

GUIDE

GUIDE

Guidelines for defining halogen content terminology in IEC standards

Guide pour la définition de la terminologie relative à la teneur en halogènes dans les normes IEC



THIS PUBLICATION IS COPYRIGHT PROTECTED

Copyright © 2024 IEC, Geneva, Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized in any form or by any means, electronic or mechanical, including photocopying and microfilm, without permission in writing from either IEC or IEC's member National Committee in the country of the requester. If you have any questions about IEC copyright or have an enquiry about obtaining additional rights to this publication, please contact the address below or your local IEC member National Committee for further information.

Droits de reproduction réservés. Sauf indication contraire, aucune partie de cette publication ne peut être reproduite ni utilisée sous quelque forme que ce soit et par aucun procédé, électronique ou mécanique, y compris la photocopie et les microfilms, sans l'accord écrit de l'IEC ou du Comité national de l'IEC du pays du demandeur. Si vous avez des questions sur le copyright de l'IEC ou si vous désirez obtenir des droits supplémentaires sur cette publication, utilisez les coordonnées ci-après ou contactez le Comité national de l'IEC de votre pays de résidence.

IEC Secretariat
3, rue de Varembe
CH-1211 Geneva 20
Switzerland

Tel.: +41 22 919 02 11
info@iec.ch
www.iec.ch

About the IEC

The International Electrotechnical Commission (IEC) is the leading global organization that prepares and publishes International Standards for all electrical, electronic and related technologies.

About IEC publications

The technical content of IEC publications is kept under constant review by the IEC. Please make sure that you have the latest edition, a corrigendum or an amendment might have been published.

IEC publications search - webstore.iec.ch/advsearchform

The advanced search enables to find IEC publications by a variety of criteria (reference number, text, technical committee, ...). It also gives information on projects, replaced and withdrawn publications.

IEC Just Published - webstore.iec.ch/justpublished

Stay up to date on all new IEC publications. Just Published details all new publications released. Available online and once a month by email.

IEC Customer Service Centre - webstore.iec.ch/csc

If you wish to give us your feedback on this publication or need further assistance, please contact the Customer Service Centre: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Discover our powerful search engine and read freely all the publications previews, graphical symbols and the glossary. With a subscription you will always have access to up to date content tailored to your needs.

Electropedia - www.electropedia.org

The world's leading online dictionary on electrotechnology, containing more than 22 500 terminological entries in English and French, with equivalent terms in 25 additional languages. Also known as the International Electrotechnical Vocabulary (IEV) online.

A propos de l'IEC

La Commission Electrotechnique Internationale (IEC) est la première organisation mondiale qui élabore et publie des Normes internationales pour tout ce qui a trait à l'électricité, à l'électronique et aux technologies apparentées.

A propos des publications IEC

Le contenu technique des publications IEC est constamment revu. Veuillez vous assurer que vous possédez l'édition la plus récente, un corrigendum ou amendement peut avoir été publié.

Recherche de publications IEC -

webstore.iec.ch/advsearchform

La recherche avancée permet de trouver des publications IEC en utilisant différents critères (numéro de référence, texte, comité d'études, ...). Elle donne aussi des informations sur les projets et les publications remplacées ou retirées.

IEC Just Published - webstore.iec.ch/justpublished

Restez informé sur les nouvelles publications IEC. Just Published détaille les nouvelles publications parues. Disponible en ligne et une fois par mois par email.

Service Clients - webstore.iec.ch/csc

Si vous désirez nous donner des commentaires sur cette publication ou si vous avez des questions contactez-nous: sales@iec.ch.

IEC Products & Services Portal - products.iec.ch

Découvrez notre puissant moteur de recherche et consultez gratuitement tous les aperçus des publications, symboles graphiques et le glossaire. Avec un abonnement, vous aurez toujours accès à un contenu à jour adapté à vos besoins.

Electropedia - www.electropedia.org

Le premier dictionnaire d'électrotechnologie en ligne au monde, avec plus de 22 500 articles terminologiques en anglais et en français, ainsi que les termes équivalents dans 25 langues additionnelles. Egalement appelé Vocabulaire Electrotechnique International (IEV) en ligne.

