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

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Foreword

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This second edition cancels and replaces the first edition (ISO 14284:1996), which has been technically revised. The main changes are as follows:

— figures updated;

— Clause 3 updated;

— text updated;

— new sampling probes added;

— units changed to SI units.

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

1 Scope

This document specifies methods for sampling and sample preparation for the determination of the chemical composition of pig irons, cast irons and steels.

Methods are specified for both liquid and solid metal.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
chemical method
method for the determination of chemical composition in which the *test sample* (3.16) or the *test portion* (3.17) is submitted to chemical reactions

3.2
physical method of analysis
physical method
method for the determination of chemical composition in which the determination is carried out without submitting the *test sample* (3.16) to chemical reactions

EXAMPLE Optical emission spectrometric (OES) method or X-ray fluorescence spectrometric (XRF) method.

3.3
thermal method of analysis
thermal method
method for the determination of chemical composition in which the *test sample* (3.16) is submitted to a process of heating, combustion or fusion

3.4
melt
liquid metal from which a *sample* (3.25) is taken

3.5
spoon sampling
method in which a *sample* (3.25) is taken from the *melt* (3.4), or during the pouring of the melt, using a long-handled spoon and poured into a small mould

3.6
spoon sample
sample (3.25) obtained from *spoon sampling* (3.5)

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3.7
probe sampling
method in which a *sample* (3.25) is taken from the *melt* (3.4) using a commercially available sampling probe that is immersed in the melt

3.8
probe sample
sample (3.25) obtained from *probe sampling* (3.7)

3.9
suction sampling
method of *probe sampling* (3.7) in which the probe is immersed in the *melt* (3.4) and the sample chamber in the probe fills by aspiration

3.10
stream sampling
method of *probe sampling* (3.7) in which the probe is inserted into a stream of liquid metal and the sample chamber in the probe fills by the force of the metal flow

3.11
immersion sampling
method of *probe sampling* (3.7) in which the probe is immersed in the *melt* (3.4) and the sample chamber in the probe fills by ferrostatic pressure or gravity

3.12
cast product
steel or cast iron product that has not been subjected to deformation

EXAMPLE An ingot, a semi-finished product obtained by continuous casting, a casting.

3.13
wrought product
product obtained by hot and/or cold plastic deformation processes such as extruding, forging, hot rolling, cold rolling or drawing, either exclusively or in combination

EXAMPLE Rods, bars, wires, tubes, profiles, sheets, strips, forgings.

3.14
batch sample
sufficient amount of cast iron, pig iron or steel selected from a product batch for the purpose of obtaining one or more *laboratory samples* (3.15)

3.15
laboratory sample
part of a *sample* (3.25) that is processed so that it can be sent to the laboratory for the purpose of obtaining one or more *test samples* (3.16)

3.16
test sample
part of a *batch sample* (3.14), part of a *laboratory sample* (3.15) taken from a batch sample or part of a *sample* (3.25) taken from the *melt* (3.4) and brought to the appropriate condition required for analysis

Note 1 to entry: The test sample can also be the batch sample itself or a sample taken from the melt.

Note 2 to entry: The categories of test samples are the following:

— sample in the form of a solid block;

— sample obtained by remelting;

— sample in the form of chips obtained by machining;

— sample in the form of fragments obtained by *crushing* (3.19);

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— sample in the form of powder obtained by *comminution* (3.18).

3.17
test portion
part of a *test sample* (3.16), or part of a *sample* (3.25) taken from the *melt* (3.4), submitted to analysis

Note 1 to entry: In some cases, the test portion may be selected from the *batch sample* (3.14) itself.

Note 2 to entry: Specific types of test portions in the form of solid blocks are the following:

— small disc, commonly described as a slug, obtained by punching;

— small appendage, commonly described as a lug;

— small-diameter rod, commonly described as a pin, obtained by cutting.

3.18
comminution
operation of reducing particle size by *crushing* (3.19) or *grinding* (3.21)

3.19
crushing
mechanical reduction of the particle size of a material by fracturing large pieces into multiple smaller pieces

3.20
linishing
method of preparing a *sample* (3.25) of metal for a *physical method of analysis* (3.2) in which the surface of the *test sample* (3.16) is abraded using a rotating disc or a continuous belt coated with an abrasive material

3.21
grinding
method of preparing a *sample* (3.25) of metal for a *physical method of analysis* (3.2) in which the surface of the *test sample* (3.16) is abraded using an abrasive wheel

3.22
milling
method of preparing chips or the surface of a *sample* (3.25) for a *physical method of analysis* (3.2) in which the surface of the *sample* (3.25) is machined using a rotating, multi-edged cutting tool

3.23
consignment
quantity of metal delivered at one time

3.24
increment
quantity of metal obtained by sampling at one time from a *consignment* (3.23)

3.25
sample
portion of material selected from a larger quantity of material

4 Requirements for sampling and sample preparation

4.1 General

This clause covers the general requirements for the sampling, the sample and the sample preparation of liquid iron and steel. Specific requirements applying to each category of liquid and solid metal are given in the relevant subclauses.

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