



Standard Methods for Testing Hydraulic Spray Nozzles Used in Agriculture¹

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^{ε1} NOTE—Editorial changes were made to the equation in subsection 6.3.4.5 in November 2012.

1. Scope

1.1 These methods cover procedures for testing hydraulic spray nozzles used in agriculture. The methods herein cover the following performance parameters: nozzle flow rate, nozzle spray angle, liquid distribution, spray droplet size, and nozzle wearability.

1.2 These methods are applicable to hydraulic spray nozzles which produce the following spray patterns: flat-fan, hollow cone, and full cone.

1.3 The values stated in SI units are to be regarded as standard. No other units of measurement are included in this standard.

1.4 *This standard does not purport to address the safety concerns associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Terminology

2.1 Definitions of Terms Specific to This Standard:

2.1.1 The types of hydraulic spray nozzles considered are categorized according to spray characteristics, as follows:

2.1.1.1 *flat-fan “tapered edge” type spray nozzle*—this nozzle provides a range of atomization sizes throughout the pattern area. Its edges are tapered to permit the overlapping of spray patterns from adjacent nozzles, thereby providing relatively uniform overall distribution. These nozzles are popular on field-type crop sprayers where uniform coverage is desired across the swath.

2.1.1.2 *flat fan “even edge” type spray nozzle*—this nozzle provides relatively uniform atomization size as compared to the “tapered edge” type nozzle and uniform distribution throughout the spray pattern. There is no requirement for

overlap of adjacent spray patterns when using this nozzle. It is used primarily to spray uniform strips or bands in fields.

2.1.1.3 *flooding or deflector-fan type spray nozzle*—this nozzle produces a low impact spray with a wide-angle flat pattern having uniform distribution when low pressures are used. It is used primarily on field-type sprayers when broad coverage at lower pressures is desired.

2.1.1.4 *hollow cone and full cone nozzle*—the hollow cone nozzle normally provides uniform distribution throughout a hollow cone pattern area. The full cone nozzle, provides uniform distribution throughout its full cone pattern. Both types are used extensively for spraying of fruits and vegetables, some row crops with pesticides, and aerial applications.

3. Significance and Use

3.1 The purpose of these methods is to provide uniform testing procedures for evaluating the performance criteria of hydraulic spray nozzles used for agricultural purposes.

3.2 The procedures set forth in these methods are for spray nozzles of the hydraulic energy type in which the spray material is forced through an orifice under pressure, providing fluid break-up into droplets.

3.3 Droplet producing nozzles that operate by means other than hydraulic energy are not applicable to these methods.

4. Apparatus

4.1 This section covers equipment used in testing hydraulic spray nozzles. The equipment and apparatus listed are sufficient for use in all methods described herein.

4.2 Fundamental equipment common to all of the test methods are as follows:

4.2.1 *Water Reservoir or Retaining Vessel*—A water reservoir or vessel sufficiently large to provide smooth continuous flow to the nozzle(s) throughout the duration of a particular test.

4.2.2 *Pump or Source of Water Pressure*—A pump or source of water pressure sufficient to maintain the required test pressure with less than $\pm 2\%$ deviation from the nominal pressure.

4.2.3 *Pressure Gage:*

¹ These methods are under the jurisdiction of ASTM Committee E35 on Pesticides, Antimicrobials, and Alternative Control Agents and are the direct responsibility of Subcommittee E35.22 on Pesticide Formulations and Delivery Systems.

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