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10086-2

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Coal — Methods for evaluating flocculants for use in coal preparation —

Part 2:
Flocculants as filter aids in rotary vacuum filtration systems

Charbon — Méthodes d'évaluation des floculants utilisés dans la préparation des charbons —

Partie 2: Floculants comme aides à la filtration dans des systèmes rotatoires de filtration sous vide

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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 10086-2 was prepared by Technical Committee ISO/TC 27, *Solid mineral fuels*, Subcommittee SC 1, *Coal preparation: Terminology and performance*.

ISO 10086 consists of the following parts, under the general title *Coal — Methods for evaluating flocculants for use in coal preparation*:

— *Part 1: Basic parameters*

— *Part 2: Flocculants as filter aids in rotary vacuum filtration systems*

Coal — Methods for evaluating flocculants for use in coal preparation —

Part 2:
Flocculants as filter aids in rotary vacuum filtration systems

1   Scope

This part of ISO 10086 specifies a method for the comparative evaluation of the performance of flocculants used as filter aids for rotary vacuum filtration applications on a given slurry.

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 10086-1:2000, *Coal — Methods for evaluating flocculants for use in coal preparation — Part 1: Basic parameters*

3   Principle

The performance of different flocculants on a given slurry is determined by measuring the cake yield and moisture content.

A flocculant solution is added to an aliquot of slurry in a beaker. A filter leaf is then applied to the flocculated sample and the cake thus produced on the apparatus is weighed wet, dried and reweighed. A measure of the efficiency of the flocculant is obtained from the cake yield and moisture content.

4   Apparatus

Ordinary laboratory apparatus and the following.

NOTE   The apparatus is generally arranged as shown in Figure 1.

4.1   Laboratory vacuum pump or **piped vacuum system**, capable of producing a vacuum better than that proposed for the plant equipment.

4.2   Vacuum gauge

4.3   Two-way valves, of at least 2 mm to 3 mm bore, manufactured in glass or plastics.

4.4   Buchner flask, with a minimum volume of 1 L.

4.5   Filter-leaf apparatus, consisting of a drainage plate and filter cloth in an assembly, as shown in Figure 4.

4.6   Vacuum tubing and glass/plastics tubing

4.7   Stirrers, motorized variable-speed stirrers, capable of speeds up to 1 000 r/min, one for flocculant preparation and one for sample homogenization.

4.8   Syringes, having capacities of 1 ml, 2 ml, 5 ml, 10 ml and 50 ml.
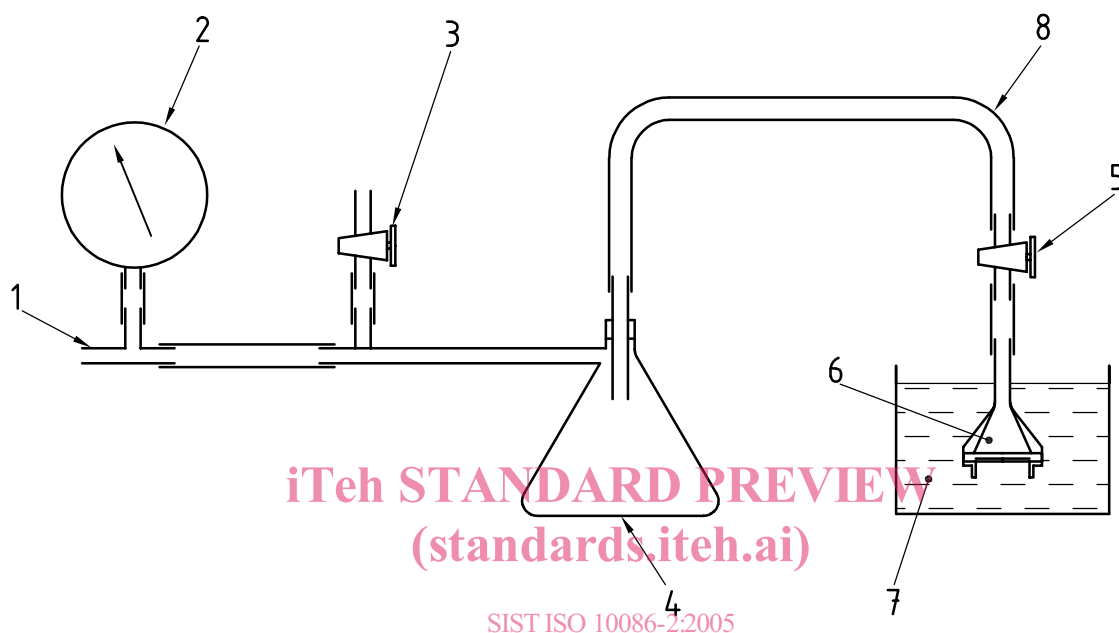
Key

1	vacuum pump/source	5	two-way valve
2	vacuum gauge	6	filter leaf
3	two-way valve	7	slurry in 800 mL beaker
4	buchner flask	8	vacuum tubing

