
**Iron ores for blast furnace
feedstocks — Determination of low-
temperature reduction-disintegration
indices by static method —**

**Part 1:
Reduction with CO, CO₂, H₂ and N₂**

*Minerais de fer pour charges de hauts fourneaux — Détermination
des indices de désagréation par réduction à basse température par
méthode statique —*

Partie 1: Réduction avec CO, CO₂, H₂ et N₂



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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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT), see the following URL: [Foreword — Supplementary information](#)

The committee responsible for this document is ISO/TC 102, *Iron ore and direct reduced iron*, Subcommittee SC 3, *Physical testing*.

This third edition cancels and replaces the second edition (ISO 4696-1:2007), which has been technically revised to address the care needed during hand sieving, to introduce the mechanical sieving and to exclude the reference to ISO 4701.

ISO 4696 consists of the following parts, under the general title *Iron ores for blast furnace feedstocks — Determination of low-temperature reduction-disintegration indices by static method*:

- *Part 1: Reduction with CO, CO₂, H₂ and N₂*
- *Part 2: Reduction with CO and N₂*

Introduction

This part of ISO 4696 concerns one of a number of physical test methods that have been developed to measure various physical parameters and to evaluate the behaviour of iron ores, including reducibility, disintegration, crushing strength, apparent density, etc. This method was developed to provide a uniform procedure, validated by collaborative testing, to facilitate comparisons of tests made in different laboratories.

The results of this test have to be considered in conjunction with other tests used to evaluate the quality of iron ores as feedstocks for blast furnace processes.

This part of ISO 4696 can be used to provide test results as part of a production quality control system, as a basis of a contract, or as part of a research project.

Iron ores for blast furnace feedstocks — Determination of low-temperature reduction-disintegration indices by static method —

Part 1: Reduction with CO, CO₂, H₂ and N₂

CAUTION — This International Standard may involve hazardous operations and equipment. This standard does not purport to address all of the safety issues associated with its use. It is the responsibility of the user of this International Standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to its use.

1 Scope

This part of ISO 4696 specifies a method to provide a relative measure for evaluating the degree of size degradation of iron ores when reduced with carbon monoxide, carbon dioxide, hydrogen, and nitrogen, under conditions resembling those prevailing in the low-temperature reduction zone of a blast furnace.

This part of ISO 4696 is applicable to lump ores, sinters, and hot-bonded pellets.

2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO 3082, *Iron ores — Sampling and sample preparation procedures*

ISO 3310-1, *Test sieves — Technical requirements and testing — Part 1: Test sieves of metal wire cloth*

ISO 3310-2, *Test sieves — Technical requirements and testing — Part 2: Test sieves of perforated metal plate*

ISO 11323, *Iron ore and direct reduced iron — Vocabulary*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 11323 apply.

4 Principle

The test portion is isothermally reduced in a fixed bed, at 500 °C, using a reducing gas consisting of CO, CO₂, H₂, and N₂, for 60 min. The reduced test portion is tumbled in a specific tumble drum for 300 revolutions and then sieved with sieves having square openings of 6,30 mm, 3,15 mm, and 500 µm. Three reduction-disintegration indices (RDI) are calculated as the mass percentage of material greater than 6,30 mm, less than 3,15 mm, and less than 500 µm.