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Renhetsteknik – Renrum och tillhörande renhetskontrollerade miljöer –
Del 8: Klassificering av luftens kemiska renhet
(ISO 14644-8:2013)

Cleanrooms and associated controlled environments –
Part 8: Classification of air cleanliness by chemical concentration (ACC) (ISO 14644-8:2013)

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Europastandarden EN ISO 14644-8:2013 gäller som svensk standard. Detta dokument innehåller den officiella engelska versionen av EN ISO 14644-8:2013.

Denna standard ersätter SS-EN ISO 14644-8:2006, utgåva 1.

The European Standard EN ISO 14644-8:2013 has the status of a Swedish Standard. This document contains the official version of EN ISO 14644-8:2013.

This standard supersedes the Swedish Standard SS-EN ISO 14644-8:2006, edition 1.

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Denna standard är framtagen av kommittén för Renhetsteknik, SIS/TK 108.

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EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 14644-8

February 2013

ICS 13.040.35

Supersedes EN ISO 14644-8:2006

English Version

Cleanrooms and associated controlled environments - Part 8: Classification of air cleanliness by chemical concentration (ACC) (ISO 14644-8:2013)

Salles propres et environnements maîtrisés apparentés - Partie 8: Classification de la propreté chimique de l'air (ISO 14644-8:2013)

Reinräume und zugehörige Reinraumbereiche - Teil 8: Klassifizierung der Luftreinheit anhand der Chemikalienkonzentration (ACC) (ISO 14644-8:2013)

This European Standard was approved by CEN on 9 February 2013.

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Foreword

This document (EN ISO 14644-8:2013) has been prepared by Technical Committee ISO/TC 209 "Cleanrooms and associated controlled environments" in collaboration with Technical Committee CEN/TC 243 “Cleanroom technology” the secretariat of which is held by BSI.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by August 2013, and conflicting national standards shall be withdrawn at the latest by August 2013.

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

This document supersedes EN ISO 14644-8:2006.

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Endorsement notice

The text of ISO 14644-8:2013 has been approved by CEN as EN ISO 14644-8:2013 without any modification.

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Introduction

Cleanrooms and associated controlled environments provide for the control of airborne particulate contamination to levels appropriate for accomplishing contamination-sensitive activities. Products and processes that benefit from the control of airborne contamination include those in such industries as aerospace, microelectronics, pharmaceuticals, medical devices, food, healthcare, optics, instrumentation, vacuum technology, coatings, photovoltaics, displays, LEDs, coatings, automotive and surface analysis.

In some of these industries, the product or process can be sensitive to, or can be destroyed by, chemical contamination resulting from chemicals that are present due to external, process, or otherwise generated sources.

Within this part of ISO 14644, the presence of chemicals is expressed as air chemical contamination. Chemical contamination is a three-step event. The first step is *generation* due to external sources such as process leakage or construction material or personnel or material outgassing. The second step is *transport* as airborne chemical contamination. The third step is *sorption* on the sensitive surface, which can be quantified as a surface chemical contamination.

The generating materials and the surfaces where sorption takes place will have a large influence on the steps of generation and sorption in addition to the actual air contamination. Thus, for these two steps, not only the contaminants but also the involved bulk and surfaces need to be defined. In order to make a standard generally applicable to any type of cleanroom or associated controlled environment, air chemical cleanliness (ACC) has been chosen for the classification.

This part of ISO 14644 assigns ISO classification levels to be used to specify the level of ACC within a cleanroom and associated controlled environment, where the product or process is deemed to be at risk from air chemical contamination.

For classification purposes, this part of ISO 14644 is limited to a designated range of ACC and provides standard protocols for specifying such levels with regard to chemical compounds, methods of test and analysis, and time weighted factors.

Informative annexes are contained in this part of ISO 14644 covering:

— parameters for consideration: Annex A;

— typical contaminating chemicals and substances: Annex B;

— typical methods of measurement and analysis: Annex C;

— considerations of specific requirements for separative devices: Annex D.

This part of ISO 14644 is one of a series of standards concerned with cleanrooms and contamination control. Many factors besides ACC need to be considered in the design, specification, operation and control of cleanrooms and other controlled environments. These are covered in some detail in other parts of the International Standards prepared by ISO/TC 209, including ISO 14698 (all parts).[4] In some circumstances, relevant regulatory agencies can impose supplementary policies or restrictions. In such situations, appropriate adaptations of this part of ISO 14644 can be required.

