

**Doc 9303**



# Machine Readable Travel Documents

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## **Part 2** Machine Readable Visas

Approved by the Secretary General  
and published under his authority

Third Edition — 2005

International Civil Aviation Organization

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**Doc 9303**



# **Machine Readable Travel Documents**

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## **Part 2 Machine Readable Visas**

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**International Civil Aviation Organization**

# AMENDMENTS

The issue of amendments is announced regularly in the *ICAO Journal* and in the supplements to the *Catalogue of ICAO Publications and Audio-visual Training Aids*, which holders of this publication should consult. The space below is provided to keep a record of such amendments.

## RECORD OF AMENDMENTS AND CORRIGENDA

AMENDMENTS		
No.	Date	Entered by

CORRIGENDA		
No.	Date	Entered by

## FOREWORD

The Third Edition of Doc 9303, Part 2, *Machine Readable Visas (MRVs)* represents a substantial modification of the specifications in the Second Edition (1994) and completes the work undertaken in ICAO to revise and harmonize the specifications for machine readable passports, visas and official travel documents. As was done in the revision of Parts 1 and 3, the specifications in Part 2 have been augmented to provide for structural features to enhance the security of the document and expanded machine readable data storage capacity beyond the OCR-based Machine Readable Zone, including optional bar code and/or contactless integrated circuit(s) to accommodate identity confirmation with biometrics. In addition, two policy changes, intended to deter the misuse of a visa by someone other than the rightful holder, are reflected in the new specifications: a provision that only one person be identified on each visa, and a mandatory field in the MRV format for the visa holder's portrait or other identification feature. As a result, the new edition presents a significantly streamlined set of specifications with fewer format style options.

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## I. INTRODUCTION

ICAO's work on machine readable travel documents began in 1968 with the establishment, by the Air Transport Committee of the Council, of a Panel on Passport Cards. This Panel was charged with developing recommendations for a standardized passport book or card that would be machine readable, in the interest of accelerating the clearance of passengers through passport controls. The Panel produced a number of recommendations, including the adoption of optical character reading (OCR) as the machine reading technology of choice due to its maturity, cost-effectiveness and reliability. In 1980, the specifications and guidance material developed by the Panel were published as the first edition of Doc 9303, titled *A Passport with Machine Readable Capability*, which became the basis for the initial issuance of machine readable passports by Australia, Canada and the United States.

In 1984, ICAO established what is now known as the Technical Advisory Group on Machine Readable Travel Documents (TAG/MRTD), comprised of government officials who specialize in the issuance of passports and other travel documents, in order to update and enhance the specifications which had been prepared by the Panel. Subsequently, this group's terms of reference were expanded to include, first, the development of specifications for a machine readable visa and, later, specifications for machine readable cards that may be used as official travel documents. Doc 9303 is now published in separate parts, one for each type of document.

In 1997, the TAG/MRTD commenced a comprehensive revision of Doc 9303, Parts 1, 2 and 3. In this revision process, the structure and organization of the three parts were harmonized to facilitate implementation by issuing States and organizations. Each part of Doc 9303 contains a section outlining the specifications that are common to all types of machine readable travel documents, followed by one or more sections detailing the specifications unique to the type of travel document addressed in the particular part.<sup>1</sup> The familial relationship between the three parts of Doc 9303 is demonstrated in Figure I-1.

## GENERAL CONSIDERATIONS

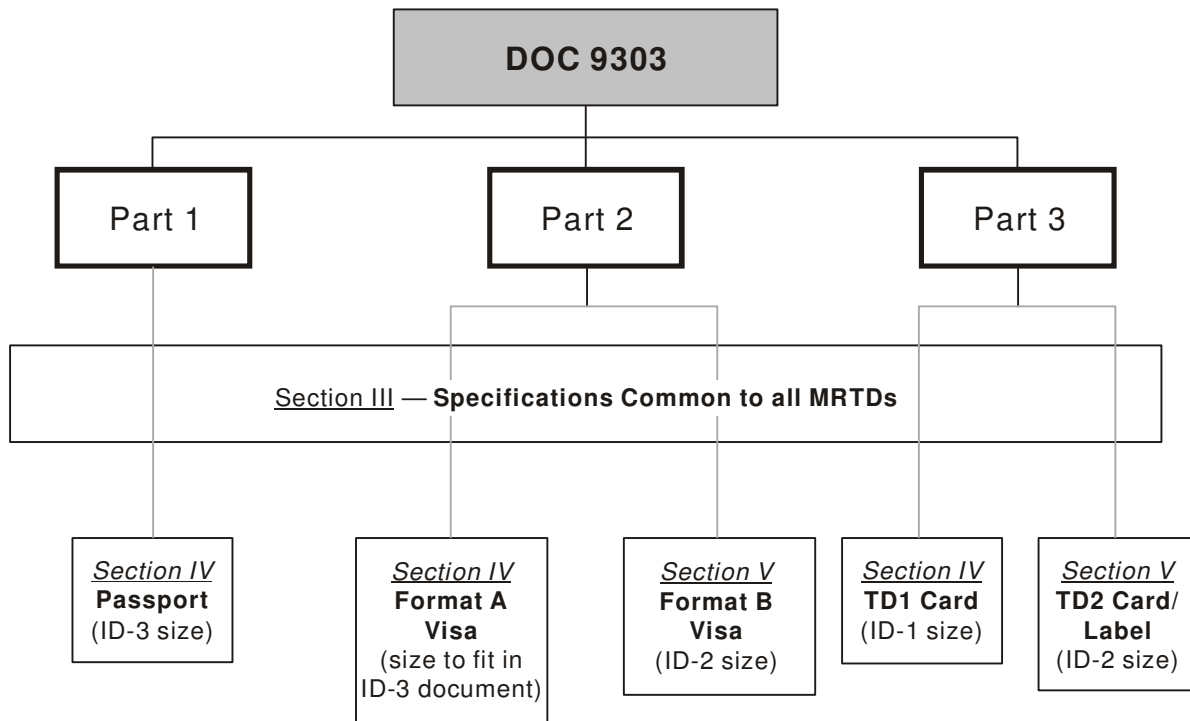
### ICAO's leadership role

ICAO's initiative to develop standard specifications for passports and other travel documents followed the tradition established by the League of Nations Passport Conferences of the 1920s and the work of the League's successor, the United Nations Organization. ICAO's mandate to continue in its leadership role stems from the Convention on International Civil Aviation, which covers the full range of requirements for efficient and orderly civil aviation operations, including provisions for clearance of persons through border controls, i.e.:

- a) the requirement for persons travelling by air and aircraft crews to comply with immigration, customs and passport regulations (Article 13);

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1. Both the common specifications and the applicable unique specifications are essential to the construction of each type of travel document.



**Figure I-1. The familial relationship between the three parts of Doc 9303**

- b) the requirement for States to facilitate border clearance formalities and prevent unnecessary delays (Article 22); and
- c) the requirement for States to develop and adopt internationally standard procedures for immigration and customs clearance (Articles 23 and 37 (j)).

Under this mandate, ICAO develops and maintains international standards for these and other border operations in Annex 9 to the Convention (*Facilitation*) for implementation by Contracting States. The production of standardized specifications for travel documents is an integral part of this work.

The Council of ICAO has affirmed that work on specifications for travel documents is an appropriate part of the work programme for the Organization. Nevertheless, ICAO is prepared to cooperate with any other international organization that might wish to promote the use of MRTDs. In addition to the International Organization for Standardization (ISO), consultants to the TAG/MRTD include the International Air Transport Association (IATA), the Airports Council International (ACI), and the International Criminal Police Organization (INTERPOL).

### **Operations and enhancements**

The machine readable travel document, with its OCR medium, is designed for both visual and mechanical reading. This feature is essential, since the conversion of travel documents to machine readable format can only

be made gradually as current travel documents expire and are renewed or reissued, and the introduction of machine readability at border-crossing points is only being introduced gradually according to traffic volumes. As additional machine reading technologies are introduced on an optional basis in various travel documents, the OCR will be retained as the basic technology, considered mandatory to ensure global interoperability.

Document integrity is a significant factor in the security of the global travel system, and confidence in the integrity of a State's travel documents on the part of border control authorities promotes facilitation of border control formalities. In ICAO, biometric identification is considered an important tool for States to use to strengthen the security of their documents and increase the level of that confidence. Since 1997 the TAG/MRTD has been developing specifications for the enhancement of machine readable passports, visas and other official travel documents with the expansion of machine readable data storage capacity and incorporation of one or more biometrics.

On 22 May 2003 the Air Transport Committee of the Council approved a four-part recommendation from the TAG/MRTD which subsequently became known as the ICAO "Blueprint" for implementation of this enhancement to MRTDs. The recommendation entailed selection of *the face* as the globally interoperable biometric for machine-assisted identity confirmation; use of a *contactless integrated circuit (IC)* chip, with a minimum capacity of 32K bytes of data, as the medium for storage of electronic data, including biometric(s), on a travel document; programming of the chip using the instructions set out in a specified *logical data structure (LDS)*; and use of a modified *public key infrastructure (PKI)* scheme for the implementation of digital signatures to secure the electronic data against unauthorized alteration.

### **Endorsement by ISO**

The technical specifications sections of Doc 9303, Parts 1, 2 and 3, have received the endorsement of the International Organization for Standardization as ISO Standards 7501-1, 7501-2 and 7501-3, respectively. Such endorsement is made possible by means of a liaison mechanism through which manufacturers of travel documents, readers and other technologies provide technical and engineering advice to the TAG/MRTD under the auspices of ISO. Through this working relationship, the ICAO specifications have achieved the status of worldwide Standards by means of a simplified procedure within ISO.

The liaison mechanism with ISO has been successfully applied not only to the endorsement of new specifications for travel documents as ISO Standards but also to the approval of amendments to the specifications. Subsequent revisions to Doc 9303, Parts 1, 2 and 3, will therefore be processed for ISO endorsement in the same manner as previously.

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## II. TECHNICAL SPECIFICATIONS FOR MACHINE READABLE VISAS

### REFERENCES AND DEFINITIONS

#### Scope

1. Part 2 of Doc 9303 defines the specifications for machine readable visas (MRV) which allow compatibility and global interchange using both visual (eye readable) and machine readable means. The specifications lay down standards for visas which can, where issued by a State and accepted by a receiving State, be used for travel purposes. The MRV shall, as a minimum, contain the data specified herein in a form that is legible both visually and by optical character recognition methods, as presented herein. Specifications are included for the discretionary expansion of the machine readable data capacity of the MRV beyond that defined for global interchange, as well as for machine-assisted identity confirmation of the rightful holder and MRV security features.

#### Normative references

2. Certain provisions of the following international Standards, referenced in this text, constitute provisions of Part 2 of Doc 9303. Where differences exist between the specifications contained in Part 2 and the referenced Standards, to accommodate specific construction requirements for machine readable travel documents, including machine readable visas, the specifications contained herein shall prevail.

ISO 1073-2:1976	<i>Alphanumeric character sets for optical recognition — Part 2: Character set OCR-B — Shapes and dimensions of the printed image</i>
ISO 1831:1980	<i>Printing specifications for optical character recognition</i>
ISO 3166-1:1997	<i>Codes for the representation of names of countries and their subdivisions — Part 1: Country codes</i>
ISO/IEC 7810:2003	<i>Identification cards — Physical characteristics</i>
ISO 8601:2000	<i>Data elements and interchange formats — Information interchange — Representation of dates and times</i>

*Note.— The date indicates the most recent edition of the Standard. Hereinafter, this document will cite the above ISO Standards only, without reference to the year.*

#### Definitions

3. For the purpose of Part 2 of Doc 9303, the following definitions shall apply.

- *Machine readable travel document (MRTD)*: Official document issued by a State or organization which is used by the holder for international travel (e.g. passport, visa, official document of identity) and which

contains mandatory visual (eye readable) data and a separate mandatory data summary in a format which is capable of being read by machine.

- *Machine readable passport (MRP)*: Passport conforming with the specifications contained in Doc 9303, Part 1. Normally constructed as an ID-3 size book containing pages with information on the holder and the issuing State or organization and pages for visas and other endorsements. Machine readable information is contained in two lines of OCR-B text, each with 44 characters. May also be a free-standing card of ID-1 size.
- *MRP data page*: A fixed-dimensional page within the MRP containing a standardized presentation of visual and machine readable data. When constructed to form an end leaf of the MRP, the back is securely bonded to the cover stock of the MRP.
- *Machine readable visa (MRV)*: A visa (also known as an entry clearance but not referred to as such in these specifications) conforming with the specifications contained in Doc 9303, Part 2. The MRV is normally attached to a visa page in a passport.
- *Full size (Format-A) machine readable visa (MRV-A)*: An MRV conforming with the dimensional specifications contained in Doc 9303, Part 2, sized to completely fill a passport visa page.
- *Small size (Format-B) machine readable visa (MRV-B)*: An MRV conforming with the dimensional specifications (ID-2 size) contained in Doc 9303, Part 2, sized to maintain a clear area on the passport visa page adjacent to the visa to allow, for example, a seal to be placed on the visa and the passport page on which it is affixed.
- *Machine readable official travel document (MROTD)*: An official document of identity, capable of being read by machine, issued by a State or organization, which may, subject to agreement of the issuing and receiving State, be accepted in lieu of a passport or visa for international travel.
- *Size 1 machine readable official travel document (TD-1)*: A card with nominal dimensions guided by those specified for the ID-1 type card (ISO/IEC 7810) (excluding thickness). In the case of a plastic card which carries any optional, additional data storage technology, the reading of which requires it to be inserted into a slot reader (i.e. magnetic stripe, optical memory or integrated circuit with contacts), the TD-1 conforms to the precise dimensions and tighter tolerances specified in ISO/IEC 7810.
- *Size 2 machine readable official travel document (TD-2)*: A card or label conforming with the dimensions defined for the ID-2 type card (ISO/IEC 7810) (excluding thickness). In the case of a card which carries any optional, additional data storage technology, the reading of which requires the TD-2 to be inserted into a slot reader (e.g. a magnetic stripe), the TD-2 conforms to the precise dimensions and tighter tolerances specified in ISO/IEC 7810.
- *Machine readable zone (MRZ)*: A fixed-dimensional area located on the MRTD or MRP data page, containing mandatory and optional data formatted for machine reading using OCR methods.
- *Effective reading zone (ERZ)*: A fixed-dimensional area, common to all MRTDs, in which the machine readable data in the MRZ can be read by document readers.
- *Visual inspection zone (VIZ)*: Those portions of the MRTD (data page in the case of an MRP), i.e. front and back (where applicable), not defined as the MRZ.



- 
- *Issuing State*: The country issuing the MRTD.
  - *Receiving State*: The country to which the MRTD holder is applying for entry.
  - *Issuing organization*: Organization authorized to issue an official travel document (e.g. the United Nations Organization, issuer of the laissez-passer).
  - *Zone*: An area containing a logical grouping of data elements on the MRTD. Seven (7) zones are defined for MRTDs.
  - *Field*: Specified space for an individual data element within a zone.
  - *Caption*: Printed word or phrase to identify a field.
  - *Portrait*: A visual representation of the facial image of the holder of the document.

#### **Technical specifications for machine readable visas**

4. Technical specifications for machine readable visas (MRVs) are presented in three sections as follows:

Section III — Technical specifications for machine readable visas common to all machine readable travel documents;

Section IV — Technical specifications unique to Format A machine readable visas; and

Section V — Technical specifications unique to Format B machine readable visas.

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### **III. TECHNICAL SPECIFICATIONS FOR MACHINE READABLE VISAS COMMON TO ALL MACHINE READABLE TRAVEL DOCUMENTS**

#### **Scope**

1. This section defines specifications that are common to all machine readable travel documents (MRTDs) and, hence, the machine readable visa (MRV). Reference to the MRTD in Section III shall therefore constitute reference to the MRV.

#### **Physical characteristics**

2. Issuing States and organizations have the freedom to choose the materials to be used. Nevertheless, the MRTD shall, in normal use throughout its period of validity, meet the following requirements.

2.1 *Deformation.* The MRTD shall be of such nature that bends (not creases), i.e. deformation due to normal use, can be flattened by the reading device without impairing the use of the MRTD or the functioning of the reader.

2.2 *Toxicity.* The MRTD shall present no toxic hazards in the course of normal use (see also ISO/IEC 7810).

2.3 *Resistance to chemicals.* The MRTD shall be resistant to chemical effects arising from normal handling and use, except where chemical sensitivity is added for security reasons.

2.4 *Temperature stability.* The MRTD shall remain machine readable at operating temperatures ranging from  $-10^{\circ}\text{C}$  to  $+50^{\circ}\text{C}$  ( $14^{\circ}\text{F}$  to  $122^{\circ}\text{F}$ ). The MRTD should not lose its reliability after being stored at temperatures ranging from  $-35^{\circ}\text{C}$  to  $+80^{\circ}\text{C}$  ( $-31^{\circ}\text{F}$  to  $176^{\circ}\text{F}$ ).

2.5 *Humidity.* The MRTD shall be machine readable at a relative air humidity ranging from 5 per cent to 95 per cent, with a maximum wet bulb temperature of  $25^{\circ}\text{C}$  ( $77^{\circ}\text{F}$ ) (see also ISO/IEC 7810). The MRTD should not lose its reliability after being stored at a relative air humidity ranging from 0 per cent to 100 per cent.

2.6 *Light.* The MRTD shall resist deterioration from exposure to light encountered during normal use (see also ISO/IEC 7810).

2.7 While material choices remain at the discretion of the individual issuing State or organization, no materials shall adversely affect any other component in the MRTD.

#### **Security aspects**

3. The MRTD shall incorporate safeguards as deemed appropriate by the issuing State or organization. Security features incorporated in the MRTD should permit reliable verification but shall not interfere with machine reading. While Doc 9303 does not specify the security precautions to be taken against counterfeit and fraudulent alteration, informative Annex A to this section provides details of recommended security standards for MRTDs, and the following security principles shall be observed in the production of the MRTD.

3.1 *Forgery.* Reliable security measures shall be incorporated to facilitate the visual detection of any alteration to the MRTD. Such security measures should, if possible, also facilitate the automated detection of alterations. “Forgery” is defined as the fraudulent alteration of any part of the MRTD.

3.2 *Counterfeit.* To facilitate the visual and/or automated detection of counterfeits, a combination of reliable security features shall be incorporated in the MRTD. “Counterfeit” is defined as the unauthorized reproduction of the MRTD by whatever means.

3.3 *Imposters.* Security features should be incorporated to facilitate the visual and/or automated detection of the fraudulent use of the MRTD by an imposter. “Imposter” is defined as someone representing himself or herself to be some other person.

3.4 *Materials.* Whenever possible, materials should be of controlled varieties which cannot be easily acquired for other than official purposes. Where materials are not of a controlled variety, it is recommended that additional security features be integrated with these materials. Where different types of materials are integrated to form the MRTD or any part thereof (e.g. paper substrate with laminate), they shall be assembled in a manner to prevent reuse and reassembly following separation for purposes of fraudulent alteration.

#### **General layout of the MRTD**

4. The MRTD follows a standardized layout to facilitate reading of data on a global basis by both eye readable and machine readable means (global interoperability).

4.1 To accommodate the various requirements of States’ laws and practices and to achieve the maximum standardization within those divergent requirements, the MRTD is divided into seven zones as listed below. Zones I through VI constitute the visual inspection zone (VIZ). Zone VII is the machine readable zone (MRZ).

Zone I	Header
Zone II	Personal data elements (mandatory and optional)
Zone III	Document data elements (mandatory and optional)
Zone IV	Signature
Zone V	Identification feature
Zone VI	Optional data elements
Zone VII	Mandatory machine readable zone (MRZ)

4.2 The location, contents and dimensional specifications of zones are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

#### **Content, use and dimensional flexibility of zones**

5. The content and use of zones, while common in large part to all MRTDs, vary to accommodate the unique requirements of the different types of MRTDs and the diverse requirements of issuing States and organizations.

## 6. Visual inspection zone (VIZ) (Zones I through VI)

6.1 The VIZ consists of zones designated mandatory and optional to accommodate the diverse requirements of issuing States and organizations while maintaining sufficient uniformity to ensure global interoperability for all MRTDs.

6.2 *Captions in the VIZ.* Mandatory captions are defined for key data elements in the VIZ. Details are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

### 6.3 Entered data in the VIZ

6.3.1 Selection of typeface and type size used within the VIZ is at the discretion of the issuing State or organization. However, OCR-B, size 1, constant stroke width characters with a width spacing of 2.54 mm (0.1 in) as specified in ISO 1073-2 are recommended.

6.3.2 The horizontal printing density and the vertical line spacing may be adjusted at the discretion of each issuing State or organization, provided that in the VIZ all data are printed in a size such that they can be easily read and assimilated by a person with normal eyesight.

*Note.— Where OCR-B, size 1, is **not** used, a maximum horizontal printing density of 15 characters per 25.4 mm (1.0 in) should not be exceeded. This printing density has been chosen as the smallest in which information is clear and legible.*

6.3.3 If any optional field is not used, the entered data may be spread out in the VIZ consistent with the requirement for sequencing zones and data elements specific to the different types of MRTDs.

6.3.4 Use of upper-case characters is recommended.

6.3.5 Diacritical marks (accents) may be used with either lower- or upper-case characters, at the option of the issuing State or organization.

6.4 *Languages and characters.* Data entered in the visual zone shall be represented using Latin-alphabet characters (A to Z) and the numerals 1234567890. Data entered in a national language which uses non-Latin alphabet characters and/or alternative numerals shall be transliterated or transcribed. Where representation in such a national language is required, each data element shall first appear as prescribed in the data element directory for the relevant type of MRTD, followed by a blank space, an oblique character and another blank space, followed by the same data element in the national character set, subject to available space in the field concerned. Case and size of font for the non-Latin character data entries may be selected at the discretion of the issuing State or organization. Whenever possible, however, the same size of font should be used as for the machine readable zone. In all other respects, the layout, fields and data elements of the VIZ, as set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303, shall be observed.

6.5 *Zone position/data position/data elements/print specifications/print position in the VIZ.* Details are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

## 7. *Mandatory machine readable zone (MRZ) (Zone VII)*

### 7.1 *Purpose of the MRZ*

7.1.1 MRTDs produced in accordance with Doc 9303 incorporate an MRZ to facilitate inspection of travel documents and reduce the time taken up in the travel process by administrative procedures. In addition, the MRZ provides verification of the information in the VIZ and may be used to provide search characters for a database inquiry. Equally, it may be used to capture data for registration of arrival and departure or simply to point to an existing record in a database.

7.1.2 The MRZ provides a set of essential data elements in a standardized format for each type of MRTD that can be used by all receiving States regardless of their national script or customs.

7.1.3 The data in the MRZ are formatted in such a way as to be readable by machines with standard capability worldwide. It must be stressed that the MRZ is reserved for data intended for international use in conformance with international Standards for MRTDs. The MRZ is a different representation of the data than is found in the VIZ. The VIZ contains data not specifically intended to be read by machine, and herein data can be included in the national script of the issuing State provided that it is also transliterated into Latin-alphabet characters in conformance with 6.4. On the other hand, the constraints posed by machine reading in the MRZ do not permit such flexibility.

### 7.2 *Properties of the MRZ*

7.2.1 In consideration of national privacy laws, the data in the MRZ must be visually readable as well as machine readable. Data presentation must conform to a common standard such that all machine readers configured in conformance with Doc 9303 can recognize each character and communicate in a standard protocol (e.g. ASCII) that is compatible with the technology infrastructure and the processing requirements defined by the receiving State.

7.2.2 To meet these requirements, OCR-B typeface is specified in Doc 9303 as the medium for storage of data in the MRZ. The MRZ as defined herein is recognized as the machine reading technology essential for global interchange and is therefore mandatory in all types of MRTDs.

### 7.3 *Constraints of the MRZ*

7.3.1 The characters allowed in the MRZ are a common set (as defined in Appendix 2 to this section) which can be used by all States. National characters generally appear only in the computer-processing systems of the States in which they apply and are not available globally. They shall not, therefore, appear in the MRZ.

7.3.2 Diacritical marks are not permitted in the MRZ. Even though they may be useful to distinguish names, the use of diacritical marks in the MRZ would confuse machine-reading equipment, resulting in less accurate database searches and slower clearance of travellers.

7.3.3 The number of character positions available for data in the MRZ is limited and varies according to the type of MRTD. The length of the data elements inserted in the MRZ must conform to the size of the respective fields as specified in the data element directory in the applicable part of Doc 9303.

7.3.4 In some instances, names in the MRZ may not appear in the same form as in the VIZ. In the VIZ, non-Latin and national characters may be used to represent more accurately the data in the script of the issuing State or organization.

#### 7.4 *Data position/data elements/check digits/print specifications/print position in the MRZ*

7.4.1 *Data position.* Appendices to the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303 define the location of the MRZ and the nominal position of the data therein.

7.4.2 *Data elements.* The data elements corresponding to specified fields of the VIZ shall be printed, in machine readable form, in the MRZ beginning with the leftmost character position in each field in the sequence indicated in the data structure specifications for each document type. Details on the data elements to be included in the MRZ are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

7.4.3 *Check digits.* The data structure of the machine readable lines provides for the inclusion of check digits. The position of check digits and the data used in their calculation differ between MRTDs, and a table defining this information is set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

7.4.4 *Print specifications.* Machine readable data shall be printed in OCR-B type font, size 1, constant stroke width characters, at a fixed width spacing of 2.54 mm (0.1 in), i.e. horizontal printing density of 10 characters per 25.4 mm (1.0 in) as specified in ISO 1073-2. Printed characters are restricted to those defined in Appendix 2 to this section.

7.4.5 *Print position.* Reference centre lines for the OCR lines within the MRZ and a nominal starting position for the first character of each line are set out in appendices to the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

#### 8. *Dimensional flexibility of zones*

8.1 *Visual inspection zone (VIZ).* The dimensions of individual zones within the VIZ (i.e. for MRVs, Zones I through V, since MRVs do not contain Zone VI) may be adjusted to accommodate the diverse requirements of issuing States and organizations. Details are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

8.2 *Machine readable zone (MRZ).* The dimensions of the MRZ (Zone VII) are fixed for each type of MRTD. Details are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

### **Convention for writing the name of the holder**

#### 9. *Visual inspection zone (VIZ)*

9.1 The issuing State or organization shall establish which part of the name is the primary identifier — this may be the family name, the main name, the surname, and in some cases, the entire name. This shall be entered in the field for the primary identifier in the VIZ. It is recommended that upper-case characters be used.

9.2 The remaining parts of the name are the secondary identifier. These may be the forenames, familiar names, given names, or any other secondary names. These names shall be written in the field for the secondary identifier in the VIZ. It is recommended that upper-case characters be used throughout. If a single field is used for the name, then the secondary identifier should be separated from the primary identifier by a single comma (.). A comma is not needed if multiple fields are used.

9.3 It is recommended that prefixes and suffixes, including titles, professional and academic qualifications, honours, awards, and hereditary status, not be included in the VIZ. However, if an issuing State or organization considers a prefix or suffix to be legally part of the name, the prefix or suffix can appear in the VIZ. Numeric characters should not be written in the name fields of the VIZ. Where the use of numeric characters is a legal naming convention in the issuing States, these should be represented in Roman numerals.

9.4 National characters may be used in the VIZ. If the national characters are not Latin-based, then a transliteration into Latin characters shall be provided.

#### 10. *Machine readable zone (MRZ)*

10.1 In the MRZ, the name of the holder shall be printed using upper-case OCR-B characters, specified in Appendix 2, without diacritical marks.

10.2 To achieve global interoperability, the primary and/or secondary identifiers shall conform to requirements of the limited OCR-B character set permitted in the MRZ and to the number of character positions available. The issuing State or organization shall be responsible for any transliteration or truncation, specifications for which are provided in 10.3 through 10.10.

10.3 The primary identifier, using the Latin character transliteration (if applicable), shall be written in the appropriate machine readable line, with the starting character position as set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303. It shall be followed by two filler characters (<<). The secondary identifier, using the Latin character transliteration (if applicable), shall be written starting in the character position immediately following the two filler characters.

10.4 If the primary or secondary identifiers have more than one name component, each component shall be separated by a single filler character (<).

10.5 Filler characters (<) should be inserted immediately following the final secondary identifier (or following the primary identifier in the case of a name having only a primary identifier) through to the last character position in the machine readable line.

10.6 The number of character positions in the name field is limited and differs for the different types of MRTDs. If the primary and secondary identifiers, written in the relevant machine readable line using the above procedure, exceed the available character positions, then truncation shall be carried out using the procedure set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303. In all other cases, the name shall not be truncated.

10.6.1 In truncating the name components, the last character of the name field shall be an alpha character (A to Z inclusive) as an indication that truncation has occurred (see the data element directory of the MRZ in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303).



*Note.*— Where long names extend to the last character position in the name field, the presence of an alpha character means that the name must be treated as though truncation had occurred.

10.6.2 Examples of truncation of names are contained in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

10.7 Prefixes and suffixes, including titles, professional and academic qualifications, honours, awards, and hereditary status, shall not be included in the MRZ except where the issuing State considers these to be legally part of the name. In such cases, prefixes or suffixes shall be represented as components of the secondary identifier(s).

10.8 Numeric characters shall not be used in the name fields of the MRZ.

10.9 Punctuation characters are not allowed in the MRZ. Where these appear as part of a name, they should be treated as follows:

*Apostrophe:*

This shall be omitted; name components separated by the apostrophe shall be combined and no filler character shall be inserted in its place in the MRZ.

*Example* VIZ: D'ARTAGNAN MRZ: DARTAGNAN

*Hyphen:*

Where a hyphen appears between two name components, it shall be represented in the MRZ by a single filler character (<).

*Example* VIZ: MARIE-ELISE MRZ: MARIE<ELISE

*Comma:*

Where a comma is used in the VIZ to separate the primary and secondary identifiers, the comma shall be omitted in the MRZ, and the primary and secondary identifiers shall be separated in the MRZ by two filler characters (<<).

*Example* VIZ: ERIKSSON, ANNA MARIA MRZ: ERIKSSON<<ANNA<MARIA

Otherwise, where a comma is used in the VIZ to separate two name components, it shall be represented in the MRZ as a single filler character (<).

*Example* VIZ: ANNA, MARIA MRZ: ANNA<MARIA

*Other punctuation characters:*

All other punctuation characters shall be omitted from the MRZ (i.e. no filler character shall be inserted in their place in the MRZ).

10.10 *Transliteration of national characters in names in the MRZ*

10.10.1 Names in the MRZ are represented differently from those in the VIZ. National characters must be transliterated using only the allowed OCR character set defined in Appendix 2 to this section. Issuing States or organizations should adopt the recommended transliterations specified in Appendix 3 to this section, if applicable. Appendix 3 represents the most commonly used national characters of the Latin and Cyrillic families of languages.

### Displayed identification feature(s) of the holder

11. *Displayed identification feature(s)*. The section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303 identify mandatory and/or optional display of identification feature(s) of the holder within the VIZ, i.e. portrait, signature or usual mark and/or single-digit fingerprint.

11.1 *Displayed portrait*. A displayed portrait of the rightful holder shall be either a photograph or other faithful reproduction of the image of the holder securely affixed to or represented on/within the substrate of the MRTD. Necessary measures shall be taken by the issuing State or organization to ensure that the displayed portrait is resistant to forgery and substitution. The displayed portrait shall meet the following requirements.

11.1.1 *Pose*. The displayed portrait shall: a) depict the face of the rightful holder of the MRTD in a full-face frontal pose with both eyes visible, i.e. captured perpendicular to an imaginary plane formed parallel to the front surface of the face; or b) if the additional detail of one ear is required (sometimes referred to as “half-on profile”), the face shall be at such an angle to the imaginary plane as to reveal the detail of the ear while maintaining full-face frontal details on that side of the face opposite to the exposed ear.

11.1.2 *Depth of field*. The full-face frontal pose shall be in focus from the crown (top of the hair) to the chin and from the nose to the ears.

11.1.3 *Orientation*. The crown (top of the hair) shall be nearest the top edge of the MRTD as defined in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303, i.e. the crown-to-chin orientation covering the longest dimension defined for Zone V.

11.1.4 *Face size*. The crown-to-chin portion of the full-face frontal pose shall be 70 to 80 per cent of the longest dimension defined for Zone V, maintaining the aspect ratio between the crown-to-chin and ear-to-ear details of the face of the holder.

11.1.5 *Centring*. The full-face frontal pose shall be centred within Zone V.

11.1.6 *Capturing the full-face frontal pose of the holder*

11.1.6.1 *Lighting*. Adequate and uniform illumination shall be used to capture the full-face frontal pose, i.e. appropriate illumination techniques shall be employed and illumination used to achieve natural skin tones (and avoid any colour cast) and a high level of detail, and minimize shadows, hot spots and reflections (such as sometimes caused by spectacles).