GUIDE

GUIDE

Guidelines for defining halogen content terminology in IEC standards

Guide pour la définition de la terminologie relative à la teneur en halogènes dans les normes IEC

INTERNATIONAL
ELECTROTECHNICAL
COMMISSION

COMMISSION
ELECTROTECHNIQUE
INTERNATIONALE

ICS 13.020.01

ISBN 978-2-8322-8674-6

Warning! Make sure that you obtained this publication from an authorized distributor.
Attention! Veuillez vous assurer que vous avez obtenu cette publication via un distributeur agréé.

CONTENTS

FOREWORD.....	3
INTRODUCTION.....	5
1 Scope.....	7
2 Normative references	7
3 Terms, definitions and abbreviated terms	7
3.1 Terms and definitions.....	7
3.2 Abbreviated terms.....	9
4 The use of halogens in EEE and associated terminology	9
4.1 Halogens in electrical and electronic equipment.....	9
4.2 Currently used terminology	9
4.3 Overview of currently used halogen content terminology in standards.....	13
4.3.1 General	13
4.3.2 Non-halogenated and non-halogen	13
4.3.3 Non-chlorine and non-bromine.....	13
4.3.4 Halogen-free.....	13
4.3.5 Zero-halogen	14
4.3.6 Low-halogen.....	14
4.3.7 Halogenated	15
4.3.8 Fluorinated, chlorinated, brominated, and iodinated.....	15
4.3.9 Halogen containing.....	15
5 Recommendations on how to employ halogen content terminology.....	15
5.1 General.....	15
5.2 Recommendations on the use of halogen content terms.....	16
5.2.1 General	16
5.2.2 Non-halogenated	16
5.2.3 Halogen-free.....	16
5.2.4 Zero-halogen	17
5.2.5 Low-halogen.....	17
5.2.6 Halogenated	17
5.3 Recommendations on halogen content terminology in existing and new standards.....	18
5.3.1 Halogen content terminology in existing IEC standards.....	18
5.3.2 Employing halogen content terminology in new IEC standards.....	18
5.4 Test methodology considerations.....	18
Annex A (informative) Examples of existing standards, legislation and policies that include halogen content terminology	20
Annex B (informative) Background information on halogens.....	40
B.1 Background and typical application of halogens in EEE	40
B.2 Safety and health considerations of halogenated substances.....	41
Bibliography.....	42
Table 1 – Examples of halogen content terminology used in standards and legislation.....	10
Table A.1 – Examples of halogen content terminology used in standards (IEC and other SDOs).....	21
Table A.2 – Examples of halogen content terminology used in legislation and policies.....	37

INTERNATIONAL ELECTROTECHNICAL COMMISSION

**GUIDE FOR DEFINING HALOGEN CONTENT
TERMINOLOGY IN IEC STANDARDS****FOREWORD**

- 1) The International Electrotechnical Commission (IEC) is a worldwide organization for standardization comprising all national electrotechnical committees (IEC National Committees). The object of IEC is to promote international co-operation on all questions concerning standardization in the electrical and electronic fields. To this end and in addition to other activities, IEC publishes International Standards, Technical Specifications, Technical Reports, Publicly Available Specifications (PAS) and Guides (hereafter referred to as "IEC Publication(s)"). Their preparation is entrusted to technical committees; any IEC National Committee interested in the subject dealt with may participate in this preparatory work. International, governmental and non-governmental organizations liaising with the IEC also participate in this preparation. IEC collaborates closely with the International Organization for Standardization (ISO) in accordance with conditions determined by agreement between the two organizations.
- 2) The formal decisions or agreements of IEC on technical matters express, as nearly as possible, an international consensus of opinion on the relevant subjects since each technical committee has representation from all interested IEC National Committees.
- 3) IEC Publications have the form of recommendations for international use and are accepted by IEC National Committees in that sense. While all reasonable efforts are made to ensure that the technical content of IEC Publications is accurate, IEC cannot be held responsible for the way in which they are used or for any misinterpretation by any end user.
- 4) In order to promote international uniformity, IEC National Committees undertake to apply IEC Publications transparently to the maximum extent possible in their national and regional publications. Any divergence between any IEC Publication and the corresponding national or regional publication shall be clearly indicated in the latter.
- 5) IEC itself does not provide any attestation of conformity. Independent certification bodies provide conformity assessment services and, in some areas, access to IEC marks of conformity. IEC is not responsible for any services carried out by independent certification bodies.
- 6) All users should ensure that they have the latest edition of this publication.
- 7) No liability shall attach to IEC or its directors, employees, servants or agents including individual experts and members of its technical committees and IEC National Committees for any personal injury, property damage or other damage of any nature whatsoever, whether direct or indirect, or for costs (including legal fees) and expenses arising out of the publication, use of, or reliance upon, this IEC Publication or any other IEC Publications.
- 8) Attention is drawn to the Normative references cited in this publication. Use of the referenced publications is indispensable for the correct application of this publication.
- 9) IEC draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). IEC takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, IEC had not received notice of (a) patent(s), which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at <https://patents.iec.ch>. IEC shall not be held responsible for identifying any or all such patent rights.

