



SLOVENSKI STANDARD
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Kmetijski stroji – Odlagalni in metalni trosilniki mineralnih gnojil – Varovanje okolja – 2. del: Preskusne metode

Agricultural machinery - Solid fertilizer broadcasters and full width distributors - Environmental protection - Part 2: Test methods

Landmaschinen - Ausleger- und Wurf-Mineraldüngerstreuer - Umweltschutz - Teil 2: Prüfmethode

Matériel agricole - Distributeurs d'engrais solides en nappe et centrifuges - Protection de l'environnement - Partie 2: Méthodes d'essai

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13.020.99	Drugi standardi v zvezi z varstvom okolja	Other standards related to environmental protection
65.060.25	U] ^ { ¨ Á ¨ Á ¨ ¨ ¨ ^ } ¨ Ê] ¨ ¨ ¨ [¨ Á ¨ ¨ ¨ ^ ¨ ¨ ¨ ¨ * } [¨ ¨	Equipment for storage, preparation and distribution of fertilizers

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Agricultural machinery - Solid fertilizer broadcasters and full width distributors - Environmental protection - Part 2: Test methods

Matériel agricole - Distributeurs d'engrais solides en nappe et centrifuges - Protection de l'environnement - Partie 2: Méthodes d'essai

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This European Standard was approved by CEN on 20 December 2002.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (EN 13739-2:2003) has been prepared by Technical Committee CEN/TC 144 "Tractors and machinery for agriculture and forestry", the secretariat of which is held by AFNOR.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by September 2003, and conflicting national standards shall be withdrawn at the latest by September 2003.

This European Standard consists of the following parts under the general title *Agricultural machinery - Solid fertilizer broadcasters and full width distributors - Environmental protection*:

— *Part 1: Requirements*

— *Part 2: Test methods*

Annex A is normative and concerns the identification of the physical properties of fertilizer used in the test.

Annexes B and C are informative and give an example of the collector container and the format for the test report.

This document includes a Bibliography.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Slovakia, Spain, Sweden, Switzerland and the United Kingdom.

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EN 13739-2:2003 (E)**1 Scope**

This European Standard specifies methods to test mounted, trailed and self-propelled broadcasters and full width solid fertilizer distributors used in agriculture and horticulture.

This European Standard does not apply to machines which are:

- combined grain and fertilizer drills; or
- equipment for distributing granulated pesticides; or
- solid fertilizer line-distributors (which are dealt with in prEN 13740-1 and in prEN 13740-2).
- If the term 'machine' is used it shall cover both full width distributors and broadcasters, except in the definitions.

2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text, and the publications are listed hereafter. For dated references, subsequent amendments to or revision of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

EN 1235, *Solid fertilizers – Test sieving* (ISO 8397:1988 modified)

EN 1236, *Fertilizers – Determination of bulk density loose* (ISO 3944:1992 modified).

EN 13299, *Fertilizers – Determination of flow rate*

EN 13739-1:2003, *Agricultural machinery – Solid fertilizer broadcasters and full width distributors – Environmental protection – Part 1: Requirements.*

3 Terms and definitions

For the purposes of this European Standard the terms and definitions given in EN 13739-1:2003 apply.

4 Test conditions**4.1 Machine for test**

During the tests the machine shall be used according to the instruction handbook.

In the test the machine shall be driven with a forward test speed which does not vary by more than $\pm 0,1$ km/h and which is within the range of $4 \text{ km/h} \pm 0,4 \text{ km/h}$.

The number of runs for each measurement shall be two.

The flow adjustment using 4 km/h shall be set to correspond to the flow rate obtained at a forward driving speed of 8 km/h .

If the machine is not designed to be used at a forward speed of 4 km/h, the forward test speed shall be within the range of 8 km/h \pm 0,4 km/h or 10 km/h \pm 0,5 km/h or 12 km/h \pm 0,6 km/h and the number of runs shall be four resp. five resp. six with the flow rate set according to the forward speed. The test speed shall also in this case not vary by more than \pm 0,1 km/h from run to run within each test.

The forward speed, PTO ratio and disc speed shall be stated in the test report.

The distributing mechanism shall be at the height above the fertilizer-collecting containers (the upper edge of the containers) equal to that recommended by the manufacturer for work above the ground or the crop.

