INTERNATIONAL STANDARD

ISO 11790

Second edition
2017-06

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

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



Reference number
ISO 11790:2017(E)

© ISO 2017



COPYRIGHT PROTECTED DOCUMENT

© ISO 2017, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 General consideration ... **2**
4.1 Precision ... 2
4.2 Quality variation ... 2
4.3 Bias ... 2
4.4 Operation of the sampling system ... 2

5 Establishment of inspection system ... **3**
5.1 General ... 3
5.2 Audits ... 3
5.3 Mechanical inspections ... 4
5.4 Operational inspections ... 4

6 Procedures ... **4**
6.1 Audits ... 4
6.2 Mechanical inspections ... 5
6.3 Operational inspections ... 6
6.4 Control charts ... 6
6.4.1 General ... 6
6.4.2 Sampling ratio ... 6
6.4.3 Extraction ratio ... 7
6.5 Sampling records ... 10
6.6 Operator's inspection report ... 10

Annex A (informative) **Example of a sampling checklist for copper ore** ... **11**

Annex B (informative) **Example of sampling plant operator's inspection report on a shift basis** ... **14**

Annex C (informative) **Example of sampling-system operations inspection summary** ... **17**

© ISO 2017 – All rights reserved

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).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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.

© ISO 2017 – All rights reserved

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

© ISO 2017 – All rights reserved

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.

© ISO 2017 – All rights reserved