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**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 47122.2-2026

**Printed electronics - Inkjet printing equipment - Part 2: Imaging
based measurement of droplet volume**

印刷电子 喷墨印刷设备 第2部分：基于成像的液滴体积测量

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 2 of GB/T 47122 "Printing Electronic Inkjet Printing Equipment". GB/T 47122 has published the following...

part.

---Part 1: Imaging-based measurement of droplet ejection velocity;

---Part 2: Imaging-based droplet volume measurement;

---Part 3: Imaging-based measurement of droplet orientation.

This document is equivalent to IEC 62899-302-2:2018 "Printed electronics - Part 302-2.Devices for inkjet imaging-based droplet printing".

Volume measurement.

The following minimal editorial changes have been made to this document.

---To align with existing standards, the standard title has been changed to "Printing

Electro-Inkjet Printing Equipment Part 2: Imaging-Based Droplets" Volume Measurement;

---IEC 62899-302-1 has been replaced with GB/T 47122.1 (see Chapter 4 and References) for informational reference.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Machinery Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Printing Machinery (SAC/TC192).

Introduction

Inkjet technology uses micro-nozzles to precisely eject ink droplets. During the printing process, these droplets are patterned and ejected onto the substrate.

Inkjet technology is a mature technology that has been widely applied in home, commercial, and industrial sectors. When using inkjet technology, the volume of the droplets can be precisely controlled.

The droplets can be controlled to a precision of 0.1 pl. Furthermore, the droplets can be transferred onto the substrate with micron-level accuracy. Due to these and other properties, inkjet technology has...

It has become one of the most powerful tools in fields such as electronic device patterning, drug formulation, and high-precision industrial applications. Unlike traditional photolithography processes...

Similarly, patterned inkjet technology in the electronics field is an additive manufacturing process that allows for the addition of multiple layers of patterns without removing any already deposited material.

Therefore, inkjet technology significantly reduces the waste of often very expensive materials, and is also more environmentally friendly. GB/T 47122 aims to provide a standard the accurate inkjet measurement method is proposed to consist of 5 parts.

---Part 1: Imaging-based measurement of droplet ejection velocity.

---Part 2: Imaging-based measurement of droplet volume.

---Part 3: Imaging-based measurement of droplet orientation.

---Part 4: Media for evaluating dot position in inkjet printing.

---Part 5: Key Characteristics of Inkjet Printing as the application scope of inkjet technology continues to expand, more types of materials are being ejected more precisely from the inkjet head. This is especially true for new and traditional inkjet printing technologies.

For systematic applications, accurate measurement of the droplet state ejected from the inkjet printhead is necessary to assess and control the ejection behavior. In inkjet manufacturing systems...

In this system, vision-based measurement techniques are widely used because visual images provide an intuitive understanding of flight behavior. From droplet images...

Among the obtained jetting performance parameters, droplet jetting velocity and droplet volume are the two most frequently measured parameters.

By using information about inkjet droplet formation and properties obtained through vision-based measurement systems, developers can adjust ink formulations.

And injection parameters to improve performance.

However, please note that since there is no standard measurement procedure, the measured injection performance and evaluation results may vary depending on the measurement method used.

There can be significant differences. Due to the lack of fair testing methods, process engineers may find it difficult to evaluate the ink and inkjet printhead manufacturers' offerings.

The injection performance data sheet may lead to potentially unreliable results.

Printing electronic inkjet printing equipment Part 2: Imaging-Based Droplet Volume Measurement

1 Scope

This document describes a method for determining the precise volume of inkjet droplets based on images obtained from a flying droplet measurement system.

This document does not apply to imaging systems that use interference fringes, such as holography or phase Doppler velocimetry. This document is not limited to...

This requires an inkjet system, but is not suitable for continuous inkjet or liquid dispensing systems. This document includes a description of the aforementioned measurement issues and an assessment of measurement accuracy.

Limitations to consider.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

droplet volume

The amount of liquid ejected from the nozzle of an inkjet printhead is measured using single-event imaging.

Note: This refers to a single event where the design drive pulse generates multiple secondary droplets to synthesize a larger droplet (e.g., to form a specific grayscale image during deposition).

(Value), the droplet volume refers to the larger droplet after merging, not the smaller component secondary droplets.

native drop volume

The amount of liquid in the smallest secondary droplet formed by a grayscale inkjet printhead in a single event.

Note: Primary droplets (or trails or satellite droplets) may be too small to be accurately measured using flash imaging, but satellite droplets merging during flight may be sufficient.

Large enough to be used in droplet analysis systems for measurement (see Figure 1, showing the relative size of gray droplets in flight).

Figure 1. Schematic diagram of grayscale droplet sizes 1 ("native droplet") to 7.

4.1.1 Overview

This document describes the precise determination of inkjet droplet volume using high-speed flash imaging of droplets flying through the nozzles of an inkjet printhead. (In industrial inkjet printing...) in printed electronics applications, a relatively accurate (rather than absolute) droplet volume is useful. A shorter flash duration can prevent droplet images from appearing out of focus.