AS 5621—2013

Australian Standard®

Iron ores—Rapid moisture determination

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The following are represented on Committee MN-002:

- Australasian Institute of Mining and Metallurgy
- Chamber of Minerals and Energy of Western Australia
- CSIRO Process Science and Engineering
- Minerals Council of Australia
- Royal Australian Chemical Institute

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Iron ores—Rapid moisture determination

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PREFACE

This Standard was prepared by the Standards Australia Committee MN-002, Iron Ores and Direct Reduced Iron, to supersede ATS 5621—2012.

This document is based on but not equivalent to ISO 3087:2009, *Iron ores—Determination of the moisture content of a lot*. It is distinct from ISO 3087 in that it allows for rapid drying of the iron ore test sample by radiant and conduction heating whereas ISO 3087 implies that slower convection heating will be used.

In all other aspects, except for those related to increased speed of drying due to the higher efficiency of the radiant and conduction heating combination, this document does not differ appreciably from the prescriptions of ISO 3087.

Therefore, prescriptions that carry over virtually unchanged from ISO 3087 are drying temperature, test sample mass, number of tests to be carried out, principle of end-point determination and the calculation of the moisture content.

This Standard does not replace ISO 3087 for application in Australia. Rather, it complements the latter by way of faster moisture content determination values that, later, can be compared to parallel, though slower convection drying values. Therefore, the rapid moisture determination method specified in this Australian Standard is not purported to be the accepted method for commercial moisture content certification at this time.

The main changes from ATS 5621 are to include updated precision data and to clarify the procedure.

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

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FOREWORD

Since 2011, the shipment of iron ore worldwide has become subject to the concern of transportable moisture limit (TML). The TML issue involves the monitoring and controlling of the moisture content of all ore shipments against pre-determined ore type-specific TMLs.

In the Australian context, the shipped ore is usually carefully sampled during shiploading and then soon afterwards tested for its prevailing moisture content by a physical drying test. However, the conventional method for moisture determination by means of convection drying is too slow for the new requirement of ensuring that the prevailing moisture content during loading does not exceed the specific ore's predetermined TML value.

The Australian iron ore industry response was to develop a faster, yet adequately accurate method for moisture content determination where the established method did not meet the speediness that has now become critical. The standardization of this new method by way of an Australian Standard was deemed essential to make the rapid method acceptable to the Australian Maritime Safety Authority (AMSA) and to other national bodies involved in the continued safe shipping of Australian iron ores.

STANDARDS AUSTRALIA

Australian Standard
Iron ores—Rapid moisture determination

1 SCOPE

This Standard specifies a method for the rapid determination of moisture content of iron ore using radiant and conduction drying instead of drying by convection. The method is applicable to all iron ores, whether natural or processed, provided the drying is controlled to safeguard the test material against temperatures in excess of those specified in this document.

2 NORMATIVE REFERENCES

The following are the normative documents referenced in this Standard:

ISO
3082 Iron ores—Sampling and sample preparation procedures

11323 Iron ore and direct reduced iron—Vocabulary

3 DEFINITIONS

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

4 PRINCIPLE

The test portion is dried under the influence of controlled heating at no more than 105°C to constant mass and the loss in mass is measured, which is equated to the mass of moisture originally in the wet sample. The moisture content is expressed as a percentage of mass loss relative to the original mass of the wet sample.

5 APPARATUS

The following apparatus is required:

(a) Drying pans with a smooth surface, free from contamination and capable of accommodating the specified quantity of a test portion in an average layer thickness nominally not exceeding the top size of the material. The dimensions of the pan shall not exceed the area of the heating plate and shall lie within the reach of the infrared radiation.

NOTE: Examples of appropriate pan dimensions are as follows:

(a) For typical Australian iron ore fines with a top size of 8 mm, pans should preferably be at least 700 cm^2 in area for accommodating the test sample without the average layer thickness exceeding 8 mm.

(b) For typical Australian lump ore with a top size of 31.5 mm, pans should preferably be at least 1900 cm^2 in area for accommodating the test sample without the average layer thickness exceeding 31.5 mm.

(b) A drying oven equipped with overhead infrared lights and a bottom hot plate, both with individual temperature-control mechanisms (pyrometers, thermocouples and PID circuits) that will allow for the regulation of the temperature of the entire test sample so that it does not deviate from the chosen temperature by more than ±1°C.

The oven will normally have minimal forced air ventilation at the top for keeping the lamps cool. It needs to allow the air movement due to the forced ventilation and due to convection currents from the heated sample surface to dissipate safely out the sides of the oven without causing disruption to the sample.