11.1.6.2 *Background*. A uniform colour background shall be used to provide a contrast to the face and hair. For colour portraits, light blue, beige, light brown, pale grey or white are recommended for the background.

11.1.6.3 *Quality of captured portrait*. The quality of the original captured portrait should at least be comparable to the minimum quality acceptable for photographs (resolution comparable to 6–8 line pairs per millimetre). To achieve this comparable image quality in a digital reproduction, careful attention must be given to the image capture, processing, digitization, compression and printing technology and the process used to produce the portrait, including the final preparation of the MRTD.

11.1.7 *Colour*. The displayed portrait shall be black and white or a true-colour representation of the holder.

### 11.1.8 Digitally printed reproduction

11.1.8.1 *Digital reproduction quality.* The digital reproduction shall yield an accurate recognizable representation of the rightful document holder. The quality of a digitally reproduced portrait should be visually comparable to a minimally acceptable photograph. To achieve this comparable image quality in a digital reproduction, careful attention must be given to the image capture, processing, digitization, compression and printing technology and the process used to reproduce the portrait in the final document, including the final preparation of the MRTD.

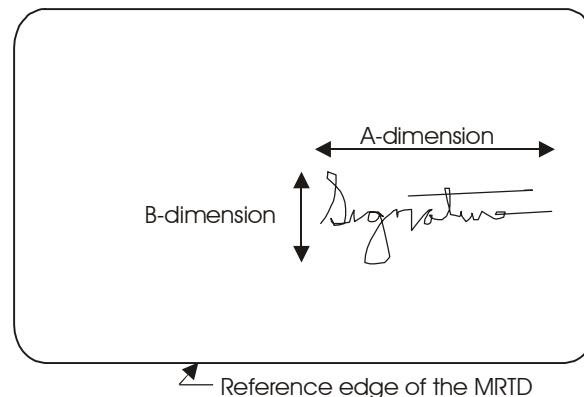
11.1.8.2 *Border.* A border or frame shall not be used to outline a digitally printed reproduction.

11.1.8.3 *Coexistence with background security treatment(s).* A digitally printed reproduction shall coexist with background security treatment(s) located within Zone V, i.e. background security printing shall not interfere with proper viewing of the displayed portrait, and vice versa.

11.1.9 *Coexistence with final preparation treatment(s) of the MRTD.* A displayed portrait shall coexist with final preparation treatment(s), i.e. final preparation treatment(s) shall not interfere with proper viewing of the displayed portrait, and vice versa.

11.2 *Displayed signature or usual mark.* A displayed signature or usual mark shall be an original created on the MRTD, a digitally printed reproduction of an original or, where permitted by specifications defined in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303, on a substrate that can be securely affixed to the MRTD. Necessary measures shall be taken by the issuing State or organization to ensure that the displayed signature or usual mark is resistant to forgery and substitution. The displayed signature or usual mark shall meet the following requirements.

11.2.1 *Orientation.* The displayed signature or usual mark shall be placed with its A-dimension parallel to the reference edge of the MRTD as defined in Figure III-1.



**Figure III-1. Orientation of the displayed signature or usual mark**

11.2.2 *Size.* The displayed signature or usual mark shall be of such dimensions that it is discernible by the human eye, and the aspect ratio (A-dimension to B-dimension) of the original signature or usual mark is maintained.

11.2.3 *Scaling for reproduction using digital printing.* In the event the displayed signature or usual mark is scaled up or scaled down, the aspect ratio (A-dimension to B-dimension) of the original signature or usual mark shall be maintained.

11.2.4 *Cropping for reproduction using digital printing.* The issuing State or organization should take steps to eliminate or minimize cropping.

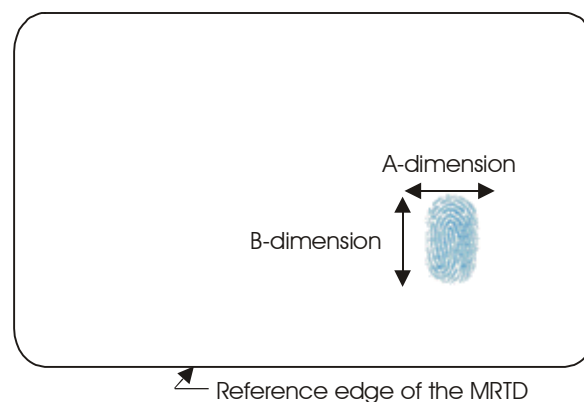
11.2.5 *Colour.* The displayed signature or usual mark shall be displayed in a colour that affords a definite contrast to the background.

11.2.6 *Borders.* Borders or frames shall not be permitted or used to outline the displayed signature or usual mark.

11.3 *Displayed single-digit fingerprint.* A displayed single-digit fingerprint shall be either an original created on the MRTD substrate by the holder, or a digitally printed reproduction of an original. Necessary measures shall be taken by the issuing State or organization to ensure that the single-digit fingerprint is resistant to forgery and substitution. The single-digit fingerprint shall meet the following requirements.

11.3.1 *Orientation.* The A-dimension (width) of the displayed single-digit fingerprint shall be parallel to the reference edge of the MRTD as defined in Figure III-2. The top of the finger shall be that portion of the single-digit fingerprint furthest away from the reference edge of the MRTD.

11.3.2 *Size.* The displayed single-digit fingerprint shall be a one-to-one replication (A-dimension versus B-dimension) of the original print.



**Figure III-2. Orientation of the displayed single-digit fingerprint**

11.3.3 *Scaling for reproduction using digital printing.* Scaling of a single-digit fingerprint shall not be permitted.

11.3.4 *Cropping for reproduction using digital printing.* The issuing State or organization should take steps to eliminate or minimize cropping.

11.3.5 *Colour.* The displayed single-digit fingerprint shall be displayed in a colour that affords a definite contrast to the background.

11.3.6 *Borders.* Borders or frames shall not be permitted or used to outline the displayed single-digit fingerprint.

### **Representation of the issuing State or organization and nationality of the holder**

12. *Visual inspection zone (VIZ)*

12.1 The issuing State or organization and the nationality of the holder shall be represented as set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

13. *Machine readable zone (MRZ)*

13.1 The three-letter codes listed in Appendix 1 to this section shall be used to complete the fields identifying the issuing State or organization and the nationality of the holder. The codes listed in Appendix 1 are based on the Alpha-3 codes for entities specified in ISO 3166-1, with extensions for certain States and organizations being identified by an asterisk.<sup>1</sup>

### **Representation of dates**

14. Representation of dates on MRTDs conforms with a convention to achieve global interoperability. Details are set out in the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303.

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1. When required by an issuing State or organization and upon request to ICAO, amended or additional three-letter codes will be submitted to the Technical Advisory Group on Machine Readable Travel Documents (TAG/MRTD) for recommendation as to inclusion in Appendix 1. To facilitate amendment of the list, liaison with the ISO Maintenance Agency for ISO 3166-1 will be provided through ISO/IEC JTC1/SC17 Working Group 3. ICAO recognizes the importance of advising its Contracting States on an urgent basis of new three-letter codes added to Appendix 1 to this Section.

**Machine reading requirements and the effective reading zone**

15. *Effective reading zone.* A fixed-dimensional reading area (effective reading zone or ERZ of 17.0 mm × 118.0 mm (0.67 in × 4.65 in)), sized to accommodate the largest MRTD, is defined to allow use of a single machine reader for all sizes of MRTDs. The location of the ERZ is as defined in Appendix 4 to this section. The provision of the ERZ is not intended to allow additional tolerance for the printing positions defined in the appendices to the section(s) specific to the preparation of the different types of MRTDs contained in the applicable part of Doc 9303. The ERZ is intended to allow for variances due to the manual placement of machine readable visas (MRVs) and the fanning effect of the pages that takes place when reading an interior page of an MRP. It also allows for the reading of MRTDs with either two or three lines of machine readable data.

15.1 To combat the threat to travel document security posed by the use of items such as photocopiers, security features are permitted in the MRZ, and any such security feature shall not interfere with accurate reading of the OCR characters at the B900 range, as defined in ISO 1831. While OCR characters must be visible, as specified in 7.2.1, to ensure that all MRTDs, including those with security features in the MRZ, can be successfully read, the OCR characters in the MRZ shall be machine readable only in the near infra-red portion of the spectrum (i.e. the B900 band defined in ISO 1831).

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## APPENDIX 1 to Section III

### THREE-LETTER CODES

(based on Alpha-3 codes for entities specified in ISO 3166-1,  
with extensions for certain States being identified by an asterisk)

#### Part A — Codes for designation of nationality, place of birth or issuing State/authority

<i>Entity (short name)</i>	<i>Code</i>	<i>Entity (short name)</i>	<i>Code</i>
Afghanistan	AFG	Burundi	BDI
Åland Islands	ALA	Cambodia	KHM
Albania	ALB	Cameroon	CMR
Algeria	DZA	Canada	CAN
American Samoa	ASM	Cape Verde	CPV
Andorra	AND	Cayman Islands	CYM
Angola	AGO	Central African Republic	CAF
Anguilla	AIA	Chad	TCD
Antarctica	ATA	Chile	CHL
Antigua and Barbuda	ATG	China	CHN
Argentina	ARG	Christmas Island	CXR
Armenia	ARM	Cocos (Keeling) Islands	CCK
Aruba	ABW	Colombia	COL
Australia	AUS	Comoros	COM
Austria	AUT	Congo	COG
Azerbaijan	AZE	Cook Islands	COK
Bahamas	BHS	Costa Rica	CRI
Bahrain	BHR	Côte d'Ivoire	CIV
Bangladesh	BGD	Croatia	HRV
Barbados	BRB	Cuba	CUB
Belarus	BLR	Cyprus	CYP
Belgium	BEL	Czech Republic	CZE
Belize	BLZ	Democratic People's Republic of Korea	PRK
Benin	BEN	Democratic Republic of the Congo	COD
Bermuda	BMU	Denmark	DNK
Bhutan	BTN	Djibouti	DJI
Bolivia	BOL	Dominica	DMA
Bosnia and Herzegovina	BIH	Dominican Republic	DOM
Botswana	BWA	Ecuador	ECU
Bouvet Island	BVT	Egypt	EGY
Brazil	BRA	El Salvador	SLV
British Indian Ocean Territory	IOT	Equatorial Guinea	GNQ
Brunei Darussalam	BRN	Eritrea	ERI
Bulgaria	BGR	Estonia	EST
Burkina Faso	BFA		

<i>Entity (short name)</i>	<i>Code</i>	<i>Entity (short name)</i>	<i>Code</i>
Ethiopia	ETH	Kazakhstan	KAZ
Falkland Islands (Malvinas)	FLK <sup>1</sup>	Kenya	KEN
Faroe Islands	FRO	Kiribati	KIR
Fiji	FJI	Kuwait	KWT
Finland	FIN	Kyrgyzstan	KGZ
France	FRA	Lao People's Democratic Republic	LAO
France, Metropolitan	FXX	Latvia	LVA
French Guiana	GUF	Lebanon	LBN
French Polynesia	PYF	Lesotho	LSO
French Southern Territories	ATF	Liberia	LBR
Gabon	GAB	Libyan Arab Jamahiriya	LBY
Gambia	GMB	Liechtenstein	LIE
Georgia	GEO	Lithuania	LTU
Germany	D*	Luxembourg	LUX
Ghana	GHA	Macao Special Administrative Region of China	MAC
Gibraltar	GIB	Madagascar	MDG
Greece	GRC	Malawi	MWI
Greenland	GRL	Malaysia	MYS
Grenada	GRD	Maldives	MDV
Guadeloupe	GLP	Mali	MLI
Guam	GUM	Malta	MLT
Guatemala	GTM	Marshall Islands	MHL
Guinea	GIN	Martinique	MTQ
Guinea-Bissau	GNB	Mauritania	MRT
Guyana	GUY	Mauritius	MUS
Haiti	HTI	Mayotte	MYT
Heard and McDonald Islands	HMD	Mexico	MEX
Holy See (Vatican City State)	VAT	Micronesia (Federated States of)	FSM
Honduras	HND	Monaco	MCO
Hong Kong Special Administrative Region of China	HKG	Mongolia	MNG
Hungary	HUN	Montserrat	MSR
Iceland	ISL	Morocco	MAR
India	IND	Mozambique	MOZ
Indonesia	IDN	Myanmar	MMR
Iran (Islamic Republic of)	IRN	Namibia	NAM
Iraq	IRQ	Nauru	NRU
Ireland	IRL	Nepal	NPL
Israel	ISR	Netherlands	NLD
Italy	ITA	Netherlands Antilles	ANT
Jamaica	JAM	Neutral Zone	NTZ
Japan	JPN	New Caledonia	NCL
Jordan	JOR	New Zealand	NZL
		Nicaragua	NIC
		Niger	NER
		Nigeria	NGA
		Niue	NIU
		Norfolk Island	NFK
		Northern Mariana Islands	MNP

1. A dispute exists between the Governments of Argentina and the United Kingdom of Great Britain and Northern Ireland concerning sovereignty over the Falkland Islands (Malvinas).



<i>Entity (short name)</i>	<i>Code</i>	<i>Entity (short name)</i>	<i>Code</i>
Norway	NOR	Swaziland	SWZ
Oman	OMN	Sweden	SWE
Pakistan	PAK	Switzerland	CHE
Palau	PLW	Syrian Arab Republic	SYR
Panama	PAN	Taiwan, Province of China	TWN
Papua New Guinea	PNG	Tajikistan	TJK
Palestinian Territory, Occupied	PSE	Thailand	THA
Paraguay	PRY	The former Yugoslav Republic of Macedonia	MKD
Peru	PER	Timor-Leste	TLS
Philippines	PHL	Togo	TGO
Pitcairn	PCN	Tokelau	TKL
Poland	POL	Tonga	TON
Portugal	PRT	Trinidad and Tobago	TTO
Puerto Rico	PRI	Tunisia	TUN
Qatar	QAT	Turkey	TUR
Republic of Korea	KOR	Turkmenistan	TKM
Republic of Moldova	MDA	Turks and Caicos Islands	TCA
Réunion	REU	Tuvalu	TUV
Romania	ROU	Uganda	UGA
Russian Federation	RUS	Ukraine	UKR
Rwanda	RWA	United Arab Emirates	ARE
St. Helena	SHN	United Kingdom	
Saint Kitts and Nevis	KNA	British	
Saint Lucia	LCA	— Citizen	GBR
St. Pierre and Miquelon	SPM	— Dependent territories citizen	GBD*
Saint Vincent and the Grenadines	VCT	— National (Overseas)	GBN*
Samoa	WSM	— Overseas citizen	GBO*
San Marino	SMR	— Protected person	GBP*
Sao Tome and Principe	STP	— Subject	GBS*
Saudi Arabia	SAU	United Republic of Tanzania	TZA
Senegal	SEN	United States	USA
Serbia and Montenegro	SCG	United States Minor Outlying Islands	UMI
Seychelles	SYC	Uruguay	URY
Sierra Leone	SLE	Uzbekistan	UZB
Singapore	SGP	Vanuatu	VUT
Slovakia	SVK	Vatican City State (Holy See)	VAT
Slovenia	SVN	Venezuela	VEN
Solomon Islands	SLB	Viet Nam	VNM
Somalia	SOM	Virgin Islands (British)	VGB
South Africa	ZAF	Virgin Islands (U.S.)	VIR
South Georgia and the South Sandwich Islands	SGS	Wallis and Futuna Islands	WLF
Spain	ESP	Western Sahara	ESH
Sri Lanka	LKA	Yemen	YEM
Sudan	SDN	Zambia	ZMB
Suriname	SUR	Zimbabwe	ZWE
Svalbard and Jan Mayen Islands	SJM		

**Part B — Codes for use in United Nations travel documents**

- \*UNO — Designates the United Nations Organization or one of its officials.
- \*UNA — Designates a specialized agency of the United Nations or one of its officials.
- \*UNK — Designates a resident of Kosovo to whom a travel document has been issued by the United Nations Interim Administration Mission in Kosovo (UNMIK).

**Part C — Codes for persons without a defined nationality**

- \*XXA — Stateless person, as defined in Article 1 of the 1954 Convention Relating to the Status of Stateless Persons.
- \*XXB — Refugee, as defined in Article 1 of the 1951 Convention Relating to the Status of Refugees as amended by the 1967 Protocol.
- \*XXC — Refugee, other than as defined under the code XXB above.
- \*XXX — Person of unspecified nationality, for whom the issuing State does not consider it necessary to specify any of the codes XXA, XXB or XXC above, whatever that person's status may be. This category may include a person who is neither stateless nor a refugee but who is of unknown nationality and legally residing in the State of issue.

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\* These are the extensions to the ISO 3166-1 codes referred to in 13.1.

**APPENDIX 2 to Section III**

**SUBSET OF OCR-B CHARACTERS FROM ISO 1073-2  
FOR USE IN MACHINE READABLE TRAVEL DOCUMENTS  
(constant stroke width)**

*(for illustrative purposes only)*

**1. Machine readable zone (MRZ)**

Only the following characters shall appear in the MRZ.

0 1 2 3 4 5 6 7 8 9  
A B C D E F G H I  
J K L M N O P Q R  
S T U V W X Y Z <

The above characters are shown larger than actual size. The typeface required in the MRZ on MRTDs is OCR-B, size 1, constant stroke width with a character width spacing of 2.54 mm (0.10 in), i.e. a horizontal printing density of 10 characters per 25.4 mm (1.0 in).

**2. Visual inspection zone (VIZ)**

The typeface and type size used within the VIZ is at the discretion of the issuing State or organization, although use of OCR-B, size 1, is preferred. Irrespective of typeface used, the printing density should not exceed 15 characters per 25.4 mm (1.0 in).



**APPENDIX 3 to Section III**

**TRANSLITERATIONS RECOMMENDED FOR USE BY STATES**

<i>Sequence number</i>	<i>National character</i>	<i>Description</i>	<i>Recommended transliteration</i>
<b>A. Transliteration of multinational characters</b>			
1	Á	A acute	A
2	À	A grave	A
3	Â	A circumflex	A
4	Ä	A diaeresis	AE
5	Ã	A tilde	A
6	Ă	A breve	A
7	Å	A ring	AA
8	Ā	A macron	A
9	Ą	A ogonek	A
10	Ć	C acute	C
11	Ĉ	C circumflex	C
12	Č	C caron	C
13	Ċ	C dot accent	C
14	Ç	C cedilla	C
15	Ð	Eth	D
16	Ď	D caron	D
17	É	E acute	E
18	È	E grave	E
19	Ê	E circumflex	E
20	Ë	E diaeresis	E
21	Ě	E caron	E
22	Ė	E dot accent	E
23	Ē	E macron	E
24	Ę	E ogonek	E
25	Ĕ	E breve	E
26	Ĝ	G circumflex	G
27	Ğ	G breve	G

<i>Sequence number</i>	<i>National character</i>	<i>Description</i>	<i>Recommended transliteration</i>
28	Ġ	G dot accent	G
29	Ģ	G cedilla	G
30	Ĥ	H bar	H
31	ĥ	H circumflex	H
32	İ	I without dot (Turkey)	I
33	Í	I acute	I
34	Ì	I grave	I
35	Î	I circumflex	I
36	Ï	I diaeresis	I
37	Ĩ	I tilde	I
38	İ̇	I dot accent	I
39	Ī	I macron	I
40	Į	I ogonek	I
41	İ̆	I breve	I
42	Ĵ	J circumflex	J
43	Ķ	K cedilla	K
44	Ł	L slash	L
45	Ł́	L acute	L
46	Ł̈́	L caron	L
47	Ł̣	L cedilla	L
48	Ł̇	L dot	L
49	Ñ	N acute	N
50	Ñ̃	N tilde	N or NXX
51	Ñ̄	N caron	N
52	Ñ̇	N cedilla	N
53	Ŋ	Eng	N
54	Ø	O slash	OE
55	Ó	O acute	O
56	Ò	O grave	O
57	Ô	O circumflex	O
58	Ö	O diaeresis	OE
59	Õ	O tilde	O
60	Ő	O double acute	O
61	Ō	O macron	O

<i>Sequence number</i>	<i>National character</i>	<i>Description</i>	<i>Recommended transliteration</i>
62	Ö	O breve	O
63	Ř	R acute	R
64	Ṛ̌	R caron	R
65	Ŕ	R cedilla	R
66	Ś	S acute	S
67	Ŝ	S circumflex	S
68	Š	S caron	S
69	Ș	S cedilla	S
70	Ʀ	T bar	T
71	Ť	T caron	T
72	Ṭ	T cedilla	T
73	Ú	U acute	U
74	Ù	U grave	U
75	Û	U circumflex	U
76	Ü	U diaeresis	UE or UXX
77	Ũ	U tilde	U
78	Ŭ	U breve	U
79	Ū	U double acute	U
80	Ů	U ring	U
81	Ū	U macron	U
82	Ů	U ogonek	U
83	Ŵ	W circumflex	W
84	Ý	Y acute	Y
85	Ŷ	Y circumflex	Y
86	ÿ	Y diaeresis	Y
87	Ž	Z acute	Z
88	Ẓ̌	Z caron	Z
89	Ž̇	Z dot	Z
90	Ð	Thorn (Iceland)	TH
91	Æ	ligature AE	AE
92	IJ	ligature IJ	IJ
93	Œ	ligature OE	OE
94	ß	double s (Germany)	SS

<i>Sequence number</i>	<i>National character</i>	<i>Description</i>	<i>Recommended transliteration</i>
<b>B. Transliteration of Cyrillic characters</b>			
1	А		A
2	Б		B
3	В		V
4	Г		G (except Belorussian and Serbian-Macedonian = H)
5	Д		D
6	Е		E
7	Ё		E (except Belorussian = IO)
8	Ж		ZH (except Serbian-Macedonian = Z)
9	З		Z
10	И		I (except Ukrainian = Y)
11	І		I
12	Й		I
13	К		K
14	Л		L
15	М		M
16	Н		N
17	О		O
18	П		P
19	Р		R
20	С		S
21	Т		T
22	У		U
23	Ф		F
24	Х		KH (except Serbian-Macedonian = H)
25	Ц		TS (except Serbian-Macedonian = C)
26	Ч		CH (except Serbian-Macedonian = C)
27	Ш		SH (except Serbian-Macedonian = S)
28	Щ		SHCH (except Bulgarian = SHT)
29	Ы		Y
30	Ѣ		IE
31	Э		E
32	Ю		IU

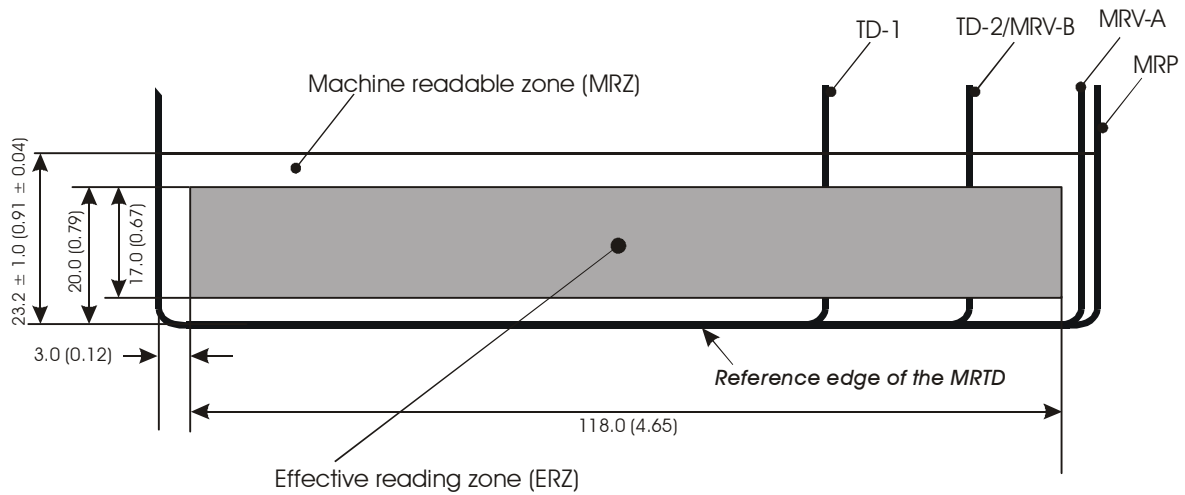


<i>Sequence number</i>	<i>National character</i>	<i>Description</i>	<i>Recommended transliteration</i>
33	Я		IA
34	V		Y
35	Г		G
36	Ў		U
37	Ж		U
38	Г		G
39	Ђ		D
40	S		DZ
41	J		J
42	Ќ		K
43	Љ		LJ
44	Њ		NJ
45	ћ		C
46	џ		DZ
47	€		IE
48	İ		I



**APPENDIX 4 TO SECTION III**

**SCHEMATIC DIAGRAM OF THE MRTD  
EFFECTIVE READING ZONE**



Dimensions in millimetres  
(inch dimensions in parentheses)

Not to scale

*Note.— The dimensions of the effective reading zone (ERZ) illustrated are based on a standardized ERZ for all machine readable travel documents to allow use of a single machine reader.*



**ANNEX to Section III**

**SECURITY STANDARDS FOR  
MACHINE READABLE TRAVEL DOCUMENTS**

**A.1 SCOPE**

This annex provides advice on the security of machine readable travel documents made in accordance with the specifications set out in ICAO Doc 9303, Part 1 (*Machine Readable Passports*), Part 2 (*Machine Readable Visas*) and Part 3 (*Size 1 and Size 2 Machine Readable Official Travel Documents*). The recommendations cover the security of the materials used in the document's construction, the security printing and copy protection techniques to be employed and the processes used in the production of document blanks, as well as the security considerations that apply to the imaging and finishing processes involved in personalization and the protection of the biographical data in the document. Those States not yet issuing machine readable travel documents shall also consider this annex.

**A.2 INTRODUCTION**

A.2.1 Historically, Doc 9303 has not made recommendations on the specific security features to be incorporated in travel documents. Each issuing State has been free to incorporate such safeguards as it deems appropriate to protect its nationally issued travel documents against counterfeiting, forgery and other forms of attack, with the proviso that nothing be included which would adversely affect their OCR machine readability.

A.2.2 The growth in international crime and illegal immigration has led to increasing concerns over the security of travel documents and what may be done to help improve their resistance to attack or misuse. With this objective in mind, ICAO has decided that it would be desirable to publish a set of recommended minimum security standards as a guideline for all States issuing machine readable travel documents.

A.2.3 This annex identifies the security threats to which travel documents are frequently exposed and the counter-measures that may be employed to protect these documents and their associated personalization systems. The list of security features and/or techniques offering protection against these threats has been subdivided into: 1) basic security features and/or techniques that are considered essential; and 2) additional security features and/or techniques from which States are encouraged to select items that are recommended for providing an enhanced level of security. This approach recognizes that a feature or technique which may be necessary to protect one State's documents may be superfluous or of minor importance to another State using different production systems and vice versa. A targeted approach that allows States the flexibility to choose from different document systems (paper-based documents, plastic cards, etc.) and a combination of security features and/or techniques most appropriate to their particular needs is therefore preferred to a "one size fits all" philosophy. However, to help ensure that a balanced set of security features and/or techniques is chosen, it is necessary for each State to conduct a risk assessment of its national travel documents to identify their most vulnerable aspects and select the additional features and/or techniques that best address these specific problems.

A.2.4 The aim of the recommendations in this annex is to improve the security of machine readable travel documents worldwide by establishing a baseline for issuing States. Nothing within these recommendations shall

prevent or hinder States from implementing other, more advanced security features, at their discretion, to achieve a standard of security in excess of the minimum recommended features and techniques set forth in this annex.

A.2.5 A glossary of technical terms has been included at the end of this annex.

A.2.6 Table III-A1 provides a summary of typical security threats relating to travel documents and some of the security features and techniques that can help to protect against these threats.

### A.3 BASIC PRINCIPLES

A.3.1 Production of passport books and travel documents, including the personalization processes, should be undertaken in a secure, controlled environment with appropriate security measures in place to protect the premises against unauthorized access. If the personalization process is decentralized, or if personalization is carried out in a location geographically separated from where the travel document blanks are made, appropriate precautions should be taken when transporting the blank documents and any associated security materials to safeguard their security in transit.

A.3.2 There should be full accountability for all the security materials used in the production of good as well as spoiled travel documents and a full reconciliation at each stage of the production process with records maintained to account for all material usage. The audit trail should be to a sufficient level of detail to account for every unit of material used in the production of travel documents and should be independently audited by persons who are not directly involved in their production. Certified records should be kept of the destruction of all security waste material and spoiled documents.

A.3.3 Materials used in the production of travel documents should be of controlled varieties and obtained only from bona fide security materials suppliers. Materials restricted to high security applications should be used, and materials that are available to the public on the open market should be avoided.

A.3.4 Sole dependence upon the use of publicly available graphics design software packages for originating the security backgrounds should be avoided. These software packages may however be used in conjunction with specialist security design software.

A.3.5 Security features and/or techniques should be included in travel documents to protect against unauthorized reproduction, alteration and other forms of tampering, including the removal and substitution of pages in the passport book, especially the biographical data page. In addition to those features included to protect blank documents from counterfeiting and forgery, special attention must be given to protect the biographical data from removal or alteration. A travel document should include adequate security features and/or techniques to make evident any attempt to tamper with it.

A.3.6 The combination of security features, materials and techniques must be well chosen to ensure full compatibility and protection for the lifetime of the document.

A.3.7 Although this annex deals mainly with security features that help to protect travel documents from counterfeiting and fraudulent alteration, there is another class of security features that are covert (secret) features, designed to be authenticated either by forensic examination or by specialist verification equipment. It is evident that knowledge of the precise substance and structure of such features should be restricted to very few people on

a “need-to-know” basis. The purpose of these features is not to prevent counterfeiting but to enable authentication of documents where unequivocal proof of authenticity is a requirement (e.g. in a court of law). All travel documents should contain at least one covert security feature as a basic feature.

#### **A.4 MAIN THREATS TO THE SECURITY OF TRAVEL DOCUMENTS**

A.4.1 The following list of threats to document security, which is in no particular order of importance, identifies ways in which the document, its issuance and use may be fraudulently attacked:

- counterfeiting a complete travel document;
- photo substitution;
- deletion/alteration of text in the visual or machine readable zone of the biographical data page;
- construction of a fraudulent document, or parts thereof, using materials from legitimate documents;
- removal and substitution of entire page(s) or visas;
- deletion of entries on visa pages and the observations page;
- theft of genuine document blanks;
- impostors (assumed identity, altered appearance).

A.4.2 To provide protection against these threats and others, a travel document requires a range of security features and techniques combined in an appropriate way within the document. Although some features can offer protection against more than one type of threat, no single feature can offer protection against them all. Likewise, no security feature is 100 per cent effective in eliminating any one category of threat. The best protection is obtained from a balanced set of features and techniques providing multiple layers of security in the document, which combine to deter or defeat fraudulent attacks.

#### **A.5 SECURITY FEATURES AND TECHNIQUES**

In the sections that follow, security features, techniques and other security measures are categorized according to the phases passed through during the production and personalization processes and the components of the travel document created thereby with regard to: 1) substrate materials; 2) security printing; 3) protection against copying; and 4) personalization techniques. Issuing States are recommended to incorporate all of the basic security features/measures and to select a number of additional security features/measures from the list, having first completed a full risk assessment of their travel documents. Unless otherwise indicated, the security features may be assumed to apply to all parts of a travel document and to all the interior pages of a passport, comprising the biographical data page, end leaves and visa pages. Care must be taken to ensure that features do not interfere with the machine readability of the travel document.

### A.5.1 Substrate Materials

#### A.5.1.1 *Paper used for the pages of a travel document*

##### *Basic security features*

- UV dull paper, or a substrate with a controlled response to UV, such that when illuminated by UV light exhibits a fluorescence distinguishable in colour from the blue used in commonly available fluorescent materials;
- watermark comprising two or more grey levels in the biographical data page and visa pages;
- appropriate chemical sensitizers in the paper, at least for the biographical data page (if compatible with the personalization technique);
- paper with appropriate absorbency and roughness.

##### *Additional security features*

- watermark in register with printed design;
- invisible fluorescent fibres and/or planchettes;
- visible (fluorescent) fibres\* and/or planchettes\*;
- security thread (embedded or window)\*.

#### A.5.1.2 *Paper labels used for the biographical data page of a travel document*

##### *Basic security features*

- UV dull paper, or a substrate with a controlled response to UV, such that when illuminated by UV light exhibits a fluorescence distinguishable in colour from the blue used in commonly available fluorescent materials;
- appropriate chemical sensitizers in the paper;
- invisible fluorescent fibres and planchettes;
- visible (fluorescent) fibres\* and/or planchettes\*;
- a system of adhesives and/or other characteristics that prevents the label from being removed without causing clearly visible damage to the label and to any laminates or overlays used in conjunction with it\*.

