Royal Mail Mailmark®

Mailmark Barcode Definition Document

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Contents

> **Updates to this document 20th December 2024**
>
> 1. Updates to Class value definitions on pages 10, 21, 23 and 24 to reflect dual use of class value '8' for both Premium & Priority mail under USO changes.
>
> **Note: These changes will take effect on the same date Access Letters Contract Change Notice 114 takes effect**

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1. Introduction

This document has been written to provide customers and interested parties with the Royal Mail Mailmark® barcode specification to enable development of compliant Mailmark® barcodes.

Overview:

A Mailmark barcode must be added to mail pieces in order to access the Mailmark options of the Retail and Network Access product portfolios. At a high level, Mailmark barcodes can be either 2-Dimensional Complex Mail Data Mark[1] Mailmark barcodes (2D Mailmark barcodes) or 4-state Mailmark barcodes.

There are three types of 2D Mailmark barcodes available (types 7, 9 and 29) and they offer varying quantities of space for non-Royal Mail use.

For customers who may be unable to print 2D Mailmark barcodes, a 4-state Mailmark barcode is available but this does not offer spare space for customer use.

This document covers all of the Mailmark barcodes and includes:

- The specifications for the format and structure of the Mailmark barcodes
- The data content of each Mailmark barcode, including the legitimate character sets and ranges of data

For help as to which Mailmark barcode is appropriate for you please refer to the accompanying document called 'Which Mailmark barcode is right for me' which is available on:

- www.royalmailwholesale.com > Mailmark Resources > Getting Started > Other useful documents or,
- www.royalmail.com > Guide to Technical Implementation.

Alternatively, speak to your Account Manager or Network Access carrier.

Referenced documents:

- Mailmark eMHS Customer Upload Interface Specification 25th September 2021
- Mailmark 4-state barcode Encoder User Guide Nov 2013 release 1a
- Which Mailmark barcode is right for me v2.2

These documents are available on www.royalmailwholesale.com and www.royalmail.com in the technical sections notes above.

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[1] Complex Mail Data Mark (CMDM) that has the specified format of a Data Matrix type ECC200 code complying with the international standard ISO/IEC 16022, version 2006

2. 2D Mailmark barcodes

A 2Dimensional Mailmark barcode is a Complex Mail Data Mark (CMDM) that has the specified format of a Data Matrix type ECC200 code complying with the international standard ISO/IEC 16022, version 2006. It is referred to in this document as a 2D Mailmark barcode.

ECC200 is the latest version of Data Matrix and determines the size of the symbols. ISO/IEC 16022, v2006 defines the requirements for Data Matrix and specifies the symbology characteristics, data character encodation, symbol formats, dimensions and print quality requirements, error correction rules, decoding algorithm, and user-selectable application parameters.

A 2D Mailmark barcode has a format, data structure and content that complies with this definition document (i.e. it adheres to the Royal Mail specification).

A 2D Mailmark barcode can be any of the following formats (Types) of Data Matrix type ECC200 as defined in ISO/IEC 16022:

- Type 7 (24 x 24 modules)
- Type 9 (32 x 32 modules)
- Type 29 (16 x 48 modules)

The module size of 2D Mailmark barcode must be in the range of 0.50 – 0.70mm.

Note: A module is defined as one of the black or white square elements/cells in an ECC 200 barcode. They can be arranged in a square or rectangular pattern. The left and bottom edge of a 2D Mailmark barcode will have a solid line (L shaped finder pattern) and the top and right edge will have alternate black and white modules which enables counting.

Table 1 – Key characteristics of Mailmark 2D barcodes

	2D Type 7	2D Type 9	2D Type 29
Barcode size	24 x 24 modules	32 x 32 modules	16 x 48 modules
Minimum physical size	12 x 12 mm at 0.5 mm modules)	16 x 16 mm (at 0.5 mm modules)	8 x 24 mm (at 0.5 mm modules)
Maximum physical size	16.8 X 16.8 mm (at 0.7 mm modules)	22.4 x 22.4 mm (at 0.7 mm modules)	11.2 x 33.6 mm (at 0.7 mm modules)
Total capacity	51 characters	90 characters	70 characters
Available for customer use	6 characters	45 characters	25 characters

2.1. 2D Mailmark barcode principles

Identification

A 2D Mailmark barcode is differentiated from any other Data Matrix symbols that may be present on the mail piece by the first 6 characters of the data within the barcode. A 2D Mailmark barcode will have the following content in the first part of the data string:

- UPU identifier – 1 Characters (J)
- Royal Mail identifier assigned by the UPU – 3 Characters (GB<SPACE>)
- Information (Product) type ID – 1 Character
- Information type ID version number – 1 Character

Therefore, the first six characters of the data string will demonstrate the barcode is a Royal Mail Mailmark barcode of a certain product and version.

