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BSI Standards Publication

## Road vehicles — Cleanliness of components and systems

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## National foreword

This British Standard is the UK implementation of ISO 16232:2018. It supersedes BS ISO 16232-1:2007, BS ISO 16232-2:2007, BS ISO 16232-3:2007, BS ISO 16232-4:2007, BS ISO 16232-5:2007, BS ISO 16232-6:2007, BS ISO 16232-7:2007, BS ISO 16232-8:2007, BS ISO 16232-9:2007, BS ISO 16232-10:2007, which are withdrawn.

The UK participation in its preparation was entrusted to Technical Committee MCE/22, Engines for road vehicles.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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## Road vehicles — Cleanliness of components and systems

*Véhicules routiers — Propreté des composants et des systèmes*



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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](http://www.iso.org/directives)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on 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 the following URL: [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 22, *Road vehicles*, Subcommittee SC 34, *Propulsion, powertrain, and powertrain fluids*.

This edition of ISO 16232 cancels and replaces the entire ISO 16232:2007 series (all parts) which have been technically revised and consolidated into a single document.

The main changes are described in [Annex L](#).

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](http://www.iso.org/members.html).



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## Introduction

In order to achieve reliable performance of components and systems, control over the amount of particles introduced during the build phase is necessary, and measurement of particulate contaminants is the basis of control.

Based on a world-wide broadening and ongoing development of technical cleanliness issues this document is intended to:

- further improve the comparability of cleanliness inspection results;
- include new (extraction and analysis) techniques; and
- provide information on how to define cleanliness specifications and explain how to react when cleanliness limit values are exceeded.

This document has been prepared to fulfil the requirements of the automotive industry, since the function and performance of modern automotive components and systems are sensitive to the presence of a single or a few critically sized particles. Consequently, this document deals with the analysis of the total volume of extraction liquid and of all contaminants collected using an approved extraction method.

To be able to compare inspection results the same extraction procedure, the same test fluid and also same parameter settings for the analysis instruments are intended to be used.

This document is based on existing International Standards such as those developed by ISO/TC 131/SC 6. They have been extended, modified and new ones have been developed to produce a comprehensive suite of International Standards to measure and report the cleanliness levels of components and systems fitted to road vehicles.

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# Road vehicles — Cleanliness of components and systems

## 1 Scope

**WARNING — The use of this document can involve hazardous materials, operations and equipment. This document does not purport to address all of the safety problems associated with its use. It is the responsibility of the user of this document to establish appropriate safety and health practices and to determine the applicability of any other restrictions prior to its use.**

This document specifies requirements for applying and documenting methods for determining particulate contamination on functionally-relevant components and systems (cleanliness inspection) of road vehicles.

A cleanliness inspection comprises the basis of an assessment of technical cleanliness, which is performed, for example, under the following circumstances:

- initial inspection and evaluation;
- inspection of incoming and outgoing components; and
- quality control or monitoring of manufacturing processes relevant to cleanliness (e.g. cleaning, surface treatment and assembly processes).

This document is intended to improve the informative quality and comparability of test results. It also defines the standardized expression of cleanliness specifications and cleanliness test results in the quality chain of the automotive industry.

This document does not apply to the following:

- detection of filmy contamination (grease, oils, etc.);
- application of non-quantifiable particulate detection methods on test components (e.g. visual assessment, wipe test with clean cloth, etc.); and
- characterization of operating fluids (fuel, oils, coolants, brake fluid, etc.).

This document does not define any cleanliness limit values for specific components or systems. The degree of cleanliness required for a specific component or system is dependent on a number of highly-individual factors. Cleanliness specifications are intended to be undertaken only by specialists who not only know the component concerned but also the system it is built into, the later conditions of use, technically-feasible practices and possible consequences for manufacturing processes and the supply chain. Guidance for deriving limit values can be found in [Annex H](#).

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>