AAMVA

American Association of
Motor Vehicle Administrators

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AAMVA DL/ID Card Design Standard

Personal Identification – AAMVA North American Standard

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Foreword

The American Association of Motor Vehicle Administrators, AAMVA, founded in 1933 is a voluntary, nonprofit, educational organization striving to develop model programs in motor vehicle administration, police traffic services and highway safety. The association serves as an information clearinghouse for these same disciplines, acts as the international spokesman for these interests, and represents the state and provincial officials in the United States and Canada who administer and enforce motor vehicle laws.

The association's programs encourage uniformity and reciprocity among the states and provinces, and liaisons with other levels of government and the private sector. Its program development and research activities provide guidelines for more effective public service.

AAMVA understands its unique positioning and the continuing role identification security will play in helping the general public realize a safer North America. The association believes ID security will help increase national security, increase highway safety, reduce fraud and system abuse, increase efficiency and effectiveness, and achieve uniformity of processes and practices.

This standard was originally developed as one part of an extensive program to improve the security of the DL/ID card conducted by AAMVA's Uniform Identification Subcommittee. To accomplish this program, the Subcommittee created a number of task groups, including the Card Design Specification Task Group that developed the 2005 specification. The Task Group surveyed and met with many stakeholders during the development effort. The Task Group gathered information from government and non-government users of the DL/ID card to determine their uses for the DL/ID card and how they believed the card should function. In addition, the Task Group surveyed and met with industry experts in the area of card production and security to gather their advice, especially about the physical security of the card.

The intermediate work of the Task Group was repeatedly reviewed by the UID Subcommittee as a whole and approved by the AAMVA Board.

A Special Task Force was reconstituted in late 2008, then changed to a committee, to undertake this revision and to provide specific guidance for those jurisdictions seeking to comply with programs like REAL ID and the Western Hemisphere Travel Initiative (WHTI). The option of issuing an International Organization for Standardization (ISO) compliant driving licence (IDL) is also supported and explained.

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0 Introduction

This document provides a standard for the design of driver licenses (DL) and identification (ID) cards issued by AAMVA member jurisdictions. The intent of the standard is to improve the security of the DL/ID cards issued by AAMVA's members and to improve the level of interoperability among cards issued by all jurisdictions. AAMVA respects the fact that each jurisdiction's laws and regulations determine its driver license issuance process and its associated card requirements. As a result, the intent of this document is to provide jurisdictions with guidance on the driver license/ID card design standards in order to provide a reliable source of identification and, at the same time, reduce a cardholder's exposure to identity theft and fraud.

0.1 Functional Requirements

At its August 2002 meeting, the AAMVA Board of Directors approved the following list of functional requirements for the DL/ID card:

Evidence of the privilege to drive

Identification

Age verification

Address/residence verification

Automated administrative processing

Originally the DL satisfied only the first of these requirements. It has long since become the identity document of choice for satisfying the other four. A clear indication of this is the fact that virtually every motor vehicle administration in the U.S. and Canada issues a non-driver ID card to serve these needs for those who do not have a DL.

The mobility of the driving population has made it necessary for AAMVA's members to focus increasingly on issues affecting the interoperability of the driver licensing system. Jurisdictions routinely process large numbers of DL applicants who are transferring from one jurisdiction to another. In addition, drivers regularly drive in jurisdictions other than the one in which they are licensed. In order to effectively manage this mobile driving population, AAMVA has long stressed the one driver, one license, and one driver control record concept. In order to implement this concept, AAMVA has placed increasing emphasis on interoperability of driver licensing systems, including the DL itself. Many of the details of this standard are intended to improve the interoperability of DL/ID cards, particularly by standardizing the machine-readable technology (MRT) used on the card.

The increased use of the card for purposes other than proof of the privilege to drive have increased the motivation to alter or counterfeit the DL/ID card. Therefore, this standard places great emphasis on improving the security requirements for these cards.

0.2 Interoperability

The AAMVA National Standard for the Driver License/Identification Card, AAMVA DL/ID-2000 did not require the use of any MRT on the DL/ID card. The AAMVA DL/ID-2000 provided instructions for the contents and format for a number of different types of MRT. A jurisdiction could choose one or more of these, or choose to have no MRT

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at all. In addition, jurisdictions using the same MRT did not always interpret or implement the instructions in AAMVA DL/ID-2000 in the same manner. As a result of these variances, the desired level of interoperability was not achieved.

Jurisdictions that follow this standard will all implement a common MRT on their cards. In addition, much effort has been made to reduce confusion about the contents and format of the common MRT. Furthermore, space has been allotted in the layout for an additional MRT should a jurisdiction choose to have one on its card. Jurisdictions are strongly encouraged to coordinate implementation efforts within the AAMVA community to resolve any interpretation issues and ensure a high level of commonality in their implementations.

0.3 Commonality (Uniformity) & Harmonization between Human and Machine Readable Data

Closely related to the issue of interoperability is the issue of commonality. AAMVA DL/ID-2000 did not provide guidance on the physical layout of the card. As a result, the graphic design and layout of DL/ID cards varied greatly from jurisdiction to jurisdiction. In addition, since jurisdictions rarely if ever replace all existing cards as soon as they begin issuing a card with a new design, variations have been possible even within a single jurisdiction. Some estimates place the number of design variations for valid DL/ID cards among AAMVA members well in excess of 200. This makes it extremely difficult for law enforcement, or anyone else, to recognize a valid license, especially if it comes from another jurisdiction. This standard calls for the use of a zoned layout that will increase the commonality of appearance of the cards from all jurisdictions.

The standard also employs the principle of harmonization (correlation) between human and machine readable data – which means that there should be corresponding information as it relates to mandatory data elements. This is at times not identical as names may require truncation in the human readable rendering but stored in their full form in the machine readable; in the case of an indicator the human readable may be a term like “limited duration” but in the machine readable stored as “1”. Note – non-mandatory and non-applicable data should not be present on the card in any way (human or machine readable).

0.4 Security

AAMVA DL/ID-2000 provided only basic guidance in the area of security features that would prevent alteration or counterfeiting of the card. This standard provides a much more comprehensive set of requirements for the security features of the DL/ID card. Each jurisdiction will choose several other security features to address a variety of threats to the security of the card. To augment the guidance provided within this standard the CDS committee compiled and published a special guide that can be downloaded on the AAMVA website – *Secure Card Design Principles*.

0.5 Replacement of AAMVA DL/ID 2013

This standard replaces the existing AAMVA North American Standard for the Driver License/Identification Card, AAMVA DL/ID-2013. Since at the time of publication of this standard and for some time after, many jurisdictions will continue to issue licenses based on AAMVA DL/ID-2013, that document will continue to be available. However, when a jurisdiction develops new card designs, it should use this document for guidance instead of AAMVA DL/ID-2013.

0.6 Conformity Assessment Testing/Courtesy Verification Program (CVP)

Conformity assessment is the name given to the processes that are used to demonstrate that a product (DL/ID) meets specified requirements. These requirements are contained in standards and guides. The processes that

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need to be followed to be able to demonstrate that they meet the requirements are also contained in ISO/IEC standards and guides.

