
**Crop protection equipment — Drift
classification of spraying equipment —
Part 2:
Classification of field crop sprayers
by field measurements**

*Matériel de protection des cultures — Classification de la dérive des
matériels de pulvérisation —*

*Partie 2: Classification des pulvérisateurs à rampes par mesurage
au champ*



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Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

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

ISO 22369-2 was prepared by Technical Committee ISO/TC 23, *Tractors and machinery for agriculture and forestry*, Subcommittee SC 6, *Equipment for crop protection*.

ISO 22369 consists of the following parts, under the general title *Crop protection equipment — Drift classification of spraying equipment*:

- *Part 1: Classes*
- *Part 2: Classification of field crop sprayers by field measurements*

The following part is under preparation:

- *Part 3: Potential spray drift measurement for field crop sprayers by the use of a test bench*

Introduction

ISO 22369 (all parts) specifies the drift classification of spraying equipment. ISO 22369-1 defines the spray drift reduction classes. The other parts of ISO 22369 specify the test procedures and, therefore, ISO 22369-1 is intended to be used in combination with one of the other parts of ISO 22369.

Spray drift of plant protection products can contaminate non-target or sensitive areas, such as surface water hence minimum spray distances or buffer zones, are often specified. Using sprayers and/or sprayer parts, which reduce levels of spray drift, can enable these distances to be reduced. Drift classification procedures for sprayers and sprayer parts facilitate decision making by the farmer and can be of interest in defining best practice or for regulation/legislation.

Spray drift can occur as airborne drift and ground sedimentation of drift fallout. Classification in this part of ISO 22369 is based on the comparison of levels of ground sedimentation from spraying equipment (for example sprayers or parts of sprayers) with reference spraying systems based on the use of spraying equipment according to good agricultural practice for plant protection in different regions and crops. Spray drift deposition or collection is measured at different distances from the target area and the drift reducing performance of the spraying equipment is rated against a reference spraying system.

The object of ISO 22369 (all parts) is to provide uniform procedures for the determination of the drift reducing performance of spraying equipment.

Crop protection equipment — Drift classification of spraying equipment —

Part 2: Classification of field crop sprayers by field measurements

1 Scope

This part of ISO 22369 specifies the drift classification procedure for field crop sprayers by field measurements of spray drift sedimentation in conformity with ISO 22866, including the test methods and evaluation criteria needed. It also allows the allocation of the spray drift reduction classes specified by ISO 22369-1.

This part of ISO 22369 is intended to determine the drift reducing performance of field crop sprayers by comparison with a reference spraying system in order to rate (classify) the field crop sprayers. The application of this part of ISO 22369 can support advisory services for farmers, product development and legal certification and classification schemes.

This part of ISO 22369 is intended to be used together with ISO 22369-1.

This part of ISO 22369 is applicable to mounted, trailed and self-propelled field crop sprayers used in field crops.

2 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.

ISO 22369-1, *Crop protection equipment — Drift classification of spraying equipment — Part 1: Classes*

ISO 22866, *Equipment for crop protection — Methods for field measurement of spray drift*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 22369-1 and ISO 22866 and the following apply.

3.1 zone 1
 1 m to 5 m zone
 zone which is downwind and adjacent to the directly sprayed zone and which is at a distance of between 1 m and 5 m from the directly sprayed zone

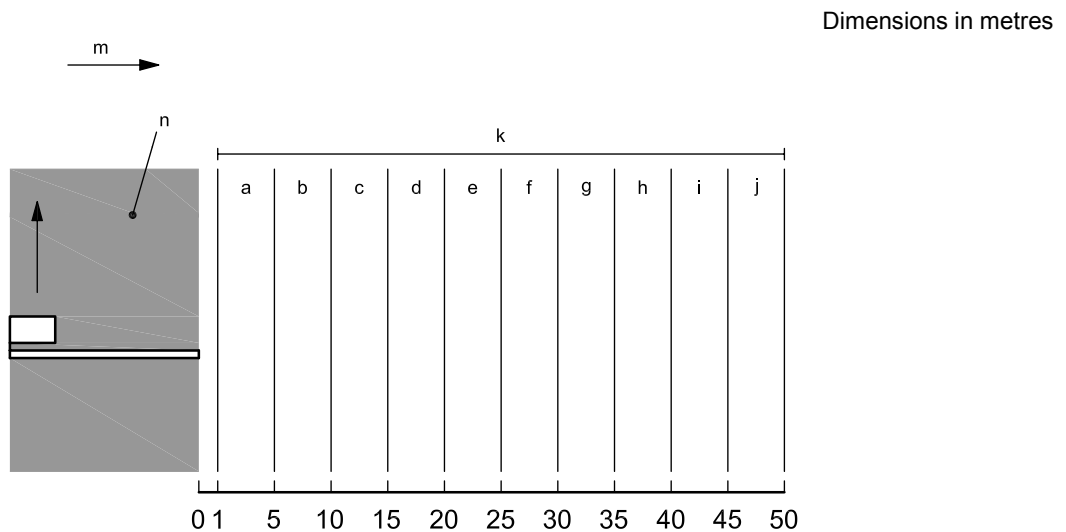
See Figure 1.

