
**Equipment for crop protection —
Vocabulary**

Matériel de protection des cultures — Vocabulaire

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Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

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For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html.

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

This third edition cancels and replaces the second edition (ISO 5681:1992), which has been technically revised.

The main changes compared to the previous edition are as follows:

- review and addition of new terms and definitions, in line with new International Standards published and developed by ISO/TC 23/SC 6.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

Equipment for crop protection — Vocabulary

1 Scope

This document defines terms commonly used in relation to equipment for applying plant protection products for crop protection.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <http://www.electropedia.org/>

3.1 General terms

3.1.1 plant protection product PPP

any substance or micro-organism, including a virus, or a mixture or solution composed of two or more of them, prepared in the form in which it is supplied to the user intended: to protect plants or plant products against harmful organisms or prevent the action of such organisms, influence the life processes of plants other than as a nutrient, preserve plant products, destroy undesired plants or parts of plants, or check or prevent the undesired growth of plants

3.1.2 plant protection product container

collective name for *plant protection product* (3.1.1) packaging such as cans, bottles, bags, sacks or boxes

3.1.3 formulated product

plant protection product (3.1.1) as purchased by users

3.1.4 ready-to-use formulated product RTU formulated product

formulated product (3.1.3) that does not require dilution

3.1.5 active ingredient

substance with primary biological activity for specified uses

3.1.6 carrier diluent

substance used to dilute the *active ingredient* (3.1.5) to aid in metering and delivery

3.1.7 treatment

operation of applying *plant protection products* (3.1.1) to produce a biological effect

3.1.8

overall treatment

treatment (3.1.7) carried out over the entire area of a crop or field

3.1.9

localised treatment

treatment (3.1.7) carried out over part of a crop or field, generally in bands or spots

3.1.10

treated area

sprayed area

area to which the *treatment* (3.1.7) is intended

3.1.11

spray target

specific pest, part of the plant, or surface to which the *treatment* (3.1.7) is intended

3.1.12

liquid flow

liquid flow rate

volume of liquid flowing through an appliance or device per unit of time

3.1.13

liquid output

volume of liquid discharged by an appliance or device per unit of time

3.1.14

air flow

air flow rate

volume of air flowing through an appliance or device per unit of time

3.1.15

air output

volume of air discharged by an appliance or device per unit of time

3.1.16

application equipment

device or assembly of components to mix and apply *plant protection products* (3.1.1) and other compatible chemicals, including fertilisers, to the target

3.2 Equipment for spraying

3.2.1 Basic definitions

3.2.1.1

spraying

division and emission into the air of a *spray liquid* (3.2.1.4) by atomisation into the form of droplets

3.2.1.2

spray

droplets produced by a *nozzle/atomiser* (3.2.3.1)

3.2.1.3

sprayer

spray system

machines/appliances for application of *plant protection products* (3.1.1) and liquid fertiliser

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3.2.1.4**spray liquid
spray mixture**

liquid containing the *formulated product* (3.1.3) ready for *spraying* (3.2.1.1)

3.2.1.5**droplet**

substantially spherical liquid particle, generally with a diameter less than 1500 µm

3.2.1.6**droplet size**

diameter of the *droplet* (3.2.1.5) in micrometre (µm)

3.2.1.7**droplet size spectrum**

cumulative distribution of *droplet sizes* (3.2.1.6) by volume or number

3.2.1.8**volume median diameter****vmd** **$D_{v0,5}$**

droplet size (3.2.1.6) where half the volume of the spray is in larger droplet sizes and half in smaller droplet sizes

3.2.1.9**number median diameter****nmd** **$D_{n0,5}$**

droplet size (3.2.1.6) where half the number of droplets in a spray are in larger droplet sizes and half in smaller droplet sizes

