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Information technology — Print cartridge characterization —

Part 1: General: terms, symbols, notations and cartridge characterization framework

Technologies de l'information — Caractérisation des cartouches d'impression —

Partie 1: Généralités : termes, symboles, notations et cadre pour la caractérisation des cartouches

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Foreword

ISO (the International Organization for Standardization) and IEC (the International Electrotechnical Commission) form the specialized system for worldwide standardization. National bodies that are members of ISO or IEC participate in the development of International Standards through technical committees established by the respective organization to deal with particular fields of technical activity. ISO and IEC technical committees collaborate in fields of mutual interest. Other international organizations, governmental and non-governmental, in liaison with ISO and IEC, also take part in the work.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives or www.iec.ch/members_experts/refdocs).

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Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see www.iso.org/iso/foreword.html. In the IEC, see www.iec.ch/understanding-standards.

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 28, *Office equipment*.

This second edition cancels and replaces the first edition (ISO/IEC 29142-1:2013), which has been technically revised.

The main changes compared to the previous edition are as follows:

— revision of the term “black-only printer” in order to harmonize with ISO/IEC 22505.

A list of all parts in the ISO/IEC 29142 series can be found on the ISO and IEC websites.

Any feedback or questions on this document should be directed to the user’s national standards body. A complete listing of these bodies can be found at www.iso.org/members.html and www.iec.ch/national-committees.

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Introduction

The purpose of this document is to define the framework for characterizing ink and toner cartridges used in printing devices that have a digital input printing path, including multi-function devices. This document defines terms, symbols, and notations used throughout the ISO/IEC 29142 series to characterize such ink and toner cartridges.

Customer information related to ink and toner cartridges is not consistent in the global marketplace.

Cartridge manufacturers, including original, non-original manufacturers, refillers, and remanufacturers, have each communicated expressions of cartridge characteristics.

The ISO/IEC 29142 series is provided to aid transparency between manufacturers, suppliers and their customers regarding selected cartridge characteristics. The selected cartridge characteristics do not allow an exhaustive cartridge characterization. Where applicable, cartridge attributes and the associated characterization tests are used consistently with both ink and toner cartridge technologies. The selected cartridge attributes are defined for all cartridges, regardless of manufacturing methodology.

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Information technology — Print cartridge characterization —

Part 1: General: terms, symbols, notations and cartridge characterization framework

1 Scope

This document establishes terms, symbols, notations and a framework for characterizing toner and ink cartridges used in printing devices that have a digital input printing path, including multi-function devices. This document is intended for equipment used in office environments.

It primarily provides a foundation for measuring, evaluating, or specifying characteristics of such toner and ink cartridges.

The terms, symbols, notations and framework established herein can be applied to such cartridges.

The characterizations associated with the terms, symbols, notations, and framework established herein are specified throughout the ISO/IEC 29142 series.

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.

ISO 5-3, *Photography and graphic technology — Density measurements — Part 3: Spectral conditions*

ISO 13655, *Graphic technology — Spectral measurement and colorimetric computation for graphic arts images*

ISO/IEC 29142-2, *Information technology — Print cartridge characterization — Part 2: Cartridge characterization data reporting*

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:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
all-in-one toner cartridge
cartridge that includes at least: a *toner* (3.64) *containment part* (3.15), a *photoreceptor part* (3.47) and a *developer part* (3.20)

Note 1 to entry: See Annex A for the term categorization.

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3.2
monochrome printer
printer (3.51) only capable of printing black and not configurable to print another colourant

Note 1 to entry: More than one black cartridge can be installed simultaneously if they have the same *cartridge identifier* (3.10).

[SOURCE: ISO/IEC 22505:2019, 3.8, modified — The term was originally "monochrome inkjet printer".]

3.3
binomial attribute
attribute which either occurs or does not occur and which is characterized by a count of the number of times it occurs in a particular number of observations

Note 1 to entry: A random process is said to be binomial if it satisfies four basic properties:

a) it consists of a sequence of n trials for some $n > 1$,

b) each trial has exactly two possible outcomes, A and B, which are mutually exclusive,

c) P(A), the probability of A, takes the same value P on all n trials. P(B) is likewise fixed at 1-p,

d) the n trials are independent of one another.

3.4
cartridge
user replaceable unit (3.67) operating with a printing system that includes at least a containing mechanism designed for materials intended for deposition on a *substrate* (3.62)

3.5
cartridge-attribute test report
report including the information of a cartridge *customer report* (3.18) and the detailed cartridge-characterization results of an ISO/IEC 29142 *cartridge-characterization test* (3.6) reported for customer presentation according to a required format

Note 1 to entry: The format is prescribed according to each ISO/IEC 29142 standardized or specified cartridge-characterization test and is in conformance with ISO/IEC 29142-2.

