

PUBLICLY AVAILABLE SPECIFICATION PRE-STANDARD

Definition of “Low-Halogen” for electronic products

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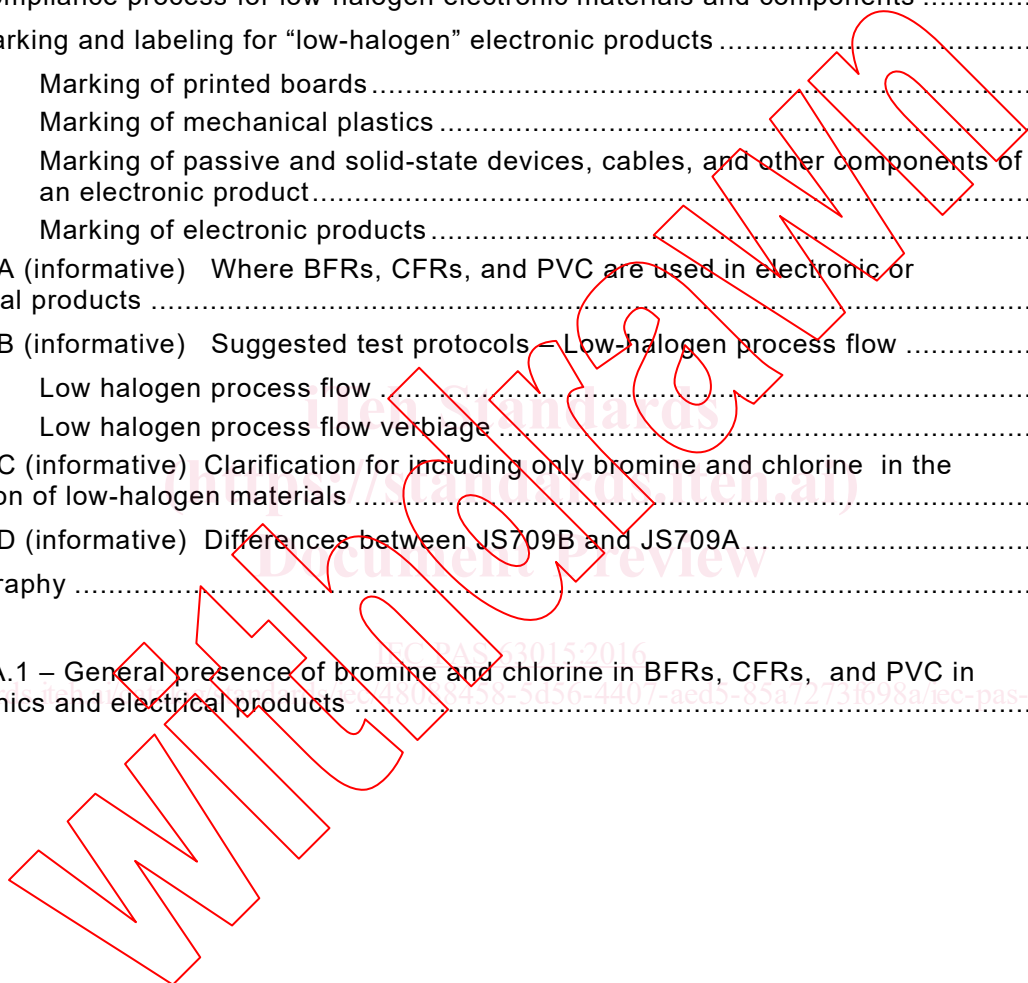
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INTERNATIONAL ELECTROTECHNICAL COMMISSION

DEFINITION OF “LOW-HALOGEN” FOR ELECTRONIC PRODUCTS

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INTRODUCTION

Halogenated polymeric materials and compounds are used in various engineering applications, including flame retardation. Several decades of use have proven these materials and compounds to be reliable and cost-effective. The electronic industry seeks to reduce the overall environmental impact of our products by working to develop reliable and cost-effective alternatives to these materials and compounds. However, the timetable for broad-scale adoption of low-halogen materials is difficult to predict, because applications such as complex multilayer PCBs and large molded integrated circuits will require further investigation and qualification of new materials.

The halogen group contains fluorine, chlorine, bromine, iodine, and astatine; however, this document will use the term “low-halogen” to refer only to bromine and chlorine to be consistent with the International Electrotechnical Commission (IEC) and IPC definitions of “halogen-free” (see Clause 2). Refer to Annex C for further explanation for exclusion of astatine, iodine and fluorine. In this document, the term “low-halogen” is used to identify a material that contains low concentrations of bromine and chlorine from brominated and chlorinated flame retardants (BFRs, CFRs) and polyvinyl chloride (PVC).

