

INTERNATIONAL STANDARD

**ISO
6153**

First edition
1989-09-01

Chromium ores — Increment sampling

Minerais de chrome — Échantillonnage par prélèvements



Documents

Reference number
Document Sharing Hub
ISO 6153 : 1989 (E)

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 approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75 % approval by the member bodies voting.

International Standard ISO 6153 was prepared by Technical Committee ISO/TC 65, *Manganese and chromium ores*.

Annex A forms an integral part of this International Standard.

Chromium ores — Increment sampling

1 Scope

This International Standard specifies the methods for taking samples of chromium ores to be used at the places of dispatch and acceptance of ores for determining the chemical composition and moisture content of a consignment.

The methods are applicable to both the manual and mechanical sampling of all chromium ores, whether natural or processed.

Details of the hammer and shovel method for sampling ores containing lumps of + 100 mm in size are given in annex A.

2 Normative references

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

ISO 565 : 1983, *Test sieves — Woven metal wire cloth, perforated plate and electroformed sheet — Nominal sizes of openings*.

ISO 6154 : 1989, *Chromium ores — Preparation of samples*.

ISO 8541 : 1986, *Manganese and chromium ores — Experimental methods for checking the bias of sampling and sample preparation*.

ISO 8542 : 1986, *Manganese and chromium ores — Experimental methods for evaluation of quality variation and methods for checking the precision of sampling*.

3 Definitions

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

3.1 lot : A definite quantity of an ore, processed or produced under conditions which are presumed uniform.

3.2 consignment : A quantity of an ore delivered at one time. The consignment may consist of one or more lots or parts of lots.

3.3 increment :

(1) A quantity of an ore taken by a sampling device at one time from a consignment.

(2) A quantity taken by the increment division method.

3.4 sub-sample :

(1) A quantity of an ore consisting of two or more increments taken from a consignment.

(2) An aggregation of two or more increments each of which has been optionally crushed and/or optically divided as necessary.

3.5 gross sample :

- (1) The quantity of an ore consisting of all the increments taken from a consignment.
- (2) An aggregation of all the increments or all the sub-samples each of which has been optionally crushed and/or optionally divided as necessary.

3.6 test sample : Any sample, for the determination of moisture content or chemical composition, which is prepared from each increment, each sub-sample, or from the gross sample in accordance with the specified method for that type of sample.

3.7 nominal top size : The smallest sieve in the range included in the R 20 series (in table 1 of ISO 565, square hole) such that not more than 5 % of the ore is retained.

3.8 increment sampling : The process in sampling whereby a sample is obtained by combining a number of increments from a consignment and meant for representing the consignment.

3.9 manual sampling : The sampling by human effort with sampling devices, including mechanically assisted devices.

3.10 stratified sampling : For a consignment which can be divided into strata, sampling carried out in such a way that specified proportions of the sample are drawn from different strata.

NOTE — The stratum is a part of a consignment which is derived by division of the consignment according to specific criteria.

3.11 periodic systematic sampling : The sampling in which increments are taken from a consignment at regular intervals. When the mass interval is adopted, it is called "periodic systematic sampling on mass basis", and when the time interval is adopted, it is called "periodic systematic sampling on time basis".

3.12 two-stage sampling : The sampling by which primary sampling units are selected first from a consignment and then secondary sampling units are taken from those selected primary sampling units. In this International Standard, the method can be applied to sampling from wagons or containers in which a certain number of wagons or containers are selected first as primary sampling units, and then increments are taken from those selected wagons or containers as secondary sampling units.

4 General rules

The rules given below are general and obligatory for the parties concerned.

- a) Sampling should be carried out by qualified samplers or mechanical sampling devices authorized by the seller and/or purchaser.

- b) Sampling shall preferably be carried out during handling immediately before or immediately after weighing.

- c) Sampling shall be carried out by the systematic method with a random start. The sampling of ores from wagons shall be conducted by the two-stage method or stratified method.

- d) The mass of the increment shall be determined in accordance with the nominal top size of the ore in order to avoid the introduction of bias at the time of collecting the sample.

- e) The number of increments to be taken from a consignment shall be determined according to classification of the quality variation of the ore and the required precision of sampling.

- f) Throughout the procedure of sampling, the samples shall be protected from any contamination.

- g) All sampling methods shall be confirmed to have no bias in accordance with ISO 8541.

- h) When the planned number of increments has been taken before the handling has been completed, the taking of increments should continue at the same interval until the handling operation of the consignment has been completed.

- i) Sampling shall be carried out in conformity with national safety standards.

5 Methods of sampling in general

5.1 General sampling procedure

The procedure shall be as follows.