The use of ISO/IEC standards in conformity assessment procedures allows for harmonization throughout the world and this, in turn, not only facilitates international interoperability between countries but also gives the purchaser of the product confidence that it meets the requirements.

The CVP provides an effective way for AAMVA members to determine if their driver's licenses and identification (DL/ID) cards conform to the applicable AAMVA standards and specifications. AAMVA strongly encourages its member jurisdictions to regularly take advantage of the CVP. Even though AAMVA has published best practices, standards and specifications covering DL/ID cards for years, inconsistencies in the implementation of those guidelines continue to occur. These inconsistencies adversely impact the interoperability that is the main goal of the AAMVA standard. A primary objective of the CVP is improving the consistency of implementation across all jurisdictions choosing to follow the AAMVA standard. Information gained from the testing of jurisdictions DL/ID cards and other documents is not only used by jurisdictions to improve their issuance systems but also is used by AAMVA to make improvements to the standards it publishes. For more information on the CVP please visit www.aamva.org.

0.7 Compatibility with ISO Standard for International Driver License

This standard generally follows the ISO/IEC 18013-1: ISO compliant driving license – Part 1: Physical Characteristics and Basic Data Set; and, Part 2:Machine-readable technologies. The ISO standard (which was developed under leadership of the U.S.) specifies requirements for a card that is aligned with the UN Conventions on road traffic (covering among others domestic and international driving permits), and also addresses security and interoperability issues in general. Taking advantage of the investment already made by ISO in the ISO standard and of the international expertise embodied therein, this standard continues to move toward full compatibility with the ISO standard while at the same time making adaptations to accommodate local requirements. An example of such an adaptation is the specification of a vertical card format for a driver under the age of twenty-one (optional for Canada). As far as the regularly oriented card is concerned, this standard does not prevent a jurisdiction from designing a card that is compliant with this standard as well as with the ISO standard (thus enabling the jurisdiction to issue one document acting as both a State driver's license and as an international driving permit).

0.8 DHS's standards for driver's licenses and enhanced driver's licenses

Since the publication of the AAMVA National Standard for the Driver License/Identification Card, AAMVA DL/ID-2000 and the AAMVA International Standard for the Driver License/Identification Card, AAMVA DL/ID-2005, the REAL ID Act was signed into law on May 11, 2005[1] and the Department of Homeland Security (DHS) subsequently issued a regulation on the "Minimum Standards for Driver's Licenses and Identification Cards Acceptable by Federal Agencies for Official Purposes"[2]. The AAMVA standard is consistent with the requirements identified in the DHS regulation. Through implementation of REAL ID Act, DHS's goal is to improve the security of state-issued driver's licenses by requiring:

(1) Information and physical security features that must be incorporated into each card;

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[1] *See*, Public Law 109–13, 119 Stat. 231, 302 (May 11, 2005) (codified at 49 U.S.C. 30301 note).

[2] Federal Register / Vol. 73, No. 19 / Tuesday, January 29, 2008, pp. 5272-5340

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(2) Specific application information to establish an applicant's identity and lawful presence in the United States before a card can be issued;[3]

(3) Verification of certain source documents provided by an applicant with the document issuing agencies; and

(4) Issuance and physical security standards for locations where licenses and identification cards are issued.

The Enhanced Driver's License (EDL) programs have been developed to provide U.S. (and Canadian) citizens with an alternative cross-border travel document that meets the requirements of the Western Hemisphere Travel Initiative (WHTI). The EDLs are being developed consistent with the requirements of REAL ID; the programs have some important similarities and distinctions. Similarities include:

- EDLs can be used for official purposes, such as: accessing Federal facilities, boarding Federally-regulated commercial aircraft, or entering nuclear power plants.
- EDLs will utilize the capabilities developed for REAL ID (such as the electronic verification of vital records and state-to-state verification of existing DLs/IDs) as they are implemented.
- Both REAL ID licenses and EDLs include (1) information and security features that must be incorporated into each card; (2) specific application information to establish the identity and citizenship of an applicant before a card can be issued; (3) ability to verify certain source documents provided by an applicant with the document issuing agency where applicable; and (4) physical security standards for locations where licenses and identification cards are issued.

Although the goal of enhancing driver's license security is shared by both programs, there are some distinctions:

- In order to be eligible for a REAL ID compliant license, the applicant must demonstrate proof of legal status in the U.S., to be eligible for an EDL the applicant must be a U.S. citizen.
- The EDL serves as a limited-use international travel document, under the Western Hemisphere Travel Initiative (WHTI).) that denotes both identity and citizenship. REAL ID compliant licenses may not be used for international travel.
- An EDL includes a vicinity Radio Frequency Identification (RFID) chip to facilitate border crossing and verification by U.S. Customs and Border Protection (CBP) at a land or sea port of entry. REAL IDs are not prohibited from including this technology, but it is not a requirement.
- An EDL also includes a machine readable zone (MRZ), which complies with travel document standards, to allow CBP officers to read the card electronically if RFID is not available. A REAL ID includes a 2D PDF417 bar code, primarily to allow State and local law enforcement to verify the document's validity.

[3] EDLs are only issued to U.S. citizens by states or Canadian citizens by provinces.

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0.9 Interim/Temporary DL/IDs

Interim documents for jurisdictions using central issuance have run the spectrum from a secure document with physical security features and implied identification value on one end to a paper receipt on the other.

Research based on review of samples of a number of jurisdictions' interim documents shows that most jurisdictions who issue an interim document use a "receipt-like" approach where the customer receives proof of a transaction which is acceptable for driving but not intended for identification. In the case of renewals/transfers, some jurisdictions return the expired/old credential to the customer defaced or "punched" in some way so that the individual can continue to use that credential for identification purposes until their new credential arrives. This practice, while customer-service friendly, creates the risk that an individual can hold and use two genuine identity credentials.

An additional consideration is that potential relying parties, like the Transportation Security Administration (TSA), have informed AAMVA that their policy will continue to be to not accept any interim documents as a valid form of identification. They also have a policy that they will accept an expired DL/ID for up to a year beyond the expiration for the purposes of identification and boarding a commercial airplane. This assumes that (in the case where a jurisdiction has returned a marked/punched card to the customer) it not interfere or obliterate the photo, human readable data, or PDF417 bar code. This further exacerbates the risk of an individual holding two genuine DL/IDs in that both could be valid for Federal identification purposes (one expired, one unexpired).

It is the recommendation of AAMVA to its members that they adopt/implement a process by which the interim document should be a receipt and not a secure document. Interim/Temporary documents should not contain security features, should not contain a photograph, and should be clearly branded to express that the document is meant as proof of a transaction only. In the case of driver licenses, it should reflect a privilege to operate a motor vehicle and should not be accepted for identification purposes beyond this one use case.

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Personal Identification – AAMVA North American Standard – DL/ID Card Design

1 Scope

This standard was developed by AAMVA for the production and use of government-issued driving license / identification card documents (DL/IDs). Private institutions and other organizations may benefit from DL/ID uniformity established by this standard, but the functional requirements are primarily for the benefit of issuing authorities and law enforcement.

