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English version

Postal services - Automatic identification of items - Two dimensional bar code symbol print quality specification for machine readable Digital Postage Marks

Services postaux - Identification automatique des objets postaux - Mesure de la qualité d'impression

Postalische Dienstleistungen - Automatische Identifizierung von Sendungen - Druckqualität von zwei-dimensionalen Strichcodes für Digitale Freimachungsvermerke

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Foreword

This document (CEN/TS 14826:2004) has been prepared by Technical Committee CEN/TC 331 "Postal Services", the secretariat of which is held by NEN.

This document includes a Bibliography.

Organisations contributing to the development of the document include:

— Universal Postal Union

— ISO/IEC JTC1/SC28 "Office equipment"

— ISO/IEC JTC1/SC31 "Automatic identification and data capture techniques"

It is intended that this document should be adopted by ISO/IEC JTC1/SC28, in the work programme of which the project has been assigned project number ISO/IEC NP 18050.

For compatibility between CEN and UPU versions of this document, the term 'document' is used. In a CEN context, this should be interpreted as being equivalent to the deliverable mentioned on the title page of this document. In a UPU context, this should be interpreted as being equivalent to 'standard'.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this Technical Specification : Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Introduction

Digital Postage Marks (or franking marks), sometimes abbreviated to DPM, are used to evidence the payment of postage and/or other fees related to services requested by mailers. Digital Postage Marks are represented by symbols imprinted on the envelope, the label or the insert. Digital Postage Marks produced by different vendors' systems are generated with a variety of symbols and graphical images. The symbologies used for these images are primarily two-dimensional bar codes of both multi-row (PDF417) and matrix types (e.g. Data Matrix), as specified in UPU standard S28. However, postal operators can also use other symbologies, e.g. OCR or 4-state codes for these purposes. The two-dimensional bar code symbologies offer advantages for the machine-readable representation of data strings of the order of 80 or more bytes in length, due to their high information density characteristics.

Public postal operators and private carriers in Europe have a high interest in automatically reading and validating these marks, preferably at high speed. It is essential that these symbols are read reliably by postal processing equipment. The highest practicable read rate is desired by users of such equipment in order to ensure efficient automation of this process, and any shortfall in the read rate can have as its consequence a loss of revenue to the operator.

This document has been designed to customise the generic method of measuring the print quality of two-dimensional bar code symbols to the needs of the postal application and to recommend appropriate print quality levels that should contribute to the achievement of the read rates desired by the authorities responsible for validation of the Digital Postage Marks and by postal operators; it is also intended to provide guidelines for printing machine readable Digital Postage Marks on mail items. The Technical Specification will provide mailers, postal operators and their suppliers with a practical, quantitative, and objective way to measure and communicate to each other basic print quality parameters of machine readable Digital Postage Marks. Since all attributes do not contribute uniformly to the readability of a Digital Postage Mark, the Technical Specification identifies five levels of criticality for an attribute (graded 0 to 4, in ascending order of quality), and a grading scheme that assesses the overall symbol quality based on averaging the results of multiple scans.

The Technical Specification can be used in the following ways:

- it allows an estimate to be made of the readability of a Digital Postage Mark without actually submitting it to any postal validation and the qualification of said symbol as acceptable or not acceptable for readability purposes.

- it allows an estimate to be made of the quality levels potentially achievable by a printing system with particular substrates

- it provides a tool for process control in the operation of Digital Postage Mark printing systems.

The Technical Specification applies the measurement methodology defined in ISO/IEC 15415 for print quality attributes that tend to influence the readability of two-dimensional bar codes. This methodology is derived from a view of the current state-of-the-art in two-dimensional bar code scanning technologies.

Yet, such a state-of-the-art is not a perfectly defined concept. First, it is likely to evolve with time towards improved recognition capabilities. Second, an automatic identification and data capture system is always the result of a compromise between recognition power and cost. This is why the Technical Specification is expressed in the form of guidelines rather than prescriptions. However, it is not technically possible to define guidelines concerning solely the printing of Digital Postage Marks without taking into account the manufacturing of the mail item as a whole. The readability of the Digital Postage Mark is a function not only of the inherent quality of printing, i.e. the interaction of the ink, substrate and printing mechanism together with the effects of the shape of the mail-piece and its transport through the printing system on the production of the mark, but also of the effects of environmental and handling factors in transit between the production point and the point at which it is to be read. For example, the symbol contrast of Digital Postage Marks is not only that provided by the printer/paper combination under defined illumination conditions. It also results from a variety of other factors among which the covering of the mail item or the material of the transparent window through which the Digital Postage Mark can be seen. As a consequence, the guidelines described in this document apply to the Digital Postage Mark blocks of fully assembled mail items. It

is the responsibility of the users of the Technical Specification to achieve compliance with the guidelines by controlling the effects of the physical elements resulting in the relevant attributes.