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\* The use of these features must not interfere with machine readability of the document in the B900 band of the spectrum or with the legibility of the portrait, signature or other biographical data in the visual zone.



*Additional security features*

- security thread, which may either be embedded or partially embedded, and may include special effects such as thermochromic, photochromic or magnetic properties\*;
- a watermark need not be used in the paper of a data page produced in label form.

**A.5.1.3 Paper used for the inside cover of a passport book**

*Security aspects*

- Paper used to form the inside cover of a passport book need not have a watermark. However, if an inside cover is used as a biographical data page, alternative measures must be employed to achieve a significant level of security.
- Where an inside cover is used as a biographical data page and if compatible with the personalization technique, the paper forming the inside cover should contain appropriate chemical sensitizers.

**A.5.1.4 Plastic**

Where the substrate used for the biographical data page of a passport book or MRTD card is formed entirely of plastic, it is not usually possible to incorporate the security components described in A.5.1.1 through A.5.1.3. In such cases additional security properties shall be included, including additional security printed features, enhanced personalization techniques and/or the use of optically variable features over and above the recommendations contained in A.5.2 to A.5.5.4.

## **A.5.2 Security Printing**

**A.5.2.1 Background and text printing**

*Basic security features*

- two-colour guilloche security background design pattern\*\*;

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\* The use of these features must not interfere with machine readability of the document in the B900 band of the spectrum or with the legibility of the portrait, signature or other biographical data in the visual zone.

\*\* Where the guilloche pattern has been computer-generated, the image reproduced on the document must be such that no evidence of a pixel structure shall be detectable. Guilloches may be displayed as positive images, where the image lines appear printed with white spaces between them, or as negative images, where the image lines appear in white, with the spaces between them printed. A two-colour guilloche is a design that incorporates guilloche patterns created by superimposing two elements of the guilloche, reproduced in contrasting colours.

- rainbow printing;
- anti-scan pattern;
- microprinted text;
- security background of the biographical data page printed in a design which is different from that of the visa pages or other pages of the document.

*Additional security features*

- single or multi-colour intaglio printing comprising a “black-line white-line” design on one or more of the end leaves or visa pages;
- latent (intaglio) image;
- duplex security pattern;
- relief (three-dimensional) design feature;
- front-to-back (see-through) register feature;
- deliberate error (e.g. spelling) incorporated within microprinted text;
- every visa page printed with a different security background design;
- tactile feature.

**A.5.2.2 Inks**

*Basic security features*

- UV fluorescent ink (visible or invisible) on the biographical data page and all visa pages;
- reactive inks, where the substrate of the document pages or of a label is paper, at least for the biographical data page (if compatible with the personalization technique).

*Additional security features*

- inks with optically variable properties;
- metallic inks;
- penetrating numbering inks;

- metameric inks;
- infra-red drop-out inks;
- thermochromic inks;
- photochromic inks;
- infra-red fluorescent inks;
- phosphorescent inks;
- tagged inks.

#### A.5.2.3 *Numbering*

A number unique to the document should appear on all pages inside the passport, with the exception of the inside cover pages (unless used for biographical data), and on the biographical data face of an MRTD card or visa as follows:

- *Passport.* The number in a passport shall either be printed or perforated. When it is printed it should ideally be in a special style of figures or typeface and be printed with an ink that fluoresces under ultra violet light in addition to having a visible colour.
- *Label.* The number on a label used as a biographical data page in a passport, or as a visa, shall be in a special style of figures or typeface and be printed with an ink that fluoresces under ultra violet light in addition to having a visible colour.
- *Card.* The number on a card used for the biographical data of a passport or on an MRTD card can alternatively be incorporated using the same technique as is used for applying the biographical data.

#### A.5.2.4 *Special security measures*

- *Non-laminated biographical data pages.* If a label or a page of a passport is used for biographical data that is not protected by a laminate film or an overlay (see A.5.3.2, A.5.4.3 and A.5.4.4), additional protection shall be provided by the use of intaglio printing incorporating a latent image and microprinting and preferably utilizing a colour-shifting ink (e.g. ink with optically variable properties).
- *Plastic cards.* When a travel document is constructed entirely of plastic, optically variable security features shall be employed which give a changing appearance with angle of viewing. Such devices may take the form of latent images, lenticular features, colour-shifting ink or diffractive, optically variable image features.

### A.5.3 Protection against Copying

#### A.5.3.1 *Need for copy protection*

- The current state of development of generally available digital reproduction techniques and the resulting potential for fraud means that high-grade security features in the form of optically variable features or other equivalent devices will be required as safeguards against copying and scanning. Emphasis should be placed on the security of the biographical data page of a passport book, travel card or visa, based on an independent, complex, optically variable feature technology or other equivalent devices complementing other security techniques.
- Appropriate integration of optically variable feature components or other equivalent devices into the layered structure of the biographical data page should also protect the data from fraudulent alteration. The optically variable components and all associated security materials used to create the layered structure must also be protected against counterfeiting.

#### A.5.3.2 *Copy protection methods*

Subject to the minimum recommendations described in A.5.4.3 and A.5.4.4 on the need for lamination, optically variable features should be used on the biographical data page of a passport book, travel card or visa as a *basic feature* in the following circumstances:

- When a biographical data page of a passport book, travel card or visa is protected by a laminate film or overlay, an optically variable feature (preferably based on a diffractive structure) should be integrated into the page. Such a feature should not affect the legibility of the entered data.
- When the biographical data page is a paper label or a page in a passport with no overlay or laminate protection, an optically variable feature (preferably based on a diffractive structure) with intaglio overprinting or other printing technique shall be used.
- When the machine readable page of a passport book is made entirely of plastic, or when the travel document is itself a plastic card, an optically variable feature should be incorporated. The inclusion of a diffractive, optically variable feature is recommended to achieve an enhanced level of protection against reproduction.

Devices offering equivalent protection may be used in place of an optically variable feature.

### A.5.4 Personalization Techniques

#### A.5.4.1 *Document personalization*

This is the process by which the portrait, signature and/or other biographical data relating to the holder of the document are applied to the travel document. These data record the personalized details of the holder and are at the greatest risk of fraudulent alteration. One of the most frequent types of document fraud involves the removal

of the portrait image from a stolen or illegally obtained travel document and its replacement with the portrait of a different person. Documents with stick-in portrait photographs are particularly susceptible to photo substitution. Therefore, this method is not recommended.

#### A.5.4.2 *Protection against alteration*

To ensure that data are properly secured against attempts at forgery, it is necessary to integrate the biographical data, including the portrait (if included), signature (if it is included on the biographical data page) and main issue data into the basic material of the document. A variety of technologies are available for imaging the document in this way, including the following, which are listed in no particular order of importance:

- electro-photographic printing;
- thermal-transfer printing;
- ink-jet printing;
- photographic processes;
- laser engraving.

The same imaging technologies may also be used to apply data to the observations page of the passport.

#### A.5.4.3 *Choice of document system*

The choice of a particular technology is a matter for individual issuing States and will depend upon a number of factors, such as the volume of travel documents to be produced, the construction of the document and whether it is to be personalized during the document or passport bookmaking process or after the document or book has been assembled. Whichever method is chosen, it is essential that precautions be taken to protect the personalized details against tampering. This is important because, even though eliminating the stick-in portrait reduces the risk of photo substitution, the unprotected biographical data remain vulnerable to alteration and need to be protected, either by the application of a heat-sealed (or equivalent) laminate or by a heat-transferred, thin film overlay. Exceptionally, where the imaging technology and the substrate material have been specifically designed to provide equivalent or better protection against tampering (e.g. laser engraving onto plastic, ink-jet printing on security paper using an ink with a high resistance to removal by solvents and mechanical erasure), a laminate or overlay may be dispensed with, at the discretion of the issuing State, provided that this does not result in a reduction in overall security.

#### A.5.4.4 *Protection against photo substitution and alteration of data on the biographical data page of a passport book, travel card or visa*

##### *Basic security features*

- imaging the portrait and all biographical data by integration into the basic material;

- security background guilloche overlapping the portrait area;
- heat-sealed (or equivalent) laminate or overlay or an imaging technology and substrate material that provides an equivalent resistance to substitution of the portrait and other biographical data (e.g. laser engraved plastic, ink-jet printing on security paper).

#### *Additional security features*

- an optically variable feature superimposed on the portrait (but not rendering it illegible);
- digital signatures incorporated in the document;
- embedded images incorporated in the document;
- secondary portrait image of the holder;
- duplicate information in a machine readable form in one of the optional data capacity expansion technologies;
- machine verifiable biometric feature.

### **A.5.5 Additional Security Measures for Passport Books**

#### **A.5.5.1 *Position of the biographical data page***

In 1992, Interpol advised issuing States that the biographical data page should be on an inner page and not on the inside cover of a passport. This advice was primarily directed at passports with stick-in photographs, where the inside cover presents a much easier target for photo substitution than an inner page. However, in the intervening period, new methods of personalization have been introduced in which the biographical data are integrated into the basic material of the document, and the biographical data page is integrated in the passport book. These new technologies have reduced the risk of photo substitution, and for this reason several States have elected to continue using the inside cover after introducing new passport personalization technologies, sometimes in combination with thin film laminates or overlays. Therefore, States may elect to have their data page on either an inside page or an inside cover if this page is adequately protected from alteration and tampering.

#### **A.5.5.2 *Whole-page substitution***

Issuing States' attention is drawn to the fact, that with integrated biographical data pages replacing stick-in photographs in passports, some cases of whole-page substitution have been noted in which the entire biographical data page of the passport has been removed and substituted with a fraudulent one. Although whole-page substitution is generally more difficult to effect than photo substitution of a stick-in photo, nevertheless, it is important that the following recommendations be adopted to help in combatting this category of risk. As with all other categories of document fraud, it is better to employ a combination of security features to protect against whole-page substitution rather than relying on a single feature which, if compromised, could undermine the security of the whole travel document.

#### A.5.5.3 **Biographical data — whole-page substitution**

##### *Basic security features*

- thread sewing with back-sewn lock stitch or an alternative binding technique with equivalent resistance to unpicking;
- security background of the biographical data page printed in a design which is different from that of the visa pages.

##### *Additional security features*

- multi-colour and/or fluorescent sewing thread;
- biographical data page to be an integral, bound-in page of the passport book or an insert encapsulated between two bound-in sheets of laminate. Where self-adhesive labels are used for the biographical data page, additional security requirements as described in A.5.1.2 and A.5.2.4 are advised, including linking the label to the passport book by the passport number;
- programmable thread-sewing pattern.

#### A.5.5.4 **Visa page — whole-page substitution**

##### *Basic security feature*

- thread sewing with back-sewn lock stitch or an alternative binding technique with equivalent resistance to unpicking.

##### *Additional security features*

- page numbers integrated into security background design on every visa page;
- index or collation marks printed on the fore-edge of every visa page;
- passport serial number on every visa page (perforated or printed in a non-standard type font).

#### A.5.5.5 **Deletion of stamps and removal of labels from passports, including the removal of data from the observations page**

This section relates to the deletion of ink stamps and the removal of visa labels applied to the visa page of a passport book. This type of fraud may be carried out to remove evidence from a travel document or to transfer a visa label to another passport book.

*Basic security features*

- reactive inks;
- chemical sensitizers in the paper;
- high-tack, non-peelable adhesives (for labels);
- permanent, non-fading inks (for stamps).

*Additional security features*

- over-lamination or overlays on stamps and labels;
- visa-page paper with appropriate absorbency and surface characteristics;
- frangible substrate (for labels).

## **A.6 DOCUMENT ISSUANCE AND INSPECTION PROCEDURES**

This section relates to the processes whereby a State determines the entitlement of an individual to be issued a travel document and the immigration and border controls that are applied to check the document and validate the identity of the person presenting it. Although these are not strictly document security issues, they are fundamental to the overall security of the document system and so have been included for the sake of completeness. In Section 4 of this annex these threats are characterized as the threats posed by impostors. In this context, an impostor is a person who assumes a false identity to obtain a travel document in someone else's name or who uses another person's document and alters their own appearance in order to impersonate that other person. These are uniquely troublesome problems because both cases involve the fraudulent use of genuine documents rather than counterfeit or forged documents. Prevention and detection of this type of fraud can be difficult, requiring different security measures and checks than are used to protect and determine the authenticity of a document. The following security measures should be adopted:

*Basic security measures*

- original portrait photographs and all digitally captured portrait images to be true likenesses of the legitimate holder and the image to be of the appropriate dimensions as specified in Section III, 11;
- reproductions of the portrait and the holder's signature to be true likenesses of the original, and if the signature is reduced in scale to fit the size of the field on the biographical data page, the image so reproduced should be no less than 50 per cent of the original;
- training of border inspection officers in detection techniques;



- thorough checking and cross-referencing of supporting identity documents prior to issuing a travel document;
- maintenance of a database of all documents issued nationally along with search and match capability, where permitted by national legislation;
- maintenance of a database of all lost, stolen, defective or other security-sensitive documents or materials along with search and match capability.

*Additional security measures*

- inclusion of a machine verifiable biometric feature linking the document to its legitimate holder;
- bilateral and multi-lateral international agreements to share information on suspect travellers/ documents;
- full audit trail recording the document applicant's identity from "cradle to grave";
- records interrogation capability at "ports of entry" with access to application forms, photos and supporting identity documents, where permitted.

### **A.7 OTHER SECURITY-RELATED ISSUES**

In addition to the security features identified above, the following factors related to the production and configuration of the travel document also contribute to the overall security of the document. This section of the annex aims to give guidance to States on these issues.

#### **A.7.1 *Protection against theft and abuse of genuine document blanks or document components***

The most effective method of protecting against the illegal issue of stolen blank travel documents is to centralize the issuing procedure. Where travel documents continue to be issued on a regional or decentralized basis, appropriate security measures should be taken in terms of logistics, administration and personalization techniques. This applies particularly to the storage of blank documents and the means of personalization (e.g. access to personalization systems). Blank documents should be stored in locked and appropriately supervised premises. The following security measures should be adopted:

*Basic security measures*

- good physical security of the premises with controlled access to delivery/shipment and production areas, document storage facilities and personalization equipment;
- full audit trail, with counting and reconciliation of all materials (used, unused, defective or spoiled) and certified records of same;

- all document blanks and other security-sensitive components serially numbered with a full audit trail for every document from manufacture to dispatch;
- where applicable, tracking and control numbers of other principal document components (e.g. rolls or sheets of laminates, optically variable feature devices);
- secure transport vehicles for movement of blank passports and other principal document components (if applicable);
- details of all lost and stolen travel document blanks to be rapidly circulated between governments;
- appropriate controls to be in place to protect the production, personalization and issuance systems from internal fraud.

#### *Additional security measures*

- closed-circuit television (CCTV) coverage/recording of all production areas, where permitted;
- centralized production, personalization and issuance of documents;
- the use of computerized systems to authenticate document issue, for example by affixing digital security devices (the “electronic seal”, e.g. digital signature or embedded image).

#### **A.7.2 Internal security of the issuance process**

Appropriate controls must be in place to protect the internal security of the issuance process to prevent fraudulent use of the system by employees and other persons who may obtain access to all or any part of the official issuance system.

#### *Basic security features*

- the handling and storage of application data and forms should be done using relevant security arrangements so that the integrity of the data can be guaranteed through the issuance process and to ensure any archived/stored information cannot be changed;
- if possible, when making the issuance decisions, the relevant national/municipal registers and databases should be deployed for proper identification;
- the issuance process should be organized in such a manner that no one individual can authorize the issuance of, personalize and issue a travel document;
- there should be a complete audit trail of the entire issuance and personalization processes and when handling forms and user data, or making database transactions, the person(s) carrying out these operations should sign or identify themselves to link them with the action;
- the integrity of audit trail data should be protected through proper means (user rights/encryption, etc.).

*Additional security features*

- strict control of the issuance of personalized travel documents to applicants with proper identification of applicants both when they apply for and when they receive travel documents;
- control of the staffing arrangements to reduce the possibility of fraud through complicity of employees in the application and document handling processes;
- centralization of the personalization processes.

**A.7.3 Quality control**

Quality checks and controls at all stages of the production process and from one batch to the next are essential to maintain consistency in the finished travel document. This should include quality assurance checks on all materials used in the manufacture of the documents and the readability of the machine readable lines. The importance of consistency in the finished travel document is paramount because immigration inspectors and border control officers rely upon being able to recognize fake documents from variations in their appearance or characteristics. If there are variations in the quality, appearance or characteristics of a State's genuine travel documents, detection of counterfeit or forged documents is made more difficult.

**Table III-A1. Summary of security recommendations**

<i>Threats</i>	<i>Basic security features</i>	<i>Additional security features</i>
<b>Counterfeiting</b>		
Paper substrates (A.5.1.1)	<ul style="list-style-type: none"> <li>– controlled UV response</li> <li>– two-tone watermark</li> <li>– chemical sensitizers</li> <li>– appropriate absorbency and surface characteristics</li> </ul>	<ul style="list-style-type: none"> <li>– registered watermark</li> <li>– invisible UV fibres/planchettes</li> <li>– visible UV fibres/planchettes</li> <li>– embedded or window thread</li> </ul>
Label substrates (A.5.1.2)	<ul style="list-style-type: none"> <li>– controlled UV response</li> <li>– chemical sensitizers</li> <li>– invisible UV fibres/planchettes</li> <li>– visible UV fibres/planchettes</li> <li>– non-peelable adhesive</li> </ul>	<ul style="list-style-type: none"> <li>– embedded or window thread</li> </ul>
Plastic/synthetic substrates (A.5.1.4)	<ul style="list-style-type: none"> <li>– as per paper or substitute</li> <li>– security features providing an equivalent level of security in plastic</li> </ul>	<ul style="list-style-type: none"> <li>– optically variable feature (OVF)</li> </ul>

<i>Threats</i>	<i>Basic security features</i>	<i>Additional security features</i>
Security printing (A.5.2)	<ul style="list-style-type: none"> <li>– two-colour guilloche background</li> <li>– rainbow printing</li> <li>– anti-scan pattern</li> <li>– microprinting</li> <li>– unique biodata page design</li> </ul>	<ul style="list-style-type: none"> <li>– intaglio printing</li> <li>– latent image</li> <li>– duplex pattern</li> <li>– three-dimensional design feature</li> <li>– front-to-back register feature</li> <li>– deliberate error in microprint</li> <li>– unique design on every page</li> <li>– tactile feature</li> </ul>
Numbering (A.5.2.3)	<ul style="list-style-type: none"> <li>– unique document number</li> </ul>	<ul style="list-style-type: none"> <li>– perforated document number</li> <li>– special type fonts</li> </ul>
Inks (A.5.2.2)	<ul style="list-style-type: none"> <li>– UV inks on all pages</li> <li>– reactive inks</li> </ul>	<ul style="list-style-type: none"> <li>– optically variable properties</li> <li>– metallic inks</li> <li>– penetrating numbering ink</li> <li>– metameric inks</li> <li>– infra-red dropout ink</li> <li>– thermochromic ink</li> <li>– photochromic ink</li> <li>– infra-red fluorescent ink</li> <li>– phosphorescent ink</li> <li>– tagged ink</li> </ul>
Photo substitution (A.5.4.4)	<ul style="list-style-type: none"> <li>– integrated biodata page</li> <li>– guilloche overlapping portrait</li> <li>– secure laminate or equivalent</li> </ul>	<ul style="list-style-type: none"> <li>– OVF over the portrait</li> <li>– digital signature in document</li> <li>– embedded image</li> <li>– secondary portrait image</li> <li>– storage and retrieval system for digital portrait images</li> <li>– biometric feature</li> </ul>
Alteration of the biodata (A.5.4.4)	<ul style="list-style-type: none"> <li>– reactive inks</li> <li>– secure laminate or equivalent</li> </ul>	<ul style="list-style-type: none"> <li>– chemical sensitizers in substrate</li> <li>– secondary biodata image</li> <li>– OVF over the biodata</li> </ul>
Page substitution (A.5.5.3 and A.5.5.4)	<ul style="list-style-type: none"> <li>– lock stitch or equivalent</li> <li>– unique biodata page design</li> </ul>	<ul style="list-style-type: none"> <li>– programmable sewing pattern</li> <li>– fluorescent sewing thread</li> <li>– serial number on every page</li> <li>– page folio numbers in guilloche</li> <li>– index marks on every page</li> <li>– biodata on inside page</li> </ul>
Deletion/removal of stamps and labels (A.5.5.5)	<ul style="list-style-type: none"> <li>– reactive inks</li> <li>– chemical sensitizers</li> <li>– high-tack adhesives (labels)</li> <li>– permanent inks (stamps)</li> </ul>	<ul style="list-style-type: none"> <li>– over-lamination</li> <li>– high absorbency substrates</li> <li>– frangible substrate (labels)</li> </ul>

<i>Threats</i>	<i>Basic security features</i>	<i>Additional security features</i>
Falsely obtained documents (A.6)	<ul style="list-style-type: none"> <li>– good quality captured images</li> <li>– good quality reproduction images</li> <li>– training of inspection staff</li> <li>– checks of supporting ID documents</li> <li>– records search capability</li> <li>– register of lost and stolen documents</li> </ul>	<ul style="list-style-type: none"> <li>– biometric identifier</li> <li>– international cooperation</li> <li>– audit trail for identity checks</li> <li>– records interrogation system</li> <li>– national ID database</li> </ul>
Document theft (A.7.1 and A.7.2)	<ul style="list-style-type: none"> <li>– good physical security arrangements</li> <li>– control of all security components</li> <li>– serial numbers on blank documents</li> <li>– secure transport of blank documents</li> <li>– internal fraud protection system</li> <li>– international exchange on lost and stolen documents</li> </ul>	<ul style="list-style-type: none"> <li>– CCTV in production areas</li> <li>– centralized production</li> <li>– digital signature</li> <li>– embedded image</li> </ul>

## NOTES:

1. Issuing States and organizations are recommended to include all of the basic security features and to select from the additional security features those that are best suited to their particular documents and issuing systems after conducting an assessment of the risks to which their documents are most susceptible.
2. The descriptions in Table III-A1 are necessarily abbreviated from the main text. For ease of reference the relevant sections of the annex are referenced by the paragraph numbers in parentheses in the “threats” column of the table.
3. Certain of the features are repeated one or more times in the table. This indicates that the particular feature protects against more than one type of threat. It is only necessary to include these features once within any particular document.

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## Glossary of Terms

The glossary of terms in this document is included to assist the reader with understanding the general meanings of such terms within the context of this document. This glossary is not intended to be authoritative or definitive.

**Anti-scan pattern.** An image usually constructed of fine lines at varying angular displacement and embedded in the security background design. When viewed normally, the image cannot be distinguished from the remainder of the background security print, but when the original is scanned or photocopied the embedded image becomes visible.

**Biographical data (biodata).** The personalized details of the bearer of the document appearing as text in the visual and machine readable zones on the biographical data page of a passport book or on a travel card or visa.

**Black-line white-line design.** A design made up of fine lines often in the form of a guilloche pattern and sometimes used as a border to a security document. The pattern migrates from a positive to a negative image as it progresses across the page.

**Chemical sensitizers.** Security reagents to guard against attempts at tampering by chemical erasure, such that irreversible colours develop when bleach and solvents come into contact with the document.

**Counterfeit.** An unauthorized copy or reproduction of a genuine security document made by whatever means.

**Document blanks.** A document blank is a travel document that does not contain the biographical data and personalized details of a document holder. Typically, document blanks are the base stock from which personalized travel documents are created.

**Digital signature.** A method of securing and validating information by electronic means.

**Duplex design.** A design made up of an interlocking pattern of small irregular shapes, printed in two or more colours and requiring very close register printing in order to preserve the integrity of the image.

**Embedded image.** An image or information encoded or concealed within a primary visual image.

**Fibres.** Small, thread-like particles embedded in a substrate during manufacture.

**Fluorescent ink.** Ink containing material that glows when exposed to light at a specific wavelength (usually UV) and that, unlike phosphorescent material ceases to glow immediately after the illuminating light source has been extinguished.

**Forgery.** Fraudulent alteration of any part of the genuine document, e.g. changes to the biographical data or the portrait.

**Front-to-back (see-through) register.** A design printed on both sides of the document or an inner page of the document which, when the page is viewed by transmitted light, forms an interlocking image.

**Guilloche design.** A pattern of continuous fine lines, usually computer generated, and forming a unique image that can only be accurately re-originated by access to the equipment, software and parameters used in creating the original design.

**Heat-sealed laminate.** A laminate designed to be bonded to the biographical data page of a passport book, or to a travel card or visa, by the application of heat and pressure.

**Impostor.** A person who applies for and obtains a document by assuming a false name and identity, or a person who alters his or her physical appearance to represent himself or herself as another person for the purpose of using that person's document.

**Infra-red drop-out ink.** An ink that forms a visible image when illuminated with light in the visible part of the spectrum and which cannot be detected in the infra-red region.

**Laminate.** A clear material, which may have security features such as optically variable properties, designed to be securely bonded to the biographical data or other page of the document.

**Laser engraving.** A process whereby images (usually personalized images) are created by "burning" them into the substrate with a laser. The images may consist of both text, portraits and other security features and are of machine readable quality.

**Laser-perforation.** A process whereby images (usually personalized images) are created by perforating the substrate with a laser. The images may consist of both text and portrait images and appear as positive images when viewed in reflected light and as negative images when viewed in transmitted light.

**Latent image.** A hidden image formed within a relief image which is composed of line structures which vary in direction and profile resulting in the hidden image appearing at predetermined viewing angles, most commonly achieved by intaglio printing.

**Machine-verifiable biometrics feature.** A unique physical personal identification feature (e.g. an iris pattern, fingerprint or facial characteristics) stored on a travel document in a form that can be read and verified by machine.

**Metallic ink.** Ink exhibiting a metallic-like appearance.

**Metameric inks.** A pair of inks formulated to appear to be the same colour when viewed under specified conditions, normally daylight illumination, but which are a mismatch at other wavelengths.

**Micro-printed text.** Very small text printed in positive and/or negative form, which can only be read with the aid of a magnifying glass.

**Optically variable feature (OVF).** An image or feature whose appearance in colour and/or design changes depending upon the angle of viewing or illumination. Examples are: features including diffraction structures with high resolution (diffractive optically variable image device (DOVID)), holograms, colour shifting inks (e.g. ink with optically variable properties) and other diffractive or reflective materials.



**Optional data capacity expansion technologies.** Data storage devices (two-dimensional bar codes, integrated circuit chips, etc.) that may be added to a travel document to increase the amount of machine-readable data stored in the document.

**Overlay.** An ultra-thin film or protective coating that may be applied to the surface of a biographical data or other page of a document in place of a laminate.

**Penetrating numbering ink.** Ink containing a component that penetrates deep into a substrate.

**Personalization.** The process by which the portrait, signature and biographical data are applied to the document.

**Phosphorescent ink.** Ink containing a pigment that glows when exposed to light of a specific wavelength, the reactive glow remaining visible and then decaying after the light source is removed.

**Photochromic ink.** An ink that undergoes a reversible colour change when exposed to UV light.

**Photo substitution.** A type of forgery in which the portrait in a document is substituted for a different one after the document has been issued.

**Physical security.** The range of security measures applied within the production environment to prevent theft and unauthorized access to the process.

**Planchettes.** Small visible (fluorescent) or invisible platelets incorporated into a document material at the time of its manufacture.

**Rainbow (split-duct) printing.** A technique whereby two or more colours of ink are printed simultaneously by the same unit on a press to create a controlled merging of the colours similar to the effect seen in a rainbow.

**Reactive inks.** Inks that contain security reagents to guard against attempts at tampering by chemical erasure (deletion), such that a detectable reaction occurs when bleach and solvents come into contact with the document.

**Relief (three-dimensional) design (Medallion).** A security background design incorporating an image generated in such a way as to create the illusion that it is embossed or debossed on the substrate surface.

**Secondary image.** A repeat image of the holder's portrait reproduced elsewhere in the document by whatever means.

**Security thread.** A thin strip of plastic or other material embedded or partially embedded in the substrate during the paper manufacturing process. The strip may be metallized or partially de-metallized.

**Tactile feature.** A surface feature giving a distinctive "feel" to the document.

**Tagged ink.** Inks containing compounds that are not naturally occurring substances and which can be detected using special equipment.

**Thermochromic ink.** An ink that undergoes a reversible colour change when the printed image is exposed to heat (e.g. body heat).

**UV.** Ultra violet light.

**UV dull substrate.** A substrate that exhibits no visibly detectable fluorescence when illuminated with UV light.

**Variable laser image.** A feature generated by laser engraving or laser perforation displaying changing information or images depending upon the viewing angle.

**Watermark.** A custom design, typically containing tonal gradation, formed in the paper or other substrate during its manufacture that is created by the displacement of materials therein and is traditionally viewable by transmitted light.

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## IV. TECHNICAL SPECIFICATIONS FOR FORMAT-A MACHINE READABLE VISAS (MRV-A)

### Scope

1. This section defines those specifications which are unique to Format-A machine readable visas (MRV-A) and are necessary for global interoperability. Section IV should be read in conjunction with Section III which defines those specifications for the MRV that are common to all machine readable travel documents (MRTDs). Specifications are included for the discretionary expansion of the machine readable data capacity of the MRV beyond that defined for global interchange, as well as for machine-assisted identity confirmation of the rightful holder, and security features. The Format-A visa (MRV-A) is suitable for use by States who wish to have maximum space available to accommodate their data requirements and who do not need to maintain a clear area on the passport visa page adjacent to the visa.

### Dimensions and placement of the MRV-A

2. The dimensions and placement of the MRV-A shall be as follows:

2.1 *MRV-A nominal dimensions.* The nominal dimensions of the MRV-A shall be as follows:

80.0 mm × 120.0 mm (3.15 in × 4.72 in)

2.2 *MRV-A margins.* The dimensional specifications refer to the outer limits of the MRV-A. A margin of 2.0 mm (0.08 in) along each outer edge, with the exception of the header zone, must be left clear of data.

2.3 *MRV-A edge tolerances.* The edges of the MRV-A shall be within the area circumscribed by the following concentric rectangles as illustrated in Figure IV-1.

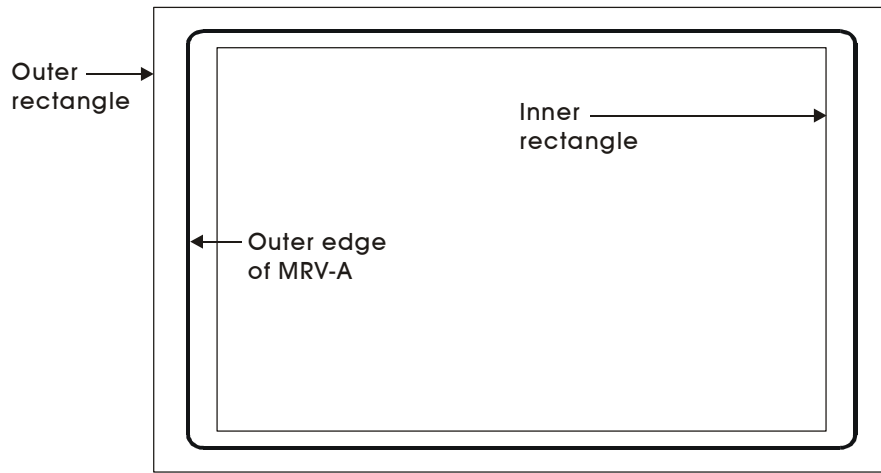
*Inner rectangle:* 79.0 mm × 119.0 mm (3.11 in × 4.69 in)

*Outer rectangle:* 81.0 mm × 121.0 mm (3.19 in × 4.76 in)

2.4 *MRV-A thickness.* If the visa is issued as a label, the increase in thickness once the label is attached to the passport visa page shall not exceed 0.19 mm (0.0075 in). The thickness of the area within the machine readable zone (MRZ) shall not vary by more than 0.05 mm (0.002 in). If a protective laminate is used, it is recommended that its thickness not exceed 0.15 mm (0.006 in).

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*General note.— The decimal notation used in these specifications conforms to ICAO practice. The ISO practice is to use a decimal point (.) in imperial measurements and a comma (,) in metric measurements.*



Not to scale

**Figure IV-1. MRV-A dimensional illustration**

2.5 *Placement of the MRV-A.* The MRV-A shall be positioned as follows:

2.5.1 The MRV-A shall be located on the passport visa page such that the MRZ is coincident with and parallel to the outside edge (*reference edge*) of the passport visa page, and the left edge of the MRV-A is coincident with and parallel to the left edge of the passport visa page as defined in Appendix 7.