This standard supersedes the AAMVA DL/ID 2013 Standard. Requests for interpretation, suggestions for improvement, addenda, or defect reports are welcome. They should be sent to AAMVA Identity Management Program, 4301 Wilson Boulevard, Suite 400, Arlington, VA 22203.

A DL/ID is in conformance with this standard if it meets all mandatory requirements specified directly or by reference herein, including requirements contained in annexes A, B, C, and D. There are additional requirements of other standards as referenced in Annexes E, F, G, H, I and J that may be adopted by issuing authorities.

2 Reference(s)

The following documents contain provisions, which, through reference in this text, constitute provisions of this AAMVA standard or were consulted in the compilation of this standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this standard are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

European Commission Directive 2006/126/EC of 20 December 2006 O.J. EC No. L 403/18

European Commission Directive 2000/56/EC of 14 September 2000 O.J. EC No. L 237/45

European Union Council Directive 97/26/EC of 2 June 1997 O.J. EC No. L 150/41

European Union Council Directive 96/47/EC of 23 July 1996 O.J. EC No. L 235/1

European Union Council Directive 91/439/EC of 29 July 1991 O.J. EC No. L 237/1

TS EN 15480-1, ECC-1 *Identification Card Systems – European Citizen Card*

AAMVA D-20: *Data Element Dictionary – Traffic Records System*

ANSI INCITS 385:– *Digital Image Attributes, Face Interchange Format (Human and Automated)*

ISO 1073-2:1976: *Alphanumeric character sets for optical recognition -- Part 2: Character set OCR-B -- Shapes and dimensions of the printed image*

ISO 1831: *Printing Specifications for Optical Character Recognition*

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ISO/IEC 7810: *Identification cards - Physical characteristics*

ISO/IEC 7811: *Identification cards – Recording Techniques*

ISO/IEC 7812: *Identification cards – Registration Numbers*

ISO/IEC 7816: *Identification cards – Integrated Circuit Cards*

ISO 8601:2004: *Data elements and interchange formats -- Information interchange -- Representation of dates and times*

ISO/IEC 10373: *Identification cards - Test methods*

ISO/IEC 10918: *JPEG 2000*

ISO/IEC 11693: *Identification cards – Optical Memory – General Characteristics*

ISO/IEC 11694: *Identification cards – Optical Memory – Linear Recording Method*

ISO/IEC 14443: *Identification cards – Contactless Integrated Circuit Cards – Proximity Cards*

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

ISO/IEC 15438: *Automatic Identification and Data Capture Techniques – International Two-dimensional Symbology Specification – PDF417*

ISO/IEC 18013-1: *ISO compliant driving licence – Part 1: Physical Characteristics and Basic Data Set*

ISO/IEC 18013-2: *ISO compliant driving licence – Part 2: Machine-readable technologies*

ISO/IEC 24789: *Identification cards – Card Service Life*

ANSI/ASQZ Z1.4: *Military standard, sampling procedures and tables for inspection by attributes*

MIL-L-61002 *Labels, Pressure Sensitive Adhesive, for Bar-Codes and other Markings*

UN Convention on Road Traffic *(Geneva – 19 September 1949), amended 22 October 1964*

UN Convention on Road Traffic *(Vienna – 8 November 1968), Amendment 1 amended 3 September 1993 (E/CONF.56/16/REV.1/Amend.1)*

ICAO 9303 Part 3 - Machine Readable Official Travel Documents, Volume 1 – MRtds with Machine Readable Data Stored in Optical Character Recognition Format, Third edition – 2008

EPC Tag Data Standard (Available from www.gs1.org/gsmp/kc/epcglobal/tds/)

EPC Generation 2 Air Interface Specification (Available from http://www.gs1.org/gsmp/kc/epcglobal/uhfc1g2/)

3 Term(s) and definition(s)

For the purposes of this AAMVA standard, the terms and definitions given in the following apply:

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3.1
alphabetic (A)
alpha characters/letters from A to Z and a to z

3.2
ANS
any combination of A, N, or S characters

3.3
cardholder
an individual to whom a driver license or identification card is issued

3.4
country distinguishing sign
abbreviation used on the license document (human-readable) for countries that issue driver licenses describes a section of the standard that provides supplementary information intended to assist in the understanding and use of this standard

3.5
customer record
Information pertaining to the cardholder that is stored in a jurisdiction database. Such records commonly include biographical and demographical data, address information, driving privileges, traffic convictions, driving restrictions, and information from prior jurisdictions of record. Customer records may also be linked to vehicle registration data.

3.6
data element
an item of data that may appear on the license in either human or machine-readable form

3.7
digital
any data that is composed of a discrete sample or collection of discrete samples that are represented as finite numbers

3.8
document recognition
the educational knowledge and ability to recognize the validity of the driver license card of both national and international jurisdictions including data elements, formatting, visual images (e.g. photo image, signature), electronic readable features and document security features

3.9
driver license (DL)
A document issued to a driver license cardholder by a driver license issuing authority, or their designated agent, granting the individual the right or privilege to operate a motor vehicle within its jurisdiction. The document may facilitate driver license transactions and provide input data for such transactions. This issued document incorporates several elements and qualifications regarding the driver license cardholder: positive identification of the individual applicant; evidence of knowledge of laws and practices; practical driving proficiency in specific motor vehicle class categories; and, the individual's health and driving privilege restrictions (e.g. corrective eye lenses) and endorsements enabling special or extra categories of driving privileges.

NOTE: The ISO term for this document is ”driving licence” and appears in some places in this document.

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3.10
DL/ID
refers generally to both or either driver licenses (DL) and identification cards (ID)

3.11
EDL
enhanced driver license

3.12
first line inspection (level 1)
examination done without tools or aids that involves easily identifiable visual or tactile features for rapid inspection at point of usage

3.13
human-readable
data or information that is printed or engraved that is visually present on a driver license

3.14
identification card (ID)
a card issued to a person whose identity is verified in the same manner as required for the issuance of a driver license by a licensing authority for identification purposes only, excluding other identification provided by the issuing authority, such as state employee identification, senior citizen cards, handgun permits, etc.

