

SLOVENSKI STANDARD SIST EN 13406:2004

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Agricultural machinery - Slurry tankers and spreading devices - Environmental protection - Requirements and test methods for the spreading precision

Landmaschinen - Flüssigmisttankwagen und Verteileinrichtungen - Umweltschultz -Anforderungen und Prüfmethoden für die Verteilgenauigkeit (standards.iteh.ai)

Matériel agricole - Epandeurs de lisier et dispositifs d'épandage - Protection de l'environnement - Prescriptions et méthodes d'essal pour la précision d'épandage 7d02t2ec250/sist-en-13406-2004

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This European Standard was approved by CEN on 2 October 2002.

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

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Contents

Foreword		3	
Introd	duction	4	
1	Scope	5	
2	Terms and definitions	5	
3	Requirements	6	
4	· Verification	7	
5	Instruction handbook	15	
6	Test report	16	
Anne	ex A (normative) Characterisation and determination of physical properties of slurry	17	
Anne	ex B (informative) Filtering of data collected in the longitudinal distribution tests	21	
Biblic	ography	23	

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Foreword

This document EN 13406:2002 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of an identical text or by endorsement, at the latest by May 2003, and conflicting national standards shall be withdrawn at the latest by May 2003.

Annex A is normative and gives information on a method for the characterisation and determination of physical properties of slurry.

Annex B is informative.

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, Iceland, Ireland, Italy, Luxembourg, Malta, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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Introduction

The objective of this standard is to specify test methods and requirements that, as far as possible, allow uniform testing and evaluation of slurry tankers.

The methods and requirements aim at evaluating the slurry tankers and the spreading devices regarding the user's ability, when he uses the machine according to the manufacturer instruction handbook, to:

- control the application rate;
- attain an even distribution of the slurry;
- reduce the load on the external environment, for example by not unintentionally spreading slurry outside the target area.

It should be noted that there is often a great number of varieties of a machine type and also varieties of spreading device. This should be considered when selecting the machine configuration for the tests, with the aim of reducing the necessary number of machines to be tested.

This standard is developed for the evaluation of a complete machine (through transverse and longitudinal tests). The standard can also be used for testing a single piece of the equipment in the form of a spreading device only (transverse tests and pressure/flow measurements) or a tanker only (longitudinal tests and pressure/flow measurements).

1 Scope

This European Standard specifies test methods and requirements for the design and construction of slurry tankers for broadcasting and band spreading of slurry in agriculture and horticulture with the intention of minimising the environmental damage.

It specifies requirements for the transverse and longitudinal spreading characteristics such as working widths, characteristic application rate, characteristic flow and the stretch within the tolerance zone.

NOTE The application of this standard alone will not be sufficient to deal with all the environmental aspects. Other aspects such as ammonia emission, odour reduction etc. should be considered.

These requirements are valid only according to the tests with slurry as described in Table A.1.

Personal safety aspects have not been considered in this standard. These aspects are covered by EN 707.

2 Terms and definitions

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

2.1



a) Mechanically powered slurry tanker

b) Pneumatically powered slurry tanker

Figure 1 — Basic components of a slurry tanker

2.2

broadcasting spreading device

device intended to distribute the slurry over the field surface

2.3

band spreading device

device intended to distribute the slurry in bands separated by bands with no slurry over the field surface or in the soil

2.4

working width

distance between the centre of two adjacent bouts

2.5

throwing width

distance between the left and the right end of a transverse distribution

2.6

unloading time

time needed to empty the first 95 % of the mass of slurry spread

2.7

characteristic flow

average flow calculated over a specified part of the unloading time

NOTE In the case of slurry tankers, this specified part equals 100 % of the unloading time, i.e. the characteristic flow will be equal to the average flow.

2.8

characteristic application rate

application rate calculated on the basis of characteristic flow, working width and forward speed

2.9

tolerance zone

interval of flows within – 15 % and + 15 % of the characteristic flow

2.10

stretch within the tolerance zone

percentage of the unloading time during which the momentary flows lie within the tolerance zone

2.11

unidirectional distribution

distribution obtained when the slurry tanker moves for two adjacent bouts in the same direction

2.12

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"to and fro" distribution

distribution obtained when the slurry tanker moves for two adjacent bouts in opposite direction

3 Requirements

3.1 General

The requirements in this standard are based on the selection of slurry for the tests as described in 4.1.2.