Each field within any 2D Mailmark barcode is of a fixed and defined length, and therefore the next data field starts from a fixed point in the data string, ensuring its location can be defined. As all the attributes must start at a defined point in the data string, any missing or optional attributes must be filled with the SPACE character. One exception[2] to this rule is the customer data space that is available in some barcodes. Any unused customer data space should not be filled with space characters as this maximises the amount of error correction employed in the Mailmark barcode.

Where space characters have been inserted into the barcode for the purposes of padding out, these padding characters will not be included in the data fields after the parsing of the barcode information following barcode reading.

Customer content

2D Mailmark barcodes have spare space for customers and/or mailing houses to place information. The amount of space depends on the barcode type and characters/encoding used (see section 2.3). This information could be used to manage print operations, organise mail opening and scanning operations, assist in returns and goneaway management, identify items as part of specific campaigns, or provide opportunities for customers to scan the barcode with smartphones. Please note that customer content does not flow through to Mailmark Analytics.

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[2] A second exception relates to the Post Code plus DPS field in a 4-state Mailmark barcode for International destinations – see Table 3.2.1 for more information.

Encoding

The Basic C40 character set is the data encoding standard (Upper case Alphas, Numerals and the SPACE character only) for 2D Mailmark barcodes. All data within the Royal Mail defined portion of the 2D Mailmark barcode (all fields except customer content) shall comply with the C40 Basic Character set and C40 encodation scheme as described within ISO 16022 (i.e. the encoding should commence from the start of the data string). The customer content field does not need to comply with this encoding, but please note that alternatives will have an impact on use of space and the number of available characters. Punctuation may be used in the customer content field.

The data within the code will not comply with optional message structures that are referenced from ISO 16022, such as ISO 15434 or 15418. The data will be a single continuous string of data with no header, footer or data identifiers included.

Additionally please see section 2.3 Mailmark barcode Encoders and Decoders.

Data Security

For Sorted and Unsorted Bulk Mail the information contained in the barcode is not sensitive as much of it can be found within human readable information on the mail item and the Supply Chain ID is not relevant to any other Royal Mail or customer account information. Therefore, there is no requirement for encryption.

Product Specification

The full product and technical specifications (e.g. physical characteristics of the mailpieces, and the mandatory and recommended requirements) associated with any Mailmark barcode item are set out in the Retail and Wholesale User Guides available online.

2.2. 2D Mailmark barcode data contents

All three types of 2D Mailmark barcode (Types 7, 9 & 29) can be used for

a. Network Access bulk Mailings for Sorted and Unsorted Services, including Manual Mailmark Parcel and Manual Mailmark General Large Letters.

b. Non-Regulated bulk Mailings for Sorted, International Sorted/Unsorted and Sorted Services.

2.2.1 Data Elements used in 2D Mailmark barcodes

The following data definitions are common to various formats of 2D Mailmark barcode (product specific details follow).

Notes: The first 6 characters are compared with a configurable file on processing to determine if the CMDM is a 2D Mailmark barcode.

Table 2 – Data definitions common to 2D Mailmark barcodes

The format of all fields except the customer content must comply with the C40 encodation scheme as described within ISO 16022 and in Section 2.1. Values reserved for potential future use are shown in italics.

Field Name	Definition	Length (Start position)	Legitimate Value(s)	Comments
UPU Country ID	Identifies the UPU Country ID	4 (1)	"JGB<space>"	n/a
Information Type ID	Identifies the Royal Mail Mailmark barcode payload for each product type.	1 (5)	"0" – Domestic Sorted & Unsorted *"1" – International Sorted & Unsorted* *"2" – Response Services* "A" – Online Postage "B" - Franking "C" – Consolidation	Format is C40 Alpha & Numeric. *Values in italics are reserved for potential future use.*
Version ID	Identifies the barcode version as relevant to each Information Type ID.	1 (6)	Currently "1" Identifies the Data Content Version of each Information Type ID. Numeric 0-9 and Alpha A-Z.	

Field Name	Definition	Length (Start position)	Legitimate Value(s)	Comments
Class	Identifies the class of the item.	1 (7)	"0" – Null or Test "**1**" – 1C (Retail) "**2**" – 2C (Retail) "**3**" – Economy (Retail) "4" – Premium (Retail Publishing Mail) "**5**" – Deferred (Retail) "6" – Air (Retail) "7" – Surface (Retail) "**8**" – Premium: Priority (Network Access) "**9**" – Standard (Network Access) "A" to "D" and "F to Z" – Spare "**E**" – 4 Day Economy (Network Access)	
Supply Chain ID	Identifies the unique group of customers involved in the mailing.	7 (8)	"0000000" to "9999999"	Format is Numeric only.
Item ID	Identifies the unique item within the Supply Chain ID.	8 (15)	"00000000" to "99999999"	Every Mailmark barcode is required to carry an ID so it can be uniquely identified for at least 90 days. Format is Numeric only.