3.15
image
digital data that represents the visual likeness of its subject, such as a portrait, finger print, or signature. Images may be collected, stored, and rendered for visual inspection using a variety of digital formats

3.16
informative
describes a section of the standard that provides supplementary information intended to assist in the understanding and use of this standard

3.17
issuing authority
a statutorily authorized agent organization that issues driver licenses and/or identification cards such as a Ministry of Transport, Department of Motor Vehicles, or Police Agency

3.18
machine-readable technology (MRT)
machine-readable mediums, such as a magnetic stripe, bar code, optical memory, or integrated circuit card that carry data

3.19
mutual recognition agreements
reciprocal agreements between governments of two nations, regions, states, provinces, or territories for the right of its citizens to drive an eligible vehicle in each others jurisdictions without the requirement of undergoing additional practical and/or written testing

3.20
non-portrait side of card
the opposite face from the portrait side

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3.21
normative
describes a section of the standard that is mandatory and must be implemented in the prescribed way for compliance

3.22
numeric (N)
digits 0 to 9

3.23
portrait side of card
face of the card carrying visual information containing the reproduction of the portrait of the cardholder and cardholder identifiers

3.24
second line inspection (level 2)
examination that requires the use of a tool or instrument (e.g., UV light, magnifying glass, or scanner) to discern

3.25
third line inspection (Level 3)
inspection by forensic specialists conducting detailed examination that allows for more in-depth evaluation and may require special equipment to provide true certification

3.26
visual special characters (S)
! “ # % & ‘ ( ) * + , - . / : ; < = > ? [\ ] ^ _ @ “space”. Visual special characters do not include characters used as delimiters between data elements in a machine-readable technology

4 Human-readable data elements

4.1 Data element tables

Table 1 in section 4.2 describes the mandatory data elements that must visually appear on DL/ID documents. Jurisdictions may go beyond these minimum mandatory requirements, as long as each mandatory requirement is met. Table 2 in section 4.3 describes optional data elements that may visually appear on DL/ID documents. Jurisdictions may include additional data elements and features on their compliant DL/ID document. However, if any of the optional data elements are included on the document, they should appear as described by the rules in this standard.

Column 1 (**Data Ref.**): serves as a reference indicator for citation elsewhere in this standard and in other documents.

Column 2 (**On card reference**): The reference number shall be visibly included as text on the DL/ID to identify the data element for purposes of interpreting the data and other international interchange requirements. If no on card reference number is listed in this standard, then no number should be used.

Column 3 (**Zone placement**): indicates the location on the DL/ID where the data element must be placed. Location of the zones is provided in Annex A of this standard. In some cases, data elements may appear in a choice of zones, or be repeated in another zone. Such data elements are marked with the appropriate multiple zone placements. If no zone is listed for a data element, it may be placed anywhere on the card as long as it does not interfere with the required placement of other data elements.

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Column 4 (**Data element**): common name or phrase that designates what information is to be inscribed on the card. These **data elements, if used,** must be labeled using text on the card (If the jurisdiction uses French, the French translations of the data elements and their abbreviations are provided). When abbreviations are provided in bold, they are available for use by jurisdictions. If a jurisdiction uses an abbreviation to designate a data element, the abbreviation must conform to the bold abbreviations when provided. Unless otherwise specifically stated, formatting rules of *AAMVA D20 Data Dictionary for Traffic Record Information Systems* must be followed.

Column 5 (**Definition**): description of the data element, including any exceptions.

Column 6 (**Card type**): identifies the applicability of the data element. DL = driver license only; ID = non-driver identification card only; Both = both the driver license and the non-driver identification card.

Column 7 (**Field maximum length/type**): valid field length (i.e., the number of characters and type) for each data element. The following refer to the valid characters or image used (A=alpha A-Z, N=numeric 0-9, S=special, F=fixed length, V=variable length).

4.2 Mandatory data elements

Table 1 — Mandatory data elements

Data ref.	On card reference	Zone placement	Data element English/ Français	Definition	Card type	Field maximum length/type
a.	1	Zone II	Family Name[4] / Nom de famille	Family name (commonly called surname or last name), or primary identifier, of the individual that has been issued the driver license or identification document. If the individual has only one name, it will be placed in this data element. Collect full name for record, print as many characters as possible on portrait side of DL/ID.	Both	V40ANS

[4] Family name, given names, and suffix may be concatenated into a single element for placement on the card in Zone II. If a jurisdiction chooses this option, the element will consist of the family name followed by a comma and then the given names. If a suffix is used, it will follow the given name(s) and be separated by a comma and a space. If no suffix, there should be no comma after given name(s). Such a concatenated name element will use the data element tag “Name”.

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Data ref.	On card reference	Zone placement	Data element English/ Français	Definition	Card type	Field maximum length/type
b.	2	Zone II	Given names[2] / Prénoms	Given name or names (includes all of what are commonly referred to as first and middle names), or secondary identifier, of the individual that has been issued the driver license or identification document. If Suffix is used, the Given Names and the Suffix must be separated by a comma and a space. Collect full name for record, print as many characters as possible on portrait side of DL/ID.	Both	V80ANS
c.	3	Zone II	Date of birth **DOB** / Date de naissance **DDN**	Month, day, year (If unknown, approximate DOB). Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
d.	4a	Zone II	Date of Issue **Iss** / Date de délivrance **Dél.**	Date DL/ID was issued. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
e.	4b	Zone II	Date of expiry **Exp** / Date d'expiration **Exp.**	Date DL/ID expires. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
f.	4d	Zone II	Customer identifier / Identificateur de client	The alphanumeric string assigned or calculated by the issuing authority.	Both	V25ANS
g.	5	Zone II	Document discriminator **DD** / Discriminateur de document **Réf**	Number must uniquely[5] identify a particular document issued to that customer from others that may have been issued in the past. This number may serve multiple purposes of document discrimination, audit information number, and/or inventory control.	Both	V25ANS

[5] If the same number appears on more than one document it does not qualify as unique or fulfill the function on the field.

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Data ref.	On card reference	Zone placement	Data element English/ Français	Definition	Card type	Field maximum length/type
h.		Zone III	Portrait / Portrait	A reproduction of the cardholder's photograph/image. The portrait must be in color unless laser engraving card production is used.	Both	- (Image)
i.		Zone II / III	Signature / Signature	A reproduction of the cardholder's signature. The signature may overlap the portrait image. If the signature overlaps the portrait, it may be in Zone III. Otherwise, it must be in Zone II.	Both	- (Image)
j.	8	Zone II	Cardholder address[6] / Adresse du détenteur/de la détentrice	The place where the cardholder resides and/or may be contacted (street/house number, municipality etc.). The issuing jurisdiction may choose to use either the mailing or physical address. If a mailing address such as a P.O. Box is used on portrait side of document, the residence address must be collected for the electronic record.	Both	V108ANS
k.	9	Zone II / Zone IV	Vehicle classifications / categories / Classifications/catégories de véhicules	Vehicle types the driver is authorized to operate. Each vehicle classification / category denoted on the DL/ID must be described or illustrated in Zone IV.	DL	V6ANS or image
l.	9a	Zone II / Zone IV	Endorsements **End** / Mentions **Ment.**	Jurisdiction-specific codes denoting additional privileges granted to the cardholders, such as hazardous materials, passengers, doubles/triples trailers, motorcycle, chauffeur, emergency vehicles, and farm vehicles. Each endorsement denoted on the DL/ID must be described or illustrated in Zone IV.	DL	V5ANS or image

[6] Address: Regardless of the type of address used for the production of the DL/ID, the issuing jurisdiction must store the driver's physical address as part of the customer record.

