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GB/T 26572-2011

Requirements of concentration limits for certain restricted substances in electrical and electronic products

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Foreword

This Standard is drafted according to the rules given by GB/T 1.1-2009.

The Standard was proposed by the Ministry of Industry and Information Technology.

This Standard shall be under the jurisdiction of the Environment Standardization Technical Committee of National Electrical and Electronic Products and Systems (SAC/TC 297).

Main drafting organizations of this Standard: China Electronics Standardization Institute, China Quality Certification Center, The Fifth Technology Institute of Ministry of Industry and Information, Jiangsu Entry-Exit Inspection and Quarantine Bureau, Nayou Technology (Beijing) Co., Ltd., and Shenzhen Metrology and Quality Inspection Institute.

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Requirements of concentration limits for certain restricted substances in electrical and electronic products

1 Scope

This Standard specifies the maximum allowable content and compliance determination rules of restricted substances in electrical and electronic products.

This Standard applies to the control of restricted substances such as lead (Pb), mercury (Hg), cadmium (Cd), hexavalent chromium (Cr(Ⅵ)), polybrominated biphenyls (PBB), and polybrominated diphenyl ethers (PBDE) in electrical and electronic products.

2 Normative references

The provisions in following documents become the provisions of this Standard through reference in this Standard. For dated references, the subsequent amendments (excluding corrections) or revisions do not apply to this Standard.

GB/T 26125-2011 Electrical and electronic products - Determination of six regulated substances (lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers) (IEC 62321:2008, IDT)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

restricted substances

The substances that are required by laws and regulations or customer to be used restrictedly in electrical and electronic products.

3.2

electrical and electronic products

EEP

The equipment and ancillary products that rely on current or magnetic field to work; generate, transmit and measure such current and magnetic field; the rated working voltage of which does not exceed 1500 V in direct current, and does not exceed 1000 V in alternate current.

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Annex A

(Normative)
Disassembly of electrical and electronic products

A.1 Structure of electrical and electronic products

A.1.1 Composition structure

A.1.1.1 Complete machines: The equipment that can perform specific functions individually, such as televisions, telephones, computers, and washing machines.

A.1.1.2 Parts/components: The structural units that can be disassembled only with simple tools, such as boards, power supplies, and modules.

A.1.1.3 Components: The electronic components or electronic devices that constitute circuit boards, such as resistors, capacitors, integrated circuits, optoelectronic devices, and connectors.

A.1.1.4 Raw materials: The basic materials that constitute parts or components, such as metal, plastic, solder, adhesives, and coating materials.

A.1.2 Classification of connection methods

A.1.2.1 Physical connections: The method that connects or fixes different components and parts by physical forces such as pressure, friction, and gravity. Usually by crimping, riveting, bonding, taping, threaded connection, fastening, and surrounding.

A.1.2.2 Chemical connections: The connections between different materials, components, and parts by the methods of metallurgical or chemical reactions. Usually by welding, electroplating, and electroless plating.

A.2 Prepare and requirements of disassembly

A.2.1 Environment

A.2.1.1 Disassembly area

Disassembly area shall be relatively independent, and sufficient for disassembly operation. KEEP the disassembly environment clean. KEEP the indoor temperature and humidity to be appropriate and being monitored. It shall avoid the direct sunlight.

A.2.1.2 Disassembly bench

Disassembly bench shall be smooth, clean, wear-resistant, corrosion-resistant, and has sufficient loading capacity. The bench-board area shall meet the requirements of disassembly operation and sample placement.

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A.2.7.1 If the samples contain impurities such as dust and oil that may affect test results, it shall be necessarily cleaned or decontaminated before disassembly. Cleaning agents and decontamination method shall not change the composition of samples.

A.2.7.2 Samples shall be stored under specified terms and appropriate conditions.

A.2.7.3 Transfer of samples shall remain stable compositions.