Field Name	Definition	Length (Start position)	Legitimate Value(s)	Comments
Destination Post Code plus Delivery Point Suffix (DPS)	Contains the Postcode of the Delivery Address with DPS If inland the Postcode/DP contains the following number of characters. Area (1 or 2 characters) District (1 or 2 characters) Sector (1 character) Unit (2 characters) DPS (2 characters)	9 (23)	**The Postcode and DPS must comply with a valid PAF® format (see appendix A).** If there was no DPS and a Unit is present then a default 9Z DPS shall be used. If no Unit information is available the Sector Unit and Delivery Point fields will not be included. e.g. "NE\<space>\<space>\<space>\<space>\<space>\<space>\<space>" **If no destination Postcode information is available this field shall be filled with 9 \<space> characters.** **If you choose to use the supplementary Default Postcode option enter the characters XY991AA** *If International (**nb** potential future use only), then "XY11" shall be used as the Outward element with no Inward or DP as follows: "XY11\<space>\<space>\<space>\<space>\<space>"*	Format is C40 Alpha & Numeric. *Please see Appendix A for more information.*
Service Type	Flag which indicates the Service Type chosen.	1 (32)	"0" – Mailmark Letter (mech) "1" – Mailmark Large Letter (mech) "2" – *Reserved for future use* "3" – *Reserved for future use* "4" – Parcel *"5" - not in use* *"6"- not in use*	Format is C40 Alpha & Numeric.
Return to Sender Post Code	Contains the Return to Sender Post Code but no DPS	7 (33)	The PC (without DPS) must comply with a PAF® format (see Appendix A) Note this shall be a full postcode to Unit depth. **If no RTS post code exists this field shall be filled with 7 \<space> characters.**	Format is C40 Alpha & Numeric.
Reserved	Reserved by Royal Mail	6 (40)	Must be filled with \<space> characters until further notice.	\<space> characters only

Field Name	Definition	Length (Start position)	Legitimate Value(s)	Comments
Customer Content	Optional space for use by customer.	Type 7: 6 Type 9: 45 Type 29: 25(46)	Any data as required by the customer up to the maximum size for that format of barcode. Unused spaces must be left blank to maximise error correction capability.	Format is not restricted to C40 Alpha & Numeric. However note alternative characters will have an impact on space.
Total capacity (with C40 encoding)		Type 7: 51 Type 9: 90 Type 29: 70	n/a	This is the maximum practical capacity of the format

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2.3. 2D Mailmark barcode encoders and decoders

Complex Mail Data Marks (CMDM) are industry standard and a range of encoders and decoders are available in the market.

C40 is the data encodation scheme being used for Mailmark barcodes. The benefit of the C40 encodation scheme is to optimize the encoding of upper-case alphabetic and numeric characters.

Although there are various encoding modes generally available for CMDM barcodes (e.g. ASCII, C40, TEXT, and BASE256), products which can encode using the C40 Basic character set encodation scheme must be used, please refer to Section 2.1.

C40 is divided into 4 character subsets. The character sub set 0 is called the Basic set, contains only upper case alphas, numbers and the SPACE character, and should be used for all Royal Mail fields in the Mailmark barcodes.

Alternatives can be used in the customer content field, to enable flexibility (e.g. website addresses), however please note this will have an impact on utilisation of the space available.

On decoding the barcode, the C40 latch character (instruction to begin C40 encoding) should be seen at the beginning of the data string. If the customer content field also uses the C40 Basic character set, the output would be as shown in table 4.

If the customer content contains alternative encoding the 'unlatching' would be after the 'Reserved for Royal Mail' and before the 'Customer content' field as shown in table 5.

Customers will need to check that their barcodes comply with this encoding. They may wish to use/purchase a barcode scanner/verifier which shows how the data string has been encoded if this is not visible in their solution. Alternatively Royal Mail is able to check barcode samples, either by a PDF or physical mailpiece, and provide feedback.