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Data ref.	On card reference	Zone placement	Data element English/ Français	Definition	Card type	Field maximum length/type
m.	12	Zone II / Zone IV	Restrictions / conditions / information codes / Codes d'information sur les restrictions/conditions	Jurisdiction-specific codes used by the issuing jurisdiction to indicate restrictions or conditions that apply to the cardholder (shown as alphanumeric codes or pictographs). Other medical, administrative, or legal limitations applying to the cardholder are also to be displayed in this area. Restrictions or conditions denoted in Zone II must be described in Zone IV. If no restrictions or other conditions apply to the cardholder, "NONE" shall be indicated and is only required to be present in Zone II.	DL	V12ANS (Image)
n.	15	Zone II	Cardholder sex **Sex** / Sexe du détenteur/de la détentrice **Sexe**	Cardholder's sex: M for male, F for female, X for not specified	Both	F1A
o.	16	Zone II	Height **Hgt** / Taille **Taille**	U.S. : feet and inches ex. 6 foot 1 inch = "6'-01"" Canada: centimeters (cm), number of centimeters followed by " cm" ex. 181 centimeters="181 cm"	Both	F6ANS
p.	18	Zone II	Eye color **Eyes** / Couleur des yeux **Yeux**	Blue, brown, black, hazel, green, gray, pink, maroon, dichromatic. If the issuing jurisdiction wishes to abbreviate colors, the three-character codes provided in AAMVA D20 must be used.	Both	V12A

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4.3 Optional data elements

Table 2 — Optional data elements

Data ref	On card reference	Zone placement	Data element/label	Definition	Card Type	Field Length/Type
a.	19	Zone II	Hair color **hair** / Couleur des cheveux **cheveux**	Bald, black, blonde, brown, gray, red/auburn, sandy, white, unknown. If the issuing jurisdiction wishes to abbreviate colors, the three-character codes provided in AAMVA D20 must be used.	Both	V12A
b.	3a	Zone II	Place of birth / Lieu de naissance	Country and municipality and/or state/province	Both	V33A
c.	21	-	Inventory control number / Numéro de contrôle d'inventaire	A string of letters and/or numbers that is affixed to the raw materials (card stock, laminate, etc.) used in producing driver licenses and ID cards.	Both	V25ANS or bar code
d.	10	Zone II / Zone IV	Date of first issue per category [7] / Date de délivrance pour la première fois, par catégorie	The date of first issue for a specific class of vehicle if it is before the date of issue of the license document (same format as DOB). If this information is not available, indicate "**unavail.** "	DL	F10ANS
e.	11	Zone II / Zone IV	Separate expiry dates for vehicle classifications / Dates d'expiration séparées pour les catégories de véhicule	If driving privilege for certain vehicle classifications expire before the base document, the date(s) must be noted on the document as indicated in Annex A. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	DL	F10NS

[7] Date of first issue per category is a mandatory data element for compliance with the ISO standard. Other countries require this information to be displayed on the license document to convey additional data about driving experience of the cardholder. It is generally understood that the jurisdictions of North America do not maintain this information and the data will generally be unavailable.

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Data ref	On card reference	Zone placement	Data element/label	Definition	Card Type	Field Length/Type
f.	17	Zone II	Weight **Wgt** / Poids **Poids**	Indicates the approximate weight range of the cardholder: U.S.: pounds ex. 185 pounds = “185 lb” Canada: kilograms ex. 84 kilograms = “084 kg”	Both	F6ANS
g.		Zone II	Name suffix[2] / Suffixe	Name suffix of the individual that has been issued the driver license or identification document. If Suffix is used, the Given Names and the Suffix must be separated by a comma and a space. Collect full name for record, print as many characters as possible on portrait side of DL/ID. • JR (Junior) • SR (Senior) • 1ST or I (First) • 2ND or II (Second) • 3RD or III (Third) • 4TH or IV (Fourth) • 5TH or V (Fifth) • 6TH or VI (Sixth) • 7TH or VII (Seventh) • 8TH or VIII (Eighth) • 9TH or IX (Ninth)	Both	V5ANS
h.	20	-	Audit information / Renseignements de vérification	A string of letters and/or numbers that identifies when, where, and by whom a driver license/ID card was made. If audit information is not used on the card or the MRT, it must be included in the driver record.	Both	V25ANS

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Data ref	On card reference	Zone placement	Data element/label	Definition	Card Type	Field Length/Type
i	-	Zone I	Issuing jurisdiction / Administration délivrante	The state, province, or territory responsible for the issuance of the DL/ID, and has the power to revoke or restrict the cardholder's driving and identification privileges. The appropriate two-character code in AAMVA D20 must be used.	Both	F2A
j	-	Zone II	Under 18 Until	Date DL/ID cardholder turns 18 years old. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
k	-	Zone II	Under 19 Until	Date DL/ID cardholder turns 19 years old. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
l	-	Zone II	Under 21 Until	Date DL/ID cardholder turns 21 years old. Format: MM/DD/CCYY U.S., CCYY/MM/DD Canadian	Both	F10NS
m	-	Zone II	Organ Donor	An indicator that denotes that the card holder is an organ donor. A red heart icon is required "♥". The issuer has the option of adding text – recommendation is for the words "ORGAN DONOR" to be used.	Both	Image and V20ANS
n	-	Zone II or IV	Veteran Indicator	An indicator that denotes that the card holder is a veteran. The word "VETERAN" is required.	Both	F7A

5 Quality Control

5.1 Quality Control Inspections

It is highly recommended that jurisdictions make regular quality control inspections of the DL/ID cards they are producing. These quality control inspections should continue throughout the life of the card production system. The production of DL/ID cards is essentially a manufacturing operation, and the need for effective quality control is the same as for any other manufacturing operation that seeks to produce a quality product.

5.2 Quality Control Guidelines

The following guidelines will help jurisdictions establish an effective quality control program:

Basic quality control testing. Ideally, basic quality control testing should be performed on every card produced. The purpose of this testing is to ensure that the cards conform to the design and includes all required elements (bar code, security devices, digital image, etc.) This could be as simple as a visual inspection prior to releasing the card to the cardholder. In high volume printing operations, it may be necessary to use statistical sampling or automated quality control testing.

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Comprehensive quality control testing. In addition, more comprehensive quality control testing should be conducted on a regular basis. This testing should determine that not only are the required design elements present but also that they perform as intended. This testing should include a check of the format of the data in the bar code and a test of bar code print quality.

Frequency of testing. The frequency of testing that is needed depends on the actual design of the card production system. At a minimum, testing of sample cards from each printer in operational use should be done on a weekly basis. It is the responsibility of the DMV to ensure testing is done. If the DMV hires a vendor to print the cards for them, then the DMV should ensure that quality control testing is required as part of the contract with the vendor.

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Annex A
(normative)

Card Design

A.1 Introduction

This annex contains the requirements with regard to the human readable content and layout of the data elements on DL/ID documents.

The main ideology for defining the design of the DL/ID is the minimum acceptable set of requirements to guarantee global interoperability. Sufficient freedom is afforded to the issuing authorities of driver licenses to meet their national (domestic) needs (existing standards, data contents, security elements, etc).

A.2 Scope

Annex A defines the specifications of the card layout, together with informative examples for ease of understanding.

A.3 Dimensions and character set

The dimensions of the DL/ID shall be in conformance with ISO/IEC7810 ID-1.

All mandatory human readable data elements shall be printed in ANS characters.

