BS EN 13739-1:2011

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Agricultural machinery — Solid fertilizer broadcasters and full width distributors — Environmental protection

Part 1: Requirements

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National foreword

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The UK participation in its preparation was entrusted to Technical Committee AGE/32, Agricultural implements and trailers.

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

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Contents

Foreword

This document (EN 13739-1:2011) 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of an identical text or by endorsement, at the latest by April 2012, and conflicting national standards shall be withdrawn at the latest by April 2012.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN [and/or CENELEC] shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 13739-1:2003.

This 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*

The following changes were introduced compared to the previous version:

— an update of the normative references.

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Introduction

The objective of this European Standard is to specify requirements for fertilizer distributors used according to the instruction handbook, so that:

a) unintentional spreading of fertilizers is avoided;

b) an even distribution of fertilizer with the desired application rate is achieved.

This European Standard does not include any direct requirements for the longitudinal distribution. The requirements for evenness of flow rate will partly cover that subject.

1 Scope

This European Standard specifies requirements for the environmental protection for design and construction of mounted, trailed and self-propelled full width solid fertilizer distributors and solid fertilizer broadcasters used in agriculture and horticulture. It also gives the requirements for the minimum content of the instruction handbook.

The standard does not apply to machines which are:

a) combined grain and fertilizer drills; or

b) equipment for distributing granulated pesticides; or

c) solid fertilizer line-distributors (which are dealt with in EN 13740-1:2003 and in EN 13740-2:2003).

Personal safety aspects have not been considered in this standard; they are dealt with in EN 14017:2005+A2:2009.

If the term ‘machine’ is used it covers both full width distributors and broadcasters, except in the definitions.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 13739-2:2011, *Agricultural machinery — Solid fertilizer broadcasters and full width distributors — Environmental protection — Part 2: Test methods*

3 Terms and definitions

For the purposes of this document, the following definitions apply (see Figure 1):

3.1
solid fertilizer distributor
machine which spreads fertilizer in a continuous way on the soil surface and in the crop

3.1.1
solid full width fertilizer distributor
solid fertilizer distributor which spreads fertilizer over the whole surface and which has a working width which is roughly the same as the machine width

3.1.2
solid fertilizer broadcaster
solid fertilizer distributor which spreads fertilizer over the whole surface and which has a working width which is essentially wider than the machine width

3.1.3

solid fertilizer line-distributor
solid fertilizer distributor which spreads fertilizer in bands separated by bands without fertilizer and which has a working width which is roughly the same as the machine width

3.2
combined grain and fertilizer drill
machine which simultaneously applies seed and fertilizer

3.3
border
line that surrounds the area within which fertilizer is to be applied

3.4
working width
distance between two adjacent tramlines

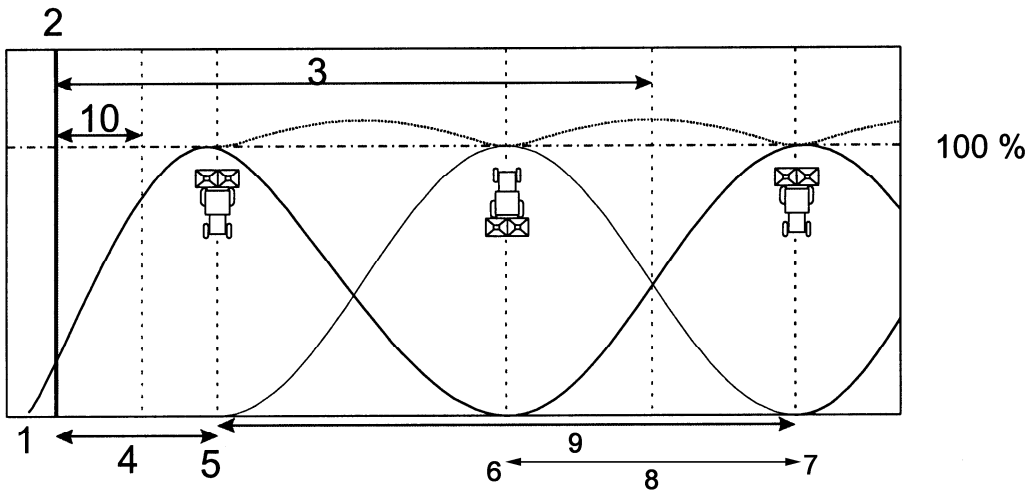
3.5
throwing width
distance between the left and the right end of a single pattern

