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Third edition
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Rubber compounding ingredients — Carbon black — Determination of specific surface area by nitrogen adsorption methods — Single-point procedures

*Ingrédients de mélange du caoutchouc — Noir de carbone —
Détermination de la surface spécifique par méthodes par adsorption
d'azote — Modes opératoires à un point de mesure*



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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.

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 documents 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 45, *Rubber and rubber products*, Subcommittee SC 3, *Raw materials (including latex) for use in the rubber industry*.

This third edition cancels and replaces the second edition (ISO 4652:2012), which has been technically revised. The main changes compared to the previous edition are as follows:

- the former method A has been updated as an automatic volumetric method (method B);
- the former method B has been removed;
- the former methods C and D have been updated as an automatic gas chromatography method (method A);
- [4.4](#) has been clarified;
- [Annex B](#) on precision data has been added.

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

The specific surface area of carbon black is an important element which categorizes the type of carbon black. In this document, nitrogen adsorption at the relative pressure of 0,3 is measured to determine the specific surface area (the single-point method). The single-point method can be a reasonable alternative for process management and shipping management after testing with the multi-point method in ISO 18852, because the measurement time is shorter and relative magnitude of the specific surface area among the samples is kept.

The multi-point method determines specific surface area on the basis of monolayer amount of nitrogen adsorbed (V_m) which is derived by [Formula \(1\)](#):

$$V_m = 1/(M+B) \quad (1)$$

where

M is the slope of the BET plot (see ISO 9277);

B is the intercept of the BET plot (see ISO 9277),

The single-point method simplifies this technique by assuming the intercept (B) as zero and calculating the slope (M) with the straight line joining the origin and the point at the relative pressure of 0,3. Therefore, the monolayer amount and specific surface area determined by the single-point method is always lower than those determined by the multi-point method.

Although most of the operation is done automatically, the operator should be familiar with the operation and follow the instruction manual.