



**SLOVENSKI STANDARD**  
**SIST ISO 20905:2005**

**01-november-2005**

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Coal preparation -- Determination of dust/moisture relationship for coal

**iTeh STANDARD PREVIEW**

Préparation du charbon -- Détermination de la relation particules/humidité du charbon  
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**Ta slovenski standard je istoveten z: ISO 20905:2004**

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**ICS:**

73.040

Premogi

Coals

**SIST ISO 20905:2005**

**en**

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INTERNATIONAL  
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ISO  
20905

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**Coal preparation — Determination of  
dust/moisture relationship for coal**

*Préparation du charbon — Détermination de la relation  
particules/humidité du charbon*

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Tel. + 41 22 749 01 11  
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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.

ISO 20905 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 1, *Coal preparation: Terminology and performance*.

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## Introduction

The development of the dust/moisture curve provides an indication of the likely response of different coal types to drying or water addition during mining and handling processes. The dust/moisture curve provides a good basis for comparing the response of different coal types. Understanding the dust/moisture characteristics of a coal will allow minimized water addition to the product for dust suppression. This will in turn assist in water conservation at mines and other handling facilities, as well as minimizing the total moisture of the product.

This International Standard describes a reliable measurement of dustiness of coal and extends to cover the relationship between dust and total moisture utilizing the Rio Tinto Dust Tumbler Test. This test provides a quantitative measure of the dustiness of a coal that can be used to predict operational dust problems, and is also suitable for the assessment of dust suppression chemicals.

The Rio Tinto Dust Tumbler Test was developed using rotating equipment in a controlled temperature and humidity environment, and uses a stream of air to remove particles which become airborne during the tumbling process. It is a batch test in which dust particles ( $\sim 150 \mu\text{m}$  particles) are collected in a pre-weighed filter bag and weighed. From this mass, a dust number, calculated as the mass yield of dust multiplied by 100 000, is determined for the test total moisture. Only 1 kg of sample is required for each dust test, but eight sample lots are required to develop the dust/moisture curve for a particular coal, i.e. approximately 10 kg is required for each coal type.

This dust test can be repeated with subsamples at different coal total moisture levels to develop a dust/moisture curve. The slope of the curve provides information on how sensitive the dustiness is to changes in total moisture and a dust number of 10 has been used to provide a comparison between coals.

The test has been successfully used for several years on many coals and other bulk materials. The results have been correlated with the operating practice. The method has been applied to the evaluation of dust-control products, and the determination of dust-elimination total moisture requirements for coal-handling systems.

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# Coal preparation — Determination of dust/moisture relationship for coal

## 1 Scope

This International Standard sets out a laboratory procedure for the dust testing of higher rank coals. The procedure defines a means of evaluating the dust/moisture relationship characteristic of a coal and a dust extinction moisture (DEM).

NOTE In this standard, an experimental dust number of 10 has been used in the example given in Annex A.

## 2 Normative references

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

ISO 589, *Hard coal — Determination of total moisture*

ISO 1953, *Hard coal — Size analysis by sieving*

ISO 7886-1, *Sterile hypodermic syringes for single use — Part 1: Syringes for manual use*

## 3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

### 3.1

#### **dust**

particles of 150 µm or less diameter entrained in an air stream

### 3.2

#### **dust extinction moisture**

#### **DEM**

total moisture at which a dust number of 10 is attained on the dust/moisture curve

NOTE DEM is a useful point for comparing different coals and the effectiveness of reagents.

## 4 Safety

The following safety precautions shall be observed.

- a) To prevent nitrogen build-up within the laboratory, the exhaust tube of the minimum-free-space oven shall remain clear of obstruction.
- b) Safety glasses shall be worn at all times.

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- c) The exhaust tube of the minimum-head-space oven shall remain free of obstruction to prevent nitrogen build-up within the laboratory.
- d) A dust mask shall be worn when handling coal.
- e) Cloth or leather gloves shall be worn when using ovens.
- f) The hazards associated with a reagent shall be determined prior to use. Instructions on all relevant Material Safety Data Sheets (MSDS) shall be followed.

**5 Apparatus and equipment**

The following apparatus and equipment is required.

- 5.1 Humidity- and temperature-controlled laboratory**, with relative humidity of  $63 \pm 2$  % and temperature of  $20 \pm 2$  °C.
- 5.2 Dust-test apparatus**, having a rotating drum of 30 cm diameter and 30 cm effective length, as shown in Figure 1. The required drum speed is 29 r/min, and the desired airflow through the drum is 175 L/min.
- 5.3 Double filter bags**, single use only.
- 5.4 Electronic thermohydrograph.**
- 5.5 Tachometer.**
- 5.6 Laminar flow differential-pressure manometer.**
- 5.7 Stopwatch.**
- 5.8 Capped bottles**, of capacity 250 mL wide mouth, polypropylene.
- 5.9 Top loading balance**, having a minimum capacity of 1 g and readable to the nearest 0,01 g.
- 5.10 Laboratory trays.**
- 5.11 Minimum-free-space drying oven.**

**6 Reagent**

Tap water is used in solution and sample preparation.

