



Standard Practice for Microscopical Examination of Pigment Dispersion in Plastic Compounds¹

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1. Scope

1.1 This practice describes microscopical examination of plastic compounds to check quality of pigment dispersion. Thin sections of polymers are prepared for observation with transmitted light. Microscopical examination is normally made for grading or classification by comparison against observational standards.

1.2 Operations are listed for practice generally applicable to many thermoplastic compounds. Details specific to wire- and cable-grade Type I polyethylene is given in Appendix X1.

NOTE 1—There is no similar or equivalent ISO standard.

1.3 *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:

D 883 Terminology Relating to Plastics²

D 1238 Test Method for Flow Rates of Thermoplastics by Extrusion Plastometer²

F 412 Terminology Relating to Plastic Piping Systems³

3. Terminology

3.1 **Definitions**—Terms applicable to this practice are defined in Terminologies D 883 and F 412.

4. Significance and Use

4.1 Examination is made because of the general relationship between observed quality on the microscopical scale and overall serviceability, and to some extent the appearance, of the plastic compound. The method may be employed to measure degree of dispersion of pigments, presence of foreign matter, spots of unpigmented resin, and resin degradation. Serviceability of a compounded plastic can be quite sensitive to the quality

of pigment dispersion. Black, weather-resistant polyethylene serves as a good example where quality of the dispersion is indicative of weatherability which is achieved by effective screening of ultraviolet light by the carbon black.

4.2 The test is directly applicable to plastic compounds that are translucent in thin (microscopical) sections. Up to 5 % carbon black-filled polyethylene, for example, could be so examined for dispersion. The test may also be employed indirectly with opaque samples or pigment concentrates. Concentrates (which are extended in use) may be diluted with base resin to their final pigment level, as for example, by roll milling, such that examination of test specimens may be made with transmitted light. As such processing can effect improved dispersion, dilution must not be employed without regard to end use of the material being sampled.

4.3 Examination and report are normally made with respect to observational standards which are not included in this practice (see Section 7).

5. Apparatus

5.1 **Microscope**, 100-power (10× eyepiece, 10× objective), unless otherwise agreed.

5.2 **Eyepiece Micrometer** (optional), calibrated for magnification employed. A stage micrometer (standard calibrating slide), such as one having a 2-mm scale divided into units of 0.01 mm (10 μm), may be employed to calibrate the eyepiece scale.

5.3 **Light Source**, suitable for the microscope.

5.4 **Microscope Slides**, nominal 25 by 75 by 1 mm (1 by 3 by 0.040 in.)

NOTE 2—A liquid mixture of approximately the composition by volume given as follows has been found suitable for cleaning microscope slides. After being cleaned, the slides shall be wiped dry with lint-free cleansing tissue.

Ethyl alcohol (any grade)	85 %
Methyl alcohol (reagent grade)	10 %
Concentrated ammonium hydroxide (stock solution)	5 %

5.5 **Hot Plate**, capable of maintaining temperature appropriate for press-out of samples.

5.6 **Lens-Cleaning Paper**.

5.7 **Pyrometer**, or other suitable device capable of measuring surface temperatures of hot plate.

5.8 **Metal Shimstock, Brass, Aluminum, or Other Metal**—Two pieces 3.8 cm by 7.9 mm (1.5 by 5/16 in.), to control

¹ This practice is under the jurisdiction of ASTM Committee D-20 on Plastics and is the direct responsibility of Subcommittee D20.40 on Optical Properties.

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This revision includes additions of an ISO equivalency statement, a Terminology section, and a Keywords section.

² Annual Book of ASTM Standards, Vol 08.01.

³ Annual Book of ASTM Standards, Vol 08.04.