- a) Identify the consignment to be sampled.
- b) Ascertain the nominal top size of the consignment.
- c) Determine the mass of increment.
- d) Ascertain the classification of quality variation of the consignment.
- e) Determine the minimum number of increments to be taken from the consignment in the case of systematic and stratified sampling. In the case of two-stage sampling, allocate the wagons or containers to be selected from the consignment and the increments to be taken to the points of the wagons or containers selected.
- f) Determine the interval of taking increments in the case of systematic sampling and stratified sampling or the interval of selecting the wagons or containers on a mass basis.

g) Determine the point of sampling and the method of taking increments.

h) The gross sample or sub-sample shall be constituted according to ISO 6154. An example is given in figure 1.

5.2 Sampling precision and overall precision

This International Standard is designed to obtain the sampling precision (β_s) given in table 3. The sampling precision is one component of the overall precision (β_{SDM}), which shall be based on the fact that sample preparation has been undertaken in accordance with ISO 6154 and that measurement has been carried out in accordance with methods given in the appropriate International Standards.

The overall precision defines with 95 % probability the average value of the quality characteristics of a consignment. The sampling precision means that on average, in 95 % of cases the chromium oxide content of the gross sample shall not differ from that of the analysed consignment by more than β_s %.

β_s is a measure of the precision of sampling and is equal to twice the standard deviation of sampling, expressed as an absolute percentage.

β_{SDM} is a measure of the overall precision of sampling, sample division and measurement, and is equal to twice the standard deviation of the overall process of sampling, sample division and measurement, expressed as an absolute percentage.

The sampling precision shall be checked in accordance with ISO 8542.

5.3 Mass of increment

5.3.1 The minimum mass of increment in manual sampling, depending on maximum particle size is specified in table 1.

Table 1 — Mass of increment in manual sampling

Nominal top size mm	Minimum mass of increment kg
150 and over	30
100	15
50,0	5
22,4 (20,0)	2
10,0	0,5
2,8 (3,0)	0,2

The increments shall be taken in such a manner as to ensure that they have an almost uniform mass.

NOTE — "Almost uniform mass" means that the variation in mass shall be less than 20 % in terms of coefficient of variation.

The coefficient of variation (CV) is defined as the ratio of the standard deviation (σ) to the mean value ($\bar{x}$) of the mass of increments, expressed as a percentage.

$$CV(\%) = \frac{\sigma}{\bar{x}} \times 100 < 20 \% \quad \dots (1)$$

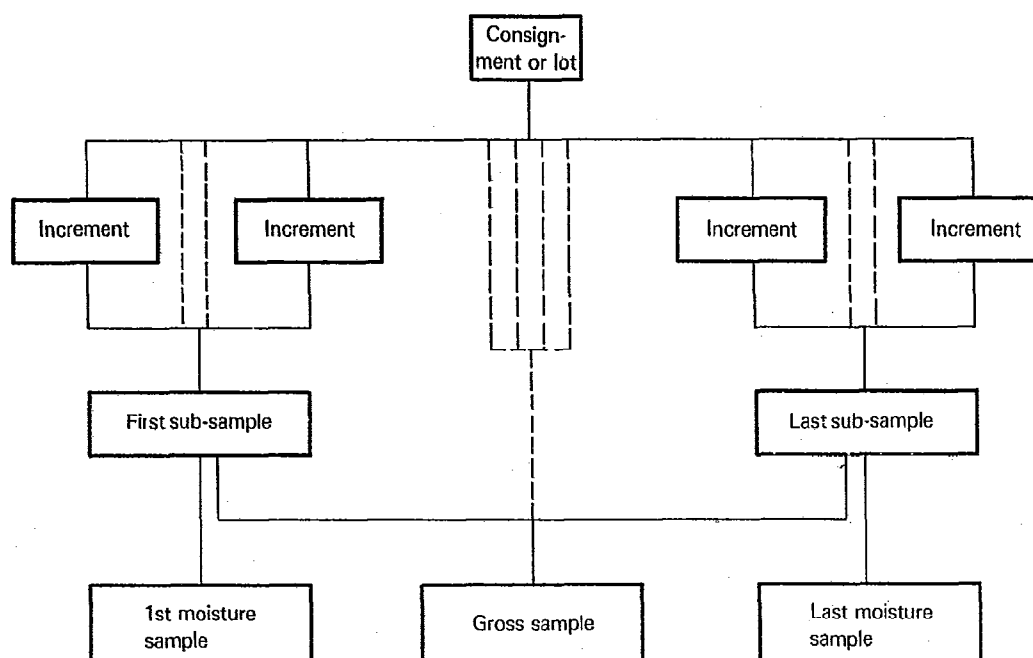


Figure 1 — Sampling plan