International Standard ISO 4700

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION•МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ•ORGANISATION INTERNATIONALE DE NORMALISATION

Iron ore pellets — Determination of crushing strength

Boulettes de minerais de fer — Détermination de la résistance à l'écrasement

First edition — 1983-09-15

UDC 553.31-492.3 : 620.173 **Ref. No. ISO 4700-1983 (E)**

Descriptors : iron ores, tests, determination, crushing strength.

Price based on 2 pages

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of developing International Standards is carried out through ISO technical committees. Every member body interested in a subject for which a technical committee has been authorized 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.

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.

International Standard ISO 4700 was developed by Technical Committee ISO/TC 102, *Iron ores*, and was circulated to the member bodies in April 1982.

It has been approved by the member bodies of the following countries :

Australia	India	Spain
Austria	Italy	Sweden
Canada	Japan	United Kingdom
China	Korea, Dem. P. Rep. of	USA
Czechoslovakia	Korea, Rep. of	USSR
Egypt, Arab Rep. of	Poland	Venezuela
Germany, F. R.	Romania	
France	South Africa, Rep. of	

The member body of the following country expressed disapproval of the document on technical grounds :

Netherlands

Printed in Switzerland

Iron ore pellets — Determination of crushing strength

1 Scope and field of application

This International Standard specifies a method for the determination of the crushing strength of fired iron ore pellets.

This method is not applicable to cylindrical agglomerates, briquettes, and reduced iron ore pellets.

2 References

ISO 3081, *Iron ores — Increment sampling — Manual method.*[1)]

ISO 3083, *Iron ores — Preparation of samples — Manual method.*[2)]

3 Definition

For the purpose of this International Standard, the following definition applies :

crushing strength : The applied maximum compressive load at which an iron ore pellet is broken completely, and which is expressed as the mean value of all measurements of test sample.

4 Principle

Application of a compressive load to a single iron ore pellet at a specified speed of the compressive platen until the pellet is broken.

Repetition of this procedure on all pellets of the test sample.

5 Apparatus

The loading and the indicating units should be as follows.

5.1 Loading unit

5.1.1 The loading capacity shall be 10 kN[3)] or greater.

5.1.2 The compressive platens shall be flat and shall be installed in mutually parallel planes; the portion of the surface of platens that will be in contact with the sample shall be made of surface-hardened steel.

5.1.3 A device capable of setting the speed of the compressive platen at 10 to 20 mm/min over the entire test period shall be used.

NOTE — If the platen speed is not constant during the test-cycle, results may differ depending upon the test machine used. More uniform results may be obtained using a test machine that applies a constant load increase.

5.2 Indicating unit

5.2.1 Transmission system of load

5.2.1.1 The means for transmission of the applied load to the indicating unit shall be either a load cell or a lever.

5.2.1.2 The capacity of the load cell shall be at least 10 kN.

5.2.2 Load indicator or recorder

5.2.2.1 The means for indicating the applied load shall be either an electric indicator (recording chart, meter with needle rider or other suitable device) for the load cell type, or a mechanical indicator (gauge equipped with needle rider or other suitable device) for the lever type.

5.2.2.2 When using a load cell the chart recorder pen response time shall be 1,0 s or less for a full-scale deflection.

5.2.2.3 The minimum graduation shall be 1/100 of the full scale.

5.2.2.4 The compression device shall be calibrated regularly.

1) At present at the stage of draft. (Revision of ISO 3081-1973.)

2) At present at the stage of draft. (Revision of ISO 3083-1973.)

3) 10 kN ≈ 1 019,7 kgf.

6 Preparation of test samples

6.1 Taking of test sample

The test sample (test pieces) for determining the crushing strength shall be obtained at random, for example by the use of a random selection plate, on about 1 kg of the sample for physical testing which has been taken in accordance with ISO 3081 and prepared in accordance with ISO 3083.[1)]

The test sample shall be oven dried at 105 ± 5 °C and cooled to room temperature before testing.

6.2 Number of test pieces (iron ore pellets)

Sixty or more test pieces, or as agreed upon between the interested parties, shall be tested for each sample.

NOTE — A method for determining the exact number of test pieces to obtain a specific precision in the test results is to use the following equation :

$$n = \left(\frac{2\sigma}{\beta}\right)^2$$

where

n is the number of test pieces;

σ is the standard deviation, in newtons, derived from several experiments;

β is the required precision, in newtons, for 95 % confidence levels.

6.3 Size range

The size range of the test piece should preferably be −12,5 +10,0 mm, or as agreed upon between the interested parties.

7 Procedure

Place a test piece (single pellet) at the approximate centre of the surface-hardened portion of the lower platen. Apply the load at a constant rate between 10 and 20 mm/min throughout the test period.

Record the maximum load, at which the test piece undergoes complete breakage, to at least one decimal place, in decanewtons.

NOTE — Complete breakage is ensured by continuing to apply the load until the platen gap has closed to 50 % of the average test piece size.

Clean the platens thoroughly before the next test piece (single pellet) is tested.

Repeat the procedure on the remaining test pieces.

8 Expression of results

Crushing strength of the sample is the arithmetic mean of all the measurements obtained. The result should be expressed to at least one decimal place, in decanewtons per pellet.

9 Test report

The test report shall include the following information :

a) a reference to this International Standard;

b) crushing strength expressed as the mean value, in decanewtons, of all measurements;

c) standard deviation of the measurements;

d) size distribution of the sample for physical testing and the size range(s) of the test pieces;

e) table of relative frequency (%) of measurements classified at 50 daN intervals;

f) numbers of test pieces in each specified size range tested;

g) platen speed used, expressed in millimetres per minute.

1) At present, ISO 3083 does not specify any requirements applicable to this International Standard. An annex will be prepared for the purpose in due course.