

# INTERNATIONAL STANDARD



Printed electronics – **STANDARD PREVIEW**  
Part 403-1: Printability – Requirements for reproducibility – Basic patterns for  
evaluation of printing machine  
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**Printed electronics – Part 403-1: Printability – Requirements for reproducibility – Basic patterns for evaluation of printing machine**

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INTERNATIONAL  
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## PRINTED ELECTRONICS –

**Part 403-1: Printability – Requirements for reproducibility –  
Basic patterns for evaluation of printing machine**

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The text of this International Standard is based on the following documents:

FDIS	Report on voting
119/214/FDIS	119/223/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

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- replaced by a revised edition, or
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## INTRODUCTION

The IEC 62899-403 series contains basic patterns to evaluate the printability of a printing machine, plating, and applications for printed electronics. The printability is defined as both the quality of printed patterns and the reproducibility of printing designs as the result of the interaction of printing media, inks, and substrates. The documents from the IEC 62899-403 series provide commonly-utilized design patterns for evaluating printability. The quality of printed patterns is satisfied by accurate measuring, with a mechanical, physical, or optical apparatus, the patterns being two-dimensional or three-dimensional. On the other hand, the reproducibility of printing designs is achieved by estimating the reproducibility of replica.

The IEC 62899-402 series assumes a large role in the standardization of measuring methods for these printed patterns, and the IEC 62899-403 series has a key role in standardizing the estimation of the patterns' reproducibility.

In the business field, requests from industry to apply the printing technology to electronics manufacturing have been guarantees for both the quality and reproducibility that have helped facilitate international trade and enhanced user value in the field of printed electronics.

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## PRINTED ELECTRONICS –

### Part 403-1: Printability – Requirements for reproducibility – Basic patterns for evaluation of printing machine

#### 1 Scope

This part of 62899-403 specifies commonly-utilized basic design patterns to evaluate printing machines with pattern reproducibility from the view point of printability in the field of printed electronics. These basic patterns consist of several evaluation patterns and register marks.

Printability is derived from the evaluation of the reproducibility of these printed patterns produced by the printed machine.

#### 2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

IEC 60050 (all parts), *International Electrotechnical Vocabulary (IEV)* (available at [www.electropedia.org](http://www.electropedia.org))

IEC 62899-402 (all parts), *Printed electronics – Part 402-X:1 Printability – Measurement of qualities*

ISO 3, *Preferred numbers – Series of preferred numbers*

#### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in IEC 60050 and the following 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

###### basic pattern

set of two-dimensional figures, which consist of evaluation patterns and register marks, used to inspect the reproducibility of printed patterns

##### 3.2

###### evaluation pattern

set of fundamental figures to evaluate the printability for printing machines in printed electronics

**3.3****register mark**

set of marks that correspond to each other's position

**3.4****printed pattern**

pattern which is printed by a machine

**3.5****machine direction**

one of the directions in which a substrate is carried by a printing or coating machine

**3.6****printing area**

imaging or drawing area on a page or substrate made by a printing machine

**3.7****margin area**

blank border around the printing area on a page or substrate

**4 Abbreviated terms**

For the purposes of this document the following abbreviated terms apply.

PMVT	Vertical evaluation pattern for printability on machine
PMHZ	Horizontal evaluation pattern for printability on machine
PMAG	Angle evaluation pattern for printability on machine
PMAR	Arrow evaluation pattern for printability on machine
PMCR	Corner evaluation pattern for printability on machine

**5 General description of basic pattern**

The basic pattern is a collection of two-dimensional graphical figures, which are basic and have various shapes according to the intended use but are kept to the minimum necessary, to estimate the printability for printing machines, plates, and applications. The collection is expected to be commonly-used, for any purpose, by relevant operators, engineers, scientists, and others in the field of printed electronics.

The basic pattern in this document has two types of pattern: evaluation patterns and register marks. Both of them are specified by graphical figures and dimensions.

The basic pattern for evaluation consists of straight lines, diagonal lines, and circular lines. The patterns are used to evaluate printability under the actual use of an electronic circuit.

The basic pattern for registration consists of square, circle, doughnut, triangle, diamond, cross, double cross, and X cross marks. The marks are used for the register.