IEC Guide 122 has been prepared in accordance with the ISO/IEC Directives, Part 1, Annex A, by the IEC Advisory Committee on Environmental Aspects (ACEA).

The text of this IEC Guide is based on the following documents:

Draft	Report on voting
SMBNC/56/DV	SMBNC/60/RV

Full information on the voting for the approval of this Guide can be found in the report on voting indicated in the above table.

The language used for the development of this Guide is English.

This publication has been drafted in accordance with the ISO/IEC Directives, Part 2, and developed in accordance with ISO/IEC Directives, Part 1 and ISO/IEC Directives, IEC

Supplement, available at www.iec.ch/members_experts/refdocs. The main document types developed by IEC are described in greater detail at www.iec.ch/standardsdev/publications.

This document is a preview generated by EVS

INTRODUCTION

IEC and other standards development organizations (SDOs), as well as numerous environmental performance programmes worldwide (such as Blue Angel in Europe and EPEAT in the US), are developing standards for the determination, quantification, and possible limitation of halogen content in materials and products.

There are multiple reasons for such interest in the use and amounts of elemental halogens and certain halogenated compounds in materials and products, including:

- the health and safety of workers and end users;
- the safety of people, animals and goods in the event of fire;
- the minimization of adverse environmental impacts;
- the demonstration of compliance with product legislation;
- business and commercial interests.

NOTE 1 The list above is not prioritized by level of importance.

NOTE 2 More information about fire retardancy in relation to halogens is provided in Clause B.2.

An analysis of standards developed by different IEC committees reveals differences in terminology, and differences in the halogens concerned and their associated threshold (see Annex A). Similar differences are also observed with respect to other standards such as regional (CEN, CENELEC, UL), national (IPC, JEDEC) and sectorial publications (e.g. in the railways domain).

The definitions related to halogen content in standards developed by IEC and other SDOs exhibit differences such as the following (see more details in Annex A).

- Different terms like halogen-free, non-halogenated, zero-halogen, and low-halogen are often used to express the same or similar halogen content.
- Different limits for the halogens (either as individual limits or as a total halogen content) are used, while often they are referred to using the same term.
- Different standards use similar terms (e.g. non-halogenated) when referring to different sets of halogens, e.g. chlorine and bromine only, or all four halogens – fluorine, chlorine, bromine, and iodine.
- Different standards cover different forms of halogen (elemental halogens, brominated or chlorinated compounds, etc.) and yet use the same terminology to refer to them.
- Different standards covering different product scopes, like electrical and electronic equipment (EEE) or certain product parts such as cables and cable management systems and printed circuit boards (PCBs), use inconsistent terminology or requirements.

There are many reasons for the observed differences in the various standards, such as the following.

- The scope of SDOs is focused on developing vertical standards on specific categories of product.
- Stakeholders did not include a complete representation of the scope of the SDO in question.
- Standards were created at different moments in time, with more recent publications using newer data and terminology.
- Stakeholders during different standardization activities can have a different knowledge base or perspective of halogenated substances and materials, their perceived risks, or links to specific legislation.