A.4 Functions

The basis of the visual card design is to meet the minimum common mandatory set of data elements in the following areas of function:

- Common recognition of the DL/ID document by law enforcement agencies and users outside of the jurisdiction of issue.
- Layout of the human readable data elements and the machine-readable components.
- Text and or pictographs of the human readable data elements.
- Security of the card as a separate topic to avoid confusion between common recognition and integrity issues.

A.5 Common recognition

To assist law enforcement agencies in recognizing a driver license presented by a driver outside the jurisdiction or country of issue as a DL/ID, the following apply:

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A.5.1 Background color

Distinctly different colors should be used for the background of Zone 1 of the driver license and non-driver identification cards. The Zone 1 background color should be predominantly a high security color chosen to make copying or duplication of the document difficult. The background of Zone 1 may utilize any type of design. The use of the following colors for the background of Zone 1 is recommended, but not required:

- For DL documents, it is recommended that the background color of Zone 1 be predominantly a 30% tint of Pantone reference 198 as specified in ISO/IEC CD18013-1 for ISO Compliant Driver Licenses

- For ID cards, it is recommended that the background color be predominantly a 30% tint of Pantone reference 368

A.5.2 Portrait position

The reproduction of the portrait of the cardholder of the license shall be depicted on the left side on the portrait side of the card as shown by the position of Zone III in figure A.2 and A.3.

A.6 Layout

Flexibility is built into the standard to accommodate the needs of the many issuing jurisdictions. There are two principal formats – vertical (under 21, mandatory for U.S., optional for Canada) and horizontal (over 21, mandatory for U.S.). Within both of these formats, zones divide the layout and options for the zones are delineated in this Annex. Zone placement will vary between the two formats for the portrait side of the cards. The non-portrait sides will be the same for the two formats.

The portrait and non-portrait side of the vertical and horizontal cards shall display the following:

Portrait side

Zones I, II and III

Non-portrait side

Zones IV and V

A.7 Contents of the zones

A.7.1 General

This section addresses the placement of data elements in various zones on the card. In some cases, it is mandatory that a data element be placed in the given zone. In other cases, the placement of a data element may be optional for the given zone. The issue of the mandatory or optional *placement* of data elements is different than the issue of whether the data element is required to appear on the card at all. For example, the use of a data element, e.g., date of expiry of each vehicle category, may be optional, but if it is used it is mandatory to place it in the given zone.

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A.7.2 Zone I

A.7.2.1 Document type indicator

For driver licenses and identification cards, the following options exist:

- DRIVING LICENSE
- DRIVING LICENCE (ISO-compatible)
- DRIVER LICENSE
- DRIVER'S LICENSE
- DRIVER LICENCE
- COMMERCIAL DRIVER'S LICENSE; COMMERCIAL DRIVER LICENSE; or CDL
- NON-DOMICILED COMMERCIAL DRIVER'S LICENSE or NON-DOMICILED CDL
- IDENTIFICATION CARD

The words "DRIVING LICENSE" or "DRIVER LICENSE" may be incorporated in the background graphic design of Zone I. The words may also be in French ("PERMIS de CONDUIRE"). NOTE: The term "driving licence" is used for compatibility with the ISO standard. If a version is to be used other than "license" or "licence," the jurisdiction must apply for an exception. You may also use a bilingual version of both French and the ISO compliant English. Other types of driving licenses may be indicated in the same manner, such as commercial driving licenses and instruction/learning permits.

Pursuant to Title 49 CFR Subpart J – Commercial driver's license document, §383.153 Information on the document and application, (a) All CDLs shall contain the following information: (a)(1) The prominent statement that the license is a "Commercial Driver's License" or "CDL," except as specified in §383.153(b).

(b) If the CDL is a Non-domiciled CDL, it shall contain the prominent statement that the license is a "Non-domiciled Commercial Driver's License" or "Non-domiciled CDL." The word "Non-domiciled" must be conspicuously and unmistakably displayed, but may be noncontiguous with the words "Commercial Driver's License" or "CDL."

For ID cards, the words "IDENTIFICATION CARD" must be included as text or, alternatively, the words "IDENTIFICATION CARD" may be incorporated in the background graphic design of Zone I. The words may also be in French ("CARTE D'IDENTITÉ").

A.7.2.2 Issuing jurisdiction information

The name of the issuing jurisdiction must be included as text (full name or abbreviation).

The distinguishing sign of the issuing country, as prescribed below, must be included in Zone I:

U.S. jurisdictions shall use: **USA**

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Canadian jurisdictions shall use: **CAN**

A full list of issuing country codes may be obtained from ISO 3166-1:2006, *Codes for the representation of names of countries and their subdivisions -- Part 1: Country codes*.

The full name of the issuing country may also be included, as well as other images, such as the flag or logo of the issuing country and/or jurisdiction.

A.7.3 Zone II

Zone II contains the following data elements:

- Table 1/Ref. a. Family name (or concatenated Name)
- Table 1/Ref. b. Given name(s) (or concatenated Name)
- Table 2/Ref. g. Suffix (optional)
- Table 1/Ref. c. Date of birth
- Table 1/Ref. d. Date of issue
- Table 1/Ref. e. Date of expiry
- Table 1/Ref. f. Customer number
- Table 1/Ref. g. Document discriminator
- Table 1/Ref. i. Signature (unless in Zone III)
- Table 1/Ref. j. Cardholder address
- Table 1/Ref. k. Vehicle classifications (if codes are used, they should be explained in Zone IV; overflow information may be placed in Zone IV)
- Table 1/Ref. l. Vehicle restrictions and endorsements (if codes are used, they should be explained in Zone IV; overflow information may be placed in Zone IV)
- Table 1/Ref. n. Cardholder sex
- Table 1/Ref. o. Cardholder height
- Table 2/Ref. f. Cardholder weight (optional)
- Table 1/Ref. p. Cardholder eye color
- Table 2/Ref. h Audit information (optional)
- Table 2/Ref. a. Cardholder hair color (optional)
- Table 2/Ref. b. Cardholder place of birth (optional)
- Table 2/Ref. e. Date of expiry per vehicle classification / category (optional – may be in Zone IV instead)
- Date of issue per vehicle classification / category (optional – may be in Zone IV instead)
- Table 2/Ref. d. Date of first issue per vehicle classification / category (optional – may be in Zone IV instead)
- Table 2/Ref. j. Under 18 until date (optional)
- Table 2/Ref. k. Under 19 until date (optional)
- Table 2/Ref. l. Under 21 until date (optional)
- Table 2/Ref. m. Organ donor indicator (optional)
- Table 2/Ref. n. Veteran indicator (optional – may be in Zone IV instead)

Other data fields for national or jurisdictional purposes in human readable format (optional).

A.7.4 Zone III

Zone III contains the following:

- Table 1/Ref. h. Portrait
- Table 1/Ref. i. Signature (May be in Zone II instead)

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A.7.5 Zone IV

Zone IV contains the following:

- Explanations of codes used in Zone II categories, restrictions, and/or endorsements
- Overflow from categories, restrictions, and/or endorsements in Zone II
- Table 2/Ref. e. Date of expiry of each vehicle category (if used)
- Table 2/Ref. d. Date of first issue of each vehicle category (if used)
- Optical character recognition text & RFID for enhanced DL/ID (if used)

Jurisdiction-specific information in human-readable format for purposes of administration of the license or related to road safety may also be included in this zone.

