European Commission

Better Training for Safer Food

Initiative

Personal protective equipment available to professional users

Proper use and maintenance

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IRSTEA

Consumers, Health And Food Executive Agency

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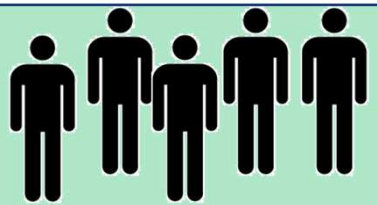

Bystanders, workers

Intrinsic risks due to the sprayer

operator

Intrinsic risks due to the PPP

environment

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Contents

Responsibility of professional users, report of incidents
Machinery requirements
Risk mitigation measurements
Emergency actions to protect human health and/or the environment
Accidental spillage, contamination
Close transfer systems

Responsibility of professional users

The enterprise manager is under the responsibility of providing to his employees:

- Adequate and conform tools or machines
- A detailed description of the risks
- A provision for risk mitigation equipment (PPE)

Accidental events

Non respected regulation regarding pesticide application can lead to court

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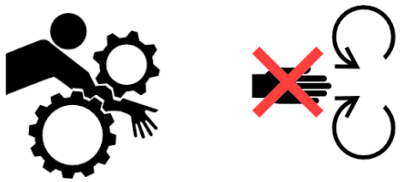
1) Presumption of conformity of machines in Europe

2006/42/CE : Machinery Directive
2009/27/CE : Amendment to the MD, environmental issues.

Risk assessment:
Construction
Use – storage
End of life

- Mechanical Risks
- Chemical Risks
- Environmental Risks



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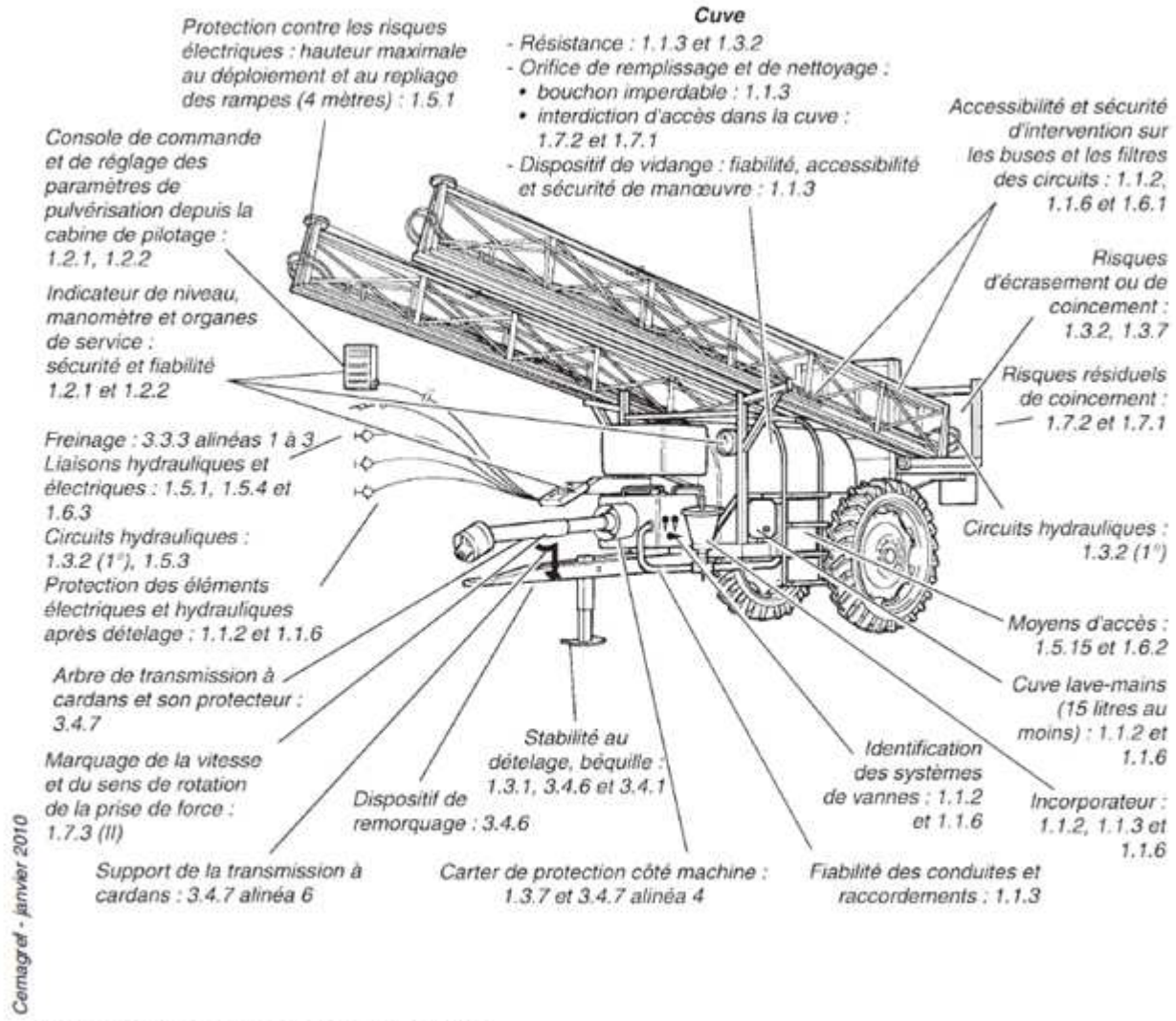
Example