Table 4 – Position of C40 encodation latch character in 2D Mailmark barcode types when C40 encodation used throughout

Description	Size	Embedded data example
Latch to C40		*‹230›*
UPU Country ID	4	JGB‹space›
Information type ID	1	0
Version ID	1	1
Class	1	2
Supply Chain ID	7	1001234
Item ID	8	12345678
Destination Post Code plus DPS	9	AB19XY1A‹space›
Service Type	1	0
RTS postcode	7	‹space›‹space›‹space›‹space›‹space›‹space›‹space›
Reserved for Royal Mail	6	‹space›‹space›‹space›‹space›‹space›‹space›
Customer content	Variable depending on type	REFERENCE‹space›12300AB
Unlatch (optional)		*‹254›*

Table 5 – Position of C40 encodation latch character in 2D Mailmark barcode types when C40 encodation used throughout

Description	Size	Embedded data example
Latch to C40		*<230>*
UPU Country ID	4	JGB<space>
Information type ID	1	0
Version ID	1	1
Class	1	2
Supply Chain ID	7	1001234
Item ID	8	12345678
Destination postcode plus DPS	9	AB19XY1A<space>
Service Type	1	0
RTS postcode	7	<space><space><space><space><space><space><space>
Reserved for Royal Mail	6	<space><space><space><space><space><space>
Unlatch		*<254>*
Customer content	Variable depending on type	www.xyz.com

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2.4. 2D Mailmark barcode printing

The quality of the printed barcode is essential to the successful read of the code. Printing systems should comply with ISO 15415 grades 4/A or 3/B.

The module size of 2D Mailmark barcodes must be in the range of 0.5mm – 0.7mm. The recommendation is to print these barcodes with a module size of 0.5mm, which equates to 6 dots when printed at 300dpi. It is permitted to increase the module size to match the print resolution provided the maximum module size for printing is not exceeded (0.7mm). At a module size of 0.5mm & 0.7mm, the printed size of each 2D Mailmark barcode type would be as shown in table 6. A clear zone of at least 4 times the module size should appear around 2D Mailmark barcodes.

Table 6 – Minimum & maximum 2D Mailmark barcode sizes

2D Mailmark barcode Type	Number of modules	Minimum size – recommended		Maximum size	
		Module size	Total physical size	Module size	Total physical size
9	32 x 32	0.5mm	16mm x 16mm	0.7mm	22.4mm x 22.4mm
29	16 x 48	0.5mm	8mm x 24mm	0.7mm	11.2mm x 33.6 mm
7	24 x 24	0.5mm	12mm x 12mm	0.7mm	16.8mm x 16.8mm

2.4.1. Optical specification
The specification for 2D Mailmark barcodes is defined by the ISO/IEC16022v2006 standard.

2.4.2. Illumination source
The same image capture system is used for both 2D and 4-state Mailmark barcodes. Compliance will be based on a light source with an illumination spectrum similar to that defined in Table 12 and a detector with a spectral response similar to that in Table 13.

3. 4-state Mailmark barcodes

A 4-state Mailmark barcode is a non-industry standard, 4-state barcode similar in appearance (but not content or method of producing) to the previously available Barcode or CBC option, no longer available for Retail & Network Access services. It has defined data content, which is compliant with this Mailmark barcode specification.

There are 2 types of 4-state Mailmark barcodes available:

- Mailmark barcode L – for customers of machine readable Low Sort & Unsorted Retail and Access 70 services
- Mailmark barcode C – for customers of consolidated machine readable Low Sort Retail and Access 70 services
- Barcode C and Barcode L can be used for Manual Mailmark Parcel and Manual Mailmark General Large Letters

Both are variable content barcodes that have a unique identifier (ID) and include Postcode and Delivery Point information. The key characteristics are shown in table 7.

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Table 7 – Key characteristics of 4–state Mailmark barcodes

	4–state Mailmark barcode L	4–state Mailmark barcode C
Barcode size		
Number of bars	78	66
Physical size	Approx. 89mm (at 21.2 bars per inch)	Approx. 76.2mm (at 21.2 bars per inch).
Content	26 characters	22 characters
Spare space available for customer use	None	None

3.1. 4-state Mailmark barcode principles

3.1.1. Identification

The data in the barcode will identify it as a 4-state Mailmark barcode. If there are two 4-state Mailmark barcodes on an item, the 'consolidator' code will be given preference.

3.1.2. Encoding

The 4-state Mailmark barcodes are encoded, including error correction, and are no longer a direct character font solution (as per CBC or barcode). 4-state Mailmark barcodes C & L contain at least 25% error correction, and ensure the performance requirements can be met irrespective of the constraints around the number of bars within the barcode.

Please also see section 3.3 relating to encoders.

3.1.3. Data Security

For Sorted and Unsorted Bulk Mail the information contained in the barcode is not sensitive as much of it can be found within human readable information on the mail item and the Supply Chain ID is not relevant to any other Royal Mail or customer account information. Therefore, there is no requirement for encryption.

3.1.4. Product Specification

The full product and technical specifications (e.g. physical characteristics of the mailpieces, and the mandatory and recommended requirements) associated with any Mailmark barcode item are set out in the Retail and Wholesale User Guides available online.