A.7.6 Zone V

The PDF417 2-dimensional bar code must be included in Zone V – details can be found in Annex D. Other optional machine-readable technologies may co-exist with the PDF417 2-dimensional bar code in Zone V. This standard contains additional details concerning how to use 3-track magnetic stripes, optical memory cards, and optical character recognition text & RFID for enhanced DL/ID. Issuing authorities wishing to implement other non-proprietary technologies, such as integrated circuit cards (also known as "smart cards") beyond how that technology is reflected for the enhanced DL/ID, are asked to work with AAMVA prior to implementation, so that future iterations of this standard will properly include these technologies to ensure future interoperability with other jurisdictions.

The positions of the zones for the optional jurisdiction-specific human readable fields and optional machine-readable technologies are presented in figures A.4 and A.5. The position and size of Zones IV and V may be adjusted in accordance with the machine-readable technologies incorporated on the card.

A.7.7 Truncation of name

If information has to be truncated to fit in the available space then this is the way to do it. For all name fields, characters are eliminated from a field in the following order until the name fits into the field:

- Starting from the right and moving to the left, eliminate spaces adjacent to hyphens
- Starting from the right and moving to the left, eliminate apostrophes
- Starting from the right and moving to the left, eliminate any remaining characters, excluding:
  - Hyphens
  - Remaining spaces
  - Characters immediately following a hyphen or a space

For example, in the case where a person's middle names are "V'Erylongmiddlename01 V'Erylongmiddlename02 Marie - Louise" (58 characters), the truncation sequence will progress as follows:

- Remove spaces adjacent to hyphens, resulting in "V'Erylongmiddlename01 V'Erylongmiddlename02 Marie-Louise" (56 characters)
- Remove apostrophes, resulting in "VErylongmiddlename01 VErylongmiddlename02 Marie-Louise" (54 characters)
- Remove other characters as allowed, resulting in "VErylongmiddlename01 VErylongmi M-L" (35 characters)

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A.7.8 Reproduction of images

A.7.8.1 Portrait

Measures shall be taken by the issuing authority to ensure that the digitally printed reproduction of the portrait of the cardholder on the card is resistant to forgery and substitution. The portrait shall meet the following requirements:

Pose. The portrait shall depict the face of the rightful cardholder 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. The portrait may only show the cardholder with headgear, if the cardholder is a member of a religion requiring the wearing thereof and provided that the headgear does not present as an obstruction or present a shadow and render the portrait inadequate for the identification of the cardholder. Jurisdictions that incorporate facial recognition biometric technology may wish to ensure eyeglasses are removed as well, to aid in consistent identification of the cardholder.

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.

Orientation. The crown (top of the hair) shall be nearest the top edge of Zone III as defined in figure A.2 and A.3; i.e. the crown to chin orientation covering the longest dimension defined for Zone III.

Face Size. The crown to chin portion of the full-face frontal pose shall be 70 to 80 percent of the longest dimension defined for Zone III, maintaining the aspect ratio between the crown-to-chin and ear-to-ear details of the face of the cardholder.

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 color cast) and a high level of detail, and minimize shadows, hot spots and reflections (such as sometimes caused by spectacles).

Background. A uniform light blue color or white background shall be used to provide a contrast to the face and hair. Note: Preference is for uniform light blue color, such as Pantone 277 (though the specific Pantone color is not a requirement – a uniform light blue color or white background is a requirement).

Centering. The full-face frontal pose shall be centered within Zone III.

Border. A border or frame shall not be used to outline the digitally printed reproduction of the portrait.

Color. The digitally printed reproduction of the portrait shall be a true color representation of the cardholder, unless laser engraving is used to produce the DL/ID document. If laser engraving is used, a true color representation of the cardholder must be stored by the issuing jurisdiction with the cardholder's record.

Printing resolution. The digitally printed reproduction shall yield an accurate recognizable representation of the rightful cardholder of the license. The quality of a digitally reproduced portrait shall be visually comparable to an acceptable photograph. To achieve this comparable quality in a digital reproduction, care must be given to the image capture, processing, digitization, compression and printing technology and the process used to reproduce the portrait on the card, including the final preparation of the DL/ID.

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A.7.8.2 Signature

The signature of the cardholder shall be a digitally printed reproduction of an original. Measures shall be taken by the issuing authority to ensure that the digitally printed reproduction of the signature is resistant to forgery and substitution. The signature displayed shall meet the following requirements:

Orientation. The digitally printed reproduction of the signature shall be displayed in either Zone II or Zone III with its A-dimension parallel to the Top Reference Edge of the horizontal format cards identified in figure A.2. In the case of vertical format cards, the A-dimension will be perpendicular to the top reference edge. (See figure A.2.1 for an example of the horizontal format and figure A.3.1 for an example of the vertical format.)

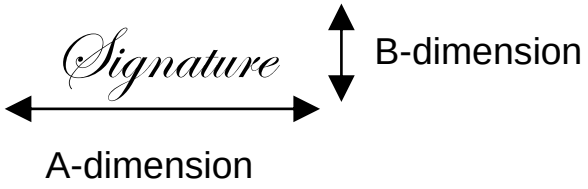

Figure A.1

Size. The signature displayed shall be of such dimensions as to be discernible by the human eye and maintain the aspect ratio (A-dimension to B-dimension) of the original signature.

Scaling. In the event the signature displayed is scaled-up or scaled-down, the aspect ratio (A-dimension to B-dimension) of the original signature shall be maintained. In the case of a scaled-down image, the image shall not be reduced to a size where it is no longer a discernible representation of the original. The resulting signature must be a smooth representation of the original signature without such distortions such as stair stepping, stretching and/or squishing being apparent to the human eye.

Cropping. The issuing authority should take steps to eliminate or minimize cropping.

Color. The digital reproduction of the signature shall be printed or laser engraved in definite contrast to the background color of the license. Either use a light signature on a dark background or a dark signature on a light background if printed. The ink of the signature must be printed entirely in the same shade or of a color, not varying shades (i.e., grey scale printing).

Borders. Borders or frames shall not be used to outline the digitally printed reproduction of the signature.

Printing resolution. The digitally printed reproduction shall yield an accurate recognizable representation of the signature of the rightful cardholder of the license. To achieve this comparable quality in a digital reproduction, care must be given to the image capture, processing, digitization, compression and printing technology and the process used to reproduce the signature on the card, including the final preparation of the DL/ID.

A.8 Security

Aspects such as a specific background pattern, rainbow printing, holograms and special inks relate to the minimum security requirements of the card and should not be confused with common recognition of the DL/ID. The security requirements are addressed in Annex B.

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A.9 DHS Compliance Indicators

The markings on both compliant and non-compliant cards should be secured in the same way that other personalization data on the card must be secured. For example, if the name and photo/image are secured using a high security overlay then the marking should also be secured by the security overlay.