**6 Basic pattern for evaluation****6.1 General**

The evaluation patterns consist of the following five patterns. These patterns shall be used for the evaluation of printing. These patterns are described in a uniform way.

- a) PMVT (see 6.2) for vertical printability

- b) PMHZ (see 6.3) for horizontal printability
- c) PMAG (see 6.4) for angle printability
- d) PMAR (see 6.5) for arrow printability
- e) PMCR (see 6.6) for corner printability

See Annex B and Annex C for use cases of evaluation patterns.

Values in 6.2 to 6.6 shall be selected from values specified in ISO 3.

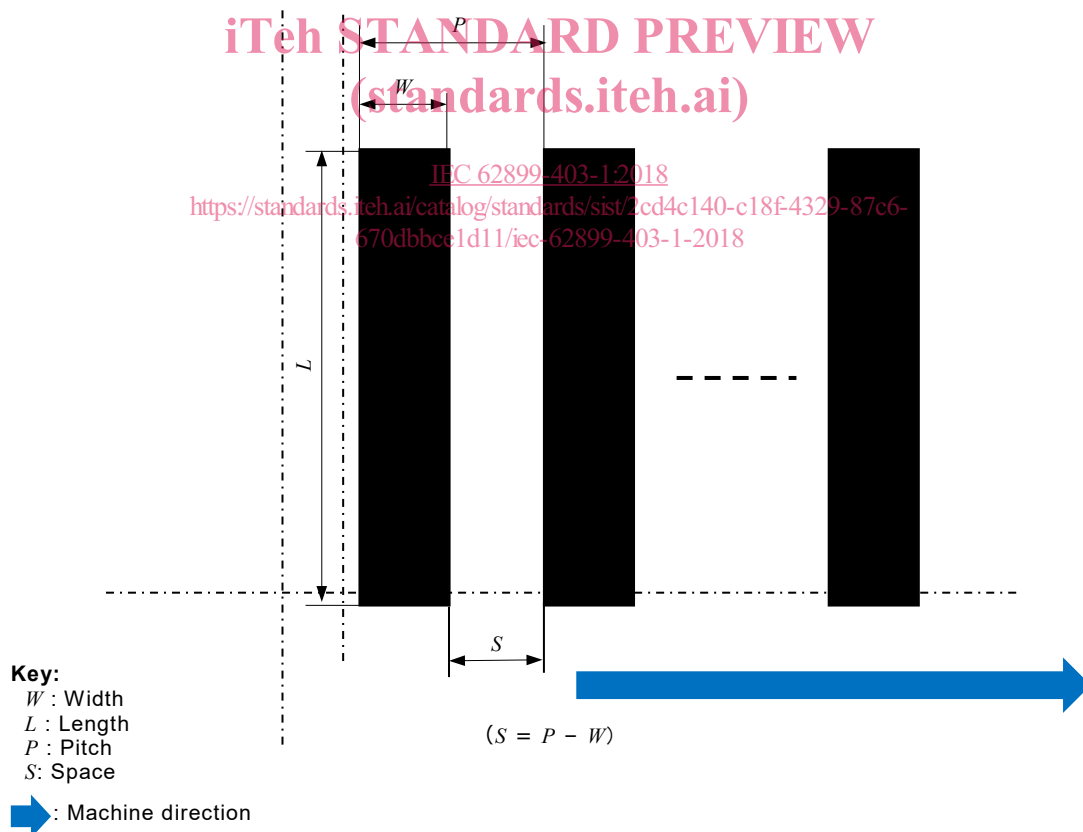
## 6.2 PMVT

PMVT shall be a set of straight lines perpendicular to the machine direction as shown in Figure 1.

The width may be selected from 3 µm, 5 µm, 8 µm, 10 µm, 20 µm, 50 µm, 80 µm, 100 µm, or 200 µm.

The pitch shall be twice the width.

The length shall be more than ten times the width. When the length is beyond the printing area, the length may be less than ten times.



**Figure 1 – PMVT**

## 6.3 PMHZ

PMHZ shall be a set of straight lines parallel to the machine direction as shown in Figure 2.