3.2. 4-state Mailmark barcode data contents

This section specifies the data contents for each format of 4-state Mailmark barcode.

Where number ranges are used within any data field within this section, then the most significant character is always to the left, as per normal decimal convention.

3.2.1. Data Elements used in 4-state Mailmark barcodes

The following data definitions are common to various types of 4-state Mailmark barcode.

Please note Postcodes must be to at least Unit level to be valid for 4-state Mailmark barcode types. Therefore these barcodes cannot be used if the postcode information is not available for at least the outward element. *Please see the definition of the Destination Postcode in table 8 below.*

Table 8 – Data definitions common to 4-state Mailmark barcodes

Values reserved for potential future use are shown in italics.

Field Name	Length (Start position)	Definition	Legitimate Value(s)	Comments
Format	1	Identifies the format of the item.	"0" – Null or Test "**1**" – Mailmark Letter "**2**" – Mailmark Large Letter *"3" – Reserved for future use* "**4**" – Parcel	Format is Numeric only. **Please note:** it is a mandatory requirement to select the 'format'
Version ID	1	Identifies the barcode version.	Currently "**1**" – For Mailmark barcodes *("0" & "2" to "9" and "A" to "Z")*	Format is Numeric only.

Field Name	Length (Start position)	Definition	Legitimate Value(s)	Comments
Class	1	Identifies the class of the item.	"0" – Null or Test "1" – 1C (Retail) "2" – 2C (Retail) "3" – 3C (Retail) "4" – Premium (Retail Publishing Mail) "5" – Deferred (Retail) "6" – Air (Retail) "7" – Surface (Retail) "8" – Premium: Priority (Network Access) "9" – Standard (Network Access) "A to D" and "F to Z" – Spare "E" – 4 Day Economy (Network Access)	Format is Numeric
Supply Chain ID	2 or 6	Identifies the unique group of customers (participants) involved in the mailing.	"00 to 99" or "000000" to "999999"	Format is Numeric only. Consolidator SCIDs are 2 digits; all other 4 state SCIDs are 6 digits. Where a Consolidator SCID is less than 2 digits or other SCID are less than 6 digits they should be filled with preceding '0's
Item ID	8	Identifies the unique item within the Supply Chain.	"00000000" to "99999999"	Format is Numeric only.

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Field Name	Length (Start position)	Definition	Legitimate Value(s)	Comments
Destination Post Code plus Delivery Point Suffix (DPS)	9	Contains the Postcode of the destination with DPS If inland the Postcode/DP contains the following number of characters. Area (1 or 2) District (1 or 2) Sector (1) Unit (2) DPS (2)	**The Postcode and DPS must comply with a valid PAF® format (see Appendix B).** If there was no DPS and a Unit is present then a default 9Z DP shall be used. Note: 4-state Mailmark barcode encoder applications require all Postcodes to be of the same length (9 Characters) (with the exception of International – see below). To achieve this, padding "space" characters will need to be added at the end of the Postcode/DP string prior to the data being sent to the encoder application. Decoder applications will not remove these padding characters such that the output Postcode/DP string is always 9 characters. *If International (**nb** potential future use only), then "XY11" shall be used as the Outward element with no Inward or DP as follows: "XY11"*	Format is C40 Alpha & Numeric. Note: The PAF compliant **Outward** Postcodes must be one of the following 6 formats: (A=Alpha N=Numeric) ANA, AAN, AANN, AANA, AN, ANN and must not contain "space" characters. If no DPS, default 9Z must be used rather than spaces. **If you choose to use the supplementary Default Postcode option enter the characters XY991AA** If no postcode information is available in PAF® this field should be populated with XY72LT9Z.

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3.2.1. 4-state Mailmark barcode C

The Mailmark barcode C is only available to customers who consolidate mailings.

Table 9 – 4-state Mailmark barcode C data

Field Name	Start position	Length	Legitimate Value(s)	Comments
Format	1	1	"0" – Null or Test "1" – Letter "2" – Large Letter "3" – *Reserved for future use* "4" – Parcel *5...9 = not in use* *A...Z = not in use*	**Please note:** it is a mandatory requirement to select the 'format
Version ID	2	1	"1" – For Mailmark	Set to "1" for this version of the data structure
Class	3	1	"0" – Null or Test "1" – 1C (Retail) "2" – 2C (Retail) "3" – 3C (Retail) *"4" – Premium (Retail Publishing Mail)* "5" – Deferred (Retail) *"6" – Air (Retail)* *"7" – Surface (Retail)* "8" – Premium: Priority (Network Access) "9" – Standard (Network Access) "A to D" and "F to Z" – Spare "E" – 4 Day Economy (Network Access)	
Supply Chain ID	4	2	"00" to "99"	4 state Consolidator SCIDs are 2 characters
Item ID	6	8	"00000000" to "99999999"	
Destination Post Code plus DPS	14	9	See section 3.2.1	
TOTAL CONTENT		22		

3.2.2. 4-state Mailmark barcode L

The Mailmark barcode L is available to all customers including those who consolidate mailings.