A.2.8 Record and preservation of disassembly process

A.2.8.1 Record requirements

Samples shall have unique identifications. The records of disassembly process shall be complete, including disassembly environment, disassembly equipment and tools, disassembly results, sample identification, and other relevant information required special record.

A.2.8.2 Record tables

Disassembly record table of electrical and electronic products may include: part name, material name, specifications/models, size, quality, color, material production plants, etc.

A.3 Disassembly objectives and disassembly principles of electrical and electronic products

A.3.1 Disassembly objectives

In order to determine the content of restricted materials in electrical and electronic products, and to achieve the objective of controlling the use of restricted substances in electrical and electronic products effectively, it shall disassemble the electrical and electronic products into test units before test (as shown in Table 1).

A.3.2 Disassembly principles

A.3.2.1 General principle: DISASSEMBLE the samples according to the principle of disassembling into homogeneous materials as far as possible.

A.3.2.2 The test units that can be disassembled into homogeneous materials are classified as EEP-A. The test units that can not be disassembled into homogeneous materials are classified as EEP-B and EEP-C.

A.3.2.3 In order to give consideration to both operability and economy, it shall refer to Annex D to assess the possibility grade of the existence of restricted substances before disassembly, so as to guide the subsequent sample disassembly, and obtain a better disassembly program.

A.3.2.4 When disassembling, it shall firstly consider to SEPARATE the materials or components, to which there are exceptional requirements of application of restricted

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substances by the laws and regulations, FROM other parts (EEP-A/B/C).

A.3.2.5 For chemical connection, if it is plating-layer (EEP-B), then it can directly use the corresponding test methods in Chapter 6, Annex B, and Annex D of GB/T 26125-2011 to conduct qualitative or semi-quantitative detection. As for the sample preparation of main body (base materials), PREPARE the sample by using mechanical or dissolving methods to remove the plating; if the surface of one material is connected to the terminal of another material, or the terminals of two materials are connected, then they shall be separated, and choose their non-chemical-connection portion to prepare the sample.

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B.5.2 Disassembly example of plug-in electrolytic capacitor

The structure of plug-in electrolytic capacitor is more complex. It is usually constituted by casing, rubber, electrolyte, electrolytic membrane, aluminum foil, aluminum, pins, and other materials.

When the volume of capacitor's main body is less than or equal to 4 mm^3, disassemble it into pins and main body.

When the volume of capacitor's main body is greater than 4 mm^3, disassemble it into pins, shell, membrane, positive electrode, and negative electrode.

B.5.3 Disassembly example of cable

There are many cable materials, such as wire, cable, optical fiber, and optical cable.

The structure of this kind of materials are relatively simple. It is generally constituted by external protective layer, internal protective layer, and inorganic core materials. DISASSEMBLE according to its constitution.

B.5.4 Metal plating samples

PREPARE the sample according to A.3.2.

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Annex C

(Informative)
Sample-disassembly examples with assistance of X-ray fluorescence spectrum analysis (XRF) technology

C.1 Introduction

Chapter 6 in GB/T 26125-2011 outlines the screening method of applying XRF to determine whether the restricted substances exist in electrical and electronic products or not. Aimed at the analysis process of restricted substances in electrical and electronic products, XRF is an effective technological means. It can help to determine which parts need to be further disassembled and which parts do not need to be further disassembled and tested.

C.2 XRF analytical instruments

X-ray fluorescence spectroscopic analysis method is able to conduct qualitative and quantitative analysis to the elements contained in the sample. The instrument uses X-ray to irradiate the sample. The elements contained in the sample will produce fluorescent X-ray. By analyzing these characterized rays, it can obtain the element information of the sample.

Common XRF are wavelength-dispersive X-ray fluorescence (WDXRF) and energy-dispersive X-ray fluorescence (EDXRF). WDXRF has high precision, but the pretreatment is complex; sample pretreatment of EDXRF is very simple, even to irregular samples, it can quickly provide the qualitative or semi-quantitative results, which makes EDXRF widely applied in the screening test of restricted substances.

