Coating powders - Part 5: Determination of flow properties of a powder/air mixture

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Coating powders - Part 5: Determination of flow properties of a powder/air mixture (ISO 8130-5:1992)

Poudres pour revêtement - Partie 5: Détermination de l'aptitude à la fluidisation d'un mélange poudre/air (ISO 8130-5:1992)

Pulverlacke - Teil 5: Bestimmung der Fließeigenschaften eines Pulver-Luft-Gemisches (ISO 8130-5:1992)

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Foreword

The text of ISO 8130-5:1992 has been prepared by Technical Committee ISO/TC 35 “Paints and varnishes” of the International Organization for Standardization (ISO) and has been taken over as EN ISO 8130-5:2010 by Technical Committee CEN/TC 139 “Paints and varnishes” the secretariat of which is held by DIN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by May 2011, and conflicting national standards shall be withdrawn at the latest by May 2011.

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Endorsement notice

The text of ISO 8130-5:1992 has been approved by CEN as a EN ISO 8130-5:2010 without any modification.

Coating powders —

Part 5:
Determination of flow properties of a powder/air mixture

1 Scope

This part of ISO 8130 specifies a method for determining the flow properties of a mixture of coating powder and air. The method reflects commercial practice in powder spraying (see "Bibliography", annex B).

The results obtained are influenced by the composition of the coating powder, its density, particle size distribution and particle shape, together with the tendency of the particles to agglomerate and to accept a triboelectric charge.

NOTE 1 It is well known that the transport and spraying characteristics of powders are highly dependent on their flow properties in bulk and in air. The procedure described in this method is considered to be more meaningful than the "flow angle" approach sometimes used to evaluate bulk flow properties. In the latter, the angle of the cone formed when a powder is allowed to flow through a vertical funnel on to a horizontal surface is measured. A given mass of powder with good flow properties forms a shallower cone than an equal mass of a powder with poorer flow. The objections to the flow angle method are that it is difficult to obtain a precise measurement and that the powder is used alone, whereas during application it is mixed with air.

2 Normative reference

The following standard contains provisions which, through reference in this text, constitute provisions of this part of ISO 8130. At the time of publication, the edition indicated was valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8130 are encouraged to investigate the possibility of applying the most recent edition of the standard indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 8130-9:1992, *Coating powders — Part 9: Sampling*.

3 Principle

Under draught-free conditions, a specified quantity of coating powder is placed in a vessel and is fluidized with clean dry air under standard conditions of atmospheric temperature and pressure. The height of the powder during and after fluidization is measured and the rate at which the fluidized powder flows through a specified orifice is then determined.

The measurements are used to calculate the fluidization factor ϕ and the powder flow rate (flow factor) R which together define the transport and spraying characteristics of the powder.

4 Apparatus

4.1 Apparatus for the determination of flow properties, consisting of a fluidization vessel with a circular opening in the wall and a device for measuring the height of powder in the vessel. A means for weighing the amount of powder that flows through the opening is also included.

NOTE 2 A suitable apparatus is shown in figure 1 and described below. Other apparatus may be used if it gives comparable results.

A typical apparatus consists of the elements described in 4.1.1 to 4.1.3.

Annex A
(informative)

Notes on apparatus and procedure

A.1 Construction of apparatus

To prevent cleaning difficulties and/or clogging of the sintered-bronze bottom, it is strongly recommended that the air entrance compartment G (below the porous bottom of vessel A) be removable (for example by a screw mechanism).

A.2 Corrections

Usually flow meter F is calibrated with air under standard conditions of temperature and pressure. Mostly, however, it is used under other conditions, so it is necessary to make corrections to obtain the real flow rate of 200 l/h. If C is the correction factor and q_r the required flow rate [e.g. (200 ± 10) l/h as given in 6.2], then the flow meter reading q_f is given by:

$$q_f = \frac{q_r}{C}$$

This correction factor C ($= C_1 \cdot C_2$) depends on

a) the difference in air pressure during the calibration and during the test:

$$C_1 = \sqrt{\frac{p_2}{p_1}}$$

where

p_1 is the air pressure, in kilopascals, during the calibration,

p_2 is the air pressure, in kilopascals, during the test;

b) the difference in the absolute temperature of the air during the calibration and during the test:

$$C_2 = \sqrt{\frac{T_1}{T_2}}$$

where

T_1 is the temperature, in kelvins, of the air during the calibration,

T_2 is the temperature, in kelvins, of the air during the test.

A.3 Example

A test is carried out using a flow meter that has been calibrated in litres of air per hour at 23 °C and 101,3 kPa (1 013 mbar).

If the test is carried out at 15 °C and 120 kPa (1 200 mbar), the following calculations can be used to determine the reading on the flow meter which will obtain a real flow rate of 200 l/h:

$$C_1 = \sqrt{\frac{1,2}{1,013}} = 1,088$$

$$C_2 = \sqrt{\frac{296}{288}} = 1,014$$

Thus

$$q_f = \frac{200}{1,088 \times 1,014} = 181 \text{ l/h}$$

To obtain a real flow rate of 200 l/h under the conditions of the test, the flow meter should therefore be adjusted to 181 l/h.

Annex B
(informative)

Bibliography

[1] DOUMA, G.H. and SELIER, P. *I-Lack*, **41**, No. 9, p. 361 (1973).

[2] DE LANGE, P.G. *I-Lack*, **42**, No. 9, p. 339 (1974).