2.5.2 The MRZ shall be located such that the two OCR lines contained therein are within the Effective Reading Zone (ERZ) as defined in Appendix 4 of Section III.

2.5.3 Only one MRV-A shall be located on a passport visa page (see Appendix 7).

### **General layout of the MRV-A**

3. The MRV-A follows a standardized layout to facilitate reading of data globally, by visual and machine readable means, to accommodate the various requirements of States' laws and practices and to achieve the maximum standardization within those divergent requirements.

3.1 The standard layout incorporates space for a portrait and other identification feature(s). The inclusion of a portrait on a visa is strongly recommended in the interests of security, but States who are not yet able to apply portraits may fill this space with, for example, a national crest.

3.2 An MRV-A is divided into six zones as follows:

- Zone I Mandatory header
- Zone II Mandatory and optional personal data elements

Zone III	Mandatory and optional document data elements
Zone IV	Signature (original or reproduction) or authentication
Zone V	Mandatory zone for identification feature (feature optional)
Zone VII	Mandatory machine readable zone (MRZ)

- Notes.—*
1. *The signature in Zone IV of a visa is that of an issuing officer, not of the document holder. The signature may be replaced or accompanied by an official stamp.*
  2. *To facilitate inspection of visas at immigration, the layout of the visa presents Zone III above Zone II.*
  3. *Zone VI is not available on an MRV issued in the form of a label.*
  4. *Zones I - V constitute the Visual Inspection Zone (VIZ).*

3.3. *MRV-A zones.* Zones I and VII are mandatory. Certain data in Zones II and III are also mandatory. The mandatory components of these four Zones represent the minimum data requirements for an MRV-A. The optional data elements in Zones II, III and V and in optional Zone IV may be elected to accommodate the diverse requirements of States, while achieving the desired level of standardization. The data elements which may be included in the various zones and their order are set out in Appendix 1. Appendices 2 and 3 illustrate the dimensional specifications and tolerances for the layout of the MRV-A and the technical specifications for the printing of data elements within the zones. Appendix 3 outlines the guidelines for positioning and adjusting the dimensional specifications of Zones I to V to accommodate the flexibility desired by issuing States *and should be read in conjunction with paragraph 4 of this Section*. Examples of personalized MRV-As are shown in Appendix 5. Appendix 6 illustrates the format for the presentation of the machine readable data in Zone VII.

#### **Content, use and dimensional flexibility of zones**

4. The data elements to be included in the zones and the treatment of the zones and guidelines for the dimensional layout of zones shall be as described hereunder.

4.1 Zone I identifies the issuing State and the type of document. These elements are mandatory. The order of the data elements in this zone is left to the discretion of the issuing State.

4.2 To facilitate the checking of visas by airline personnel and control authorities, the essential details of the visa document shall be entered in a standard sequence in Zone III while essential personal details of the holder shall be entered in a standard sequence in Zone II. On a visa, Zone III appears above Zone II.

4.3 Zone IV provides space for an optional signature or authentication. This is normally the signature of the issuing officer or an official stamp. The application of an official stamp elsewhere on the document is not precluded except that it must not intrude into the MRZ or affect the legibility of entered data.

4.4 Zone VII conforms in height to the MRZ defined for all MRTDs so that the machine readable data lines fall within the ERZ specified in Appendix 4, Section III, thus allowing a single reader to be used for all types and sizes of MRTDs.

4.5 All MRZ data elements are mandatory and shall be shown as defined in 6.5 and 6.6 even though an issuing State may choose not to include a specific MRZ data element in the VIZ.

#### 4.6 *Dimensional flexibility of Zones I to V*

4.6.1 Zones I to V may be adjusted in size and shape within the overall dimensional specifications of the MRV-A to accommodate the diverse requirements of issuing States. All zones, however, shall be bounded by straight lines, and all angles where straight lines join shall be right angles (i.e. 90 degrees). It is recommended that the zone boundaries not be printed on the MRV-A. The nominal position of the zones is shown in Appendix 3 to this section.

4.6.2 When an issuing State chooses to produce an MRV-A as a securely attached card containing a transparent or otherwise unprintable border around the card, the available area within the zones will be reduced. The full MRV-A dimensions and zone boundaries shall be measured from the outside edge of this border, which is the external edge of the MRV-A.

4.6.3 Zone I shall be adjacent and parallel to the top edge of the MRV-A and extend across the full 120.0 mm  $\pm$  1.0 mm (4.72 in  $\pm$  0.04 in) dimension. The issuing State may vary the *vertical* dimension of Zone I, as required, but this dimension shall be sufficient to allow legibility of the data elements in the zone, and the height shall not be greater than 12.0 mm (0.47 in) as defined in Appendix 3 to this section.

4.6.4 Zone V shall be located such that its left edge is coincident with the left edge of the MRV-A, as defined in Appendix 3 to this section. Zone V may vary in size but any variation from the nominal dimensions shall not exceed the tolerances specified in Appendix 3.

4.6.5 Zone V may move *vertically* along the left edge of the MRV-A and overlay a portion of Zone I as long as individual details contained in either zone are not obscured. Zone V may, as a result, have its *lower external boundary* coincident with the top edge of the MRZ of the MRV-A and its *upper external boundary* coincident with the top edge of the MRV-A.

4.6.6 The upper boundary of Zone III shall be coincident with the lower boundary of Zone I.

4.6.7 Zone III may extend to the full width of that portion of the MRV-A to the right of Zone V.

4.6.8 The lower boundary of Zone III (see Appendix 3) may be positioned at the discretion of the issuing State. Enough space shall be left for Zone II and Zone IV (when used) below the boundary.

4.6.9 Normally, the upper boundary of Zone II should be coincident with the lower boundary of Zone III. The boundary does not have to be straight across the 120.0 mm  $\pm$  1.0 mm (4.72 in  $\pm$  0.04 in) dimension of the visa. Zone II may also overlay a portion of Zone V for the MRV-A if required. When this occurs, issuing States shall ensure that data contained in either zone are not obscured. See Appendix 5.

4.6.10 Zone IV, when included on the MRV-A, shall be entered on the right hand side of the visa immediately above but not intruding into the MRZ. See Appendix 4.

### Detailed layout

5. *Visual inspection zone (VIZ) (Zones I-IV (Layout 1) or V (Layout 2)).* All data in the VIZ shall be clearly legible.

5.1 *Languages/characters.* These specifications provide for entered data in the VIZ to appear in Latin alphabet characters and Arabic numerals, i.e. 1234567890 (see Section III, 6.4). When the mandatory elements of Zones I, II and III are in a national language that does not use the Latin alphabet, a transliteration shall also be provided in the case of the name of the holder. States that use other than Arabic numerals to represent numerical data in the VIZ shall provide a translation into Arabic numerals. In the case of the name of the issuing State, or place of issue, the representation in the original language shall be accompanied by a translation of the name into English, French or Spanish, when the translated name is more familiar to the international community. Optional data elements should be entered in both the national language and one of the English, French or Spanish languages, if space permits.

5.2 *Fields.* Captions shall be used to identify all fields for mandatory data elements in the VIZ, except as specified in the directory below, and may be in the language of the issuing State. If the language of the issuing State used for captions is other than English, French or Spanish, one of these three languages should also be used, and the corresponding text should be presented in italics. The use of captions for fields in the optional zones is at the discretion of the issuing State.

5.2.1 *Unused fields.* When a field is not used, the caption shall not be entered in the MRV-A.

5.3 *Print spacing.* The design of the MRV-A in Zones II and III is based on a vertical line spacing of a maximum of 8 lines per 25.4 mm (1.0 in) and a horizontal printing density of a maximum of 15 characters per 25.4 mm (1.0 in) (see Section III, 6.3). This spacing has been chosen as the smallest in which information is clear and legible. If any optional field or data element is not used, the entered data may be spread out in the VIZ of the MRV-A consistent with the requirement for sequencing zones and data elements. This horizontal printing density and the font and the vertical line spacing may be adjusted at the discretion of each State, provided that in the VIZ all data shall be printed in a size such that they can be easily read and assimilated by a person with normal eyesight. Typical configurations are shown in Appendices 4 and 5. Zone VII, the mandatory MRZ, shall be printed with a line spacing as defined in Appendix 2 and a horizontal printing density of 10 characters per 25.4 mm (1.0 in).

5.4 *Data element directory.* The data elements in the VIZ are specified as follows.

### Visual inspection zone — Data element directory

<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
01/I	Issuing State	The State responsible for issuing the MRV-A. This should be printed, the type font being selected at the discretion of the issuing State. A translation of the name into one or more languages, one of which should be English, French or Spanish, should be given when the translated name is more familiar to the international community.	Variable	Notes a, c, d, e, i
02/I	Document	The word or words in the language of the issuing State for the document (visa or other appropriate document) which confers on the holder that State's authority to travel to a port of entry in its territory.	Variable	Notes a, c, d, e, i
03/III	Place of issue	Post/location (usually a city) where the MRV-A is issued. A translation of the name into one or more languages, one of which should be English, French or Spanish, should be given when the translated name is more familiar to the international community.	15	Notes a, b, c, i, k
04/III	Valid from (date)	In most cases this will be the date of issue of the MRV-A and indicates the first date from which the MRV-A can be used to seek entry. For some States the date of issue and the date the visa becomes valid may differ. In such cases the latter shall be indicated in this field and the date of issue may be shown in Field 09 (see below).	8	10; Notes a, b, c, i, k
05/III	Valid until (date)	In most cases this will be the date of expiry of the MRV-A and indicates the last day on which the MRV-A can be used to seek entry. For some States this will be the date by or on which the holder should have left the country concerned.	8	10; Notes a, b, c, i, k
06/III	Number of entries	The number of entries for which the visa is valid.	8	Notes a, b, c, i, k
07/III	Document number	The number given to the visa by the issuing State.	13	Notes a, b, c, i, j, k
08/III	Type/class/ category	This field shall include one or more of the following elements: <ul style="list-style-type: none"> <li>— the issuing State's indication of the type and/or class of visa granted in accordance with the law/practice of that State;</li> <li>— the broad categorization of the type of visa granted, e.g. visitor/resident/temporary resident/student/diplomat, etc., in accordance with the law/practice of the issuing State;</li> <li>— any limitations on the territorial validity of the visa.</li> </ul>	46	Notes a, b, c, i, k

\* Notes can be found following 6.6.



<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
09/III	Additional information	This field may include necessary endorsements as to entitlements which attach to the visa. The issuing State may also use this field to include a) the maximum authorized duration of stay; b) conditions related to the granting of the visa; c) date of issue if different from "Valid from" date; and d) record of any fees paid.		Note g
10,11/II	Name	<p>The full name of the holder, as identified by the issuing State. The name shall be divided, where possible, by the issuing State into two parts, the first representing that portion of the name that the issuing State defines as the "primary identifier" for the holder (e.g. surname, maiden name plus married name, family name) and the second representing all remaining components (e.g. given names, initials) of the holder's name and which the issuing State considers as collectively representing a "secondary identifier". The two parts, i.e. primary and secondary identifiers, once integrated, constitute the name of the visa holder.</p> <p>Where the issuing State determines that the holder's name cannot be divided into the two parts, as defined above, the full name of the holder shall be defined as the primary identifier.</p>	Variable	Section III, 6 & 9 Notes a, c, i
10/II	Primary identifier	Predominant component(s) of the name of the holder as described above. In cases where the predominant component(s) of the name of the holder (e.g. where this consists of composite names) cannot be shown in full or in the same order, owing to space limitations of field(s) 10 and/or 11 or national practice, the most important component(s) (as determined by the State) of the primary identifier shall be inserted.	Variable	Section III, 6 & 9 Notes a, c, i, k
11/II	Secondary identifier	Secondary component(s) of the name of the holder, as described above. The most important component(s) (as determined by the State) of the secondary identifier of the holder shall be inserted in full, up to the maximum dimensions of the field frame. Other components, where necessary, may be represented by initials. Where the holder's name has only predominant component(s), this data field shall be left blank. A State may optionally utilize the whole zone comprising fields 10 and 11 as a single field. In such a case the primary identifier shall be placed first, followed by a comma and a space, followed by the secondary identifier.	Variable	Section III, 6 & 9 Notes a, c, i
12/II (optional field)	Passport number	The number of the passport or other travel document in which the MRV-A is placed.	Variable	Notes a, b, c, g, i, j

\* Notes can be found following 6.6.

<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
13/II (optional field)	Sex	Sex of MRV-A holder, when included, is to be specified by use of the single initial commonly used in the language of the State of issue. If translation into English, French or Spanish is necessary, followed by a dash and the capital letter F for female, M for male, or X for unspecified.	3	Note a, f, g
14/II (optional field)	Date of birth	Holder's date of birth as recorded by issuing State. For unknown dates see 10.1.6.	9	10; Notes a, b, c, k
15/II (optional field)	Nationality	Nationality of the holder as recorded by the issuing State, in accordance with the codes in Appendix 1 to Section III.	3 Fixed	Notes a, h, k
16/IV (optional field and zone)	Signature or other authorization	An authorization which may be the signature of an issuing official and/or an official stamp.		
17/V	Identification feature	This field shall be entered on the document and should contain a portrait of the holder. If included, the portrait shall have a nominal size of 36.0 mm × 29.0 mm (1.42 in × 1.14 in)  At the option of the issuing State, this field may contain another biometric identifier or security feature(s) provided this does not obscure the portrait.  If a State does not place an identification feature in this field, a national symbol or logo may be inserted instead.  See Section III, 11.1 for additional specifications for the portrait.		

\* Notes can be found following 6.6.

## 6. *Machine readable zone (MRZ) (Mandatory Zone VII)*

6.1 *MRZ position.* The MRZ is located at the bottom of the MRV-A. Appendix 2 shows the nominal position of the data in the MRZ.

6.2 *Data elements.* The data elements corresponding to Fields 01, 05, 10, 11, and 13 to 15 of the VIZ are mandatory in the MRZ and shall be printed in machine readable form, in the MRZ, beginning with the leftmost character position in each field in the sequence indicated in the data structure specifications shown below. Appendix 6 indicates the structure of the MRZ.

6.3 *Print specifications.* Machine readable data shall be printed in OCR-B type font, size 1, constant stroke width, as specified in Section III, 7.4.4. The MRZ shall be printed with the line spacing as defined in Appendix 2 to this section and a horizontal printing density of 10 characters per 25.4 mm (1.0 in).

6.4 *Print position.* The position of the left-hand edge of the first character shall be 4.0 mm  $\pm$  1.0 mm (0.16 in  $\pm$  0.04 in) from the left-hand edge of the document. Reference centre lines for the two OCR lines and a nominal starting position for the first character of each line are shown in Appendix 2 to this section. The positioning of the characters is indicated by those reference lines and by the printing zones of the two code lines in Appendix 2 to this section.

### Data structure of machine readable data for the MRV-A

#### 6.5 Data structure of the upper machine readable line

MRZ field character positions (line 1)	Field no. in VIZ	Data element	Specifications	Number of characters	References and notes*
1 to 2		Type of document	Capital letter V to designate a machine readable visa. One additional character may be used, at the discretion of the issuing State, to designate a particular type of visa. If the second character position is not used for this purpose, it shall be filled by the filler character (<).	2	Notes a, b, c, e
3 to 5	1	Issuing State	The three-letter code specified in Section III, Appendix 1 shall be used. If the code contains fewer than 3 characters, filler character(s) shall be inserted in the unused position(s).	3	Section III, Appendix 1; Notes a, c, e
6 to 44	10, 11	Name	The name consists of primary and secondary identifiers which shall be separated by two filler characters (<<). Components within the primary or secondary identifiers shall be separated by a single filler character (<).  When the name of the document holder has only one part, it shall be placed first in the character positions for the primary identifier, and filler characters (<) shall be used to complete the unused character positions of the line.	39 [Primary identifier(s), Secondary identifier(s) and fillers]	Section III, 10.1 to 10.10; Notes a, c, e
		Punctuation in the name	Representation of punctuation is not permitted in the MRZ.		Section III, 10.9
		Apostrophes in the name	Components of the primary or secondary identifiers separated by apostrophes shall be combined, and no filler character (<) shall be inserted. <i>Example:</i> VIZ: D'ARTAGNAN MRZ: DARTAGNAN		Section III, 10.9

<i>MRZ field character positions (line 1)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
		Hyphens in the name	Hyphens (-) in the name shall be converted to the filler character (<) (i.e. hyphenated names shall be represented as separate components). <i>Example:</i> VIZ: Marie-Elise MRZ: M A R I E < E L I S E		Section III, 10.9
		Commas	When a comma is used in the VIZ to separate the primary and secondary identifiers, the comma shall be omitted in the MRZ and the primary and secondary identifiers shall be separated by two filler characters (<<).  When a comma is used in the VIZ to separate two name components, it shall be represented in the MRZ by a single filler character (<).		Section III, 10.9
		Name suffixes	Name suffixes (e.g. Jr., Sr., II or III) shall not be included in the MRZ except as permitted by Section III, 10.7 as components of the secondary identifier.		Section III, 10.7
		Filler	When all components of the primary and secondary identifiers and required separators (filler characters) do not exceed 39 characters in total, all name components shall be included in the MRZ and all unused character positions shall be completed with filler characters (<) repeated up to position 44 as required.		
		Truncation of the name	When the primary and secondary identifiers and required separators (filler characters) exceed the number of character positions available for names (i.e. 39), they shall be truncated as follows:  Characters shall be removed from one or more components of the primary identifier until three character positions are freed, and two filler characters (<<) and the first character of the first component of the secondary identifier can be inserted. The last character (position 44) shall be an alphabetic character (A through Z). This indicates that truncation may have occurred.		Section III, 10.6 Note a

\* Notes can be found following 6.6.

<i>MRZ field character positions (line 1)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
			<p>Further truncation of the primary identifier may be carried out to allow characters of the secondary identifier to be included, provided that the name field shall end with an alphabetic character (position 44). This indicates that truncation may have occurred.</p> <p>When the name consists of only a primary identifier which exceeds the number of character positions available for the name, i.e. 39, characters shall be removed from one or more components of the name until the last character in the name field is an alphabetic character.</p>		

#### 6.6 Data structure of the lower machine readable line

<i>MRZ character positions (line 2)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
1 to 9	07 or 13	Passport or document number	At the discretion of the issuing State, either the passport number or the visa number shall be used in this field; however, the latter option can only be exercised where the visa number has 9 characters or fewer. Any special characters or spaces in the number shall be replaced by the filler character (<). The number shall be followed by the filler character (<) repeated up to position 9 as required.	9	Notes a, b, c, e, j
10		Check digit	See 11 and 12.	1	Notes b, e
11 to 13	16	Nationality	The three-letter code specified in Section III, Appendix 1 shall be used. If the code contains fewer than 3 characters, filler character(s) shall be inserted in the unused position(s).	3	Section III, Appendix 1; Notes a, c, e, h
14 to 19	15	Date of birth	<p>The structure is YYMMDD, where:</p> <p>YY = Year (2 positions) MM = Month (2 positions) DD = Day (2 positions).</p> <p>For unknown dates see 10.2.2.</p>	6	10.2; Notes b, c, e
20		Check digit	See 11 and 12.	1	Note b

\* Notes can be found following 6.6.

<i>MRZ character positions (line 2)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
21	14	Sex	F = Female; M = Male; < = non-specified.	1	Notes a, c, f, g
22 to 27	5	Valid until (date)	In most cases this will be the date of expiry of the MRV-A and indicates the last day on which the MRV-A can be used to seek entry. For some States this will be the date by or on which the holder should have left.  The structure is YYMMDD, where:  YY = Year (2 positions) MM = Month (2 positions) DD = Day (2 positions).	6	10.2; Notes b, e
28		Check digit	See 11 and 12.	1	Note b
29 to 44		Optional data elements	For optional use of the issuing State. Unused character positions shall be completed with the filler character (<) repeated up to position 44 as required.	16	Notes a, b, c, e

\* Notes for 5.4, 6.5 and 6.6.

- a) Alphabetic characters (A–Z). National characters may be used in the VIZ. In the MRZ, only those characters specified in Appendix 2 to Section III shall be used.
- b) Numeric characters (0–9). National numerals may be additionally included in the VIZ. In the MRZ, only the numerals 0–9 may be used as defined in Appendix 2 to Section III.
- c) Punctuation may be included in the VIZ. In the MRZ, only the filler character specified in Appendix 2 to Section III shall be used.
- d) The lengths of fields 01 and 02 are undefined, depending on type font and limits set by MRV-A size and position of other fields.
- e) The field caption is not printed on the document.
- f) Where a person does not wish his/her sex to be identified or where a State does not want to show this data, the filler character (<) shall be used in this field in the MRZ and an X in this field in the VIZ.
- g) The use of a caption to identify a field is at the option of the issuing State.
- h) United Nations Laissez-passer are issued to officials of the United Nations Organization under the terms of the Convention on the Privileges and Immunities of the United Nations of 13 February 1946 and to officials of the Specialized Agencies of the United Nations under the terms of the Convention on the Privileges and Immunities of the Specialized Agencies of the United Nations of 21 November 1947. In the case of visas entered in the United Nations Laissez-passer, in keeping with the international character of United Nations officials, nationality shall not be shown. Instead the appropriate code shall be entered in accordance with Part B of Appendix 1 to Section III.
- i) The number of characters (in the field length) includes any blank spaces.
- j) The number of characters in the VIZ may be variable; however, if the document number has more than 9 characters, the 9 principal characters shall be shown in the MRZ in character positions 1 to 9.
- k) The field caption shall be printed on the document.



(b) One or more name components truncated:

Name: Nilavadhanananda Arnpol Petch Charonguang  
 VIZ: NILAVADHANANANDA, Arnpol Petch Charonguang  
 MRZ (upper line): V<UTONILAVADHANANANDA<<ARNPOL<PETCH<CHARONGU

#### 6.7.2 *Truncated names — Primary identifier truncated*

(a) One or more components truncated to initials:

Name: Dingo Potoroo Bennelong Woolloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENNELONG<WOOLOOMOOLOO<WARRANDYTE<W<<DI

(b) One or more components truncated:

Name: Dingo Potoroo Bennelong Woolloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENNELONG<WOOLOOM<WARRAND<WARNAM<<DINGO

(c) One or more components truncated to a fixed number of characters:

Name: Dingo Potoroo Bennelong Woolloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENNEL<WOOLOO<WARRAN<WARNAM<<DINGO<POTO

#### 6.7.3 *Names that just fit, indicating possible truncation by letter in the last position of the name field, but which are not truncated*

Name: Jonathon Warren Trevor Papandropoulos  
 VIZ: PAPANDROPOULOUS, Jonathon Warren Trevor  
 MRZ (upper line): V<UTOPAPANDROPOULOUS<JONATHON<WARREN<TREVOR

*Note.* — Even though there is an alphabetic character in the 44th character position of this MRV-A upper machine readable line, this name has not been truncated **but it shall be assumed that it has been truncated.**

### **Representation of the issuing State and the nationality of the holder**

#### 7. *Visual inspection zone (VIZ)*

7.1 Where the name of the issuing State and/or the place of issue or place of birth are in a national language that does not use Latin characters, the name of the State or other location shall appear in the national language and also shall be either transliterated into Latin characters or translated into one or more languages (at least one of which must be English, French or Spanish) by which the name may be more commonly known to the international community. The name in the different languages shall be separated by an oblique character (/) followed by at least one blank space.



7.2 Where the name of the issuing State or place of issue or place of birth is in a language that uses the Latin alphabet, but where the name is more familiar to the international community in its translation into another language or languages (particularly English, French or Spanish), the name in the national language should be accompanied by one or more translations of the name. The name in the different languages shall be separated by an oblique character (/) followed by at least one blank space.

7.3 The three-letter codes listed in Appendix 1 to Section III shall be used to complete the field for the nationality of the holder, if the issuing State chooses to portray this field in the VIZ.

#### 8. Machine readable zone (MRZ)

8.1 The three-letter codes listed in Appendix 1 to Section III shall be used to complete the fields for the issuing State and holder's nationality (character positions 3-5 in the upper machine readable line and 11-13 in the lower machine readable line, respectively) in the MRZ of the MRV-A.

#### 9. Three-letter code use

9.1 Use of three-letter codes is mandatory in the MRZ and optional in the VIZ. Specific locations are defined in the following table.

	<i>Zone</i>	<i>Field no.</i>	<i>Character position no.</i>	<i>Number of character positions</i>
Issuing State	VIZ	01	—	3
	MRZ (upper line)		3–5	3
Holder's nationality	VIZ	15	—	3
	MRZ (lower line)		11–13	3

### Representation of dates

10. Dates shall be presented as set forth hereunder.

10.1 *Dates in the VIZ.* Such dates on the MRV-A shall be entered in accordance with the Gregorian calendar as follows.

10.1.1 Days shall be shown by a two-digit number, i.e. the dates from one to nine shall be preceded by a zero.

10.1.2 The month may be printed in full in English, French or Spanish, or abbreviated, using up to four character positions.

10.1.3 The year shall be shown by the last two digits.

**Abbreviations of months in English, French and Spanish**

<i>Month</i>	<i>English</i>	<i>French</i>	<i>Spanish</i>
January	Jan	Jan	Ene
February	Feb	Fév	Feb
March	Mar	Mars	Mar
April	Apr	Avr	Abr
May	May	Mai	Mayo
June	Jun	Juin	Jun
July	Jul	Juil	Jul
August	Aug	Août	Ago
September	Sep	Sept	Sept
October	Oct	Oct	Oct
November	Nov	Nov	Nov
December	Dec	Déc	Dic

10.1.4 As an example, using the recommended practice, a date of 12 July 1942 would be entered in an MRV-A as follows:

- a) Using French                      12JUIL42
- b) Using English or Spanish      12JUL 42

10.1.5 The month may, however, be written in numerical form in the VIZ, at the discretion of the issuing State, particularly in cases where the use of English, French or Spanish is not acceptable or where this might facilitate the use of machine readable visas by countries using other than the Gregorian calendar. Following a practice established to facilitate the visual inspection of travel documents, a date would be written DD MM YY. For example, a date of 12 July 1942, would appear in the visual zone of the MRV-A as follows:

12 07 42.

10.1.6 *Unknown date of birth.* Where a date of birth is completely unknown, that data element shall be entered as follows:

XXbXXXbXX

b = blank space

If only part of the date of birth is unknown, that part shall be represented by XX if it is the day or year, or by XXX if it is the month.

10.2 *Dates in the MRZ.* Such dates on the MRV-A shall, in accordance with the standard set forth in ISO 8601, be shown as a six-digit number consisting of the last two digits for the year (YY) immediately followed by two digits for the number of the month (MM) and by two digits for the day (DD). The structure is as follows: YYMMDD.

10.2.1 Following this format, the example given in 10.1.6 would be shown as: 420712.

10.2.2 If all or part of the birth date is unknown, the relevant character positions shall be completed with filler characters (<).

### Check digits in the MRZ

11. The data structure of the lower machine readable line in 6.6 provides for the inclusion of three check digits as follows:

<i>Check digit</i>	<i>Character positions (lower MRZ line) used to calculate the check digit</i>	<i>Check digit position (lower MRZ line)</i>
Passport or Document Number Check Digit	1–9	10
Date of Birth Check Digit	14–19	20
Valid Until (date) Check Digit	22–27	28

11.1 Details on calculation of check digits in the MRZ are set out below. A special check digit calculation has been adopted for use in MRTDs. The check digits shall be calculated on modulus 10 with a continuously repetitive weighting of 731 731 ..., as follows.

11.1.1 *Step 1.* Going from left to right, multiply each digit of the pertinent numerical data element by the weighting figure appearing in the corresponding sequential position.

11.1.2 *Step 2.* Add the products of each multiplication.

11.1.3 *Step 3.* Divide the sum by 10 (the modulus).

11.1.4 *Step 4.* The remainder shall be the check digit.

11.1.5 For data elements in which the number does not occupy all available character positions, the filler character (<) shall be used to complete vacant positions and shall be given the value of zero for the purpose of calculating the check digit.

11.1.6 When the check digit calculation is applied to data elements containing alphabetic characters, the characters A to Z shall have the values 10 to 35 consecutively, as follows:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

11.1.7 *Example 1.* Using 27 July 1952 as an example, with the date in numeric form as specified in ISO 8601, the calculation will be:

	Date:	5	2	0	7	2	7	
	Weighting:	7	3	1	7	3	1	
Step 1 (multiplication)	Products:	35	6	0	49	6	7	
Step 2 (sum of products)		35 + 6 + 0 + 49 + 6 + 7 = 103						
Step 3 (division by modulus)		$\frac{103}{10} = 10$ , remainder 3						

Step 4. Check digit is the remainder, 3. The date and its check digit shall consequently be written as **5207273**.

11.1.8 *Example 2.* Using the passport number AB2134 as an example for coding a 9-character, fixed-length field (e.g. passport number), the calculation will be:

Passport No.:	A	B	2	1	3	4	<	<	<
Assigned numeric values:	10	11	2	1	3	4	0	0	0
Weighting:	7	3	1	7	3	1	7	3	1
Step 1 (multiplication)	Products:	70	33	2	7	9	4	0	0
Step 2 (sum of products)		70 + 33 + 2 + 7 + 9 + 4 + 0 + 0 + 0 = 125							
Step 3 (division by modulus)		$\frac{125}{10} = 12$ , remainder 5							

Step 4. Check digit is the remainder, 5. The passport number and its check digit shall consequently be written as **AB2134<<<5**.

11.1.9 *Composite check digit.* No mandatory composite check digit is defined for the MRV-A.

### Character sets and fonts

12. The character sets and fonts to be used on the MRV-A shall be as indicated hereunder.

#### 12.1 Captions

12.1.1 Captions in Fields 03 through 10 for the data elements listed in the directory appearing in 5.4 shall be represented in a clear, linear type font in a size of 1.0 mm to 1.8 mm (0.04 in to 0.07 in).

12.1.2 Captions shall be in the language of the issuing State. When such language uses the Latin alphabet, regular font style should be used to print the captions.

12.1.3 Where the language of the issuing State is not English, French or Spanish, the printed caption, as defined in 12.1.1, shall be followed by an oblique character (/) and the equivalent of the caption in English, French or Spanish. An italic font style should be used for the second language.

*Note.* — Where the language of the issuing State is English, French or Spanish, the issuing State should use one of the other two languages to print the caption following the oblique character (/).

12.2 *Entered data in the visual inspection zone (VIZ).* See Section III, 6 and 8.

12.3 *Entered data in the machine readable zone (MRZ).* See Section III, 7 and 8.

### **Portrait**

13. *Portrait.* For the MRV-A, a portrait should be inserted in the rectangular area defined as Zone V. Such portrait, if included, shall represent only the holder of the MRV-A.

13.1 *Position of holder's portrait.* If a laminate is used over a glued-in portrait, the margin between the portrait and the left-hand edge of the visa should be increased to 6.0 mm (0.24 in) by moving the portrait 4.0 mm (0.16 in) to the right. This is to provide a secure and durable adherence of the laminate to the visa on the left-hand margin. This would result in reduction in the width of fields for identification and document data.

13.2 *Portrait edges.* The portrait may have irregular edges. When a digitally printed reproduction is used, the background of the portrait may be dropped out in order to provide protection against forgery or substitution.

13.3 *Zone V without an identification feature.* A standard default image, such as a national symbol, crest or wording, should be selected and used in Zone V when an identification feature is not included.

### **Characteristics of the MRZ**

14. Except as otherwise specified herein, the MRV-A shall conform with ISO 1831 concerning the following matters:

- optical properties of the substrate to be used;
- optical and dimensional properties of the image patterns forming OCR characters;
- basic requirements related to the position of OCR characters on the substrate.

14.1 Machine readable data shall be arranged from left to right in fixed-length fields in two lines (upper and lower) in the order specified in the data structure tables shown in 6.5 and 6.6, respectively, and located on the document as shown in Appendix 2 to this section. Data shall be entered in each field, beginning with the left-hand character position.

14.2 Where the entered data do not occupy all the character positions specified for the relevant field, the filler character (<) shall be used to fill the unoccupied positions.

### **Quality specifications of the MRZ**

15. In general, the print quality shall conform to ISO 1831, Range X, except as otherwise provided herein. All quality specifications set forth hereunder shall apply to MRV-As after final preparation and placement in the passport or other travel document, except where otherwise noted, and conform to the requirements of Section III, 2.

