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Commission Internationale des Méthodes d'Analyse des Pesticides (CIMAP)

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Special MT 171.1

This draft revised method is free available on the CIPAC Webpage till the method will be published in the next CIPAC Handbook

MT 171.1 DUSTINESS OF GRANULAR PRODUCTS

SCOPE

In this method dustiness is defined as the property of a granular product to release dust into the air when handled under specified conditions. These conditions are related to typical handling in agricultural practice (i.e. measuring out the required dose and pouring the product into the spray tank).

The method is applicable to granular formulations.

REASON FOR REVISION

MT 171.1 supersedes MT 171.

The method was editorially revised and obsolete references removed. Error correction in result table; definition of range for sample weight; revised description of equipment.

Test results obtained with MT 171.1 are equivalent to those obtained with MT 171.

OUTLINE OF METHOD

The test sample is allowed to fall from a defined height into a measuring box. By impacting at the bottom of the box dust is released into the air. The airborne dust is then analysed.

Analysis can be done either gravimetrically by collecting and weighing the dust on a filter or by an optical method in which the obscuration of a light-beam by the airborne dust is measured (Note 1).

APPARATUS

Analytical balance, with an accuracy of at least ± 0.1 mg

Ionizing blower, optional, for reducing electrostatic effects during weighing of filter in gravimetric method only

Beaker, ca. 100 ml

Dust-measuring apparatus, consisting of a vertical pouring tube (1) with funnel being connected to the top of a measuring box (2) with removable case for cleaning (optional) and a device for dust analysis. The pouring tube (1) may be equipped with a sealing trap or slide (3) just below the funnel to control release of the sample (Note 2).

Gravimetric method, glass filter (4) plugged into a fitting (5) on the side of the

measuring box (2), the glass filter being connected to an air flow meter (6) and a vacuum pump (see Appendix 1)

Sintered glass filter, porosity P100 (pore size 40-100 μm), diameter 40 mm

Filter discs, e.g. glass fiber or cellulose-based, diameter 35 mm (Note 3)

Air flow meter, range 10 l/min – 20 l/min

Stopwatch

Tweezers

Optical method, electronic control unit (7); (laser) light source (8) and photocell / receiver (9), both being positioned off-centre from the tube centre line.

For older models with a non-laser light source only: optical filters (10) to be fitted in front of the photocell for readjustment. (see Appendix 2). Optical instrument is commercially available, e.g. from Palas, Microtrac.

PROCEDURE

(a) *Sampling*

For each determination, use a representative sample. It is important to measure dustiness with the product ‘as received’. Wherever possible, take the sample from a previously unopened container. Changes in water content caused by conditioning of the sample under certain temperature and/or humidity conditions can change dustiness significantly.

(b) *Determination of dust*

Gravimetric method

Record the weight of the empty filter disc with an accuracy of 0.1 mg (W_1 in [g]) and put the disc on the filter plate of the glass filter. Connect the glass filter to an air flow meter and a vacuum pump and then plug the glass filter into the fitting of the measuring box. Start the vacuum pump and adjust the air flow to 15 l/min.

In a beaker, weigh 30.0 ± 0.5 g of test sample with an accuracy of 0.1 g and transfer it with a single action into the funnel on top of the pouring tube. At the same time start the stopwatch.

The released airborne dust is sucked off for 60 s and collected on the filter. Remove the filter disc with tweezers and weigh it to the nearest 0.1 mg (W_2 in [g]). Report the difference in weight ($W_2 - W_1$ in [mg]) as ‘collected dust’.

Optical method

Before starting a measurement, calibrate the dust measuring apparatus.

In a beaker, weigh 30.0 ± 0.5 g of test sample with an accuracy of 0.1 g and transfer it into the funnel with the trap closed. Start the measurement. The software will open the trap for 2 s and allow the sample to fall to the bottom of the measuring box, releasing dust and thus reducing the intensity of the light-beam detected by a photocell / receiver opposite the light source.

The obscuration of the light beam is continuously measured by the instrument and the “dust value” is automatically generated as sum of two values: the first being measured directly after the fall of the sample and the second after further 30 s (Note 4). The “dust value” has no unit.

The difference between the first value and the value after further 30 s is indicative for the time period the generated dust remains airborne. Report the summary ‘dust value’ only.

ASSESSMENT OF DUSTINESS

Based on the results of 'collected dust' in [mg] (gravimetric method) or 'dust-value' (optical method), the dustiness of a granular product can be categorised as follows:

Category	Range of results		Interpretation
	gravimetric “collected dust” [mg]	optical dust value	
1	0 - 12	0 - 10	nearly dust-free
2	> 12 - 30	> 10 - 25	essential non dusty
3	> 30	> 25	dusty

Note 1 The optical method usually shows good correlation with the gravimetric method and can therefore be used as an alternative where the equipment is available. Where the correlation is in doubt, it should be checked with the product to be tested. In cases of arbitration, the gravimetric method should be employed.