3.6
border distance
distance selected from the border to the edge tramline

3.7
edge width
first five meters from the border inside the area within which fertilizer is to be applied

3.8
transition width
distance from the border to the centre between the first and second field spreading tramline

3.9
fertilizer limit
line measured from the border beyond which no fertilizer is found continuously



Key

1 Fertilizer limit
2 Border
3 Transition width
4 Border distance
5 Edge tramline
6 First field spreading tramline
7 Second field spreading tramline
8 Working width
9 Throwing width
10 Edge width

Figure 1 — Illustration of definitions related to border spreading

3.10
application rate
weight of solid fertilizer applied per unit area, in kg/ha

3.11
flow rate
amount of solid fertilizer leaving the feeding system(s), in kg/min

NOTE The relation between the flow rate and the application rate is given by the following formula:
Flow rate (kg/min) = [application rate (kg/ha) × travelling speed (km/h) × working width(m)] :600

3.11.1
intended flow rate
flow rate desired by the user

3.11.2
obtained flow rate
flow rate given by the machine for a certain machine control setting during spreading in simulated conditions as described in EN 13739-2

3.12
spillage
fertilizer which falls uncontrolled from the machine to the ground when the feeding device is closed or disengaged

4 Requirements

4.1 General

The machine shall be designed to allow easy handling and adjustments for different types of fertilizers to be used, in order to ensure that the chosen amount of fertilizer per area is spread evenly and in the area at which it is aimed. The machine shall fulfil at least the requirements given 4.2 up to 4.13.

NOTE The manufacturer should also take into consideration that the machine may work in a corrosive environment.

4.2 Hopper filling opening

The machine shall be designed to minimize the risk that undesirable materials will cause blockages and influence the flow rate or the distribution spreading pattern in a negative way. This can for example be achieved by a grid.

4.3 Cleaning and emptying of residuals

Emptying and collecting the fertilizer from the hopper shall be possible without spreading and without unintentional flow to the ground. If tools are necessary to empty the hopper they shall be delivered with the machine and a place shall be provided on the machine for their storage.

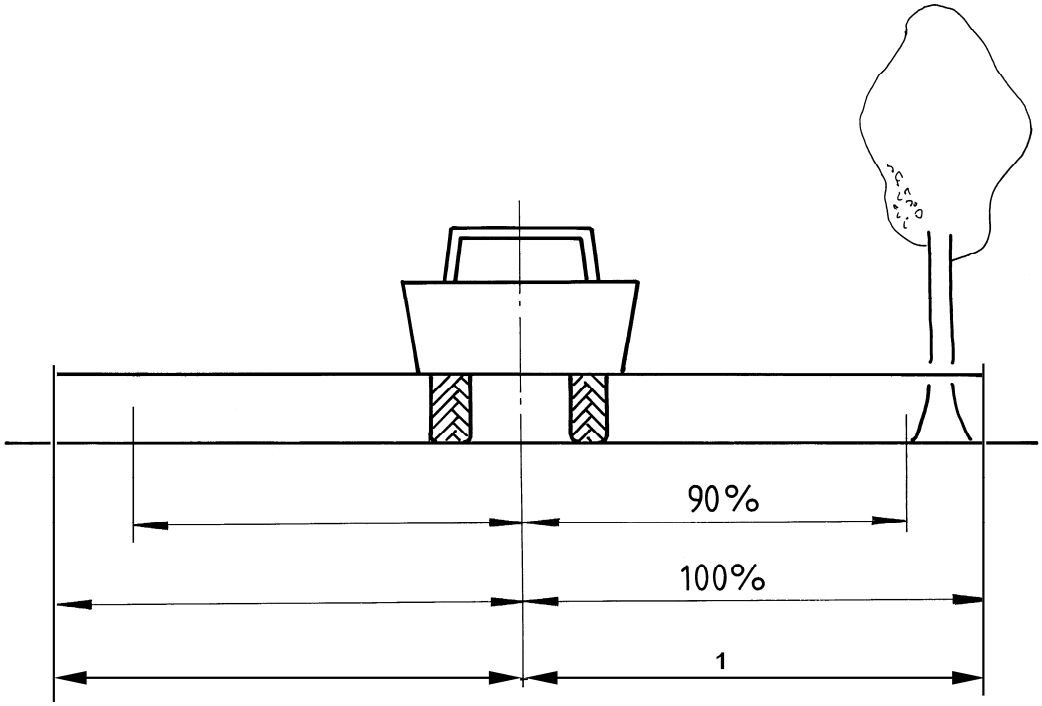
It shall be possible for a person, standing on the ground or on the existing access means to clean the machine.

