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Cleanrooms and associated controlled environments —

Part 10: Assessment of surface cleanliness for chemical contamination

Salles propres et environnements maîtrisés apparentés —
Partie 10: Évaluation de la propreté chimique des surfaces

Reference number
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Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Testing and grading surface chemical levels ... **2**
4.1 Principles for testing the surface chemical contamination levels of clean surfaces in cleanrooms and controlled environments ... 2
4.2 ISO SCC descriptor format ... 2
4.3 ISO-SCC grade level ... 4
4.4 Converter for substances into surface atomic concentration ... 4

5 Measuring the cleanliness of surfaces for chemical contamination and demonstration of grade level compliance ... **5**
5.1 Criteria for good cleanliness assessment ... 5
5.2 Documentation and reporting ... 6
5.2.1 Principle ... 6
5.2.2 Testing ... 6
5.2.3 Test report ... 6

Annex A (informative) **Conversion between different unit expressions of surface concentration for chemical substances** ... **8**

Annex B (informative) **Parameters influencing testing and interpretation of results** ... **15**

Annex C (informative) **Essential considerations for a good cleanliness assessment** ... **16**

Annex D (informative) **Methods for testing surface cleanliness for chemical concentration** ... **17**

Annex E (informative) **Test record documentation** ... **29**

Bibliography ... **30**

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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 209, *Cleanrooms and associated controlled environments*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 243, *Cleanroom technology*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 14644-10:2013), of which it constitutes a minor revision. The changes are as follows:

— the term class (classification, classified) changed to grade or assessment where appropriate;

— ISO 14644-1 moved from Clause 2 to the Bibliography and ISO 14644-6 removed (document withdrawn);

— minor editorial changes.

A list of all parts in the ISO 14644 series can be found on the ISO website.

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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Cleanrooms and associated controlled environments —

Part 10: Assessment of surface cleanliness for chemical contamination

1 Scope

This document establishes appropriate testing processes to determine the cleanliness of surfaces in cleanrooms with regard to the presence of chemical compounds or elements (including molecules, ions, atoms and particles). This document is applicable to all solid surfaces in cleanrooms and associated controlled environments such as walls, ceilings, floors, worksurfaces, tools, equipment and devices.

NOTE 1 For the purpose of this document, consideration is only given to the chemical characteristics of a particle. The physical properties of the particle are not considered and this document does not cover the interaction between the contamination and the surface.

NOTE 2 This document does not include the contamination generation process or any time-dependent influences (e.g. deposition, sedimentation, ageing) or process-dependent activities such as transportation and handling. Neither does it include guidance on statistical quality-control techniques to ensure compliance.

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 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/

3.1
air cleanliness by chemical concentration
ACC
level, expressed as an ISO grade level *N*, which represents the maximum allowable concentration of a given chemical species or group of chemical species, expressed in grams per cubic metre (g/m^3)

Note 1 to entry: This definition does not include macromolecules of biological origin, which are judged to be particles.

3.2
contaminant category
common name for a group of compounds with a specific and similar deleterious effect when deposited on the surface of interest

3.3
chemical contamination
chemical (non-particulate) substances that can have a deleterious effect on the product, process or equipment

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3.4
solid surface
boundary between the solid phase and a second phase

3.5
surface
boundary between two phases

Note 1 to entry: One of the phases is normally a solid phase and the other a gas, a liquid or another solid.

3.6
surface cleanliness by chemical concentration
SCC
<condition> condition of a surface with respect to its chemical concentration

3.7
surface cleanliness by chemical concentration
N_{SCC}
<mathematics> common logarithm (to the base of 10) of the chemical concentration on a surface in grams per square metre (g/m^2)

4 Testing and grading surface chemical levels

4.1 Principles for testing the surface chemical contamination levels of clean surfaces in cleanrooms and controlled environments

The testing and grading levels shall be determined by the use of a descriptor designated "ISO-SCC". This is used to indicate the amount of total chemical concentration measured on a surface for an individual chemical substance or group of substances. The SCC level is based upon the concentration of chemicals on a surface as calculated using Formula (1) (given in 4.2) and expressed in g/m^2. For this calculation all other units shall be converted to g/m^2. In specific cases where low concentrations need to be determined, the concentration level of chemical on a surface may be expressed in atoms per square centimetre, ISO-$SCC_{_atomic}$, using Formula (2) in 4.4.

4.2 ISO SCC descriptor format

The SCC level shall be designated by a grading number N_{SCC}, where N_{SCC} is the common logarithm index of concentration C_{SCC}, expressed in g/m^2. The SCC grade level statement shall always be connected with a chemical substance or group of substances to which it is related. Thirteen distinct grading levels are used from 0 to −12, where level 0 is most contaminated. Intermediate concentrations may be specified, with 0,1 being the smallest permitted increment of N_{SCC}. C_{SCC} is determined from Formula (1), in terms of N_{SCC}:

$$C_{SCC} = 10^{N_{SCC}} \quad (1)$$

Therefore, $N_{SCC} = \log_{10} C_{SCC}$.

C_{SCC}, the concentration of the specified chemical substance or group of substances, is expressed in g/m^2. The measured chemical concentration on a surface shall not exceed the level of SCC, C_{SCC} to satisfy the predetermined SCC that is agreed between the customer and the supplier.

In all cases, N_{SCC} grade level numbers shall include the negative sign.

NOTE 1 An SCC grade level number is only valid in connection with a descriptor (see 4.3).

NOTE 2 For converting from gravimetric concentration (g/m^2) to numeric concentration (number of atoms, molecules or ions per unit area), see 4.4.

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