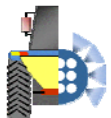




Cambios en la normativa Europea: Nuevas ISO 16122 y ISO 16119

Prof. Emilio Gil
Universidad Politècnica de Catalunya



Unidad de Mecanización Agraria
<http://uma.deab.upc.edu>



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DE CATALUNYA
BARCELONATECH



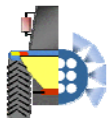
DIRECTIVA 2009/128/CE DEL PARLAMENTO EUROPEO Y DEL CONSEJO

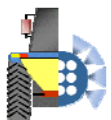
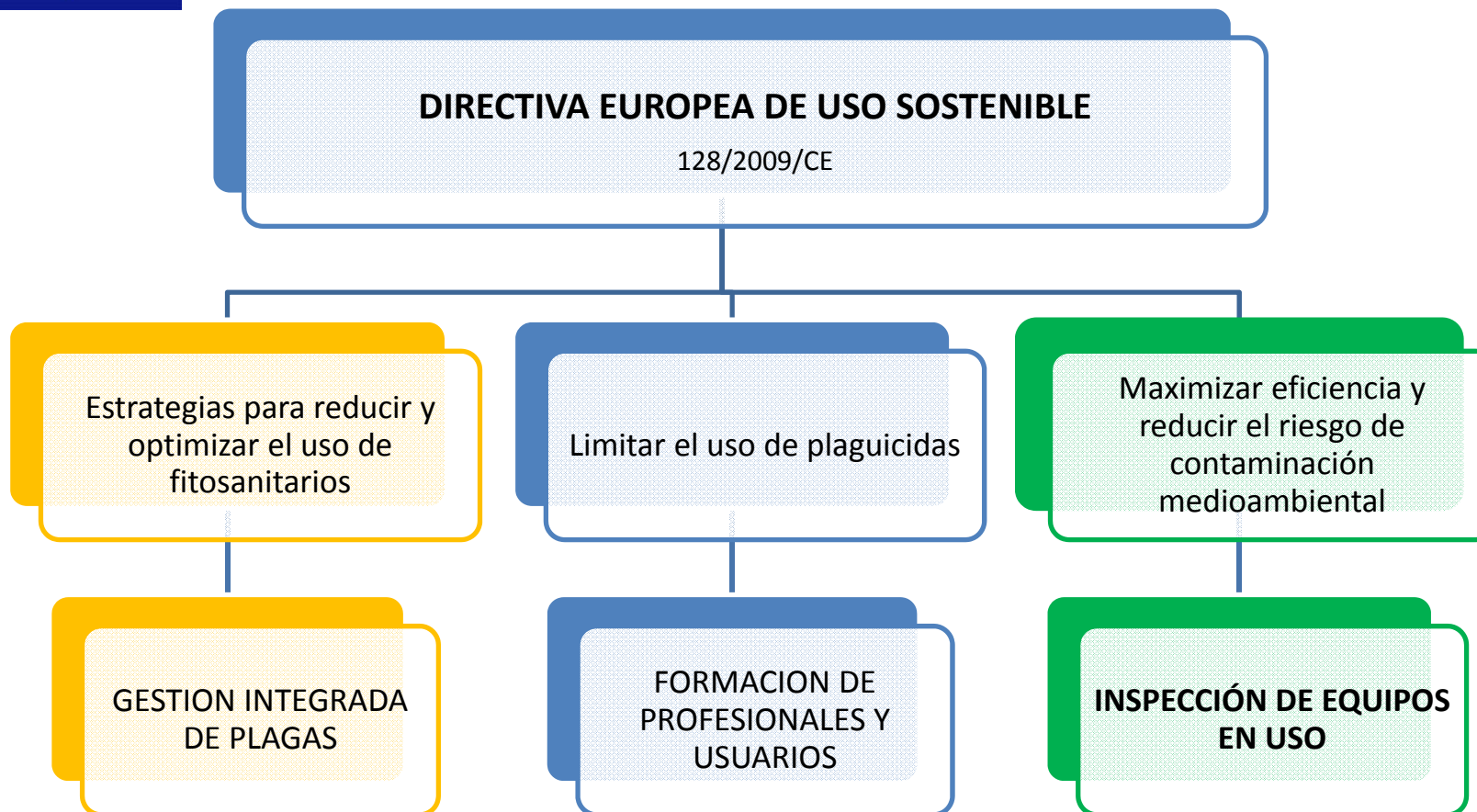
de 21 de octubre de 2009

por la que se establece el marco de la actuación comunitaria para conseguir un uso sostenible de los plaguicidas

(Texto pertinente a efectos del EEE)

La presente Directiva establece un marco para conseguir un uso sostenible de los plaguicidas mediante la reducción de los riesgos y los efectos del uso de los plaguicidas en la salud humana y el medio ambiente, y el fomento de la gestión integrada de plagas y de planteamientos o técnicas alternativos, como las alternativas no químicas a los plaguicidas.



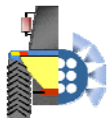


CAPÍTULO III

EQUIPOS DE APLICACIÓN DE FITOSANITARIOS

Artículo 8

Inspección de equipos en uso

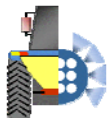


Inicio de las inspecciones obligatorias

Artículo 8.2.

A más tardar el 14 de diciembre de 2016, los Estados miembros velarán por que los equipos de aplicación de plaguicidas se inspeccionen como mínimo una vez. Transcurrido dicho período, solamente podrán utilizarse para fines profesionales los equipos de aplicación de plaguicidas que hayan pasado con éxito la inspección.

- *Con posterioridad al 14 de diciembre de 2016 únicamente podrán utilizarse equipos que hayan pasado la inspección favorablemente*



¿Cómo se hace una inspección?

El procedimiento oficial y más adecuado es el que contempla la EN 13790 1/2 para inspecciones de equipos de barras y atomizadores

norma
española

UNE-EN 13790-1

Diciembre 2004

TÍTULO

Maquinaria agrícola

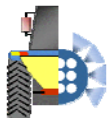
Pulverizadores

Inspección de pulverizadores en uso

Parte 1: Pulverizadores para cultivos bajos

Agricultural machinery. Sprayers. Inspection of sprayers in use. Part 1: Field crop sprayers.

Matériel agricole. Pulvérisateurs. Contrôle des pulvérisateurs en service. Partie 1: Pulvérisateurs pour cultures basses.



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norma
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TÍTULO

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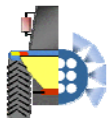
Pulverizadores

Inspección de pulverizadores en uso

Parte 2: Pulverizadores para plantaciones arbustivas y arbóreas

Agricultural machinery. Sprayers. Inspection of sprayers in use. Part 2: Air-assisted sprayers for bush and tree crops.

Matériel agricole. Pulvérisateurs. Contrôle des pulvérisateurs en service. Partie 2: Pulvérisateurs à jet porté pour arbustes et arboriculture.



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SPRAYERS COMPONENTS TO BE REPLACED DUE TO THE INSPECTION (average of inspection activity results in Belgium, Italy and Germany)



Nozzles -15%



Pressure regulator -
20%



Pump membranes -
5%



Pump - 5%

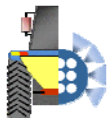


Manometer - 5%

Filters - 5%



Antidrip - 5%



Encargo de la Comisión Europea al CEN

CEN was requested to:

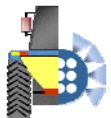
Develop European standards for the inspection of all types of equipment used by professionals that will enable equipment to comply with the essential health and safety and environmental requirements listed in Annex 2 to the Framework Directive on the sustainable use of pesticides.

The most common other types of pesticide equipment to be scrutinised belong to the following main categories:

- **Tractor mounted, trailed or self-propelled sprayers (including spray trains)**
- **Aircraft sprayers (airplanes/helicopters + mixing station)**
- **Handheld or portable sprayers**
- **Others (dusters, foggers, granules applicators, seed treatment equipment, large scale batch treatment, large-scale continuous application (conveyor belt), mistblowers/generators, wipers, etc.)**

Furthermore, standards for specific important spare parts of the application equipments like the nozzles could also be developed under this mandate, if deemed necessary.