- 15.1 *Substrate quality.* ISO 1831, 4.3 through 4.3.2 shall be used for reference only.
- 15.2 *Substrate opacity.* The substrate used, measured before and after final preparation and prior to placement in the passport or other travel document, shall be within the definition of at least medium opacity (ISO 1831, 4.4.1 and 4.4.3).
- 15.3 *Substrate gloss.* The level of gloss is not specified.
- 15.4 *Fluorescence.* The reflectance of the substrate in the visible spectrum shall exhibit no visibly detectable fluorescence when irradiated by ultraviolet light, except where this is a predictable fluorescence for security reasons.
- 15.5 *Alternative substrates.* The guidelines in 15.1 to 15.4 should be followed irrespective of the substrate material.
- 15.6 *Spectral band.* The OCR print shall be legible visually and shall be black (B425 through B680 as defined in ISO 1831). The OCR print in the MRZ shall also absorb in the B900 band as defined in ISO 1831 (i.e. near infra-red). This property must test successfully when the characters are machine-read through any protective material that may have been applied to the surface of the document.
- 15.7 *Print contrast signal (PCS).* After final preparation, the minimum print contrast signal (PCS/min), when measured as specified in ISO 1831, shall be as follows:  $PCS/min \geq 0.6$  at the B900 spectral band.
- 15.8 *Character stroke width.* The stroke width after final preparation shall be as specified for Range X in ISO 1831 (5.3.1).
- 15.9 *Contrast variation ratio (CVR).* After final preparation, the CVR should be as is shown for Range X in ISO 1831, i.e.  $CVR < 1.50$ .
- 15.10 *Spots and extraneous marks.* ISO Standard 1831 (5.4.4.6 and 5.4.5.12) shall apply at the reading surface (see also B.6 of Annex B and C5.10 of Annex C to ISO 1831).
- 15.11 *Voids.* The value of “d” as defined in ISO 1831 (5.4.5.9) shall be equal to 0.4 at the reading surface.
- 15.12 *Line separation.* See 6.4 and Appendix 2 to this section.
- 15.13 *Line spacing.* See 6.4 and Appendix 2 to this section.
- 15.14 *Skew.* The provisions relating to skew shall be as follows:
- 15.14.1 *Skew of MRZ characters.* The skew of individual MRZ characters on the MRV-A shall not exceed 3 degrees measured from the reference edge of the passport or travel document to which the MRV-A is affixed.
- 15.14.2 *Skew of the MRZ lines.* The effect of the actual skew of the MRZ lines and the actual skew of the MRZ characters shall not exceed the limit specified in 15.14.1, nor shall the skew of the MRZ or character misalignment result in the MRZ lines or any part thereof appearing outside the ERZ as defined in Appendix 4 of Section III.

### Optional expansion of machine readable data capacity

16. Should a State wish to expand the machine readable data capacity of the MRV-A beyond that defined for global interchange (see Section III, 7), and intend that data stored in such expanded capacity be readable in other than its own systems, the issuing State shall use the following additional machine readable data technologies, as appropriate, as specified below.

16.1 *Bar code(s)*. See Annex E for details on the use of bar code(s) to expand the machine readable data capacity of an MRV-A.

16.2 *Contactless integrated circuit(s)*. See Annex F for details on the use of contactless integrated circuit(s) to expand the machine readable data capacity of an MRV-A.

17. *Coexistence*. Proper coexistence of the above optional machine readable data storage technologies with the *mandatory OCR technology* is critical to ensure global interoperability of the MRV-A. Annex B (currently in development) will provide informative details on the possible combinations available (scenarios) to assist the issuing State, should it choose to provide for the above optional technologies to expand the machine readable data capacity of the MRV-A in addition to the mandatory OCR technology.

17.1 *Logical data structure*. This edition of Doc 9303, Part 2 does not specify which data elements could or should be contained within the various optional data storage technologies nor the format in which the various data elements are presented. A Logical Data Structure, which includes a range of mandatory and optional data elements and a preferred method of presenting those data, has been developed and will be published subsequently.

### Optional machine-assisted identity confirmation and document security feature verification using an MRV-A

18. Should a State wish to provide for machine-assisted identity confirmation and/or machine-assisted document security feature verification with the MRV-A, and global interoperability is the objective, the specifications and/or recommendations below shall be applied.

18.1 *Machine-assisted identity confirmation*. See Annex C for details on machine-assisted identity confirmation of the rightful holder when using an MRV-A.

18.2 *Machine-assisted security feature verification*. See Annex D for details on machine-assisted document security feature verification for an MRV-A.

19. *Coexistence*. Proper coexistence of optional machine-assisted identity confirmation and document security feature verification technologies with the mandatory OCR technology and/or optional machine readable data expansion technologies is critical to ensure global interoperability of the MRV-A. Annex B (currently in development) will provide informative details on the possible combinations available (scenarios) should the issuing State choose to provide for machine-assisted identity confirmation or document security feature verification with the MRV-A.

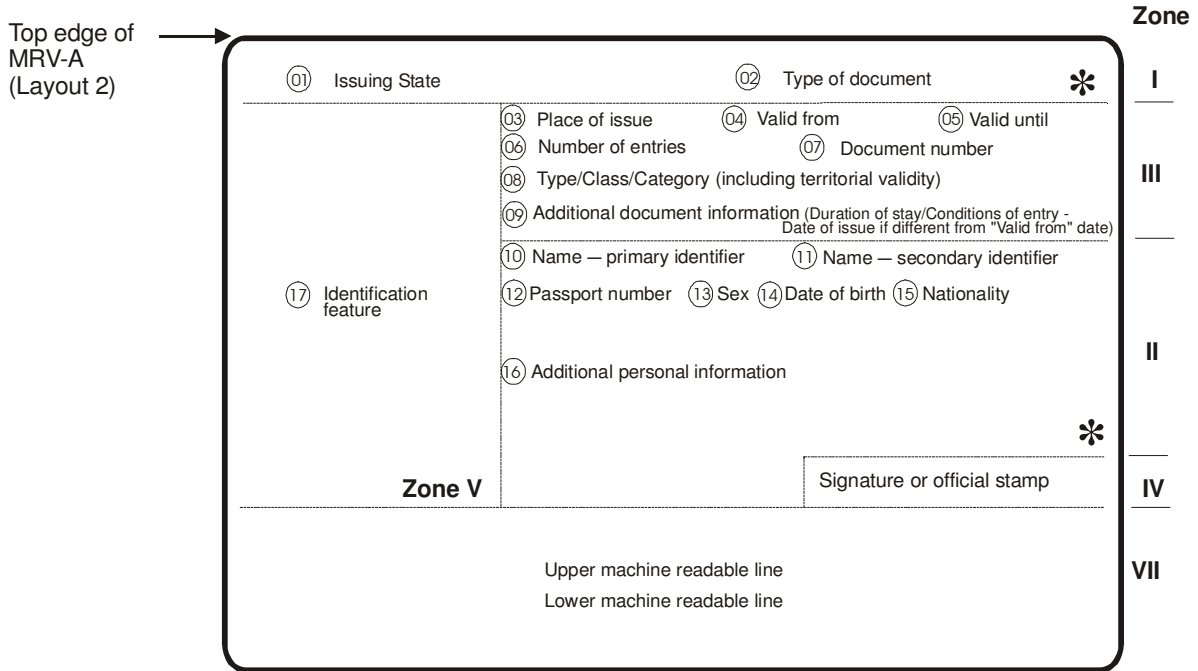
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**APPENDIX 1 to Section IV**

**LOCATION OF DATA ELEMENTS ON A FORMAT-A  
MACHINE READABLE VISA  
(MRV-A)**



\* Optional control number — to be preprinted at the option of the issuing State either horizontally where shown in Zone I or in Zone II or vertically anywhere along the right-hand edge of Zone V (where present).

Not to scale

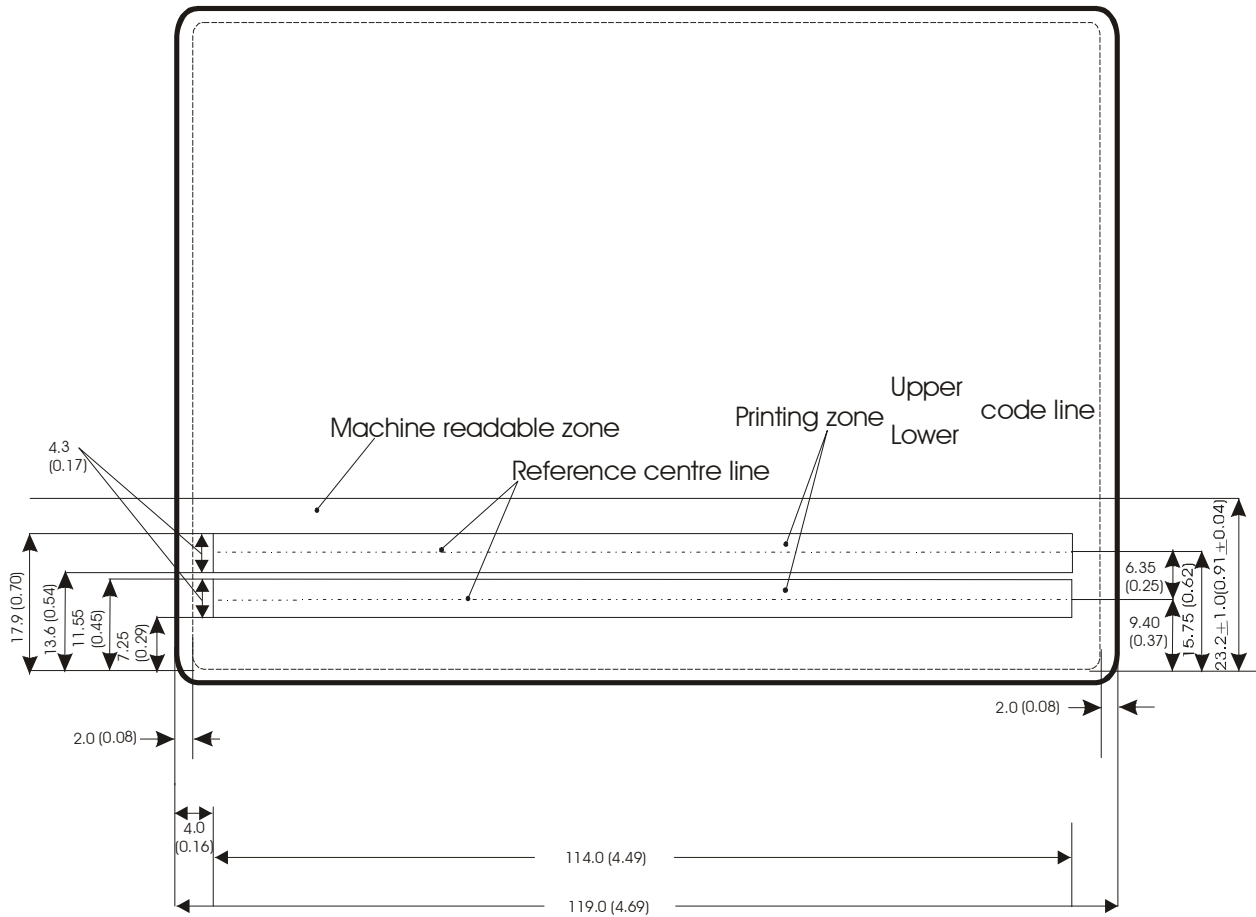
**NOTES:**

1. VIZ based on maximum printing density of 8 lines per 25.4 mm (1.0 in) and horizontal printing density of 15 characters per 25.4 mm (1.0 in)
2. MRZ based on horizontal printing of 10 characters per 25.4 mm (1.0 in)
3. ○ = field numbers
4. The borderlines of the zones are not printed on the actual visa.



APPENDIX 2 to Section IV

SCHMATIC DIAGRAM OF THE MACHINE READABLE ZONE  
OF AN MRV-A



Dimensions in millimetres  
(inch dimensions in parentheses)

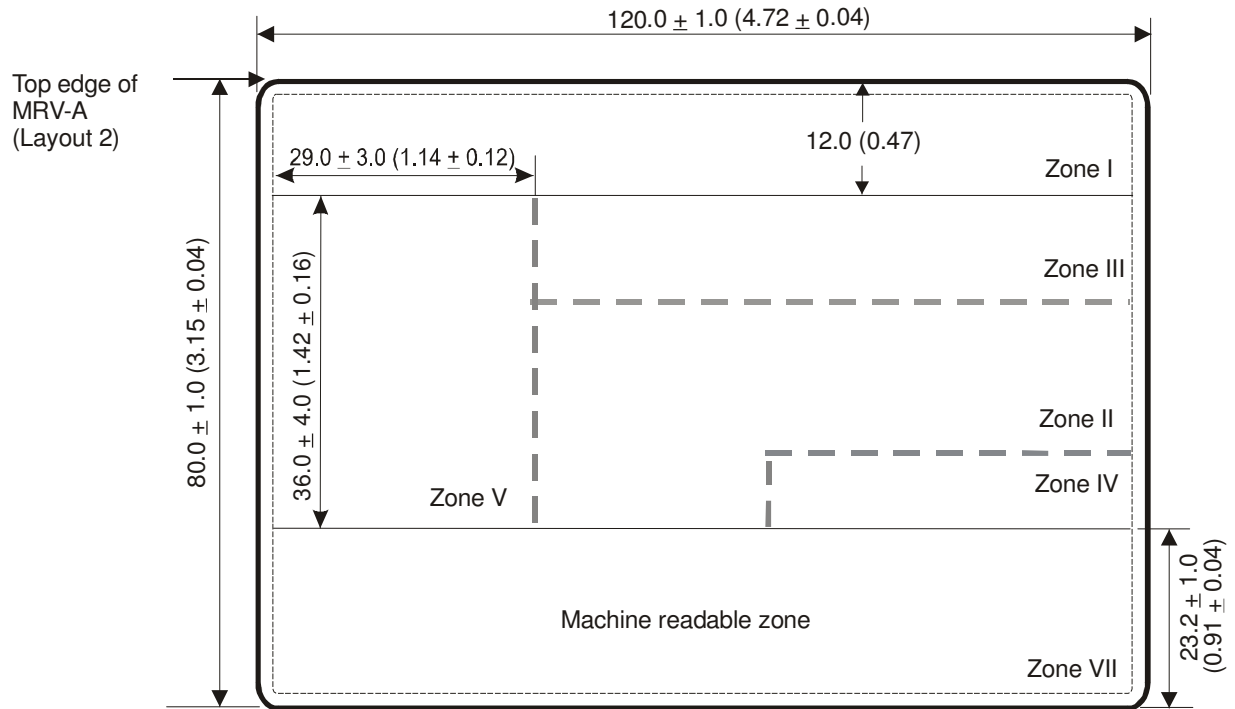
Not to scale

Note.— For illustration purposes, the smallest option for the 120.0 mm (4.72 in) dimension of the MRV-A and the smallest option for the left-hand margin in the MRZ have been selected.



**APPENDIX 3 to Section IV**

**NOMINAL POSITIONING OF ZONES ON A FORMAT-A  
MACHINE READABLE VISA (MRV-A)**



Dimensions in millimetres  
(inch dimensions in parentheses)

Not to scale

This diagram should be considered in conjunction with paragraph 4 of Section IV. It assumes that all the available space for data in the Visual Inspection Zone is used. The line spacing in the VIZ is the closest permitted at 8 lines per 25.4 mm (1.0 in). If an issuing State requires less information the line spacing can be increased to print fewer lines in the VIZ.

Dotted lines indicate zone boundaries whose positions are not fixed, enabling issuing States flexibility in the presentation of data.

The dimensions of the identification feature (normally a portrait) shall be between a minimum of 32.0 mm × 26.0 mm (1.26 in × 1.02 in) and a maximum of 40.0 mm × 32.0 mm (1.57 in × 1.26 in). An issuing State may elect to issue an MRV in this format without an identification feature, replacing it with a crest or symbol.

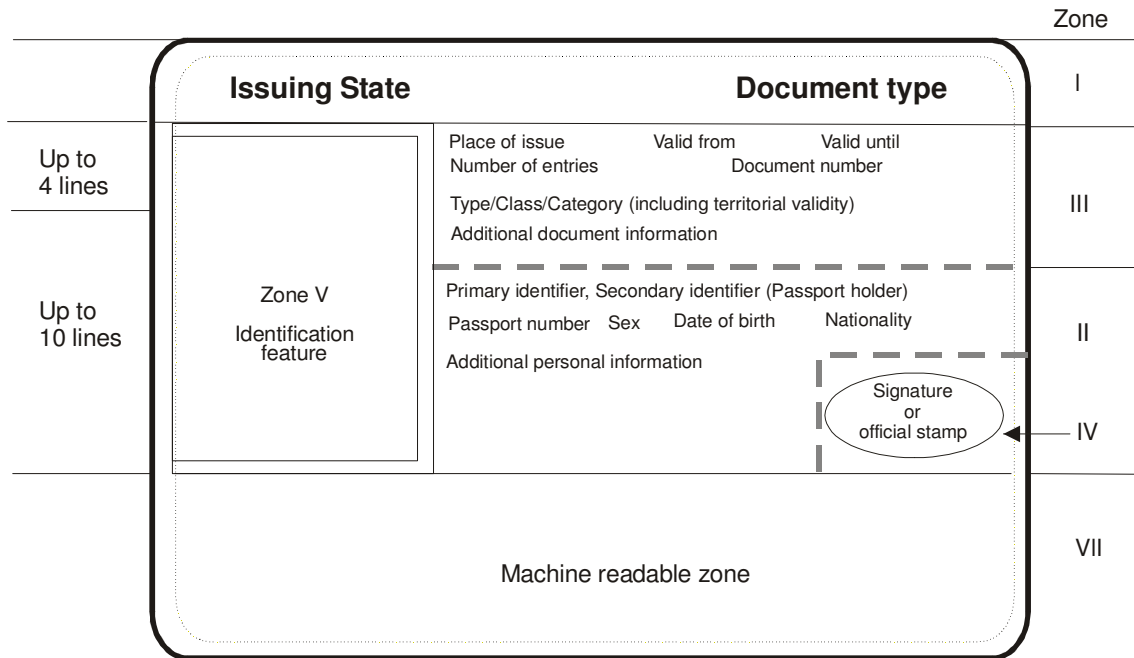
Though the portrait position is defined as a rectangular area, it may have irregular edges or, if the portrait is digitally printed, have the background dropped out. Such technique may be used to provide protection against fraudulent alteration.

When the identification feature is a photograph affixed to the visa and protected by a laminate, the photograph is to be positioned a further 4.0 mm (0.16 in) to the right.



**APPENDIX 4 to Section IV**

**DATA ELEMENTS ON A FORMAT-A  
MACHINE READABLE VISA (MRV-A)**



Not to scale

**NOTES:**

1. Broken lines indicate zone borders whose position may be adjusted by the issuing State to optimize the presentation of the data. Solid lines indicate fixed zone borders. Zone border lines are not printed on the documents.
2. Provided it is contained within the rectangular area, the identification feature may have irregular edges.
3. An issuing State may elect to issue a visa with the identification feature replaced by a crest or symbol.







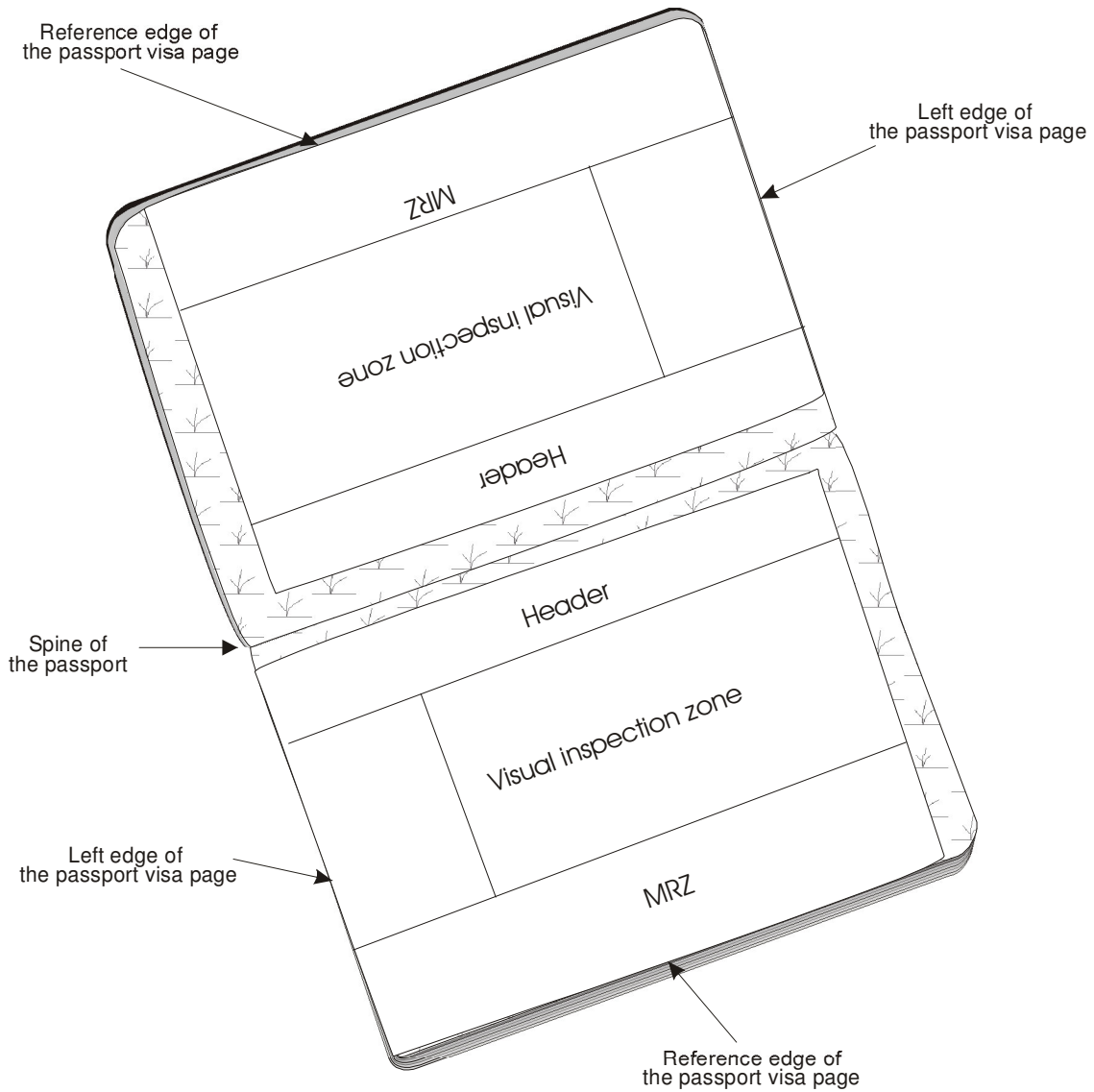






**APPENDIX 7 to Section IV**

**POSITIONING OF A MACHINE READABLE VISA (MRV-A) IN A PASSPORT**  
**Example of positioning of a Format-A Machine Readable Visa (MRV-A)**



Each MRV shall be placed so that:

1. the two OCR lines of the MRZ are parallel to the appropriate reference edge of the passport visa page;
2. the leading characters of each OCR line are positioned with respect to the left edge of the passport visa page;
3. the MRZ is immediately adjacent to the appropriate reference edge of the passport visa page; and
4. no MRV may be placed on top of another, nor on the reverse of a page that already has an MRV affixed, nor on the reverse of an MRP data page.



## ANNEX A (INFORMATIVE) to Section IV

### VISAS — INFORMATION ON MATERIALS AND PRODUCTION METHODS

*Note 1.— The following information reflects some past as well as current practices of MRV-A producers and is included here for guidance only. It is not an endorsement of any product or method.*

*Note 2.— It is the responsibility of the issuing State to ensure that the MRV-A selected for issue is constructed in such a way that the document will perform satisfactorily for its required life.*

**A.1** Traditionally, visas have taken the form either of a label affixed to a page of the holder's passport or the application of an imprint onto the passport page usually with manual infilling for the personalization. Manual infilling is obviously impractical for machine readable visas where very precise characters for optical recognition are required. There is no fundamental reason why a visa should not be imprinted onto a passport page using a printer capable of printing OCR-B. However, an issuing State that elects to do this will find that many passports, which, of course, are issued by other States, have printed or perforated numbers or other printing on their pages which can absorb the infra red light used by the document reader and result in a failure to read at an immigration position. In general, therefore, it is better to use a machine readable visa in the form of a label affixed to the passport page.

**A.2** An MRV-A can have a life limited to a single entry into a country or it can allow multiple entries over the life of the passport or beyond. The issuing State should ensure that the MRV-A is appropriately durable for the required life. States should also ensure that their visas are resistant to fraud. States can achieve considerable protection against these threats where immigration positions have access to a central database containing the details of the issuance of genuine visas. However this is not always practicable. The threats are:

- total counterfeiting of the document
- removal of a visa from one passport and its placement in another
- alteration of the personal information or validity data.

**A.3 Substrate** — Visas have been produced using either paper or a synthetic polymer as the substrate. The substrate should have adequate opacity to prevent any printing or perforations on the passport page affecting the machine reading. The substrate should exhibit no visible fluorescence when irradiated by ultra violet light. Common choices of security features for paper have included: chemical reactants, planchettes, iridescent plaquettes, fibers (silk and/or synthetics, visible and/or invisible, fluorescent and/or non-fluorescent), and security threads. Synthetic polymer substrates may also incorporate some of these security features. Care must be taken to ensure that any chemical reactants used are unaffected by the adhesive used to affix the visa. It is desirable that the substrate be damaged by attempts to alter the data on the visa or to remove it from the passport. The damage may take the form of tearing or distortion.

**A.4 Inks** — Inks that are chemically fugitive, fluorescent, heat sensitive, and optically variable are means of enhancing security in the MRV-A.

**A.5 Printing** — Fine line printing, rainbow (split fountain) printing using guilloche patterns, intaglio printing, and incorporation of concealed images into the design are methods of enhancing both the security and aesthetics of the MRV-A.

**A.6 Adhesive** — Water-moistenable or pressure-sensitive adhesives have been used to affix visas into passports. The selected adhesive should achieve and maintain a strong bond even when heated. The adhesive/substrate combination should be such that the substrate tears or distorts before the adhesive bond fails.

**A.7 Die cutting** — Though the final size and shape of the visa is defined in these specifications, the size is too small for most types of visa infilling printers. It is therefore normal for an issuing State to procure visas in a sheet form suitable for the infilling printer with one or more visas contained within the sheet area, the visas being die cut to shape. It is important to ensure compatibility between the sheets of visas and the printer to ensure that the visas do not become separated from the carrier sheet in the printer. It is also important to ensure that the edges of the sheet or of the die-cut shape are not contaminated with adhesive which can build up in the printer and result in misfeeding. Consistency of position of the die-cut shape relative to the edges of the sheet is important to ensure that the machine readable information is placed within the ERZ.

**A.8 Personalization** — Most forms of variable image printing, including laser, ink jet, dye sublimation and dot matrix printing have been used in the personalization of visas, with the first three used where a portrait is required. To minimize the risk of fraudulent removal of the personalization, the selected combination of substrate and infilling method should achieve a high penetration of the image into the substrate or a strong bond between the material forming the image and the substrate.

**A.9 Protecting the personalization** — Protective laminate or lacquer layers may be used to secure the data on the visa. Any laminate material should be firmly bonded to the substrate so that disruption of the substrate or destruction of the laminate material occurs when attempts are made to remove the laminate.

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**ANNEX B (INFORMATIVE) to Section IV**

**COEXISTENCE OF MACHINE READABLE DATA TECHNOLOGIES,  
IDENTITY CONFIRMATION TECHNOLOGIES AND DOCUMENT SECURITY  
FEATURE VERIFICATION TECHNOLOGIES ON AN MRV-A**

*[Contents will be provided later.]*

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## ANNEX C (NORMATIVE) to Section IV

### MACHINE-ASSISTED IDENTITY CONFIRMATION WITH AN MRV-A

**C.1 Scope** — Annex C defines a “scheme” for machine-assisted identity confirmation of the rightful holder of an MRV-A, including specifications for related details recorded on an MRV-A at the discretion of the issuing State.

**C.2 Definition** — The following definition shall apply.

*Machine-assisted identity confirmation* is defined as confirmation that the presenter of the MRV-A is the rightful holder through successful machine-assisted comparison of identity details captured from the presenter against equivalent details recorded for the rightful holder on the visa and/or entered in the accompanying passport by the passport’s issuing State and/or in a database created and maintained by a “receiving State”.

**C.3 Machine-assisted identity confirmation scheme** — The scheme defined below is designed to permit global interchange and interoperability of an MRV-A when confirming identity of the rightful holder using machine-assisted means. The scheme allows for a number of comparative techniques to be used when an MRV-A is presented, as follows:

- comparison of presenter details against corresponding details created by scanning “displayed features” located in the VIZ of the MRV-A (i.e. portrait or optional fingerprint [single digit], where present) and, where available, equivalent details in the accompanying passport using machine assistance *selected at the discretion of the receiving State* (In the case of a visa, the issuing State and the receiving State are the same.);
- comparison of presenter details against corresponding details “encoded” in the optional data element field(s) of the MRZ of the MRV-A, and, where available, equivalent details in the accompanying passport using machine assistance;
- comparison of presenter details against corresponding details “encoded” in optional machine readable data technologies using machine assistance identical to that used by the issuing State to encode the details on the MRV-A *when information on decoding is shared by the issuing State*; such a situation could arise when an airline is checking in a visa holder for a flight to the visa-issuing State;
- comparison of presenter details against corresponding “compressed grey scale” representations (i.e. for facial characteristics, and/or fingerprints (single digit through 10 prints)) optionally stored in optional machine readable data technologies by the issuing State and, where available, equivalent details in the accompanying passport; or
- comparison of presenter details *selected at the discretion of the issuing State* against corresponding details stored in a database established and maintained by the issuing State, with the MRZ of the MRV-A used as a pointer to the appropriate comparative entry stored in the database and the portrait resident on the MRV-A used as a “backup” visual comparator.

The scheme integrates the variety of comparisons under two methods for machine-assisted identity confirmation depending on whether comparative details are extracted from the MRV-A (Method 1) or whether a database established and maintained by the issuing State is used, triggered by specific pointing details extracted from the MRZ of the MRV-A (Method 2). To ensure interoperability between States liaising on machine-assisted identity confirmation or global interoperability, one of the two methods shall be adopted.

**Method 1** — Where an issuing State records identity confirmation details on the MRV-A as defined in C.4 or encodes details as defined in C.5 and C.6 and shares information on decoding of the encoded details with an authorized body such as an airline, the body can compare identity details captured from the presenter against equivalent details recorded for the rightful holder on the MRV-A and, where available, equivalent details in the accompanying passport.

Method 1, as illustrated in Figure IV-C1, permits a State to implement machine-assisted identity confirmation using the MRV-A to directly provide comparison details. It also provides flexibility for the design of the related technology infrastructure, enabling use of either interfaced (on-line) or stand-alone (off-line) identity confirmation machines, as required.

**Method 2** — As illustrated in Figure IV-C2, where an issuing State has not recorded identity confirmation details on the MRV-A in a manner consistent with C.4 through C.6, the State can compare identity details captured from the presenter against equivalent details recorded for the rightful holder of the MRV-A stored in a database created and maintained by the State. Details contained in the MRZ of the MRV-A, selected at the discretion of the State, shall be used as a pointer to the comparative details recorded in the database, with the portrait resident on the MRV-A (Zone V) used as the secondary (backup) non-machine-assisted comparator for identity confirmation.

**C.4 Identity confirmation using displayed feature** — Identity may be confirmed using machine assistance by comparing one of the mandatory or optional displayed identity features of the rightful holder located on the MRV with the equivalent captured from the person presenting the MRV-A. Confirmable displayed features with required specifications are as follows.

**C.4.1 Portrait** — Where a portrait is placed on an MRV-A, identity may be confirmed using machine assistance by comparing the presenting person's facial image (or characteristics) with the portrait of the rightful holder displayed on the MRV-A where the displayed portrait complies with the specifications contained in Section IV and the following minimum characteristics:

*Quality* — The displayed portrait shall be of such quality as to allow the isolation of required confirmation details.

*Head size (chin to crown)* — The head size from chin to crown shall be as defined in the data element directory, 5.4 of this section.

*Head orientation* — Both eyes shall be clearly visible in the displayed portrait.

**C.4.2 Fingerprint (single digit only)** — Where an optional fingerprint is placed on an MRV-A, identity may be confirmed using machine assistance by comparing the presenting person's equivalent fingerprint (single digit only) with the fingerprint of the rightful holder (single digit only) displayed on the MRV-A where the displayed fingerprint complies with the following minimum characteristics:

*Quality* — The displayed fingerprint shall be of such quality as to allow the isolation of required confirmation details.

*Size* — The displayed fingerprint shall conform with the specifications defined in Section III.