Table 10 – 4-state Mailmark barcode L data

Field Name	Start position	Length	Legitimate Value(s)	Comments
Format	1	1	"0" – Null or Test "**1**" – Letter "**2**" – Large Letter "**3**" – *Reserved for future use* "**4**" – Parcel *5…9 = not in use* *A…Z = not in use*	**Please note:** it is a mandatory requirement to select the 'format'
Version ID	2	1	"1" – For Mailmark	Set to "1" for this version of the data structure
Class	3	1	"0" – Null or Test "**1**" – 1C (Retail) "**2**" – 2C (Retail) "**3**" – 3C (Retail) *"4" – Premium (Retail Publishing Mail)* "**5**" – Deferred (Retail) *"6" – Air (Retail)* *"7" – Surface (Retail)* "**8**" – Premium: Priority (Network Access) "**9**" – Standard (Network Access) "A to D" and "F to Z" – Spare "**E**" – 4 Day Economy (Network Access)	
Supply Chain ID	4	6	"000000" to "999999"	Type L SCIDs must be 6 characters. If less than this they should be padded with 0s at the start
Item ID	10	8	"00000000" to "99999999"	
Destination Post Code plus DPS	18	9	See section 3.2.1	
TOTAL CONTENT		26		

3.3. Encoding and decoding

3.3.1. 4-state Mailmark barcode encoders

Royal Mail has provided Encoders to enable customers to generate 4-state Mailmark barcodes. Our encoders will create a string of D, A, F & T characters which when printed using a new font (called the '4state Jack 1 barcode' font) that appears as Descender, Ascender, Full and Track bars.

There are various user scenarios that will require encoders. Royal Mail has provided User Guides relating to each of the Encoders and the font.

3.3.2. 4-state Mailmark barcode decoders

Royal Mail has provided 4-state Mailmark barcode decoders to customers to allow them to decode all types of 4-state Mailmark barcode.

3.3.3. 4-state Mailmark barcode encoding and decoding design

The 4-state barcode Encoding and Decoding design for all forms of 4-state Mailmark barcode have been produced as a separate combined document (covering Encoding and Decoding), but are based on the requirements contained within this document. It includes the design specifications for the decoding algorithms of a 4-state Mailmark barcode to extract the customer's data content.

The Encoding specifications and associated Terms & Conditions, the "4State Jack 1 Barcode" font and the decoders are available on These are available at:

- www.royalmailwholesale.com > Mailmark Resources > Getting Started > Other useful documents or,
- www.royalmail.com > Guide to Technical Implementation.

3.4 Mailmark barcode Mailpiece specification

The full product and technical specifications (e.g. physical characteristics of the mailpieces, and the mandatory and recommended requirements) associated with any Mailmark barcode item are set out in the Retail and Wholesale User Guides available online.

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3.5. 4-state Mailmark barcode specification

This section specifies the general requirements for any 4-state Mailmark barcode that is printed by a customer prior to the mail being received by Royal Mail for processing. This specification relates primarily to systems reading the codes, as the actual customer specification may be more stringent to give an overlap between the two functions to aid reading performance measurement.

3.5.1. 4-state Mailmark barcode bar size

The 4-state Mailmark barcode has been developed for use with most common printing systems. However, as many of these systems might not be able to match ideal requirements, we have also incorporated systems that read imperfect 4-state Mailmark barcodes to the extent those practical algorithms will allow.

4-state Mailmark barcodes should be printed using the new font '4State Jack 1 Barcode font' provided, set with a font size between 19.5 and 22.5 point.

If you choose to create your own font rather than use the '4State Jack 1 Barcode font' then Table 11 shows the recommended sizes, and the tolerances, for the various measurements of a 4-state Mailmark barcode.

Table 11 – Measurements for 4-state Mailmark barcodes

Field Name	Recommended size (mm)	Acceptable sizes (mm)
Ascender bar	1.90	1.60 – 2.16
Descender bar	1.90	1.60 – 2.16
Tracker bar	1.30	1.02 – 1.52
Full bar	5.10	4.22 – 5.84
Bar width (all)	0.54	0.38 – 0.63
Bar pitch	21.2 bars per inch (25.4mm)	20 – 24 bars per inch (25.4mm)

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It is recommended that bar width is set at 0.54mm (with width tolerance of +/- 0.05mm), the ascender and descender height is set at 1.9mm and the track bar is 1.3mm high (with height tolerances of+/-0.1mm). The recommended pitch is 21.2 (+/- 0.2) bars per inch (25.4mm). It is required that there are between 20 and 24 bars per inch (25.4mm) and they must be equally spaced.