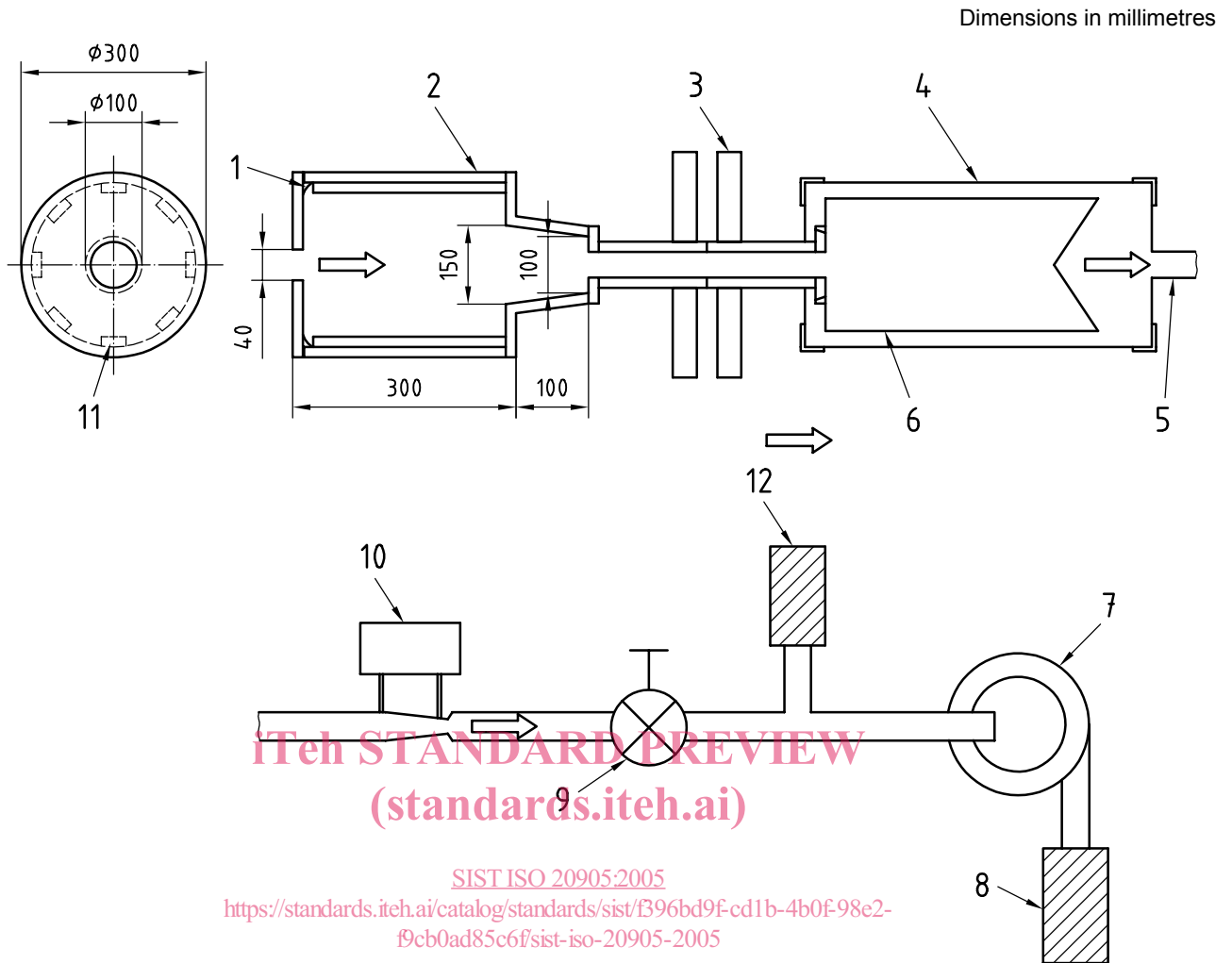
**7 Sample — Initial**

Before testing, remove the particles greater than 6,3 mm. Do not crush and replace this removed fraction as the sample's particle size distribution will be altered.

Prepare sufficient sample to provide 1,2 kg for each dust determination over the desired range of total moisture or reagent concentrations as well as 1,2 kg for sample characterization. Approximately 8 subsamples, at a range of total moisture, are required to develop a dust/moisture relationship.

Once the sample has been screened, it shall be representatively split down to approximately 1,2 kg portions which are then heat-sealed in plastic bags and labelled.

One of the 1,2 kg portions is used to determine the sample's total moisture content (initial total moisture), particle size distribution as specified in ISO 1953, and other relevant characteristics. The experimental details relating to these properties shall be recorded and retained.

**Key**

- |                                                     |                                 |
|-----------------------------------------------------|---------------------------------|
| 1 rubber seal                                       | 7 blower                        |
| 2 rotating drum                                     | 8 muffler                       |
| 3 drive unit, 30 r/min                              | 9 valve                         |
| 4 sealed compartment with hinged lid for bag access | 10 flowmeter, 170 L/min         |
| 5 25 mm flexible hose                               | 11 lifters 7 mm wide, 6 mm high |
| 6 vacuum bag                                        | 12 intake                       |

**Figure 1 — Dust-test apparatus****8 Sample preparation — Initial****8.1 Initial total moisture**

Determine the initial total moisture ( $M_1$ ) of the sample using a subsample of the extra 1,2 kg lot, as specified in ISO 589.

**8.2 Moisture adjustment**

Samples are moisture adjusted to a range of total moisture contents at approximately 1 % moisture intervals. Adjust the total moisture of each of the 1,2 kg subsamples to the required level for dust testing via the following processes.