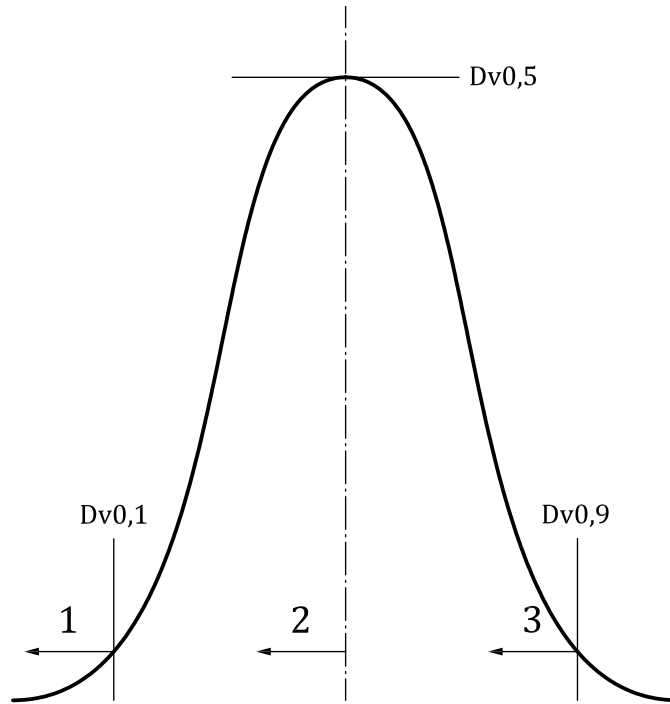
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Note 1 to entry: The vmd/nmd ratio is used to characterise the uniformity of droplet sizes in a spray.

3.2.1.10**span**

measure of range of *droplet sizes* (3.2.1.6) in a spray

Note 1 to entry: Span is expressed as $\frac{D_{v0,9} - D_{v0,1}}{D_{v0,5}}$ (see [Figure 1](#)).



Key

- 1 10 % of spray volume below this size
- 2 50 % of spray volume below this size
- 3 90 % of spray volume below this size

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Figure 1 — Droplet spectrum parameters for calculation of span

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3.2.1.11 droplet volume fraction

$D_{v0,x}$
droplet size (3.2.1.6) where the fraction 0,x of the spray volume (3.2.2.14) is in smaller droplet sizes

Note 1 to entry: See also [Figure 1](#).

3.2.1.12 sauter mean diameter

SMD
 $D_{3:2}$
diameter of a droplet having the same volume/surface area ratio as the entire spray

3.2.1.13 mist
spray with volume median diameter (3.2.1.8) between 50 µm and 100 µm

3.2.1.14 fog aerosol
spray with volume median diameter (3.2.1.8) under 50 µm where the droplets are effectively suspended in air with little or no settling by gravity

3.2.1.15 controlled droplet application cda
spray with a narrow droplet size spectrum (3.2.1.7), designed for a specific target, defined by limits of vmd/nmd ratio or span (3.2.1.10)

3.2.1.16**flat spray**

spray with a flat shape

3.2.1.17**flat fan spray**

spray with a thin flat ellipsoid shape

3.2.1.18**conical spray**

spray with a conical shape

3.2.1.19**solid stream spray**

spray with a cylindrical shape

3.2.1.20**sprayer liquid delivery system**

system for delivery of *spray liquid* ([3.2.1.4](#)) from the *spray tank* ([3.2.9.1](#)) to the *nozzle/atomiser* ([3.2.3.1](#))

3.2.1.21**sprayer set up**

combination of nozzle and boom parameters and sprayer adjustment on a specific sprayer model

3.2.1.22**spray quality**

classification of *droplet size spectrum* ([3.2.1.7](#)) against a reference

3.2.1.23**spray volume fraction** **V_y**

fraction of the *spray volume* ([3.2.2.14](#)) in droplets smaller than y micron

3.2.2 Types of spraying**3.2.2.1****hydraulic energy spraying****hydraulic pressure spraying**

spraying ([3.2.1.1](#)) obtained by using only the hydraulic energy of the *spray liquid* ([3.2.1.4](#))

3.2.2.2**centrifugal spraying**

spraying ([3.2.1.1](#)) obtained by the use of centrifugal force imparted to the *spray liquid* ([3.2.1.4](#)), generally by mechanical rotational energy from a spinning disc, cup or gauze

