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INTERNATIONAL STANDARD

colour inside

Printed electronics –
Part 302-1: Equipment – Inkjet – Imaging based measurement of jetting speed

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International Standard IEC 62899-302-1 has been prepared by Technical committee 119: Printed electronics.

The text of this standard is based on the following documents:

FDIS	Report on voting
119/168/FDIS	119/183/RVD

Full information on the voting for the approval of this International Standard can be found in the report on voting indicated in the above table.

This document has been drafted in accordance with the ISO/IEC Directives, Part 2.

A list of all parts in the IEC 62899 series, published under the general title *Printed electronics*, can be found on the IEC website.

The committee has decided that the contents of this document will remain unchanged until the stability date indicated on the IEC website under "http://webstore.iec.ch" in the data related to the specific document. At this date, the document will be

- reconfirmed,
- withdrawn,
- replaced by a revised edition, or
- amended.

A bilingual version of this publication may be issued at a later date.

IMPORTANT – The 'colour inside' logo on the cover page of this publication indicates that it contains colours which are considered to be useful for the correct understanding of its contents. Users should therefore print this document using a colour printer.

INTRODUCTION

Inkjet technology uses micro nozzles to precisely eject droplets. For printing, these droplets are patterned on a substrate. Inkjet is a mature technology that has been used widely in home, commercial, and industrial applications. When using inkjet technology, the volume of a droplet can be controlled down to the tenth of a picoliter (pl). Furthermore, the droplet can be placed onto the substrate with an accuracy of micrometers (µm). Because of these features and others, inkjet technology has emerged as one of the most powerful tools for patterning electronic devices, medical dispensing, high precision industrial applications, and more. Inkjet patterning for electronics is an additive process wherein the addition of multiple layers of the pattern does not require the removal of any previously deposited material, unlike the conventional photolithography process. Inkjet also reduces waste when used in more traditional printing applications and when it is used for dispensing. As a result, inkjet technology significantly reduces waste of what are often very expensive materials and is also more environmentally friendly.

As applications for inkjet broaden, a wider variety of jetting materials should be dispensed precisely from inkjet heads. For both new and traditional applications, droplet behaviour from the inkjet head should be measured properly to evaluate and control jetting behaviour. Vision-based measurement techniques are widely used in inkjet-based manufacturing systems, since physical insight into jetting behaviour can be obtained from visual images. The droplet jetting speed and droplet volume are the most frequently measured jetting performance parameters obtained from droplet images.

Using information obtained from vision-based measurement systems about inkjet droplet formation and characteristics, developers can adjust ink formulations and jetting parameters, in order to improve performance.

Note, however, that the measured jet performance and evaluation may vary considerably according to the measurement method since there is no standard measurement procedure available. It may be difficult for process engineers to judge the data sheets of jet performance provided by ink and inkjet head manufacturers since there are no fair test methods, thus causing potentially untrustworthy results. Therefore, the purpose of this document is to provide a standard inkjet measurement method.

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1 Scope

This part of IEC 62899 specifies the method for determining inkjet drop speed based on visualized droplet images obtained by a drop analysis system. This measurement standardization is limited to drop-on-demand-type of inkjet and is not applicable to continuous inkjet. This document includes the test process, image processing software algorithm, and analysis of jetting behavior.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

3.1
inkjet printing
type of printing in which a digital image is created by propelling droplets of ink onto a substrate

3.2
drop analysis system
vision-based equipment that can both image and measure inkjet droplets

3.3
drop speed
distance divided by the time it takes the drop to traverse the distance

3.4
drop delivery speed
total distance between the inkjet print-head nozzle plate and the substrate, divided by the time interval between jet triggering and drop arrival

3.5
drop trajectory
drop's direction of travel, often characterised as an angle relative to the nozzle plate

3.6
drop repeatability
droplet jetting behaviour whereby each drop ejected from the nozzle is the same as every other