Figure 1 — Laboratory vacuum filter-leaf apparatus

5   Materials

5.1   Slurry

The slurry for evaluation shall be collected and divided by the method described in ISO 10086-1. The contents of each test cylinder shall then be poured into an 800 ml beaker for evaluation.

5.2   Water

The water used for the preparation of flocculant solutions shall be collected by the method described in ISO 10086-1.

6   Sampling

The flocculant samples should be collected according to the recommendations described in ISO 10086-1.

7 Preparation of flocculant solutions

The flocculant, both powder and liquid grades, shall be prepared in accordance with the methods specified in ISO 10086-1.

8 Test procedure

8.1 Preliminary

The test procedure shall simulate the operating conditions of a rotary vacuum filter on a plant (see Figures 2 and 3). Where the slurry is taken from a plant using such equipment, the immersion and drying times in the test procedure shall be the same as on the plant equipment. Where these times are not known, or where no vacuum filtration system exists, the following times shall apply:

— immersion time: 1 min 10 s;

— drying time: 2 min.
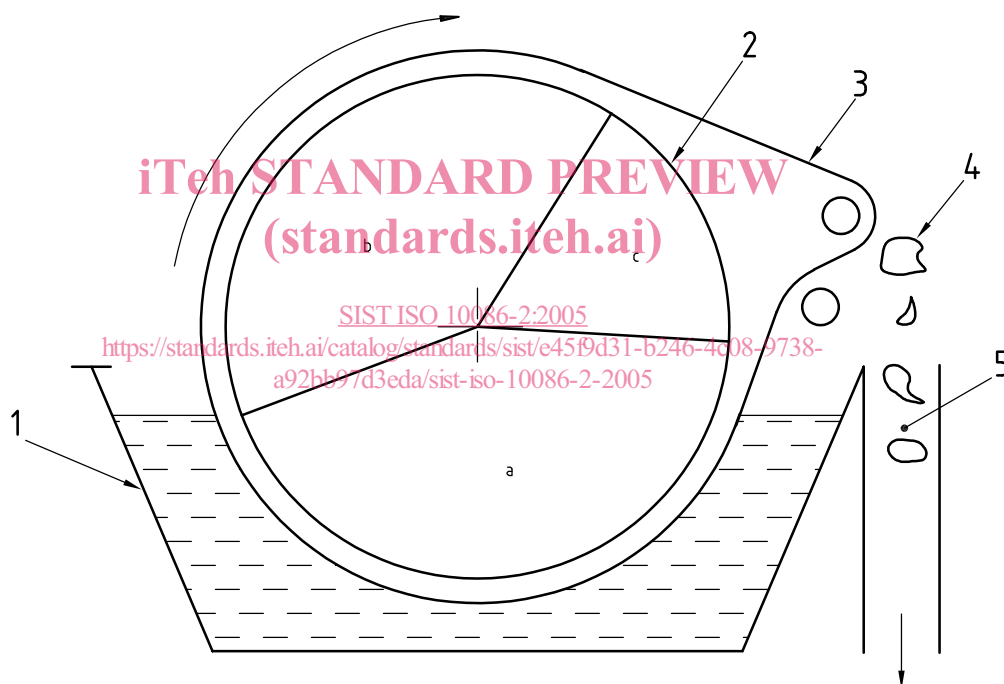
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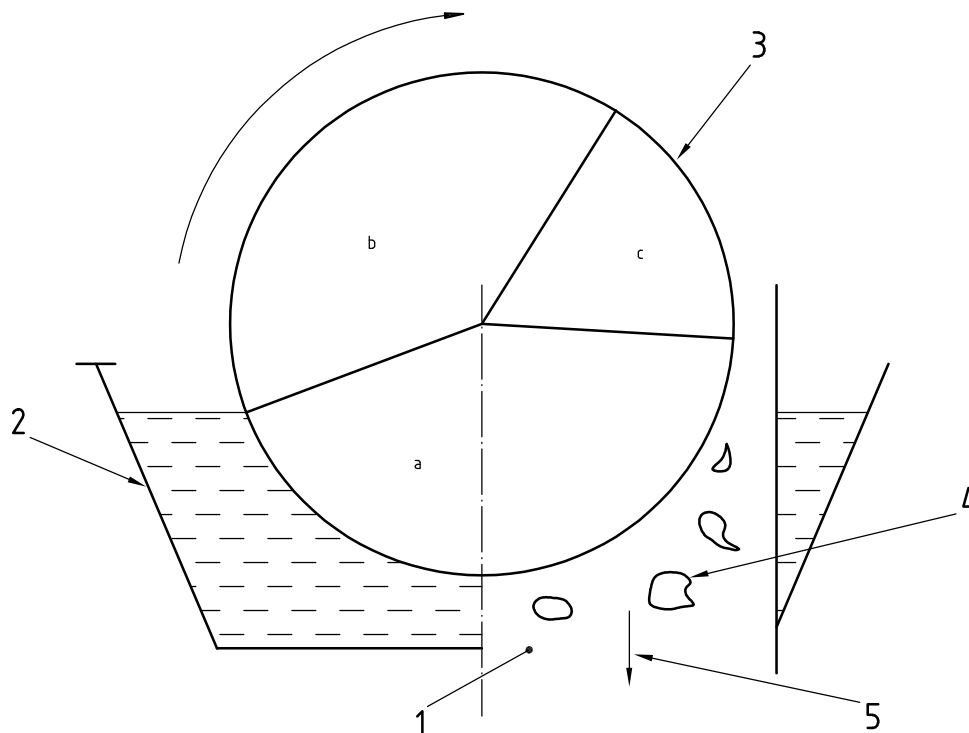
1 filter bowl
2 filter drum
3 filter cloth
4 filter cake
5 filter cake