The maximum tolerances for the bars within a 4-state Mailmark barcode when printed are demonstrated below.
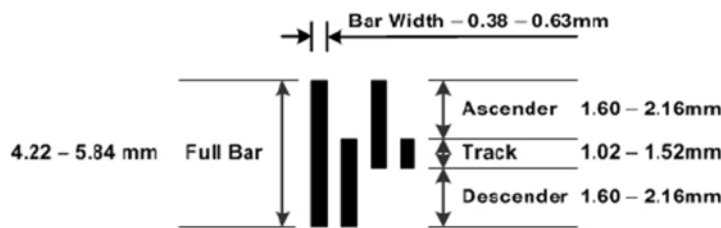
3.5.2. 4-state Mailmark barcode clear zone

There must be a clear zone of at least 2mm around all edges of a 4-state Mailmark barcode.

3.5.3. Optical specification

Reading systems shall read contrast 4-state Mailmark barcodes that conform to the following optical specification:

- Symbol Contrast Ratio greater than or equal to 40% (see definition below)
- Reflectance Difference is greater than or equal to 30% (see definition below)
- The bars must always be darker than the substrate

Symbol Contrast	Symbol Contrast Ratio is defined as: SC = (Reflectance B – Reflectance S) / Reflectance B; B = Background Reflectance; S = Symbol Reflectance (contrast 4SB bar).
	Only diffuse (scattered) reflectance is of interest. It represents the percentage of incident light diffusely reflected by the material in question. A surface perfectly reflecting the incident light has a reflectance of 100 percent; a surface reflecting only half the incident light has a reflectance of 50 percent.
Reflectance Difference	Reflectance Difference = Background Reflectance - Symbol Reflectance (contrast 4SB bar).

If the Symbol Contrast Ratio and the Reflectance Difference values are achieved using a light source with an illumination spectrum similar to that defined in Table 12 and a detector with a spectral response similar to that in Table 16 the contrast 4 State barcode shall be deemed as being compliant with the Symbol Contrast Ratio and the Reflectance Difference requirements.

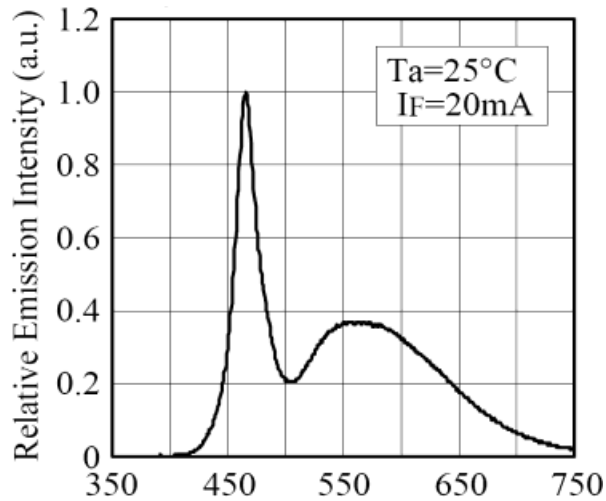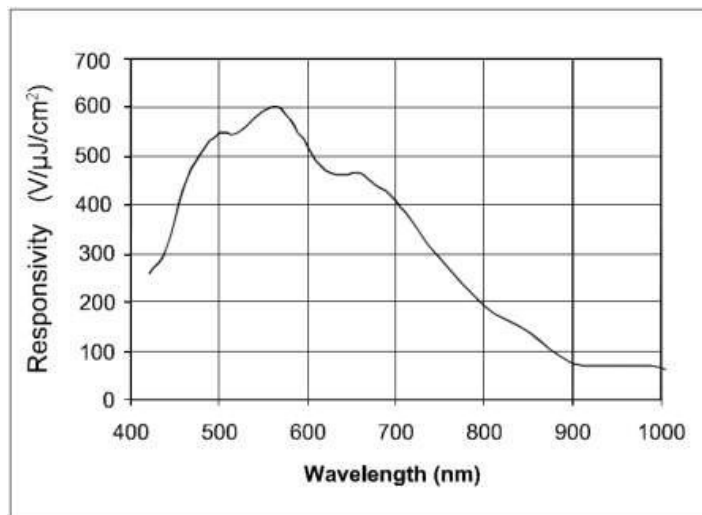## Table 12 – Illumination emission spectrum

Table 13 – Detector Spectral Response

4. Appendix A –
valid postcode formats – 2D

This section defines the valid postcode and DPS formats to populate the content of the "Destination Post Code plus DPS" and "Return to Sender Post Code" fields within the 2D Mailmark barcodes.