EDXRF includes desktop models, portable models, and micro-area analysis models, etc.
The most commonly used are desktop models. Objects can be directly put into sample chamber to test. By choosing appropriate test conditions, it can obtain high test precision. The detection limit of desktop EDXRF is related to instrument configuration. Most desktop EDXRF are equipped with different collimators (common pore size is about 1mm~10mm), which can automatically switch, to facilitate the testing personnel to select the appropriate detection area. What shall be noted is that, generally at the condition of same X-ray tube power and the optical path structure, the smaller the pore size of collimator, the poorer the detection sensitivity.

Portable models are placed on the sample when testing, therefore the sample do not need be removed from the components. It has better adaptability to the size and shape of the components, and it applies to on-site screening and analysis. Typical spot diameter of portable XRF instrument is 2mm~5mm. What shall be noted is that, due to the limit of light tube power of portable XRF instrument, the detection sensitivity

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Table C.2 Selection of visual test sites - mobile phone charger

Sample number	Parts	Material	Detection element	Existence probability	Is it tested
1	Back cover of black plastic	Polymer	Cd, Hg, Cr[a], Pb, Br[b]	Medium	Yes
2	Plastic base of plug	Polymer	Cd, Hg, Cr[a], Pb, Br[b]	Medium	Yes
3	Pins	Metal	Cd, Hg, Cr[a], Pb	Low	Yes
4	Screws	Metal	Cd, Hg, Cr[a], Pb	High	Yes
5	Grommet	Polymer	Cd, Hg, Cr[a], Pb, Br[b]	Medium	Yes
6	Power line sheath	Polymer	Cd, Hg, Cr[a], Pb, Br[b]	Medium	Yes
7	Printed circuit board	Composite	Cd, Hg, Cr[a], Pb, Br[b]	High	Yes
8	Charging plug	Metal	Cd, Hg, Cr[a], Pb	Low	Yes
9	Charging plug plastic	Polymer	Cd, Hg, Cr[a], Pb, Br[b]	Medium	Yes
10	Velcro	Synthetic	Cd, Hg, Cr[a], Pb, Br[b]	Unsure	Yes

[a] If there exists Chromium (Cr), it indicates that it may have used the restricted hexavalent chromium (Cr (VI)).

[b] If there exists Bromine (Br), it indicates that it may have used the restricted PBBs and (or) PBDEs.

Firstly, it can analyze the different parts of charger before disassembly. Such as measuring different positions of black plastic back cover, the results show that the content of bromine is between 2600 mg/kg and 7000 mg/kg; if the analysis just stays in this stage, it seems that the black plastic's back cover of charger can be determined that it may contain bromine flame retardants. However, if removing the two screws of charger and conducting simple disassembly, sample ① and sample ⑦ can be tested separately. When sample ① is tested alone, measurement results do not contain bromine element. Next, analyze sample ⑦ . SELECT the sites without components and USE XRF to detect directly. The actual measurement results show that the content of bromine in this sample is 5.5%, so it is necessary to carry out confirmatory analysis of flame retardants.

This example shows that: Even analyzing it without disassembly, it can be determined that the content of bromine in the entire product is too high. After simple disassembly, it is clear that it is printed circuit board that causes the high bromine content, rather than the plastic's back cover.

Before simple disassembly of charger, the results of bromine can be obtained from direct measurement of the back cover. It is because the original-level X-rays penetrates into the back cover of charger, and detects the printed circuit board inside the charger.

C.4.4 Printed circuit board

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References

[1] IEC/PAS 62596:2009 Electrotechnical products - Determination of restricted substances - Sampling procedure - Guidelines

[2] GB/Z 20288-2006 General disassembly requirements for testing hazardous substances in electrical and electronic products

[3] SJ/T 11363-2006 Requirements for concentration limits for certain hazardous substances in electronic information products

[4] SJ/T 11365-2006 Testing methods for hazardous substances in electronic information products

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