BS EN ISO 17962:2015

BSI Standards Publication

Agricultural machinery — Equipment for sowing — Minimization of the environmental effects of fan exhaust from pneumatic systems

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National foreword

This British Standard is the UK implementation of EN ISO 17962:2015.

The UK participation in its preparation was entrusted to Technical Committee AGE/6, Agricultural tractors and forestry machinery.

A list of organizations represented on this committee can be obtained on request to its secretary.

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Matériel agricole - Semoirs - Considérations pour réduire au minimum les effets de l'échappement du ventilateur des systèmes pneumatiques (ISO 17962:2015)

Landmaschinen - Sägeräte - Minimierung der Umweltauswirkungen von Gebläseluft bei pneumatischen Geräten (ISO 17962:2015)

This European Standard was approved by CEN on 16 April 2015.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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European foreword

This document (EN ISO 17962:2015) has been prepared by Technical Committee ISO/TC 23 “Tractors and machinery for agriculture and forestry” in collaboration with Technical Committee CEN/TC 144 “Tractors and machinery for agriculture and forestry” the secretariat of which is held by AFNOR.

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Endorsement notice

The text of ISO 17962:2015 has been approved by CEN as EN ISO 17962:2015 without any modification.

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Foreword

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The committee responsible for this document is ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 3, *Safety and comfort*.

Introduction

This International Standard has been developed to consider potential methods of minimizing the effects of seed coating dust drift when mixed in the exhaust fan air flow. This dust has the potential to become fugitive during the sowing process on equipment with pneumatic systems.

INTERNATIONAL STANDARD ISO 17962:2015(E)

Agricultural machinery — Equipment for sowing — Minimization of the environmental effects of fan exhaust from pneumatic systems

1 Scope

This International Standard specifies various means of minimizing the environmental effects of fan exhaust from pneumatic systems for vacuum-style sowing agricultural field equipment used for sowing coated seeds.

It is applicable to vacuum-style sowing systems where "dust off" (fugitive) material from seed coatings can mix with fan (blower) intake air and be exhausted into the atmosphere.

This International Standard is not applicable to

— conveyance systems between a central tank and remote meters where the air is exhausted at the remote meters, and

— conveyance systems where the meter is at a central tank and the air is exhausted at a ground engaging opening device.

The design principles in this International Standard are not applicable to pneumatic equipment for sowing which was manufactured before the date of its publication.

NOTE National or local requirements can apply which could be more stringent.

2 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

2.1
direct drift
quantity of plant protection product that is carried out of and deposited within specified distance of the sowed area by the action of air currents during the sowing process

2.2
fan exhaust zone
cylindrical shape (static) that defines the boundaries of the fan exhaust of a pneumatic system

2.3
vacuum-style sowing system
pneumatic system where negative air pressure is used to meter seeds on equipment for sowing

2.4
zero position
distance from the sowing area that is half of the row width from the last row

Note 1 to entry: See Figure 2.

3 Requirements

3.1 General

A means of minimizing the effects of fan exhaust from pneumatic systems shall be employed using either of the methods found in 3.2 and 3.3.

The application of design principles is an acceptable means to minimize the effects of fan exhaust. Alternatively, testing methods can be used to verify conformance.

3.2 Principles of design method

3.2.1 Fan exhaust outlet

3.2.1.1 The height of the fan exhaust outlet above the ground plane shall be ≤0,5 m with the machine in the sowing mode.

3.2.1.2 The height of the fan exhaust outlet above the ground plane when changing direction in the turning (headland) mode shall be ≤1,5 m.

3.2.2 Fan exhaust system verification

3.2.2.1 The equipment for sowing shall be set up per the manufacturer's recommendations for the shape, size, and sowing rate of 60 000 seeds/ha to 80 000 seeds/ha of the field (dent) maize seed being used.

3.2.2.2 The seed metering device shall be loaded with field (dent) maize seeds (2 500 seeds/kg – 4 000 seeds/kg) as test material.

3.2.2.3 The maximum air velocity of the exhaust stream shall not exceed 2 m/s external to a 2 m radius cylinder centring on the fan outlet and extending from a height of 0,25 m above the ground plane to a cylinder height as defined by 3.2.2.5 and 3.2.2.6. The air velocity at the cylinder sides from the ground plane to 0,25 m height shall not exceed 4 m/s. For verification, eight (8) equally spaced measurements in the cylinder height range shall be made (see Figure 1).