3.2.2.3**pneumatic spraying**

spraying ([3.2.1.1](#)) obtained by the action of a high velocity air stream on the *spray liquid* ([3.2.1.4](#)), generally after the nozzle outlet and using a distributor/plate

3.2.2.4**air-assisted spraying**

spraying ([3.2.1.1](#)) in which the droplets are carried wholly or partly by a flow of artificially created air

3.2.2.5**electrostatic spraying**

spraying ([3.2.1.1](#)) obtained by the use of electrostatic forces or where electrostatic forces are used to aid *spray deposition* ([3.7.2.9](#))

3.2.2.6

ultra-sonic spraying

spraying (3.2.1.1) obtained either partly or wholly by (ultra-)sonic energy

3.2.2.7

thermal spraying

spraying (3.2.1.1) obtained either partly or wholly by thermal energy

3.2.2.8

twin fluid spraying

spraying (3.2.1.1) obtained by the action of a pressurised air stream mixed with the *spray liquid* (3.2.1.4) before the nozzle outlet

3.2.2.9

precision spraying

directed and/or *localised application* (3.6.2.6) to improve spray targeting

EXAMPLE Using sensors, maps, etc.

3.2.2.10

sensor activated spraying

spraying (3.2.1.1) adaptation using sensors

3.2.2.11

crop adapted spraying

canopy adapted spraying *spraying* (3.2.1.1) adaptation based on physical characteristics of the crop, e.g. canopy size and/or density

3.2.2.12

underleaf spraying

spraying (3.2.1.1) where the spray target (3.1.11) is the underside of the leaves

3.2.2.13

spray dose

quantity of *plant protection product* (3.1.1) applied

3.2.2.14

spray volume

quantity of *spray liquid* (3.2.1.4) applied

3.2.3 Droplet generators

3.2.3.1

nozzle

atomiser

device to form droplets from a *spray liquid* (3.2.1.4)

3.2.3.2

hydraulic energy nozzle

part or an assembly of parts with an orifice through which the *spray liquid* (3.2.1.4) is forced under hydraulic pressure to provide the energy to obtain a spray at the orifice

3.2.3.3

fan nozzle

hydraulic energy nozzle (3.2.3.2) with an orifice in the shape of a slit or elliptical orifice, producing a flat shape of spray

3.2.3.4

flat fan nozzle

fan nozzle (3.2.3.3) producing a thin flat ellipsoidal spray

3.2.3.5**double flat fan nozzle**

flat fan nozzle (3.2.3.4) having two separate orifices when mounted, intended to direct spray into and rearward of the direction of travel

3.2.3.6**centrifugal energy nozzle****rotary nozzle****rotary atomiser**

device atomising the *spray liquid* (3.2.1.4) by centrifugal energy

3.2.3.7**deflector nozzle****anvil nozzle****impact nozzle****flood(ing) nozzle**

hydraulic energy nozzle (3.2.3.2) with a deflector producing a flat shape of spray, with the shape of the spray dependent on the deflector

3.2.3.8**off-centre nozzle**

nozzle (3.2.3.1) in which the fan pattern is not symmetrical around the centerline of travel for the nozzle

EXAMPLE End nozzle.

3.2.3.9**off-centre fan nozzle**

fan nozzle (3.2.3.3) in which the angle of the spray shape and volume distribution are asymmetrical about the nozzle axis

3.2.3.10**directional nozzle**

nozzle (3.2.3.1) which enables the direction of spray to be altered

3.2.3.11**cone nozzle**

hydraulic energy nozzle (3.2.3.2) in which the *spray liquid flows* (3.1.12) rotationally, or is swirled, producing a conical sheet of spray

3.2.3.12**hollow cone nozzle****disc-core nozzle**

cone nozzle (3.2.3.11) in which most of the *spray liquid* (3.2.1.4) is in the outside of the conical spray pattern

