

JIS

JAPANESE INDUSTRIAL STANDARD

**Methods for Sampling, Preparation
and Determination of Moisture
Content of Non-ferrous Metal
Bearing Ores**

JIS M 8101—1988

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In the event of any doubt arising,
the original Standard in Japanese is to be final authority.

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Methods for Sampling, Preparation and
Determination of Moisture Content of
Non-ferrous Metal Bearing Ores

M 8101-1988

1. Scope

This Japanese Industrial Standard specifies the following methods for determining the average values of the constituent and moisture content of a lot, hereinafter referred to as the "average quality", of the non-ferrous metal ores and concentrates, hereinafter referred to as the "ores", of copper ore, lead ore, zinc ore, tin ore, gold ore silver ore and the like, provided that this does not apply to the ores for which these factors have been specified in the other Japanese Industrial Standards.

- (1) Sampling method
- (2) Method of preparing the moisture content test sample and the constituent test sample
- (3) Method of determining the moisture content and the dry mass

- Remarks 1. This Standard is applicable, as appropriate, to arsenic ore, antimony ore, bismuth ore, nickel ore (excluding garnierite nickel ore), cobalt ore, molybdenum ore, tungsten ore, roasted ore, flue cinder.
2. The mass of valuables of lot is determined by the average grade of the mass, dry mass content and constituent of a lot, and this Standard has been so regulated as to equalize the level of coefficient of variation of the dry mass content and the constituent.
 3. This Standard is, as a rule, in accordance with JIS M 8100, as appropriate.

Applicable Standards:

JIS M 8100-General Rules for Methods of Sampling of Bulk Materials
JIS Z 8401-Rules for Rounding Off of Numerical Values

Reference Standard:

JIS M 8083-Methods for Sampling of Non-Ferrous Flotation Concentrates
in Bulk

2. Definitions

For the purposes of this Standard, the following definitions apply:

- (1) lot A quantity of ore as agreed upon between the parties concerned to determine the average grade of the ore.
- (2) sub-lot Unit of a divided lot.
- (3) increment Ore of unit quantity gathered principally by one action from a lot or a sub-lot by the use of a sampling device. Or, the ore of unit quantity gathered from the sample by the increment reduction method.

The mass of one increment is called the size of an increment.

- (4) small sample A sample consisting of several increments gathered. Separate increments individually prepared and later gathered into a sample is also called a small sample.
- (5) large sample A sample consisting of the increments from one lot or of all small samples gathered. Individual increments or small samples prepared as required, when they are later gathered as a unit, may be occasionally called a large sample.
- (6) sample for constituent analysis Generic name for the samples gathered for constituent analysis. The sample for constituent analysis, when specifically prepared for an analysis, is called the constituent test sample.
- (7) sample for moisture Generic name for the samples gathered for moisture measurement. The sample for moisture, when specifically prepared for a moisture measurement, is called the moisture test sample.
- (8) dry mass content Dry mass indicated in percentage.

$$\text{Dry mass content (mass \%)} = 100 - \text{moisture (mass \%)}$$

- (9) belt sampling Method of gathering increments being transported by a conveyor or the like as a lot, from the belt conveyor or from its chute.
- (10) wagon sampling Method of gathering increments being delivered by the wagons or trucks as a lot, from the wagons or trucks.
- (11) container sampling Method of gathering increments being delivered by the containers (bags, drums, etc.) as a lot, from the container.
- (12) hatch sampling Method of gathering increments being delivered by the shipping facility as a lot, from the hatch or out of the cargo-handling appliance during cargo work.

- (13) divided use and repeated use of sample The divided use of sample is to divide a sample into one part for moisture measurement, and the other part for the preparation of a constituent test sample. The repeated use is to use the whole or part of the sample which has been used for moisture measurement for the preparation of a constituent test sample.
- (14) largest particle size Sieve opening corresponding to 5 % in residual percentage of the oversize of a sample.