3.2.2.4 When 2 m radius cylinders from separate exhaust outlets intended to operate simultaneously overlap, those overlapping cylinders shall be connected into a single ovoid shape with 2 m radius ends. Air speed measurements shall be taken with both exhaust outlets in operation. Air speed external to the ovoid shall not exceed limits specified for a single exhaust outlet.

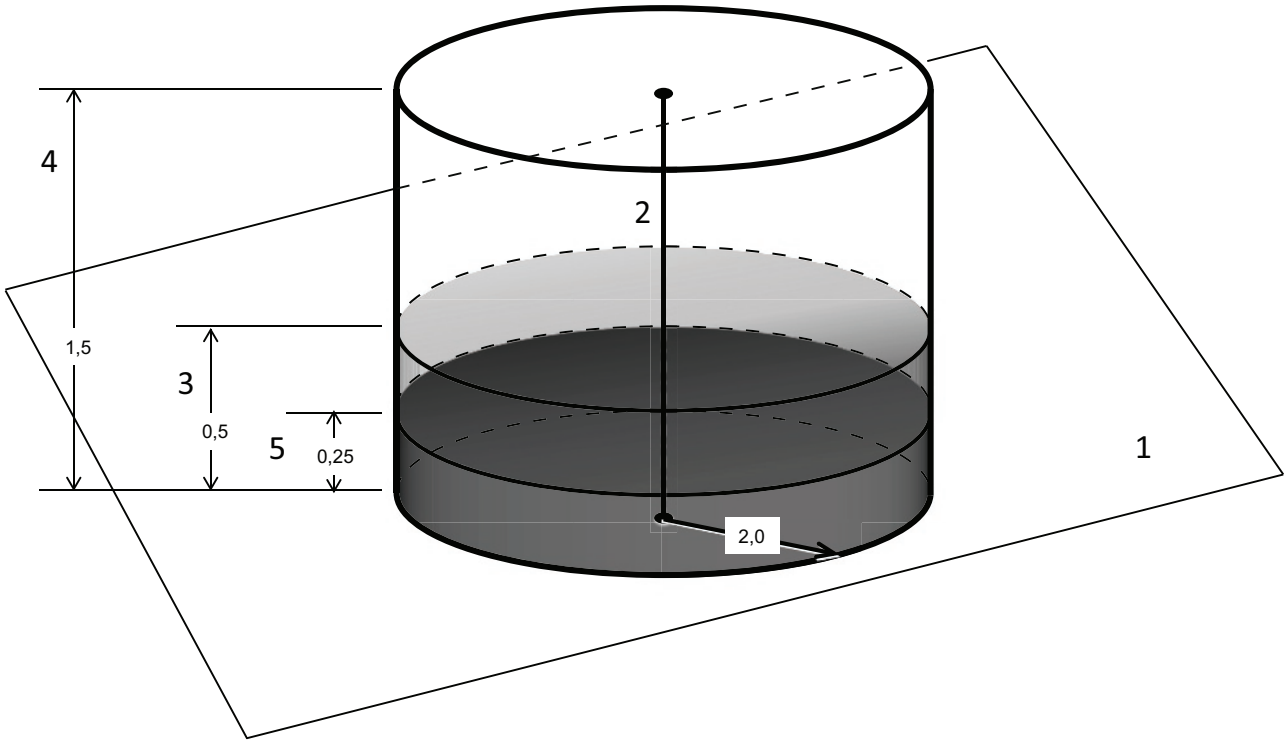
3.2.2.5 The equipment for sowing shall be stationary and the ground plane shall be smooth, level, and unobstructed. The maximum ambient wind speed shall be ≤0,5 m/s.

3.2.2.6 The height of the air velocity measurement cylinder above the ground plane shall be ≤0,5 m with the machine in the sowing mode.

3.2.2.7 The height of the air velocity measurement cylinder above the ground plane when changing direction in the turning (headland) mode shall be ≤1,5 m.

3.2.2.8 The air velocity measurement device shall be an anemometer with a measurement head diameter of 45 mm to 90 mm, a minimum measurement range of 0,5 m/s to 20 m/s and an accuracy of ±2%. The specific volume of the ambient air during testing shall be 0,819 m^3/kg to 0,894 m^3/kg.

Dimensions in metres



Key

1 ground plane
2 fan outlet centre line (normal to ground plane)
3 sowing mode
4 turning (headland) mode
5 area where increased air speed is permissible

Figure 1 — Example of fan exhaust zone

3.3 Test method

3.3.1 Testing area

3.3.1.1 The testing area shall be a field that has been prepared for sowing.

3.3.1.2 Since each repetition will require a new, uncontaminated sowing area and measuring area, the testing area shall be sufficient in size to allow for all repetitions.