4.4 Contact with obstacles

On a full width distributor fitted with a boom with a working width more than 10 m, the outer end of the boom shall be able to move backwards in case of contact with obstacles in the field. If the full width distributor is moved forwards at 8 km/h and the obstacle is within 90 % to 100 % of half the boom width measured from the

middle of the track, the boom or sections of the boom shall be able to give way without being damaged (see Figure 2).

The boom sections shall return automatically to their original position after contact with the obstacle.



Key

1 Half boom width

Figure 2 — Identification of half boom width

4.5 Estimation of hopper volume

The basic-hopper of the machine (e.g. the hopper without any extension walls), shall be fitted with a scale in litres by which the volume of fertilizer in the hopper can be determined. The scale shall cover at least 10 % to 80 % of the basic-hopper volume and have a graduation for at least each 10 % of the nominal volume of the basic-hopper. The accuracy of the graduations shall be within ± 10 % of the reading.

4.6 Adjustment of flow rate

4.6.1 Machines with a hopper volume of 600 l or more, shall either be equipped with:

a) relevant calibration aids (for example chute, guide, collector) to adjust the flow rate; or

b) a system which controls the flow rate automatically (for example load-sensor, mass flow control).

4.6.2 If the machine is fitted with a manually controlled system which allows a variation of the flow rate, then this variation range shall be at least ± 20 % of the intended flow rate, but shall not exceed the limit values defined in 4.13.

4.6.3 It shall be possible to make the adjustment stepless or in steps of maximum 10 % of the intended flow rate.

4.7 Flow rate regulation system

If the machine is fitted with an automatic system which controls the flow rate, depending on speed, working width, and application rate, the deviation of the obtained flow rate from the intended flow rate shall fulfil the requirements of Table 1.

The adjustment of the feeding system with fertilizer of type a) as defined in 4.2 and 4.3 of EN 13739-2:2011 shall occur within 5 s when adjusting the flow rate from the flow rate 3 by changing parameters, influencing the regulation system, by ± 50 %, but shall not exceed the limit values defined in 4.12.1.

4.8 Adjustment of working width

It shall be possible to adjust the machine to a different working width (for example to a reduced working width) and for border spreading even when the hopper is filled with fertilizer.

4.9 Feeding device

The control(s) (e.g. lever, switches, etc.) of the feed mechanism shall have a clearly marked on and off position related to opened and closed feed mechanism. This marking can be replaced by an indicator visible to the operator at the driver's position, showing whether the feed mechanism is on or off.

4.10 Spillage

With the feeding device closed or disengaged, no spillage shall occur from the filled machine to the ground during transport.