3. Symbol

The symbols to be used for this Standard shall be as follows:

N : size of a lot

n : number of increments gathered from one lot

σ : precision given in standard deviation

σ_w : dispersion between increments within a stratum given in standard deviation

σ_s : sampling precision given in standard deviation

σ_p : preparation precision given in standard deviation

σ_M : precision of analysis or measurement given in standard deviation

β : precision of 2σ

β_{SPM} : overall precision including sampling, preparation and analysis or measurement given in 2σ

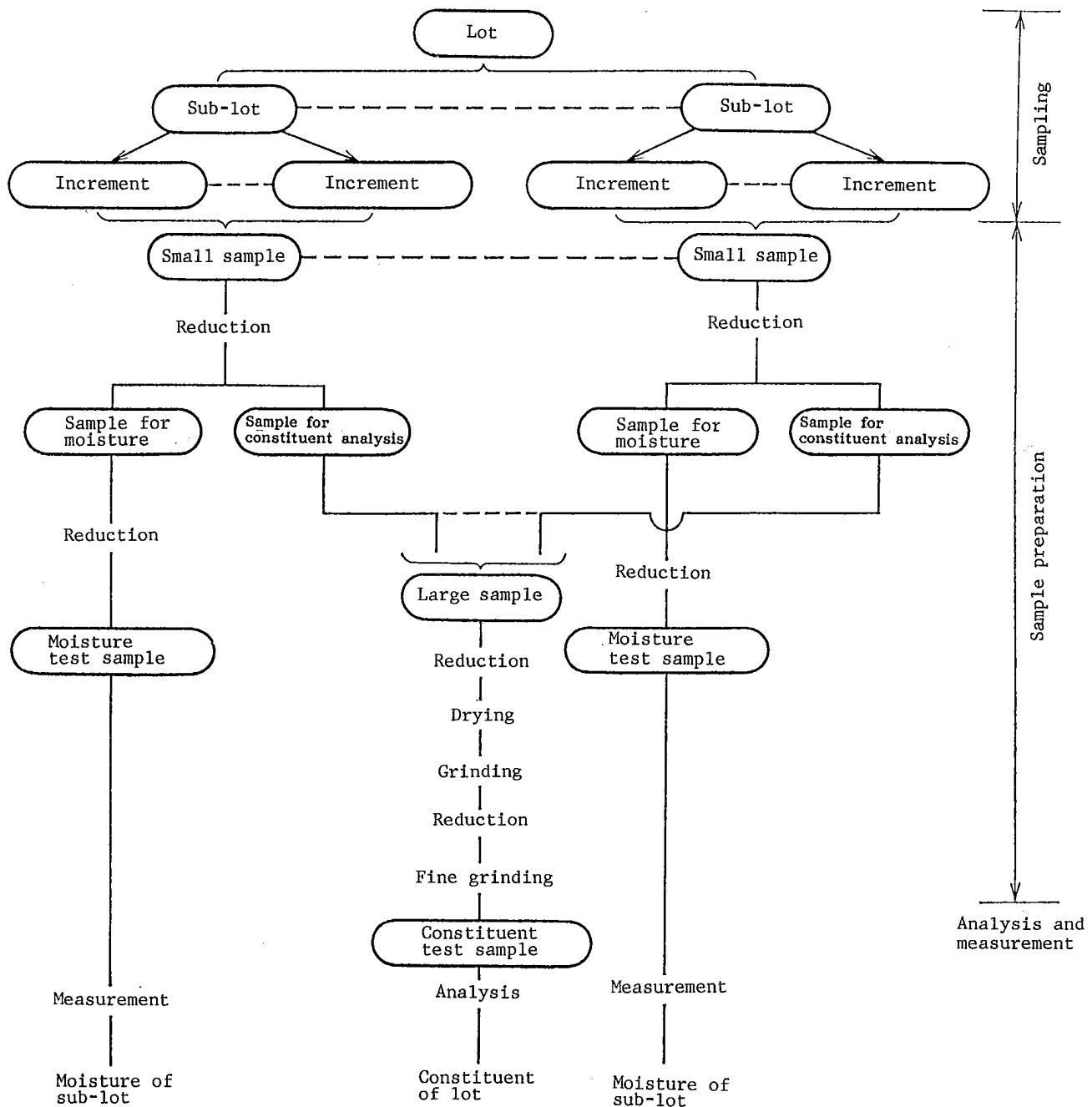
CV : coefficient of variation $CV = \frac{\text{Standard deviation}}{\text{Mean value}} \times 100 \text{ (mass \%)}$

4. General Matters

4.1 Outline of Sampling and Sample Preparation An outline of sampling and sample preparation shall be as follows (see Figure).