4.2 Test materials

Unless the instruction handbook states otherwise, test materials shall be used from the following groups and as specified in 6.3 to 6.10:

- a) a granular fertilizer with bulk density $> 0,9 \text{ kg/dm}^3$;
- b) a granular fertilizer with bulk density $\leq 0,9 \text{ kg/dm}^3$;
- c) a prilled fertilizer with bulk density $> 0,9 \text{ kg/dm}^3$;
- d) a prilled fertilizer bulk density $\leq 0,9 \text{ kg/dm}^3$;
- e) a compacted fertilizer.

NOTE Crystalline fertilizers will be considered during the next revision when they have been used more regularly so that experts can agree on their physical properties.

The physical properties for the test material to be used shall be within the limits given in Table A.1.

The physical properties of the test material used shall be specified in the test report.

4.3 Application rates

Unless the instruction handbook states otherwise, the following adjustments calculated for 8 km/h shall be used as selected in 6.3 to 6.10:

- rate 1: a flow rate corresponding to a minimum application rate for the test material depending on the nutrient content, according to Table 1;
- rate 2: a flow rate corresponding to a maximum application rate for the test material depending on the nutrient content, according to Table 1;
- rate 3: a flow rate in between, corresponding to $(\text{rate 1} + \text{rate 2})/2$.

The machine shall be adjusted to give the flow rate of the test material within $\pm 5 \text{ kg/min}$ for flow rates $< 100 \text{ kg/min}$ and $\pm 5 \%$ for flow rates $\geq 100 \text{ kg/min}$. The flow rates are calculated from application rates and working widths at the forward driving speed determined in 4.1.

Table 1 — Minimum and maximum application rates depending on nutrient content

Nutrient	Application rate	
	kg/ha	
	minimum	maximum
N	20	120
P ₂ O ₅ (P)	30 (13)	150 (65)
K ₂ O (K)	40 (33)	300 (249)
MgO (Mg)	25 (15)	100 (60)

NOTE The application rate (kg/ha) is calculated on the basis of the nitrogen (N) content for the test materials which include nitrogen and on the basis of the phosphor (P) content for test materials which include phosphor but no nitrogen.

If there is no (N) or (P), the application rate is calculated on the basis of (K) or (K₂O), and if no (K), on (Mg) or (MgO).

5 Test equipment

5.1 Accuracy in weighing measurements

The minimum accuracy for the weighing of the samples of test materials shall be:

- ± 0,1 g for the tests of 6.6; 6.7; 6.8;
- ± 1,0 g for the test of 6.5.2;
- ± 500 g for the tests of 6.2; 6.3; 6.5.1; 6.9; 6.10.

5.2 Devices for receiving fertilizer for transverse distribution

The collecting containers shall have top external dimensions of 500 mm × 500 mm and precautions shall be taken to minimise spillage by ricochet out of the containers.

NOTE The wall thickness at the top edge should be equal or smaller than 1,5 mm. An example of a funnel shaped container is shown in Figure B.1. The container can also be of rectangular or square vertical section. Test collecting containers with external top dimensions of 250 mm × 500 mm could be used side by side if their collected amount is added together. Existing collecting containers of 250 mm × 1 000 mm could be used since it has been shown that the result corresponds to 500 mm × 500 mm containers.

90 % to 100 % of the expected amount of test materials shall be collected.

This requirement is checked by comparing the application rate calculated from the collecting containers with the application rate obtained in the flow rate test, when using test material from the same batch in both measurements.

5.3 Test site

The tests shall be carried out on an even, horizontal and hard surface. The air velocity shall be less than 2 m/s during the tests. The air humidity shall be less than 65 % and the temperature 10 °C to 25 °C.

The actual values of air humidity, temperature and air velocity shall be stated in the test report. If tests are done outdoors, this shall also be stated in the test report.

Precautions shall be taken to eliminate ricochets from the ground into the collecting containers.

The test site shall be fully described in the report.

5.4 Handling of test materials during the tests

It is important that the test materials are not exposed to the air more than necessary. The maximum exposure time before the test starts is 4 h.

All samples, for later analysis of physical properties, shall be immediately put under airtight storage.

