

JIS

JAPANESE INDUSTRIAL STANDARD

Iron Ores—Determination of
Size Distribution by Sieving

JIS M 8706—1985

Translated and Published

by

Japanese Standards Association

Printed in Japan

Translation without guarantee
In the event of any doubt arising, the original
standard in Japanese is to be evidence

JAPANESE INDUSTRIAL STANDARD

J I S

Iron Ores - Determination of Size
Distribution by Sieving

M 8706-1985

1. Scope

This Japanese Industrial Standard specifies the methods to be employed for determination of size distribution by sieving of iron ore (¹) utilizing one, two or several sieves and for determination of specification size fraction of a consignment. The size distribution and size fraction are to be expressed in terms of percentage mass, passed through or retained on specification sieves. Hereinafter the contents of specification size fraction (%) is to be called "size (%)".

Note (¹) Iron ore includes whether natural or processed (e.g. concentrates and agglomerates, such as pellets, sinters or briquettes).

Remark: This method is equally applicable to size determination resulting from physical testing of ore.

2. General Rules

2.1 Definitions For the purpose of this standard, the following definitions apply:

(1) lot A definite quantity of an ore, processed or produced under conditions which are presumed uniform.

(2) consignment A quantity of an ore delivered at one time.

Remark: The consignment may consist of one or more lots or parts of lots.

(3) increment A quantity of an ore obtained by a sampling device at one time from a consignment or lot; also a quantity taken in the increment division method.

(4) sub-sample A quantity of an ore consisting of several increments or divided increments taken from a part of the consignment or lot.

(5) gross sample The quantity of an ore consisting of all of the increments or divided increments or sub-samples or divided sub-samples taken from a consignment.

(6) size sample The sample taken for the determination of size distribution of the consignment or part of the consignment.

Applicable Standards:

JIS M 8702-Iron Ores-Increment Sampling and Sample Preparation-Mechanical Method

JIS M 8703-Iron Ores-Preparation of Samples-Manual Method

JIS Z 8401-Rules for Rounding off of Numerical Values

JIS Z 8801-Test Sieves

- (7) size test sample A sample which is prepared from size sample.
- (8) charge A quantity of an ore to be treated at one time on an individual sieve or nest of test sieves. The charge may consist of a part of size test sample or the whole.
- (9) particle A discrete coherent body of the ore regardless of size.
- (10) particle size The size of the smallest sieve aperture through which the particle has passed and the size of the largest sieve aperture on which the particle has been retained.
- (11) max. particle size The max. particle size of a sample designates the largest size of sieve aperture on which approximately 5 % (m/m) of iron ore is retained.

 Remark: The max. particle size of consignment shall be confirmed according to the past experience or experiments. However, where there is no information, it may be estimated according to visual inspection.
- (12) size fraction The portion of the sample separated by one sieve or two sieves of different apertures.
- (13) oversize fraction The portion of the sample not passing the coarsest sieve in the test, e.g. +x mm (or μm).
- (14) undersize fraction The portion of the sample passing the finest sieve in the test, e.g. -z mm (or μm).
- (15) intermediate size fraction The portion of the sample specified by the smallest sieve aperture, x mm (or μm), through which the fraction has passed together with the size of the largest sieve aperture, y mm (or μm), on which the fraction has been retained in the test, e.g. -x+y mm (or μm).
- (16) size distribution The quantitative grouping of particles in the sample according to size. It is expressed in terms of percentage mass, passed or retained on selected sieves in relation to the total mass of the sample.
- (17) specification size Any sieve size (or sizes) selected by the interested parties to define the limit (or limits) of the fraction considered by them to be significant.
- (18) bulk density The mass in air of a unit volume of iron ore, including the voids within and between particles expressed as mass units per unit volume e.g. kg/m^3 .
- (19) sieving medium A plate or wire cloth containing regularly arranged apertures of uniform shape and size.
- (20) sieve An apparatus for the purpose of sieving consisting of a sieving medium mounted in a frame.
- (21) specification sieve The sieve having an aperture size corresponding to the specification size.

