

# SVENSK STANDARD

## SS-EN ISO 14644-8:2013



Fastställt/Approved: 2013-03-04  
Publicerad/Published: 2013-03-05  
Utgåva/Edition: 2  
Språk/Language: engelska/English  
ICS: 13.040.35

---

### **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)**

This preview is downloaded from [www.sis.se](http://www.sis.se). Buy the entire standard via <https://www.sis.se/std-89119>

# Standarder får världen att fungera

*SIS (Swedish Standards Institute) är en fristående ideell förening med medlemmar från både privat och offentlig sektor. Vi är en del av det europeiska och globala nätverk som utarbetar internationella standarder. Standarder är dokumenterad kunskap utvecklad av framstående aktörer inom industri, näringsliv och samhälle och befrämjar handel över gränser, bidrar till att processer och produkter blir säkrare samt effektiviserar din verksamhet.*

## Delta och påverka

Som medlem i SIS har du möjlighet att påverka framtida standarder inom ditt område på nationell, europeisk och global nivå. Du får samtidigt tillgång till tidig information om utvecklingen inom din bransch.

## Ta del av det färdiga arbetet

Vi erbjuder våra kunder allt som rör standarder och deras tillämpning. Hos oss kan du köpa alla publikationer du behöver – allt från enskilda standarder, tekniska rapporter och standardpaket till handböcker och onlinetjänster. Genom vår webbtjänst e-nav får du tillgång till ett lättnavigerat bibliotek där alla standarder som är aktuella för ditt företag finns tillgängliga. Standarder och handböcker är källor till kunskap. Vi säljer dem.

## Utveckla din kompetens och lyckas bättre i ditt arbete

Hos SIS kan du gå öppna eller företagsinterna utbildningar kring innehåll och tillämpning av standarder. Genom vår närhet till den internationella utvecklingen och ISO får du rätt kunskap i rätt tid, direkt från källan. Med vår kunskap om standarders möjligheter hjälper vi våra kunder att skapa verklig nytta och lönsamhet i sina verksamheter.

**Vill du veta mer om SIS eller hur standarder kan effektivisera din verksamhet är du välkommen in på [www.sis.se](http://www.sis.se) eller ta kontakt med oss på tel 08-555 523 00.**



# Standards make the world go round

*SIS (Swedish Standards Institute) is an independent non-profit organisation with members from both the private and public sectors. We are part of the European and global network that draws up international standards. Standards consist of documented knowledge developed by prominent actors within the industry, business world and society. They promote cross-border trade, they help to make processes and products safer and they streamline your organisation.*

## Take part and have influence

As a member of SIS you will have the possibility to participate in standardization activities on national, European and global level. The membership in SIS will give you the opportunity to influence future standards and gain access to early stage information about developments within your field.

## Get to know the finished work

We offer our customers everything in connection with standards and their application. You can purchase all the publications you need from us - everything from individual standards, technical reports and standard packages through to manuals and online services. Our web service e-nav gives you access to an easy-to-navigate library where all standards that are relevant to your company are available. Standards and manuals are sources of knowledge. We sell them.

## Increase understanding and improve perception

With SIS you can undergo either shared or in-house training in the content and application of standards. Thanks to our proximity to international development and ISO you receive the right knowledge at the right time, direct from the source. With our knowledge about the potential of standards, we assist our customers in creating tangible benefit and profitability in their organisations.

**If you want to know more about SIS, or how standards can streamline your organisation, please visit [www.sis.se](http://www.sis.se) or contact us on phone +46 (0)8-555 523 00**



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.

© Copyright/Upphovsrätten till denna produkt tillhör SIS, Swedish Standards Institute, Stockholm, Sverige. Användningen av denna produkt regleras av slutanvändarlicensen som återfinns i denna produkt, se standardens sista sidor.

© Copyright SIS, Swedish Standards Institute, Stockholm, Sweden. All rights reserved. The use of this product is governed by the end-user licence for this product. You will find the licence in the end of this document.

*Upplysningar om sakinnehållet i standarden lämnas av SIS, Swedish Standards Institute, telefon 08-555 520 00. Standarder kan beställas hos SIS Förlag AB som även lämnar allmänna upplysningar om svensk och utländsk standard.*

*Information about the content of the standard is available from the Swedish Standards Institute (SIS), telephone +46 8 555 520 00. Standards may be ordered from SIS Förlag AB, who can also provide general information about Swedish and foreign standards.*

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

Har du synpunkter på innehållet i den här standarden, vill du delta i ett kommande revideringsarbete eller vara med och ta fram andra standarder inom området? Gå in på [www.sis.se](http://www.sis.se) - där hittar du mer information.



EUROPEAN STANDARD

**EN ISO 14644-8**

NORME EUROPÉENNE

EUROPÄISCHE NORM

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.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: Avenue Marnix 17, B-1000 Brussels**

<b>Contents</b>		Page
<b>Foreword</b> .....		<b>iv</b>
<b>Introduction</b> .....		<b>v</b>
<b>1</b>	<b>Scope</b> .....	<b>1</b>
<b>2</b>	<b>Normative references</b> .....	<b>1</b>
<b>3</b>	<b>Terms and definitions</b> .....	<b>1</b>
	3.1 General .....	1
	3.2 Contaminant categories .....	2
<b>4</b>	<b>Classification</b> .....	<b>3</b>
	4.1 General .....	3
	4.2 ISO-ACC descriptor format .....	3
<b>5</b>	<b>Demonstration of compliance</b> .....	<b>5</b>
	5.1 Principle .....	5
	5.2 Testing .....	5
	5.3 Test report .....	6
<b>Annex A (informative) Parameters for consideration</b> .....		<b>7</b>
<b>Annex B (informative) Typical contaminants</b> .....		<b>11</b>
<b>Annex C (informative) Typical methods of measurement</b> .....		<b>15</b>
<b>Annex D (informative) Consideration of specific requirements for separative devices</b> .....		<b>19</b>
<b>Bibliography</b> .....		<b>21</b>

## **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.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

### **Endorsement notice**

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

## 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).<sup>[4]</sup> 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.



# 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<sup>3</sup> 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

**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

### 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  $N$ ;