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**Rubber — Assessment of carbon black  
and carbon black/silica dispersion —  
Rapid comparative methods**

*Caoutchouc — Évaluation de la dispersion du noir de carbone et du noir  
de carbone/silice — Méthodes comparatives rapides*



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## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

ISO 11345 was prepared by Technical Committee ISO/TC 45, *Rubber and rubber products*, Subcommittee SC 2, *Testing and analysis*.

This second edition cancels and replaces the first edition (ISO 11345:1997), which has been technically revised.

## Introduction

The degree of filler dispersion in a rubber compound is important because certain physical properties, e.g. tensile strength, hysteresis and abrasion resistance, are influenced by dispersion.

The methods described in this International Standard make use of the well known fact that, in a compound in which the ingredients are well dispersed, light is reflected from a freshly cut surface, revealing a smooth, unblemished texture. The presence of improperly dispersed ingredients is shown by irregularities which usually take the form of circular, convex "bumps" or concave pockmarks on the surface, and their presence indicates a less-than-perfect dispersion of the compounding ingredients. The size and frequency of these irregularities may be used to judge the degree to which the compound falls short of an optimum dispersion. A set of four standards each comprising ten photographs based on size and frequency of these irregularities has been established to which numerical ratings have been assigned. This scheme provides a means of evaluating dispersion in a rubber compound and assigns numerical designations to the degrees of dispersion.

This International Standard describes test procedures for assessing the degree of macrodispersion of carbon black and silica in rubber. The methods are primarily intended to be used as rapid factory controls during mixing and subsequent processing stages to assure adequate carbon black dispersion. Five alternative methods are described.

The addition of a higher magnification and photographic reference standards for silica was in response to a request from tyre manufacturers and filler producers. Method E was specially requested by manufacturers of extruded profiles for the automotive industry.

Equipment with electronically stored standards may be supplied by:

TechPro, Inc

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# Rubber — Assessment of carbon black and carbon black/silica dispersion — Rapid comparative methods

**WARNING** — Persons using this International Standard should be familiar with normal laboratory practice. This standard does not purport to address all of the safety problems, if any, associated with its use. It is the responsibility of the user to establish appropriate safety and health practices and to ensure compliance with any national regulatory conditions.

## 1 Scope

This International Standard specifies qualitative visual methods for the rapid and comparative assessment of the degree of macrodispersion of carbon black and carbon black/silica in rubber. Ratings are made relative to a set of standard reference photographs, and the results are expressed on a numerical scale from 1 to 10.

In addition, a method is given for rating the presence of large agglomerates on a numerical scale (ratings 1 to 10).

## 2 Normative references

The following referenced documents are indispensable for the application 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 1382, *Rubber — Vocabulary*

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 1382 apply.

## 4 Principle

The carbon black or carbon black/silica filled rubber compound is cut to expose a fresh surface for examination under magnification.

Five methods are described:

- **Method A:** Visual microscopic or photographic microscopic inspection with  $\times 30$  magnification (for carbon black).
- **Method B:** Split-field microscopic inspection with  $\times 30$  magnification (for carbon black).
- **Method C:** Visual microscopic or photographic microscopic inspection with  $\times 100$  magnification (for carbon black or carbon black/silica).
- **Method D:** Split-field microscopic inspection with  $\times 100$  magnification (for carbon black or carbon black/silica).
- **Method E:** Large-agglomerate count with  $\times 100$  magnification (for carbon black).