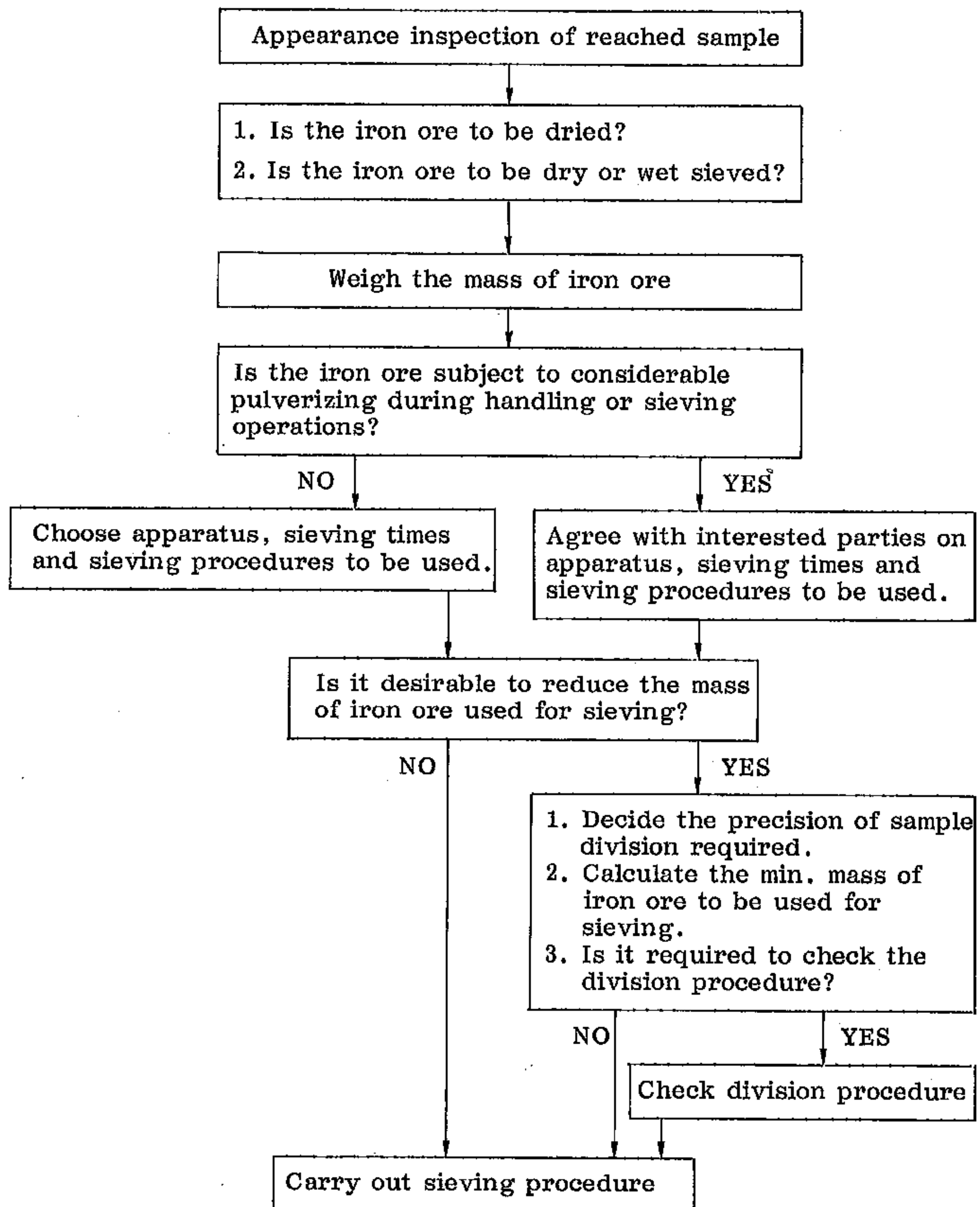
- (22) sieving The process of separating a mixture of particles, according to their size, by means of one or more sieves.
- (23) hand placing A sieving operation in which particles are presented individually and by hand to the sieve apertures. The particles which cannot be passed through the sieve apertures can be clearly classified as oversize.
- (24) hand sieving A sieving operation in which the sieve or sieves are supported and agitated manually.
- (25) assisted hand sieving A sieving operation in which the sieve or sieves are supported mechanically, but are agitated manually.
- (26) mechanical sieving A sieving operation in which the sieves are supported and agitated by mechanical means.
- (27) batch sieving A sieving operation in which a specific quantity of iron ore is presented to one or more sieves which are agitated either by hand or by mechanical means. Characteristically, the resulting products are retained within the frame of the sieve or sieves until the end of the operation is reached (see Attached Figure).
- (28) continuous sieving A sieving operation in which the ore is fed continuously into one or several consecutive sieving surfaces, over which it travels, e.g. by virtue of the sieving surface being agitated. The products are continuously discharged (see Annex). This operation is a form of mechanical sieving.
- (29) wet sieving Sieving with the application of water.
- (30) dry sieving Sieving without the application of water.