3.2.3.13**solid cone nozzle****full cone nozzle**

cone nozzle (3.2.3.11) in which *spray liquid* (3.2.1.4) is directed throughout the conical spray pattern

3.2.3.14**solid stream nozzle**

nozzle (3.2.3.1) which produces a cylindrical spray

3.2.3.15**impinging stream nozzle**

hydraulic energy nozzle (3.2.3.2) designed so that spray is produced by the impact of two or more streams of *spray liquid* (3.2.1.4)

3.2.3.16

**pneumatic nozzle
air shear nozzle**

atomiser ([3.2.3.1](#)) in which the spray is produced by the action of an air stream on the *spray liquid* ([3.2.1.4](#))

3.2.3.17

**twin fluid nozzle
air atomising nozzle**

nozzle ([3.2.3.1](#)) in which mixing of spray liquids or the *spray liquid* ([3.2.1.4](#)) and air takes place under pressure within the nozzle with the spray discharged through a common nozzle tip

3.2.3.18

adjustable nozzle

hydraulic energy nozzle ([3.2.3.2](#)) designed so that the *spray liquid flow rate* ([3.1.12](#)) to the nozzle tip and spray droplet size can be altered without changing the components

3.2.3.19

vibratory nozzle

nozzle ([3.2.3.1](#)) in which an oscillating solid surface is the primary source of energy used to produce the spray

3.2.3.20

ultra-sonic nozzle

pneumatic ([3.2.3.16](#)) or *vibratory nozzle* ([3.2.3.19](#)) in which energy is imparted to the spray by (ultra-) sonic waves

3.2.3.21

fog nozzle

nozzle ([3.2.3.1](#)) for producing a fog

3.2.3.22

pre-orifice nozzle

nozzle ([3.2.3.1](#)) with an internal orifice that meters the *spray liquid* ([3.2.1.4](#)) prior to producing spray at the nozzle tip

3.2.3.23

variable orifice nozzle

nozzle ([3.2.3.1](#)) with an adjustable opening to vary *spray liquid flow rate* ([3.1.12](#)) and/or droplet size

3.2.3.24

**air induction nozzle
venturi nozzle**

pre-orifice nozzle ([3.2.3.22](#)) with a hole in the chamber between the two orifices to suck external (generally atmospheric) air into a reduced pressure chamber to mix with the *spray liquid* ([3.2.1.4](#))

3.2.3.25

**pulse width modulation nozzle
PWM nozzle**

nozzle ([3.2.3.1](#)) using a controlled solenoid valve to determine the volume of *spray liquid* ([3.2.1.4](#)) sprayed from the nozzle, thereby allowing independent variation of *spray liquid flow rate* ([3.1.12](#)) and *spraying* ([3.2.1.1](#)) pressure

3.2.3.26

vibrating reed nozzle

vibratory nozzle ([3.2.3.19](#)) in which individual droplets are formed from a needle point attached to an oscillating reed

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3.2.3.27**vibrating needle nozzle**

vibratory nozzle (3.2.3.19) in which *spray liquid* (3.2.1.4) under pressure is passed through a vibrating needle to form a liquid jet which disintegrates into droplets

3.2.3.28**piezoelectric vibratory nozzle****Bergland-Liu nozzle**

vibratory nozzle (3.2.3.19) in which a piezoelectric transducer transmits high frequency oscillations to a liquid jet to create droplets

3.2.3.29**electromagnetic vibratory nozzle**

vibratory nozzle (3.2.3.19) in which an electromagnetic transducer transmits high frequency oscillations to a liquid jet to create droplets

3.2.3.30**nozzle body****nozzle holder**

main component into or on which other components of a nozzle are fitted, generally mounted on the *spray boom* (3.2.7.4), *nozzle bar* (3.2.7.5) or *spray lance* (3.2.7.1)

Note 1 to entry: See key 3 in [Figure 2](#).

Note 2 to entry: In some designs, the *nozzle boss* (3.2.3.32) performs the function of the body and the *cap nut* (3.2.3.31) screws directly on to the boss.

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