**C.5 Identity confirmation using encoded features recorded in the MRZ** — Identity may be confirmed using machine assistance by comparing feature details from the rightful holder optionally encoded on the MRV-A in character positions 29 to 44 of the lower line of the MRZ with the equivalent feature captured from the person presenting the MRV-A. Acceptable encoded features are as follows.

**C.5.1 Handgeometry** — Identity may be confirmed using machine assistance by comparing the presenting person's handgeometry with handgeometry details from the rightful holder optionally encoded in the MRZ of the MRV-A.

**C.6 Identity confirmation using encoded features recorded in optional machine readable data technologies added to the MRV-A** — Identity may be confirmed using machine assistance by comparing feature details from the rightful holder encoded within optional machine readable technologies added to the MRV-A with the equivalent feature details captured from the person presenting the MRV-A. Acceptable encoded features with required minimum specifications are as follows.

**C.6.1 Facial characteristics** — Identity may be confirmed using machine assistance by comparing the presenting person's facial image (or characteristics) with details from the rightful holder encoded on the MRV-A in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State. To allow for greater interoperability between States and authorized bodies liaising on machine-assisted identity confirmation or global interoperability, recorded details shall be presented as a compressed grey scale representation of the full facial image using a standard JPEG compression technique.

**C.6.2 Fingerprints (single digit up to 10 prints)** — Identity may be confirmed using machine assistance by comparing the presenting person's fingerprints against details from the rightful holder encoded on the MRV-A in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State. To allow for greater interoperability between States and authorized bodies liaising on machine-assisted identity confirmation or global interoperability, recorded details should be presented as a compressed representation of the fingerprints using a standard compression technique.

**C.6.3 Handgeometry** — Identity may be confirmed using machine assistance by comparing the presenting person's handgeometry with details from the rightful holder encoded on the MRV-A in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State.

**C.6.4 Eye pattern** — Identity may be confirmed using machine assistance by comparing the presenting person's eye (e.g. iris) pattern with details from the rightful holder encoded on the MRV-A in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State.









## ANNEX D (INFORMATIVE) to Section IV

### MACHINE-ASSISTED DOCUMENT SECURITY VERIFICATION WITH AN MRV-A

**D.1 Scope** — Annex D provides recommendations for issuing States choosing to include machine-verifiable security features on the MRV-A in terms of the generalized location of machine-verifiable structure and substance features to allow for global interoperability.

**D.2 Definitions** — The following definitions shall apply.

*Machine-assisted security feature verification* is defined as the ability to verify security features located on the MRV-A using machine-assisted techniques (e.g. calculation and comparison of valid check digit values and optical devices to confirm the wavelength of a security ink or diffraction pattern of a hologram or other optically variable device), ideally using the travel document reader.

*Data feature* is defined as a security feature directly linked to a number of the mandatory machine readable data elements located on the MRV-A (e.g. check digit(s) contained in the lower MRZ line).

*Structure feature* is defined as a security feature containing some form of identifiable information (e.g. interference characteristic of a hologram or other optically variable device; image details of a security pattern).

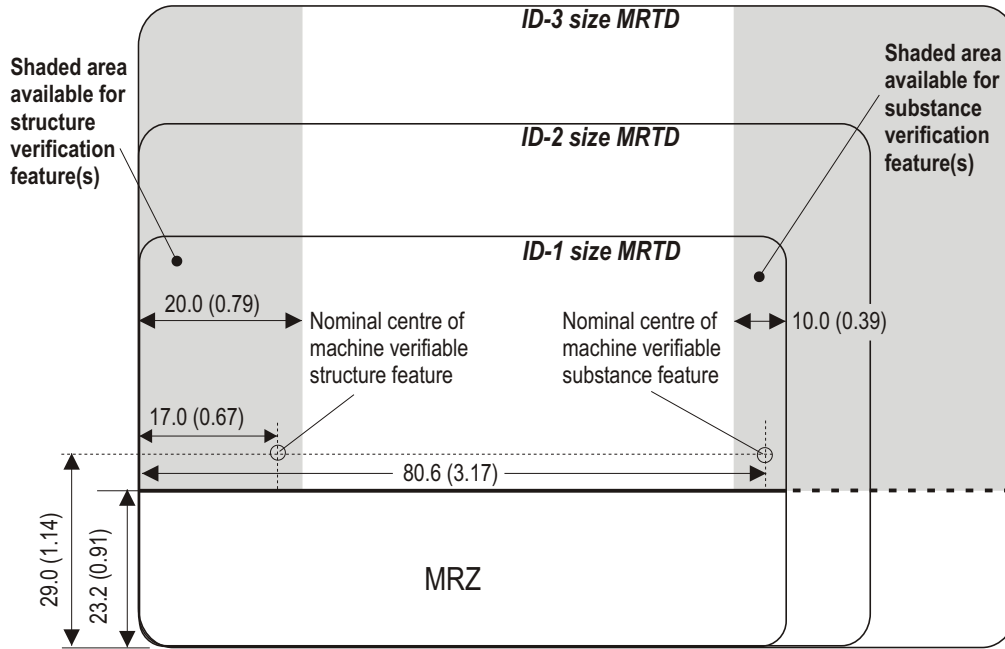
*Substance feature* is defined as a security feature that has a defined characteristic based on the substance used in the construction of the feature (e.g. colour, luminescence or magnetic characteristic).

**D.3 Machine-verifiable data features** — See 11 and 12 of Section IV for computational details and locations for the five mandatory, verifiable data features located on an MRV-A.

**D.4 Recommended locations for machine-verifiable structure and substance features** — Figure IV-D1 defines recommended locations for machine-verifiable structure and substance features when added to an MRV-A at the discretion of the issuing State. These recommended locations ensure global interoperability between States wishing to enhance security by using machine-assisted verification of the structure and/or substance features.

*Note.— These locations are recommended for generalized placement of such features. However, a feature, should it be used, can appear anywhere in the area(s) shown. Moreover, the area(s) designated for feature placement do not mutually exclude the use of other features. For example, a structure feature can be accommodated along with a portrait.*

**D.5 Coexistence with other optional technologies** — Annex B (under development) will contain additional details on machine-assisted document security technologies being combined with other optional machine readable data technologies and/or machine-assisted identity confirmation technologies.



Nominal dimensions in millimetres  
(inch dimensions in parentheses)

Not to scale

**Figure IV-D1. Recommended locations (above the MRZ) for machine-verifiable structure and substance features and corresponding nominal centres on MRTDs**

## ANNEX E (NORMATIVE) to Section IV

### USE OF OPTIONAL BAR CODE(S) ON THE MRV-A

**E.1 Scope** — Annex E defines the specifications governing the use of one or more bar codes on an MRV-A, at the discretion of the issuing State, to allow expansion of the machine readable data capacity.

**E.2 Normative references** — The following International Standards contain provisions which, through reference herein, constitute provisions of Annex E. Where differences exist between the specifications contained in Doc 9303, Part 2 and the referenced Standards to accommodate the addition of one or more bar codes, the specifications contained in Part 2 shall prevail.

#### *European Standards*

EN 797:1995	<i>Bar coding — Symbology specifications — “EAN/UPC”</i>
EN 799:1995	<i>Bar coding — Symbology specifications — “Code 128”</i>
EN 800:1995	<i>Bar coding — Symbology specifications — “Code 39”</i>
EN 1571:1996	<i>Bar coding — Data identifiers</i>
EN 1635:1997	<i>Bar coding — Test specifications — Bar code symbols</i>
ENV 12403:1998	<i>Bar coding — Structured data files</i>
EN 1635 1D codes	
ENV 12925:1998	<i>Bar coding — Symbology specifications — “PDF417”</i>

#### *ISO/IEC Standards*

ISO/IEC JTC 1/SC 31 WD 15438	<i>Automatic identification and data capture — 2D-bar code symbology specifications — PDF417</i>
ISO/IEC JTC 1/SC 31 WD 15417	<i>Bar coding — Symbology specification — Code 128 (27 pages)</i>
ISO/IEC 7810 : 2003	<i>Identification cards — Physical characteristics (Note.— The dimensional specifications should conform with those defined in Section IV of this document.)</i>
ISO/IEC 10373-1 : 1998	<i>Identification cards — Test methods — Part 1: General characteristics tests</i>

**E.3 Definition** — A bar code is defined as a linear or two-dimensional bar code conforming with the specifications defined herein and capable of representing data therein and encoded data read therefrom.

**E.4 Location of bar code(s)** — Figure IV-E1 illustrates the location of bar codes on the MRV-A with specifications for the exact placement and overall dimensions of the area to house any optional bar codes. It should be noted that the height and width of the bar code(s) area can vary up to the maximum dimensions shown. In defining these dimensions, the trade-off between optional expanded machine readable data capacity desired and accommodation of mandatory and optional details (VIZ) should be considered.

**E.5 Quality of bar code(s)** — The bar code(s) included in the bar code(s) area shall meet the overall symbol grade defined for the chosen symbology (symbologies) that allows symbols to be read, following final assembly of the MRV-A, most times in a single pass.

**E.6 Symbologies and logical data structure** — In order to have the capability to support global data interchange with authorized bodies such as airlines, the bar code symbology selected for use in MRTDs must offer sufficient data storage capacity to accommodate all mandatory data elements included in the mandatory data groups and in any optional data groups which may be selected from the logical data structure as developed for optional capacity expansion technologies. Furthermore, the associated reading software must be available in the public domain.

**E.7 Machine reading of the bar code(s)** — To enable accurate reading of bar code(s) coexisting with security treatments (e.g. background security printing) in the bar code(s) area, and the use of a single machine reader for reading the MRZ and the bar code(s), where desired by a State, the bar code(s) optionally included on the MRV-A shall be printed such that the bar code(s) absorb(s) in the B900 band as defined in ISO 1831 (i.e. near infra-red). The bar code(s) may be visually legible.

In determining the placement of the bar code on the MRV-A, issuing States shall accommodate any special needs or operating conditions of the symbology (symbologies) such as bit area and error correction level. In addition, sufficient marginal space shall be included to accommodate “quiet areas”.

Issuing States are encouraged to locate the bar code(s) area nearest to the top edge of the MRZ to allow for possible use of the optical sensing components from the OCR reader, supported by bar code interpretation logic, to accommodate reading of optional bar code data.

The bar code(s) optionally included in the bar code(s) area of the MRV-A shall not interfere with the accurate reading of data from the MRZ.





## ANNEX F (NORMATIVE) to Section IV

### USE OF OPTIONAL CONTACTLESS INTEGRATED CIRCUIT(S) IN AN MRV-A

**F.1 Scope** — Annex F defines the specifications governing the use of the contactless IC(s) (“proximity”) in an MRV-A at the discretion of the issuing State to allow expansion of the machine readable data capacity.

**F.2 Normative references** — The following International Standards contain provisions which, through reference herein, constitute provisions of Annex F. Where differences exist between the specifications contained in this annex and the referenced Standards to accommodate the addition of the contactless IC(s), the specifications contained herein shall prevail.

ISO/IEC 7810 : 2003	<i>Identification cards — Physical characteristics</i>
ISO/IEC 10536-1 : 2000	<i>Identification cards — Contactless integrated circuit(s) cards — Close-coupled cards — Part 1: Physical characteristics</i>
ISO/IEC 10536-2 : 1995	<i>Identification cards — Contactless integrated circuit(s) cards — Part 2: Dimensions and location of coupling areas</i>
ISO/IEC 10536-3 : 1996	<i>Identification cards — Contactless integrated circuit(s) cards — Part 3: Electronic signals and reset procedures</i>
ISO/IEC 14443-1 : 2000	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 1: Physical characteristics</i>
ISO/IEC 14443-2 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and interface</i>
ISO/IEC 14443-3 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision</i>
ISO/IEC 14443-4 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 4: Transmission protocols</i>
ISO/IEC 10373-1 : 1998	<i>Identification cards — Test methods — Part 1: General characteristics tests</i>

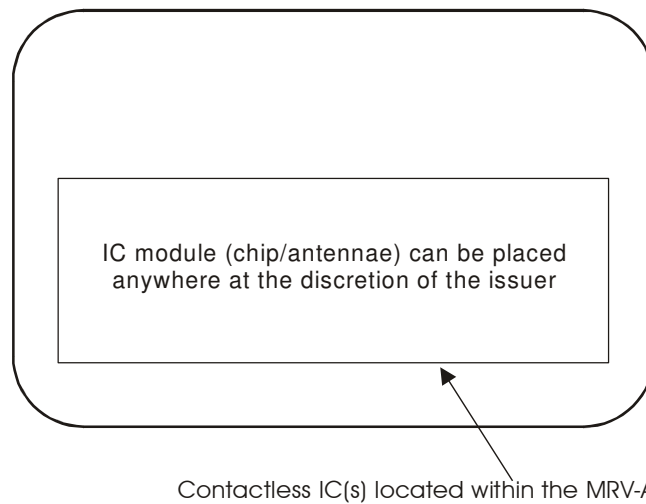
**F.3 Definition** — A contactless IC(s) is defined as the integrated circuit(s) absent of any direct path from the card reader to the integrated circuit(s) resident located within the MRV-A when implemented in conformance with the specifications for the contactless IC(s) as defined in the normative references (F.2) to allow optional machine readable data to be recorded therein.

**F.4 Location of contactless IC(s)** — The contactless IC(s) shall be located within the structure of the MRV-A as illustrated in Figure IV-F1. Exact placement of the contactless IC(s) within the MRV-A shall be at the

discretion of the issuing State. However, when an MRV-A is placed in a passport also enabled by a contactless IC, the contactless IC(s) shall be located in the MRV-A so as to avoid collision with the IC(s) in the passport.

**F.5 Construction of an MRV-A with the contactless IC(s)** —The IC(s) shall be incorporated so as to ensure that the VIZ, the MRZ, and the contactless IC(s) cannot be separated without physical damage.

*Note.*— See Annex B for additional details if the contactless IC(s) is combined with other optional machine readable data technologies.



**Figure IV-F1. MRV-A (with optional contactless IC(s))**



## V. TECHNICAL SPECIFICATIONS FOR FORMAT-B MACHINE READABLE VISAS (MRV-B)

### Scope

1. This section defines the specifications which are unique to Format-B machine readable visas (MRV-B) and are necessary for global interoperability. Section V should be read in conjunction with Section III which defines those specifications for the MRV that are common to all MRTDs. Specifications are included for the discretionary expansion of the machine readable data capacity of the MRV beyond that defined for global interchange, as well as for machine-assisted identity confirmation of the rightful holder, and security features. The Format-B visa (MRV-B) is suitable for use by States who wish to maintain a clear area on the passport visa page adjacent to the visa, so as to allow a seal to be placed on the visa and the passport page on which it is affixed.

### Dimensions and placement of the MRV-B

2. The dimensions and placement of the MRV-B shall be as follows:

2.1 *MRV-B nominal dimensions.* The nominal dimensions of the MRV-B are based on ISO/IEC 7810, ID-2 Type Card as follows:

74.0 mm × 105.0 mm (2.91 in × 4.13 in)

2.2 *MRV-B margins.* The dimensional specifications refer to the outer limits of the MRV-B. A margin of 2.0 mm (0.08 in) along each outer edge, with the exception of the header zone, must be left clear of data.

2.3 *MRV-B edge tolerances.* The edges of the MRV-B shall be within the area circumscribed by the following concentric rectangles as illustrated in Figure V-1.

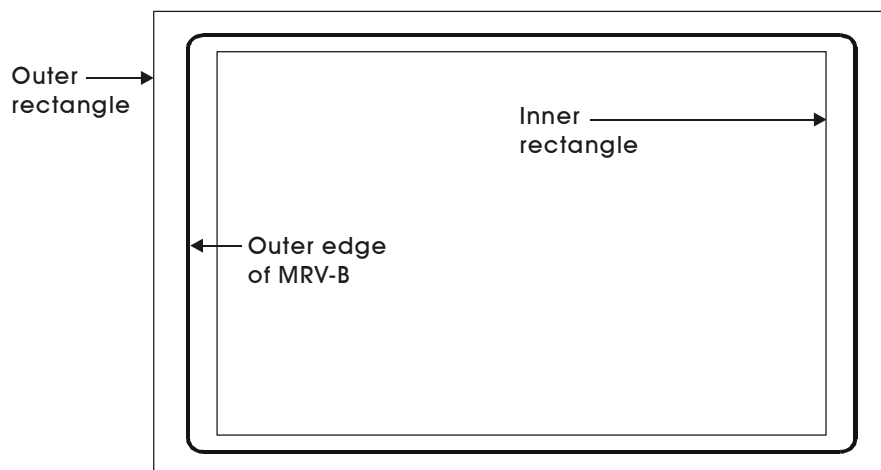
*Inner rectangle:* 73.0 mm × 104.0 mm (2.87 in × 4.09 in)

*Outer rectangle:* 75.0 mm × 106.0 mm (2.95 in × 4.17 in)

2.4 *MRV-B thickness.* If the visa is issued as a label, the increase in thickness once the label is attached to the passport visa page shall not exceed 0.19 mm (0.0075 in). The thickness of the area within the machine readable zone (MRZ) shall not vary by more than 0.05 mm (0.002 in). If a protective laminate is used, it is recommended that its thickness not exceed 0.15 mm (0.006 in).

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*General note.— The decimal notation used in these specifications conforms to ICAO practice. The ISO practice is to use a decimal point (.) in imperial measurements and a comma (,) in metric measurements.*



Not to scale

**Figure V-1. MRV-B dimensional illustration**

2.5 *Placement of the MRV-B.* The MRV-B shall be positioned as follows:

2.5.1 The MRV-B shall be located on the passport visa page such that the MRZ is coincident with and parallel to the outside edge (*reference edge*) of the passport visa page, and the left edge of the MRV-B is coincident with and parallel to the left edge of the passport visa page as defined in Appendix 7.

2.5.2 The MRZ shall be located such that the two OCR lines contained therein are within the Effective Reading Zone (ERZ) as defined in Appendix 4 of Section III.

2.5.3 Only one MRV-B shall be located on a passport visa page (see Appendix 7).

### **General layout of the MRV-B**

3. The MRV-B follows a standardized layout to facilitate reading of data globally, by visual and machine readable means, to accommodate the various requirements of States' laws and practices and to achieve the maximum standardization within those divergent requirements.

3.1 The standard layout incorporates space for a portrait and other identification feature(s). The inclusion of a portrait on a visa is strongly recommended in the interests of security, but States who are not yet able to apply portraits may fill this space with, for example, a national crest.

3.2 An MRV-B is divided into six zones as follows:

Zone I	Mandatory header
Zone II	Mandatory and optional personal data elements
Zone III	Mandatory and optional document data elements
Zone IV	Signature (original or reproduction) or authentication
Zone V	Mandatory zone for identification feature (feature optional)
Zone VII	Mandatory machine readable zone (MRZ)

- Notes.—*
1. *The signature in Zone IV of a visa is that of an issuing officer, not of the document holder. The signature may be replaced or accompanied by an official stamp.*
  2. *To facilitate inspection of visas at immigration, the layout of the visa presents Zone III above Zone II.*
  3. *Zone VI is not available on an MRV issued in the form of a label.*
  4. *Zones I - V constitute the Visual Inspection Zone (VIZ).*

3.3 *MRV-B zones.* Zones I and VII are mandatory. Certain data in Zones II and III are also mandatory. The mandatory components of these four Zones represent the minimum data requirements for an MRV-B. The optional data elements in Zones II, III and V and in optional Zone IV may be elected to accommodate the diverse requirements of States, while achieving the desired level of standardization. The data elements which may be included in the various zones and their order are set out in Appendix 1. Appendices 2 and 3 illustrate the dimensional specifications and tolerances for the two layouts of the MRV-B and the technical specifications for the printing of data elements within the zones. Appendix 3 outlines the guidelines for positioning and adjusting the dimensional specifications of Zones I to V to accommodate the flexibility desired by issuing States *and should be read in conjunction with paragraph 4 of this Section.* Examples of personalized MRV-Bs are shown in Appendix 5. Appendix 6 illustrates the format for the presentation of the machine readable data in Zone VII.

#### **Content, use and dimensional flexibility of zones**

4. The data elements to be included in the zones and the treatment of the zones and guidelines for the dimensional layout of zones shall be as described hereunder.

4.1 Zone I identifies the issuing State and the type of document. These elements are mandatory. The order of the data elements in this zone is left to the discretion of the issuing State.

4.2 To facilitate the checking of visas by airline personnel and control authorities, the essential details of the visa document shall be entered in a standard sequence in Zone III while essential personal details of the holder shall be entered in a standard sequence in Zone II. On a visa, Zone III appears above Zone II.

4.3 Zone IV provides space for an optional signature or authentication. This is normally the signature of the issuing officer or an official stamp. The application of an official stamp elsewhere on the document is not precluded except that it must not intrude into the MRZ or affect the legibility of entered data.

4.4 Zone VII conforms in height to the MRZ defined for all MRTDs so that the machine readable data lines fall within the ERZ specified in Appendix 4, Section III, thus allowing a single reader to be used for all types and sizes of MRTDs.

4.5 All MRZ data elements are mandatory and shall be shown as defined in 6.5 and 6.6 even though an issuing State may choose not to include a specific MRZ data element in the VIZ.

#### 4.6 *Dimensional flexibility of Zones I to V*

4.6.1 Zones I to V may be adjusted in size and shape within the overall dimensional specifications of the MRV-B to accommodate the diverse requirements of issuing States. All zones, however, shall be bounded by straight lines, and all angles where straight lines join shall be right angles (i.e. 90 degrees). It is recommended that the zone boundaries not be printed on the MRV-B. The nominal position of the zones is shown in Appendix 3 to this section.

4.6.2 When an issuing State chooses to produce an MRV-B as a securely attached card containing a transparent or otherwise unprintable border around the card, the available area within the zones will be reduced. The full MRV-B dimensions and zone boundaries shall be measured from the outside edge of this border, which is the external edge of the MRV-B.

4.6.3 Zone I shall be adjacent and parallel to the top edge of the MRV-B and extend across the full 105.0 mm  $\pm$  1.0 mm (4.13 in  $\pm$  0.04 in) dimension. The issuing State may vary the *vertical* dimension of Zone I, as required, but the dimension shall be sufficient to allow legibility of the data elements, and the height shall not be greater than 12.0 mm (0.47 in) as defined in Appendix 3 to this section.

4.6.4 Zone V shall be located such that its left edge is coincident with the left edge of the MRV-B, as defined in Appendix 3 to this section. Zone V may vary in size but any variation from the nominal dimensions shall not exceed the tolerances specified in Appendix 3.

4.6.5 Zone V may move *vertically* along the left edge of the MRV-B and overlay a portion of Zone I as long as individual details contained in either zone are not obscured. Zone V may, as a result, have its *lower external boundary* coincident with the top edge of the MRZ of the MRV-B and its *upper external boundary* coincident with the top edge of the MRV-B.

4.6.6 The upper boundary of Zone III shall be coincident with the lower boundary of Zone I.

4.6.7 Zone III may extend to the full width of that portion of the MRV-B to the right of Zone V.

4.6.8 The lower boundary of Zone III (see Appendix 3) may be positioned at the discretion of the issuing State. Enough space shall be left for Zone II and Zone IV (when used) below the boundary. The boundary does not need to be straight across the 105.0 mm  $\pm$  1.0 mm (4.13 in  $\pm$  0.04 in) dimension of the MRV-B.

4.6.9 Normally, the upper boundary of Zone II should be coincident with the lower boundary of Zone III. The boundary does not have to be straight across the 105.0 mm  $\pm$  1.0 mm (4.13 in  $\pm$  0.04 in) dimension of the visa. Zone II may also overlay a portion of Zone V for the MRV-B if required. When this occurs, issuing States shall ensure that data contained in either zone are not obscured. See Appendix 5.

4.6.10 Zone IV, when included on the MRV-B, shall be entered on the right hand side of the visa immediately above but not intruding into the MRZ. See Appendix 4.

### Detailed layout

5. *Visual inspection zone (VIZ) (Zones I-IV (Layout 1) or V (Layout 2)).* All data in the VIZ shall be clearly legible.

5.1 *Languages/characters.* These specifications provide for entered data in the VIZ to appear in Latin alphabet characters and Arabic numerals, i.e. 1234567890 (see Section III, 6.4). When the mandatory elements of Zones I, II and III are in a national language that does not use the Latin alphabet, a transliteration shall also be provided in the case of the name of the holder. States that use other than Arabic numerals to represent numerical data in the VIZ shall provide a translation into Arabic numerals. In the case of the name of the issuing State, or place of issue, the representation in the original language shall be accompanied by a translation of the name into English, French or Spanish, when the translated name is more familiar to the international community. Optional data elements should be entered in both the national language and one of the English, French or Spanish languages, if space permits.

5.2 *Fields.* Captions shall be used to identify all fields for mandatory data elements in the VIZ, except as specified in the directory below, and may be in the language of the issuing State. If the language of the issuing State used for captions is other than English, French or Spanish, one of these three languages should also be used, and the corresponding text should be presented in italics. The use of captions for fields in the optional zones is at the discretion of the issuing State.

5.2.1 *Unused fields.* When a field is not used, the caption shall not be entered in the MRV-B.

5.3 *Print spacing.* The design of the MRV-B in Zones II and III is based on a vertical line spacing of a maximum of 8 lines per 25.4 mm (1.0 in) and a horizontal printing density of a maximum of 15 characters per 25.4 mm (1.0 in) (see Section III, 6.3). This spacing has been chosen as the smallest in which information is clear and legible. If any optional field or data element is not used, the entered data may be spread out in the VIZ of the MRV-B consistent with the requirement for sequencing zones and data elements. This horizontal printing density and the font and the vertical line spacing may be adjusted at the discretion of each State, provided that in the VIZ all data shall be printed in a size such that they can be easily read and assimilated by a person with normal eyesight. Typical configurations are shown in Appendix 5. Zone VII, the mandatory MRZ, shall be printed with a line spacing as defined in Appendix 2 and a horizontal printing density of 10 characters per 25.4 mm (1.0 in).

5.4 *Data element directory.* The data elements in the VIZ are specified as follows.

### Visual inspection zone — Data element directory

<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
01/I	Issuing State	The State responsible for issuing the MRV-B. This should be printed, the type font being selected at the discretion of the issuing State. A translation of the name into one or more languages, one of which should be English, French or Spanish, should be given when the translated name is more familiar to the international community.	Variable	Notes a, c, d, e, i
02/I	Document	The word or words in the language of the issuing State for the document (visa or other appropriate document) which confers on the holder that State's authority to travel to a port of entry in its territory.	Variable	Notes a, c, d, e, i
03/III	Place of issue	Post/location (usually a city) where the MRV-B is issued. A translation of the name into one or more languages, one of which should be English, French or Spanish, should be given when the translated name is more familiar to the international community.	15	Notes a, b, c, i, k
04/III	Valid from (date)	In most cases this will be the date of issue of the MRV-B and indicates the first date from which the MRV-B can be used to seek entry. For some States the date of issue and the date the visa becomes valid may differ. In such cases the latter shall be indicated in this field and the date of issue may be shown in Field 09 (see below).	8	10; Notes a, b, c, i, k
05/III	Valid until (date)	In most cases this will be the date of expiry of the MRV-B and indicates the last day on which the visa can be used to seek entry. For some States this will be the date by or on which the holder should have left the country concerned.	8	10; Notes a, b, c, i, k
06/III	Number of entries	The number of entries for which the visa is valid.	8	Notes a, b, c, i, k
07/III	Document number	The number given to the visa by the issuing State.	13	Notes a, b, c, i, j, k
08/III	Type/class/category	This field shall include one or more of the following elements: <ul style="list-style-type: none"> <li>— the issuing State's indication of the type and/or class of visa granted in accordance with the law/practice of that State;</li> <li>— the broad categorization of the type of visa granted, e.g. visitor/resident/temporary resident/student/diplomat, etc., in accordance with the law/practice of the issuing State;</li> <li>— any limitations on the territorial validity of the visa.</li> </ul>	46	Notes a, b, c, i, k

\* Notes can be found following 6.6.

<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
09/III	Optional information	This field may include necessary endorsements as to entitlements which attach to the visa. The issuing State may also use this field to include a) the maximum authorized duration of stay; b) conditions related to the granting of the visa; c) date of issue if different from “Valid from” date; and d) record of any fees paid.		Note g
10,11/II	Name	<p>The full name of the holder, as identified by the issuing State. The name shall be divided, where possible, by the issuing State into two parts, the first representing that portion of the name that the issuing State defines as the “primary identifier” for the holder (e.g. surname, maiden name plus married name, family name) and the second representing all remaining components (e.g. given names, initials) of the holder’s name and which the issuing State considers as collectively representing a “secondary identifier”. The two parts, i.e. primary and secondary identifiers, once integrated, constitute the name of the visa holder.</p> <p>Where the issuing State determines that the holder’s name cannot be divided into the two parts, as defined above, the full name of the holder shall be defined as the primary identifier.</p>	Variable	Section III, 6 & 9 Notes a, c, i, k
10/II	Primary identifier	Predominant component(s) of the name of the holder as described above. In cases where the predominant component(s) of the name of the holder (e.g. where this consists of composite names) cannot be shown in full or in the same order, owing to space limitations of field(s) 10 and/or 11 or national practice, the most important component(s) (as determined by the State) of the primary identifier shall be inserted.	Variable	Section III, 6 & 9 Notes a, c, i, k
11/II	Secondary identifier	Secondary component(s) of the name of the holder, as described above. The most important component(s) (as determined by the State) of the secondary identifier of the holder shall be inserted in full, up to the maximum dimensions of the field frame. Other components, where necessary, may be represented by initials. Where the holder’s name has only predominant component(s), this data field shall be left blank. A State may optionally utilize the whole zone comprising fields 10 and 11 as a single field. In such a case the primary identifier shall be placed first, followed by a comma and a space, followed by the secondary identifier.	Variable	Section III, 6 & 9 Notes a, c, i
12/II (optional field)	Passport number	The number of the passport or other travel document in which the MRV-B is placed.	Variable	Notes a, b, c, g, i, j

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\* Notes can be found following 6.6.

<i>Field/ zone no.</i>	<i>Data element</i>	<i>Specifications</i>	<i>Maximum no. of character positions</i>	<i>References and notes*</i>
13/II (optional field)	Sex	Sex of MRV-B holder, when included, is to be specified by use of the single initial commonly used in the language of the State of issue. If translation into English, French or Spanish is necessary, followed by a dash and the capital letter F for female, M for male, or X for unspecified.	3 Fixed	Notes a, f, g
14/II (optional field)	Date of birth	Holder's date of birth as recorded by the issuing State. For unknown dates see 10.1.6.	9	10; Notes a, b, c, k
15/II (optional field)	Nationality	Nationality of the holder as recorded by the issuing State, in accordance with the codes in Appendix 1 to Section III.	3 Fixed	Notes a, h, k
16/IV (optional field and zone)	Signature or other authorization	An authorization which may be the signature of an issuing official or an official stamp.		
17/V	Identification feature	This field shall appear on the document and should contain a portrait of the holder. If included, the portrait shall have a nominal size of 35.0 mm × 28.5 mm (1.38 in x 1.12 in).  At the option of the issuing State, this field may contain another biometric identifier or security feature(s) provided this does not obscure the portrait.  If a State does not place an identification feature in this field, a national symbol or logo may be inserted instead.  See Section III, 11.1 for additional specifications for the portrait.		Note e

\* Notes can be found following 6.6.

## 6. *Machine readable zone (MRZ) (Mandatory Zone VII)*

6.1 *MRZ position.* The MRZ is located at the bottom of the MRV-B. Appendix 2 shows the nominal position of the data in the MRZ.

6.2 *Data elements.* The data elements corresponding to Fields 01, 05, 10, 11, and 13 to 15 of the VIZ are mandatory in the MRZ and shall be printed in machine readable form, in the MRZ, beginning with the leftmost character position in each field in the sequence indicated in the data structure specifications shown below. Appendix 6 indicates the structure of the MRZ.

6.3 *Print specifications.* Machine readable data shall be printed in OCR-B type font, size 1, constant stroke width, as specified in 7.4.4. of Section III. The MRZ shall be printed with the line spacing as defined in Appendix 2 to this section and a horizontal printing density of 10 characters per 25.4 mm (1.0 in).



6.4 *Print position.* The position of the left-hand edge of the first character shall be 4.0 mm  $\pm$  1.0 mm (0.16 in  $\pm$  0.04 in) from the left-hand edge of the document. Reference centre lines for the two OCR lines and a nominal starting position for the first character of each line are shown in Appendix 2 to this section. The positioning of the characters is indicated by those reference lines and by the printing zones of the two code lines in Appendix 2 to this section.