3.2 zone 2 to zone 10
 5 m to 10 m zone to 45 m to 50 m zone
 zones which are downwind and further away from the directly sprayed zone, and which are 5 m apart and between 5 m and 50 m from the directly sprayed zone

See Figure 1.

3.3 zone 11
 zone which is downwind and used for assessing the drift, which consists of one specific, several or all zones from zone 1 to zone 10 and which is at a distance of 1 m up to 50 m from the directly sprayed zone

For the 1 m to 50 m example, see Figure 1.



Key					
a	zone 1	f	zone 6	k	zone 11
b	zone 2	g	zone 7	m	wind direction (as specified in ISO 22866)
c	zone 3	h	zone 8	n	directly sprayed zone
d	zone 4	i	zone 9		
e	zone 5	j	zone 10		

Figure 1 — Zone 1 (1 m to 5 m) to zone 11 (1 m to 50 m)

4 Classification

The classification is based on the comparison of the candidate spraying equipment (field crop sprayer to be specified) with the reference spraying system (see 5.2). The classification may include classes A to F (see ISO 22369-1) and may be done for one, several or all zones specified in Figure 1.

The classification of the spraying equipment depends on the amount of reduction in soil sediments of the spray drift determined by field measurements (see 5.1), compared with the spray drift deposition of the reference spraying system (see 5.2), in a comparative measurement at the same time and weather and crop condition.

The classification is based on the evaluation (see 5.3).

5 Drift classification procedure

5.1 Measurements

The measurements shall be carried out in accordance with ISO 22866 and downwind from the edge of the directly sprayed zone. The soil sediments shall be measured in one, several or all zones specified in Figure 1 and at least at the distances to the directly sprayed zone shown in Table 1.

NOTE Additional zones can be added in case of special interests.

Table 1 — Distances for ground sediment measurements

Zone	Distance to the sprayed zone m	Zone	Distance to the sprayed zone m
1 (1 m to 5 m)	1, 3, 5	7 (30 m to 35 m)	30, 35
2 (5 m to 10 m)	5, 10	8 (35 m to 40 m)	35, 40
3 (10 m to 15 m)	10, 15	9 (40 m to 45 m)	40, 45
4 (15 m to 20 m)	15, 20	10 (45 m to 50 m)	45, 50
5 (20 m to 25 m)	20, 25	11	1, 5, 10, 20, 30, 40, 50
6 (25 m to 30 m)	25, 30		

5.2 Reference spraying system

The reference spraying system is defined by the equipment-related data (as given in Table 2), crop-related data (as given in Table 3) and meteorological data (as given in Table 4). The crop-related data shall be the same and the meteorological data shall be as similar as practicable for the candidate and the reference spraying equipment and shall be specified.

Due to the different good agricultural practices for plant protection in different regions and crops, the modification of the reference spraying system may be necessary. However, to allow international comparison of measurements, any classification scheme shall include data derived with the equipment as given in Table 2.

NOTE The comparison of classification is limited due to differences in the reference spraying system caused by variation in crop-related data and metrological data.

Table 2 — Equipment-related data

Nozzle type	Comparable with ISO 25358 ^a
Spray pressure	See above
Nozzle size	Borderline nozzle, fine/medium ^b
Nozzle height above target	50 cm
Driving speed	6 km/h to 8 km/h
^a Under preparation.	
^b Typically used in north-western Europe.	

Table 3 — Crop-related data

Type of crop	
Crop condition and growth stage	
Physical description (including height of crop)	

Table 4 — Meteorological data

Wind speed	
Wind direction	
Air temperature	
Air humidity	

5.3 Statistical evaluation and classification

The candidate spraying equipment is classified in a drift reduction class if no median value for the respective zone is statistically significantly higher than the respective percentage of the drift value from the reference spraying system for that zone. This shall be evaluated by use of the Wilcoxon signed-rank test or the Student's *t*-test for each measuring distance. The choice of the statistical test (Wilcoxon or Student's *t*-test) shall be made according to the distribution of the values.

Bibliography

- [1] ISO 22856, *Equipment for crop protection — Methods for the laboratory measurement of spray drift — Wind tunnels*
- [2] ISO 25358, *Crop protection equipment — Droplet-size spectra from atomizers — Measurement and classification*
- [3] ASAE 572, *Spray nozzle classification by droplet spectra*

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