Table 14 – Valid postcode and DPS content for 2D Mailmark barcodes

Barcode field	Outward	Inward	Delivery Point	Padding if required	Comment
Destination Post Code plus DPS'	AN	NAA	NA	SS	Valid Outward, Inward and Delivery point information available. Note Delivery Point information is not a default delivery point (9Z).
	AAN	NAA	NA	S	
	ANN	NAA	NA	S	
	AANN	NAA	NA		
	ANA	NAA	NA	S	
	AANA	NAA	NA		
	AN	NAA	9Z	SS	Valid Outward and Inward but no delivery point information. A default Delivery Point (9Z) must be included in the barcode.
	AAN	NAA	9Z	S	
	ANN	NAA	9Z	S	
	AANN	NAA	9Z		
	ANA	NAA	9Z	S	

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Barcode field	Outward	Inward	Delivery Point	Padding if required	Comment
Destination Post Code plus DPS'	AANA	NAA	9Z		
	AN			SSSSSSS	Valid Outward but no Inward or Delivery Point information.
	AAN			SSSSSS	
	ANN			SSSSSS	
	AANN			SSSSS	
	ANA			SSSSSS	
	AANA			SSSSS	
				SSSSSSSSS	No postcode information
Return to Sender Post Code	AN	NAA	-	SS	Outward and Inward information is required. Note this field does not support inclusion of delivery point information
	AAN	NAA	-	S	
	ANN	NAA	-	S	
	AANN	NAA	-		
	ANA	NAA	-	S	
	AANA	NAA	-		
			-	SSSSSSS	No postcode information

5. Appendix B – valid postcode formats – 4-state

This section defines the valid postcode and DPS formats to populate the content of the "Destination Post Code plus DPS" field within the 4-state Mailmark barcodes.

Table 15 – Valid postcode and DPS content for 2D Mailmark barcodes

Field	Length	Definition	Comment
Destination Post Code plus DPS	9	Contains the Postcode plus DPS of the destination If inland the Postcode/DP contains the following number of characters. Area (1 or 2 characters), District (1 or 2 characters), Sector (1 character), Unit (2 characters), and DPS (2 characters)	This field shall be to at least Postcode Unit level.

Postcodes must be to at least Unit level to be valid in 4-state Mailmark barcode types[3].

The Postcode and DPS within the 'Destination Post Code plus DPS' field must be PAF® format compliant.

The outward Postcodes must be one of the following 6 formats (A=Alpha, N=Numeric):

- ANA,
- AAN,
- AANN,
- AANA,
- AN or
- ANN

Whatever outward code is used it must not be followed by "space" characters before the inward part of the Postcode.

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[3] with the exception of International items which are currently not permitted in any Mailmark option mailings but if they were they should simply have XY11 in the postcode field

Note: 4-state Mailmark barcode encoder applications require all postcode and DPS strings to be of the same length (9 Characters). To achieve this, padding "space" characters may need to be added at the end of the postcode and DPS string prior to the data being sent to the encoder application. Decoder applications will not remove these padding characters so the output postcode and DPS string will always be 9 characters long.

"Space" characters must not be used within the Postcode and DPS string – only at the end if needed to make up the nine characters.

Valid examples of a Postcode and DPS in a 9-character string include:

- AANNNAANA,
- AANNAANA<space> and
- ANNAANA<space><space>

If no delivery point information (DPS) is available a default DPS of 9Z shall be used.

The full postcode format allowed. However to minimise the length of the Mailmark barcode the following features of the postcode shall be used e.g.:

- Outward never has 4 alphas;
- Inward does not use the following characters –C,I,K,M,O or V
- Inward portion is always numeric, alpha, alpha (NAA) format;
- Delivery point does not use C,I,K,M,O or V
- Delivery point is always numeric, alpha (NA) format.

6. Previous Change Control Log

Updated to this document 3rd August 2023
1. Page 10. Addition
   If you choose to use the supplementary Default Postcode option enter the characters XY991AA
2. Page 21. Addition
3. If you choose to use the supplementary Default Postcode option enter the characters XY991AA

Updates to this document 15th February 2021
2. Page 8. Addition:
   Network Access bulk Mailings for Sorted and Unsorted Services, including Manual Mailmark Parcel and Manual Mailmark General Large Letters.
3. Page 13: Consistency
   Service Flag changed to Service Type
4. Page 16. Addition:
   Barcode C and Barcode L can be used for Manual Mailmark Parcel and Manual Mailmark General Large Letters.
5. Pages 10, 19, 22 and 23. Clarity around 'Service Type' and 'Format':
6. Additional:
   Format type: *5...9 = not in use* and *A...Z = not in use*
   Service type: *5 = not in use* and *6 = not in use*