

Sampling and analysis of nickel, ferronickel and nickel alloys —

Part 5: Method for determination of carbon in nickel, ferronickel and nickel alloys by infra-red absorption after induction furnace combustion

[ISO title: Nickel, ferronickel and nickel alloys — Determination of carbon content — Infra-red absorption method after induction furnace combustion]

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- British Non-ferrous Metals Federation
- British Steel Industry
- Engineering Equipment and Materials Users' Association
- Ministry of Defence
- Process Plant Association
- Stainless Steel Fabricators' Association of Great Britain
- Coopted members

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National foreword

This Part of BS 6783 has been prepared under the direction of the Non-ferrous Metals Standards Committee. It is identical with ISO 7524:1985 “*Nickel, ferronickel and nickel alloys — Determination of carbon content — Infra-red absorption method after induction furnace combustion*” published by the International Organization for Standardization (ISO).

At present this British Standard consists of nine Parts all concerned with analysis of nickel, ferronickel and nickel alloys. Further International Standards are in preparation on sampling and analysis of nickel, ferronickel and nickel alloys and, when available, these will be published as further Parts of this British Standard.

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “International Standard” appear, referring to this standard, they should be read as “Part of BS 6783”.

In British Standards it is current practice to use the symbol “L” for litre (and in its submultiples) rather than “l”.

Cross-reference

International Standard	Corresponding British Standard
ISO 5725:1981	BS 5497 <i>Precision of test methods</i> Part 1:1979 <i>Guide for the determination of repeatability and reproducibility for a standard test method</i> (Technically equivalent)

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 8, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

1 Scope and field of application

This International Standard specifies an infra-red absorption method after combustion for the determination of the carbon content of nickel and ferronickel in the range 0,001 to 2,0 % (m/m), and of nickel alloys in the range 0,001 to 0,5 % (m/m). Examples of compositions are given in Annex A.

2 Reference

ISO 5725, *Precision of test methods — Determination of repeatability and reproducibility by inter-laboratory tests*.

3 Principle

Combustion of a test portion in a flow of oxygen at a high temperature in a high frequency induction furnace in the presence of fluxes and accelerators. Measurement of the carbon dioxide formed using an infra-red analyser and an integration procedure.

4 Reagents and materials

4.1 Oxygen (O₂), 99,5 % (m/m) minimum.

4.2 Ascarite or *soda lime*, 0,7 to 1,2 mm (14 to 22 mesh).

4.3 Magnesium perchlorate [Mg(ClO₄)₂] 0,7 to 1,2 mm (14 to 22 mesh).

4.4 Glass-wool

4.5 Crucibles and lids

4.5.1 Ceramic crucibles shall be of precise dimensions so that the sample is positioned correctly in the induction coil of the furnace (see 9.1).

4.5.2 For carbon levels of less than 0,01 % (m/m) pre-ignite the crucibles in air or oxygen in a furnace for not less than 1 h at 1 100 °C and store in a desiccator or closed container. A resistance furnace with a combustion tube through which a flow of oxygen passes may be used. Crucible lids, used to help retain the solid oxidation products in the hot zone, are pre-ignited in a similar manner.

4.6 Fluxes: low carbon tin, copper plus tin or copper (see 9.2).

4.7 Accelerators: low carbon copper, iron, tungsten or nickel (see 9.2).

4.8 Standard reference steels, containing 0,01 to 2,5 % (m/m) carbon.

5 Apparatus

The apparatus required for combustion in a high frequency induction furnace and the subsequent infra-red absorption measurement of the evolved carbon 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 (usually 28 kN/m²). Features of commercial equipment are given in Annex B.

6 Sampling and samples

6.1 Sampling and preparation of the laboratory sample shall be carried out by normal agreed procedures or, in case of dispute, by the relevant International Standard.

6.2 The laboratory sample normally is in the form of a powder, granules, millings or drillings and no further preparation of the sample is necessary.

6.3 If it is suspected that the laboratory sample is contaminated with oil or grease from the milling or drilling process, it shall be cleaned by washing with high purity acetone and drying in air.

6.4 If the laboratory sample contains particles or pieces of widely varying sizes, the test portion should be obtained by riffing.

7 Procedure

WARNING — The risks related to combustion analysis are mainly burns in pre-igniting the ceramic crucibles and in the fusions. Use crucible tongs at all times and suitable containers for the used crucibles. Normal precautions for handling oxygen cylinders shall be taken. Oxygen from the combustion process shall be removed effectively from the apparatus since a high concentration of oxygen in a confined space can present a fire hazard.

7.1 Stabilizing the equipment

7.1.1 Condition and stabilize the equipment by combusting several samples, similar to those to be analysed (7.4), using appropriate fluxes and accelerators.

NOTE It is not necessary to use pre-ignited crucibles.

7.1.2 Allow the instrument to cycle several times with oxygen flowing and adjust the instrument zero.

7.2 Blank test and zero adjustment

7.2.1 Charge a pre-ignited crucible (4.5) with the quantity of flux and accelerator to be used in the determination (7.4).