



Designation: D1366 – 86 (Reapproved 2007)

Standard Practice for Reporting Particle Size Characteristics of Pigments¹

This standard is issued under the fixed designation D1366; 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 practice for reporting the fineness characteristics of pigments is designed to apply in most cases where well-known methods for determining these particle size characteristics in the subsieve range are employed, such as microscopic, sedimentation, and turbidimetric methods; and partially to absorption and permeability methods.

1.2 Lamellar, plate-like pigments and composite pigments having a definite bimodal distribution are not considered within the scope of this practice.

1.3 *Parameters*—The fineness characteristics are reported in the following three parameters:

1.3.1 *Particle Size Parameter*.

1.3.2 *Coarseness Parameter*—A parameter descriptive of the coarseness character of the pigment, making use of a limiting value in the subsieve range similar to that used in the sieve ranges.

1.3.3 *Dispersion Parameter*—A parameter descriptive of the uniformity of the particle size distribution.

1.4 *This standard does not purport to address the safety problems, 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

E20 Practice for Particle Size Analysis of Particulate Substances in the Range of 0.2 to 75 Micrometres by Optical Microscopy (Withdrawn 1994)³

¹ This practice is under the jurisdiction of ASTM Committee D01 on Paint and Related Coatings, Materials, and Applications and is the direct responsibility of Subcommittee D01.31 on Pigment Specifications.

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² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

³ The last approved version of this historical standard is referenced on www.astm.org.

3. Terminology

3.1 *Definitions*:

3.1.1 *particle size parameter* (specific surface diameter, *SSD*), *n*—diameter d_3 used elsewhere in ASTM test methods. This parameter is the same as that frequently reported as “Average Particle Size by Surface Mean,” and “Specific Particle Size,” and is defined as follows:

$$SSD = \frac{\sum d^3 f}{\sum d^2 f} \quad (1)$$

where:

SSD = specific surface diameter, μm ,
d = mean class size, μm , and
f = frequency.

Therefore the *SSD* is the diameter of a sphere having the specific surface characteristic of the pigment. The true specific surface of all pigments involves a shape factor. Report *SSD* whether or not the effect of shape has been considered in the calculations. Presumably, as the effect of shape is better understood, it will figure more and more in calculations involving particle size, but in the meantime it will of necessity be ignored in many cases.

3.1.2 *coarseness parameter (CP)*, *n*—that diameter, expressed in micrometres, below which 99.5 % of the pigment falls.

3.1.3 *dispersion parameter (DP)*, *n*—the ratio of the micrometre size within which 50 % of the pigment lies, to the specific surface diameter, *SSD*. The larger the *DP* number, the greater the dispersion parameter and the lower the uniformity. Report the dispersion parameter in all cases when a distribution curve can be prepared from the original data. The dispersion parameter cannot be calculated from data obtained by absorption or permeability methods. Determine as follows:

3.1.3.1 Prepare a cumulative-size distribution curve on 3-phase log paper, using the vertical axis for the percent falling below the size indicated, and the horizontal axis (log scale) for diameter in micrometres. Use the upper class limit corresponding to the cumulative weight percentage. Subtract the micrometre size at 25 % cumulative weight from the micrometre size at 75 %, and multiply the difference by $100 \div SSD$, as follows:

$$DP = (\mu\text{m at 75 \%} - \mu\text{m at 25 \%}) / (SSD) \times 100 \quad (2)$$