3.2 Transverse distribution

3.2.1 Broadcasting spreading devices – Working widths

The tested unit shall, for a specific setting, have at least one working width so that the coefficient of variation (CV) is lower than 20 % and wider than the half of the throwing width when simulating unidirectional distribution and/or "to and fro" distribution.

The *CV* shall be calculated according to 4.3.1.1 and the throwing width shall be limited to the total width of adjacent collecting containers as far as the container which is adjacent to three adjacent containers containing less than 50 g of slurry.

The test shall be completed in accordance with 4.2.1 and the requirement shall be fulfilled for the settings of flows defined in 4.2.1.3 with slurry selected as specified in 4.1.2.

If the requirement is not met for one of the settings, one additional test shall be completed with that same setting and with slurry selected as specified in 4.1.2 to check the lack of temporary default; this shall be noted in the test report. The calculated CV for this additional test shall then be lower than 20 %.

3.2.2 Band spreading devices – Average deviation

NOTE The method for the collection of slurry in the transverse tests (e.g. the size of the collecting containers), is different for band spreading devices than for broadcasting spreading devices. Therefore, it would be inappropriate to use the *CV* for describing the evenness of spreading for band spreading devices too, since that can lead to misleading comparisons of the evenness of spreading e.g. between different band spreading devices.

The tested unit shall, for a specific setting, have an average deviation which is lower than 15 %.

The average deviation shall be calculated according to 4.3.1.2.

The test shall be completed in accordance with 4.2.1 and the requirement shall be fulfilled for the setting of flows defined in 4.2.1.3.

If the requirement is not met for one of the settings, one additional test shall be completed with that same setting and with slurry selected as specified in 4.1.2 to check the lack of temporary default; this shall be noted in the test report. The calculated averaged deviation for this additional test shall then be lower than 15 %.

3.3 Longitudinal distribution

3.3.1 Characteristic application rate

A test shall be made to check that it is possible to obtain the lowest characteristic application rate specified by the manufacturer, when the forward speed used is lower than 8 km/h. This characteristic application rate shall be stated in the test report.

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The test shall be made in accordance with 4.2.2 and the calculation of the characteristic application rate shall be shal

3.3.2 Stretch within the tolerance zone SIST EN 13406:2004

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The stretch within the tolerance zone determined at a specific setting shall exceed 90 % of the unloading time.

The test shall be made in accordance with 4.2.2 and the calculation of the stretch within the tolerance zone shall be completed according to 4.3.3.

The requirement shall be fulfilled for settings defined in 4.2.1.3.

If the requirement is not met for one of the settings, one additional test shall be completed with that same setting and with slurry selected as specified in 4.1.2 to check the lack of temporary default; this shall be noted in the test report. The calculated stretch within the tolerance zone for this additional test shall then be longer than 90 % of the unloading time.

4 Verification

4.1 Test conditions

4.1.1 Slurry tanker and spreading device

The unit to be tested shall be used in accordance with the instructions given in the instruction handbook. If a slurry tanker is equipped with an agitation device, this device shall operate to avoid separation of the slurry. If the instructions limit the use of the unit, in relation to 4.1.2, this shall be noted in the test report.

When only the spreading device is tested, it can either be mounted on a tanker or mounted in any other way that allows slurry to be supplied from a separate pump (similar to an umbilical system). In all cases the mounting shall allow measurements of pressures and corresponding flows.

When only the tanker (without spreading device) is tested, the tanker shall be connected to equipment that allows pressure/flow measurements to be performed at different backpressures of the spreading devices (for example through a variable valve).

If a complete machine is tested, no pressure measurement at the connection point is necessary.

All pressure measurements shall be made at the connection point for the attachment of the spreader to the tanker (see principle in Figure 1). The inclination of the feeding pipe at the connection point shall be in accordance with the information given by the manufacturer and shall be recorded in the test report.

The inner diameter of the pipe at the connecting point and its height above ground shall be stated in the test report together with a schematic drawing of the connecting point.

The level of liquid in the tanker at the beginning and at the end of the test shall be stated in relation to the connecting points.

4.1.2 Slurry

The slurry is classified in one class as described in annex A. The physical properties of the slurry used in the tests shall be determined in accordance with annex A and shall be stated in the test report.