4.11 Evenness of transversal distribution

4.11.1 Field spreading

The evenness of the transversal distribution for fertilizer distributors shall be such that the calculated value of the coefficient of variation (CV), when driving to and fro, does not exceed 15 % calculated in accordance with EN 13739-2. This requirement shall be met for all stated conditions (e.g. working widths and fertilizer type) except for border spreading.

The above requirement shall also be fulfilled for fertilizer distributors equipped with systems for flow rate regulation as mentioned in 4.7.

4.11.2 Border spreading

It shall be possible to use the machine for border spreading, with or without extra equipment, with the aim that no fertilizer is spread out of the field. This requirement is fulfilled if the calculation of value Y according to 7.1.4 of EN 13739-2:2011 is less than 3,0 ‰ .

At no point within the edge width shall the application rate exceed the average application rate found, when testing according to 4.11.1, by more than 20 %.

The coefficient for the transition width, CT, shall not exceed 25 % calculated in accordance with 7.1.4 of EN 13739-2:2011.

4.11.3 Top-dressing

When equipment and/or adjustments are used to spread fertilizer in a high crop, the CV for the evenness of transverse distribution shall not exceed the CV for the evenness of distribution as defined in 4.11.1 and 4.11.2.

4.12 Setting of flow rate

4.12.1 For the fertilizers listed in the instruction handbook, it shall be possible to set the flow rate in the range between the stated maximum and minimum flow rates.

4.12.2 The maximum allowed deviation of the obtained flow rate from the intended flow rate shall be as given in Table 1 when it is measured in accordance with EN 13739-2.

Table 1 — Maximum allowed deviation of the obtained flow rate from the intended flow rate

Intended flow rate kg/min	**Maximum allowed deviation** of the obtained flow rate from the intended flow rate %
< 25	15
25 – 150	10
> 150	7,5

4.13 Evenness of obtained flow rate

During spreading, when tested, the deviation in the obtained flow rate shall not exceed the values in Table 2. The requirement shall be fulfilled with the hopper filled to all levels above 5 % of the capacity for the basic hopper volume and for all slopes up to 10°.

Table 2 — Maximum allowed deviation in obtained flow rate

Average obtained flow rate (kg/min)	**Maximum allowed deviation of the average obtained flow rate** %
< 25	10
25 – 150	7,5
> 150	5

5 Instruction handbook

An instruction handbook shall be delivered with the machine. The text shall be in at least one of the official languages of the country in which the distributor is sold. An example of checklist for the instruction handbook is given in annex A.

The instruction handbook shall be such that it does not deteriorate during normal use.

The instruction handbook shall contain at least the points listed below. If the figures given vary with the type of fertilizer used, the information shall be extended to each type of fertilizer:

a) a description of the machine's function and of its proper use;

b) a list of the types of fertilizer which are suitable for the machine;

NOTE 1 The list may be based on types of fertilizers or physical properties of the fertilizers.

c) a description of handling, care and maintenance of the machine which enable the driver to adjust, check and use it as it is intended to operate;

NOTE 2 All information for the adjustment of the distributor may also be durably marked on the machine.

d) instructions about the risk of corrosion and how to reduce it, including recommendations on when to change vital parts due to wear and corrosion;

e) an explanation about the relationship between the travelling speed and the application rate, including instructions for checking the flow rate, or for land driven machines the application rate;

f) the means to influence the fertilizer distribution (spreading pattern), i.e. more/less in the middle of the spreading pattern respectively more/less in the range of overlap of the spreading pattern, and how to adjust the spreading pattern;

g) the possible working widths and instructions how to get a different working width (normal and reduced);

h) instructions on the adjustment of the spreader to avoid spreading over the border for at least one distance per working width between the edge tramline and the border;

i) instructions on how to spread towards and from the headland in order to obtain an even spreading and avoid fertilizer being spread outside the field.

6 Verification

The test methods to be used for the verification of the requirements in Clause 4 shall be as listed in Table 3. Also the content of the instruction handbook has to be checked as listed in Table 3.

