International Standard

ISO 18553

Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds

Méthode d'estimation de la dispersion du pigment et du noir de carbone dans les tubes, raccords et compositions à base de polyoléfines

Second edition
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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 138, *Plastics pipes, fittings and valves for the transport of fluids*, Subcommittee SC 5, *General properties of pipes, fittings and valves of plastic materials and their accessories -- Test methods and basic specifications*.

This second edition cancels and replaces the first edition (ISO 18553:2002), which has been technically revised. It also incorporates the Amendment ISO 18553:2002/Amd. 1:2007.

The main changes are as follows:

— the microtome method for preparing test pieces has been made the primary method, but the compression method remains an option;

— for testing of materials, samples can now be taken from pellet, moulded sheet or melt index extrudate, using test pieces cut by microtome;

— more prescriptive descriptions of preparing samples and test pieces from pipe and fittings have been given;

— the magnification to be used to assess the size of particles and agglomerates is no longer specified (a magnification appropriate to allow identification of the different size ranges is to be used);

— for the rating of appearance, a more precise evaluation has been given.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Thermoplastic products manufactured for pipeline systems are normally pigmented. Typically, fine carbon black particles or pigments are used. These are normally incorporated into the raw material prior to either extrusion of pipe or injection moulding of pipe fittings. The purpose of colouring is to allow identification of the pipeline in service and, in the case of carbon black, to act as protection of the polymer from degradation by ultra-violet light if the product is stored outdoor or used for outdoor service. It is important that the carbon black or pigment particles are correctly dispersed in the polymer, and hence the final product, to ensure that the physical, mechanical and surface protection properties are maintained. Correct dispersion can also be an indication that antioxidants and ultra-violet stabilizers are correctly dispersed, and that the size of agglomerates or particles is not excessive.

This method provides procedures for assessing the degree of dispersion by physical measurement of the size of the dispersed particles and arithmetic grading of the particle size distribution. It also provides photographs for comparison with microscopic images of samples taken from raw-material compounds or products in order to judge subjectively the acceptability of carbon black or pigment dispersion.

A recommended limit of particles/agglomerate size grading and an acceptable rating of appearance is given in Annex D.

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Method for the assessment of the degree of pigment or carbon black dispersion in polyolefin pipes, fittings and compounds

1 Scope

This document describes a method with two procedures for the assessment of carbon black or pigment particle and agglomerate size, and the rating of dispersion in polyolefin pipes, fittings and compounds.

The method is applicable to polyolefin pipes and fittings, as well as raw material in pellet form, with the choice of procedure to be determined by the referring specification.

The method is applicable to carbon black or pigmented polyolefin pipes, fittings and compounds with a carbon black content of less than 3 % by weight, and pigment content of less than 5 % by weight.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 293, *Plastics — Compression moulding of test specimens of thermoplastic materials*

ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method*

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

4 Principle

Small samples of raw-material pellet, melt index extrudate, compression moulded sheet, or material removed from the pipe or fitting are taken for assessment. Microtome slices are cut from the samples for examination. Alternatively, samples are heated and compressed between microscope slides for examination.

The test pieces produced are examined microscopically and the sizes of particles and agglomerates are measured, recorded and graded by comparison with a tabulated grading system (see Table A.1).

A particle/agglomerate size grading is determined from an average of the gradings determined for six test pieces.

If required, a rating of the appearance of the dispersion is determined by comparison with photomicrographs (see Annex B).

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