

Methods of testing iron ores —

Part 3: Iron ore fines — Method for presentation of the results of sintering tests

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Committees responsible for this British Standard

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- British Steel Industry
- Institution of Mining and Metallurgy
- Coopted members

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National foreword

This Part of BS 5663 has been prepared under the direction of the Iron and Steel Standards Policy Committee. It is identical with ISO 8263:1992 *Iron ore fines — Method for presentation of the results of sintering tests*, published by the International Organization for Standardization (ISO).

Cross-references

International Standard	Corresponding British Standard
ISO 3271:1985	BS 6212:1987 <i>Method for determination of tumbler strength of iron ores</i> (Identical)
ISO 4695:1984	BS 6598:1985 <i>Method for determination of reducibility of iron ores</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 4696 and ISO 7215, to which normative reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Introduction

Sintering tests can be conducted for several different purposes, for example, the assessment of the sintering behaviour of a particular iron ore fines, for production and quality control purposes at a sinter plant, or for research purposes concerned with the sintering process or sintering technology.

From the results of these sintering tests, the sintering behaviour of an iron ore, or iron ore mix, is determined in terms of production rate, fuel consumption rate and sinter quality. The purpose of this International Standard is to establish the terminology and method for presentation of these results, for use when sintering test data is required to be exchanged between separate parties, such as will be the case where a particular iron ore fines has been assessed for commercial reasons, or where research or production results are to be published.

1 Scope

This International Standard specifies a method for presentation of the results of sintering tests. It is applicable to all iron ore fines that are agglomerated by the sintering process.

2 Definitions

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

2.1

ore mix

the blend of iron ores, and other iron bearing raw materials, such as mill scale, basic oxygen steel making slag, dust, etc., used in the tests. It does not include return sintered fines, fluxes, coke or other solid fuel

2.2

sinter mix

the mix of materials charged to the sintering test apparatus, which includes the ore mix, fluxes, coke or other fuel, and return sintered fines

2.3

mixing times

the time, in minutes, taken for blending and granulating the various constituents of the sinter mix

2.4

moisture content of sinter mix

the moisture content, as a percentage by mass, determined by drying the granulated sinter mix, as charged to the sintering test apparatus, at $105\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$

2.5

moisture content for maximum permeability

the moisture content of the granulated sinter mix at which maximum permeability is obtained

2.6

bulk density of sinter mix

the mass per unit volume of the wet sinter mix as charged

2.7

hearth layer

a layer of previously made and sized sinter, or other iron ore material, which is placed on the grate before the sinter mix is charged

2.8

grate area

the area of the grate of the sintering test apparatus

2.9

net bed height

the height of the bed of sinter mix above the hearth layer, prior to the application of suction and ignition

2.10

suction

the air suction measured at the wind box or at the entrance of the main blower of the sintering test apparatus

2.11

ignition intensity

the heat supplied per unit of grate area per unit time of ignition

2.12

ignition temperature

the maximum temperature attained at or immediately above the surface of the sinter bed during the ignition process

2.13

sintering time

the time from the start of ignition until the exhaust gas temperature reaches a maximum

2.14

sinter cake

the total mass of sinter produced, including the hearth layer and the material collected from the bottom of the wind box

2.15

sinter handling treatment

the tumbling and/or shatter treatment given to the sinter cake, obtained in a sinter pot to simulate the effects of handling and transportation in a sinter plant

2.16**return sintered fines**

the undersize fines separated from the sinter cake by sieving after the handling treatment

2.17**sinter product**

the sinter acceptable size for charging to the blast furnace

2.18**productivity**

the mass of sinter product, produced per unit grate area per unit of time (see 3.1.1)

2.19**fuel consumption**

the dry mass(es) of solid fuel(s) consumed per unit mass of sinter product after deducting the hearth layer (see 3.1.2)

2.20**yield**

the proportion (percentage) of sinter product in relation to the sinter cake, excluding the hearth layer (see 3.1.3)

2.21**return sintered fines balance**

the ratio of the mass of return sintered fines charged to the mass of undersize sintered fines produced (see 3.1.4)

3 Sintering tests

For reference, an example of sintering test equipment is illustrated in Figure 1, while Figure 2 gives a flow-sheet of a typical sinter test procedure.

The International Standards covering test methods for determining the chemical analyses, sieving analyses, and sinter quality indices are listed in Annex A. If any of these International Standards are not available, the respective national or regional standard should be used.

3.1 Calculation of results**3.1.1 Productivity**

The productivity P , in tonnes of sinter per square metre per hour, is calculated from the equation

$$P = \frac{m_1 - m_2}{1\,000} \times \frac{1}{A} \times \frac{60}{t}$$

where

- m_1 is the total mass, in kilograms, of sinter of acceptable size produced (including the hearth layer);
- m_2 is the mass, in kilograms, of the hearth layer;
- A is the area of grate, in square metres;
- t is the sintering time, in minutes.

NOTE 1 Productivity may also be reported in terms of tonnes of iron contained in sinter of acceptable size per square metre per hour, to reflect changes in the grade of the sinter product.

The productivity P_{Fe} , in tonnes of iron in sinter per square metre per hour, is calculated from the equation

$$P_{Fe} = \frac{P \times w_{Fe}}{100}$$

where w_{Fe} is the percentage iron content in the sinter.

3.1.2 Fuel consumption

The fuel consumption C is calculated from the equation

$$C = \frac{m_3}{m_1 - m_2} \times 1\,000$$

where

- m_1 is the total mass, in kilograms, of sinter of acceptable size produced (including the hearth layer);
- m_2 is the mass, in kilograms, of the hearth layer;
- m_3 is the dry mass of solid fuel in the sinter mix consumed.

3.1.3 Yield

The yield Y , as a percentage by mass, is calculated from the equation

$$Y = \frac{m_1 - m_2}{m_4 - m_2} \times 100$$