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1) Presumption of conformity of machines in Europe

Functioning of the sprayer (extracts):

…

No leakages, no dripping on stoppage

Respect of the application rate

Even distribution & deposition

Avoid spray drift, Cabin cat 4 …

Normative basis :

EN 4251-1: safety requirements

EN/ISO 16119 1-2-3-4 will progressively replace EN 12761

EN 15695 (tractor Cabin)

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1) Presumption of conformity of machines in Europe

Risk mitigation:
Design
Collective protection
Information

- Mechanical Risks
- Chemical Risks
- Environmental Risks

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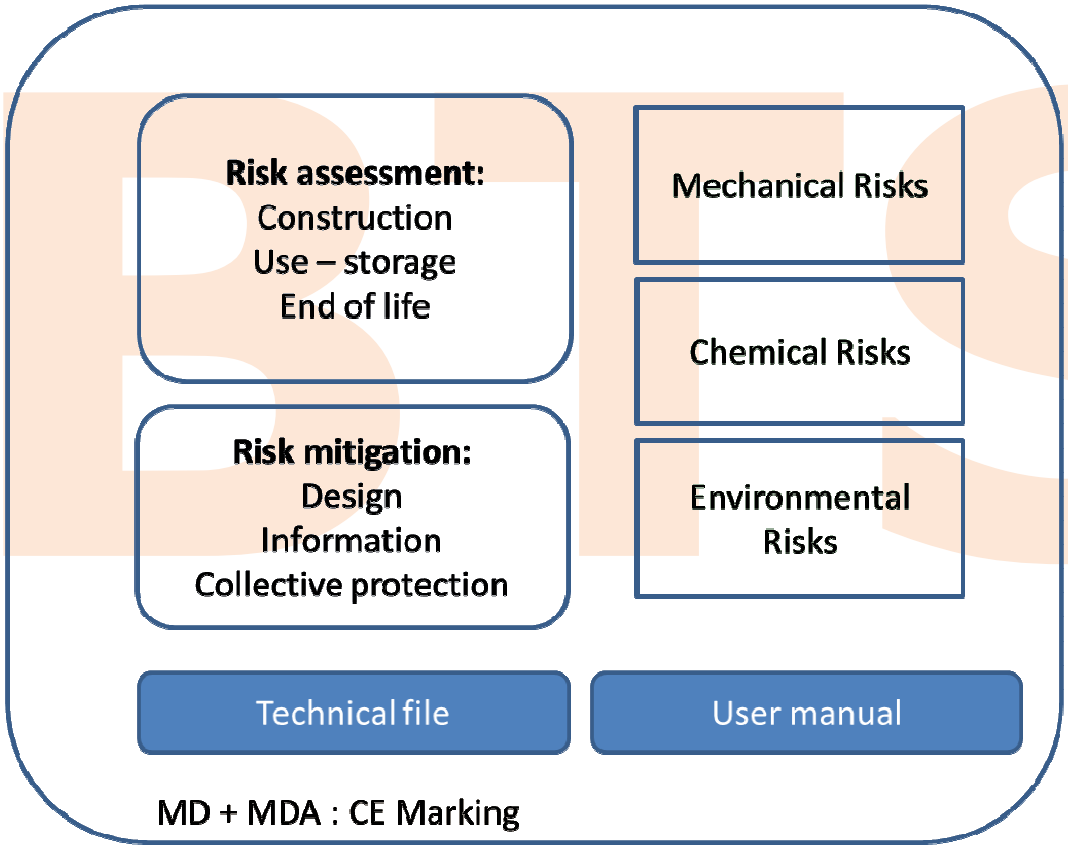
1) Presumption of conformity of machines in Europe



Market surveillance

CE

Self certification by the manufacturer
Automatic access to the EU market

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1) Presumption of conformity of machines in Europe

CE marking provides a presumption of conformity :

The sprayer complies with the EU regulation regarding health, safety and environmental issues. Market surveillance agencies (at national level) are in charge of verification.

