SLOVENSKI STANDARD
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Železove rude - Eksperimentalne metode za preverjanje pravilnosti vzorčenja

Iron ores -- Experimental methods for checking the bias of sampling

Minerais de fer -- Méthodes expérimentales de contrôle de l'erreur systématique d'échantillonnage

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INTERNATIONAL STANDARD

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Iron ores — Experimental methods for checking the bias of sampling

Minerais de fer — Méthodes expérimentales de contrôle de l'erreur systématique d'échantillonnage

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Contents

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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 3086 was prepared by Technical Committee ISO/TC 102, *Iron ores*, Subcommittee SC 1, *Sampling*.

This third edition cancels and replaces the second edition (ISO 3086:1986), which has been technically revised.

Annex A forms an integral part of this International Standard. Annex B is for information only.

Iron ores — Experimental methods for checking the bias of sampling

1 Scope

This International Standard specifies experimental methods for checking the bias of the sampling of iron ores, when the sampling is carried out in accordance with the methods specified in ISO 3081 or ISO 3082, having as reference a stopped-belt sampling method according to ISO 3081.

NOTES

1 Sampling systems not completely in accordance with ISO 3081 or ISO 3082 are not always expected to be biased. Therefore bias checking may be done when there is some disagreement about the importance of some departure from the conditions of ISO 3081 and ISO 3082. If one party argues that the bias is likely to be substantial under some particular set of conditions then bias testing should mostly be done when those conditions apply.

2 The method for analysis of experimental data described here may also be applied:

a) for checking the bias of sample preparation of iron ores, having as reference the methods for sampling preparation according to ISO 3082 and ISO 3083;

b) for checking a possibly significant difference in the results obtained from the samples of one lot collected at different places, for example, a loading point and unloading point.

2 Normative references

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

ISO 3081:1986[1)], *Iron ores — Increment sampling — Manual method.*

ISO 3082:1987[1)], *Iron ores — Increment sampling and sample preparation — Mechanical method.*

ISO 3083:1986[1)], *Iron ores — Preparation of samples — Manual method.*

ISO 3085:1996, *Iron ores — Experimental methods for checking the precision of sampling.*

ISO 11323:1996, *Iron ores — Vocabulary.*

3 Definitions

For the purposes of this International Standard, the definitions given in ISO 11323 apply.

1) To be revised and published as ISO 3082.

4 Principle

The results obtained from the method to be checked (referred to as method B) are compared with the results of a reference method (referred to as method A) which is considered to produce practically unbiased results, from technical and empirical viewpoints.

In the event of there being no significant difference, in a statistical sense, between the results obtained by method B and method A, method B may be adopted as a routine method. This difference is assessed by comparing a 90 % confidence interval for the true average bias with the relevant bias, δ (see 5.2).

5 General conditions

5.1 The number of lots to be tested shall be not less than ten. The number of further tests required depends on the confidence interval for the true average bias, based on at least ten tests, and the value of the relevant bias, δ.

5.2 The relevant bias, δ, which is considered large enough to justify the likely expense of reducing the average bias, shall be decided beforehand. As a guide, δ is likely to be less than σ_{SPM}, the standard deviation for sampling, sample preparation and measurement, determined according to ISO 3085.

NOTE — If the experiment is aimed at checking the sample preparation only, the value of δ is likely to be less than σ_{PM}, determined according to ISO 3085.

5.3 Quality characteristics such as total iron content, moisture content, size distribution and physical properties may be used.

6 Sampling and sample preparation methods

6.1 Sampling

The reference method, method A, for checking the bias of sampling is a stopped-belt sampling method according to ISO 3081.

Method A: take each increment from the full width and thickness of the ore stream on the stopped conveyor at a specified place for a length of belt more than three times the nominal top size or 30 mm, whichever is the greater.

The method to be checked, method B, carried out according to ISO 3081 or ISO 3082, shall be compared with method A for the same material.

Method B: sampling methods such as sampling from moving conveyors with a mechanical sampler and sampling during the transfer to or from ships and wagons are examples of method B.

6.2 Sample preparation

Methods for making up a pair of gross samples, preparation of samples and testing shall be as given in 6.2.1 to 6.2.3.

6.2.1 Increments obtained from one lot, in accordance with method A and method B, are made up into two gross samples, A and B.

6.2.2 The gross samples, A and B, are subjected, in the same manner, to sample preparation as specified in ISO 3082 or ISO 3083 and tested as specified in the relevant International Standards separately, and a pair of measurements obtained.

6.2.3 The above procedure is performed on ten or more lots (see 5.1).

NOTES

1 When increments for method A and method B can be taken from closely adjacent portions of the ore, it is recommended that sample preparation and testing be carried out on individual increments or on combinations of a small number of adjacent increments. This allows comparisons of ten or more pairs of measurements to be made more quickly than if measurements were only made on entire lots. The above comparison of measurements should be made on pairs of increments taken from several lots, preferably of the same type of ore. However, it is not permitted to combine a number of paired results, originating from both increments and gross samples. It should be either a number of pairs from increments or ones from gross samples.

2 Given the cost and inconvenience of stopped-belt sampling, it is generally economic to conduct sample preparation and testing in duplicate and with great care so that the number of stopped-belt samples might be reduced.

7 Analysis of experimental data

7.1 Determination of the standard deviation of the differences

7.1.1 Denote individual measurements obtained in accordance with method A and method B, x_{Ai} and x_{Bi}, respectively.

7.1.2 Calculate the difference, d_i, between x_{Ai} and x_{Bi} using the equation:

$$d_i = x_{Bi} - x_{Ai} \qquad i = 1, 2, ..., k \qquad \text{... (1)}$$

where k is the number of paired sets of measurements.

7.1.3 Calculate the mean, $\bar{d}$, of the differences to one decimal place greater precision than that used in the measurements themselves:

$$\bar{d} = \frac{1}{k}\sum d_i \qquad \text{... (2)}$$

7.1.4 Calculate the sum of squares, SS_d, and the standard deviation, s_d, of the differences:

$$SS_d = \sum d_i^2 - \frac{1}{k}(\sum d_i)^2 \qquad \text{... (3)}$$

$$s_d = \sqrt{SS_d / (k-1)} \qquad \text{... (4)}$$

7.2 Determination of the confidence interval for $\bar{d}$

7.2.1 1 Denote the lower limit of the confidence interval *LL* and the upper limit of the confidence interval *UL*.

7.2.2 Calculate the limits of the confidence interval using the equations:

$$LL = \bar{d} - t\frac{s_d}{\sqrt{k}} \qquad \text{... (5)}$$

$$UL = \bar{d} + t\frac{s_d}{\sqrt{k}} \qquad \text{... (6)}$$

Where t is the value of Student's t distribution for (k - 1) degrees of freedom and is given in table 1.