
PHILIPPINE AGRICULTURAL ENGINEERING STANDARD PAES 125: 2002
Agricultural Machinery – Sprinkler Head – Specifications
Part 1: Rotating Impact-Driven Type

Foreword

The formulation of this national standard was initiated by the Agricultural Machinery Testing and Evaluation Center (AMTEC) under the project entitled "Enhancing the Implementation of AFMA Through Improved Agricultural Engineering Standards" which was funded by the Bureau of Agricultural Research (BAR) of the Department of Agriculture (DA).

This standard has been technically prepared in accordance with PNS 01-4:1998 (ISO/IEC Directives Part 3:1997) – Rules for the Structure and Drafting of International Standards.

The word “shall” is used to indicate requirements strictly to be followed in order to conform to the standard and from which no deviation is permitted.

The word “should” is used to indicate that among several possibilities one is recommended as particularly suitable, without mentioning or excluding others, or that certain course of action is preferred but not necessarily required.

In the preparation of this standard, the following documents/publications were considered:

AMTEC Test Reports on Sprinkler Head

International Organization for Standardization (ISO) 7749-1:1986 (new 1995) – Agricultural Irrigation Equipment – Rotating Sprinklers – Part 1: Design and Operational Requirements

CIGR handbook of Agricultural Engineering. A Five-Volume Series. 1999. Published by the American Society of Agricultural Engineers (ASAE).

A web page document on Irrigation Equipment – Head. Waterboy Sprinkler Specialists, Inc. 1999

Republic Act No. 7394 otherwise known as “The Consumer Act of the Philippines” enacted on July 22, 1991.

Agricultural Machinery – Sprinkler Head – Specifications
Part 1: Rotating Impact-Driven Type

1 Scope

This standard specifies the design and operational requirements of rotating impact-driven sprinkler head for irrigation equipment used for agricultural purposes.

2 References

The following normative documents contain provisions, which, through reference in this text, constitute provisions of this National Standard:

PAES 102:2000, Agricultural Machinery – Operator’s Manual – Content and Presentation

PAES 103:2000, Agricultural Machinery – Method of Sampling

PAES 126:2002, Agricultural Machinery – Rotating Sprinkler Head – Methods of Test

ISO 7-1:1982, Pipe threads where pressure-tight joints are made on the threads – Part 1: Designation, dimensions and tolerances

3 Definitions

For the purpose of this standard the following definitions shall apply:

3.1**nozzle**

aperture of the sprinkler head through which the liquid is discharged

NOTE A sprinkler head may contain one or several cylindrical nozzles or nozzle of other shapes and sizes.

3.2**radius of throw**

farthest distance measured from the sprinkler head centerline to a point at which liquid is deposited

3.3**rotating sprinkler head**

rotating sprinkler

device which by its rotating motion around its vertical axis distributes liquid over an area

3.3.1

impact-driven sprinkler head

type of rotating sprinkler head which rotates using weighted or spring-loaded arm which is propelled by the liquid stream and hits the sprinkler body (see Figure 1)

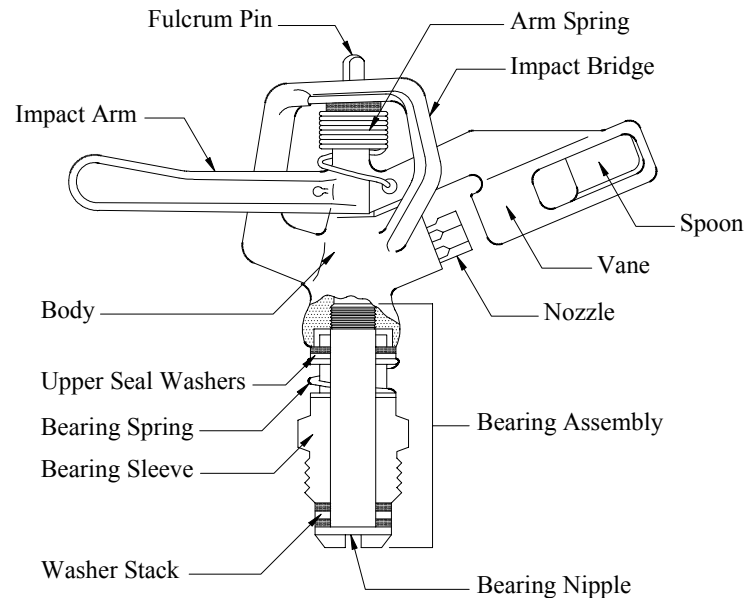


Figure 1 – Impact-driven Sprinkler Head and its Components

3.4

sprinkler head

hydraulically operated mechanical device which discharges liquid through a nozzle

3.5

trajectory angle

angle of the liquid stream above a horizontal plane, as discharged from the sprinkler nozzle operating at the test pressure

3.6

part-circle sprinkler

rotating sprinkler designed to irrigate a sector of a circular area, either with or without the possibility of adjusting it to irrigate the entire circular area

3.7

range of effective pressure

pressure range between the minimum effective pressure, p_{\min} , and the maximum effective pressure, p_{\max} , declared by the manufacturer as the pressure range in which the sprinklers operate effectively.