Only collective protection is concerned.
Ad hoc pictograms are mandatory to inform the user
Mandatory information regarding HSE is to be found in the user manual.

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2) Additional risks due to chemical products

A risk assessment is also conducted for the chemical registration.

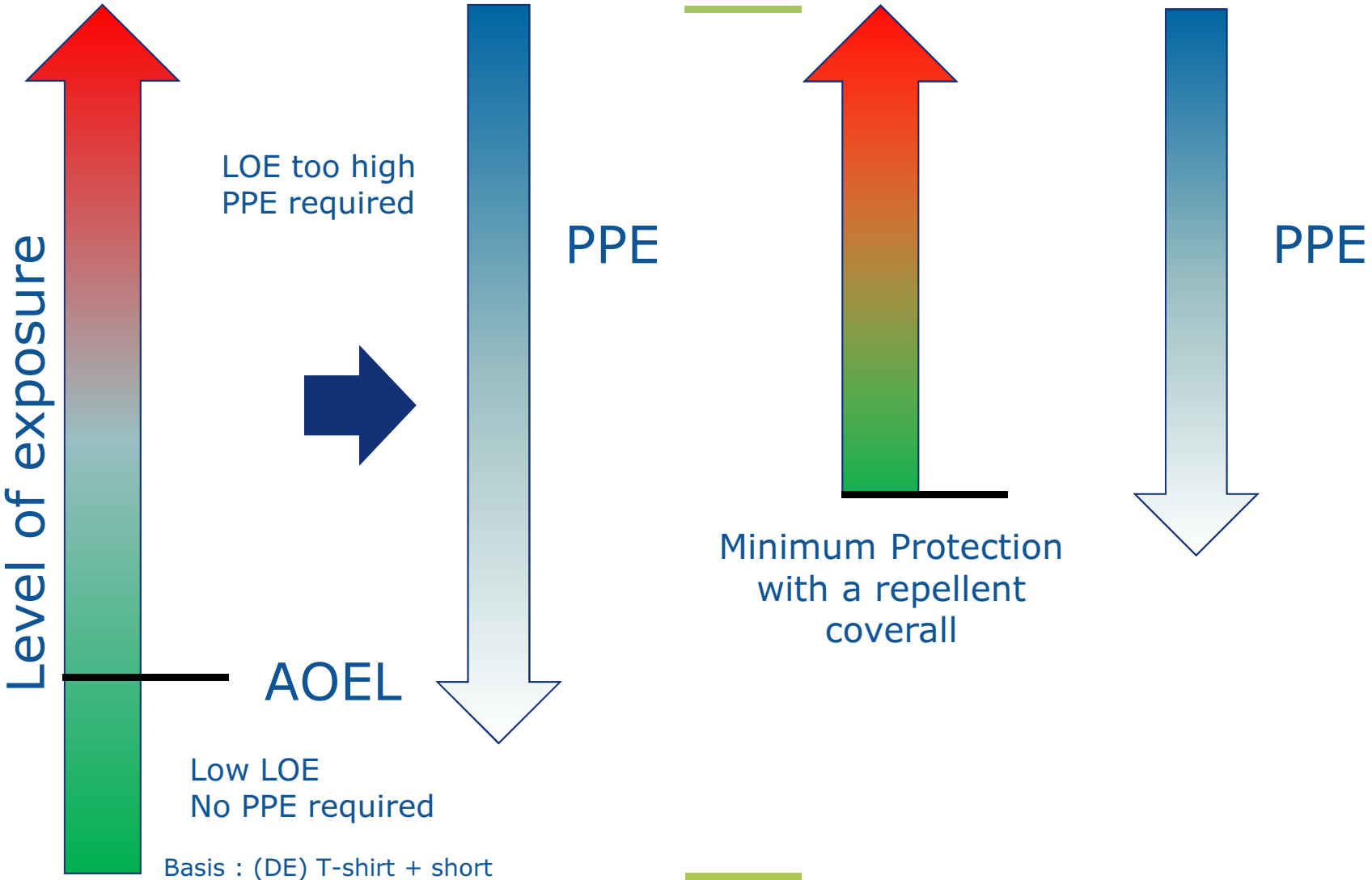
Exposure models (crop, sprayer combination) :POEM Predictive Operator Exposure Models(German/UK/**EFSA**)

Based on practical scenarios during sprayer filling, spraying and cleaning phases.