3.3.1.3 Adjacent to sowing area and downwind, there shall be adequate space to serve as the measuring area.

3.3.2 Sowing area

3.3.2.1 The sowing area shall be a width of at least 18 m for each repetition.

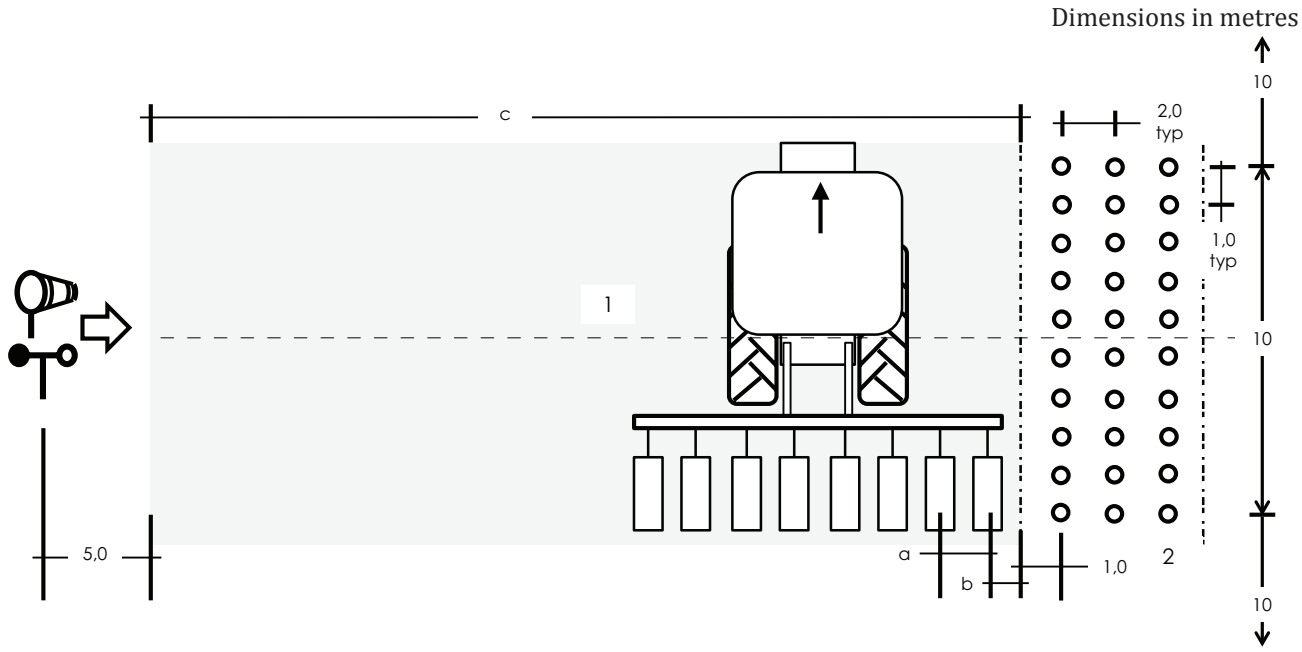
3.3.2.2 The sowing area length shall be 10 m with an entry and exit area lengths of between 10 m and 15 m.

3.3.2.3 The length and position of the sowing area shall be chosen in such a manner that the direct drift always intersects the measuring area during changes in wind direction.

3.3.3 Measuring area

3.3.3.1 Collectors, e.g. Petri dishes with a diameter of 150 mm ± 15 mm shall be distributed on the ground according to Figure 2.

3.3.3.2 The distance between collectors shall be 1 m ± 0,1 m.



Key

a row width of equipment for sowing
b zero position
c sowing area width
1 sowing area (see 3.3.2)
2 measuring area (see 3.3.3)

Figure 2 — Sowing area and measuring area set-up

3.3.4 Test conditions/parameters

3.3.4.1 The sowing equipment shall be set up per the manufacturer's recommendations for the shape and size of the field (dent) maize seed being sowed.

3.3.4.2 Undressed field (dent) maize seeds (2 500 seeds/kg to 4 000 seeds/kg) as test material shall be sowed for every repetition at a rate of 60 000 seeds/ha to 80 000 seeds/ha.

