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Steel and iron - Sampling and preparation of samples for the determination of chemical composition (ISO 14284:1996)

Eisen und Stahl - Entnahme und Vorbereitung von Proben für die Bestimmung der chemischen Zusammensetzung (ISO 14284:1996)

Fontes et aciers - Prélèvement et préparation des échantillons pour la détermination de la composition chimique (ISO 14284:1996)

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**Ta slovenski standard je istoveten z: EN ISO 14284:2002**

**ICS:**

77.080.01      Železne kovine na splošno      Ferrous metals in general

**SIST EN ISO 14284:2003****en**

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EUROPEAN STANDARD  
NORME EUROPÉENNE  
EUROPÄISCHE NORM

**EN ISO 14284**

September 2002

ICS 77.080

English version

**Steel and iron - Sampling and preparation of samples for the  
determination of chemical composition (ISO 14284:1996)**

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chimique (ISO 14284:1996)

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für die Bestimmung der chemischen Zusammensetzung  
(ISO 14284:1996)

This European Standard was approved by CEN on 21 July 2002.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

CORRECTED 2002-11-13

## Foreword

The text of ISO 14284:1996 has been prepared by Technical Committee ISO/TC 17 "Steel" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 14284:2002 by Technical Committee EC/ISS/TC 20 "Methods of chemical analysis of ferrous products", the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by March 2003, and conflicting national standards shall be withdrawn at the latest by March 2003.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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The text of ISO 14284:1996 has been approved by CEN as EN ISO 14284:2002 without any modifications. <https://standards.iteh.ai/catalog/standards/sist/53454484-78a2-4f12-aefa-be9c88293eb2/sist-en-iso-14284-2003>

NOTE Normative references to International Standards are listed in Annex ZA (normative).

## Annex ZA (normative)

### Normative references to international publications with their relevant European publications

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

NOTE Where an International Publication has been modified by common modifications, indicated by (mod.), the relevant EN/HD applies.

<u>Publication</u>	<u>Year</u>	<u>Title</u>	<u>EN</u>	<u>Year</u>
ISO 377	1997	Steel and steel products - Location and preparation of samples and test pieces for mechanical testing	EN ISO 377	1997

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# INTERNATIONAL STANDARD

**ISO**  
**14284**

First edition  
1996-07-01

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## **Steel and iron — Sampling and preparation of samples for the determination of chemical composition**

**iTeh STANDARD PREVIEW**

**(standards.iteh.ai)**

*Fontes et aciers — Prélèvement et préparation des échantillons pour  
la détermination de la composition chimique*

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Reference number  
ISO 14284:1996(E)

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International Organization for Standardization  
Case Postale 56 • CH-1211 Genève 20 • Switzerland

Printed in Switzerland



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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.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

International Standard ISO 14284 was prepared by Technical Committee ISO/TC 17, *Steel*, Subcommittee SC 1, *Methods of determination of chemical composition*.

It cancels and replaces ISO 377-2:1989, of which it constitutes a technical revision.

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

# Steel and iron — Sampling and preparation of samples for the determination of chemical composition

## 1 Scope

This International Standard specifies methods for sampling and sample preparation for the determination of the chemical composition of pig iron, cast iron and steel. Methods are specified for use with both liquid and solid metal.

## 2 Normative references

The following standards contain provisions which, through reference in 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 indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 377:—<sup>1)</sup>, *Steel and steel products — Location of samples and test pieces for mechanical testing*.

ISO 9147:1987, *Pig-irons — Definition and classification*.

## 3 Definitions

For the purposes of this International Standard, the following definitions apply.

**3.1 chemical method of analysis:** Method for the determination of chemical composition in which the sample is submitted to chemical reaction.

**3.2 physical method of analysis:** Method for the determination of chemical composition in which the determination of composition is carried out without submitting the sample to chemical reaction, for example an optical emission spectrometric method, an X-ray fluorescence spectrometric method.

**3.3 thermal method of analysis:** Method for the determination of chemical composition in which the sample is submitted to a process of heating, combustion or fusion.

**3.4 melt:** Liquid metal from which a sample is removed.

**3.5 spoon sampling:** Method in which the sample is taken from the melt, or during the pouring of the melt, using a long-handled spoon, and cast into a small mould.

**3.6 spoon sample:** Sample taken from the melt using a spoon and cast into a small mould.

**3.7 probe sampling:** Method in which the sample is taken from the melt using a commercially available sampling probe inserted into the melt.