Risks are expressed in terms of risk phrase and codes

POEM Approach (UK, German)

POEM Approach (EFSA)



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Old EU labelling

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New EU CLP system Classification-labelling – Packaging

Label Elements Old		Hazard Classes and Categories*	Label Elements New**		
VERY TOXIC	R28 R27 R26	Acute toxicity , categories 1, 2 - Oral - Dermal - Inhalation	DANGER		H300 H310 H330
TOXIC	R25 R24 R23	Acute toxicity, category 3 - Oral - Dermal - Inhalation			H301 H311 H331
TOXIC	R46 R45,R49 R60,R61 R39 R48	Germ cell mutagenicity, categories 1A, 1B Carcinogenicity, categories 1A, 1B Reproductive toxicity, categories 1A, 1B STOT***, single exposure, category 1 STOT***, repeated exposure, category 1	DANGER		H340 H350 H360 H370 H372
HARMFUL	R42 R65	Respiratory sensitisation, category 1 Aspiration hazard, category 1			H334 H304
HARMFUL	R68 R40 R62, R63 R68 R48	Germ cell mutagenicity, category 2 Carcinogenicity, category 2 Reproductive toxicity, category 2 STOT***, single exposure, category 2 STOT***, repeated exposure, category 2	WARNING		H341 H351 H361 H371 H373
HARMFUL	R22 R21 R20	Acute toxicity, category 4 - Oral - Dermal - Inhalation	WARNING		H302 H312 H332

Critical phases

mixing-
loading

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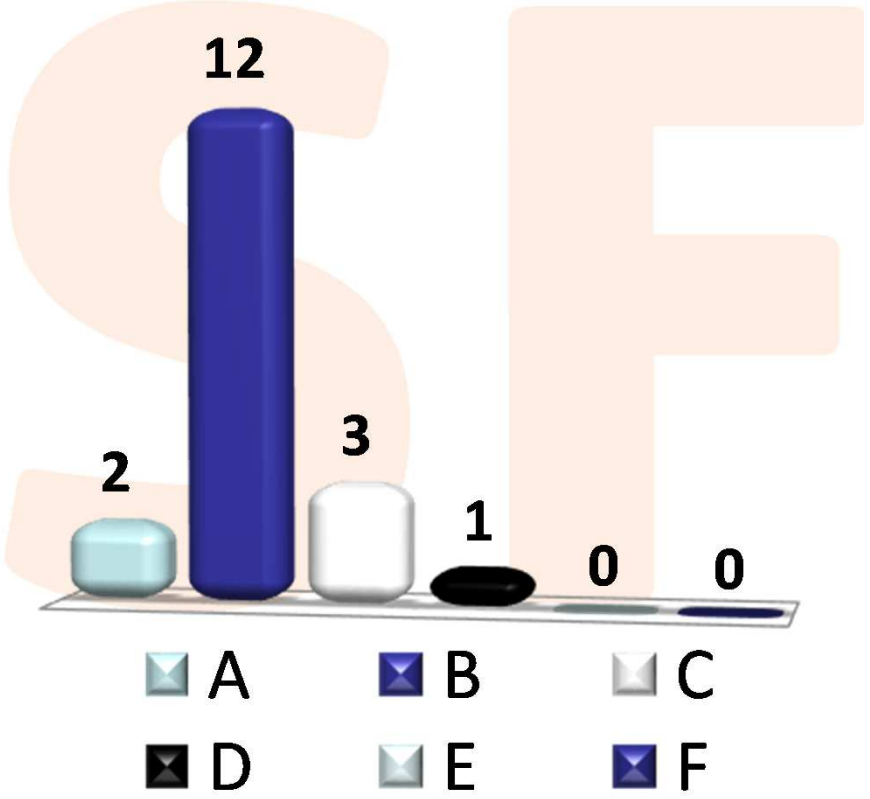
What kind of risks may occur during filling/loading phase ?

1. Contortions/steps due to difficult access ?
2. Spillage of concentrated product ?
3. Contact with contaminated tank ?
4. Leaks on the induction circuit ?
5. PPE management ?
6. Else ?



Critical phases

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Application

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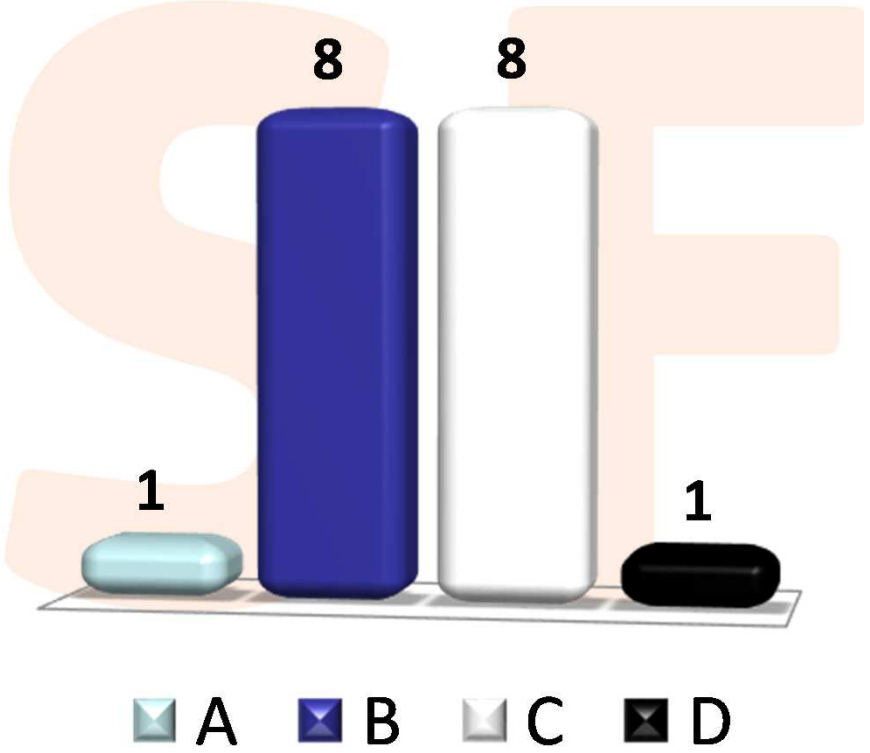
What kind of risks may occur during the application phase ?

