BS ISO 11790:2017

BSI Standards Publication

Copper, lead, zinc and nickel concentrates — Guidelines for the inspection of mechanical sampling systems

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National foreword

This British Standard is the UK implementation of ISO 11790:2017. It supersedes BS ISO 11790:2010, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee NFE/36, Copper lead and zinc ores and concentrates.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Concentrés de cuivre, de plomb, de zinc et de nickel — Lignes directrices pour le contrôle des systèmes mécaniques d'échantillonnage

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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 183, *Copper, lead, zinc and nickel ores and concentrates*.

This second edition cancels and replaces the 2010 edition (ISO 11790:2010), of which it constitutes a minor revision. The main change is the deletion of reference to ISO 20212, which has not yet been published.

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Copper, lead, zinc and nickel concentrates — Guidelines for the inspection of mechanical sampling systems

WARNING — This document may involve hazardous materials, operations and equipment. It is the responsibility of the user of this document to establish appropriate health and safety practices and determine the applicability of any other limitations prior to use.

1 Scope

This document sets out recommended practices for the inspection of mechanical sampling systems. It serves as a reference for conformance with applicable International Standards for copper, lead, zinc and nickel concentrates.

This document covers general considerations, including precision, quality variation, bias, establishment of inspection systems and inspection procedures.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 12743, *Copper, lead, zinc and nickel concentrates — Sampling procedures for determination of metal and moisture content*

ISO 12744, *Copper, lead, zinc and nickel concentrates — Experimental methods for checking the precision of sampling*

ISO 13292, *Copper, lead, zinc and nickel concentrates — Experimental methods for checking the bias of sampling*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 12743, ISO 12744 and ISO 13292 and the following apply.

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

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

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

3.1
audit
critical review of a mechanical sampling system, undertaken by a suitably qualified person not directly involved in the operation of that system, which measures its compliance with stipulated operating specifications

3.2
mechanical inspection
comparative record of observations and measurements of physical parameters against design criteria, and records of subsequent changes or improvements undertaken by a suitably qualified person not involved in the day-to-day operation of the system

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3.3
operational inspection
record of observations and inspections undertaken by the system operator before, during and after the sampling of a lot

Note 1 to entry: The operator is the person taking the sample.

4 General consideration

4.1 Precision

Precision checks are recommended for each material type sampled by the system. If there is a significant change in material type or a new material type is introduced, a precision check should be carried out. The test should outline the precision of sampling, preparation and analysis of each material type sampled by the system. These tests shall be in accordance with ISO 12744.

4.2 Quality variation

The variance between increments, s_b^2, is a measure of the heterogeneity of the lot and is the variance of the quality characteristics of increments taken from the lot. The value of s_b^2 shall be measured experimentally for each material type for each handling plant under normal operating conditions, in accordance with ISO 12743.

The entire material-handling system up to the mechanical sampling system should be examined to determine whether any unloading, storage or reclaiming procedures produce a cyclical pattern which could cause the increment collection to get in phase with the sequence of material variability. Variations in the physical characteristics, such as particle-size distribution, surface moisture, extraneous matter and oversized material, could become cyclical and could even be in phase with mass-based or time-based increment collection. Where such cyclical variations occur in the material stream, the source of the variations should be investigated to determine the practicability of eliminating the variations. If there is no practical way to eliminate the variations, the interval between primary cuts should be adjusted so that the collection of increments is not in phase with the cyclic variation. Alternatively, stratified random sampling may be used.

4.3 Bias

After commissioning and auditing of a new system or any major engineering modifications of an existing system, a bias test should be carried out in accordance with ISO 13292 to confirm the correct operation of the system. In multi-material-type facilities, it is recommended that the material having the highest variability be chosen for the bias test.

It is recommended that, on a regular basis, further bias sample pairs be taken to confirm that the initial bias result is still relevant. If a significant change is made to the sampling system, or a new material having more difficult sampling characteristics is introduced, the need for a new bias test should be considered.

NOTE Provided that the mechanical sampling system satisfies the criteria outlined in ISO 12743, bias tests are not mandatory. However, quality-assurance principles at individual plants might require bias tests.

4.4 Operation of the sampling system

The mechanical sampling system should be started at some time in advance of the start of conveying the material to be sampled, so that any foreign substances (including water) are purged. Where hydraulic drives are used, sufficient time should be allowed for the hydraulic oil and the associated system to attain temperature equilibrium. It is recommended, particularly in multi-material-type sampling systems, that one primary cut be allowed to pass through the mechanical system as a conditioner before sampling commences.

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It is recommended that the operator review any sampling-system records maintained by the previous operator. These records should include such things as quantities of material handled and sampled, and notations as to system malfunctions, stoppages, blockages or other deficiencies. The operator should use a suitable checklist, such as the example in Annex A. It is recommended that the operator complete all items on a suitable checklist designed for the particular system. For large multi-user systems, an operator's inspection report, such as the example in Annex B, should be developed.

Sufficient suitably designed inspection points should be available to observe that the falling-stream and cross-belt cutters cut the full stream of material, and cutter apertures can be inspected for blockages and blinding.

5 Establishment of inspection system

5.1 General

To ensure reliable operation, it is recommended that a sampling checklist (Annex A) and operator's sampling record (Annex B) be developed with input from the following sources:

a) original design criteria and records of any subsequent changes or improvements;

b) sampling equipment operating and maintenance manuals;

c) management responsible for the system;

d) personnel operating or maintaining the system;

e) for a new system, the designers and commissioning personnel.

The general method for establishing these procedures is as follows.

1) Refer to ISO 12743 to ascertain the correct sampling scheme.

2) Refer to the equipment supplier's operating and maintenance manuals to ascertain correct procedures for operation and intervals for routine maintenance. The manuals can provide useful information on the basis of the system design. Information such as conveyor rates, conveyor speeds and material parameters (particularly sizing and variability) are significant data and should always be kept in mind when changes are contemplated.

3) Examine existing sampling and maintenance records for an extended period. This information will provide guidance for operators to ensure that the required level of inspection and maintenance is carried out to ensure reliable operation, and will possibly alert operators to any inappropriate maintenance or modifications that may have been made to the equipment.

4) Seek the personal experience of maintenance, operational and sampling personnel with respect to the sampling system. This information, together with that obtained from the above, will enable an appropriate operator's manual, operator's sampling record and system checklist to be prepared.

5.2 Audits

A scheme for regular audits of the sampling system should be established. Reference should be made to the original operating parameters and equipment supplier's design data, as well as any records of any subsequent changes or improvements, in order to establish conformance with current applicable International Standards. Annex A provides a typical reference list.

NOTE 1 Correct operation of all new systems needs to be confirmed by an audit following the commissioning stage before being accepted as operational.

NOTE 2 The design and operation of the system need to be confirmed by an audit prior to any bias test.

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