3.6
cartridge-characterization test
test method provided in conformance with this document for the purpose of evaluating an attribute of a cartridge or *cartridge set* (3.12) of interest to cartridge and cartridge set users

3.7
cartridge collector
party providing a cartridge *take-back* (3.63) or collection program

EXAMPLE A business entity designated to collect cartridges.

3.8
cartridge element
sub piece of a cartridge other than the *containment part* (3.15) of the cartridge

3.9
cartridge end-of-life
point in a cartridge life cycle from which the cartridge is no longer used for its intended purpose without additional non-customer interaction

3.10
cartridge identifier
formatted human readable arrangement of information uniquely specifying a distinct cartridge

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3.11
cartridge life percent completion point
point in the life of a cartridge computed as a percent of *expected cartridge life* (3.25)

3.12
cartridge set
group of colourants and their assignment to one or more cartridges as defined by a printer manufacturer to be necessary and sufficient to produce the fully functional default colour renditions

EXAMPLE 1 A *printer* (3.51) often has more than one fully functional cartridge set.

EXAMPLE 2 Default colour renditions: printed black, red, green, blue, cyan, magenta, and yellow.

3.13
cartridge supplier
cartridge marketer, manufacturer, *remanufacturer* (3.57), *refiller* (3.55), or distributor, being the party or parties responsible for marketing the cartridge and providing customer support for the cartridge

3.14
colour printer
printer (3.51) with an operating part to apply *ink* (3.28) or *toner* (3.64) on a *substrate* (3.62), with a functionality to produce print output containing colours

3.15
containment part
part containing the mechanism designed for materials intended for deposition on a *substrate* (3.62)

3.16
continuous attribute
attribute which can take on any of a range of values

3.17
cross-systems attribute tolerance range
CSATR
range of actual attribute values for a cartridge-characterization attribute of a particular cartridge-characterization test method, determined from evaluation of exemplary systems to which the test method applies

3.18
customer report
report, including a cartridge notification, and a cartridge-attribute checklist, with summary results of selected ISO/IEC 29142 cartridge-attribute characterization tests, presented according to a required format

Note 1 to entry: The format is prescribed according to each ISO/IEC 29142 standardized or *specified cartridge-characterization test* (3.6) and is in conformance with ISO/IEC 29142-2.

3.19
deposition material
material, *ink* (3.28) or *toner* (3.64), liquid or solid, colourant or non-colourant, that can be contained in a cartridge, and that is designed for deposition on a surface by means of a printing system

3.20
developer part
physical mechanism, which is often a *cartridge element* (3.8), which functions to apply *toner* (3.64) particles to the latent image on the *photoreceptor part* (3.47) of an electrophotographic printing system

3.21
discrete attribute
attribute which can take only a finite number of values within a range, such as an integer count

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3.22
dye ink
material designed for liquid state deposition on a *substrate* (3.62), including a chemical dye colourant

3.23
electrophotographic printer
printer (3.51) principally using optoelectronic phenomena and electrostatic attraction to move *toner* (3.64) to a *substrate* (3.62)

3.24
end-of-life
phase in a cartridge life cycle when the cartridge can no longer be used for its intended purpose without additional non-customer interaction

3.25
expected cartridge life
approximate number of pages likely to be printed from a cartridge when ran to *cartridge end-of-life* (3.9) according to an ISO/IEC 29142 standardized or specified test method

3.26
filled cartridge
user replaceable unit (3.67) of a printing system that includes at least *ink* (3.28) or *toner* (3.64) materials, intended for deposition on a *substrate* (3.62) and a containing mechanism for such materials

3.27
incineration
disposal method that involves combustion of waste material converting it into heat, gas, steam and ash but not including smelting

3.28
ink
material, which often includes colourant, designed for liquid state deposition on a *substrate* (3.62)

3.29
ink cartridge
user replaceable unit (3.67) of a printing system that includes at least a containing mechanism designed for *ink* (3.28) intended for deposition on a *substrate* (3.62)

3.30
ink deposition mechanism
imaging apparatus for depositing *ink* (3.28) on a printing *substrate* (3.62)

EXAMPLE A printhead.

3.31
inkjet printer
printer (3.51) with an operating part, for example, a printhead, to apply *ink* (3.28) on a *substrate* (3.62)

3.32
integrated ink cartridge
cartridge that includes at least: an ink *containment part* (3.15) and an *ink deposition mechanism* (3.30)

3.33
landfilled
waste disposal in a landfill or other non-reuse, -recycle, -remanufacture, -waste to energy, or -incineration depository, excluding the residuals from *waste to energy* (3.68) and *incineration* (3.27)

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3.34
life cycle
consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposition

Note 1 to entry: See ISO 14040.