1. Plugged nozzle ?
2. Modification of sprayer setting outside the cab ?
3. PPE management (inside/outside the cab ?)
4. Else ?



Critical phases

Cleaning

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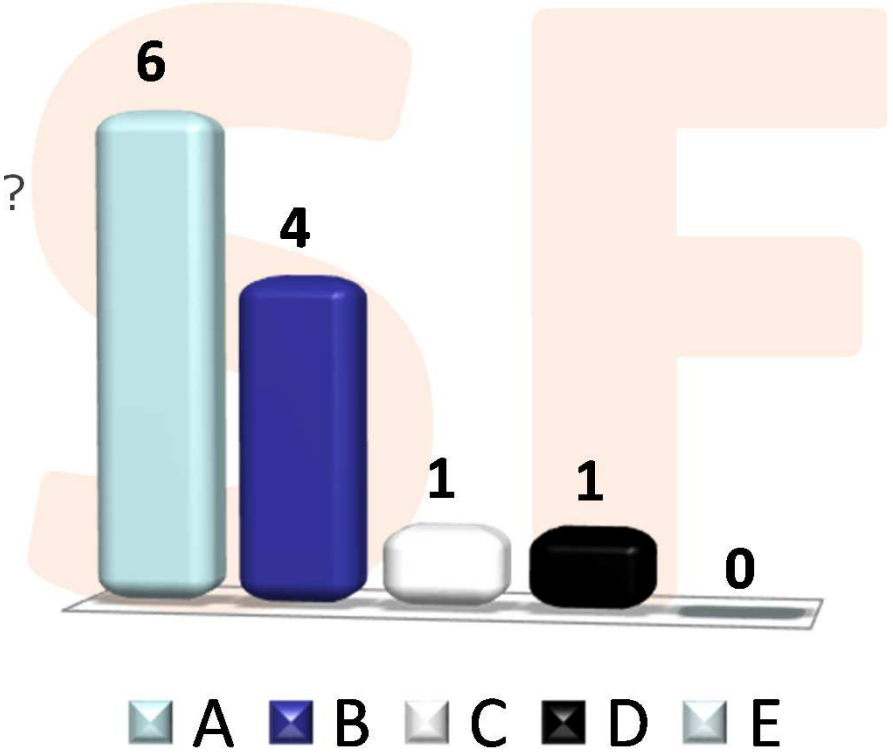
What kind of risks may occur during the cleaning phase ?

1. Splash of contaminated liquid ?
2. Contact with sprayer contaminated parts ?
3. Access difficulties ?
4. PPE management ?
5. Else ?