(SPISE, 2009)



Equipos de aplicación de fitosanitarios para uso profesional (Art. 8 Directiva)

1) Pesticide Appl. Equipment (PAE)				
2) used for spraying incl. fogging				
3) & hand-operated PAE				
4) PAE not used for spraying pesticide				
5) PAE handheld &				
6) knapsack sprayers				
7) Additional PAE: (boom < 3m)				
8) Addition (train, airc boom >3m)				

Exempt from Inspection /3(b)

Different timetables, intervals, very low scale; acc. Article 3(a)

No low scale/3(a)

(B. Huyghebaert & N. Bjugstad, SPISE 2009)



Tipología de equipos a inspeccionar en la UE

		Austria	Belgium	Bulgaria	Czech Republic	Denmark	Estonia	Finland	France	Germany	Greece	Hungary	Italy	Latvia	Lithuania	Luxembourg	Netherlands	Norway	Poland	Portugal	Romania	Serbia	Slovakia	Slovenia	Spain	Sweden	Switzerland	United Kingdom
1		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
2		x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x	x
3		x	x	x	x	x	x	x	?	x			x	x	x	x	x	x	x	x	x	x	x			(x)		x
4		x	only > 2 nozz les	x	x	x		x	?	x		x	only glass hou ses	x	x	x	x	x	x	x	x	x	x		only > 100l	(x)		
5		x	x	x	x		x	x	?	x			x	x	x	x		x	x	x	x	x	x			(x)		x
6								(x)												x		x						
7								(x)	?											x		x			(x)	(x)		
8		x	x		x	x		x	x	x		x	?	x	x	x	x	x	x	x	x	x	x			(x)		x

 Exemption follows a risk assessment





Normas Europeas - EN

Desarrolladas por el Comité Europeo de Normalización - CEN

CEN TC 144 **WG3**



Equipos de aplicación de fitosanitarios

Tractores y maquinaria agrícola



Normas Internacionales- ISO

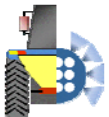
TC23 **SC6**



Equipment for crop protection

Tractors and machinery for agriculture and forestry

EN standards refer very often to ISO standards. More and more standards are developed in common between ISO and CEN (EN ISO standards)



Nueva ISO 16122

Objeto

Requisitos y métodos de inspección de los equipos de aplicación de fitosanitarios en uso

EN 13790 -1,2

Agricultural machinery - Sprayers - Inspection of sprayers in use
- Part 1: Field crop sprayers

ISO/DIS 16122 – Agricultural and forestry machinery – Inspection of sprayer and liquid fertilizer in use

Part 1. General (**ISO/DIS**)

Part 2. Boom sprayers (**ISO/DIS**)

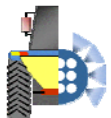
Part 3. Sprayers for bush and trees (**ISO/DIS**)

Part 4: Fixed and semi mobile sprayers (**Draft prEN ISO parallel enquiry**)

Part 5: Knapsack sprayers (covered by ISO 19932)

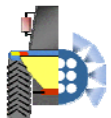
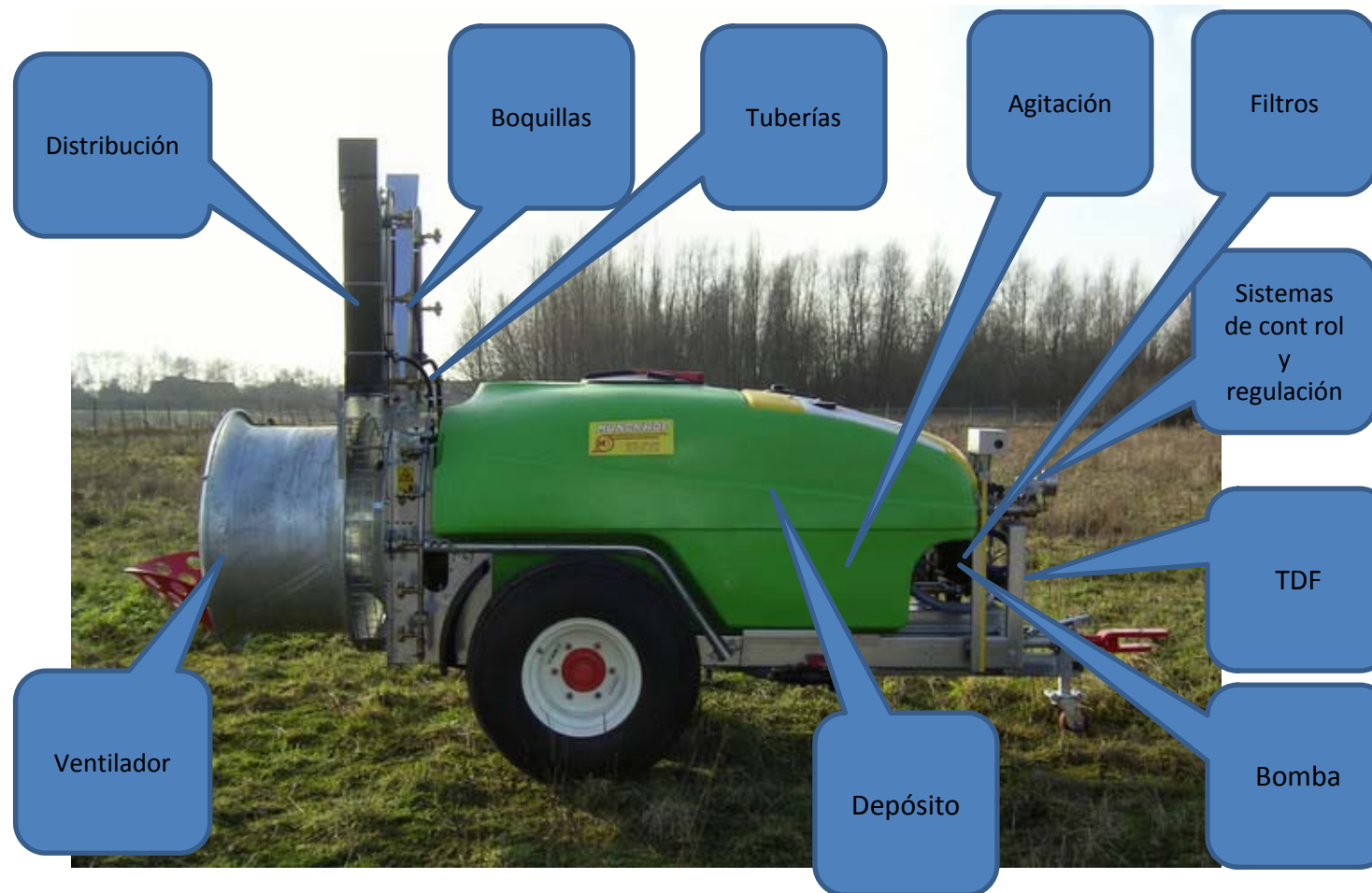
Part 6: Train sprayers

Part 7: Aerial sprayers



Normas armonizadas EN-ISO 16122

Inspection – Test de funcionamiento - Mediciones



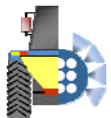
Principales cambios entre EN 13790 e ISO 16122

This document will supersede EN 13790-1:2003.

Se han introducido los siguientes cambios:

- re-organisation of the series with a new Part 1 where are transferred the general requirements to be fulfilled;
- extension of the scope;
- updating of the normative references;
- revision of requirements on control of spray drift and on cleaning;
- addition of Annex ZA.

En general pequeñas diferencias. Incorporación de métodos de medida de elementos electrónicos y revisión de algunos procedimientos (caudal, presión,...)



Diferencias en los requisitos del caudal de las boquillas

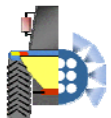
4.10.2 Flow rate measurement

4.10.2.1 The deviation of the flow rate of each nozzle of the same type shall not exceed $\pm 10\%$ of the nominal flow rate indicated by the manufacturer.

Method of verification: measurement according to 5.2.5.

4.10.2.2 The pressure drop between the measuring point for pressure on the sprayer and the end of each boom section width shall not exceed 10 % of the pressure shown on the pressure gauge.

Method of verification: measurement according to 5.2.6.



4.9.3.3 Flow rate measurements

4.9.3.3.1 General

For sprayers with only one spray liquid output, with adjustable flow rate nozzle, the flow rate has to be measured but no indication of wear can be provided.

Compliance shall be checked by measurement according to 5.7.

4.9.3.3.2 Nominal nozzle flow rate known

The deviation of the flow rate of each nozzle of the same type and size shall not exceed:

- $\pm 10\%$ of the nominal flow rate indicated by the nozzle manufacturer with a flow rate more than or equal to 1 l/min for the maximum working pressure given by the nozzle manufacturer; or
- $\pm 15\%$ of the nominal flow rate indicated by the nozzle manufacturer with a flow rate less than 1 l/min for the maximum working pressure given by the nozzle manufacturer.

Compliance shall be checked by measurement according to 5.7.

4.9.3.3.3 Nominal nozzle flow rate unknown

The flow rate of a single nozzle shall not exceed $\pm 5\%$ of the average flow rate of the nozzles of the same type and size mounted on the sprayer.