3.3.4.3 The wind speed shall not be lower than 1 m/s and shall be ≤5 m/s.

3.3.4.4 The mean wind direction shall not deviate more than 30° from perpendicular to the direction of driving.

3.3.4.5 Weather data shall be measured 5 m from the trial area in the middle of the measuring area at a height of 2 m.

3.3.5 Test procedure

a) Filter paper shall be placed on the bottom of each collector.

b) The filter paper shall be moistened immediately prior to the test with 5 ml to 10 ml of water, depending on the evaporation conditions.

c) Using a dust dosing feeder, fluorescent tracer powder of a specified particle size shall be fed into the fan inlet during the entire sowing procedure.

d) The supply shall be at least 150 mg/s ± 10 % per fan.

e) The tractor shall be set at a forward speed of 6 km/h for the test. Alternately, the tractor shall be set at the maximum forward speed specified by the manufacturer of the sowing equipment. If this specification is missing, the default forward speed shall be 6 km/h for the test.

f) Each test shall be repeated three times.

g) During the test, the wind direction and wind speed shall be collected continuously with a frequency ≥0,5 Hz.

3.3.6 Measuring method

The direct drift shall be measured as soil sediment.

3.3.7 Measuring locations

The collectors for assessing the soil sediment shall be placed in accordance with Figure 2.

3.3.8 Test evaluation

3.3.8.1 After drying of the collectors with filter papers, the amount of sedimented powder shall be determined fluorimetrically.

3.3.8.2 The mean value (percentage of sediment from the emitted tracer powder) from the 90 measured values (30 for each test), shall be calculated and recorded per 3.5 h).

3.4 Acceptance criteria

The maximum permissible drift value to pass the test shall be the mean of the measured values from 3.3.8.2. The maximum permissible drift value shall not exceed 1,5 % of the applied fluorescent tracer powder to pass the test.

3.5 Test result report

The test result report shall include (as a minimum) the following:

a) manufacturer of the sowing equipment;

b) type of equipment for sowing;

c) characteristics of the equipment for sowing tested, e.g. number of sowing elements, distance between rows;

d) configuration of the equipment for sowing tested (sketch or pictures useful);

e) the air outlet arrangement (sketch or pictures useful);

f) mean weather conditions (temperature, wind speed, wind direction) during the test;

g) the measured values of tracer dye per collector for every collector;

h) the mean value of tracer dye in the collectors;

i) the amount of the emitted tracer dye;

j) percent of applied fluorescent tracer powder as defined in 3.4.

Annex A
(informative)

Example calculation of applied fluorescent tracer powder amount for 8 row equipment for sowing

A.1 Width of equipment for sowing

For determining the width (w) of the equipment for sowing, use Formula (A.1):

$$w = n \cdot a \tag{A.1}$$

where

n	number of rows	8
a	row spacing in mm	762

A.2 Number of passes for minimum test width

For determining the needed width for (3) three passes (p) (rounded up), use Formula (A.2):

$$P = c/w \tag{A.2}$$

where

w	width of equipment for sowing	6,10 m
c	minimum test width in m	18

A.3 Tracer powder input density

For determining the tracer powder input density (m), use Formula (A.3):

$$m = 3{,}6h/(v \cdot w) \qquad 14{,}8 \text{ mg/m}^2 \tag{A.3}$$

where

v	sowing speed in km/h	6
h	rate of tracer powder	150 mg/s
w	width of equipment for sowing	6,10 m

A.4 Maximum allowable collected density

The maximum allowable collected density (z) is 1,5 % of the input density. This value is calculated using Formula (A.4):

$$z = m \cdot y/100 \qquad 0{,}221 \text{ mg/m}^2 \qquad \text{(A.4)}$$

where

m tracer powder input density 14,8 mg/m^2

y definable amount of collected tracer powder 1,5 %

A.5 Collection area

The collection area (q) is determined using Formula (A.5):

$$q = p \cdot \Phi \cdot 10^{-6} \qquad 0{,}530\ 1 \text{ m}^2 \qquad \text{(A.5)}$$

where

Φ area of one 150 mm ± 15 mm round collector 17,671 mm^2 ± 3,711 mm^2

p number of collectors 30

A.6 Measurement of tracer powder collected

The measurement of tracer powder collected (u) is determined using Formula (A.6):

$$u = s/q \qquad 0{,}003 \text{ mg/m}^2 \qquad \text{(A.6)}$$

where

s tracer powder (measured fluorimetrically) 0,001 6 mg (as an example)

q collection area 0,530 1 m^2

A.7 Acceptance criteria

The equipment passes the test if the amount of tracer powder collected (u) is ≤ the maximum allowable collected density (z).

NOTE An active spreadsheet for inputting values from Annex A can be found at http://standards.iso.org/iso/17962/ed-1/.

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