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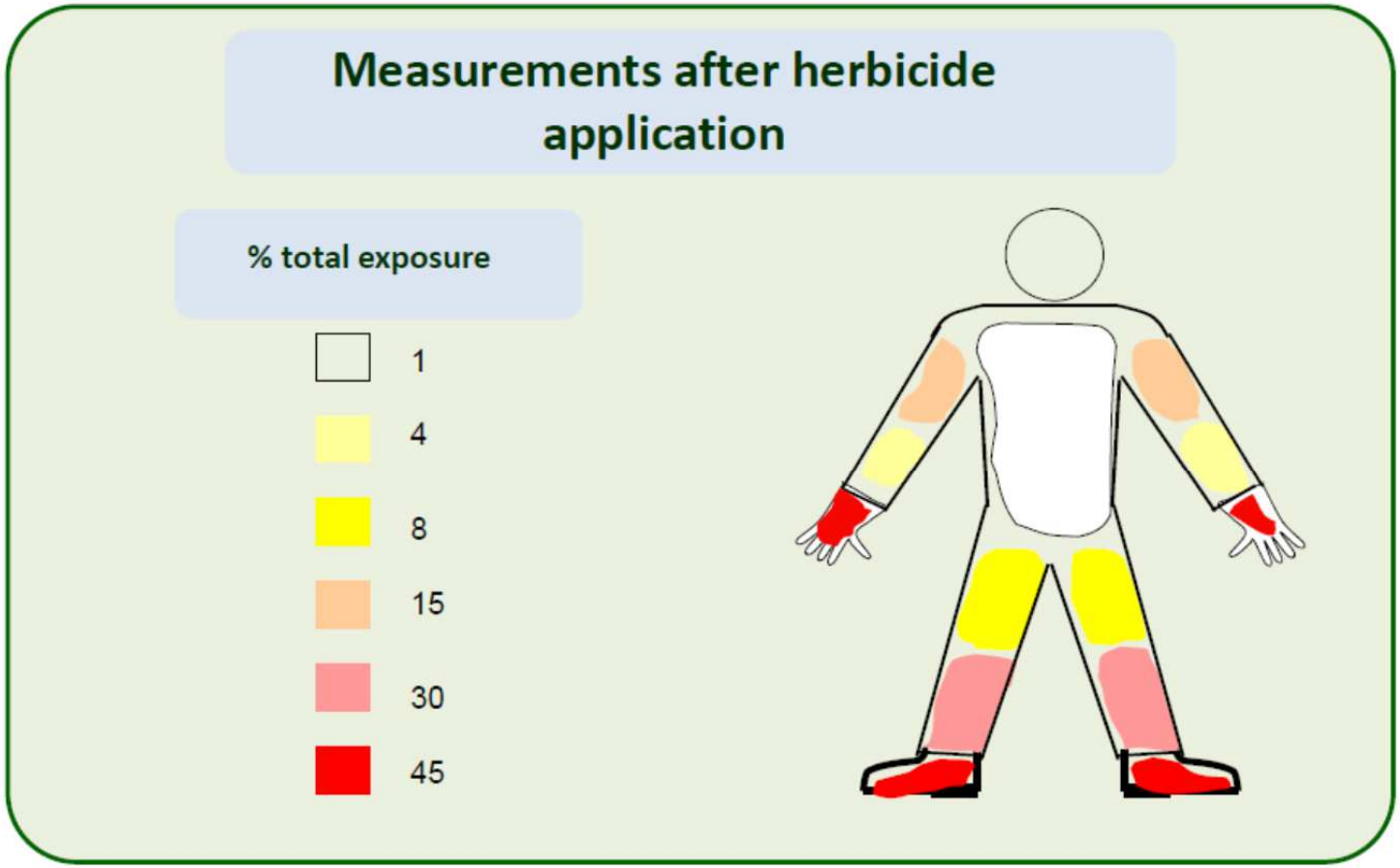
Operator exposure : 97 % Dermal route but depends on the crop and spray application technique



PPE (according to Directive 89/686/EEC)

Chemical protective clothing

PPE category III: to protect against risks which may seriously or irreversibly harm health

Liquid tight	Spray tight	Spray tight (limited)	Tight Particle	
Typ 3	**Typ 4**	**Typ 6**	**Typ 5**	**CE Einfach**
				CE
EN 14605-2005	EN 14605:2005	EN 13034:2005	EN ISO 13982-1:2004	

http://www.efsa.europa.eu/en/141028a/docs/141028a-p06.pdf

Efficacy of PPE against penetration

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Type	Cat III type 3	Cat III type 4	Gown / Apron Cat III type 3	Working coverall	Work wear
Resistance to penetration	++++	+++	++++	++ (if water repelent)	+/-

Objective : less than 5% penetration

Gloves

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Practice	Gloves
Mixing loading with concentrated products	Nitrile gloves
Diluted pesticides	Rubber glove

Gloves

Gloves with woven parts should not be used.

Gloves with a CE mark 'hammer' means mechanical resistant, but not chemical resistant.

Gloves without CE mark means no EN/ISO certified gloves (perceived protection).

Chemical protective gloves EN 374: 2003.

Masks

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Disposable dust /mist mask

CE Mark: 149:2001 (FFP: Filtering Face Piece)

Reduction of exposure by a Assigned Protection Factor (APF):

- FFP1: 4x
- FFP2: 10x (normally used)
- FFP2: 20x

Risk assessment in Germany (2010): only 8 out of 644 pesticides need a P2 filter.
Reduction of exposure in risk assessments: 90%. *

Reusable dust /mist/vapour mask

Against organic vapour (A1, A2, A3) + dust/mist (P1, P2, P3), e.g. A2P3 (normally used)

Risk assessment in Germany (2010): only 6 out of 644 pesticides need a vapour/particle filter A1P2.
Reduction of exposure in risk assessments: 90%. *

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PPE	Mix/load (M/L)	Application (A) with cabin (4)	Cleaning (C)
Protective garment (Cat III type 4)	X	(X)	X
Chemical protective gloves (nitrile)	X		
Single use nitrile gloves		(X)	X
Face shiled/safety glasses	X		X
Boots	X	(X)	X

If required by pesticide label :

Protective garment

Gloves (A & C)

Goggles

Apron (M/L)

Mask

BAYER

Valdor® EXPERT

HERBICIDE

✓ Désherbage sélectif des arbres et arbustes d'ornement en pépinières et en plantations.

