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**Ferronickels — Determination of  
sulfur content — Infrared absorption  
method after induction furnace  
combustion**

*Ferronickels — Détermination de la teneur en soufre — Méthode  
par absorption dans l'infrarouge après combustion dans un four à  
induction*

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## 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 155, *Nickel and nickel alloys*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/SS M14, *Nickel*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This second edition cancels and replaces the first edition (ISO 7526:1985), which has been technically revised. The main changes compared with the previous edition are as follows:

- the scope has been limited to ferronickels only;
- the former Clauses 5 and 7 have been technically revised;
- the former Annexes A and C have been deleted;
- the precision data have been updated.

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).

# Ferronickels — Determination of sulfur content — Infrared absorption method after induction furnace combustion

## 1 Scope

This document specifies an infrared absorption method after combustion in an induction furnace for the determination of the sulfur content in ferronickels in the range of 0,002 % to 0,12 %.

The method is applicable to normal production operations. It uses commercially available equipment, which is calibrated using steel and/or ferronickel certified reference materials (CRMs).

## 2 Normative references

There are no normative references in this document.

## 3 Terms and definitions

No terms and definitions are listed in this document.

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

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

## 4 Principle

Combustion of a test portion in a high-frequency induction furnace at high temperature in a current of pure oxygen, and in the presence of accelerators and fluxes.

Transformation of sulfur into sulfur dioxide.

Measurement by infrared absorption of the sulfur dioxide carried by the current of oxygen.

## 5 Reagents

During the analysis, use only reagents of recognized analytical grade.

### 5.1 Oxygen, high purity (mass fraction minimum 99,5 %).

An oxidation catalyst [copper(II) oxide or platinum] tube heated at 600 °C, followed by appropriate carbon dioxide and water absorbents, shall be used when the presence of organic contaminants is suspected in the oxygen.

**5.2 Inert ceramic (attapulugus clay)**, impregnated with sodium hydroxide and having particle sizes from 0,7 mm to 1,2 mm for the absorption of carbon dioxide.

**5.3 Magnesium perchlorate [Mg(ClO<sub>4</sub>)<sub>2</sub>]**, having particle size from 0,7 mm to 1,2 mm for the absorption of moisture.

#### 5.4 Glass-wool.

#### 5.5 Fluxes and accelerators.

##### 5.5.1 General

A flux addition has the effect of bonding together small particles for more effective furnace coupling and it helps to produce a more fluid melt.

An accelerator addition allows:

- a) a good coupling medium for the induction heating of otherwise unsatisfactory samples (finely divided samples, materials of complex composition);
- b) a higher combustion temperature;
- c) an increase of the mass of material in the crucible when the test portions are small.

Any flux or accelerator shall have low sulfur content and shall be used in the calibration procedure. The total blank from all sources (oxygen, refractories, flux and accelerator) shall not exceed 0,000 5 % (mass fraction) sulfur.

Some materials act as both a flux and an accelerator.

##### 5.5.2 Fluxes

Common fluxes are tin, copper plus tin, copper or vanadium pentoxide.

##### 5.5.3 Accelerators

Common accelerators are copper, iron, tungsten or nickel.

#### 5.6 Steel and/or ferronickel certified reference materials (CRMs), containing from 0,001 % to 0,15 % (mass fraction) sulfur.

All reference materials used for calibration shall be certified by internationally recognized bodies. Preference shall be given to materials that are certified using referee methods, e.g. ISO 4934, ISO 4935, ISO 10701 and ISO 13902, traceable to SI units as opposed to those based on other certified reference materials.

## 6 Apparatus

Usual laboratory apparatus and, in particular, the following.

### 6.1 Sulfur analyser.

**6.1.1** The apparatus required for combustion in a high frequency induction furnace and the subsequent infrared absorption measurement of the evolved sulfur dioxide may be obtained commercially from a number of manufacturers.

Follow the manufacturer's instructions for the operation of the equipment. A pressure regulator is required to control the oxygen pressure to the furnace according to the manufacturer's specification.

**6.1.2** Purify the oxygen supply using tubes packed with inert ceramic (5.2) and magnesium perchlorate (5.3) and maintain a flow rate of about 0,5 l/min while on stand-by.