### Data structure of machine readable data for the MRV-B

#### 6.5 Data structure of the upper machine readable line

<i>MRZ field character positions (line 1)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
1 to 2		Type of document	Capital letter V to designate an MRV. One additional character may be used, at the discretion of the issuing State, to designate a particular type of visa. If the second character position is not used for this purpose, it shall be filled by the filler character (<).	2	Notes a, b, c, e
3 to 5	1	Issuing State	The three-letter code specified in Section III, Appendix 1 shall be used. If the code contains fewer than 3 characters, filler character(s) shall be inserted in the unused position(s).	3	Notes a, c, e
6 to 36	10, 11	Name	The name consists of primary and secondary identifiers which shall be separated by two filler characters (<<). Components within the primary or secondary identifiers shall be separated by a single filler character (<).  When the name of the document holder has only one part, it shall be placed first in the character positions for the primary identifier, and filler characters (<) shall be used to complete the unused character positions of the line.	31 [Primary identifier(s), Secondary identifier(s) and fillers]	Section III, 10.1 to 10.10; Notes a, c, e
		Punctuation in the name	Representation of punctuation is not permitted in the MRZ.		Section III, 10.9
		Apostrophes in the name	Components of the name in the VIZ, separated by apostrophes shall be combined, and no filler character (<) shall be inserted. <i>Example:</i> VIZ: D'ARTAGNAN MRZ: DARTAGNAN		Section III, 10.9

<i>MRZ field character positions (line 1)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
		Hyphens in the name	Hyphens (-) in the name shall be converted to the filler character (<) (i.e. hyphenated names shall be represented as separate components). <i>Example:</i> VIZ: Marie-Elise MRZ: M A R I E < E L I S E		Section III, 10.9
		Commas	When a comma is used in the VIZ to separate the primary and secondary identifiers, the comma shall be omitted in the MRZ and the primary and secondary identifiers shall be separated by two filler characters (<<).  When a comma is used in the VIZ to separate two name components, it shall be represented in the MRZ by a single filler character (<).		Section III, 10.9
		Name suffixes	Name suffixes (e.g. Jr., Sr., II or III) shall not be included in the MRZ except as permitted by Section III, 10.7 as components of the secondary identifier.		Section III, 10.7
		Filler	When all components of the primary and secondary identifiers and required separators (filler characters) do not exceed 31 characters in total, all name components shall be included in the MRZ and all unused character positions shall be completed with filler characters (<) repeated up to position 36 as required.		
		Truncation of the name	When the primary and secondary identifiers and required separators (filler characters) exceed the number of character positions available for names (i.e. 31), they shall be truncated as follows:  Characters shall be removed from one or more components of the primary identifier until three character positions are freed, and two filler characters (<<) and the first character of the first component of the secondary identifier can be inserted. The last character (position 36) shall be an alphabetic character (A through Z). This indicates that truncation may have occurred.		Section III, 10.6 Notes a, c, e

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\* Notes can be found following 6.6.

<i>MRZ field character positions (line 1)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
			<p>Further truncation of the primary identifier may be carried out to allow characters of the secondary identifier to be included, provided that the name field shall end with an alphabetic character (position 36). This indicates that truncation may have occurred.</p> <p>When the name consists of only a primary identifier which exceeds the number of character positions available for the name, i.e. 31, characters shall be removed from one or more components of the name until the last character in the name field is an alphabetic character.</p>		

### 6.6 Data structure of the lower machine readable line

<i>MRZ field character positions (line 2)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
1 to 9	07 or 12	Passport or document number	At the discretion of the issuing State, either the passport number or the visa number shall be used in this field; however, the latter option can only be exercised where the visa number has 9 characters or fewer. Any special characters or spaces in the number shall be replaced by the filler character (<). The number shall be followed by the filler character (<) repeated up to position 9 as required.	9	Notes a, b, c, e, j
10		Check digit	See 11 and 12.	1	Notes b, e
11 to 13	15	Nationality	The code specified in Appendix 1 of Section III shall be used. Spaces are replaced with the filler character (<).	3	Notes a, c, e, h
14 to 19	14	Date of birth	<p>The structure is YYMMDD, where:</p> <p>YY = Year (2 positions) MM = Month (2 positions) DD = Day (2 positions).</p> <p>For unknown dates see 10.2.2.</p>	6	10.2; Notes b, c, e
20		Check digit	See 11 and 12.	1	Note b

\* Notes can be found following 6.6.

<i>MRZ field character positions (line 2)</i>	<i>Field no. in VIZ</i>	<i>Data element</i>	<i>Specifications</i>	<i>Number of characters</i>	<i>References and notes*</i>
21	13	Sex	F = Female; M = Male; < = non-specified.	1	Notes a, c, f, g
22 to 27	5	Valid until (date)	In most cases this will be the date of expiry of the MRV-B and indicates the last day on which the visa can be used to seek entry. For some States this will be the date by or on which the holder should have left.  The structure is YYMMDD, where:  YY = Year (2 positions) MM = Month (2 positions) DD = Day (2 positions).	6	10.2; Notes b, e
28		Check digit	See 11 and 12.	1	Note b
29 to 36		Optional elements	For optional use of the issuing State. Unused character positions shall be completed with the filler character (<) repeated up to position 36 as required.	8	Notes a, b, c, e

\* Notes for 5.4, 6.5 and 6.6.

- a) Alphabetic characters (A–Z). National characters may be used in the VIZ. In the MRZ, only those characters specified in Appendix 2 to Section III shall be used.
- b) Numeric characters (0–9). National numerals may be used in the VIZ. In the MRZ, only those characters specified in Appendix 2 to Section III shall be used.
- c) Punctuation or other special characters may be used in the VIZ. In the MRZ, only the filler character specified in Appendix 2 to Section III shall be used.
- d) The lengths of fields 01 and 02 are undefined, depending on type font and limits set by MRV-B size and position of other fields.
- e) The field caption is not printed on the document.
- f) Where a person does not wish his/her sex to be identified or where a State does not want to show this data, the filler character (<) shall be used in this field in the MRZ and an X in this field in the VIZ.
- g) The use of a caption to identify a field is at the option of the issuing State.
- h) United Nations Laissez-passer are issued to officials of the United Nations Organization under the terms of the Convention on the Privileges and Immunities of the United Nations of 13 February 1946 and to officials of the Specialized Agencies of the United Nations under the terms of the Convention on the Privileges and Immunities of the Specialized Agencies of the United Nations of 21 November 1947. In the case of visas entered in the United Nations Laissez-passer, in keeping with the international character of United Nations officials, nationality shall not be shown. Instead the appropriate code shall be entered in accordance with Part B of Appendix 1 to Section III.
- i) The number of characters (in the field length) includes any blank spaces.
- j) The number of characters in the VIZ may be variable; however, if the document number has more than 9 characters, the 9 principal characters shall be shown in the MRZ in character positions 1 to 9.
- k) The field caption shall be printed on the document.



(b) One or more name components truncated:

Name: Nilavadhanananda Arnpol Petch Charonguang  
 VIZ: NILAVADHANANANDA, Arnpol Petch Charonguang  
 MRZ (upper line): V<UTONILAVADHANANANDA<<ARNP<PE<CHARO

#### 6.7.2 Truncated names — Primary identifier truncated

(a) One or more components truncated to initials:

Name: Dingo Potoroo Bennelong Wooloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENNELONG<WOOLOOMOOLOO<WAR<W<<D

(b) One or more components truncated:

Name: Dingo Potoroo Bennelong Wooloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENNELONG<WOOLOOM<WAR<WA<<DINGO

(c) One or more components truncated to a fixed number of characters:

Name: Dingo Potoroo Bennelong Wooloomooloo Warrandyte Warnambool  
 VIZ: BENNELONG WOOLOOMOOLOO WARRANDYTE WARNAMBOOL, Dingo Potoroo  
 MRZ (upper line): V<UTOBENN<WOOL<WARR<WARN<<DINGO<POTO

#### 6.7.3 Names that just fit, indicating possible truncation by letter in the last position of the name field, but which are not truncated

Name: Stephen Trevor Papandropoulous  
 VIZ: PAPANPROPOULOUS, Stephen Trevor  
 MRZ (upper line): V<UTOPAPANPROPOULOUS<<STEPHEN<TREVOR

*Note.* — Even though there is an alphabetic character in the 36th character position of this MRV-B upper machine readable line, this name has not been truncated **but it shall be assumed that it has been truncated.**

### Representation of the issuing State and the nationality of the holder

#### 7. Visual inspection zone (VIZ)

7.1 Where the name of the issuing State and/or the place of issue or place of birth are in a national language that does not use Latin characters, the name of the State or other location shall appear in the national language and also shall be either transliterated into Latin characters or translated into one or more languages (at least one of which must be English, French or Spanish) by which the name may be more commonly known to the international community. The name in the different languages shall be separated by an oblique character (/) followed by at least one blank space.

7.2 Where the name of the issuing State or place of issue or place of birth is in a language that uses the Latin alphabet, but where the name is more familiar to the international community in its translation into another language or languages (particularly English, French or Spanish), the name in the national language should be accompanied by one or more translations of the name. The name in the different languages shall be separated by an oblique character (/) followed by at least one blank space.

7.3 The three-letter codes listed in Appendix 1 to Section III shall be used to complete the field for the nationality of the holder, if the issuing State chooses to portray this field in the VIZ.

#### 8. Machine readable zone (MRZ)

8.1 The three-letter codes listed in Appendix 1 to Section III shall be used to complete the fields for the issuing State and holder's nationality (character positions 3-5 in the upper machine readable line and 11-13 in the lower machine readable line, respectively) in the MRZ of the MRV-B.

#### 9. Three-letter code use

9.1 Use of three-letter codes is mandatory in the MRZ and optional in the VIZ. Specific locations are defined in the following table.

	<i>Zone</i>	<i>Field no.</i>	<i>Character position no.</i>	<i>Number of character positions</i>
Issuing State	VIZ	1	In full	Variable
	MRZ (upper line)		3-5	3
Holder's nationality	VIZ	15	—	33
	MRZ (lower line)		11-13	

### Representation of dates

10. Dates shall be presented as set forth hereunder.

10.1 *Dates in the VIZ.* Such dates on the MRV-B data page shall be entered in accordance with the Gregorian calendar as follows.

10.1.1 Days shall be shown by a two-digit number, i.e. the dates from one to nine shall be preceded by a zero.

10.1.2 The month may be printed in full in English, French or Spanish, or abbreviated, using up to four character positions.

### Abbreviations of months in English, French and Spanish

<i>Month</i>	<i>English</i>	<i>French</i>	<i>Spanish</i>
January	Jan	Jan	Ene
February	Feb	Fév	Feb
March	Mar	Mars	Mar
April	Apr	Avr	Abr
May	May	Mai	Mayo
June	Jun	Juin	Jun
July	Jul	Juil	Jul
August	Aug	Août	Ago
September	Sep	Sept	Sept
October	Oct	Oct	Oct
November	Nov	Nov	Nov
December	Dec	Déc	Dic

10.1.3 The year shall be shown by the last two digits.

10.1.4 As an example, using the recommended practice, a date of 12 July 1942 would be entered in an MRV-B as follows:

- a) Using French                    12JUIL42
- b) Using English or Spanish    12JUL 42

10.1.5 The month may, however, be represented in numerical form in the VIZ, at the discretion of the issuing State, particularly in cases where the use of English, French or Spanish is not acceptable or where this might facilitate the use of MRVs by countries using other than the Gregorian calendar. Following a practice established to facilitate the visual inspection of travel documents, a date would be written DD MM YY. For example, a date of birth of 12 July 1942, would appear in the visual zone of the MRV-B as follows:

12 07 42.

10.1.6 *Unknown date of birth.* Where a date of birth is completely unknown, that data element shall be entered as follows:

XXbXXXbXX

b = blank space

If only part of the date of birth is unknown, that part shall be represented by XX if it is the day or year, or by XXX if it is the month.

10.2 *Dates in the MRZ.* Such dates on the MRV-B shall, in accordance with the standard set forth in ISO 8601, be shown as a six-digit number consisting of the last two digits for the year (YY) followed by two digits for the number of the month (MM) and by two digits for the day (DD). The structure is as follows: YYMMDD.



10.2.1 Following this format, the example given in 10.1.6 would be shown as: 420712.

10.2.2 If all or part of the birth date is unknown, the relevant character positions shall be completed with filler characters (<).

### Check digits in the MRZ

11. The data structure of the lower machine readable line in 6.6 provides for the inclusion of three check digits as follows:

<i>Check digit</i>	<i>Character positions (lower MRZ line) used to calculate the check digit</i>	<i>Check digit position (lower MRZ line)</i>
Passport or Document Number Check Digit	1–9	10
Date of Birth Check Digit	14–19	20
Valid Until (date) Check Digit	22–27	28

11.1 Details on calculation of check digits in the MRZ are set out below. A special check digit calculation has been adopted for use in MRTDs. The check digits shall be calculated on modulus 10 with a continuously repetitive weighting of 731 731 ..., as follows.

11.1.1 *Step 1.* Going from left to right, multiply each digit of the pertinent numerical data element by the weighting figure appearing in the corresponding sequential position.

11.1.2 *Step 2.* Add the products of each multiplication.

11.1.3 *Step 3.* Divide the sum by 10 (the modulus).

11.1.4 *Step 4.* The remainder shall be the check digit.

11.1.5 For data elements in which the number does not occupy all available character positions, the filler character (<) shall be used to complete vacant positions and shall be given the value of zero for the purpose of calculating the check digit.

11.1.6 When the check digit calculation is applied to data elements containing alphabetic characters, the characters A to Z shall have the values 10 to 35 consecutively, as follows:

A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y	Z
10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	35

11.1.7 *Example 1.* Using 27 July 1952 as an example, with the date in numeric form as specified in ISO 8601, the calculation will be:

	Date:	5	2	0	7	2	7	
	Weighting:	7	3	1	7	3	1	
Step 1 (multiplication)	Products:	35	6	0	49	6	7	
Step 2 (sum of products)		35 + 6 + 0 + 49 + 6 + 7 = 103						
Step 3 (division by modulus)		$\frac{103}{10} = 10$ , remainder 3						

Step 4. Check digit is the remainder, 3. The date and its check digit shall consequently be written as **5207273**.

11.1.8 *Example 2.* Using the passport number AB2134 as an example for coding a 9-character, fixed-length field (e.g. passport number), the calculation will be:

Passport No.:	A	B	2	1	3	4	<	<	<
Assigned numeric values:	10	11	2	1	3	4	0	0	0
Weighting:	7	3	1	7	3	1	7	3	1
Step 1 (multiplication)	Products:	70	33	2	7	9	4	0	0
Step 2 (sum of products)		70 + 33 + 2 + 7 + 9 + 4 + 0 + 0 + 0 = 125							
Step 3 (division by modulus)		$\frac{125}{10} = 12$ , remainder 5							

Step 4. Check digit is the remainder, 5. The passport number and its check digit shall consequently be written as **AB2134<<<5**.

11.1.9 *Composite check digit.* No mandatory composite check digit is defined for the MRV-B.

### Character sets and fonts

12. The character sets and fonts to be used on the MRV-B shall be as indicated hereunder.

#### 12.1 Captions

12.1.1 Captions in Fields 03 through 10 for the data elements listed in the directory appearing in 5.4 shall be printed in a clear, linear type font in a size of 1.0 mm to 1.8 mm (0.04 in to 0.07 in).

12.1.2 Captions shall be in the language of the issuing State. When such language uses the Latin alphabet, regular font style should be used to print the captions.

12.1.3 Where the language of the issuing State is not English, French or Spanish, the printed caption, as defined in 12.1.2, shall be followed by an oblique character (/) and the equivalent of the caption in English, French or Spanish. An italic font style should be used for the second language.

*Note.* — Where the language of the issuing State is English, French or Spanish, the issuing State should use one of the other two languages to print the caption following the oblique character (/).

12.2 Entered data in the visual inspection zone (VIZ). See Section III, 6 and 8.

12.3 Entered data in the machine readable zone (MRZ). See Section III, 7 and 8.

### Portrait

13. *Portrait.* For the MRV Format-B, Layout 2, the rectangular area defined in the data element directory as Zone V should contain a portrait. Such portrait, if included, shall represent only the holder of the MRV-B.

13.1 *Position of holder's portrait.* If a laminate is used over a glued-in portrait, the margin between the portrait and the left-hand edge of the visa should be increased to 6.0 mm (0.24 in) by moving the portrait 4.0 mm (0.16 in) to the right. This is to provide a secure and durable adherence of the laminate to the visa on the left-hand margin. This would result in reduction in the width of fields for identification and document data.

13.2 *Portrait edges.* The portrait may have irregular edges. When a digitally printed reproduction is used, the background of the portrait may be dropped out in order to provide protection against forgery or substitution.

13.3 *Zone V without an identification feature.* A standard default image, such as a national symbol, crest or wording, should be selected and used in Zone V when an identification feature is not included.

### Characteristics of the MRZ

14. Except as otherwise specified herein, the MRV-B shall conform with ISO 1831 concerning the following matters:

- optical properties of the substrate to be used;
- optical and dimensional properties of the image patterns forming OCR characters;
- basic requirements related to the position of OCR characters on the substrate.

14.1 Machine readable data shall be arranged from left to right in fixed-length fields in two lines (upper and lower) in the order specified in the data structure tables shown in 6.5 and 6.6, respectively, and located on the document as shown in Appendix 2 to this section. Data shall be entered in each field, beginning with the left-hand character position.

14.2 Where the entered data do not occupy all the character positions specified for the relevant field, the filler character (<) shall be used to complete the redundant positions.

### Quality specifications of the MRZ

15. In general, the print quality shall conform to ISO 1831, Range X, except as otherwise provided herein. All quality specifications set forth hereunder shall apply to MRV-Bs after final preparation and placement in the passport or other travel document, except where otherwise noted, and conform to the requirements of Section III, 2.

- 15.1 *Substrate quality.* ISO 1831, 4.3 through 4.3.2 shall be used for reference only.
- 15.2 *Substrate opacity.* The substrate used, measured before and after final preparation and prior to placement in the passport or other travel document, shall be within the definition of at least medium opacity (ISO 1831, 4.4.1 and 4.4.3).
- 15.3 *Substrate gloss.* The level of gloss is not specified.
- 15.4 *Fluorescence.* The reflectance of the substrate in the visible spectrum shall exhibit no visibly detectable fluorescence when irradiated by ultraviolet light, except where this is a predictable fluorescence for security reasons.
- 15.5 *Alternative substrates.* The guidelines in 15.1 to 15.4 should be followed irrespective of the substrate material.
- 15.6 *Spectral band.* The OCR print shall be legible visually and shall be black (B425 through B680 as defined in ISO 1831). The OCR print in the MRZ shall also absorb in the B900 band as defined in ISO 1831 (i.e. near infra-red). This property must test successfully when the characters are machine-read through any protective material that may have been applied to the surface of the document.
- 15.7 *Print contrast signal (PCS).* After final preparation, the minimum print contrast signal (PCS/min), when measured as specified in ISO 1831, shall be as follows:  $PCS/min \geq 0.6$  at the B900 spectral band.
- 15.8 *Character stroke width.* The stroke width after final preparation shall be as specified for Range X in ISO 1831 (5.3.1).
- 15.9 *Contrast variation ratio (CVR).* After final preparation, the CVR should be as is shown for Range X in ISO 1831, i.e.  $CVR < 1.50$ .
- 15.10 *Spots and extraneous marks.* ISO Standard 1831 (5.4.4.6 and 5.4.5.12) shall apply at the reading surface (see also B.6 of Annex B and C5.10 of Annex C to ISO 1831).
- 15.11 *VOIDS.* The value of “d” as defined in ISO 1831 (5.4.5.9) shall be equal to 0.4 at the reading surface.
- 15.12 *Line separation.* See 6.4 and Appendix 2 to this section.
- 15.13 *Line spacing.* See 6.4 and Appendix 2 to this section.
- 15.14 *Skew.* The provisions relating to skew shall be as follows:
- 15.14.1 *Skew of MRZ characters.* The skew of individual MRZ characters on the MRV-B shall not exceed 3 degrees measured from the reference edge of the passport or travel document to which the MRV-B is affixed.
- 15.14.2 *Skew of the MRZ lines.* The effect of the actual skew of the MRZ lines and the actual skew of the MRZ characters shall not exceed the limit specified in 15.14.1, nor shall the skew of the MRZ or character misalignment result in the MRZ lines or any part thereof appearing outside the ERZ as defined in Appendix 4 of Section III.

### Optional expansion of machine readable data capacity

16. Should a State wish to expand the machine readable data capacity of the MRV-B beyond that defined for global interchange (see Section III, 7), and intend that data stored in such expanded capacity be readable in other than its own systems, the issuing State shall use the following additional machine readable data technologies, as appropriate, as specified below.

16.1 *Bar code(s)*. See Annex E for details on the use of bar code(s) to expand the machine readable data capacity of an MRV-B.

16.2 *Contactless integrated circuit(s)*. See Annex F for details on the use of contactless integrated circuit(s) to expand the machine readable data capacity of an MRV-B.

17. *Coexistence*. Proper coexistence of the above optional machine readable data storage technologies with the *mandatory OCR technology* is critical to ensure global interoperability of the MRV-B. Annex B (currently in development) will provide informative details on the possible combinations available (scenarios) to assist the issuing State, should it choose to use the above optional technologies to expand the machine readable data capacity of the MRV-B in addition to the mandatory OCR technology.

17.1 *Logical data structure*. This edition of Doc 9303, Part 2 does not specify which data elements could or should be contained within the optional data storage technologies nor the format in which the various data elements are presented. A Logical Data Structure, which includes a range of mandatory and optional data elements and a preferred method of presenting those data, has been developed and will be published subsequently.

### Optional machine-assisted identity confirmation and document security feature verification using an MRV-B

18. Should a State wish to provide for machine-assisted identity confirmation and/or machine-assisted document security feature verification with the MRV-B, and global interoperability is the objective, the specifications and/or recommendations below shall be applied.

18.1 *Machine-assisted identity confirmation*. See Annex C for details on machine-assisted identity confirmation of the rightful holder when using an MRV-B.

18.2 *Machine-assisted security feature verification*. See Annex D for details on machine-assisted document security feature verification for an MRV-B.

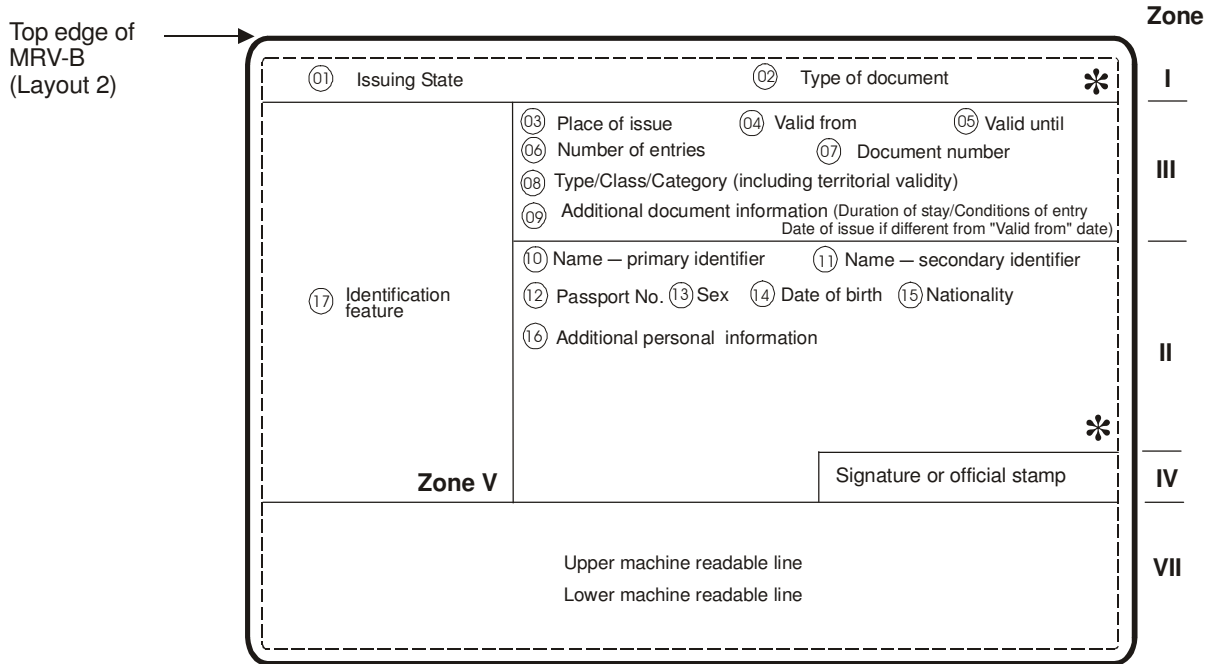
19. *Coexistence*. Proper coexistence of optional machine-assisted identity confirmation and document security feature verification technologies with the mandatory OCR technology and/or optional machine readable data expansion technologies is critical to ensure global interoperability of the MRV-B. Annex B (currently in development) will provide informative details on the possible combinations available (scenarios) should the issuing State choose to use machine-assisted identity confirmation or document security feature verification with the MRV-B.

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**APPENDIX 1 to Section V**

**LOCATION OF DATA ELEMENTS ON A FORMAT-B  
MACHINE READABLE VISA  
(MRV-B)**



\* Optional control number — to be preprinted at the option of the issuing State either horizontally where shown in Zone I or in Zone II or vertically anywhere along the right-hand edge of Zone V (where present).

Not to scale

**NOTES:**

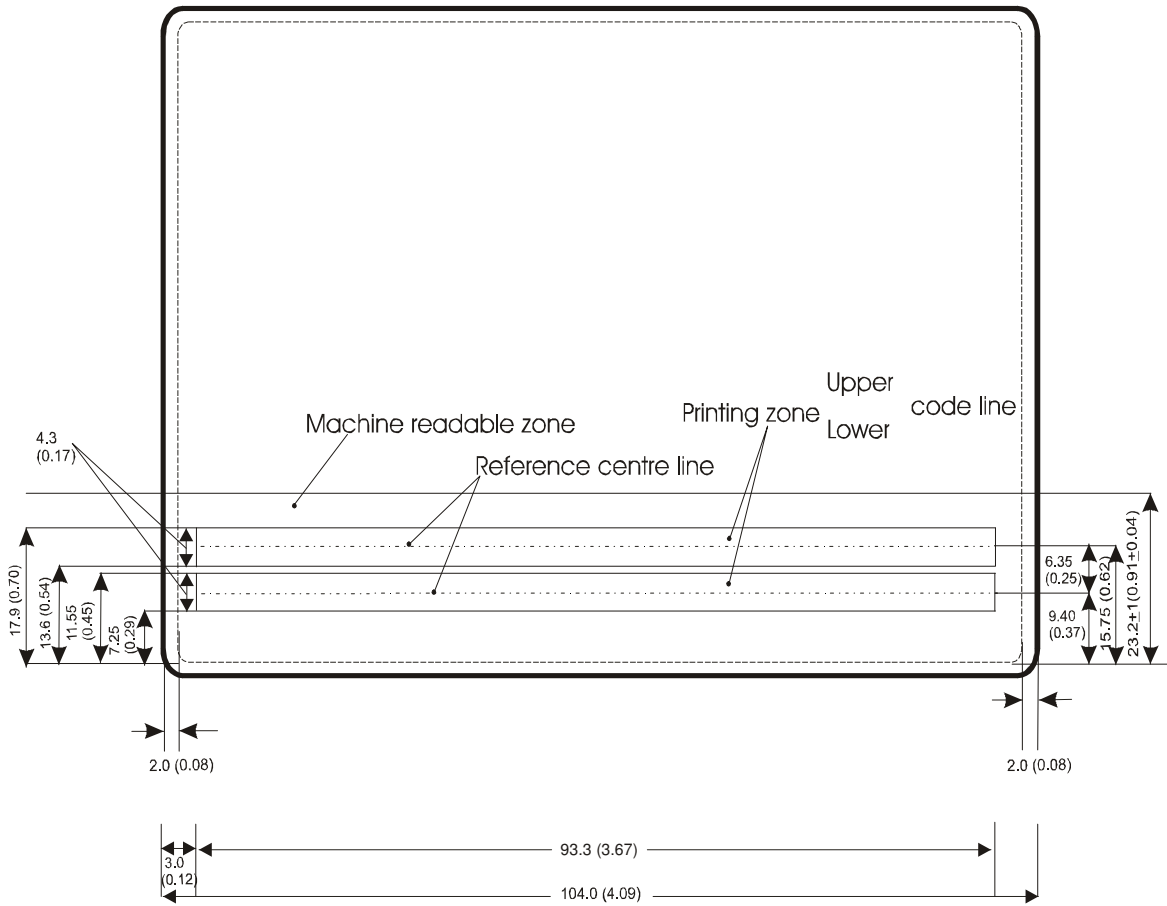
1. VIZ based on maximum printing density of 8 lines per 25.4 mm (1.0 in) and horizontal printing density of 15 characters per 25.4 mm (1.0 in)
2. MRZ based on horizontal printing of 10 characters per 25.4 mm (1.0 in)
3. ○ = field numbers
4. The borderlines of the zones are omitted on the actual visa.





APPENDIX 2 to Section V

SCHMATIC DIAGRAM OF THE MACHINE READABLE ZONE  
OF AN MRV-B



Dimensions in millimetres  
(inch dimensions in parentheses)

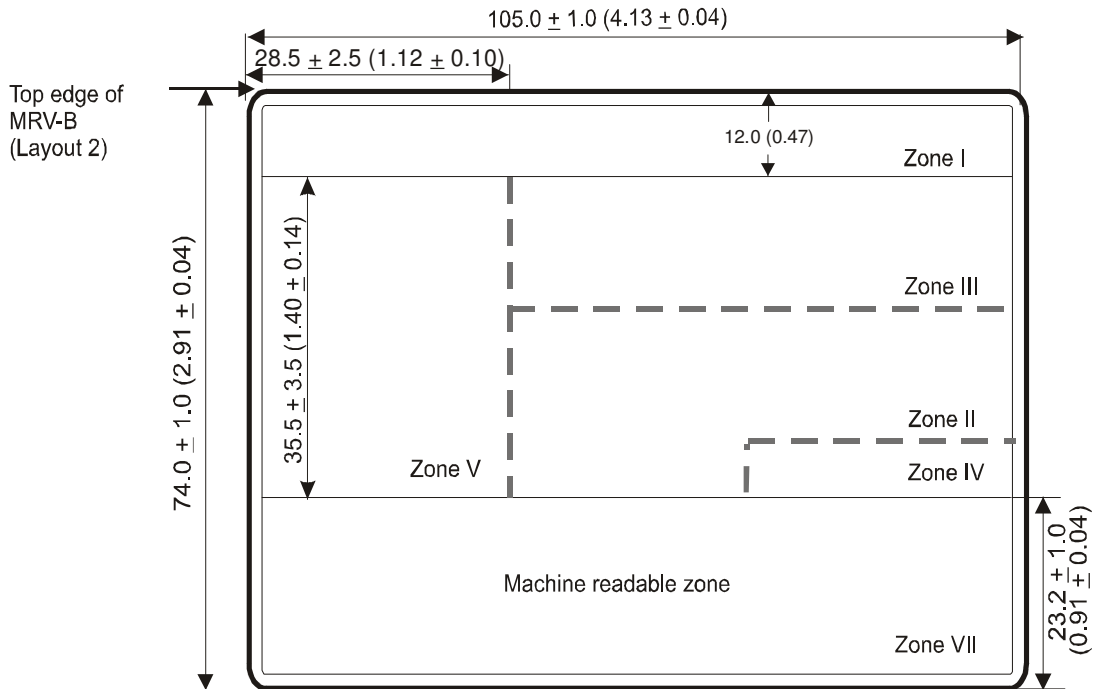
Scale 1:1

Note.— For illustration purposes, the smallest option for the 105.0 mm (4.13 in) dimension of the MRV-B and the smallest option for the left-hand margin in the MRZ have been selected.



**APPENDIX 3 to Section V**

**NOMINAL POSITIONING OF ZONES ON A FORMAT-B  
MACHINE READABLE VISA (MRV-B)**



Dimensions in millimetres  
(inch dimensions in parentheses)

Not to scale

This diagram should be considered in conjunction with paragraph 4 of Section V. It assumes that all the available space for data in the Visual Inspection Zone is used. The line spacing in the VIZ is the closest permitted at 8 lines per 25.4 mm (1.0 in). If an issuing State requires less information the line spacing can be increased to print fewer lines in the VIZ.

Dotted lines indicate zone boundaries whose positions are not fixed, enabling issuing States flexibility in the presentation of data.