Contient :
1% d'iodosulfuron-méthyl sodium,
36% de diflufénican (DFF),
Sous forme de granulé dispersable (WG)

250 g e

RÉSERVÉ À UN USAGE EXCLUSIVEMENT PROFESSIONNEL

ATTENTION

Valdor® Expert - AMM N° 2110010
Granulés à disperser dans l'eau (WG)
Contient : 1% d'iodosulfuron-méthyl-sodium (10 g/kg)
36% de diflufénicanil (DFF) (360 g/kg)
Détenteur homologation : BAYER S.A.S. (69)

H319	**Provoque une sévère irritation des yeux.**
H410	**Très toxique pour les organismes aquatiques, entraîne des effets néfastes à long terme.**
EUH401	**Respectez les instructions d'utilisation pour éviter les risques pour la santé humaine et l'environnement.**
P280	Porter des gants/des vêtements de protection et un équipement de protection des yeux/du visage.
P337 + P313	Si l'irritation oculaire persiste: consulter un médecin.
P501	Éliminer le contenu/récipient dans le lieu d'élimination conformément à la réglementation locale.
SP1	Ne pas polluer l'eau avec le produit ou son emballage.
Spe3	Pour protéger les organismes aquatiques, respecter une zone non traitée de 5 mètres par rapport aux points d'eau.
Spe3	Pour protéger les plantes non-cibles, respecter une zone non traitée de 5 mètres par rapport à la zone cultivée adjacente.

Délai de réentrée :
6 heures en cohérence avec l'arrêté du 12 septembre 2006

Premiers soins :
Contact avec la peau : Nettoyer avec une grande quantité d'eau et du savon, si disponible, avec du polyéthylèneglycol 400, puis rincer avec de l'eau. **Contact avec les yeux :** Laver immédiatement et abondamment à l'eau pendant au moins 15 minutes. **Ingestion :** En cas d'ingestion accidentelle, ne pas faire vomir, consulter un médecin.
Fiche de données de sécurité disponible sur internet : www.quickfds.fr
N°appels d'urgence 24h/24h : 04 72 85 25 25

FR80040164C - *ARTICLE 80033532*

www.club-vert.com

Bayer Service infos Espaces Verts
N°Vert 0 800 008 401
APPEL GRATUIT DEPUIS UN POSTE FIXE

3 700479 002570

Bayer

Date de fabrication/n° de lot : voir sur l'emballage

Bayer S.A.S.
Activité Espaces Verts
16 rue Jean-Marie Leclair
CS 90106
69266 LYON CEDEX 09
FRANCE

® Marque déposée

ATTENTION

Valdor® Expert - AMM N° 2110010
Granulés à disperser dans l'eau (WG)
Contient : 1% d'iodosulfuron-méthyl-sodium (10 g/kg)
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PPE choice is a compromise :

- Protection efficacy
- Suitability for work

Wearing a PPE does not avoid the risk !

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Accidental spillage, contamination

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Emergency actions to protect human health and/or the environment

When a person is contaminated accidentally

In field : provide a clean water container – tel list ICE

At Farm : Rinse eyes and the skin with abundant amount of water,

Take a shower

Remove contaminated clothes

Call Anti poison center (if ingestion or skin symptoms)

First aid kit (if injuries)

Chemical spill : 3 C actions

Control : use PPE first. Find the spill source and call

Contain: to avoid spreading

Clean up: as possible

Nozzle plug : don't use the mouth !

Pesticide handling

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Filling/rinsing area

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Container collecting and recycling