Compliance shall be checked by measurement according to 5.7.

4.9.3.3.4 Pressure distribution

When the nozzle flow rate is measured according to 5.7.2 or 5.7.3:

- the pressure at each boom section inlet shall not exceed $\pm 10\%$ of the average pressure measured on all boom section inlets;
- the pressure at the inlet and outer end of each boom section shall not drop more than 10 %, when spraying with the largest nozzle set mounted on the sprayer.



4 Requirements

4.1 General

The owner/operator of the equipment should be present at the inspection. Visible and other known faults should be remedied before the inspection.

All equipment necessary for the inspection and used by the inspector, for testing the sprayer, (e.g. flow meters, pressure indicators, forward speed sensors) shall be checked at regular intervals, normally at least once a year with certified equipment.

4.2 Place for inspection

The inspection shall be made at a location where the risk of pollution and water contamination is avoided.

Influences by external conditions on the reproducibility on the results of the inspection shall be minimized.

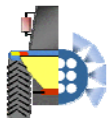
NOTE National or regional regulation may also apply regarding pollution and water contamination.

4.3 Pre-inspection

4.3.1 General

A preliminary visual check, according to 4.3.2 to 4.3.8, shall be carried out by the inspector to avoid:

- incidents resulting in the inspector injury or damage to health,
- wasting time by making measurements on equipment with very obvious serious faults.



Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers

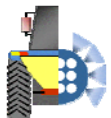
Other measuring devices

Measuring devices other than pressure indicators, especially flow meters and forward speed sensors used for controlling the volume/hectare rate, shall measure within a maximum error of $\pm 5\%$ of the value read on the reference instrument within the range of the measuring device.

Compliance shall be checked by measurement according to 5.4 and 5.5.

Pressure adjusting devices

All devices for adjusting pressure shall maintain a constant pressure with a tolerance of $\pm 10\%$ at constant setting and shall return within 10 s to the original working pressure $\pm 10\%$ after the sprayer has been switched off and on again.



Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers

Boom deformation

Vertical position

When measured with the sprayer stationary, the vertical distance between the lower edges of each nozzle and a horizontal reference line (e.g. on a level horizontal surface) shall not vary more than ± 10 cm or $\pm 0,5$ % of the working width, whichever is the highest.

Compliance shall be checked by inspection and measurement.

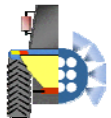
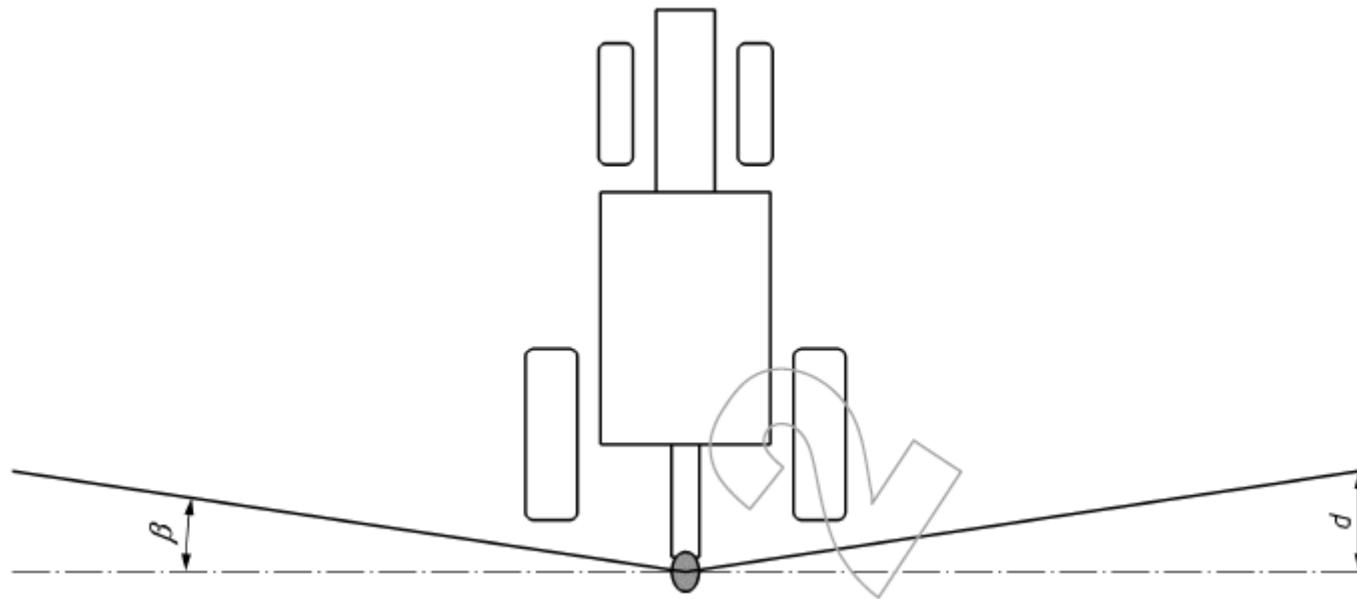
Horizontal position

The boom shall not be bent in the horizontal plane: the maximum deformation from the centre-frame (see dimension d at Figure 1) to the boom end nozzle shall not exceed $\pm 2,5$ % of the boom width.

Compliance shall be checked by inspection and measurement.



Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers



Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers

5.2.3 Flow meters for controlling the volume/hectare rate

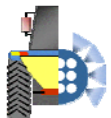
The error of the measuring instruments in the test equipment shall not exceed 1,5 % of the measured value.

Flow meters for controlling the volume/hectare rate

1.General

The error of the measuring instruments in the test equipment shall not exceed ± 2 % of the measured value with a minimum of 2 l/min.

During the test, the flow rate shall be steady, as indicated by the output of the flow rate sensor or the pressure indicator.

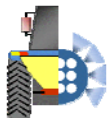


Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers

1. Operating procedure Nr 1: Verification by nozzle flow rate measurement

1. The inspection shall be conducted as follows:

- The spray control shall be set to the correct PTO speed and at a pressure within the working range of the sprayer.
- For each of the following three tests, the average flow rate of 5 nozzles shall be measured with a measuring cylinder, or the single flow rate values for each nozzle obtained from the test in 5.7 shall be used in order to calculate the mean value of a single nozzle.
- One or more spraying section(s) shall be turned on to give a total flow rate representing 30 % to 50 % of the full flow. The pressure value and the value displayed on the flow meter and the number of nozzles in use shall be recorded.



Agricultural and forestry machines — Inspection of sprayers in use — Part 2: Horizontal boom sprayers

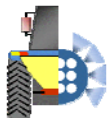
1. Operating procedure Nr 1: Verification by nozzle flow rate measurement

- Additional spraying section(s) shall be turned on to give a total flow rate representing 50 % to 75 % of the full flow. The pressure value and the value displayed on the flow meter and the number of nozzles in use shall be recorded.
- Additional spraying section(s) shall be turned on in order to reach 100 % of the full flow. The pressure value and the value displayed on the flow meter and the number of nozzles in use shall be recorded.

The pressures shall be read at the level of the sections.

For each flow rate, the reference outflow Q , corrected for the pressure applied during the test (P_1), shall be calculated as follows:

$$Q = \text{Number of nozzles} \times \text{mean of single nozzle flow rates } (d_1)$$



5.11 Pressure distribution

The test shall be carried out with the highest flow rate nozzle provided on the sprayer and at a pressure within the working pressure range given by the nozzle manufacturer.

A calibrated test pressure indicator (see 5.3.1) shall be fitted at the same position as a nozzle at the inlet of each boom section.

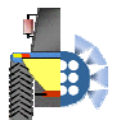
The mean inlet pressure from all sections shall be calculated and compared to individual inlet pressures

A calibrated test pressure indicator shall be fitted at the same position as a nozzle at the outermost end of each boom section

For each section, the pressure drop between the inlet and the outermost end shall be calculated as follows:

$$\text{Pressure drop} = 100 \times \frac{(P_0 - P_1)}{P_0}$$

Where P_0 is the inlet pressure of the section and P_1 the outermost end pressure of the same section

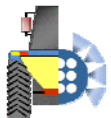


DIRECTIVA 2009/127/CE DEL PARLAMENTO EUROPEO Y DEL CONSEJO
de 21 de octubre de 2009
por la que se modifica la Directiva 2006/42/CE en lo que respecta a las máquinas para la aplicación
de plaguicidas

La presente Directiva se limita a los **requisitos esenciales** que deben cumplir las máquinas para la aplicación de plaguicidas **antes de su introducción en el mercado** o su puesta en servicio, mientras que las organizaciones de normalización europeas son responsables de elaborar normas armonizadas que faciliten especificaciones detalladas para las diferentes categorías de dichas máquinas, con el objeto de permitir a los fabricantes el cumplimiento de dichos requisitos.