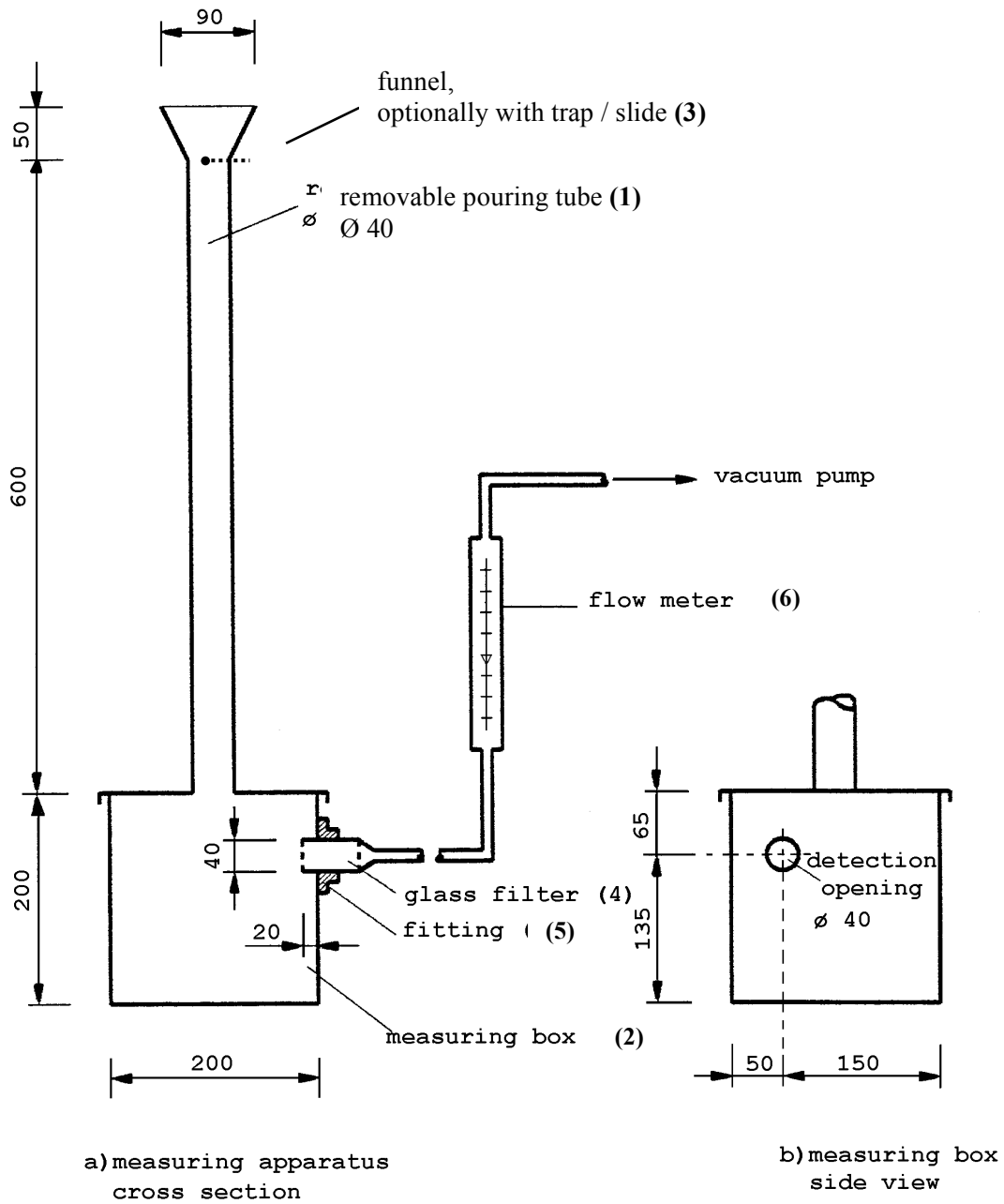
Note 2 The apparatus for optical measuring of dust is commercially available. The apparatus for the gravimetric method is commercially not available. However, it can be easily made, preferable of a non-

corroding metal-sheet (e.g. 1.5 mm gauge). If plastic (e.g. polycarbonate) is used, it must be ensured that no electrostatic effects occur.