**3.8 immersion sampling:** Method of probe sampling in which the probe is immersed in the melt where the sample chamber in the probe fills by ferrostatic pressure or gravity.

**3.9 suction sampling:** Method of probe sampling in which the probe is immersed in the melt where the sample chamber in the probe fills by aspiration.

<sup>1)</sup> To be published. (Revision of ISO 377-1:1989)

**3.10 stream sampling:** Method of probe sampling in which the probe is inserted into a stream of liquid metal where the sample chamber in the probe fills by the force of metal flow.

**3.11 probe sample:** Sample taken from the melt using a commercially available sampling probe.

**3.12 cast product:** Item of iron or steel which has not been subject to deformation, for example, an ingot, a semi-finished product obtained by continuous casting, a shaped casting.

**3.13 wrought product:** Item of steel which has been subject to deformation by rolling, drawing, forging or some other method, for example, a bar, a billet, a plate, a strip, a tube, a wire.

**3.14 sample product:** Specific item of iron or steel selected from a supplied quantity for the purpose of obtaining a sample.

**3.15 preliminary sample:** Sufficient quantity of metal selected from the sample product for the purpose of obtaining one or more samples for analysis.

**3.16 sample for analysis:** Part of the sample product, or part of the preliminary sample taken from the sample product, or part of the sample taken from the melt, brought to a required condition for submission to analysis.

The sample for analysis may comprise the sample product itself or the sample taken from the melt.

NOTE 1 The following categories of sample for analysis are distinguished:

- sample in the form of a solid mass;
- sample that has been remelted;
- sample in the form of chips obtained by machining;
- sample in the form of fragments obtained by comminution;
- sample in the form of powder obtained by comminution.

**3.17 test portion:** Part of the sample for analysis, or part of the sample taken from the melt, actually submitted to analysis. In certain cases, the test portion may be selected from the sample product itself.

#### NOTES

2 The following special types of test portions in the form of a solid mass obtained from a probe sample are distinguished:

- test portion in the shape of a small disc, commonly described as a slug, obtained by punching;
- test portion in the form of a small appendage, commonly described as a lug;
- test portion in the form of a small-diameter rod, commonly described as a pin, obtained by cutting.

3 When the sample for analysis is in the form of chips or powder, or when a sample in the form of a solid mass is analysed by a thermal method, the test portion is obtained by weighing. In the case of a physical method of analysis, the part actually analysed will constitute only a small mass of the sample for analysis. In an optical emission spectrometric method, the mass of metal consumed in an electrical discharge is about 0,5 mg to 1 mg; in an X-ray fluorescence spectrometric method, the characteristic radiation is produced from a very thin surface layer of the sample.

**3.18 grinding:** Method of preparing a sample of metal for a physical method of analysis in which the surface of the sample for analysis is abraded using an abrasive wheel.

**3.19 finishing:** Method of preparing a sample of metal for a physical method of analysis in which the surface of the sample for analysis is abraded using a flexible rotating disc or continuous belt coated with an abrasive substance.

**3.20 milling:** Method of preparing sample chips or the surface of a sample for a physical method of analysis in which the surface of the sample is machined using a rotating, multi-edged cutting tool.

