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**Magnesium and magnesium alloys —  
Determination of nickel —  
Inductively coupled plasma optical  
emission spectrometric method**



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# Contents

Page

<b>Foreword</b>	<b>iv</b>
<b>Introduction</b>	<b>v</b>
<b>1 Scope</b>	<b>1</b>
<b>2 Normative references</b>	<b>1</b>
<b>3 Terms and definitions</b>	<b>1</b>
<b>4 Principle</b>	<b>1</b>
<b>5 Reagents</b>	<b>1</b>
<b>6 Apparatus</b>	<b>2</b>
6.1 Inductively coupled plasma optical emission spectrometer	2
6.1.1 General	2
6.1.2 Wavelengths	2
6.1.3 Limit of detection	3
6.1.4 Linearity of the calibration curve	3
<b>7 Sampling and sample preparation</b>	<b>3</b>
<b>8 Procedure</b>	<b>3</b>
8.1 General	3
8.2 Test sample	3
8.3 Determination	3
8.3.1 Preparation of the test solution for nickel contents between 0,000 2 % (mass fraction) and 0,01 % (mass fraction)	3
8.3.2 Preparation of the calibration solutions for nickel contents between 0,000 2 % (mass fraction) and 0,01 % (mass fraction)	4
8.3.3 Preparation of the test solution for nickel contents between 0,01 % (mass fraction) and 0,2 % (mass fraction)	4
8.3.4 Preparation of the calibration solutions for nickel contents between 0,01 % (mass fraction) and 0,2 % (mass fraction)	4
8.4 Adjustment of the apparatus	5
8.5 Measurement of the calibration solutions	5
8.6 Calibration curve	5
8.7 Measurements of the test solution	5
<b>9 Expression of results</b>	<b>5</b>
9.1 Method of calculation	5
9.2 Precision	6
<b>10 Test report</b>	<b>6</b>
<b>Annex A (normative) Limit of detection</b>	<b>7</b>
<b>Annex B (informative) Information on the precision test</b>	<b>8</b>
<b>Annex C (informative) Graphical representation of precision data</b>	<b>9</b>
<b>Bibliography</b>	<b>10</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 79, *Light metals and their alloys*, Subcommittee SC 5, *Magnesium and alloys of cast or wrought magnesium*.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

## Introduction

Magnesium and magnesium alloys are one kind of light metallic materials and show several advantageous properties, such as low density, high specific stiffness and strength, good damping capacity, castability, weldability and machinability, etc. Nickel, as one of the hazardous elements, can significantly reduce the corrosion resistance of magnesium and its alloys. Thus, the nickel content should be controlled and monitored in order to check if its content remains at trace level. Nickel contents are limited to values not greater than 0,1 %, even 0,000 3 %, according to the material standards ISO 3116, ISO 8287 and ISO 16220. Therefore, it is extremely important to determine nickel content accurately in magnesium and its alloys.



# Magnesium and magnesium alloys — Determination of nickel — Inductively coupled plasma optical emission spectrometric method

## 1 Scope

This document specifies an inductively coupled plasma optical emission spectrometric method for the determination of nickel contents between 0,000 2 % (mass fraction) and 0,2 % (mass fraction) in magnesium and magnesium alloys.

## 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.

ISO 648, *Laboratory glassware — Single-volume pipettes*

ISO 1042, *Laboratory glassware — One-mark volumetric flasks*

ISO 3696, *Water for analytical laboratory use — Specification and test methods*

## 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Principle

After dissolution of a test sample with nitric acid and hydrochloric acid, the solution is nebulized into an inductively coupled plasma optical emission spectrometer and the intensity of the emitted light from nickel is measured. The concentrations of nickel in the test solutions are derived from magnesium-based calibration curves.

## 5 Reagents

During the analysis, use only reagents of recognized analytical grade and only grade 2 water as specified in ISO 3696, or water of equivalent purity.

**5.1 Pure magnesium**, purity  $\geq 99,99$  % (mass fraction), free from nickel.

**5.2 Pure nickel**, purity  $\geq 99,99$  % (mass fraction).

**5.3 Hydrochloric acid**,  $\rho$  about 1,19 g/ml.

**5.4 Nitric acid**,  $\rho$  about 1,42 g/ml.