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DEFINITION OF “LOW-HALOGEN” FOR ELECTRONIC PRODUCTS

1 Scope

This document provides terms and definitions for “low-halogen” electronic products that have the potential to contain the halogens bromine (Br) and chlorine (Cl) from the use of BFRs, CFRs, and PVC, and recommends methods for marking and labeling. This standard may be applied to all nonmetallic and nonceramic materials within electronic products including, but not limited to, materials in the following components commonly found in electronic products:

- 1) transistors, integrated circuits, modules consisting mainly of integrated circuits (e.g. multichip, hybrid), and memory modules;
- 2) resistors, capacitors, relays, inductors, and connectors;
- 3) printed circuit board assemblies (PCBAs) including components,
- 4) plastic in cables, sockets, switches and external wiring;
- 5) mechanical plastics (enclosures, fans, etc.);
- 6) films, tapes, inks, and adhesives;
- 7) soldering flux residues (when present);
- 8) sound, shock, and vibration dampeners (foams, resins, etc.).

This document establishes the maximum concentration level for the halogens bromine (Br) and chlorine (Cl) from the use of BFRs, CFRs, and PVC. While the halogen group contains fluorine, chlorine, bromine, iodine, and astatine, this document will use the term “low-halogen” to refer only to bromine and chlorine. Refer to Annex C for further explanation for exclusion of astatine, iodine and fluorine.

NOTE The definition of “low-halogen” is different from the term “halogen-free” as described in IEC 61249-2 sectional standard related to non-halogenated base material and as defined in the J-STD-609A marking and labeling standard; standards that pertain only to printed boards and are currently in use in the electronics and solid-state industries.

BFRs, CFRs, and PVC in materials that may be used during processing, in product delivery systems, or in packaging, but do not remain within the final product are not included in the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

IEC 62321: 2008, *Electrotechnical products – Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers)*

EN 14582:2007-06, *Characterization of waste – Halogen and sulphur content – Oxygen combustion in closed systems and determination methods*

IEC 61249-2 (all parts), *Materials for printed boards and other interconnecting structures*

IPC-T-50, *Terms and Definitions for Interconnecting and Packaging Electronic Circuits*

IPC-4101, *Specification for Base Materials for Rigid and Multilayer Printed Boards*

IPC/JEDEC J-STD-609, *Marking and Labeling of Components, PCBs and PCBA's to Identify Lead (Pb), Pb-free and Other Attributes*

ISO 11469:2000, *Plastics – Generic identification and marking of plastics products*

ISO 1043-4:1998, *Plastics – Symbols and abbreviated terms – Part 4: Flame retardants*

JESD88, *JEDEC Dictionary of Terms for Solid-state Technology*

JPCA–ES–01, *Test Method for Halogen Free Materials*

3 Terms, definitions and abbreviated terms

For the purposes of this document, the terms, definitions and abbreviated terms given in JESD88 and/or IPC-T-50 and the following 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 <http://www.iso.org/obp>

At	astatine
BFR	brominated flame retardant
Br	bromine
Cl	chlorine
CFR	chlorinated flame retardant
F	fluorine
FR	flame retardant
I	iodine
IC	ion chromatography
IEC	International Electrotechnical Commission
ISO	International Organization for Standardization
PBDE	polybrominated diphenyl ether
PCB	printed circuit board
PCBA	printed circuit board assembly
PPM	parts per million
PTFE	polytetrafluoroethylene
PVC	polyvinyl chloride
TBBPA	tetrabromobisphenol-A
XRF	X-ray fluorescence

3.1

block polymer

substance composed of block macromolecules

[SOURCE: IUPAC]

3.2 brominated/chlorinated flame retardants BFR/CFR

flame retardants that contain bromine and/or chlorine

Note 1 to entry: These compounds are typically added to or reacted into polymers such as certain epoxy resins and thermoplastics to reduce their flammability. Examples include, but are not limited to, tetrabromobisphenol-A (TBBPA), brominated epoxy resins, and polybrominated diphenyl ethers (PBDEs).

3.3 congener

member of the same kind, class or group of compounds with similar structures and similar chemical properties

3.4 copolymer

polymer derived from more than one species of monomer

[SOURCE: IUPAC]

3.5 electronic device

device whose operation depends on the conduction of electrons and/or holes in vacuum, gas, or semiconductor

Note 1 to entry: Examples of electronic devices include transistors, integrated circuits, hybrid integrated circuits, and modules containing active electronic components.

3.6 electronic product

item containing one or more electronic devices performing major functions

3.7 low-halogen

meeting the criteria established in Clause 4 of this document

Note 1 to entry: Low halogen electronic products may still contain some halogens, providing, of course, that each material in them meets the requirements in Clause 4.

3.8 plastic

any of a group of synthetic or natural organic compounds produced by polymerization, optionally combined with additives (organic or inorganic fillers, modifiers, etc.) into a homogeneous material capable of being molded, extruded, or cast into various shapes and films

3.9 polymer alloy

polymer blend (considered to be an alloy) that contains either a crystallizable component or two relatively rigid or amorphous polymers

4 Requirements for low-halogen electronic products

The halogens fluorine (F), iodine (I), and astatine (At) are not covered by this document (see annex C). Bromine (Br) and chlorine (Cl) refer to all oxidation states of these elements. Bromine (Br) and chlorine (Cl) in materials that may be used during processing but do not remain within the final product are not included in this definition.

For an electronic product to be defined as “low-halogen”, each material within the product shall meet all of the following requirements.