[a] Filter leaf.
[b] Slurry in 800 mL beaker.
[c] Vacuum tubing.

Figure 2 — Diagram to show the immersion, drying and discharge sequences of a rotary vacuum drum filter

Key

1   filter cake discharge chute
2   filter bowl
3   disk filter
4   filter cake
5   cake discharge

a   Immersion.

b   Drying.

c   Discharge.

Figure 3 — Diagram to show the immersion, drying and discharge sequences of a rotary vacuum disc filter

8.2   Procedure

Prepare a 500 ml subsample of the slurry as described in ISO 10086-1. Place one subsample in an 800 ml beaker and homogenize the slurry for 1 min using the laboratory stirrer at a speed sufficient to create a vortex.

Using a syringe, add the desired quantity of flocculant solution (see 8.3) to the surface of the slurry in the beaker and mix well by stirring until completely conditioned.

Record the conditioning time.

Excessive mixing should be avoided, to prevent degradation of the flocculant.

8.3 Calculation of flocculant dosage rate

8.3.1 Calculation of content of the flocculant solution

Mass of water in the beaker $\qquad = \qquad m_W$

Mass of flocculant dissolved in the water $\qquad = \qquad m_F$

Therefore, the content of the flocculant solution w_F is given by*:*

$$w_F = \frac{m_F}{m_W}, \text{ in grams of flocculant per gram of water}$$

For the purpose of this calculation, it is assumed that a volume of 1 ml of flocculant solution weighs 1 g.

8.3.2 Calculation of the quantity of solids in the test cylinder

Volume of slurry suspension used in the test cylinder (V_S) $\qquad = \qquad$ 500 ml ($= 0,5$ L)

Solids concentration in the slurry, in $g \cdot L^{-1}$ (c_S) $\qquad = \qquad c_S$ ($g \cdot L^{-1}$)

Therefore, the mass of the solids in 500 ml of slurry $\qquad = \qquad 0,5 \times c_S$ (g)

$\qquad = \qquad 0,5 \times 10^{-3} c_S$ kg of dry solids

8.3.3 Calculation of flocculant dosage rate

Volume of flocculant solution used to dose a slurry suspension in the cylinder $\qquad = \qquad V_F$ ml

$\qquad = \qquad V_F$ g

The mass of the flocculant used in the test cylinder $\qquad = \qquad \dfrac{m_F}{m_W} \times V_F$ g

NOTE   It is approximated that 1 ml of flocculant weighs 1 g.

The flocculant dosage rate is given by:

Mass of flocculant used : Mass of solids in the cylinder

$$= \frac{m_F}{m_W} \times V_F : 0,5 \times 10^{-3} c_S$$

$$= 2\ 000 \times \frac{m_F \times V_F}{m_W \times c_S} \text{ g of flocculant per kg of dry solids}$$

The units of the dosage rate may also be expressed as "kg of flocculant per tonne of dry solids".