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Definition of “Low-Halogen” For Electronic Products

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JEDEC SOLID STATE TECHNOLOGY ASSOCIATION
ELECTRONIC COMPONENTS INDUSTRY ASSOCIATION

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Foreword

The term "low-halogen" is currently not well defined, nor is it mandated as a requirement by any legislation worldwide at the time of this standard. Nevertheless, to ensure a uniform and consistent understanding throughout the industry of the meaning of "low-halogen", this term needs to be clearly defined as it pertains to materials within electronic products. In this standard, the term "low-halogen" is defined in Clause 4 and is used to identify materials within electronic products that contain low concentrations of bromine and chlorine from brominated and chlorinated flame retardants (BFRs, CFRs) and polyvinyl chloride (PVC). Should one choose to implement a "low-halogen" technology, this standard shall be utilized to identify the industry accepted definition, targeted materials, and systems requirements.

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 2.4). 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).

DEFINITION OF "LOW-HALOGEN" FOR ELECTRONIC PRODUCTS

(From JEDEC Board Ballot JCB-18-03, formulated under the cognizance of the JEDEC JC-14.4 Subcommittee on Quality Processes and Methods and the ECA S-1 Passive Components Steering Committee.)

1 Scope

This standard 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 (PCBA's) 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 Reference documents

2.1 IEC[1]

(IEC 62321 Ed. 1: 2008 *"Electrotechnical products - Determination of levels of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated* biphenyls, polybrominated diphenyl ethers)

IEC 61189-2 *Test methods for electrical materials, printed boards and other interconnection structures and assemblies*

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

IEC 61249-2 *Materials for printed boards and other interconnecting structures sectionals*:

- Part 2-21: *Reinforced base materials, clad and unclad - Non-halogenated epoxide woven E-glass reinforced laminated sheets of defined flammability (vertical burning test), copper-clad*
- Part 2-22: *Reinforced base materials clad and unclad - Modified non-halogenated epoxide woven E-glass laminated sheets of defined flammability (vertical burning test), copper-clad*
- Part 2-23: *Reinforced base materials, clad and unclad - Non-halogenated phenolic cellulose paper reinforced laminated sheets, economic grade, copper clad*
- Part 2-26 *Reinforced base materials clad and unclad - Non-halogenated epoxide non-woven/woven E-glass reinforced laminated sheets of defined flammability (vertical burning test), copper-clad*

2.2 IPC[2]

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 PCBAs to Identify Lead (Pb), Pb-free and Other Attributes*

IPC-TM-650 TM 2.3.41 *Test Method for Total Halogen Content in Base Materials*

IPC/WP/TR-584A *IPC White Paper and Technical Report on the Use of Halogenated Flame Retardants in Printed Circuit Boards and Assemblies*

2.3 ISO[3]

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

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

2.4 JEDEC[4]

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

[1] www.iec.ch
[2] www.ipc.org
[3] www.iso.org
[4] www.jedec.org