
Coating powders —

Part 11:
Inclined-plane flow test

Poudres pour revêtement —

Partie 11: Essai d'écoulement sur plan incliné



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 8130-11 was prepared by Technical Committee ISO/TC 35, *Paints and varnishes*, Subcommittee 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*

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- *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*
- *Part 9: Sampling*
- *Part 10: Determination of deposition efficiency*
- *Part 11: Inclined-plane flow test*
- *Part 12: Determination of compatibility*

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Coating powders —

Part 11:

Inclined-plane flow test

1 Scope

This Part of ISO 8130 is one of a series of standards dealing with the sampling and testing of paints, varnishes and related products.

It specifies a method for determining the flow characteristics of a fused thermosetting coating powder down a plane inclined at a set angle to the horizontal.

The result of the test described in this Part of ISO 8130 gives an indication of the degree of melt flow that may occur during the curing of the coating powder. This characteristic contributes to the coherence of the coating, to its surface appearance and to the degree of coverage over sharp edges.

The test acts as a useful method for checking for batch to batch variation in the behaviour of a given coating powder. Correlation between the results from coating powders of differing composition is not to be expected.

This method is unlikely to yield meaningful results with coating powders which have gel times of less than one minute at the test temperature when characterised according to ISO 8130: Part 6.

2 Normative references

The following standards contain provisions which, through reference to 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 International Standard 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 8130-2: 1992	Coating powders - Part 2: Determination of density by gas comparison pyknometer (referee method)
ISO 8130-3: 1992	Coating powders - Part 3: Determination of density by liquid displacement pyknometer
ISO 8130-6: 1992	Coating powders - Part 6: Gel time of thermosetting coating powders at a given temperature
ISO 8130-9: 1992	Coating powders - Part 9: Sampling

3 Principle

The thermosetting coating powder is pressed into a pellet of standard size which is allowed to melt and flow down a heated inclined plate. The extent of flow is measured.

4 Apparatus

4.1 Fan-assisted air circulation oven, capable of maintaining temperatures up to 250 °C. The circulation fan shall be capable of being turned on and off as required.

4.2 Glass plates, of suitable dimensions to undertake the test.

NOTE 1 - Photographic float-glass plates have been found to be suitable.

As an alternative metal plates may be used. However, these will need to be closely defined with respect to their composition and surface finish. The plates shall be sufficiently rigid so as not to flex during the test. The details of the metal plates shall be included in the test report (clause 9).

4.3 Plate assembly, of suitable metal, that fits inside the oven (4.1). The assembly shall be capable of carrying one or more of the plates (4.2) in a horizontal position and at an angle of $(65 \pm 1)^\circ$ to the horizontal when moved by a lever projecting through the side of the oven.

4.4 Balance, capable of measuring to 10 mg.

4.5 Steel pellet-moulding press, together with a knockout rod, to make pellets of $(12,5 \pm 0,05)$ mm in diameter and $(6,5 \pm 0,2)$ mm thick.

4.6 Steel rule, graduated in mm.

4.7 Polytetrafluoroethylene, (PTFE) release aerosol spray

5 Sampling

Take a representative sample of the product under test as described in ISO 8130-9.

6 Procedure

Carry out the determination in duplicate.

6.1 Weigh in the balance (4.4) to an accuracy of 10 mg a mass of the product under test equivalent in grams to half of the density of the coating powder in accordance with ISO 8130-2 or ISO 8130-3. By means of the pellet press (4.5) compact the pellet into a disc ($6,5 \pm 0,2$) mm thick and push the pellet out of the mould with the knockout rod. Weigh the pellet to confirm that its mass is correct to 10 mg.

If there is a delay between the commencement of the test and the preparation of the pellet, protect it against moisture absorption by storage in a desiccator or a sealed bag.

6.2 Unless otherwise agreed the temperature of the test shall be the recommended stoving temperature. In the absence of this information a temperature of $(180 \pm 2) ^\circ\text{C}$ shall be used.

6.3 Spray the uppermost side of the glass plate(s) (4.2) with the PTFE release material (4.7) and allow to air dry.

The use of PTFE release material is in order to facilitate the removal of the sample so that the glass test plate may be reused and to ensure that a uniform surface is obtained. This procedure may be considered inappropriate when metal plates are used. It may be omitted on agreement between interested parties in which case this shall be indicated in the test report (clause 9).

6.4 Place the plate(s) in the plate assembly (4.3) in a horizontal position.

6.5 Place the plate assembly and plate(s) into the oven set at the appropriate temperature (see clause 6.2) and allow the assembly to preheat for a minimum period of 15 minutes with the fan on.

NOTE 2 – It may be more convenient to maintain the plate assembly in the oven and carefully load the plate(s) in situ.

6.6 At the end of the preheat period turn off the circulation fan and open the door of the oven. Place the pellet(s) towards the end of the plate(s) which will be uppermost when tilted. Close the door of the oven and restart the fan. This operation shall take no longer than 15 s to perform. After a further 15 s since closing the oven door operate the plate assembly to bring the plate(s) to $(65 \pm 1)^\circ$ to the horizontal. Allow the plate(s) to remain in this position for 15 minutes. At the end of this period remove the plate(s) from the oven and allow to cool to room temperature in a horizontal position.

6.7 Using the steel rule (4.6) measure the total length of the flowed pellet in mm. This is most conveniently undertaken with glass plates by viewing from the reverse side. Record the measurement to the nearest 0,5 mm.

7 Expression of results

Calculate the pellet flow by deducting the original diameter of the pellet (12,5 mm) from the total flow as measured in clause 6.7.

If the two determinations differ by more than 5 % based on the lower figure, repeat the procedure described in clause 6.

Calculate the average of two valid determinations and report to the nearest 0,5 mm.

8 Precision

The precision of the method, as obtained by statistical examination of interlaboratory test results, is as follows:

8.1 Repeatability (r)

The value below which the absolute difference between two single test results, each the mean of duplicates, obtained on identical material by one operator in one laboratory within a short interval of time using the standardized test method, may be expected to lie with a 95 % probability is 5 %.

9 Test report

The test report should 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 8130-11);
- c) the test temperature;
- d) weight of sample;
- e) results of the test (individual values and mean value);
- f) whether a metal plate was used and a description of its surface finish and composition (sub-clause 4.2);
- g) whether a PTFE pre-treatment of the plate was used (sub-clause 6.3);
- h) any deviation from the test method specified;
- i) the date of the test.

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