TEST REPORT

OFFICIALLY TESTED
AND APPROVED

from the

Julius Kühn Institute

Federal Research Centre for Cultivated Plants, Braunschweig

"Dust Monitor" for measuring the dust load on seed during the coating process

Approved for the monitoring of dust levels during the coating process

Applicant and Manufacturer
SATEC Handelsges. mbH
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Equipment and dimensions

1. Construction and device components

Fig. 2: The dust particles are drawn by vacuum through the photometer.

Measuring device consisting of a container for the test sample, a vibrating chute, a photometer, and a switchbox with touch screen. All components are housed in a steel-sheet casing with two glass doors. The device can be operated from outside via the terminal.

2. Operating principle

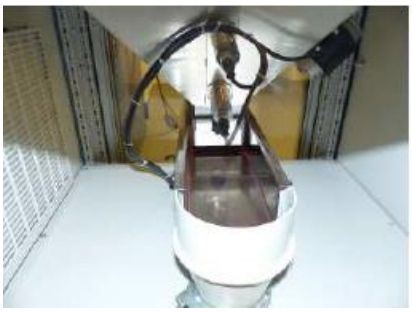
From the seed container with level switch (empty/full), the seed sample passes through a speed controllable vibrating chute into a downpipe. At the end of the downpipe the seed sample can be collected in a suitable container. The sample intake is measured every 3 seconds by a balance underneath

Fig. 3: The measured seed falls into the collection bucket.

Fig. 4: The seed hopper is provided with level switches for "empty" and "full".

the downpipe, checked against the pre-set value (normally between 200 and 500 g/min) and automatically corrected where necessary. A vacuum created by the air connection carries the dust contained in the seed sample against the direction of fall into the measuring system via a pipe branch. Measurements are made photometrically. A fixed amount of purge air passing through a separate air pressure connection ensures that the objective lens is constantly purged with clean air. The compressed air for this purpose should be free of dust and oil. All inputs necessary for the measurements are made on a panel with touch screen, on which the measurement results also are displayed. The measurement data are either recorded on a USB stick or transmitted directly at intervals of one second via a network cable to a network drive in the coating facility.

3. Components



Vibrating chute: Manually or automatically controllable seed chute above the measurement pipe with flange-mounted stainless steel seed hopper. Sliding sleeve for adjusting the thickness of the seed layer in the chute. Type: AVITEQ Type KF1-2, max. 6000 vibrations per minute.

Downpipe: Painted steel downpipe with a diameter of 60 mm, hopper inlet 80 mm, total length of downpipe 540 mm. Branch-off for the measuring tube 60 mm in diameter, then a supply tube to the photometer about 500 mm in length.

Fig. 5: The speed of the vibrating chute is controlled automatically.

Measuring device: Photometer

Balance: Electronic load cell with dimensions to fit the sample container: 240 mm wide and 300 mm long.

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Switch cabinet: Steel-sheet switch cabinet with two glass doors to accommodate the measuring device, with a panel with touch screen on the upper side, and switches for "Power Supply On/Off", "Automatic On/Off", "Logging On/Off", "Vacuum Auto/Man", "Vibrating Chute Auto/Man". Also a regulator for manual adjustment of the vibrating chute.
Connections required: 1 × 240 V, 1 × air pressure supply.

rs can be entered display.

Abb. 5: Über das Touch-Screen-Display lassen sich alle erforderlichen Parameter direkt eingeben.

4. <u>Dimensions and weight</u>

Length:	850 mm
Width:	730 mm
Height:	1350 mm
Weight:	131 kg

Assessment

The device permits automatic stand-alone evaluation of the amounts of dust present in seed samples following the coating process in the coating facility (our testing was done with oilseed rape). Before sampling, the seed must be conditioned by suitable drying methods. To avoid non-representative results, evaluations should not be carried out with damp samples. If the pre-set values for the maximum desired dust limits are exceeded, the unit gives an alarm signal and/or (if so wished) stops the coating facility. Dust levels in the seed samples are measured in "mg/m³" and continuously stored (USB stick or via the network connection). Thus the device, in combination with an automatic sampler, allows continuous monitoring of the coating process in automatic mode. It continuously takes samples of the coated seed after re-drying and before bagging, and transports them to the Dust Monitor.

Before the device is put into operation for the first time, it must be calibrated with a basic setting as given in the instructions for use and with samples previously measured in accordance with the Heubach principle. To this end, the user must adjust the vacuum for dust extraction, the amount of seed (g/min), and also the limit value at which the device sets off an alarm. This ensures that the maximum permissible "Heubach value" is in no case exceeded during ongoing operations.

The parameters for different seed batches or seed types should be documented. They must be stored centrally and must not be subsequently altered by the user ("coater"). With oilseed rape, testing has shown that there is a linear dependency of dust levels in the seed throughput range from 200 to 500 g/min. Comparisons of measured Heubach values in seed samples with the measurements made by the Dust Monitor show good general agreement. However, direct measurement of dust values in accordance with the "Heubach" principle is not possible.

To ensure sufficiently reliable measurement results, the measuring device must shielded as far as possible from external dust sources. In addition to a power connection, it is also necessary to have an air pressure connection for the purge air fitted with a fine dust filter.

Performance level in practical operation

The Dust Monitor measuring device operated without disturbances during operational testing in a coating facility. A total of 2000 t oilseed rape was coated during operation of the device.

Device safety

The technical safety of the device was evaluated by the Central Association of Social Insurance Systems for the Agricultural Sector *["Spitzenverband der landwirtschaftlichen Sozialversicherung"]* in Kassel and fulfils the safety requirements in force at the time of the evaluation.

Operational testing
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Technical testing
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