4.1.3 Filling of slurry

The slurry shall be uniformly agitated before filling the slurry tanker. The test shall be started within 15 min after the filling procedure has been completed.

4.1.4 Test site and ambient conditions

The tests shall be carried out on an even, horizontal surface, indoors or outdoors.

In the case of broadcasting spreading devices the following also applies:

- the unit to be tested shall be oriented with the driving direction as far as possible against the direction of the wind;
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- during the transverse distribution tests the wind velocity shall not exceed 3 m/s, measured 1,5 m above ground level with a limit deviation of ± 0,5 m/s;
- the average values for the wind velocity and wind direction shall be stated in the test report.

4.1.5 Containers for collecting slurry in the transverse distribution test

4.1.5.1 Broadcasting spreading devices

The containers shall have external dimensions of 500 mm \times 500 mm, with a limit deviation of \pm 2 mm, with a maximum wall thickness of 3 mm and with a minimum depth of 100 mm.

Measures shall be taken to avoid spillage of slurry by ricochets out of the containers e.g. by inserts in the containers. The upper edges of the containers shall all be at the same level within \pm 10 mm, and maximum 100 mm above the average ground level.

NOTE It is preferable to keep the upper edges of the containers as close as possible to either the ground or, if the tanker is elevated during the tests so that wheels are above containers, to the lowest part of the wheels of the tested unit.

4.1.5.2 Band spreading devices

The containers shall be designed so that one container can be placed under each outlet.

4.1.6 Accuracy in weighing of collected slurry

The collected slurry shall be weighed with a limit deviation of \pm 10 g or \pm 0,5 % of the reading, whichever is the highest value.

NOTE Since climatic variations can influence the mass of the slurry, there should be as short a time interval as possible between the weightings.

4.1.7 Device for measuring the flow of slurry

4.1.7.1 General

The flow of slurry shall be determined either by registration of the changes of the mass of the tested unit and the time elapsed since the beginning of the test, or by the use of equipment for direct flow measurements.

4.1.7.2 By registration of mass and time

The mass shall be registered with a limit deviation of \pm 10 kg or \pm 0,5 % of the reading, whichever is the highest value. The signal transmitted to the registration equipment shall have a resolution of at least 1 kg.

The time shall be registered with a limit deviation of \pm 0,01 s or \pm 0,1 % of the reading, whichever is the highest value. The signal transmitted to the registration equipment shall have a resolution of at least 0,01 s.

4.1.7.3 By registration of the flow

The flow shall be registered with a limit deviation of ± 1 l/s or ± 1 % of the reading, whichever is the highest value. The signal transmitted to the registration equipment shall have a resolution of at least 1 l/s.

NOTE This accuracy can be reached by using an electromagnetic flow meter.

4.1.8 Device and method for measuring pressure (standards.iteh.ai)

The pressure shall be measured with a limit deviation of \pm 25 kPa (0,25 bar) or \pm 5 % of the reading, whichever is the highest value. <u>SIST EN 13406:2004</u>

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The pressure shall be measured at a distance? at least five times the pipe diameter, from any bend or change in pipe area. The aperture for the measuring device shall be oriented perpendicular to the direction of the pipe.

NOTE The measurement can also be made with an electronic sensor of which the sensing surface is fixed to the inner surface of the pipe.

4.2 Test procedure

4.2.1 Transverse distribution test

NOTE This test applies to the testing of the spreading device of a complete machine or of spreading devices alone.

4.2.1.1 When testing the spreading device for broadcasting, the containers shall be placed with their edges parallel to the ground surface so that they are perpendicular to the line of travel of the machine and cover the total throwing width. In the case of a rearward throwing unit, the containers shall be placed so that the dividing line between the two containers in the middle coincides with the longitudinal vertical plane dividing the unit in two halves.

When testing the spreading device for band spreading the tested unit may be stationary with one container under each outlet.

NOTE Special arrangements can be needed (e.g. an overpass for the wheels of the tanker on which the tested unit is mounted) in order to ensure that containers can be located in all positions.

4.2.1.2 All transverse distribution tests shall be performed when at least 10 % and at most 90 % of the original mass of slurry to be filled in the tanker has been spread.

4.2.1.3 At least two tests shall be performed. Depending on the intended use of the tested unit according to the instruction handbook, these tests shall, if possible, be performed at different settings of the flow. The settings shall represent the full working range as specified by the manufacturer. In the case when only a spreading device is