



Standard Guide for Defect Detection and Rating of Plastic Films Using Optical Sensors¹

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1. Scope

1.1 This guide is intended to provide suggested approaches and criteria for the observation and reporting of defects in various types of plastic film, by means of an optical scanning system.

1.2 *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.*

NOTE 1—There is no known ISO equivalent to this standard.

2. Referenced Documents

2.1 *ASTM Standards:*²

D883 [Terminology Relating to Plastics](#)

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *defect*—for the purpose of this guide any entity in the film that is large enough to be detected by an optical sensor and is either polymeric in nature or caused by degradation, external contamination, undispersed additives or pigments, or similar sources.

4. Significance and Use

4.1 Defects in film are not acceptable to the end-user as there is a reduction in the fitness-for-use in many applications. This document is intended to be a guide to assist users in the inspection and observation of defects.

4.2 This guide is applicable in a laboratory environment as a quality control or as a research tool. It is also appropriate for

use in any commercial process used to produce film including calendering and solvent casting.

4.3 This guide is also suitable for use as an evaluation or screening tool for materials intended to be used in other processes where defects of this nature are also critical, such as fiber spinning and non-wovens.

4.4 The individual user must establish the relationship between the criteria and acceptance for fitness-for-use and the observed defects, as it varies by polymer and application. This is attained by the collection of data over a time-period to establish acceptable control limits.

5. Apparatus

5.1 *Extruder*—A device for melting polymer that produces a flat or blown (tubular) film with sizes varying from lab-scale to production-scale.

NOTE 2—Although this technique is utilized for many different processes used for producing films, the extrusion systems described in the following section represent the more prevalent process used. This is not to imply that the guidance provided for utilizing this type of instrumentation cannot be applied to other processes or other applications.

5.1.1 *Flat Film Extrusion*—An extrusion system that produces a flat film that is quenched immediately after extrusion by means of one or more cooling devices such as an air knife, chill roll or water bath.

5.1.2 *Blown or tubular extrusion*—An extrusion system that produces a tubular “bubble” of film from a circular die, usually equipped with an air-ring to cool the polymer.

5.2 *Screen Pack*—Although commonly used in commercial or semi-commercial environments, screen packs are not generally used in laboratory units intended for research or quality functions.

5.3 *Defect Detection System*—An optical scanning system with a light source, an analog or digital camera, and an image processor. The optical characteristics of the camera are critical for detecting small (30 μm) defects and it is important that the instrument manufacturer be informed of the detection needs when choosing a system.

NOTE 3—Other types of detection systems than the ones described in this guide are available, but are outside the scope of the guide and are not defined.

¹ This guide is under the jurisdiction of ASTM Committee D20 on Plastics and is the direct responsibility of Subcommittee D20.19 on Film, Sheeting, and Molded Products.

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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.