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

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

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Foreword

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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).

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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.

This document was prepared by Technical Committee ISO/TC 155, *Nickel and nickel alloys.*

This second edition cancels and replaces the first edition (ISO 7524:1985), 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.

Ferronickels — Determination of carbon 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 carbon content in ferronickels in the range of 0,004 % to 2,5 %.

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 carbon into carbon dioxide and/or carbon monoxide.

Measurement by infrared absorption of the carbon dioxide and/or carbon monoxide 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 (attapulgus 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 [$Mg(ClO_4)_2$], 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 carbon content and shall be used in the calibration procedure. The total blank from all sources (oxygen, refractories, flux and accelerator) shall not exceed 0,001 % (mass fraction) carbon.

Some materials act as both a flux and an accelerator.

5.5.2 Fluxes

Common fluxes are tin, copper plus tin, copper or tungsten.

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 2,6 % (mass fraction) carbon.

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 9556, and traceable to SI units as opposed to those based on other CRMs.

6 Apparatus

Usual laboratory apparatus and, in particular, the following.

6.1 Carbon analyser.

6.1.1 The apparatus required for combustion in a high frequency induction furnace and the subsequent infrared absorption measurement of the evolved carbon dioxide or carbon monoxide 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.