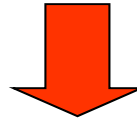
ISO CEN – 16119 (Partes 1, 2, 3 y 4)

**El fabricante debe hacer referencia a las normas ISO para dar respuesta
a los requerimientos de la Directiva 127 y poder realizar el mercado CE
de sus equipos**

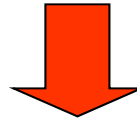


BRAND NEW SPRAYER PERFORMANCE REQUIREMENTS

BEFORE 2011



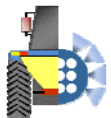
MACHINERY DIRECTIVE 2006/42



**AUTO CERTIFICATION
CE label**

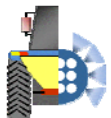
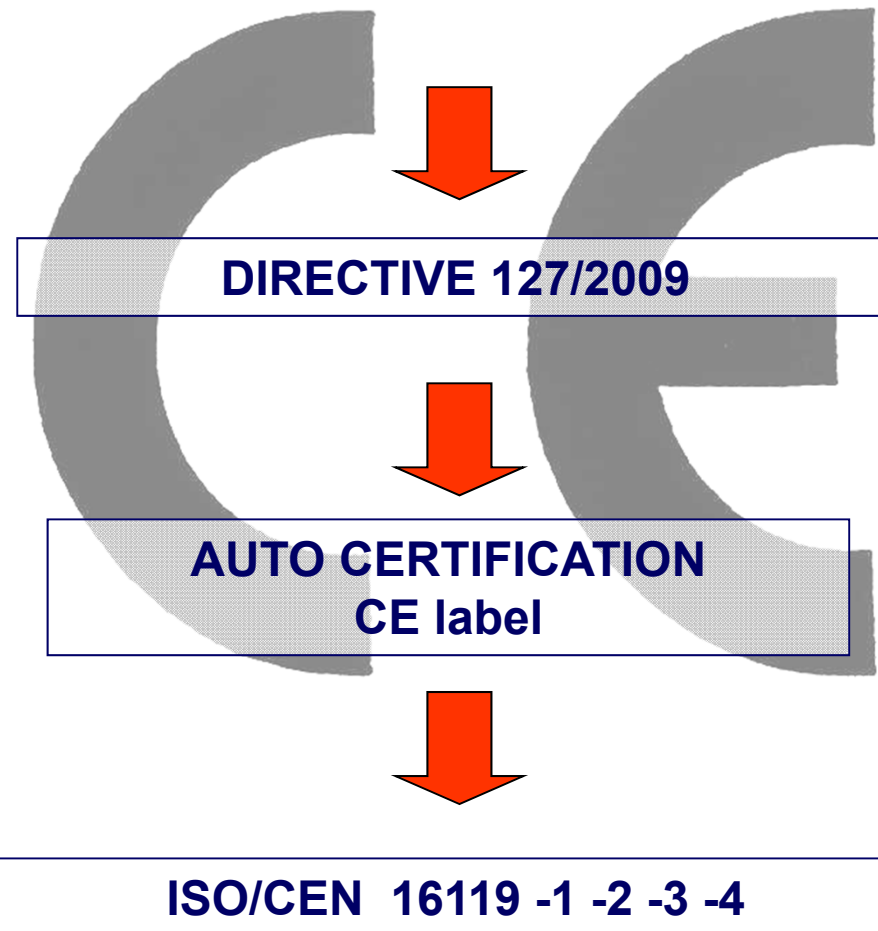


EN 12761



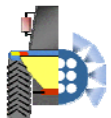
BRAND NEW SPRAYER PERFORMANCE REQUIREMENTS

FROM 01-01-2012



ISO 16119 – Agricultural and forestry machinery – Sprayers and liquid fertilizer distributors – Environmental protection

- Part 1. General ✓
- Part 2. Horizontal boom sprayers and similar ✓
- Part 3. Sprayers for bush and trees and similar ✓
- Part 4. Fixed and semi-mobile sprayers (*en votación*)



ISO 16119 –Part 2 (Horizontal boom sprayers)

Main aspects concerning:

Tank (included tank cleaning)



Boom

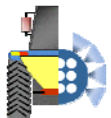


Nozzles



Drift control

Sprayers cleaning



ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos del depósito principal

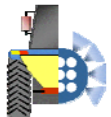


Superficie: rugosidad máxima

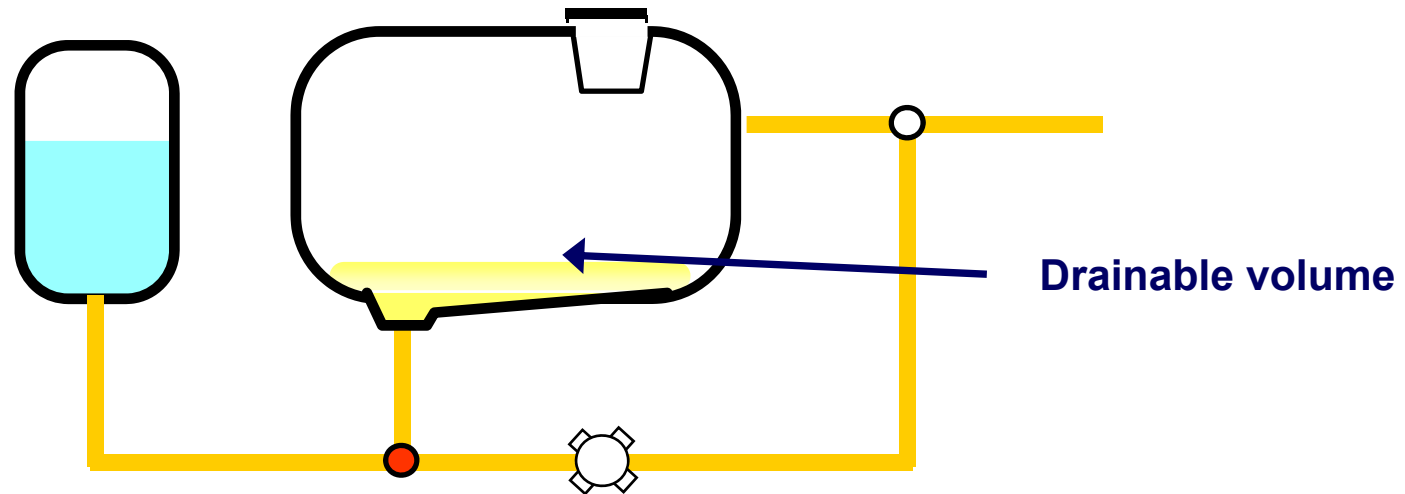
Llenado: el diámetro del orificio de llenado debe cumplir la norma **ISO 9357**

Vaciado: el volumen residual debe ser $\leq 0,5\%$

Mezcla: se debe asegurar una mezcla uniforme (**ISO 5682-2**)



ISO 16119 –Part 2 (Horizontal boom sprayers)

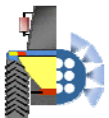


No debe exceder:

- 0,5% del volumen nominal del depósito más 2 litros por metro de barra

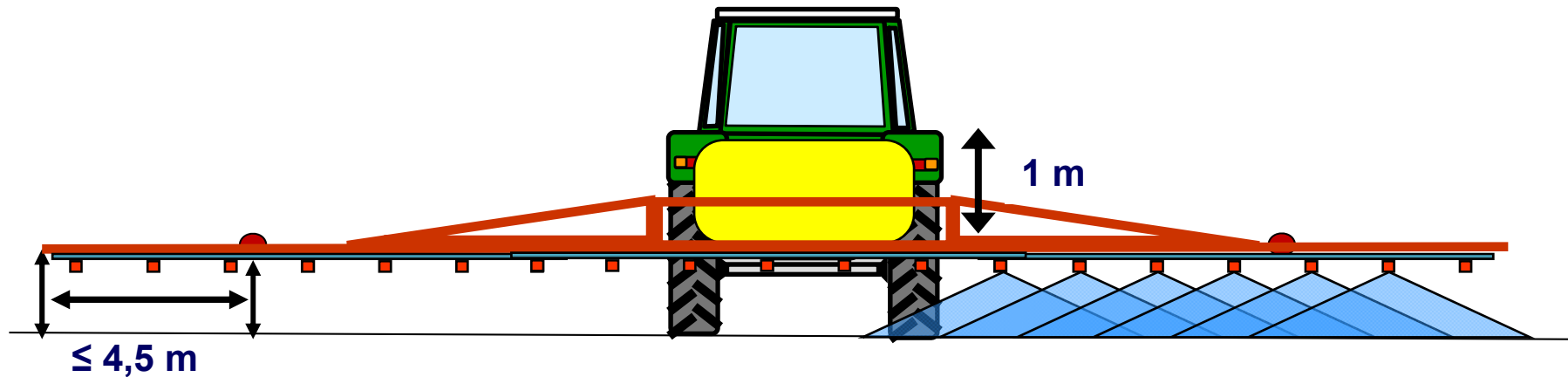
Ejemplo:

Un pulverizador con un depósito de 600 l y una barra de 12 m debe tener un volumen residual máximo de $(600 \cdot 0,005) + 2 \cdot 12 = 3 + 24 = 27$ l



ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos de las barras de pulverización:

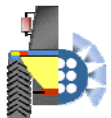


Máxima anchura de las secciones:

$\leq 4,5$ m en barras de hasta 24 m

$\leq 6,0$ m para barras ≥ 24 m

Ajuste de la altura de la barra en un rango $\geq 1,0$ m

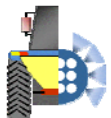
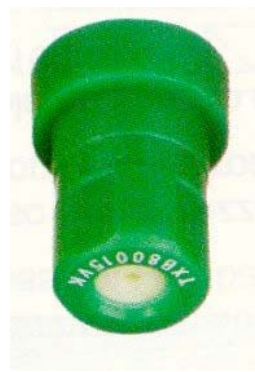


ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos de las boquillas:

Goteo: ≤ 2 ml in 5 min

Caudal: $\leq 5\%$ m desviación respecto al caudal nominal



ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos en el control de la deriva:

Se debe poder ajustar el pulverizador de forma que no genere más deriva que el equipo de referencia descrito en la tabla 2 de ISO 22369-2

Table 2 — Equipment-related data

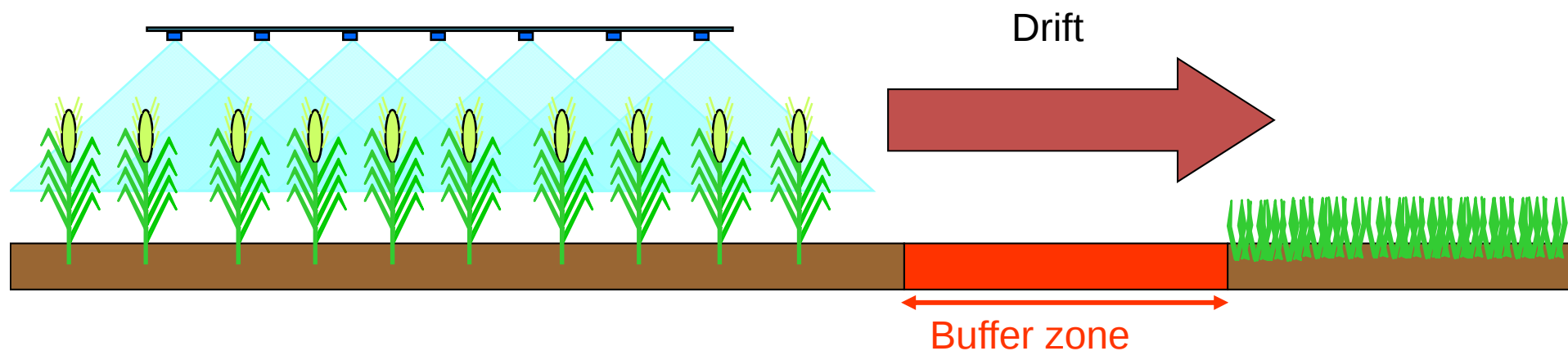
Nozzle type	Comparable with ISO 25358 ^a
Spray pressure	See above
Nozzle size	Borderline nozzle, fine/medium ^b
Nozzle height above target	50 cm
Driving speed	6 km/h to 8 km/h

^a Under preparation.

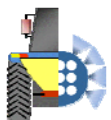
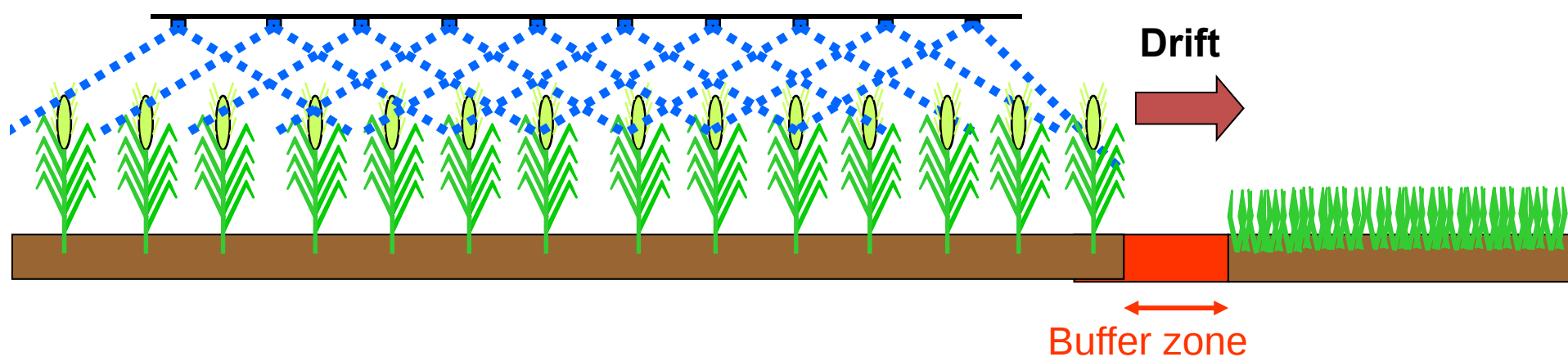
^b Typically used in north-western Europe.

Clasificación de los equipos en función de la deriva

Conventional sprayer



Sprayer equipped with anti-drift nozzles and “end boom” nozzles



Deriva

¿Por qué medirla?



¿Cómo medirla?



¿Que procedimiento?

INTERNATIONAL STANDARD ISO/FDIS 22866

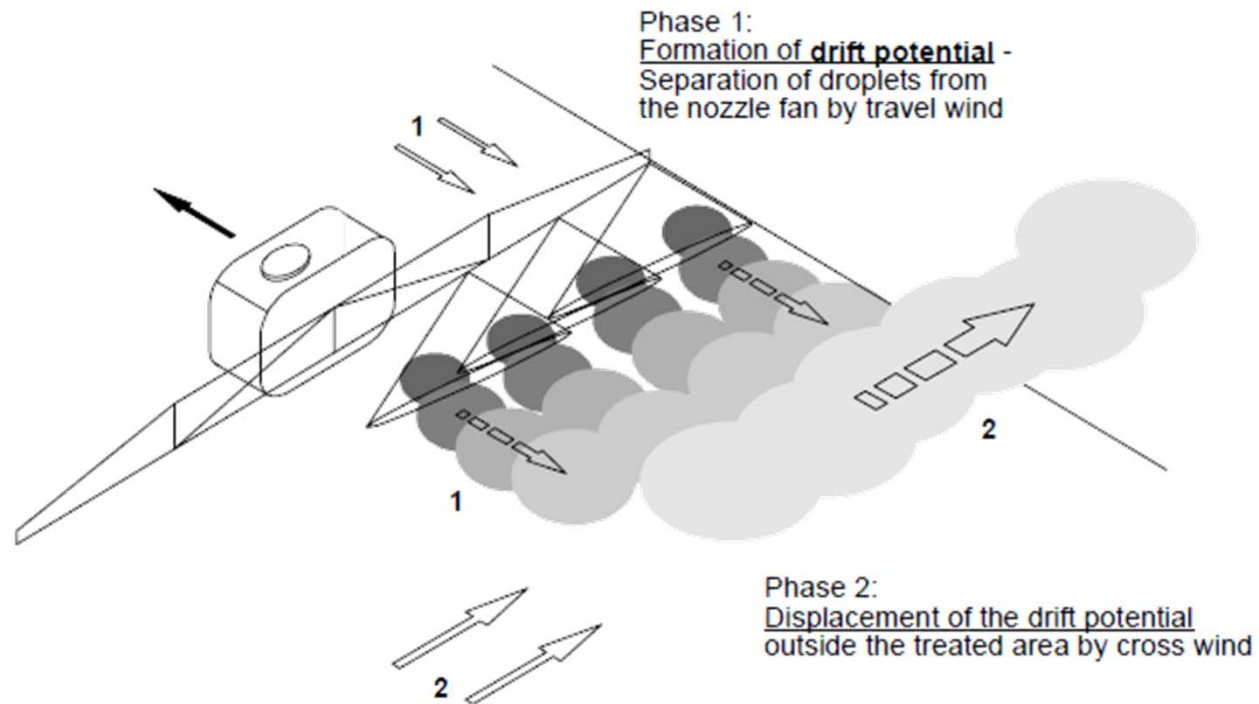
Equipment for crop protection —
Methods for field measurement of spray
drift