The dimensions of the identification feature (normally a portrait) shall be between a minimum of 32.0 mm × 26.0 mm (1.26 in × 1.02 in) and a maximum of 39.0 mm × 31.0 mm (1.54 in × 1.22 in). An issuing State may elect to issue an MRV in this format without an identification feature, replacing it with a crest or symbol.

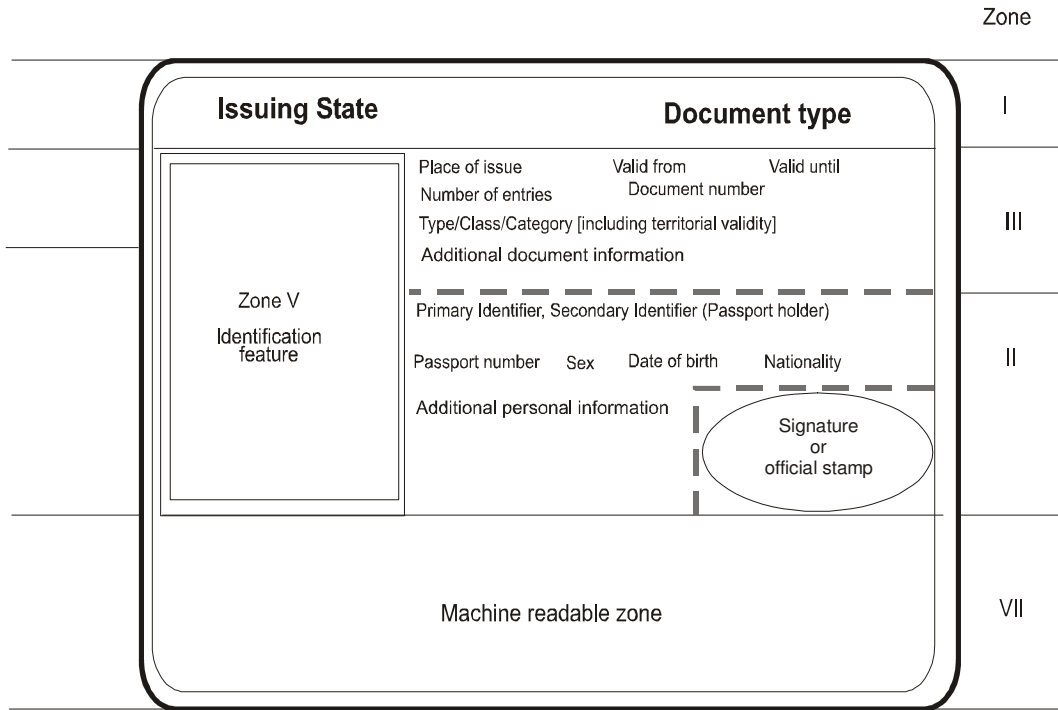
Though the portrait position is defined as a rectangular area, it may have irregular edges or, if the portrait is digitally printed, have the background dropped out. Such technique may be used to provide protection against fraudulent alteration.

When the identification feature is a photograph affixed to the visa and protected by a laminate, the photograph is to be positioned a further 4.0 mm (0.16 in) to the right.



**APPENDIX 4 to Section V**

**DATA ELEMENTS ON A FORMAT-B  
MACHINE READABLE VISA (MRV-B)**



Zone

Not to scale

**NOTES:**

1. Broken lines indicate zone borders whose position may be adjusted by the issuing State to optimize the presentation of the data. Solid lines indicate fixed zone borders. Zone border lines are not printed on the document.
2. When the identification feature is a photograph affixed to the visa and protected by a laminate, the photograph is to be positioned a further 4.0 mm (0.16 in) to the right.
3. Provided it is contained within the rectangular area, the identification feature may have irregular edges.
4. An issuing State may elect to issue a visa with the identification feature replaced by a crest or symbol.









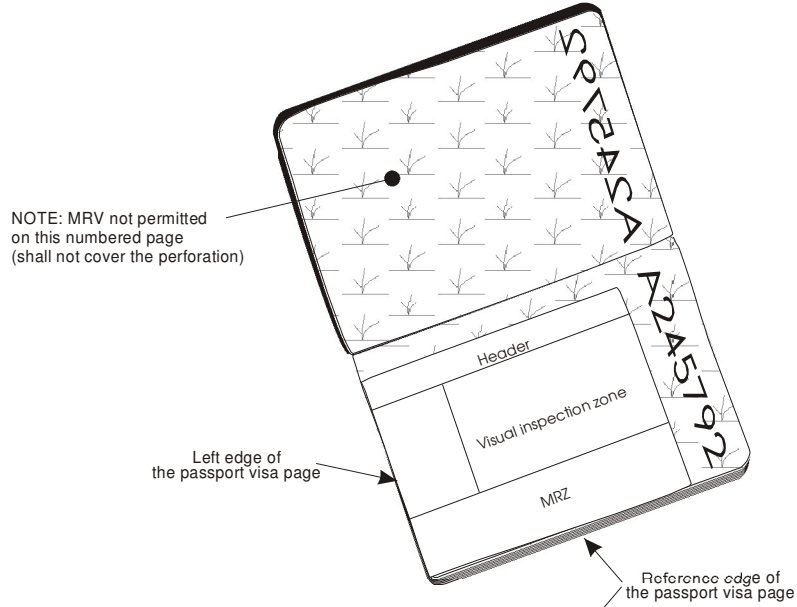




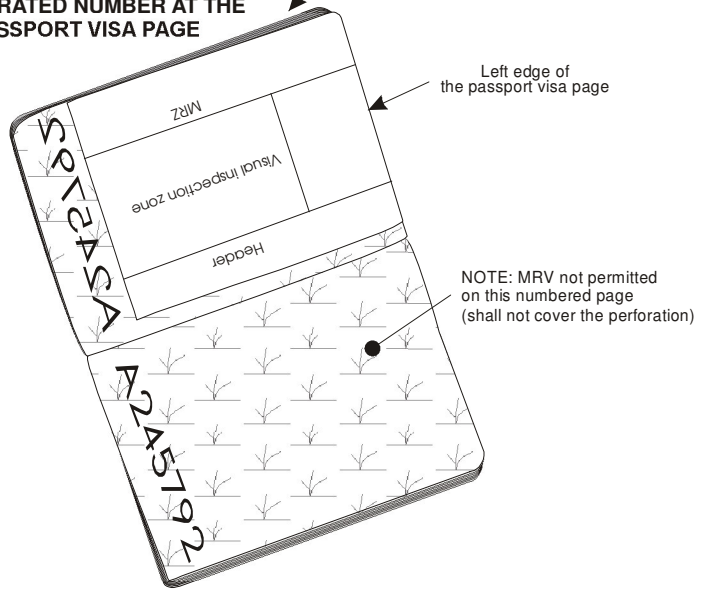
APPENDIX 7 to Section V

POSITIONING OF A MACHINE READABLE VISA (MRV-B) IN A PASSPORT  
Example of positioning of a Format-B Machine Readable Visa (MRV-B)

EXAMPLE 1: PRINTED OR PERFORATED NUMBER AT THE TOP OF THE PASSPORT VISA PAGE



EXAMPLE 2: PRINTED OR PERFORATED NUMBER AT THE BOTTOM OF THE PASSPORT VISA PAGE





## ANNEX A (INFORMATIVE) to Section V

### VISAS — INFORMATION ON MATERIALS AND PRODUCTION METHODS

*Note 1.— The following information reflects some past as well as current practices of MRV-B producers and is included here for guidance only. It is not an endorsement of any product or method.*

*Note 2.— It is the responsibility of the issuing State to ensure that the MRV-B selected for issue is constructed in such a way that the document will perform satisfactorily for its required life.*

**A.1** Traditionally, visas have taken the form either of a label affixed to a page of the holder's passport or the application of an imprint onto the passport page usually with manual infilling for the personalization. Manual infilling is obviously impractical for machine readable visas where very precise characters for optical recognition are required. There is no fundamental reason why a visa should not be imprinted onto a passport page using a printer capable of printing OCR-B. However, an issuing State that elects to do this will find that many passports, which, of course, are issued by other States, have printed or perforated numbers or other printing on their pages which can absorb the infra red light used by the document reader and result in a failure to read at an immigration position. In general, therefore, it is better to use a machine readable visa in the form of a label affixed to the passport page.

**A.2** An MRV-B can have a life limited to a single entry into a country or it can allow multiple entries over the life of the passport or beyond. The issuing State should ensure that the MRV-B is appropriately durable for the required life. States should also ensure that their visas are resistant to fraud. States can achieve considerable protection against these threats where immigration positions have access to a central database containing the details of the issuance of genuine visas. However this is not always practicable. The threats are:

- total counterfeiting of the document
- removal of a visa from one passport and its placement in another
- alteration of the personal information or validity data.

**A.3 Substrate** — Visas have been produced using either paper or a synthetic polymer as the substrate. The substrate should have adequate opacity to prevent any printing or perforations on the passport page affecting the machine reading. The substrate should exhibit no visible fluorescence when irradiated by ultra violet light. Common choices of security features for paper have included: chemical reactants, planchettes, iridescent plaquettes, fibers (silk and/or synthetics, visible and/or invisible, fluorescent and/or non-fluorescent), and security threads. Synthetic polymer substrates may also incorporate some of these security features. Care must be taken to ensure that any chemical reactants used are unaffected by the adhesive used to affix the visa. It is desirable that the substrate be damaged by attempts to alter the data on the visa or to remove it from the passport. The damage may take the form of tearing or distortion.

**A.4 Inks** — Inks that are chemically fugitive, fluorescent, heat sensitive, and optically variable are means of enhancing security in the MRV-B.

**A.5 Printing** — Fine line printing, rainbow (split fountain) printing using guilloche patterns, intaglio printing, and incorporation of concealed images into the design are methods of enhancing both the security and aesthetics of the MRV-B.

**A.6 Adhesive** — Water-moistenable or pressure-sensitive adhesives have been used to affix visas into passports. The selected adhesive should achieve and maintain a strong bond even when heated. The adhesive/substrate combination should be such that the substrate tears or distorts before the adhesive bond fails.

**A.7 Die cutting** — Though the final size and shape of the visa is defined in these specifications, the size is too small for most types of visa infilling printers. It is therefore normal for an issuing State to procure visas in a sheet form suitable for the infilling printer with one or more visas contained within the sheet area, the visas being die cut to shape. It is important to ensure compatibility between the sheets of visas and the printer to ensure that the visas do not become separated from the carrier sheet in the printer. It is also important to ensure that the edges of the sheet or of the die-cut shape are not contaminated with adhesive which can build up in the printer and result in misfeeding. Consistency of position of the die-cut shape relative to the edges of the sheet is important to ensure that the machine readable information is placed within the ERZ.

**A.8 Personalization** — Most forms of variable image printing, including laser, ink jet, dye sublimation and dot matrix printing have been used in the personalization of visas, with the first three used where a portrait is required. To minimize the risk of fraudulent removal of the personalization, the selected combination of substrate and infilling method should achieve a high penetration of the image into the substrate or a strong bond between the material forming the image and the substrate.

**A.9 Protecting the personalization** — Protective laminate or lacquer layers may be used to secure the data on the visa. Any laminate material should be firmly bonded to the substrate so that disruption of the substrate or destruction of the laminate material occurs when attempts are made to remove the laminate.

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**ANNEX B (INFORMATIVE) to Section V**

**COEXISTENCE OF MACHINE READABLE DATA TECHNOLOGIES,  
IDENTITY CONFIRMATION TECHNOLOGIES AND DOCUMENT SECURITY  
FEATURE VERIFICATION TECHNOLOGIES ON AN MRV-B**

*[Contents will be provided later.]*

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## ANNEX C (NORMATIVE) to Section V

### MACHINE-ASSISTED IDENTITY CONFIRMATION WITH AN MRV-B

**C.1 Scope** — Annex C defines a “scheme” for machine-assisted identity confirmation of the rightful holder of an MRV-B, including specifications for related details recorded on an MRV-B at the discretion of the issuing State.

**C.2 Definition** — The following definition shall apply.

*Machine-assisted identity confirmation* is defined as confirmation that the presenter of the MRV-B is the rightful holder through successful machine-assisted comparison of identity details captured from the presenter against equivalent details recorded for the rightful holder on the visa and/or entered in the accompanying passport by the passport’s issuing State and/or in a database created and maintained by a “receiving State”.

**C.3 Machine-assisted identity confirmation scheme** — The scheme defined below is designed to permit global interchange and interoperability of an MRV-B when confirming identity of the rightful holder using machine-assisted means. The scheme allows for a number of comparative techniques to be used when an MRV-B is presented, as follows:

- comparison of presenter details against corresponding details created by scanning “displayed features” located in the VIZ of the MRV-B (i.e. portrait or optional fingerprint [single digit], where present) and, where available, equivalent details in the accompanying passport using machine assistance *selected at the discretion of the receiving State* (In the case of a visa, the issuing State and the receiving State are the same.);
- comparison of presenter details against corresponding details “encoded” in optional machine readable data technologies using machine assistance identical to that used by the issuing State to encode the details on the MRV-B *when information on decoding is shared by the issuing State*; such a situation could arise when an airline is checking in a visa holder for a flight to the visa-issuing State;
- comparison of presenter details against corresponding “compressed grey scale” representations (i.e. for facial characteristics, and/or fingerprints (single digit through 10 prints)) optionally stored in optional machine readable data technologies by the issuing State and, where available, equivalent details in the accompanying passport; or
- comparison of presenter details *selected at the discretion of the issuing State* against corresponding details stored in a database established and maintained by the issuing State, with the MRZ of the MRV-B used as a pointer to the appropriate comparative entry stored in the database and the portrait resident on the MRV-B used as a “backup” visual comparator.

The scheme integrates the variety of comparisons under two methods for machine-assisted identity confirmation depending on whether comparative details are extracted from the MRV-B (Method 1) or whether a database established and maintained by the issuing State is used, triggered by specific pointing details extracted from the

MRZ of the MRV-B (Method 2). To ensure interoperability between States liaising on machine-assisted identity confirmation or global interoperability, one of the two methods shall be adopted.

Method 1 — Where an issuing State records identity confirmation details on the MRV-B as defined in C.4 or encodes details as defined in C.5 and shares information on decoding of the encoded details with an authorized body such as an airline, the body can compare identity details captured from the presenter against equivalent details recorded for the rightful holder on the MRV-B and, where available, equivalent details in the accompanying passport.

Method 1, as illustrated in Figure V-C1, permits a State to implement machine-assisted identity confirmation using the MRV-B to directly provide comparison details. It also provides flexibility for the design of the related technology infrastructure, enabling use of either interfaced (on-line) or stand-alone (off-line) identity confirmation machines, as required.

Method 2 — As illustrated in Figure V-C2, where an issuing State has not recorded identity confirmation details on the MRV-B in a manner consistent with C.4 and C.5, the State can compare identity details captured from the presenter against equivalent details recorded for the rightful holder of the MRV-B stored in a database created and maintained by the State. Details contained in the MRZ of the MRV-B, selected at the discretion of the State, shall be used as a pointer to the comparative details recorded in the database, with the portrait resident on the MRV-B (Zone V) used as the secondary (backup) non-machine-assisted comparator for identity confirmation.

**C.4 Identity confirmation using displayed feature** — Identity may be confirmed using machine assistance by comparing one of the mandatory or optional displayed identity features of the rightful holder located on the MRV-B with the equivalent captured from the person presenting the MRV-B. Confirmable displayed features with required specifications are as follows.

**C.4.1 Portrait** — Where a portrait is placed on an MRV-B, identity may be confirmed using machine assistance by comparing the presenting person's facial image (or characteristics) with the portrait of the rightful holder displayed on the MRV-B where the displayed portrait complies with the specifications contained in Section V and the following minimum characteristics:

*Quality* — The displayed portrait shall be of such quality as to allow the isolation of required confirmation details.

*Head size (chin to crown)* — The head size from chin to crown shall be as defined in the data element directory, 5.4 of this section.

*Head orientation* — Both eyes shall be clearly visible in the displayed portrait.

**C.4.2 Fingerprint (single digit only)** — Where an optional fingerprint is placed on an MRV-B, identity may be confirmed using machine assistance by comparing the presenting person's equivalent fingerprint (single digit only) with the fingerprint of the rightful holder (single digit only) displayed on the MRV-B where the displayed fingerprint complies with the following minimum characteristics:

*Quality* — The displayed fingerprint shall be of such quality as to allow the isolation of required confirmation details.

*Size* — The displayed fingerprint shall conform with the specifications defined in Section III.

**C.5 Identity confirmation using encoded features recorded in optional machine readable data technologies added to the MRV-B** — Identity may be confirmed using machine assistance by comparing feature details from the rightful holder encoded within optional machine readable technologies added to the MRV-B with the equivalent feature details captured from the person presenting the MRV-B. Acceptable encoded features with required minimum specifications are as follows.

**C.5.1 Facial characteristics** — Identity may be confirmed using machine assistance by comparing the presenting person’s facial image (or characteristics) with details from the rightful holder encoded on the MRV-B in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State. To allow for greater interoperability between States and authorized bodies liaising on machine-assisted identity confirmation or global interoperability, recorded details shall be presented as a compressed grey scale representation of the full facial image using a standard JPEG compression technique.

**C.5.2 Fingerprints (single digit up to 10 prints)** — Identity may be confirmed using machine assistance by comparing the presenting person’s fingerprints against details from the rightful holder encoded on the MRV-B in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State. To allow for greater interoperability between States and authorized bodies liaising on machine-assisted identity confirmation or global interoperability, recorded details should be presented as a compressed representation of the fingerprints using a standard compression technique.

**C.5.3 Handgeometry** — Identity may be confirmed using machine assistance by comparing the presenting person’s handgeometry with details from the rightful holder encoded on the MRV-B in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State.

**C.5.4 Eye pattern** — Identity may be confirmed using machine assistance by comparing the presenting person’s eye (e.g. iris) pattern with details from the rightful holder encoded on the MRV-B in a form required by the issuing State. Information pertaining to decoding of encoded details may be provided to other States or authorized bodies such as airlines at the discretion of the issuing State.







## ANNEX D (INFORMATIVE) to Section V

### MACHINE-ASSISTED DOCUMENT SECURITY VERIFICATION WITH AN MRV-B

**D.1 Scope** — Annex D provides recommendations for issuing States choosing to include machine-verifiable security features on the MRV-B in terms of the generalized location of machine-verifiable structure and substance features to allow for global interoperability.

**D.2 Definitions** — The following definitions shall apply.

*Machine-assisted security feature verification* is defined as the ability to verify security features located on the MRV-B using machine-assisted techniques (e.g. calculation and comparison of valid check digit values and optical devices to confirm the wavelength of a security ink or diffraction pattern of a hologram or other optically variable device), ideally using the travel document reader.

*Data feature* is defined as a security feature directly linked to a number of the mandatory machine readable data elements located on the MRV-B (e.g. check digit(s) contained in the lower MRZ line).

*Structure feature* is defined as a security feature containing some form of identifiable information (e.g. interference characteristic of a hologram or other optically variable device; image details of a security pattern).

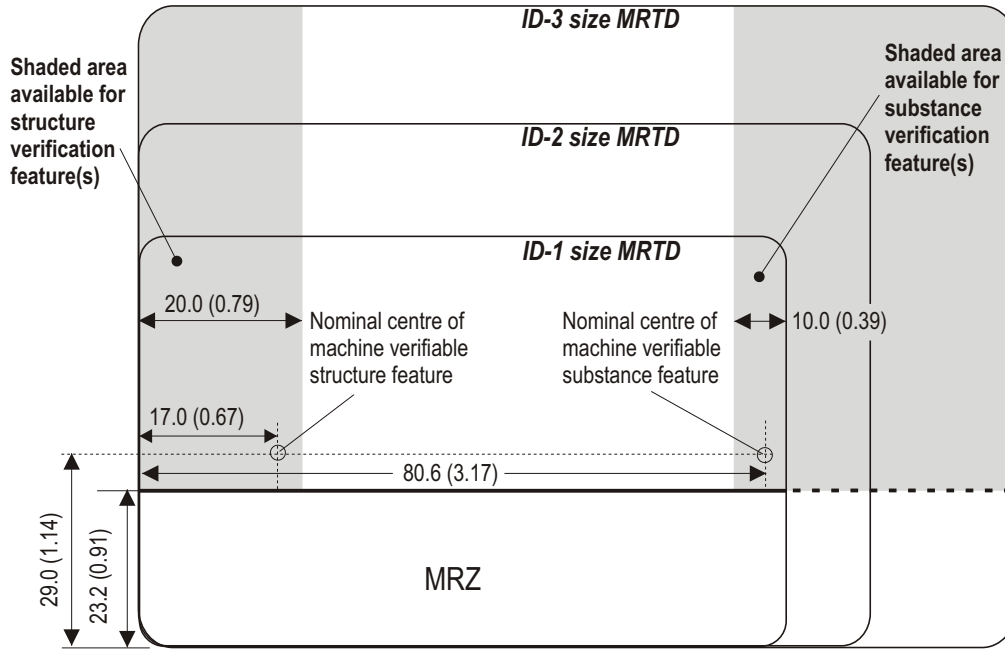
*Substance feature* is defined as a security feature that has a defined characteristic based on the substance used in the construction of the feature (e.g. colour, luminescence or magnetic characteristic).

**D.3 Machine-verifiable data features** — See 11 and 12 of Section V for computational details and locations for the five mandatory, verifiable data features located on an MRV-B.

**D.4 Recommended locations for machine-verifiable structure and substance features** — Figure V-D1 defines recommended locations for machine-verifiable structure and substance features when added to an MRV-B at the discretion of the issuing State. These recommended locations ensure global interoperability between States wishing to enhance security by using machine-assisted verification of the structure and/or substance features.

*Note.— These locations are recommended for generalized placement of such features. However, a feature, should it be used, can appear anywhere in the area(s) shown. Moreover, the area(s) designated for feature placement do not mutually exclude the use of other features. For example, a structure feature can be accommodated along with a portrait.*

**D.5 Coexistence with other optional technologies** — Annex B (under development) will contain additional details on machine-assisted document security technologies being combined with other optional machine readable data technologies and/or machine-assisted identity confirmation technologies.



Nominal dimensions in millimetres  
(inch dimensions in parentheses)

Not to scale

**Figure V-D1. Recommended locations (above the MRZ) for machine-verifiable structure and substance features and corresponding nominal centres on MRTDs**



## ANNEX E (NORMATIVE) to Section V

### USE OF OPTIONAL BAR CODE(S) ON THE MRV-B

**E.1 Scope** — Annex E defines the specifications governing the use of one or more bar codes on an MRV-B, at the discretion of the issuing State, to allow expansion of the machine readable data capacity.

**E.2 Normative references** — The following International Standards contain provisions which, through reference herein, constitute provisions of Annex E. Where differences exist between the specifications contained in Doc 9303, Part 2 and the referenced Standards to accommodate the addition of one or more bar codes, the specifications contained in Part 2 shall prevail.

#### *European Standards*

EN 797:1995	<i>Bar coding — Symbology specifications — “EAN/UPC”</i>
EN 799:1995	<i>Bar coding — Symbology specifications — “Code 128”</i>
EN 800:1995	<i>Bar coding — Symbology specifications — “Code 39”</i>
EN 1571:1996	<i>Bar coding — Data identifiers</i>
EN 1635:1997	<i>Bar coding — Test specifications — Bar code symbols</i>
ENV 12403:1998	<i>Bar coding — Structured data files</i>
EN 1635 1D codes	
ENV 12925:1998	<i>Bar coding — Symbology specifications — “PDF417”</i>

#### *ISO/IEC Standards*

ISO/IEC JTC 1/SC 31 WD 15438	<i>Automatic identification and data capture — 2D-bar code symbology specifications — PDF417</i>
ISO/IEC JTC 1/SC 31 WD 15417	<i>Bar coding — Symbology specification — Code 128 (27 pages)</i>
ISO/IEC 7810 : 2003	<i>Identification cards — Physical characteristics (Note.— The dimensional specifications should conform with those defined in Section V of this document.)</i>
ISO/IEC 10373-1 : 1998	<i>Identification cards — Test methods — Part 1: General characteristics tests</i>

**E.3 Definition** — A bar code is defined as a linear or two-dimensional bar code conforming with the specifications defined herein and capable of representing data therein and encoded data read therefrom.

**E.4 Location of bar code(s)** — Figure V-E1 illustrates the location of bar codes on the MRV-B with specifications for the exact placement and overall dimensions of the area to house any optional bar codes. It should be noted that the height and width of the bar code(s) area can vary up to the maximum dimensions shown. In defining these dimensions, the trade-off between optional expanded machine readable data capacity desired and accommodation of mandatory and optional details (VIZ) should be considered.

**E.5 Quality of bar code(s)** — The bar code(s) included in the bar code(s) area shall meet the overall symbol grade defined for the chosen symbology (symbologies) that allows symbols to be read, following final assembly of the MRV-B, most times in a single pass.

**E.6 Symbologies and logical data structure** — In order to have the capability to support global data interchange with authorized bodies such as airlines, the bar code symbology selected for use in MRTDs must offer sufficient data storage capacity to accommodate all mandatory data elements included in the mandatory data groups and in any optional data groups which may be selected from the logical data structure as developed for optional capacity expansion technologies. Furthermore, the associated reading software must be available in the public domain.

**E.7 Machine reading of the bar code(s)** — To enable accurate reading of bar code(s) coexisting with security treatments (e.g. background security printing) in the bar code(s) area, and the use of a single machine reader for reading the MRZ and the bar code(s), where desired by a State, the bar code(s) optionally included on the MRV-B shall be printed such that the bar code(s) absorb(s) in the B900 band as defined in ISO 1831 (i.e. near infra-red). The bar code(s) may be visually legible.

In determining the placement of the bar code on the MRV-B, issuing States shall accommodate any special needs or operating conditions of the symbology (symbologies) such as bit area and error correction level. In addition, sufficient marginal space shall be included to accommodate “quiet areas”.

Issuing States are encouraged to locate the bar code(s) area nearest to the top edge of the MRZ to allow for possible use of the optical sensing components from the OCR reader, supported by bar code interpretation logic, to accommodate reading of optional bar code data.

The bar code(s) optionally included in the bar code(s) area of the MRV-B shall not interfere with the accurate reading of data from the MRZ.





## ANNEX F (NORMATIVE) to Section V

### USE OF OPTIONAL CONTACTLESS INTEGRATED CIRCUIT(S) IN AN MRV-B

**F.1 Scope** — Annex F defines the specifications governing the use of the contactless IC(s) (“proximity”) in an MRV-B at the discretion of the issuing State to allow expansion of the machine readable data capacity.

**F.2 Normative references** — The following International Standards contain provisions which, through reference herein, constitute provisions of Annex F. Where differences exist between the specifications contained in this annex and the referenced Standards to accommodate the addition of the contactless IC(s), the specifications contained herein shall prevail.

ISO/IEC 7810 : 2003	<i>Identification cards — Physical characteristics</i>
ISO/IEC 10536-1 : 2000	<i>Identification cards — Contactless integrated circuit(s) cards — Close-coupled cards — Part 1: Physical characteristics</i>
ISO/IEC 10536-2 : 1995	<i>Identification cards — Contactless integrated circuit(s) cards — Part 2: Dimensions and location of coupling areas</i>
ISO/IEC 10536-3 : 1996	<i>Identification cards — Contactless integrated circuit(s) cards — Part 3: Electronic signals and reset procedures</i>
ISO/IEC 14443-1 : 2000	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 1: Physical characteristics</i>
ISO/IEC 14443-2 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 2: Radio frequency power and interface</i>
ISO/IEC 14443-3 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 3: Initialization and anticollision</i>
ISO/IEC 14443-4 : 2001	<i>Identification cards — Contactless integrated circuit(s) cards — Proximity cards — Part 4: Transmission protocols</i>
ISO/IEC 10373-1 : 1998	<i>Identification cards — Test methods — Part 1: General characteristics tests</i>

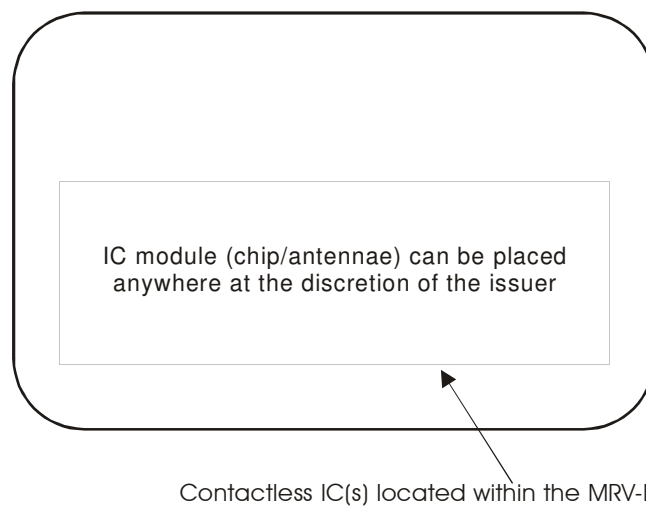
**F.3 Definition** — A contactless IC(s) is defined as the integrated circuit(s) absent of any direct path from the card reader to the integrated circuit(s) resident located within the MRV-B when implemented in conformance with the specifications for the contactless IC(s) as defined in the normative references (F.2) to allow optional machine readable data to be recorded therein.

**F.4 Location of contactless IC(s)** — Contactless IC(s) shall be located within the structure of the MRV-B as illustrated in Figure V-F1. Exact placement of the contactless IC(s) within the MRV-B shall be at the discretion

of the issuing State. However, when an MRV-B is placed in a passport also enabled by a contactless IC, the contactless IC(s) shall be located in the MRV-B so as to avoid collision with the IC(s) in the passport.

**F.5 Construction of an MRV-B with the contactless IC(s)** – The IC(s) shall be incorporated so as to ensure that the VIZ, the MRZ, and the contactless IC(s) cannot be separated without physical damage.

*Note.— See Annex B for additional details if the contactless IC(s) is combined with other optional machine readable data technologies.*



**Figure V-F1. MRV-B (with optional contactless IC(s))**

— END —

## ICAO PUBLICATIONS AND RELATED PRODUCTS IN THE AIR TRANSPORT FIELD

The following summarizes the various publications and related products in the air transport field issued by the International Civil Aviation Organization:

- *International Standards and Recommended Practices (SARPs)* adopted by the Council in accordance with Articles 37, 54 and 90 of the Convention on International Civil Aviation and designated, for convenience, as Annexes to the Convention. Annex 9 — *Facilitation* — contains SARPs dealing with customs, quarantine, immigration and health matters concerned with international air navigation. Annex 17 — *Security* — is composed of SARPs on all matters related to safeguarding civil aviation against acts of unlawful interference. Any differences between the national regulations and practices of a State and what is prescribed by an International Standard must be notified to the Council in accordance with Article 38 of the Convention. The Council has also invited Contracting States to notify differences from the provisions of the Recommended Practices.
  - *ICAO's policies* on the regulation of international air transport, charges for airports and air navigation services, and taxation in the field of international air transport.
  - *Technical specifications* on machine readable travel documents (MRTDs).
  - *Tariffs* for airports and air navigation services, including charges applied towards users in more than 180 States.
  - *Manuals* providing information or guidance to Contracting States on such issues as regulation of international air transport, financial management of airports and air navigation services, air traffic forecasting methods, and compliance with Annex 17 provisions.
  - *Circulars* providing specialized information of interest to Contracting States. They include studies on medium- and long-term trends in the air transport industry at a global and regional level and specialized studies of a worldwide nature covering issues such as the economic and financial aspects of CNS/ATM systems implementation, regional differences in airline operating economics, economic contribution of civil aviation, privatization of airports and air navigation services, and regulatory implications of slot allocation.
  - *Aviation Security Training Packages (ASTPs) and courses* on a range of subjects designed to assist security professionals, managers and staff in developing a more comprehensive understanding of SARPs, as well as to offer specialized practical expertise in the implementation and monitoring of measures and provisions in accordance with local programmes. For further information, please contact [avsec@icao.int](mailto:avsec@icao.int) or visit the training page on the ICAO AVSEC website at [www.icao.int/avsec](http://www.icao.int/avsec).
  - *Publications in electronic form*, in database and interactive forms, such as the world's air services agreements and the ICAO template air services agreements. *Civil aviation statistics* can be accessed by purchasing an annual subscription to one or more of the data series distributed by ICAO through its commercial website at [www.icaodata.com](http://www.icaodata.com). Questions regarding ICAO statistics or special orders for statistical data should be sent to [sta@icao.int](mailto:sta@icao.int).
  - *Reports of meetings in the air transport field*, including reports on the Facilitation and Statistics divisional-type meetings and those related to conferences on aviation security, regulation of international air transport, and economics of airports and air navigation services.
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