AS 1038.17—1989

Australian Standard®

Methods for the analysis and testing of coal and coke

Part 17: Determination of moisture–holding capacity (equilibrium moisture) of higher rank coal

This Australian Standard was prepared by Committee MN/1, Coal and Coke. It was approved on behalf of the Council of Standards Australia on 13 February 1989 and published on 11 August 1989.

The following interests are represented on Committee MN/1:

Australasian Institute of Mining and Metallurgy

Australian Coal Association

Australian Coal Industry Research Laboratories

Australian Institute of Energy

Bureau of Steel Manufacturers of Australia

Coal Preparation Society of N.S.W.

Coal Preparation Society of Queensland

Confederation of Australian Industry

CSIRO, Division of Coal Technology

Department of Minerals and Energy, N.S.W.

Department of Mines, Qld

Department of Primary Industries and Energy

Electricity Supply Association of Australia

Institution of Engineers, Australia

Joint Coal Board

National Association of Testing Authorities, Australia

Queensland Coal Board

Royal Australian Chemical Institute

Standing Committee on Coalfield Geology of New South Wales

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PREFACE

This Standard was prepared by the Standards Australia Subcommittee on Coal Evaluation under the supervision of the Committee on Coal and Coke and the direction of the Minerals Standards Board in order to provide a method for determination of moisture–holding capacity which is used in the classification of higher rank coals.

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STANDARDS AUSTRALIA

Australian Standard

Methods for the analysis and testing of coal and coke

Part 17: Determination of moisture-holding capacity (equilibrium moisture) of higher rank coal

1 SCOPE. This Standard sets out a method for the determination of the moisture-holding capacity of higher rank coal (i.e. coals, as defined in AS 2096, having a gross specific energy of 21.00 MJ/kg or greater on an ash-free, moist basis and having a gross specific energy of 27.00 MJ/kg or greater on a dry, ash-free basis).

NOTE: The full moisture-holding capacity is that of the solid in equilibrium with an atmosphere saturated with moisture vapour, but as there are insuperable experimental difficulties in working with such atmospheres, a slightly lower humidity (96 percent) has been adopted as the standard one.

2 REFERENCED DOCUMENTS. The following documents are referred to in this Standard:

AS		
1038		Methods for the analysis and testing of coal and coke
1038.3	Part 3:	Proximate analysis of higher rank coal
1038.16	Part 16:	Acceptance and reporting of results
2096		Classification and coding systems for Australian coals
2243		Safety in laboratories
2508		Safe storage and handling information cards for hazardous materials
2706		Numerical values-Rounding and interpretation of limiting values

3 PRINCIPLE. The sample is brought to equilibrium and conditioned in an atmosphere of 96 percent relative humidity (attained by means of a potassium sulfate pulp) at 30°C, and at reduced pressure (not greater than 4 kPa). The moisture content is then determined by drying the conditioned coal to constant mass at 105°C, in a nitrogen atmosphere.

4 SAFETY. For information on laboratory safety, reference should be made to the relevant parts of AS 2243 and AS 2508.

5 REAGENTS.

5.1 General. Unless otherwise specified, all reagents shall be of analytical reagent grade, and only distilled water or water of equivalent purity shall be used.

5.2 Potassium sulfate pulp. Add sufficient potassium sulfate (K_2S0_4) to water to form a pulp. An excess of crystalline K_2S0_4 shall extend above the solution level.

5.3 Desiccant—granular anhydrous magnesium perchlorate for use in the drying tower (6.4) for drying air.

WARNING: REGENERATION BY OVEN DRYING SHOULD NOT BE ATTEMPTED BECAUSE OF THE RISK OF EXPLOSION. WHEN EXHAUSTED, MAGNESIUM PERCHLORATE SHOULD BE WASHED DOWN THE SINK WITH A STREAM OF WATER.

6 APPARATUS.

6.1 Conditioning vessel. The conditioning vessel shall be a vacuum desiccator with a base diameter between 120 mm and 150 mm and of sufficient depth to accommodate a bed of potassium sulfate pulp (5.2) 30 mm to 40 mm thick. The conditioning vessel is fitted with a glass, ceramic or corrosion-resistant metal stand to carry dishes above the level of the pulp, so that the dishes are protected from spray resulting from frothing. A second perforated parallel plate over the one actually covering the pulp prevents fouling of the support for the dishes. A suitable vessel is shown in Figure 1.

6.2 Constant-temperature incubator. The constant-temperature incubator shall be either a water bath or air cabinet of sufficient size to accommodate one or more vacuum desiccators, and shall be provided with a temperature regulator and heater to maintain a uniform temperature of 30.0 ±0.1°C.

A suitable incubator incorporating a water bath is illustrated in Figure 1. In this system, a steel block or similar mass of 2 kg to 3 kg will be required to weigh down the conditioning vessel. The steel block should be protected from corrosion by two coats of immersible epoxy or plastic coating. The block may be placed in the bottom of the desiccator and covered with the potassium sulfate pulp.

A suitable air cabinet is illustrated in Figure 2. The air cabinet shall be of double-walled construction, with the cavity between the walls filled with insulation material. The required temperature can be attained by regulating two 100 W electric light bulbs mounted in parallel on the floor near the rear of the incubator. The sensor of the thermostat should be shielded from direct exposure to the heat sources. A small fan mounted in the incubator is used to ensure adequate circulation of air and to minimize temperature variations. An adequate seal shall be provided between the door and the incubator body.

The particular cabinet shown in Figure 2 has inner and outer walls constructed of 10 mm plywood, and has a wall cavity of 20 mm.

6.3 Balance—capable of weighing to an accuracy of ±0.1 mg.

6.4 Drying tower—250 mL capacity, packed with magnesium perchlorate (5.3) for drying the air.