The guidelines are primarily a tool for predicting the level of Digital Postage Mark readability with respect to current scanning technologies, and compliance with them should result in a high level of Digital Postage Mark readability. The guidelines are aimed at facilitating the relations between postal operators and customers, vendors of mail generation and printing equipment and suppliers of mail reading and sorting equipment. In particular, equipment vendors need firm and precise guidance in designing print systems and formats for machine readability. Therefore, a quantitative specification of print quality is critical to the development of products that meet the needs of mailers and postal operators.

1 Scope

This document:

— specifies a methodology for the measurement of defined print quality attributes of Digital Postage Marks in the form of two-dimensional bar code symbols on mail-pieces,

— defines methods for grading the results of these measurements and deriving an overall symbol quality grade as a guide to estimating the readability of the Digital Postage Marks,

— provides guidelines for printing and gives information on possible causes of deviation from high grades to assist users in taking appropriate corrective action,

— defines a test procedure for the assessment of printing systems for the production of Digital Postage Marks.

These provisions apply to the Digital Postage Mark blocks as they appear on fully produced mail items when remitted to postal operators, including the characteristics resulting from operations other than printing per se that affect their appearance to a mail processing system (covering, inserts into transparent window envelopes, affixed Digital Postage Mark labels).

This document does not define the qualification tests or sampling requirements necessary to determine the practical feasibility of any specific read rate.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, or references with a version number, only the edition cited applies. For undated references, or where there is no reference to a version number, the latest edition of the referenced document (including any amendments) applies.

EN 1556, Bar coding – Terminology.

ISO/IEC 15415, *Information technology – Automatic identification and data capture techniques – Bar code print quality test specification – Two-dimensional symbols.*

ISO/IEC 15416, *Information technology - Automatic identification and data capture techniques - Bar code print quality test specification - Linear symbols.*

ISO/IEC 15419, *Information technology - Automatic identification and data capture techniques - Bar code digital imaging and printing performance testing.*

ISO/IEC 15426-2, *Information technology – Automatic identification and data capture techniques – Bar code verifier conformance specification – Part 2: Two-dimensional verifiers.*

UPU standard S28[1], *Communication of Postal Information using Two-dimensional Symbols.*

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[1] UPU documents are available from the Universal Postal Union International Bureau:

Case Postale 13, CH 3000 Berne 15, Switzerland
Tel: +41.31.350.3111; Fax: +41.31.350.3110;
URL: http://www.upu.int

UPU standard S44-1, *Colour and Durability Attributes of Franking Marks.*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 15415, ISO/IEC 15416, EN 1556 and the following apply.

3.1
broad-band
descriptive of illumination in which the spectral distribution of the light is wide, with a bandwidth in excess of 200 nm at the 50% power level

3.2
mail format
form taken by a finished mail-piece or other carrier of a Digital Postage Mark, e.g. envelope with or without contents, or flat sheet of paper

3.3
narrow-band
descriptive of illumination in which the spectral power distribution is concentrated in a narrow band of wavelengths, with a bandwidth of less than 200 nm at the 50% power level

3.4
overall symbol grade
measure of symbol quality calculated as arithmetic mean of scan grades from a number of individual scans of the symbol

3.5
read rate
percentage representing the number of items carrying digital postage marks that have been successfully read, out of all such items attempted to be read in a given period

3.6
scan grade
result of the assessment of a single scan of a symbol, derived by taking the lowest grade achieved for any measured parameter in that scan

3.7
spectral response characteristic
integral response of the reading system, a function of wavelength across the spectral region of interest and calculated for each wavelength as the product of the intensity of light emitted, the transmission characteristic of any filters or coatings used, and the response of the sensor element at that wavelength

3.8
validation
technical process by which the authenticity, data integrity and uniqueness of a Digital Postage Mark are confirmed or denied

3.9
verification
technical process by which a bar code symbol is measured to determine its conformance with the specification for that symbol

3.10
verifier
device used to measure and analyse quality attributes of a bar code symbol such as element and quiet zone dimensions, reflectances, and other aspects against a standard to which the bar code symbol should conform