2.2 General Principles of Sieving The sieving shall, generally, be carried out on an asreceived basis. Prior to commencing a size determination, it is necessary to confirm the following items:

- (1) The condition of the sample being evaluated,
- (2) The determination of method of sieving,
- (3) The selection of using appliances,
- (4) The confirmation of purpose of the testing.

An example of these procedures are shown in Fig. 1.

Fig. 1. Confirming Procedure of Sieving Operation (Example)



2.2.1 Condition of Sample Being Evaluated It shall be ascertained whether sieving is carried out on each increment, each sub-sample or the gross sample. Also it shall be ascertained whether whole the sample or a part of the sample is utilized for sieving.

2.2.2 Decision of Method of Sieving It shall be decided beforehand that the method of sieving applied is whether manual or mechanical, also dry or wet according to the mass, number and condition of the test sample.

2.2.3 Selection of Apparatus It shall be selected that the size and kind of sieves and sieving apparatus according to the mass and size fraction to be determined of the test sample.

2.2.4 Confirmation of Purpose of Testing It shall be confirmed that this test is for which purpose i.e. for determining the particle size (%) of the consignment or for the physical testing.

2.2.5 Effect of Moisture Content

- (1) When the sample is sticky or wet according to the pre-treatment, such as water sprinkling for dust suppression, it is likely that the precision of sample division or the efficiency of sieving will be lowered. It is desirable to dry thoroughly or partially the sample before carrying out the such operations.
- (2) If there is a change of initial moisture during sieving, i.e. by absorption of atmospheric moisture under humid conditions, cognizance should be taken of the fact that the masses of the sample will be affected. Under such circumstances reliable masses can be obtained by drying the size fractions at 105°C or by handling in such a way as to reduce their time of contact with the atmosphere to a minimum.

2.2.6 Choice of Dry or Wet Sieving The choice of dry sieving, especially requiring drying by the use of the drying equipment, or wet sieving shall be taken as follows:

- (1) Dry sieving is applicable to:
 - (a) A sample having merely high surface moisture, or
 - (b) Fine ores required of the size fraction from 150 μm to 75 μm .
- (2) Wet sieving is applicable to:
 - (a) A sample having a tendency to cake on drying,
 - (b) A sample having a tendency for a significant proportion of fine particles to adhere to the larger lumps,
 - (c) A sample having a tendency to charge with static electricity during the sieving operation and to adhere tenaciously to the sieve, or
 - (d) Fine ores required specifically of the size fraction of 75 μm or less.

2.3 Precision of Sieving This standard has been so decided that a precision of sieving (testing) within $\pm 2\%$ at confidence coefficient of 95 %.

6
M 8706-1985

3. Derivation of Size Sample

The size test sample shall be prepared in accordance with JIS M 8702 or JIS M 8703.

Division for the preparation of the size test sample may be carried out on each increment, each sub-sample or the gross sample according to the particle size and the stage of sieving in accordance with JIS M 8702 or JIS M 8703.

4. Apparatus

4.1 Sieve Media

4.1.1 Shape of Aperture The sieve media shall have square aperture in accordance with JIS Z 8801.

4.1.2 Size of Aperture The nominal size and tolerances of aperture to be utilized shall be selected from Table 1 which conforms to JIS Z 8801.

Remark: The sieve of nominal size of aperture specified in Attached Tables 1 and 2 in this standard and Annex of JIS Z 8801 may be utilized.