**3.21 consignment:** Quantity of metal delivered at one time.

**3.22 increment:** Quantity of metal obtained by sampling at one time from a consignment.

## 4 Requirements for sampling and sample preparation

### 4.1 General

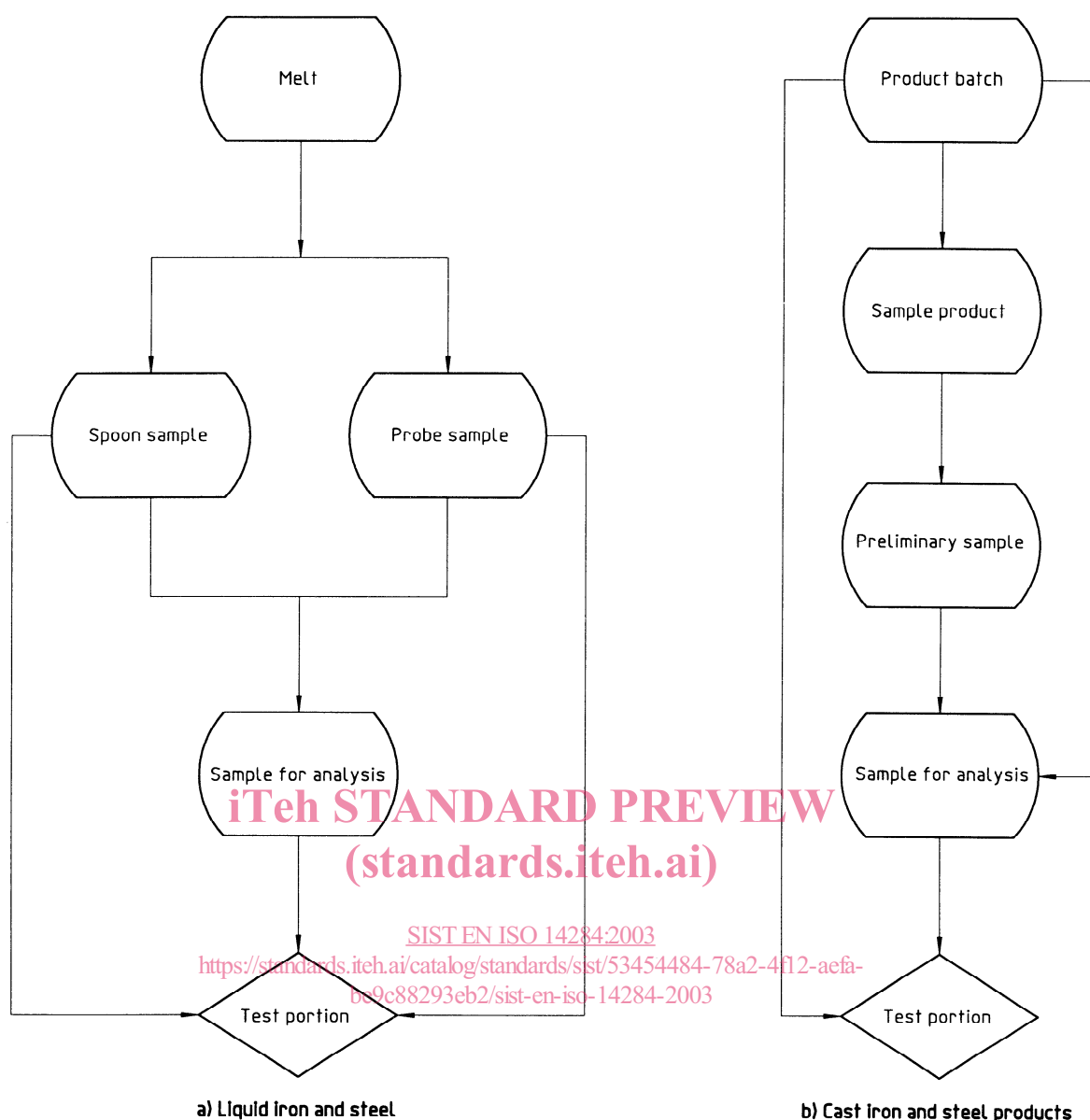
This clause covers the general requirements for the sample, and for the sampling and sample preparation of iron and steel. Special requirements apply to each category of liquid and solid metal and these are considered in the relevant subclause.

The sequence of sampling and sample preparation of liquid iron and steel, and cast iron and steel products is shown in figure 1. Special considerations apply to pig irons (see clause 8).

### 4.2 Sample

#### 4.2.1 Quality

Sampling practices shall be designed to provide a sample for analysis that is representative of the mean chemical composition of the melt or the sample product.



**Figure 1 — Sequence of sampling and sample preparation**

The sample for analysis shall be sufficiently homogeneous with respect to chemical composition such that inhomogeneity does not appreciably contribute to the error variability of the method of analysis. However, in the case of a sample taken from a melt, some variability in analysis, both within and between samples for analysis, may be unavoidable; this variability will form an inherent part of the repeatability and reproducibility of the analysis.

The sample for analysis shall be free from surface coatings, and from moisture, dirt or other forms of contamination.

As far as possible, the sample for analysis should be free from voids, cracks and porosity, and from fins, laps or other surface defects.

Particular care shall be taken when selecting and preparing the sample for analysis, where a sample taken from a melt is expected to be heterogeneous or contaminated in any way.

A sample taken from a melt shall be cooled in such a manner that the chemical composition and metallurgical structure of the sample is consistent from sample to sample.

It is important to recognize that analysis by some physical methods may be influenced by the metallurgical structure of the sample, particularly in the case of irons with white and grey iron structures, and in the case of steels in the as-cast and wrought conditions.