

Fertilizer distributors —

Part 1: Methods of evaluating performance under laboratory and field conditions

[ISO title: Equipment for distributing fertilizers — Test
methods — Part 1: Full width fertilizer distributors]

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Committees responsible

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- Agricultural Engineers' Association
- British Agricultural and Garden Machinery Association Ltd.
- British Agrochemicals Association
- Health and Safety Executive
- Ministry of Agriculture, Fisheries and Food
- National Farmers' Union
- National Institute of Agricultural Engineering
- United Kingdom Agricultural Supply Trade Association Ltd.

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National foreword

This British Standard has been prepared under the direction of the Agricultural Machinery and Implements Standards Committee. It is identical with ISO 5690-1:1982 “*Equipment for distributing fertilizers — Test methods — Part 1: Full width fertilizer distributors*” published by the International Organization for Standardization (ISO).

Terminology and conventions. The text of the International Standard has been approved as suitable for publication as a British Standard without deviation. Some terminology and certain conventions are not identical with those used in British Standards; attention is drawn especially to the following.

The comma has been used as a decimal marker. In British Standards it is current practice to use a full point on the baseline as the decimal marker.

Wherever the words “this part of ISO 5690” appear, referring to this standard, they should be read as “this Part of this British Standard”.

Cross-references

International Standards	Corresponding British Standards
ISO 500:1979	BS 5861:1980 <i>Specification for rear-mounted power take-offs on agricultural tractors</i> (Technically equivalent)
ISO 3534:1977	BS 5532:1978 <i>Statistics — Vocabulary and symbols</i> (Identical)
ISO 3944:1980	BS 5551 <i>Fertilizers</i> Part 3.1:1981 <i>Method for the determination of bulk density (loose)</i> (Identical)

The Technical Committee has reviewed the provisions of ISO 339-0, ISO 3789, ISO 5698, ISO 5699 and ISO 7424, to which reference is made in the text, and has decided that they are acceptable for use in conjunction with this standard.

There is no corresponding British Standard for ISO 565, but BS 410 “*Specification for test sieves*” is related.

Additional information. The proposed text of an amendment to Annex A is given in National appendix A.

A British Standard does not purport to include all the necessary provisions of a contract. Users of British Standards are responsible for their correct application.

Compliance with a British Standard does not of itself confer immunity from legal obligations.

Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, pages 1 to 14, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

0 Introduction

The aim of this part of ISO 5690 is to harmonize testing of full width solid fertilizer distributors first to fix the variable conditions of laboratory testing, and second to give guidance for the field testing conditions.

The laboratory test will describe the influence of forward speed, flow rate, fertilizer level in hoppers, bumps and transverse tilting.

Optional field tests (see Annex B) will complete the laboratory tests by describing the influence of slope and the condition of the ground as well as the wind.

1 Scope and field of application

This part of ISO 5690 specifies a test method for equipment for full width distribution of solid fertilizers and applies to agricultural full width fertilizer distributors.

NOTE Equipment designed for distributing microgranular pesticides or herbicides is excluded. Part 2 of ISO 5690 deals with distributors of fertilizers in lines. (See ISO 3339-0 for the classification.)

2 References

ISO 500, *Agricultural tractors — Power take-off and drawbar — Specification.*

ISO 565, *Test sieves — Woven metal wire cloth, perforated plate and electroformed sheet — Nominal sizes of openings*¹⁾.

ISO 3339-0, *Tractors and machinery for agriculture and forestry — Classification and terminology — Part 0: Classification system and classification.*

ISO 3534, *Statistics — Vocabulary and symbols.*

ISO 3789, *Tractors, machinery for agriculture and forestry, powered lawn and garden equipment — Location and method of operation of operator's controls — Part 1: Common controls*²⁾ — *Part 2: Controls for agricultural tractors and machinery*²⁾.

ISO 3944, *Fertilizers — Determination of bulk density (loose).*

ISO 5698, *Agricultural machinery — Hoppers — Manual loading height.*

ISO 5699, *Agricultural machines, implements and equipment — Dimensions for mechanical loading with bulk goods.*

ISO 7424, *Agricultural wheeled tractors and rear mounted implements — Code numbering system.*

3 Definitions

The definitions relating to the distribution of fertilizers will be covered in ISO 3339-5.

For the purpose of this part of ISO 5690, the following definition applies.

application rate (of fertilizer)

the quantity, expressed as mass or volume, of fertilizer distributed per unit length or unit area

4 General test conditions

NOTE The manufacturer or his representative shall be entitled to be present at the tests.

4.1 Fertilizer distributor

4.1.1 Selection

The fertilizer distributor to be submitted to testing may be selected by the representative of the test station in agreement with the manufacturer.

The fertilizer distributor shall, in every regard, be strictly in accordance with the specifications which the manufacturer is required to send to the test station in writing.

The test report (see Annex C) shall specify how the distributor to be tested has been selected.