Table 3 — Test methods for verifying different requirements

Requirements		Test method		References
Clause	**Quality**	**Inspection**	**Function test**	
4.2	Hopper filling opening	X		
4.3	Cleaning and emptying of residuals	X		
4.4	Contact with obstacles		X	6.1 of EN 13739-2:2011
4.5	Estimation of hopper volume		X	6.2 of EN 13739-2:2011
4.6.1	Calibration aids	X		
4.6.2	Adjustment of flow rate		X	6.3 of EN 13739-2:2011
4.7	Flow rate regulation systems		X	6.5 of EN 13739-2:2011
4.8	Adjustment of working width		X	6.4 of EN 13739-2:2011
4.9	Feeding device	X		
4.10	Spillage	X		
4.11.1	Evenness of transverse distribution for field spreading		X	6.6 of EN 13739-2:2011
4.11.2	Evenness of transverse distribution for border spreading		X	6.7 of EN 13739-2:2011
4.11.3	Evenness of transversal distribution for top dressing		X	6.8 of EN 13739-2:2011
4.12.1	Setting of maximum and minimum flow rate	X	X	6.9 of EN 13739-2:2011
4.12.2	Setting of intended flow rate		X	6.9 of EN 13739-2:2011
4.13	Evenness of flow rate		X	6.10 of EN 13739-2:2011
5	Instruction handbook	X		

Annex A
(informative)

Checklist for the instruction handbook for full width distributors and solid fertilizer broadcasters

A.1 Specifications

a) Make;

b) type;

c) identification number;

d) mass of the machine (empty);

e) maximum permissible load on the machine (fully loaded);

f) maximum weight on each axle for a fully loaded, trailed machine;

g) maximum weight on the tractor's drawbar for a fully loaded, trailed machine;

h) name and address of manufacturer;

i) minimum and maximum PTO speed for normal use.

A.2 Description of function

a) Symbols;

b) specifications of maximum rearward spreading length and lateral (left and right) spreading width;

c) tyre pressure for the machine tyres;

d) specifications of optimal tyre and wheel equipment (including recommended tyre pressures for these);

e) description of the agitator device.

A.3 Description of adjustments

a) Adjustment of the machine height relative to the ground or the crop;

b) adjustment of the machine inclination in relation to the horizontal plane;

c) instructions on how to fill the machine to obtain an even distribution;

d) how to prevent spillage during transport;

e) application rate tables, selection of forward speed and diagrams showing the distribution pattern (principals);

f) settings for different types of application rates, types of fertilizer and other factors that affect the result of the distribution;

g) adjusting of the working width;

h) how to set field-related application rates.

A.4 Function checks

a) Calibration test for checking the application rate;

b) field test for checking the application rate;

c) how to use special equipment when performing field tests of transversal distribution;

d) checking the rotational frequency;

e) checking the machine inclination and its height above the ground.

A.5 Advice on driving technique

a) Driving technique on the field and the headland and for the laps;

b) interrupted spreading in case of too high wind velocities;

c) use of permanent tramlines or other methods for keeping constant distance to the adjacent lap;

d) engaging and disengaging the spreading in the headland;

e) driving close to the border;

f) spreading with partial shut-off.

A.6 Operation and maintenance

a) Cleaning the inside and outside of the machine;

b) lubrication, greasing and change of oil;

c) corrosion-resistance;

d) necessary checks on wear and corrosion (wear limits) on all parts that are significant for the spreading results;

e) repairs and changing of worn-down parts: power shafts, transporters, spreading mechanisms, seals etc.;

f) specify what repairs ought to be done by the manufacturer/dealer.

Bibliography

[1] EN 13740-1:2003, *Agricultural and forestry machinery — Solid fertilizer line-distributors — Environmental protection — Part 1: Requirements*

[2] EN 13740-2:2003, *Agricultural and forestry machinery — Solid fertilizer line-distributors — Environmental protection — Part 2: Test methods*

[3] EN 14017:2005+A2:2009*, Agricultural and forestry machinery — Solid fertilizer distributors — Safety*

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