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Aluminium and aluminium alloys - Determination of the chemical composition of aluminium and aluminium alloys by spark optical emission spectrometry

Táto norma obsahuje anglickú verziu európskej normy.
This standard includes the English version of the European Standard.

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English Version

Aluminium and aluminium alloys - Determination of the chemical composition of aluminium and aluminium alloys by spark optical emission spectrometry

Aluminium et alliages d'aluminium - Détermination de la composition chimique de l'aluminium et des alliages d'aluminium par spectrométrie d'émission optique à étincelles

Aluminium und Aluminiumlegierungen - Bestimmung der chemischen Zusammensetzung von Aluminium und Aluminiumlegierungen durch optische Emissionsspektrometrie mit Funkenanregung

This European Standard was approved by CEN on 30 December 2018.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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EN 14726:2019 (E)

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European foreword

This document (EN 14726:2019) has been prepared by Technical Committee CEN/TC 132 “Aluminium and aluminium alloys”, the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2019, and conflicting national standards shall be withdrawn at the latest by September 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 14726:2005.

The following modifications were implemented in the present version of EN 14726:

- a new scope;
- updated Normative references;
- reorganization of the standard to respect the template used for the determination of chemical composition;
- new items added in the test report clause (Clause 13);
- new Annexes B, C, D and E.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

EN 14726:2019 (E)**Introduction**

In spark optical emission spectrometry (S-OES), a small portion of the sample is thermally vaporized through the erosion of an electric spark. In the spark discharge, the aerosol is vaporized, partially ionized and excited to emit optical radiation. The characteristic radiation of each element is used in spark optical emission spectrometry for its detection and for its quantitative determination.

Optical emission spectrometry (OES): A technique that measures the emission characteristic of a material in the ultraviolet, visible, or infrared wavelength regions of the electromagnetic spectrum. Atomised particles are excited, and each element emits a characteristic radiant energy. This characteristic radiation is detected using either a photomultiplier tube or a solid state detector; appropriate software is used to record the presence of elements and to quantitatively determine elemental content.

Spark optical emission spectrometry (S-OES): A technique that utilizes a high voltage capacitor discharge to ablate and atomise a section of the tested material in an inert atmosphere. The excited atoms and ions emit electromagnetic radiation, which is detected and analysed by an optical emission spectrometer.

Spark optical emission spectrometry is suitable for determining the chemical composition of alloys before the manufacturing and casting processes: in these cases, samples are taken from the liquid metal at different stages of the casting process. Spark optical emission spectrometry is also used to determine the chemical composition of final products.

The method covered by this document is primarily for the analysis of aluminium or aluminium alloy chill cast solid samples, as described in EN 14361, although other samples forms are acceptable.

1 Scope

This document describes the criteria and the procedure for analysing aluminium and aluminium alloys with spark optical emission spectrometry (S-OES). The scope of this document covers the following:

- sample preparation;
- operational guidelines for an optical emission spectrometer (including maintenance);
- traceability of the analytical results to the International System of units: mass (kg);
- assessing the uncertainty associated with each analytical result.

This document refers to simultaneous spark emission spectrometers for the analysis of solid samples.

It applies to the determination of silicon, iron, copper, manganese, magnesium, chromium, nickel, zinc, titanium, boron, gallium, vanadium, beryllium, bismuth, calcium, cadmium, cobalt, lithium, sodium, phosphorus, lead, antimony, tin, strontium and zirconium in aluminium and aluminium alloys.

Elements other than those listed above may be analysed on the condition that:

- a) suitable reference materials are available; and
- b) the instrument is suitably calibrated and equipped.

In the case of determining mercury, for compliance purposes an alternate method with a limit of quantification $< 0,0001\%$ is recommended as its detection is compromised by intense iron interference at 253,65 nm.

The test result obtained from a spark optical emission spectrometer generally concerns an amount of less than one milligram per spark spot. The result can be used to refer to the laboratory test sample, to the aluminium or aluminium alloy melt or to the cast product.

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 12258-2, *Aluminium and aluminium alloys - Terms and definitions - Part 2: Chemical analysis*

EN 14361, *Aluminium and aluminium alloys - Chemical analysis - Sampling from metal*

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