ADIVALOR

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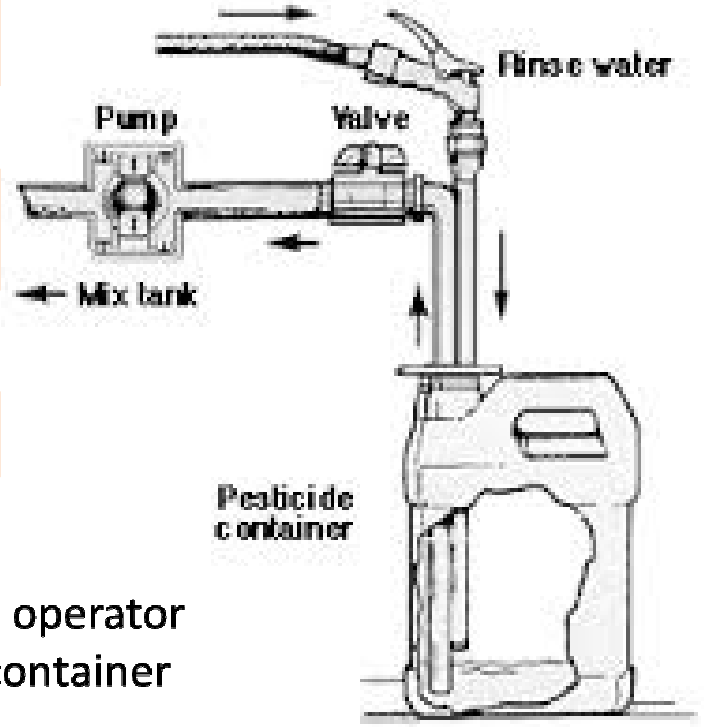
Innovations



Objectives :

1) Avoid the contact of concentrated product with the operator
2) Allow the dosing of product and the rinsing of the container

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Induction hopper

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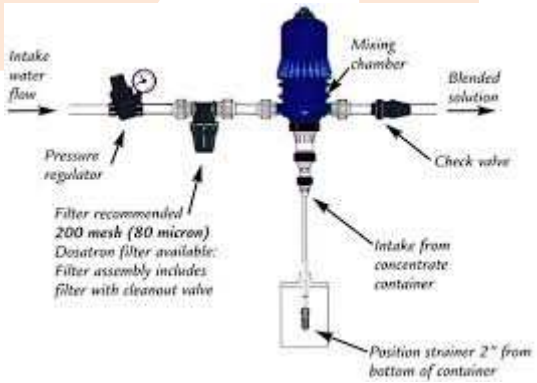
Premix tank with/without dosing



Closed tranfer systems

Easy Flow®
(Agrotop/Bayer)

Ezy connect® BASF
Wisdom Systems

Smartfill®
(BASF/Amazone)

B Safe®
(Berthoud/Bayer)

Closed Jug System®
EPA DPR (1997)

Zero Stress Caruelle

References

EN 14605, 2009 : Protective clothing for use against liquid chemicals - Performance requirements for clothing with liquid-tight (Type 3) or spray-tight (Type 4) connections, including items providing protection to parts of the body only (Types PB (3) and PB (4))

EN 13034, 2009: Protective clothing against liquid chemicals - Performance requirements for chemical protective clothing offering limited protective performance against liquid chemicals (type 6 and Type PB [6] equipment)

EN ISO 13982-1, 2005: Protective clothing for use against solid particulates - Part 1: performance requirements for chemical protective clothing providing protection to the full body against airborne solid particulates (type 5 clothing)

EN ISO 13982-2, 2005: Protective clothing for use against solid particulates - Part 2 : test method of determination of inward leakage of aerosols of fine particles into suits

www.efsa.europa.eu

ECPA - Safe use initiative : http://www.ecpa.eu/page/safe-use-initiative-sui

H Felber, 2013. Personal Protective Equipment (PPE) for handling pesticides. Zagreb.
http://www.savjetodavna.hr/adminmax/File/interne_vijesti/2013_zapisnici_prezentacije/oup/Personal%20Protective%20Equipment%20%28PPE%29%20for%20handling%20pesticides.pdf

K. Machera , PPE Requirements and Pesticides Labelling , 2014 Conference on Safe and Sustainable Use of Pesticides, Belgrade 11-12 June 2014
http://www.ecpa.eu/files/attachments/PPE%20requirements%20and%20pesticide%20label_Machera%202014_2.pdf

Optional :
PPE and sprayer inspection ?

Are all these PPE necessary ?

IRSTEA case study 2009

S. Grimbuhler, Risk exposure of sprayer inscpetor during the inspection : an ergonomic approach, SPISE 15-17 Oct 2014, Montpellier France.

http://spise.jki.bund.de/dokumente/upload/3c101_29_session_5_grimbuhler.pdf

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Failure modes, effects and criticality analysis (FMECA)

Risk analysis based on video reccording during sprayer inspection

Potential contact points identified : 53 – 320 contacts with sprayer

Remove gloves : μ = 48

Failure frequency	Criticality Level			
	Insignificant	Marginal	Critical	Catastrophic
Frequent		Reservoir cover	Hand rinse inspection	Writing report Nozzle inspection
Probable		Reservoir Guage		Filter,
Occasional		Pressure Guage		Pneumatic nozzle
Improbable	Electric control box			

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Thank you for your attention.

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Consumers, Health and Food Executive Agency
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L-2920 Luxembourg

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