SLOVENSKI STANDARD
SIST EN 50642:2018

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Sistemi za urejanje okablenja - Metoda za preskušanje vsebnosti halogenov

Cable management systems - Test method for content of halogens

Systèmes de gestion de câblage - Méthode d'essai relative à la teneur en halogènes

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Cable management systems - Test method for content of halogens

Systèmes de gestion de câblage - Méthode d'essai relative à la teneur en halogènes

Kabelführungssysteme - Prüfverfahren für Halogengehalt

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European Committee for Electrotechnical Standardization
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European foreword

This document (EN 50642:2018) has been prepared by CLC/TC 213 “Cable management systems”.

The following dates are fixed:

• latest date by which this document has to be implemented at national level by publication of an identical national standard or by endorsement	(dop)	2019-03-26
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1 Scope

This European Standard specifies a method for the determination of the content of halogens in Cable Management System (CMS) components or products made of polymeric material(s). The determination is made by combustion and subsequent analysis of the combustion product by Ion Chromatography. This standard specifies how CMS components or products can be declared as halogen free.

This European Standard is for environmental performance only.

Compliance with this standard does not imply the absence of toxicity, corrosivity or opacity of produced smoke, or other reaction to fire characteristics. If any of these characteristics are to be evaluated, the appropriate standards can be used.

The detection limit of this test method is typically 0,025 g of halogen per kg (0,002 5 %).

Halides insoluble in aqueous solution present in the original sample or produced during the combustion step are not determined by this method.

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.

EN ISO 3696, *Water for analytical laboratory use - Specification and test methods (ISO 3696)*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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

3.1
halogen content
content of fluorine, chlorine, bromine and iodine as organic and inorganic compounds that can be converted to halides (fluoride, chloride, bromide, iodide) by combustion and then absorbed or dissolved in an aqueous solution

Note 1 to entry: The above definition is valid for this European Standard only and does not strictly comply with scientific definition of halogen content.

4 Principle

The test sample is oxidized by combustion in a closed system containing oxygen under pressure using a calorimetric decomposition bomb (bomb).

Nearly all of the halogens in compounds are converted to halides (fluoride, chloride, bromide and iodide), and nearly all of these (see Clause 5) are dissolved in an absorption solution.

The detection limit of this test method is typically 0,025 g of halogen per kg (0,002 5 %). It may be used for poorly burning samples, therefore a combustion enhancer may be used.

5 Interferences

5.1 General

Inorganic halides insoluble in aqueous solution present in the original samples or produced during the combustion step are not determined by the method described here. 5.2 and 5.3 show the differences that occur between the determination of the content of organic halogenated compounds and inorganic halogen

compounds. The inorganic halogen compounds in the material can have its origin as an additive deliberately added to the material or as an impurity.

5.2 Organic halogen compounds

Organic compounds containing halogens are known under several names. Different expressions are used like organohalogens, halogenated compounds, halocarbons or organic halides. They are all substances in which one or more carbon atoms are linked by covalent bonds to one or more halogen atoms.

Among the organohalogens, some of them are efficient flame retardants. Chlorinated, brominated and fluorinated organohalogens are used separately or in combination. Organohalogens will be converted into inorganic halides by combustion and will then be absorbed or dissolved in an aqueous solution. This allows the subsequent analysis of halogen content.

5.3 Inorganic halogen compounds

Inorganic compounds containing halogens are known as inorganic halides. Inorganic halides used as additives are salts between a halogen and a metal linked together with an ionic bond, for example magnesium chloride ($MgCl_2$), potassium bromide (KBr) or sodium fluoride (NaF). These salts may have varying degrees of solubility in water.

However, this limitation is considered as not significant as no example has been found where inorganic halides have been used in CMS products.

Impurities containing inorganic halides will occur in several additives used in polymers. They can occur as impurities in, for example, fillers (like $CaCl_2$ in $CaCO_3$), pigments (like $TiCl_4$ in TiO_2) or other inorganic additives (like $AlCl_3$ in $Al(OH)_3$). These inorganic halides can have more or less solubility in water, but they will only be measured if they dissolve in the aqueous solution. Investigations have shown that the content of each halogen in impurities in inorganic additives for CMS products is low and therefore does not significantly contribute to the total content of each halogen. Insoluble inorganic halides will not be considered and will not be measured by the method described here. Examples of insoluble inorganic halides are halide salts of silver and barium (AgCl, AgBr and $BaCl_2$). Soluble inorganic halides will be dissolved in the aqueous solution and will be measured together with halides coming from the combustion of the organohalogens.

6 Classifications, limits and declaration

6.1 Classification

6.1.1 Not declared

6.1.2 Halogen free

6.2 Limits

CMS components or products classified according to 6.1.2 shall comply with the following specified limits:

- fluorine content (F) ≤ 0,30 %
- chlorine content (Cl) ≤ 0,15 %
- bromine content (Br) ≤ 0,15 %
- iodine content (I) ≤ 0,30 %
- total halogen content: fluorine content (F) + chlorine content (Cl) + bromine content (Br) + iodine content (I) ≤ 0,40 %

6.3 Declaration

A CMS component or product classified according to 6.1.2 can be declared as “halogen free according to EN 50642” if the CMS component or product meets the requirements of 6.2.

7 Reagents and control mixtures

7.1 Reagents

7.1.1 General

All reagents shall be at least of analytical grade and suitable for the specific purposes, see Clause 12.

7.1.2 Water

The water shall be grade 1 as specified in EN ISO 3696.

7.1.3 Absorption solution 1, for the determination of fluorine, chlorine and bromine

The nature and concentration of solution 1 may depend on the end-determination technique and on the expected content of halogens. For example:

- water (7.1.2); or
- 0,3 mol/l potassium or sodium hydroxide solution: dissolve 16,8 g of KOH or 12,0 g of NaOH pellets in water (7.1.2) and dilute to 1 l; or
- carbonate/bicarbonate solution: dissolve 2,52 g sodium bicarbonate $NaHCO_3$ and 2,54 g sodium carbonate Na_2CO_3 in water (7.1.2) and dilute to 1 l.

7.1.4 Absorption solution 2 for the determination of iodine

Solution 2 shall be ascorbic acid-solution, ($C_6H_8O_3$), w = 1 %.

7.1.5 Oxygen

The oxygen shall be free of combustible material, available at a pressure of 3 MPa to 4 MPa (30 atm to 40 atm) (e.g. medical grade).

7.1.6 Combustion enhancer

The combustion enhancer may be, for example, paraffin.

7.2 Control samples

Table A.1 lists examples of control substances that give complete (90 % to 110 %) recovery rate of halogens. By spiking (standard addition) a sample polymer considered not to contain any halogen with one or more of these substances, a control sample can be created. The halogen content of this sample shall be within ± 20 % of the specified pass-fail criteria. Specific polymer samples with a halogen content in the same range can also be used as control samples.

8 Sample preparation

The test sample is cut into pieces with a grain size not exceeding 2 mm.

NOTE If the grain size is too small, there is a risk of blowing away the test sample when purging and filling the bomb with oxygen. Should this occur, an appropriate method can be adopted to prevent this.

A part made of multiple polymeric materials is assessed on its averaged contents. This is achieved by grinding the part to produce a test sample likely to contain a similar ratio of polymeric materials as the original part.

During preparation of the test sample, contact with halogenated polymers, e.g. PVC gloves, shall be avoided.