Note 3 Any filter disc can be used which gives a complete separation of the airborne dust at a constant air flow of 15 l/min. The filter disc should be checked for quantitative retention of fine dust. Avoid condensation of water vapour on the glass filter and filter disk. Do not suck air through the system for prolonged time before or after the test. It is recommended to wait 1 – 3 min after removal of the filter disk before weighing.

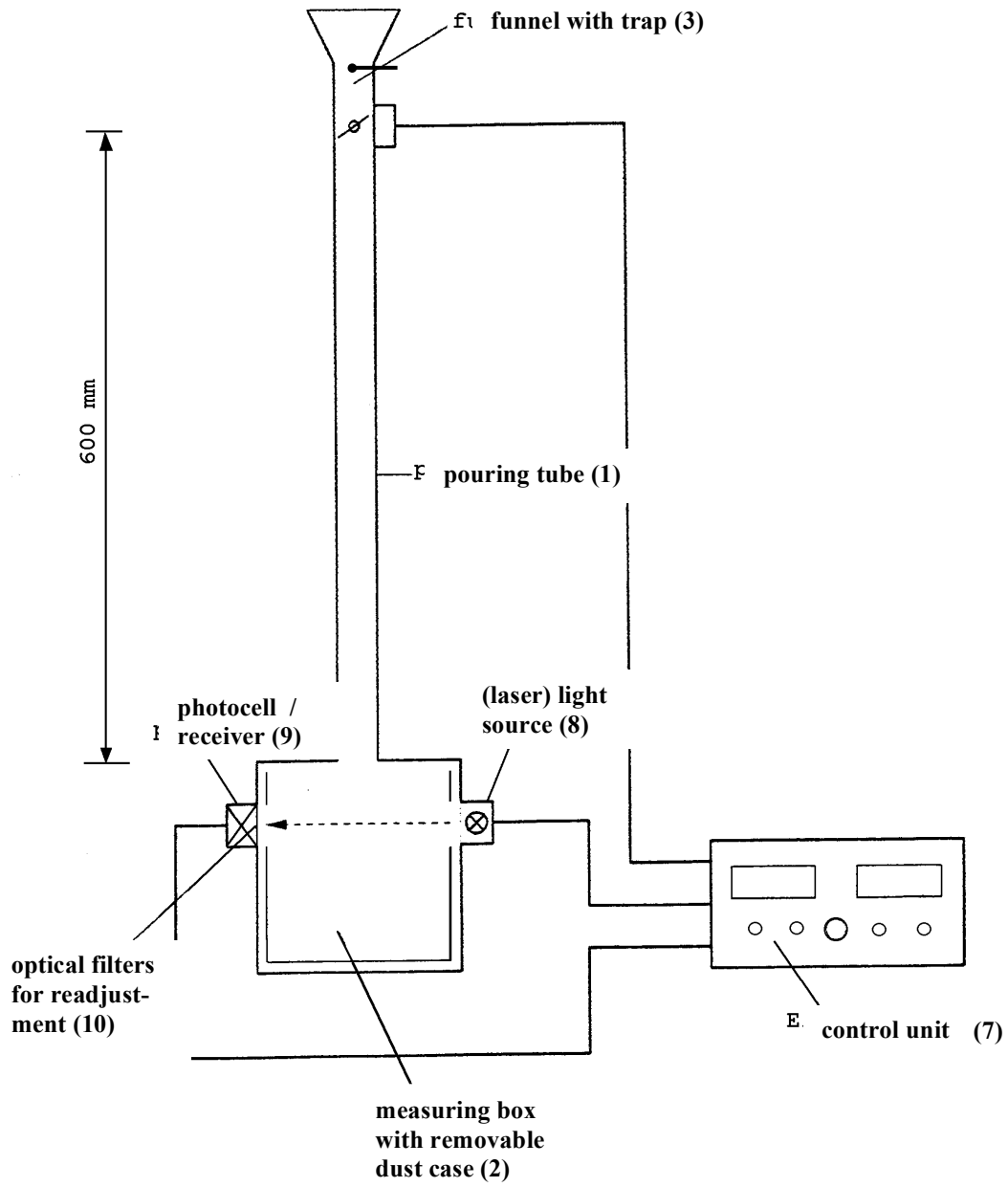
Note 4 Both values used for calculating the “dust value” are mean values and based on averaging several data point. Depending on the instrument, the first mean value is described e.g. as 0.5 s value or ‘maximum value (2 Hz)’. It must not be confused with the not averaged maximum value of the measurement which may be additionally reported by the instrument but is not considered in the calculation of the “dust value”.

Appendix 1



Apparatus for dust measuring (gravimetric method, dimensions in [mm])

Appendix 2



Apparatus for dust measuring (optical method)