THE SPISE ADVICE FOR FUNCTIONAL INSPECTION OF DUSTERS

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Dusty sulfur is mainly used to control of grape powdery mildew (Uncinula necatrix). The quality of such distribution (difficulties in dose regulation and poor in the distribution uniformity) is important in the vineyard protection strategy.

All types of dusters actually in use, are characterized by a tank where the sulfur dust is contained and by a radial fan to generate the air flow for the dust distribution.

Especially in South Europe (Italy, Spain, France, Greece, Portugal) are estimated about > 200.000 dusters in use.
INTRODUCTION

TYPES OF DUSTERS

Knapsack dusters manually operated or motorized

Tractor mounted and trailed dusters
INTRODUCTION

Gravity extraction

Type A: provided with a tank without internal air flow

Type B: provided with a tank with internal air flow

Mechanical extraction

Type A: provided with a tank without internal air flow

Pneumatic extraction

INTRODUCTION

Gravity extraction

Type A: provided with a tank without internal air flow

Type B: provided with a tank with internal air flow

Mechanical extraction

Type A: provided with a tank without internal air flow

Pneumatic extraction
It is based on EN ISO 16122-1, 3 standardized methods when applicable

- Pre inspection
- Inspection (main components to be inspected)
  - Tank
  - Agitation system
  - Pipes and hoses
  - Control devices
  - Blower
PRE – INSPECTION

It is important that the inspection can be executed in a way that is safe for the inspector and the environment.

CLEANING

_The duster shall be clean externally and internally._ Shall not be there any sulfur residues into the tank or on the external surface that can be a source of contamination for the inspector or the environment.

POWER TRANSMISSION AND MOVING PARTS

The power take-off (PTO) drive shaft, the power input connection (PIC) and the universal joints shall be equipped with suitable and undamaged guards and protective devices, that shall work properly.

Visual check
STRUCTURAL PARTS AND FRAMEWORK

*Structural parts* and framework of the duster shall be **without permanent deformation**, significant corrosion or considerable defects. The hitching device shall be in good condition and shall work properly.

LOCKABLE FOLDABLE PARTS

Locking of foldable parts of the duster, if present, shall work properly and without defects.

STATIC DISCHARGE DEVICES

*All metallic parts of the equipment that can conduct static electricity* (framework, screw conveyor, blower, controls and regulation systems, cables) **shall be connected with a static discharge device.**
Clutch

If the blower is provided with a clutch to switched off it separately from other driven parts of the sprayer, this device shall function properly.

Visual check and functional test

**General**

The *blower* (fan, casing) shall be *without mechanical deformations*, excessive wear and corrosion that could be able to significant vibration or malfunctions. Moreover it shall be verified that:

— all blades are present and without damages;
— guarding to prevent access to the fan is present and in good conditions.

**Visual check and functional test**
INSPECTION
(requirements and methods of verification)

TANK

Lid
The duster tank shall be provided with a suitable lid that shall be *tightly sealed* to prevent any dust dispersion and shall avoid unintended opening.

Visual check

Filling hole
The diameter of the tank filling hole should allow a safe and easy introduction of the dust in the tank.

Visual check
Duster category A
The mechanical agitation system in the tank, if present, shall work properly.

Duster category B
The agitation system in the tank, generated by the internal air flow it shall assure a correct agitation.

No leakages shall be present from the tank.
The lid shall be airtight (pressurized tank)
INSPECTION
(representations and methods of verification)

PIPES AND HOSES FOR DUST EXTRACTION AND DISTRIBUTION

*Shall not be present air leakages from pipes and hoses* for the dust extraction.

CONTROLS AND REGULATION SYSTEMS

*System for switching on/off the dust distribution*

The system for switching on or off the dust distribution shall operate properly.

*The duster must be equipped with a system which allows to carry out the distribution from one side only*

Example of system for switching on or off the dust distribution from one side only
Device for adjusting the dust rate

General

Device for adjusting the dust rate shall work properly.

This device shall be lockable in the intended dose rate position and shall be provided with a zero position that enables to switch off the machine without spreading any dust from the spouts.

Visual check and functional test

Indications to select the intended rate

The device for adjusting the dust rate shall be provided with clear indications (marks) to select the intended rate and shall be possible to operate from the operator’s position during the work.
BLOWER

**Air speed outlet symmetry**

The air speed outlet shall be symmetrical on the left and right hand side.

The *measurement (optional)* of the air speed shall be carried out at the spouts and 1.5 m away from them.

The *maximum difference* of the average air speed between the corresponding measurement position *at the two sides shall be ±20%.*

**Visual check (+ optional functional check)**

**Fan rotation speed**

The blower shall be checked verifying the absence of vibrations (due to imbalance), friction between the body and the fan or wrong orientation of the blades.

*The fan rotational speed shall not differ by more than ±10% compared to values indicated by the manufacturer.*

**Visual check (+ optional functional check)**
## TEST METHODS

### STATIC DISCHARGE DEVICE

The static discharge devices shall be checked with a visual inspection of the connection of all the metallic parts of the duster.

### AGITATION SYSTEM

**Duster category A**

Verify the movement (rotation and frequency) of the mechanical agitation devices into the tank (without using dust) with the machine working at the PTO rotation speed indicated by the manufacturer.

**Duster category B**

To check it, it is necessary to use the fan at the maximum velocity indicated by the manufacturer (without dust into the tank), measuring the leakages along the tank surface with an anemometer at a distance of 5 cm.

### PIPES HAD HOSES

The leakages shall be checked with a functional/visual inspection.
**BLOWER (OPTIONAL CHECK)**

*Air speed outlet (symmetry)*

Measurements shall be carried out on the two sides of duster with an anemometer.

The duster shall be positioned with the center of the spouts at a height of 0.5 m from the ground and with a PTO speed of 540 rpm.

The air velocity shall be measured in correspondence of the edge of the spouts.

The vane probe of the anemometer shall be positioned in at least 6 different positions along the spout profile and at a distance of 1.5 m from the center of the machine (considering a typical vineyard inter-row distance of 3 m) at three different heights from the ground (referred to typical vineyard canopy heights): 0.5; 1.0 and 1.5 m

**Requirements of the anemometer:**
- **Accuracy:** 0.1 m/s
- **Scale end value:** 60 m/s

![Diagram of Duster with positions marked: h = 0.5 m, h = 1.0 m, h = 1.5 m, 1.0 m, 1.5 m.](image)
**Fan speed**
The fan rotational speed shall be measured at the nominal working range of PTO velocity indicated by the manufacturer.
To carry out the test, using a tachymeter measuring the revolution of the fan shaft or considering the revolution of one of the fan blades.

Requirements of the tachymeter:
- *Accuracy*: 1 rev/min
- *Scale end value*: 5000 rev/min
CONCLUSIONS

No standard specification requirements available for *new dusters*.

Those mentioned in this draft Advice could be also taken as *guidance in design of new equipment*.

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THANK YOU FOR YOUR ATTENTION!

QUESTIONS?