

**Booklet Four**

**of the**

**Spreadmark Code of Practice**

**Spread Pattern Testing and Certification for Fixed Wing Aerial Application of Solid Nutrients**

**SPREAD PATTERN TESTING AND CERTIFICATION FOR FIXED WING AERIAL APPLICATION OF SOLID NUTRIENTS**

**INTRODUCTION**

This booklet is one of four booklets containing information that supports the Spreadmark Code of Practice for the Application of Nutrients in New Zealand

The Spreadmark Code of Practice can be found here <https://fertqual.co.nz/resources/>

This booklet forms part of the Code and all information related to copyright, document control, acknowledgements and glossary contained in the main Code apply equally to the information in this booklet.

Other booklets containing support information for the Spreadmark Code of Practice are:

Booklet 1: Spreadmark Procedures, Protocols, Policies and Codes.

Booklet 2: Technical Specifications for the Testing and Certification of Solid Nutrient Spreading Units.

Booklet 3: Technical Specifications for the Testing and Certification of Conventional Boom Sprayers Applying Liquid Nutrient.

These booklets are supported by two technical documents listed below and found here: <https://fertqual.co.nz/spreadmark/>

* Nutrient Application Specifications; and
* Nutrient Physical Properties - General Information

**Note this booklet deals only with solid nutrient spread by fixed wing aircraft. For products spread using booms and moving parts, refer booklets two and three.**

**PRINCIPLES**

Section 5.1 of the Spreadmark Code of Practice lists a series of principles for spreader certification. These include:

* The spreader test procedure allows each spreader unit to be characterised so it can be set to accommodate variable nutrient characteristics;
* The test procedure has been linked to international methods and practice, adapted to New Zealand conditions;
* Requirements for wind speed and direction, angle of slope and nature of surface shall be set;
* Testing shall be carried out in a way that does not cause environmental contamination by overloading the test site;
* The evenness of nutrient spreading both across and along the direction of spreader travel is important and shall be expressed as a Coefficient of Variation;
* To be Spreadmark Registered, application units must satisfy the performance standard for transverse CV% of 15% for nitrogenous nutrients and 25% for all other products;
* Spreading units shall be tested on a sufficiently wide range of nutrients to provide a guide to the maximum safe bout width for the range of products the spreader distributes;
* Spreader certification testing shall be done at regular intervals as prescribed in the Spreadmark Code of Practice;
* Every certified spreader shall have, a unique identification number;
* When aircraft are sold from a Spreadmark registered company to another Spreadmark registered company, the current Spreadmark Test Certificates can be transferred to the new owner. If the sale is to a non-Spreadmark registered company then the certificates lapse.

**Data Collection - general**

The principal piece of information required is the spread pattern achieved. A spread pattern shall be available for a representative sample of baseline product for each application configuration. The spread pattern shall be established at one application rate that is typical or average for that used for the product.

Pattern test data for a fixed wing aircraft distribution system shall include:

A graph of the swath pattern from a single pass;

A graph of the bout width vs. the CV% for evenness of application;

A record of maximum swath width; and

The following information:

* Wind speed and direction at the test site (relative to the flight path or the line of collectors)
* Product physical properties, including SGN, UI and Bulk Density.
* Application rate (intended and achieved, kg per ha)
* Flight path (centreline collector)
* Application height (estimated + or – 15ft)
* Ground speed (knots/hr)
* Collector size, spacing and number.
* Weight of product per collector (gm)
* Application unit type.

Collectors used shall comply with the Spreadmark specifications which are:

* Size shall be no less than 500mm x 500mm x 140mm deep; and
* Have suitable anti-ricochet systems; or
* As approved by the Fertiliser Quality Council.

**Data collection – SPREADER UNIT**

|  |  |  |
| --- | --- | --- |
| **Spreader Unit Type** | **Data** | **Report** |
|  | Dimensions of outlet | ……………………..mm long  …………….. ……….mm wide |
| **None** | Type of outlet  (clamshell/louvre/other) |  |
|  | Fairings (describe) |  |
|  | Front (inlet)  dimensions | ………………………….mm |
| **Ram Air** | Rear (outlet) dimensions | …………………………..mm |
|  | Number of vanes |  |

**Data collection and reporting**

A spread pattern is determined by flying the aircraft over a line of approved collectors, then retrieving and weighing the amount of nutrient retained in each collector. The data are used to plot a graph of the basic swath pattern from a single pass of the aircraft.

The following conditions must be met when measuring the transverse distribution pattern for an Approved Aerial Pattern Test Certificate. Wind speed and direction are particularly important along with the need to identify the flight path of the aircraft in relation to the line of collectors.

|  |  |
| --- | --- |
| **Item** | **Requirement** |
| Spreading unit | Clean and sound working condition |
| Hopper loading | Hopper content to be not less than one  quarter full at the conclusion of a pattern test |
| Application rate | The application rate measured at the  nominated BW shall be within 30% of  the nominated application rate |
| Speed over collectors | Normal operating speed |
| Height above ground level | Between 100 and 120 feet |
| Number of passes over collectors | One per spread pattern test |
| Wind speed and direction[[1]](#footnote-1) | Not greater than 15 km/hr and not more than ± 15o in the direction of travel. Tests can be into or downwind but the ground speed of the aircraft shall be recorded |

**Reporting**

Approved Aerial Spreading Unit Testers will, at the conclusion of the test, produce an Approved Aerial Pattern Test Certificate. An Aerial Pattern Test is approved by the Executive Director, Fertiliser Quality Council or their nominee.

The Certificate must show the data collected and include:

* The operators name and aircraft identification
* The Certified Bout Width for each nutrient tested –see Note below.
* The maximum spread width achieved (if required).
* A description of the physical characteristics of the product used in the test including product name, bulk density (BD), uniformity index (UI), size guide number (SGN) and a graph of the particle size distribution.
* The date of the test.
* Refer to retesting requirements for fixed wing aerial spreaders in Section 3.4(f) of the Code of Practice.

|  |  |
| --- | --- |
| **NOTE:** | The Spreadmark Certified Bout Width is the maximum bout width where the CV is 15% or less for nitrogenous nutrients and 25% or less for non-nitrogenous nutrients. |

1. Note that for cross winds, the collectors at each end of the line shall be empty. [↑](#footnote-ref-1)