- (1) Decide a lot. Decide a sub-lot as required.
- (2) Decide the size, gathering method and number of the increments required.
- (3) Gather the increments and collect them into a large sample or a small sample.
- (4) Prepare a moisture test sample and a constituent test sample.

Figure. Outline of Sampling and Preparation of Sample
(An Example)



4.2 Handling of Sample

4.2.1 Sample Container The requirements for sample containers shall be as follows:

- (1) The container to be used for transportation, storage or the like of increments, small samples, large samples or samples which have been prepared by grinding and reducing these materials shall be one that can accommodate the whole quantities of samples, kept clean and securely sealed with a lid or a stopper.

- (2) It is essential that a container of samples for moisture be excellent in airtightness, or free from absorption or evaporation of moisture, and that its the inside surface be rustproof.

4.2.2 Packing and Marking of Constituent Test Sample The constituent test sample shall be placed in an inner bag made of aluminium foil with the inner surface coated with resin, of polyethylene or the equivalent and be hermetically sealed up. Further, this shall be enclosed in an outer paper bag to be sent, distributed or reserved.

Each package shall be marked with the following information as a rule.

- (1) Name of the product, name of the ship, name of the wagons, designation of the lot, etc.
- (2) Size of the lot
- (3) Serial number of sample
- (4) Site of sampling
- (5) Date of sampling
- (6) Signature of a person in charge of the sampling
- (7) Other necessary information

4.2.3 Reservation of Constituent Test Sample The reservation of the constituent test sample shall be as follows:

- (1) One part of the constituent test sample packed in 4.2.2 shall be stored for three months as a rule.
- (2) In storing the test samples, attention shall be paid to the place of storage to keep it from the influence of temperature, humidity, direct sunlight and the like.

4.2.4 Sending of Samples The samples other than the constituent test sample, as a rule, shall not be sent out. However, where forwarding the samples is unavoidable, the method of distribution shall be decided as agreed upon between the parties concerned.

4.2.5 Precautions for Sampling Handling Throughout the periods of the gathering of samples, the preparation of samples and measurement, the sample shall be protected from contamination by foreign materials or from change in quality by a thorough cleaning of the instruments to be used.

4.3 Expression of Average Grade Average the values of the required number of measurements specified in the measuring method for each characteristic and take this average value as the final value of the average grade of the lot, provided that the final value of each characteristic shall usually be calculated down to one figure next beyond the figures shown in Table 1 and rounded off in accordance with JIS Z 8401 to the number of units given in Table 1.

Table 1. Number of Figures of Final Values

Characteristics	Unit	Number of figures of final value
Copper content	Mass %	Two figures below the decimal point
Lead content	Mass %	Two figures below the decimal point
Zinc content	Mass %	Two figures below the decimal point
Tin content	Mass %	Two figures below the decimal point
Gold content	g/t	One figure below the decimal point
Silver content	g/t	Integral number
Moisture or dry mass content	Mass %	Two figures below the decimal point

4.4 Others

4.4.1 Items not specified in this Standard shall be subject to agreement between the parties concerned.

4.4.2 Where part of this Standard can not be applied, a method other than that specified in this Standard can be applied in accordance with agreement between the parties concerned, provided that it shall be confirmed by a check experiment that the method is free from bias and satisfies the specified precision.

Remark: The method of check experiments shall be in accordance with Appendix 5 to 7 of JIS M 8100 as a rule.

5. Sampling Method

5.1 Lot Size The size of a lot shall be less than 1000 t.

5.2 Characteristic and Precision

5.2.1 Characteristic The characteristic specifying the precision shall be the constituent decided by the dry mass content and agreement between the parties concerned.

Remark: The system accuracy is specified on the basis of the dry mass content and the constituent. The precision of water content (coefficient of variation) is not considered directly.

5.2.2 Precision The system accuracy shall be specified according to the turnover of a lot.