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Cleanrooms and associated controlled environments —

Part 8: Classification of air cleanliness by chemical concentration (ACC)

1 Scope

This part of ISO 14644 establishes the classification of air chemical cleanliness (ACC) in cleanrooms and associated controlled environments, in terms of airborne concentrations of specific chemical substances (individual, group or category) and provides a protocol to include test methods, analysis and time-weighted factors within the specification for classification.

This part of ISO 14644 currently considers only concentrations of air chemical contaminants between 10^{0} and 10^{-12} g/m^{3} under cleanroom operational conditions.

This part of ISO 14644 is not relevant for application in those industries, processes or productions where the presence of airborne chemical substances is not considered a risk to the product or process.

It is not the intention of this part of ISO 14644 to describe the nature of air chemical contaminants.

This part of ISO 14644 does not give a classification of surface chemical contamination.

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 14644-6, *Cleanrooms and associated controlled environments — Part 6: Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 14644-6 and the following apply.

3.1 General

3.1.1
chemical contamination
non-particulate substances that can have a deleterious effect on the product, process or equipment

3.1.2
air cleanliness by chemical concentration
ACC
level of air cleanliness by chemical concentration, expressed in terms of an ISO-ACC Class N, which represents the maximum allowable concentration of a given chemical species or a group of chemical species, expressed in grams per cubic metre

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

3.1.3
air chemical contamination
any substance in the air that can, by its chemical nature, adversely affect the product, process or equipment

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3.1.4
surface cleanliness by chemical concentration
SCC
condition of the surface cleanliness with respect to its chemical concentration

3.1.5
surface chemical contamination
any substance on the surface that can, by its chemical nature, adversely affect the product, process or equipment

3.1.6
contaminant category
common name for a group of compounds with a specific and similar deleterious effect when deposited on the surface of interest

3.1.7
outgassing
release of chemical substances in the gaseous or vapour state from a material

3.1.8
air cleanliness by chemical concentration (ACC) class
grading number stating the maximum allowable concentration of a given chemical species or a group of chemical species in grams per cubic metre

Note 1 to entry: The maximum allowable concentrations are defined in Table 1 or determined by the equation for *N* in 4.2.

Note 2 to entry: Classification in accordance with this part of ISO 14644 is limited to the range from 0 (the class with the lowest allowable cleanliness) to –12 (the cleanest specified class).

Note 3 to entry: The ACC class number is only valid in connection with the ACC descriptor that specifies to which chemical species or group of chemical species it is related.

Note 4 to entry: The negative sign of the air chemical cleanliness classes (–1 to –12) is an integral part of the ACC class number *N* and must always be given. An air chemical cleanliness class without the negative sign (with the exception of the class 0) is not allowed.

Note 5 to entry: Intermediate ISO classification numbers may be specified, with 0,1 being the smallest permitted increment.

3.2 Contaminant categories

3.2.1
acid
substance whose chemical reaction characteristic is to establish new bonds by the acceptance of electron pairs

3.2.2
base
substance whose chemical reaction characteristic is to establish new bonds by the donation of electron pairs

3.2.3
biotoxic
contaminant substance that is obnoxious to the development and preservation of the life of organisms, microorganisms, tissues or individual cells

3.2.4
condensable
substance capable of depositing on a surface by condensation under cleanroom operating conditions

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3.2.5
corrosive
substance that causes destructive chemical change of a surface

3.2.6
dopant
substance that, after sorption and/or diffusion, is incorporated in the bulk of a product and is capable of changing the properties of materials, even in trace amounts

3.2.7
organic
species based on carbon-containing compounds

Note 1 to entry: Inorganic carbon-containing compounds are excluded.

3.2.8
oxidant
substance that, upon deposition onto a surface or product of interest, results in the formation of an oxide or participates in a redox reaction

4 Classification

4.1 General

Classification shall be specified by use of a classification descriptor as described in 4.2. This descriptor is designated "ISO-ACC" and specifies the maximum total chemical concentration permitted for a contaminant category, an individual substance or a group of substances.

4.2 ISO-ACC descriptor format

An ACC class number is only valid in connection with the ACC descriptor that specifies the chemical substance or group of substances for which this class number is valid. The ISO–ACC descriptor is expressed in the format:

ISO-ACC Class *N* (*X*)

where:

X is a chemical substance or a group of chemical substances which includes, but is not limited to:

acid (ac),

base (ba),

biotoxic (bt),

condensable (cd),

corrosive (cr),

dopant (dp),

organic, total (or),

oxidant (ox),

or a group of substances or an individual substance;

N is the ISO-ACC class, which is the logarithmic index of concentration, c_x, expressed in grams per cubic metre, and falls within a limiting range of 0 to −12. Intermediate concentrations may be specified, with 0,1 being the smallest permitted increment of *N*;