NOTE The pressure is measured at the base of the sprinkler, at a point situated about 0.20 m below the main nozzle of the sprinkler, but with the pressure gauge situated in the same plane as the main nozzle.

4 Classification

The classification of sprinkler head shall be based on the following:

4.1 Type

4.1.1 rotary

4.1.2 spray

4.2 Wetted area

4.2.1 full circle

4.2.2 part circle

4.3 Radius of throw

4.3.1 small (<5 m)

4.3.2 medium (5 m to 50 m)

4.3.3 large (>50 m)

4.4 Operating pressure

4.4.1 low (<150 kPa)

4.4.2 medium (150 kPa to 350 kPa)

4.4.3 high (>350 kPa)

4.5 Discharge

4.5.1 small (<0.5 m³/h)

4.5.2 medium (0.5 m³/h to 50 m³/h)

4.5.3 large (>50 m³/h)

4.6 Application rate

4.6.1 low (<5 mm/h)

4.6.2 medium (5 mm/h to 15 mm/h)

4.6.3 high (>15 mm/h)

4.7 Number of nozzles (one or two)

4.8 Trajectory angle

4.8.1 very low (<10°)

4.8.2 low (10° to < 25°)

4.8.3 normal (25° to 28°)

5 Materials of Construction

5.1 The sprinkler head shall be made of metal and/or plastic.

5.1.1 Metal sprinkler head shall be made from a copper alloy or of other metal whose mechanical properties when used with irrigation water are comparable with those of copper alloys.

5.1.2 Plastic parts of the sprinkler head which conduct liquid and which are exposed to sunlight shall be opaque. Plastic parts of the sprinkler head exposed to ultraviolet (UV) radiation shall contain an additive resistant to UV radiation.

5.1.3 If the sprinkler head is not suitable for operation with certain chemicals commonly used in agriculture, the manufacturer shall declare such limitations in his specification.

6 Performance Requirements

The sprinkler head when tested in accordance with PAES 126 shall conform to the following requirements:

6.1 The sprinkler head shall rotate continuously and regularly in its designated direction within its entire range of effective pressure.

6.2 The actuating mechanism of the sprinkler shall operate at any inclination of the riser up to 10° from the vertical.

6.3 The effective diameter of coverage, which is twice the radius of throw, shall not vary from that specified by the manufacturer by more than $\pm 5\%$.

7 Other Requirements

7.1 Sprinkler heads having a plastic part for connection to risers may have other configurations (projections, slots, etc) to facilitate manual assembly and removal.

7.2 Information on identifying mark such as color-coded plastic nozzles shall be provided in the manufacturer's catalogue or instruction manual.

7.3 Replaceable nozzles shall be attached to the sprinkler head by threading, push-in or any other method that permits rapid or effective replacement under service conditions.

7.4 In case of sprinkler head intended to connect to the pipeline or to the riser by threads:

7.4.1 The sprinkler head shall be equipped with a hexagonal nut, or at least with two parallel surfaces, suitable for gripping with a standard open wrench.

7.4.2 The threads shall comply with ISO 7-1. However, other threads shall be allowed provided that a suitable adaptor is supplied with each threaded connection.

8 Workmanship and Finish

8.1 The sprinkler head shall be free from manufacturing defects that may adversely affect its performance.

8.2 The sprinkler head shall be free from sharp edges and surfaces that may injure the operator.

9 Warranty for Construction and Durability

9.1 Warranty against defective materials and workmanship shall be provided for parts and services except on consumable maintenance parts within six (6) months from the purchase of the sprinkler head.

9.2 The construction shall be rigid and durable without breakdown of its components within six (6) months from purchase by the first buyer.

10 Maintenance and Operation

10.1 If the construction of sprinkler permits replacement of parts, it shall be possible to replace the parts with standard tools; and if special tools are required, the manufacturer shall be able to supply the said tools.

10.2 An operator's manual, which conforms to PAES 102, shall be provided.

11 Sampling

The sprinkler head shall be sampled for testing in accordance with PAES 103.

12 Testing

Sampled sprinkler head shall be tested in accordance with PAES 126.

13 Marking and Labeling

13.1 Marking

13.1.1 Sprinklers

Each sprinkler shall be marked in English language with the following information using a plate, stencil or by directly punching it at the most conspicuous place:

13.1.1.1 Registered Trademark of the Manufacturer

13.1.1.2 Brand

13.1.1.3 Model

13.1.1.4 Trajectory angle (marked only on low trajectory angle sprinklers)

13.1.1.5 A mark to designate correct position of nozzle (if position of nozzle affects sprinkler operation)

13.1.2 Nozzles

Each nozzle shall be marked in English language with the following information using a plate, stencil or by directly punching it at the most conspicuous place:

13.1.2.1 nozzle diameter, mm

13.1.2.2 mark indicating correct position of nozzle, if this affects sprinkler operation

13.2 Labeling

Each package shall be labeled in English language as follows:

13.2.1 Name and address of the manufacturer

13.2.2 Name and address of the importer, if imported (optional)

13.2.3 Country of manufacture (if imported) / “Made in the Philippines” (if manufactured in the Philippines)

13.2.4 Safety/precautionary markings