Subcommittee D24.41 on Carbon Black Nomenclature and Terminology.

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<sup>2</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard’s Document Summary page on the ASTM website.

**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 <sup>A</sup>		Typical Descriptive Values <sup>A</sup>					
	Iodine Adsorption No., <sup>B</sup> D1510, g/kg (mg/g)	Oil Absorption No. D2414, 10 <sup>-5</sup> m <sup>3</sup> /kg (cm <sup>3</sup> /100 g)	Oil Absorption No. Compressed Sample, D3493, 10 <sup>-5</sup> m <sup>3</sup> /kg (cm <sup>3</sup> /100 g)	Void Volume <sup>C</sup> @50 MPa, D7854, 10 <sup>-5</sup> m <sup>3</sup> /kg (cm <sup>3</sup> /100 g)	NSA Multipoint D6556, 10 <sup>3</sup> m <sup>2</sup> /kg (m <sup>2</sup> /g)	STSA D6556 10 <sup>3</sup> m <sup>2</sup> /kg (m <sup>2</sup> /g)	Tint Strength, D3265 %ITRB	Pour Density, D1513, kg/m <sup>3</sup> (lb/ft <sup>3</sup> )
N110	145	113	97	63	127	115	123	345 (21.5)
N115	160	113	97	63	137	124	123	345 (21.5)
N120	122	114	99	...	126	120	129	345 (21.5)
N121	121	132	111	70	122	114	119	320 (20.0)
N125	117	104	89	...	122	121	125	370 (23.0)
N134	142	127	103	70	143	137	131	320 (20.0)
N135	151	135	117	...	141	...	119	320 (20.0)
N219	118	78	75	...	...	...	123	440 (27.5)
N220	121	114	98	63	114	106	116	355 (22.0)
N231	121	92	86	55	111	107	120	400 (25.0)
N234	120	125	102	67	119	112	123	320 (20.0)
N293	145	100	88	...	122	111	120	380 (23.5)
N299	108	124	104	67	104	97	113	335 (21.0)
N326	82	72	68	47	78	76	111	455 (28.5)
N330	82	102	88	57	76	75	104	380 (23.5)
N335	92	110	94	...	85	85	110	345 (21.5)
N339	90	120	99	65	91	88	111	345 (21.5)
N343	92	130	104	...	96	92	112	320 (20.0)
N347	90	124	99	64	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	64	93	91	114	345 (21.5)
N539	43	111	81	...	39	38	...	385 (24.0)
N550	43	121	85	55	40	39	...	360 (22.5)
N630	36	78	62	...	32	32	...	500 (31.0)
N642	36	64	62	...	39	...	...	...
N650	36	122	84	56	36	35	...	370 (23.0)
N660	36	90	74	47	35	34	...	440 (27.5)
N683	35	133	85	56	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	38	32	30	...	520 (32.5)
N774	29	72	63	40	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	...	38	37	...	8	8	...	640 (40.0)
N991	...	35	37	...	8	8	...	355 (22.0)

<sup>A</sup> See note above. See also Terminology D3053.

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

<sup>C</sup> Values of Void Volume, Test Method D7854, are based on means from different carbon black producers. The data from some producers represents limited testing since Test Method D7854 is a relatively new structure measurement; therefore, typical values may be added or revised periodically to reflect additional testing.

<sup>D</sup> 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.

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 <sup>2</sup> /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