INTERNATIONAL STANDARD ISO/FDIS 22369-1

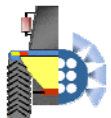
Crop protection equipment — Drift
classification of spraying equipment —



Deriva



Herbst, A., 2001. *A Method to Determine Spray Drift Potential from Nozzles and its Link to Buffer Zone Restrictions*.
ASAE Meeting, Paper 01-1047



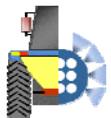
Deriva

Problemas de aplicación de la norma

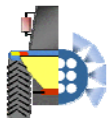
- Dependencia de las condiciones ambientales
- Dificultad en conseguir una adecuada repetitividad de los resultados
- Necesidad de importante mano de obra
- Elevadas necesidades de tiempo para la realización de un ensayo
- Gran cantidad y variedad de material y equipamiento necesario



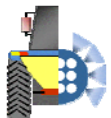
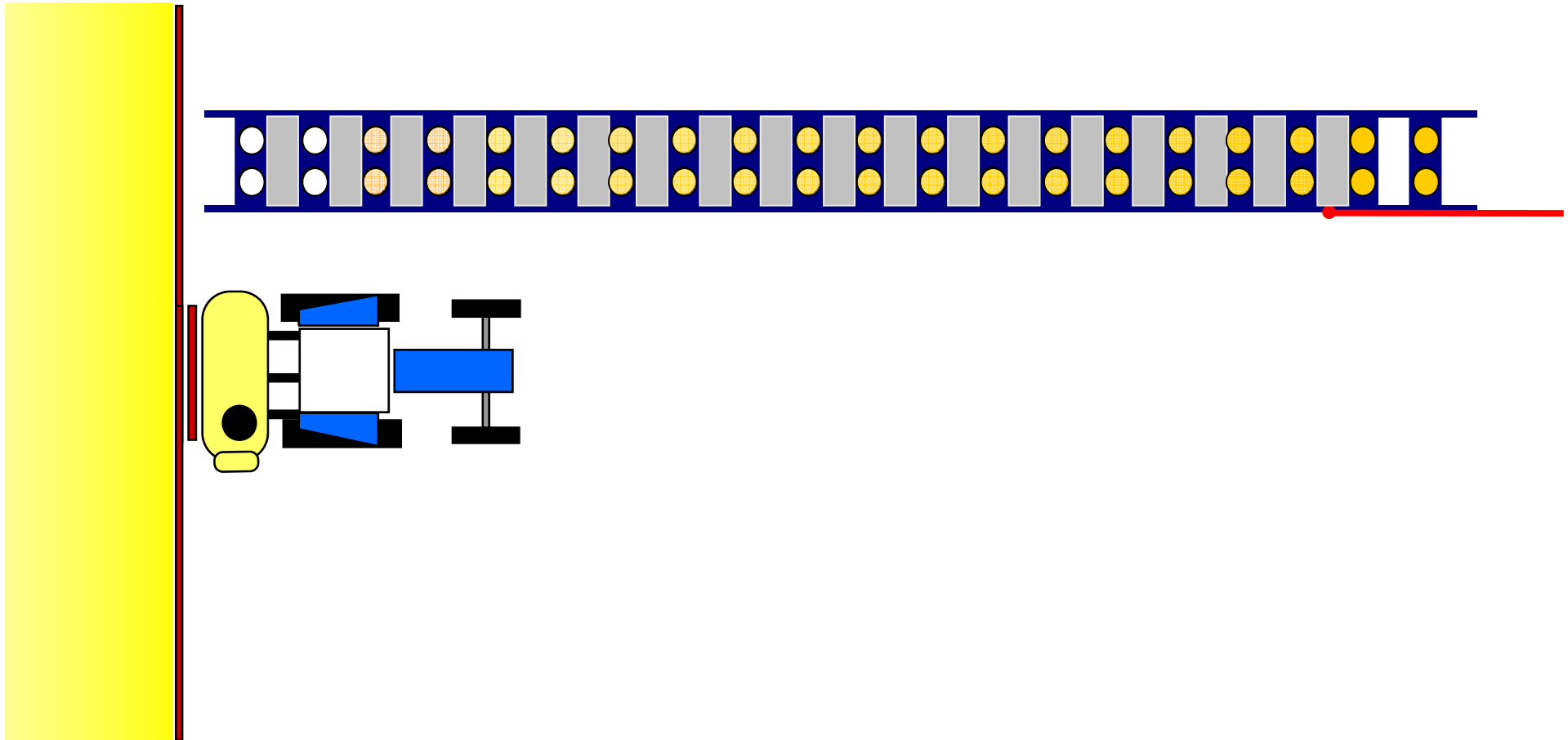
Por estas razones se plantean algunas alternativas



Deriva *Propuesta nueva norma ISO para la medida de la deriva*

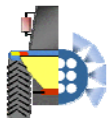


2 - 4 Splicing bench covering



Deriva

Propuesta nueva norma ISO para la medida de la deriva



Deriva *Propuesta de nueva norma ISO para la medida de la deriva*

COMMITTEE DRAFT

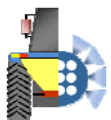
ISO/CD 22369-3

Crop protection equipment — Drift classification of spraying equipment — Part 3: Potential spray drift measurement for field crop sprayers by the use of a test bench

COMMITTEE DRAFT

ISO/DIS 22401

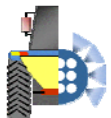
Equipment for crop protection – Method for measurement of drift potential from horizontal boom sprayer systems by the use of test bench



ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos para la limpieza del pulverizador:

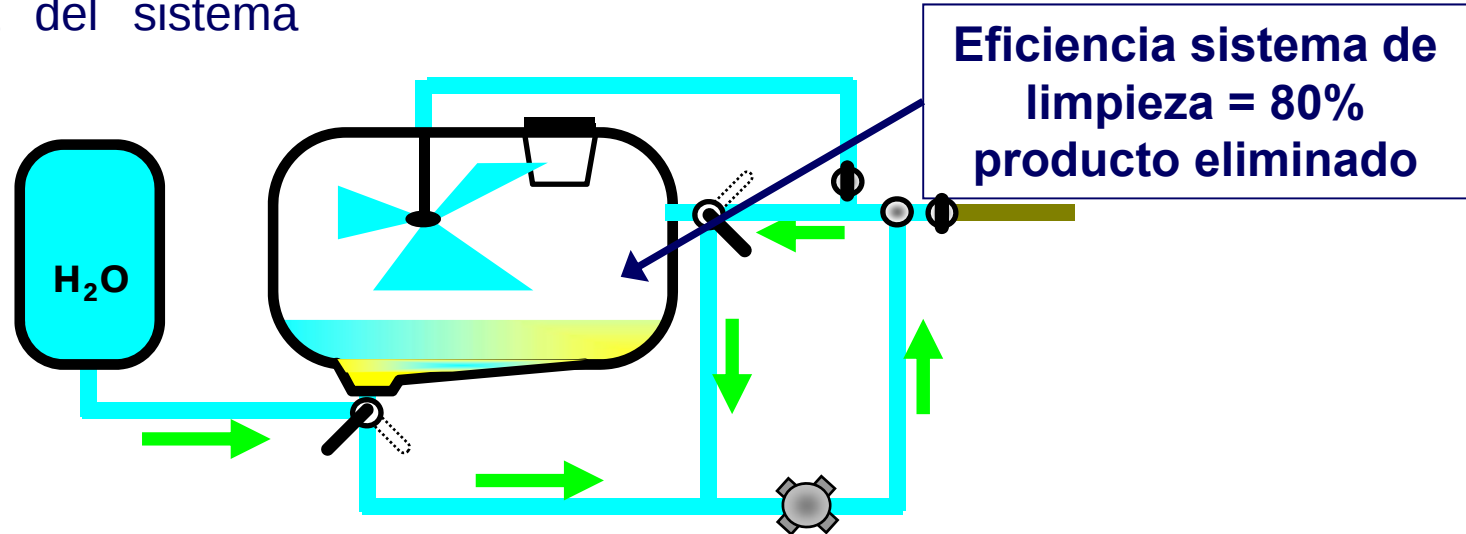
- El pulverizador debe disponer de un sistema de **limpieza interno** y conexión para algún **elemento de limpieza externo**.