6 Test methods

6.1 Contact with obstacles

For machines equipped with a boom the following test is performed:

An obstacle is placed along a horizontal test track. The machine is moved forward with the speed of 8 km/h. The boom shall hit the obstacle at 90 % to 100 % of the half boom width out measured from the middle of the track (see Figure 2 in EN 13739-1:2003).

The boom movement is observed during the test. After the test the boom section is inspected for any damage and the location of damage is noted in the test report.

6.2 Estimation of hopper volume – Checking of the spillage

The volume of the hopper shall be estimated with one fertilizer of type a) with a bulk density D measured according to EN 1236. If not stated otherwise in the instruction handbook, when estimating the volume of the hopper the machine shall be placed horizontally.

The hopper shall be filled between 10 % to 80 % of the basic hopper volume. This shall be performed three times: one at the 10 % filling level, one at the 45 % filling level and one at the 80 % filling level, with the surface levelled according to the instruction handbook.

At each time the mass M of fertilizer is measured. The volume $V = M / D$ of the fertilizer put into the hopper shall be noted as well as the volume indicated by the hopper scale. The deviation in percent between the volume of fertilizer put into the hopper and the indicated volume shall be noted.

Check by inspection at 80 % filling level of the basic hopper that no spillage occur from the machine during transport when the feeding device is closed or disengaged.

6.3 Adjustment of flow rate

The obtained flow rate shall be measured with the spreader completely equipped and adjusted for field spreading.

If the machine has a manually controlled system for decrease or increase of the flow rate, then the system shall be tested at + 20 % and at – 20 % of flow rate 3. The test shall be performed with test material of type a) as specified in 4.2.

Test samples shall be taken over a period equivalent to that required to collect at least 50 kg.

The deviation of the obtained flow rate from the intended flow rate is calculated as a percentage of the intended flow rate. This value is noted in the test report.

NOTE The test could be performed during the test of flow rate in 6.10.

EN 13739-2:2003 (E)**6.4 Reduced working width or throwing width**

The possibilities to reduce the working width and adjustment for field edge spreading shall be checked with the hopper filled to at least 10 % of the basic hopper volume with a test material of type a) and:

- 1) the working width is reduced symmetrically from the tested working width to the smallest stated reduced working width;
- 2) the machine is adjusted according to the manufacturer's instruction for field edge spreading.

NOTE The inspections could be done during the tests of 6.9 or 6.10. Points 1) and 2) can be done during the test of 6.6.

6.5 Flow rate regulation system, when available (see example in Figure 1)**6.5.1 Deviations of the flow rate**

Fill the basic hopper to at least 25 % of the basic hopper volume.

Set the machine with the automatic system and the test material of type a) and to the specified flow rate 3.

Find out which parameters can influence the regulation system and regulate the flow by using one parameter at a time according to:

- change in speed ± 50 % of average recommended speed; or
- change in application rate ± 50 % of the stated flow above.

After each change, set the machine to flow rate 3 and measure the deviation between the obtained flow rate and the intended flow rate.

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Both positive and negative deviations are measured by collecting all test material with at least 50 kg for each sample. For each parameter tested two measurements shall be made.

Calculate and note in the test report the deviations in percent of the obtained flow rate from the intended flow rate.