Differences in the various definitions bring confusion among the users of IEC standards and of other standards related to halogen content. Especially for manufacturers, traders and users of finished goods, the claims that can be associated with these different standards can appear as "greenwashing". While the specification of test methods and requirements is the responsibility of individual IEC product or systems committees, harmonization of the terminology associated with halogen content across committees would be beneficial.

This Guide, therefore, provides recommendations on how IEC committees can best employ harmonized terminology that is suitable to the halogen-content-related requirements in a scientifically sound, uniform, verifiable, and environmentally relevant way.

It also complements IEC Guide 109 [1]¹, which describes the general principles of specifying environmental aspects in IEC standards.

Standards that include halogen content provisions cover not only environmental matters, but often have a broad scope also covering health, safety and fire-related matters, thus going beyond ACEA's scope. In recognition of this, and in order to collect input from other domains, this Guide was circulated for comment to the following IEC, ISO and CLC committees:

- IEC: TC 8, TC 15, TC 18, SC 18A, TC 20, TC 21, TC 23, TC 34, TC 46, SC 46A, SC 46C, TC 47, TC 59, TC 65, SC 65C, TC 86, SC 86A, TC 89, TC 91, TC 100, TC 110, TC 111, TC 112, TC 120, TC 121, TC 147 and ACOS.
- ISO: TC 34/SC 11, TC 61/SC 5, TC 61/SC 9, TC 92/SC 3, TC 147/SC 2 and TC 207.
- CLC: TC 213.

The following IEC committees (including relevant subcommittees) made active contributions to the development of this Guide: TC 20, TC 23, TC 46, TC 47, SC 86A, TC 91 and TC 111.

In this Guide:

- the term "committees" includes technical committees (TCs), project committees (PCs), subcommittees (SCs), systems committees (SyCs), and advisory committees (ACs).
- the term "standard" includes International Standard (IS), Technical Report (TR), Technical Specification (TS), and Publicly Available Specification (PAS), where the document types are those defined in the ISO/IEC Directives, Part 2.

¹ Numbers in square brackets refer to the Bibliography.

GUIDE FOR DEFINING HALOGEN CONTENT TERMINOLOGY IN IEC STANDARDS

1 Scope

This Guide raises awareness and provides recommendation on the use of consistent terminology related to halogen content for use in horizontal and product-specific IEC standards.

The terminology related to halogen content provided in this Guide does not take into consideration astatine (At) and the artificially created tennessine (Ts), since they are not used in electrical and electronic equipment (EEE). Diatomic halogen molecules (F₂, Cl₂, Br₂, I₂), normally not found in EEE, are also excluded from the terminology recommended in this Guide.

NOTE The IEC Standardization Management Board (SMB) has decided that Guides such as this one can have mandatory requirements which shall be followed by all IEC committees developing technical work that falls within the scope of the Guide, as well as guidance which may or may not be followed. The mandatory requirements in this Guide are identified by the use of "shall". Statements that are only for guidance are identified by using the verb "should". (See ISO/IEC Directives, IEC Supplement:2021, A.1.1.).

2 Normative references

There are no normative references in this document.

3 Terms, definitions and abbreviated terms

3.1 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:

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

3.1.1

halogen

fluorine (F), chlorine (Cl), bromine (Br) or iodine (I)

Note 1 to entry: Together the four halogens plus astatine (At) constitute the group of the periodic table that in the past was known as "group VIIA". In the current IUPAC nomenclature, it is known as "group 17".

Note 2 to entry: For the purposes of this document, astatine (At) is not included in this definition because it is not known to be used in EEE. Similarly, the artificially created element tennessine (Ts) can also be considered a halogen but it is not known to be used in products in general.

3.1.2

halogen content

quantity of all halogens in a material, product or product part

Note 1 to entry: Halogen content is typically defined in mass or mass fraction (e.g. mg or mg/kg). Any expression of halogen content mass fraction is best accompanied by a clear unit basis. Parts per million (ppm) alone is not sufficient.