3.35
lifetime attribute
cartridge *performance attribute* (3.45) which can only be measured by printing to *cartridge end-of-life* (3.9) according to an ISO/IEC 29142 standardized or specified test method

3.36
material safety data sheet
MSDS
safety data sheet
SDS
form containing safety information about the *ink* (3.28) or *toner* (3.64) contained in cartridges designed for use in printing applications which includes physical, chemical, and toxicological properties, regulatory information, and recommendations to ensure safe handling

3.37
multi-chamber ink cartridge
ink cartridge (3.29) that is designed to contain two or more inks

3.38
multi-function printer
MFP
printer (3.51) with an operating part to apply *ink* (3.28) or *toner* (3.64) on a *substrate* (3.62), and also providing additional functions such as fax and copy

3.39
non-colourant ink
material designed for liquid state deposition on a *substrate* (3.62), such as gloss optimizers and fixatives, not containing a colourant

3.40
non-colourant toner
solid material, not containing colourant, capable of taking on an electrostatic charge, designed for deposition on a *substrate* (3.62) under the control of electrostatic forces in conjunction with a surface having a controlled distributed charge such as gloss optimizers and fixatives

3.41
non-original cartridge
cartridge that is marketed by a company other than the company that markets the printing system for which the cartridge is intended

3.42
original cartridge
cartridge that is marketed by the company that markets the printing system for which the cartridge is intended

3.43
original equipment manufacturer
company that markets a printing system

3.44
page-attribute value
value of a performance *point attribute* (3.50) that is the value of that attribute evaluated from a complete single printed page

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3.45
performance attribute
attribute which can be determined only through printing with the cartridge(s) installed in an operational *printer* (3.51)

3.46
photo printer
printer (3.51) with an operating part to apply *ink* (3.28) or *toner* (3.64) on a *substrate* (3.62), with the functionality to print images on photo paper sizes and types

3.47
photoreceptor part
photoconductor
physical mechanism, such as OPC, that includes a surface that accepts a uniform electrostatic charge, with a surface that can subsequently be selectively discharged by exposure to light, and which facilitates transfer of *toner* (3.64) to media after such exposure

3.48
physical attribute
attribute which can be determined directly from the cartridge and which is independent of print systems

3.49
pigment ink
material designed for liquid-state deposition on a *substrate* (3.62), including a chemical pigment colourant

3.50
point attribute
performance attribute which can be measured on pages printed at any point during the life of the cartridge

3.51
printer
device intended to apply colourant(s) to a *substrate* (3.62) in response to a digital signal

3.52
recovery
process to divert cartridges and/or cartridge materials from the solid waste stream and into productive uses

3.53
recycle
reuse (3.58), *remanufacture* (3.56) or otherwise divert from a solid waste stream

3.54
refill
operation to replace *ink* (3.28) or *toner* (3.64) in a customer's cartridge that does not involve the replacement or refurbishing of worn cartridge components

3.55
refiller
cartridge supplier (3.13) that *refills* (3.54) customer's cartridges

3.56
remanufacture
operation to replace or clean components and add *ink* (3.28) or *toner* (3.64) using cartridges from cartridge *take-back* (3.63) or collection programs

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3.57
remanufacturer
cartridge supplier (3.13) that produces or markets *remanufactured* (3.56) cartridges

3.58
reuse
operation in which a whole or a component part of a cartridge is incorporated in the manufacture or *remanufacture* (3.56) of a cartridge, such that the whole or component part is intended to be put into service for the same purpose for which it was conceived

3.59
single chamber ink cartridge
ink cartridge (3.29) that is designed to contain one ink

3.60
single function printer
SFP
printer (3.51) with an operating part to apply *ink* (3.28) or *toner* (3.64) on a *substrate* (3.62), having no additional functions such as fax or scan

3.61
standard error goal
allowed upper limit of the error in *page-attribute value* (3.44) measurements, determined as the upper limit of the standard error of the estimated mean of the measurements

3.62
substrate
user selectable imageable surfaces

EXAMPLE Paper, cloth.

3.63
take-back
programs sponsored by *cartridge suppliers* (3.13) and conducted by *cartridge collectors* (3.7) for the purpose of obtaining cartridges after *cartridge end-of-life* (3.9)

3.64
toner
solid material, capable of taking on an electrostatic charge, designed for deposition on a *substrate* (3.62) under the control of electrostatic forces in conjunction with a surface having a controlled distributed charge

3.65
toner cartridge
user replaceable unit (3.67) of a printing system that includes at least a containing mechanism designed for *toner* (3.64) intended for deposition on a *substrate* (3.62)

3.66
toner deposition mechanism
imaging apparatus for depositing *toner* (3.64) on a printing *substrate* (3.62)

EXAMPLE A surface having a controlled distributed charge.

3.67
user replaceable unit
part of a printing system that is designed to be removed and replaced by a user

3.68
waste to energy
form of *recovery* (3.52) in which the energy generated from *incineration* (3.27) is captured and used as energy

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