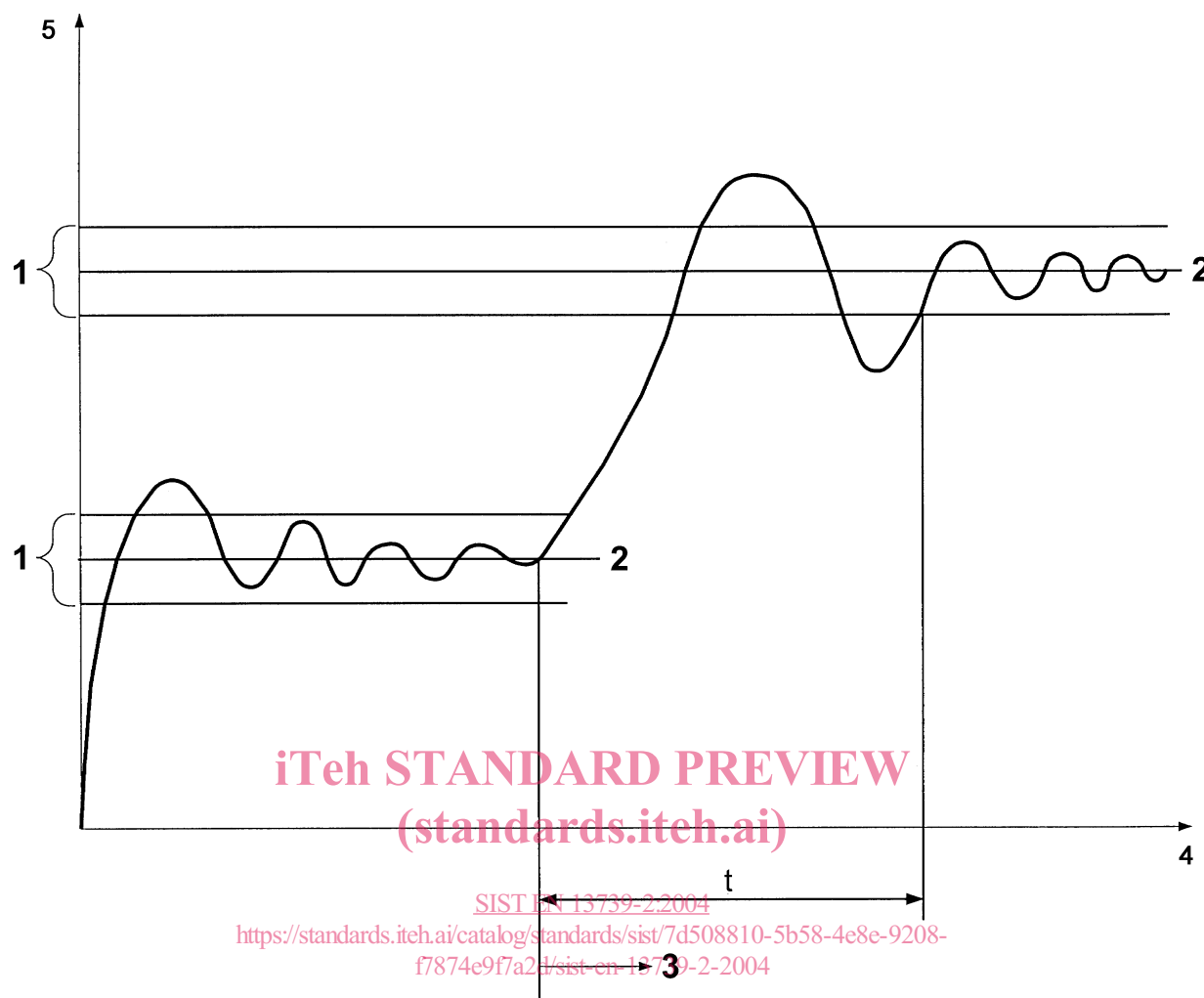
6.5.2 Continuous mass flow measurements

Set the machine with the automatic system and the test material of type a) to the specified flow rate 3.

Measure and note in the test report the time needed to increase the flow rate from flow rate 3 to 1,5 times flow rate 3.

Measure and note in the test report the time needed to decrease the flow rate from flow rate 3 to 0,5 times flow rate 3.

The deviation of the obtained flow rate from the intended flow rate according to Table 1 of EN 13739-1:2003 has to be considered.

**Key**

- | | | | |
|---|--------------------------|---|---------------------------------|
| 1 | Max. permitted deviation | 4 | $x = \text{time (s)}$ |
| 2 | Preset value | 5 | $y = \text{flow rate (kg/min)}$ |
| 3 | Initiation | | |

Figure 1 — Example of types of regulation**6.6 Evenness of transversal distribution****6.6.1 Arrangement of containers**

Containers (see 5.2) shall be placed in a row side by side with their top edges parallel to the ground surface and shall cover at least the throwing width. The row of containers shall be perpendicular to the direction of travel.

Arrange the containers so that the centre of the machine moves between the two collectors which represent the first container on right and left side.

NOTE The influence of for example tractor wheels when passing over the containers should be minimised.