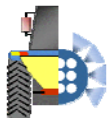
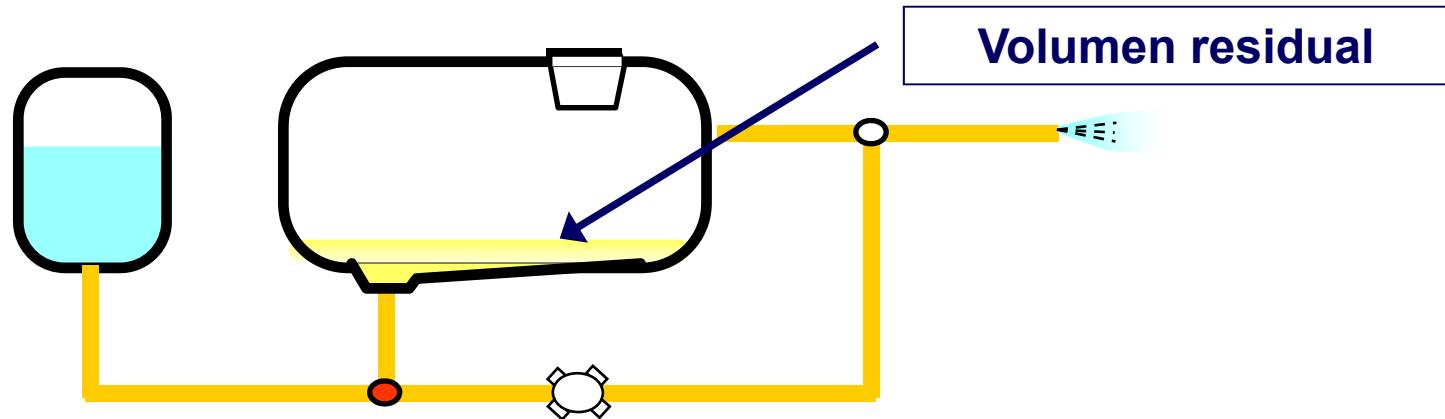
ISO 16119 –Part 2 (Horizontal boom sprayers)

Requerimientos para la limpieza

a) Eficiencia del sistema de limpieza



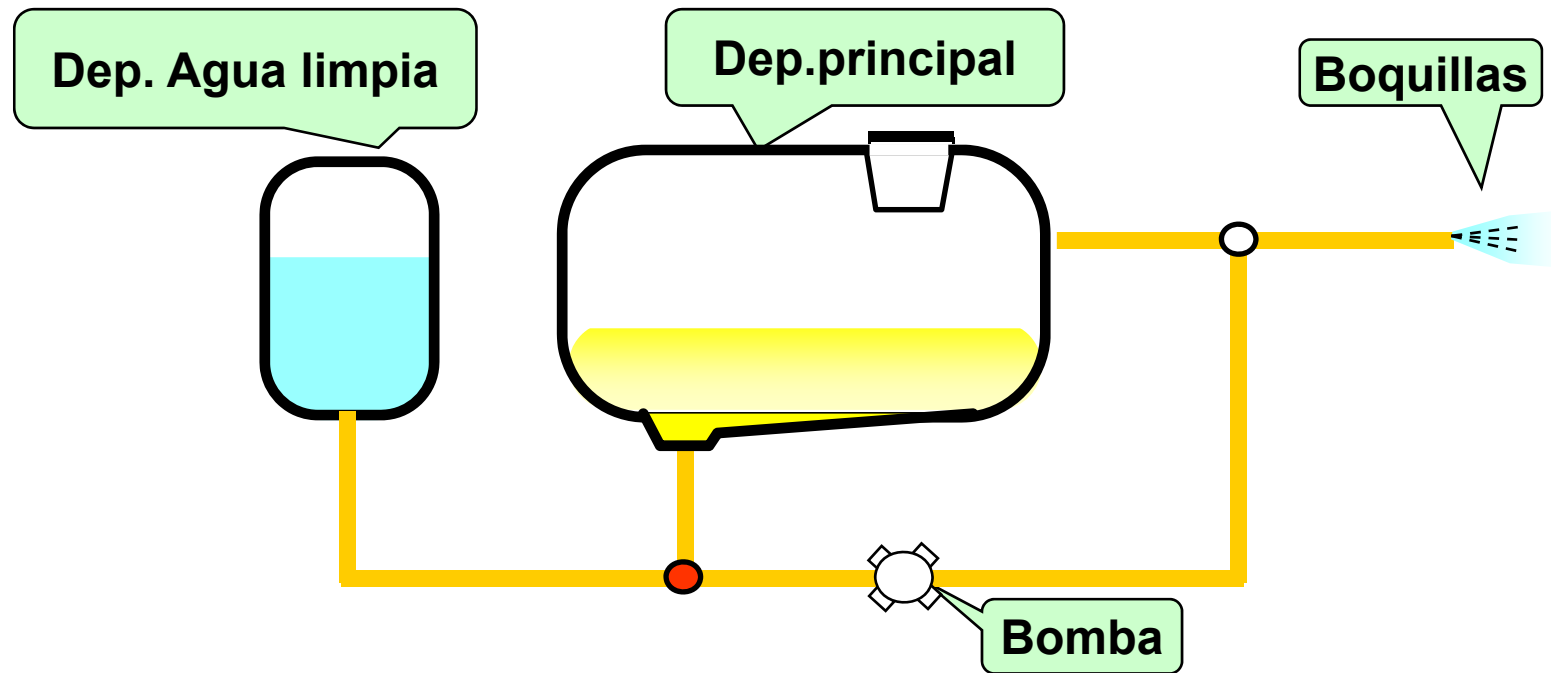
b) Concentración residual (max. 2%)



ISO 16119 –Part 2 (Horizontal boom sprayers)

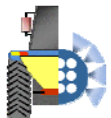
Requerimientos para la limpieza del equipo

El equipo debe incluir un depósito para la limpieza



Capacidad mínima del depósito:

$\geq 10\%$ del depósito principal o al menos 10 veces el volumen residual

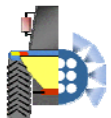


ISO 16119 –Part 2 (Horizontal boom sprayers)

Sprayer cleaning main requirements:

Residual concentration

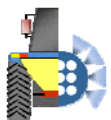
- After the cleaning process the concentration of the residue shall be reduced by the factor of 400 (respectively 99,75%) compared with the concentration before starting the cleaning process when tested in accordance with ISO 22368-1
- After the cleaning process as described in the instruction handbook, the concentration of the liquid drained from the main tank outlet shall be reduced to 2% of the original concentration in the tank.



ISO 16119 –Part 2 (Horizontal boom sprayers)

Table 3 — List of safety requirements and/or protective measurements and their verification

Clause/subclause of this part of ISO 16119	Verification			
	Inspection	Measurement	Test	Remark
5.1.1 Spray tank				
5.1.1.1 Surfaces		X		ISO 4288
5.1.1.2 Filling	X	X	X	
5.1.1.3 Emptying	X	X	X	ISO 13440 ISO 9357
5.1.1.4 Mixing		X		ISO 5682-2
5.1.2 Lines		X		
5.1.3 Spray boom				
5.1.3.1 Spraying section widths	X			
5.1.3.2 Adjustment	X	X		
5.1.3.3 Contact with obstacles			X	
5.1.4 Filter	X			
5.1.5 Nozzles	X	X		ISO 5682-1
5.1.6 Measuring systems	X	X		
5.1.7 Provisions for connecting test equipment	X			
5.2 Volume/hectare adjustment system	X	X		ISO 5682-2 ISO 5682-3
5.3 Distribution and control of spray drift				
5.3.1 Distribution			X	
5.3.2 Control of spray drift		X	X	ISO 22856 ISO 22866
5.4 Cleaning				
5.4.1 Water tank		X	X	
5.4.2 Cleaning systems		X	X	
5.5 Cleaning devices			X	ISO 21278-1
5.6 Additional requirements for band sprayers				
5.6.1 General		X		
5.6.2 Nozzles		X		
5.6.3 Distribution			X	ISO 5682-1
5.7 Additional requirements for spray guns and lances		X		



ISO 16119 –Part 3 - Sprayers for bush and trees

Principales diferencias respecto a la Parte 2



Vaciado del deposito principal

Caudal de aire del ventilador

Limpieza del equipo

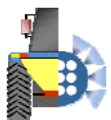
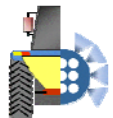


