INTERNATIONAL STANDARD

ISO 8130-4

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Coating powders —

Part 4:
Calculation of lower explosion limit

Poudres pour revêtement —

Partie 4: Calcul de la limite inférieure d'explosibilité

Reference number
ISO 8130-4:1992(E)

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.

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.

International Standard ISO 8130-4 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Sub-Committee SC 9, *General test methods for paints and varnishes*.

ISO 8130 consists of the following parts, under the general title *Coating powders*:

— *Part 1: Determination of particle size distribution by sieving*

— *Part 2: Determination of density by gas comparison pyknometer (referee method)*

— *Part 3: Determination of density by liquid displacement pyknometer*

— *Part 4: Calculation of lower explosion limit*

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

— *Part 6: Determination of gel time of thermosetting coating powders at a given temperature*

— *Part 7: Determination of loss of mass on stoving*

— *Part 8: Assessment of the storage stability of thermosetting powders*

International Organization for Standardization
Case Postale 56 • CH-1211 Genève 20 • Switzerland

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— *Part 9: Sampling*

Annex A of this part of ISO 8130 is for information only.

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Coating powders —

Part 4:
Calculation of lower explosion limit

1 Scope

This part of ISO 8130 specifies a method for the calculation of the lower explosion limit of a coating powder, i.e. the minimum concentration of the coating powder in air which will form an explosive mixture. It is based on the knowledge of the gross calorific value of the product, as determined by the method described in ISO 1928, or on the gross calorific values of the constituents of the product.

Reliable methods for the measurement of this quantity require the use of special apparatus which may not be readily available, A method for determining the explosion indices of combustible dusts in air is given in ISO 6184-1. This method is, however, very intricate, requires considerable expertise and is expensive. The calculation method leads to lower explosion limits which have been proved in practice to be satisfactory when applied to coating application plants.

NOTES

1 With powders that are not flammable, such as those of the poly(vinyl chloride) type, the method may nevertheless give a value for the lower explosion limit in air. Thus, any underestimation of an explosion risk is effectively avoided.

2 The calculation used in this International Standard is based on the following assumptions:

a) that material exists in the form of a molecular dispersion;

b) that there is complete combustion of the meterial to the highest oxidation level;

c) that there is an adiabatic type of reaction;

d) that the flame temperature for the composition with which the minimum concentration for explosion in air is attained is 1 000 °C.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8130. At the time of publication, the editions indicated were 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 editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 842:1984, *Raw materials for paints and varnishes — Sampling.*

ISO 1928:1976, *Solid mineral fuels — Determination of gross calorific value by the calorimeter bomb method, and calculation of net calorific value.*

ISO 6184-1:1985, *Explosion protection systems — Part 1: Determination of explosion indices of combustible dusts in air.*

3 Definition

For the purposes of this part of ISO 8130, the following definition applies.

3.1 lower explosion limit: The concentration of coating powder, expressed in grams per cubic metre, in a mixture of powder and air, below which self-propagation of flames is not possible.

4 Sampling

Take a representative sample of the product to be tested, as described in ISO 842.

5 Determination of gross calorific value

Either measure the gross calorific value H_0 of the product under test by the method described in ISO 1928, or calculate it by summation of the gross calorific values of the combustible constituents of the product as specified in clause 6 below.

6 Calculation of the lower explosion limit

Calculate the gross calorific value H_0 of the product under test from those of its combustible constituents by multiplying the gross calorific value of each combustible constituent by the mass present in 1 g of product and summing.

The quantity H_0 is then given by

$$H_0 = \sum_{i=1}^{n} c_i H_i$$

where

n is the number of combustible constituents;

c_i is the mass fraction of the ith constituent;

H_i is the gross calorific value of the ith constituent.

Calculate the lower explosion limit C (the minimum concentration, expressed in grams per cubic metre, for explosion in air), using the equation

$$C = A + \frac{B}{H_0}$$

where

A is a constant equal to $-2{,}5$ g/m^3;

B is a constant equal to $1{,}24 \times 10^4$ J/m^3;

H_0 is the gross calorific value of the coating powder, in joules per gram;

Report the result to the nearest whole number.

7 Test report

The test report shall contain at least the following information:

a) all details necessary to identify the product tested;

b) a reference to this part of ISO 8130 (ISO 8130-4);

c) the result of the calculation as indicated in clause 6;

d) any deviation from the calculation procedure specified;

e) the date of the calculation.

Annex A
(informative)

Bibliography

[1] SCHÖNEWALD, I. *Staub-Reinhaltung der Luft,* Vol. 31 (1971), No. 9, pp. 376-378.

[2] MEYER, B. *Farbe + Lack,* **84** (1978), pp. 75-76.

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