4.1.2 Manufacturer's instructions

The distributor shall be used in accordance with the instructions given in the manufacturer's user's handbook, to avoid in particular the use of fertilizers which are specified as not suitable for the machine. Any restrictions of this kind should be specified in the test report.

4.1.3 Checking of specifications

During the checking of specifications, the distributor shall rest on a solid horizontal surface.

4.2 Fertilizer

4.2.1 Types of fertilizer used for the tests

Carry out, unless indicated otherwise by the manufacturer of the machine (comment in the test report), each of the performance tests with the following types of fertilizer:

- type a: a powdered fertilizer;
- type b: a granular fertilizer;
- type c: a crystalline or prilled fertilizer;
- type d: optionally, any other fertilizer which the test station considers of sufficient importance and whose physical properties differ from those of the fertilizers mentioned above.

¹⁾ At present at the stage of draft. (Revision of ISO 565:1972.)

²⁾ At present at the stage of draft. (Revision of ISO 3789:1976.)

4.2.2 *Physical properties of the fertilizer*

Determine the physical properties of the fertilizer used in the tests: particle size, (loose) bulk density, water content, angle of repose. (See Annex A.) These values shall be noted in the test report.

4.3 *Filling of distributor*

Insert the fertilizer in accordance with the specifications of the manufacturer of the distributor into the hopper immediately prior to testing so that there is no time for settling or consolidation.

4.4 *Execution of tests*

The tests shall be carried out on an even, horizontal and hard surface, either indoors or out of doors. In the case of outdoor testing, for mandatory tests, the wind speed shall not exceed 2 m/s; for optional tests, the wind speed shall not exceed 7 m/s.

If the tests are carried out on concrete or on the ground, precautions shall be taken to avoid ricochet. The p.t.o. rotational frequency shall be that for which the distributor is designed. The p.t.o. rotational frequency on the tractor shall be in accordance with ISO 500.

If the manufacturer provides differing instructions, the rotational frequency used shall be mentioned in the test report. Prior to testing, check the p.t.o. rotational frequency.

The forward speed at which runs are made shall be constant. The forward speeds for testing are 8 km/h or 15 km/h according to the choice of the manufacturer, except for tests on the effect of forward speeds. The distributing mechanism shall be at the same height, above the fertilizer collecting receptacles (for example the upper edge of the containers), as that recommended by the manufacturer for work above ground or crop.

4.5 *Distributing application rates*

- a) **powdered fertilizers:** 600 kg/ha and maximum and minimum quantities currently used in agricultural practice for this type of fertilizer;
- b) **granular fertilizer:** 400 kg/ha and maximum and minimum quantities currently used in agricultural practice for this type of fertilizer;
- c) **crystalline or prilled fertilizer:** 150 kg/ha and maximum and minimum quantities currently used in agricultural practice for this type of fertilizer.

The transverse tests for evenness shall be carried out at rates a), b), c), and with the maximum quantity and the minimum quantity as shown by the manufacturer in the features of the equipment.

The longitudinal tests shall also be carried out with rates a), b), and c).

4.6 *Devices for receiving fertilizer*

The collecting containers shall have external dimensions of either 1 000 mm × 250 mm, or 500 mm × 500 mm and shall have a minimum depth of 150 mm. However, for full width distributors only containers of 1 000 × 250 mm shall be used.

Measures shall be taken to avoid spillage by ricochet out of the containers, such as

- interlocking inserts for dividing the containers into cells of dimensions 50 mm × 50 mm with a height not exceeding half the height of the container (see Figure 1);
- net (see Figure 2) unstretched and draped over the containers.

5 *Mandatory tests*³⁾

5.1 *Evenness of transverse distribution*

5.1.1 *Arrangement of containers*

Containers (see 4.6) placed side by side with their edges parallel to the ground surface shall cover the total distributing width so that their longitudinal axis is parallel to the forward axis of the distributor. If it is necessary to allow spaces between the containers for the passage of tractor wheels, these shall be as small as possible and shall be a multiple of the width of a container.

5.1.2 *Procedure*

Carry out the test at 8 km/h or 15 km/h with a half-full hopper but with a quantity of fertilizer not exceeding 2 t.

Distribute each quantity envisaged (see 4.5) in at least two runs without intermedial weighing so as to eliminate the influence of lengthwise distribution unevenness. The number of runs shall be sufficient so that the amount collected by a container allows weighing with a minimum accuracy of 1 % (0,1 g per 10 g).

Successive runs shall be perfectly coincident with each other. The number of runs and the quantities distributed shall be mentioned in the test report.

Weigh the fertilizer collected in each container.

5.1.3 *Tilt (to simulate transverse imbalance)*

Repeat the previous test

- in the case of trailed equipment by mounting one of the wheels of the distributor, on to moving rollers raised 100 mm;

³⁾ For the optional tests, see Annex B.