



Designation: D8638 – 26

Standard Test Method for Single-Stage Total Moisture in Coke¹

This standard is issued under the fixed designation D8638; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ϵ) indicates an editorial change since the last revision or reapproval.

1. Scope

1.1 This test method covers single-stage procedures for the determination of total moisture in metallurgical coke.

1.2 *Units*—The values stated in SI units are to be regarded as the standard. No other units of measurement are included in this standard.

1.3 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety, health, and environmental practices and determine the applicability of regulatory limitations prior to use.*

1.4 *This international standard was developed in accordance with internationally recognized principles on standardization established in the Decision on Principles for the Development of International Standards, Guides and Recommendations issued by the World Trade Organization Technical Barriers to Trade (TBT) Committee.*

2. Referenced Documents

2.1 *ASTM Standards*:²

D121 Terminology of Coal and Coke

D346 Practice for Collection and Preparation of Coke Samples for Laboratory Analysis

D2013 Practice for Preparing Coal Samples for Analysis

3. Terminology

3.1 *Definitions*—For additional definitions of terms used in this test method, refer to Terminology **D121**.

4. Summary of Test Method

4.1 The total moisture is determined by establishing the loss in mass of a coke sample crushed to minus 16 mm by drying in an oven capable of maintaining the required air circulation and temperatures set forth in this method. Guidance for the

determination of the single-stage total moisture of uncrushed or lump coke is provided in the appendix.

5. Significance and Use

5.1 The measurement of total moisture is required to determine whether coke meets commercial specifications, environmental specifications, or both.

6. Apparatus

6.1 *Drying Pans*, non-corrodible, mass-stable at the temperature used, and of such size that the coke sample can be spread to a maximum depth of not more than two times the nominal top size of the coke particles. The pan size may be varied to suit the top size of the coke sample and the dimensions of the oven.

6.2 *Drying Oven*, forced air-type capable of maintaining a uniform temperature zone of $150^{\circ}\text{C} \pm 10^{\circ}\text{C}$ and constructed to provide continuous air flow to all parts of the oven. Air changes shall be at the rate of 1 volume per min to 4 volumes per min.

6.3 *Balance*, sensitive to 0.1 g with a capacity sufficient to determine the mass of the pan and sample.

7. Sampling

7.1 The coke sample shall be sampled and prepared according to Practice **D346**.

8. Procedure

8.1 Obtain a representative sample of coke (run of oven or sized) for moisture analysis according to Practice **D346**.

8.2 Maintain the coke sample in a manner that minimizes potential moisture change until analysis is performed.

8.3 Crush the entire coke moisture sample, using a jaw or roll crusher, to a top size of 16 mm.

8.4 Taking into consideration that the maximum depth the sample shall have in the drying pan is two times the top size of the crushed coke, if it is necessary to subdivide the gross moisture sample after crushing, the sample shall be divided by using methods described in Practice **D2013**.

8.5 Determine the mass of the empty drying pan, to the nearest 0.1 g, and record as M_1 .

¹ This test method is under the jurisdiction of ASTM Committee **D05** on Coal and Coke and is the direct responsibility of Subcommittee **D05.15** on Metallurgical Properties of Coal and Coke.

Current edition approved April 1, 2026. Published May 2026. DOI: 10.1520/D8638-26.

² For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at www.astm.org/contact. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

8.6 Transfer the crushed coke sample to the drying pan. Distribute the coke sample uniformly over the entire pan.

8.7 The test sample shall have a mass of at least 1000.0 g and have a maximum depth in the pan of two times the nominal top size of the crushed coke.

8.8 Determine the mass of the drying pan and wet coke sample, to the nearest 0.1 g, and record as M_2 .

8.9 Place the pan and coke sample into the oven at a temperature of $150\text{ }^{\circ}\text{C} \pm 10\text{ }^{\circ}\text{C}$. Maintain the air flow to provide continuous introduction of air at one to four volumes per minute while ensuring that fine particles are not lost during drying.

8.10 Initially dry the sample for at least 90 min, remove from the oven, and determine the mass. Record the mass in grams, to the nearest 0.1 g. Record this mass as MT_0 and record the time as T_0 . Subsequent measurements will be made at a minimum of 30 min intervals.

8.11 Return to the oven for a minimum of 30 min, remove the sample, and record the mass as MT_1 and the time as T_1 .

8.12 Repeat steps 8.10 and 8.11 until the change in mass for the 30 min time period is less than 0.05 % of the original mass of the coke sample.

8.13 Refer to 9.1 to calculate the change in mass.

8.14 Record the mass of the dried sample and pan as M_3 .

8.15 Refer to 9.2 to calculate the total moisture.

9. Calculation

9.1 Calculation to determine constant mass (multiply M_c by 30 to determine if the change in mass fraction is less than 0.05 % in 30 min):

$$M_c = \frac{(MT_1 - MT_0)}{(M_2 - M_1)(T_1 - T_0)} \times 100 \quad (1)$$

where:

M_c = change in mass fraction, %/min;

M_1 = mass of empty pan, g;

M_2 = mass of wet coke plus pan, g;

MT_0 = mass of coke plus pan at time T_0 , g;

MT_1 = mass of coke plus pan at time T_1 , g;

T_0 = time of prior mass determination to nearest min;

T_1 = time of current mass determination to nearest min; and

100 = conversion factor from dimension one mass fraction to percent, %.

9.2 Calculate the moisture mass fraction of the coke sample as follows:

$$M = [(M_2 - M_3)/(M_2 - M_1)] \times 100 \quad (2)$$

where:

M = total moisture in the coke as analyzed, %;

M_1 = mass of empty pan, g;

M_2 = mass of wet coke plus pan, g;

M_3 = mass of coke plus pan after drying, g; and

100 = conversion factor from dimension one mass fraction to percent, %.

9.3 Example:

9.3.1 Mass of pan = 212.4 g (M_1).

9.3.2 Mass of wet coke plus pan = 1256.1 g (M_2).

9.3.3 Mass of dried coke plus pan = 1219.6 g (M_3).

9.3.4 Moisture, $M = [(1256.1\text{ g} - 1219.6\text{ g})/(1256.1\text{ g} - 212.4\text{ g})] \times 100 = 3.50\text{ } \%$.

10. Report

10.1 Report the total moisture, M , to the nearest 0.1 %.

11. Precision and Bias³

11.1 *Precision*—The absolute precision of this test method for D8638 – the determination of Single-Stage Total Moisture in Coke was calculated from data obtained from coals with moisture ranges shown in Table 1.

11.1.1 *Repeatability*—Precision of test results from tests conducted within the shortest practical time period on identical material by the same test method in a single laboratory with all known sources of variability conditions controlled at the same levels.

11.1.2 *Reproducibility*—Precision of test results from tests conducted on identical material by the same test method in different laboratories.

11.2 *Bias*—Since there are no acceptable reference materials for determining the bias for this test method, no statement on bias is being made.

12. Keywords

12.1 drying; metallurgical coke; single-stage total moisture

³ Supporting data have been filed at ASTM International Headquarters and may be obtained by requesting Research Report RR:D05-2004. Contact ASTM Customer Service at www.astm.org/contact.

TABLE 1 Mass Fraction Range and Limits for Repeatability and Reproducibility for the Determination of Single-Stage Total Moisture in Coke

Coke	Range (%)	Repeatability Limit, r	Reproducibility Limit, R
Crushed (16 mm)	1.2 to 6.8	0.50	0.90