# INTERNATIONAL STANDARD

# ISO 4935

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# Steel and iron — Determination of sulfur content — Infrared absorption method after combustion in an induction furnace

*Aciers et fontes — Dosage du soufre — Méthode par absorption dans l'infrarouge après combustion dans un four à induction*

Reference number
ISO 4935 : 1989 (E)

## 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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 4935 was prepared by Technical Committee ISO/TC 17, *Steel.*

Annexes A, B and C of this International Standard are for information only.



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# Steel and iron — Determination of sulfur content — Infrared absorption method after combustion in an induction furnace



## 1 Scope

This International Standard specifies an infrared absorption method after combustion in an induction furnace for the determination of sulfur content in steel and iron.

The method is applicable to sulfur contents between 0,002 % ($m/m$) and 0,10 % ($m/m$)

## 2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 377 : 1985, *Wrought steel — Selection and preparation of samples and test pieces.*

ISO 385-1 : 1984, *Laboratory glassware — Burettes — Part 1: General requirements.*

ISO 648 : 1977, *Laboratoy glassware — One-mark pipettes.*

ISO 1042 : 1983, *Laboratory glassware — One-mark volumetric flasks.*

ISO 5725 : 1986, *Precision of test methods — Determination of repeatability and reproducibility for a standard test method by inter-laboratory tests.*

## 3 Principle

Combustion of a test portion with accelerator at a high temperature in a high-frequency induction furnace in a current of pure oxygen. Transformation of sulfur into sulfur dioxide.

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

## 4 Reagents and materials

During the analysis, unless otherwise stated, use only reagents of recognized analytical grade and only distilled water or water of equivalent purity.

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

An oxidation catalyst [copper(II) oxide or platinum] tube heated to a temperature above 450 °C must be used prior to a purifying unit (see annex C), when the presence of organic contaminants is suspected in the oxygen.

**4.2 Pure iron,** of known low sulfur contents less than 0,000 5 % ($m/m$).

**4.3 Suitable solvent,** appropriate for washing greasy or dirty test samples, for example, acetone.

**4.4 Magnesium perchlorate** [$Mg(ClO_4)_2$], particle size: from 0,7 mm to 1,2 mm.

**4.5 Accelerator,** tungsten, free of sulfur, or of known sulfur contents less than 0,000 5 % ($m/m$). The mesh size of the accelerator may be dependent on the type of apparatus used.

**4.6 Sulfur,** standard solutions.

Weigh, to the nearest 0,1 mg, the mass described in table 1 of potassium sulfate [minimum assay: 99,9 % ($m/m$)] previously dried at 105 °C to 110 °C for 1 h or to constant mass and cooled in a desiccator.

**Table 1**

| Reference of sulfur standard solution | Mass of potassium sulfate g | Concentration of sulfur mg/ml |
|---|---|---|
| 4.6.1 | 0,217 4 | 0,40 |
| 4.6.2 | 0,380 4 | 0,70 |
| 4.6.3 | 0,543 4 | 1,00 |
| 4.6.4 | 1,086 9 | 2,00 |
| 4.6.5 | 1,902 2 | 3,50 |
| 4.6.6 | 2,717 2 | 5,00 |
| 4.6.7 | 4,347 5 | 8,00 |