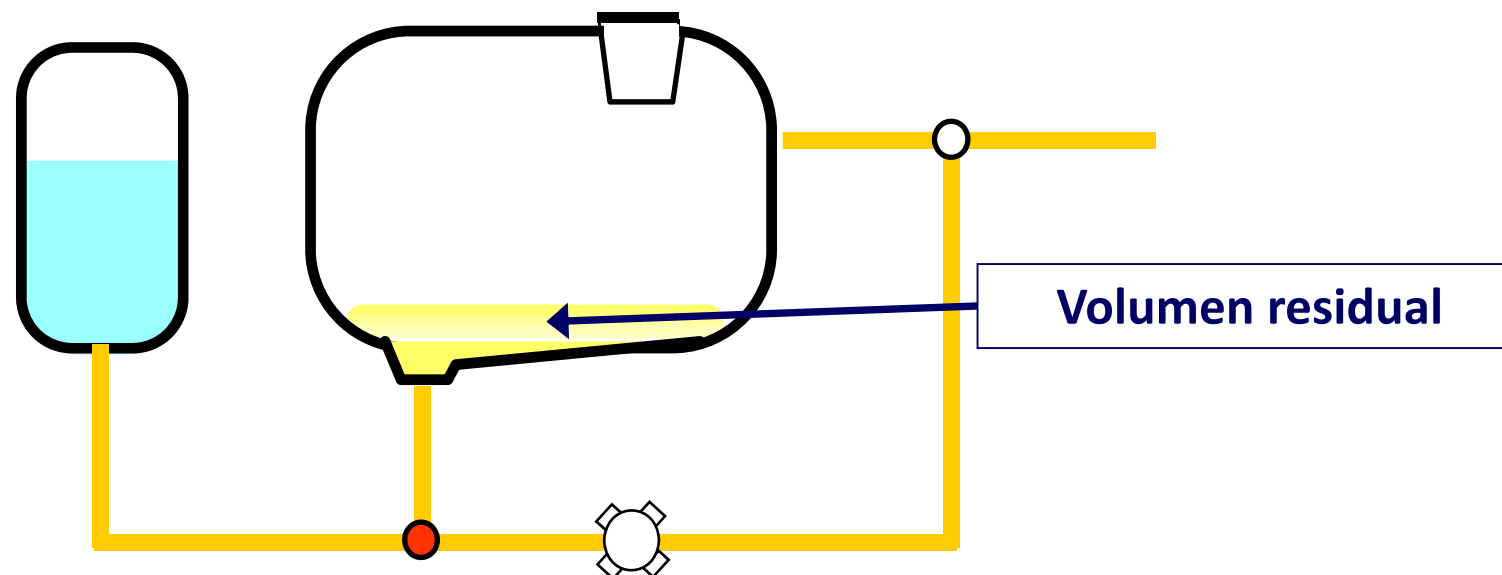
Table 1 — List of significant hazards

Hazard		Hazardous situation/event	Clause/subclause of this part of ISO 16119
4.1	Spillages	Filling Induction of plant protection products	5.1.1.2; 8 5.1.1.2; 8
4.2	Contamination of the water supply	Filling	5.1.1.2
4.3	Leakages	Transport and application Contact with crop	5.1.1.2; 5.1.2 5.1.4
4.4	Overfilling	Filling	5.1.1.2; 5.1.1.4; 8
4.5	Dispersal of spray mixture residues or plant protection products	Drainage Cleaning and rinsing	5.1.1.3.1; 5.1.1.4; 8 5.1.1.1; 5.4; 5.5; 8
4.6	Accidental leakages	Accidental opening of tank outlet	5.1.1.3.2
4.7	Over-dosing	Heterogeneous mixing Overlapping Sprayer adjustment/control Sprayer maintenance/ service Unintended deposition	5.1.1.5; 8 5.1.8 5.1.1.4; 5.1.2; 5.1.5; 5.1.6; 5.1.8; 5.2; 5.3.1; 5.6; 8 5.1.7; 7; 8 5.1.8; 5.3.1
4.8	Unintended spraying outside the target area	Application Spraying stop control	5.3.2 5.1.2; 5.1.8; 5.6
4.9	Drift	Spraying	5.3.2; 5.3.3; 7; 8
4.10	Discharge of spray mixture	Intervention on the sprayer during application or service	5.1.3; 7; 8
4.11	Dripping	Spraying stop control	5.1.4



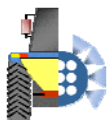
ISO 16119 –Part 3 - Sprayers for bush and trees

Vaciado del depósito principal

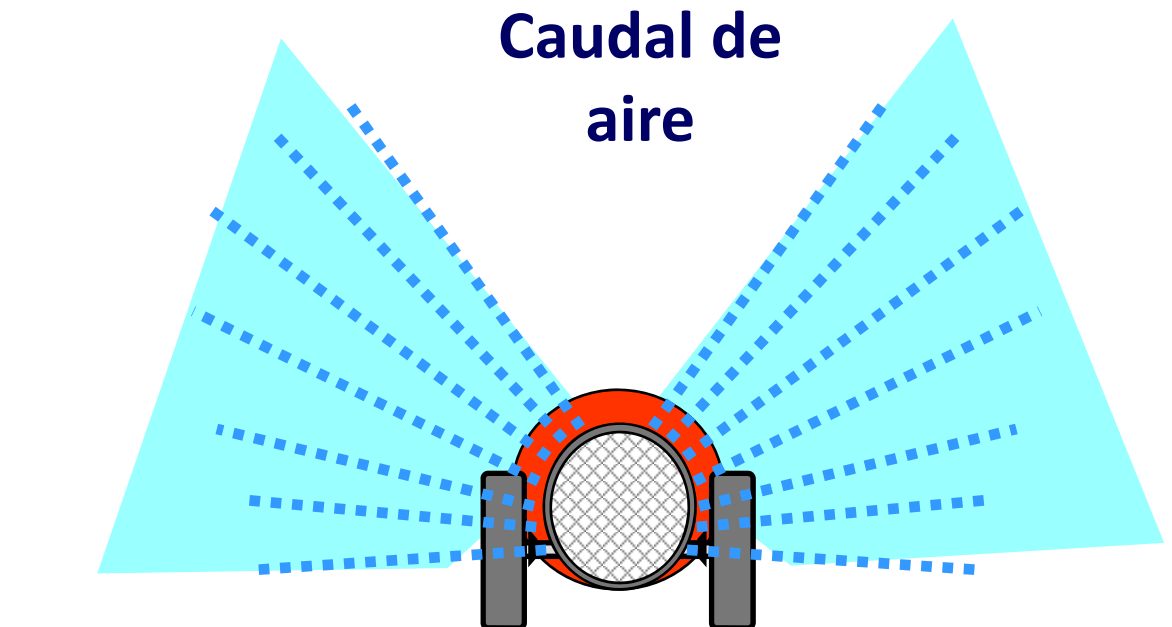


No debe exceder de:

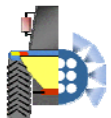
- 4% del volumen nominal para depósitos menores de 400 l;
- 3% del volumen nominal para depósitos entre 400 y 1000 l (ambos inclusive);
- 2% del volumen nominal para depósitos superiores a 1000 l.



ISO 16119 –Part 3 - Sprayers for bush and trees



- Se debe poder desconectar el ventilador independientemente del resto de elementos en movimiento.
- El caudal de salida no debe diferir en más del 10% del caudal nominal indicado por el fabricante

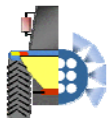


ISO 16119 –Part 3 - Sprayers for bush and trees

Caudal de aire:

-Para aplicaciones simétricas, el atomizador debe ser diseñado de forma que el caudal generado sea simétrico en ambos lados (izquierda y derecha) con respecto a la dirección, velocidad y volumen de aire (de acuerdo con ISO 9898:2000, 5.2.3)

La desviación entre el lado derecho y el lado izquierdo no debe ser superior al 25% (medido de acuerdo con la norma ISO 9898:2000, apartado 6, con el equipo ajustado de acuerdo con las recomendaciones que aparecen en el manual de instrucciones.

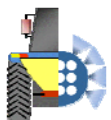


ISO 16119 –Part 3 - Sprayers for bush and trees

Limpieza del equipo:



- El equipo debe incorporar un depósito (o varios) dedicado a la limpieza, **excepto** en el caso de equipos suspendidos con depósito inferior o igual a 400 l.
- La limpieza interna del depósito debe reducir la cantidad de producto fitosanitario adherido a las superficies internas en un 70%. Para ello se aplicará el procedimiento establecido en la norma ISO 22368-3





**Workshop sobre normativa Europea en materia de
Equipos de Aplicación de Fitosanitarios
UNIVERSITAT POLITÈCNICA DE CATALUNYA
29 de Mayo de 2014**