A.9.1 Fully Compliant

The mark for Fully Compliant is a circle with a star cut out to reveal the background.

Specifications

- Printed on portrait side, in the top third of the DL/IDs, both landscape and portrait
- Mark Size is .25 inch square
- Mark Color is Gold Pantone 117 or CMYK equivalent: C: 0.0 M: 18.5 Y: 100.0 K: 15.0

A.9.2 Non-Compliant Card

The text "NOT FOR REAL ID PURPOSES" or "NOT FOR FEDERAL IDENTIFICATION" is the marking for a Non-Compliant Card.

Specifications

- The Non-Compliant text is on the portrait side of the DL/ID where portrait/personalization is captured
- Printed in the top third of DL/IDs, both landscape and portrait
- The Non-Compliant text is recommended in a font size of 9 points and an acceptable minimum of 7 points
- The Non-Compliant text should be capitalized
- The Non-Compliant text is set in a san serif font (straight line) such as Helvetica and Arial, and set **bold**.
- The Non-Compliant text tracking* should be set to 100 based on a tracking unit of 1/1,000th of an em[8]. Tracking can be adjusted to fit and look.
- It is suggested that the Non-Compliant text be placed above all personalization data
- Recommend one space above and one space below text to separate words from other personalization on the card

*Tracking creates an even spacing between multiple characters in a line of text, widening out or tightening up.

8 An em is a unit of measurement in the field of typography, equal to the point size of the current font.

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A.10 DHS Limited Duration of Stay Document Indicator

States shall only issue a temporary or limited-term DHS Compliant DL/ID to an individual who has temporary lawful status in the United States. These cards should clearly indicate on their face and in the machine readable zone that they are temporary or limited-term DL/IDs compliant with DHS standards.

The temporary or limited-term compliant DL/ID should be marked on the portrait side with the phrase "Temporary" or "Limited-Term" within the top third of the card. The specified font is Helvetica Bold with a recommended font size of 9 points, however not less than a 7 points font in regular black ink. This phrase should be secured in the same way that other personalization data on the card is secured.

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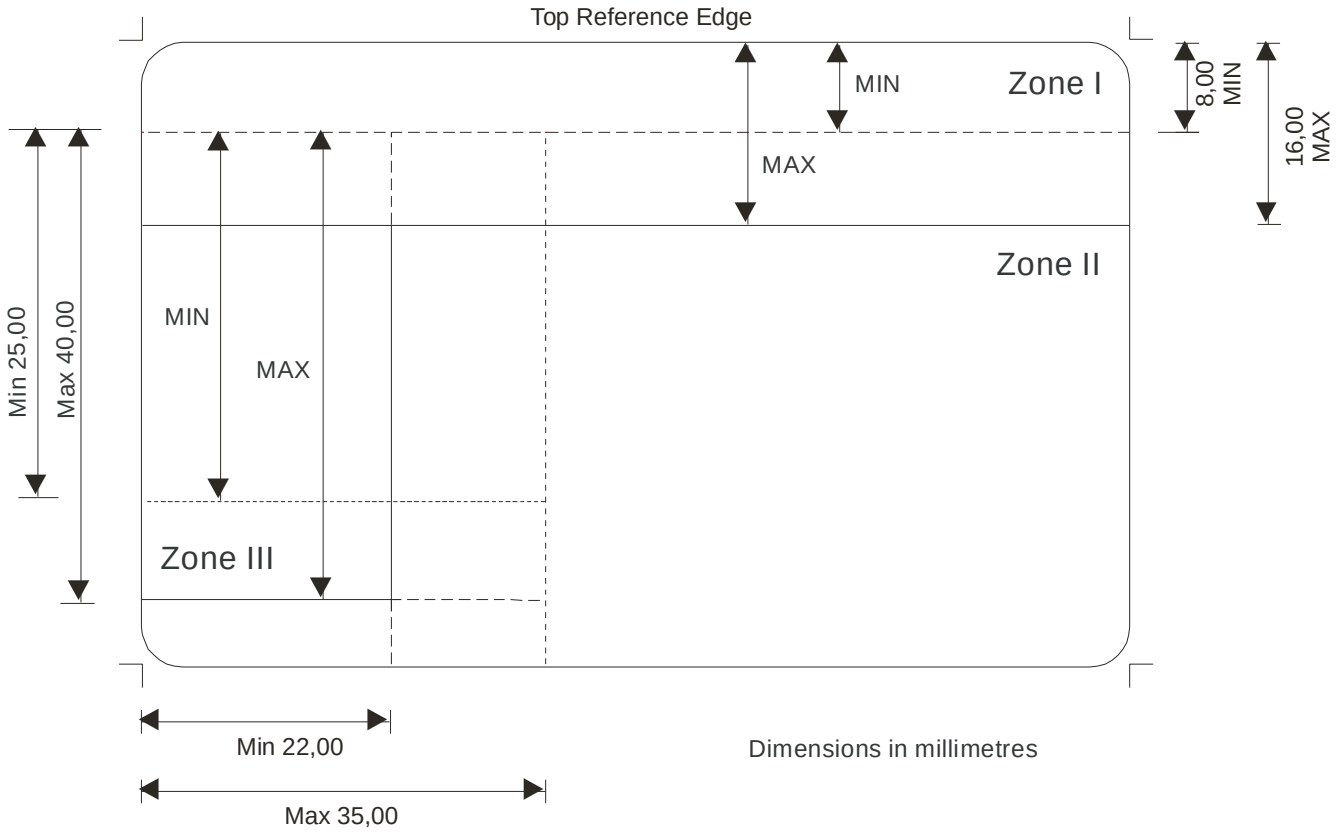
Figure A.2: Portrait side of Horizontal DL/ID (not to scale)[9]



NOTE Overlap is allowed, and expected, between zones.

[9] The top reference edge is noted for horizontal oriented documents only.

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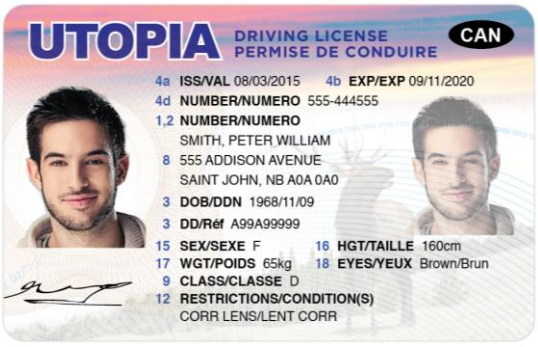
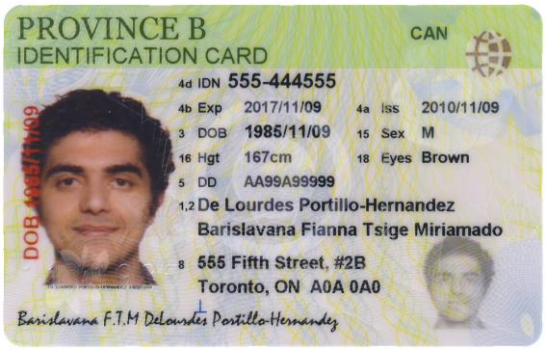
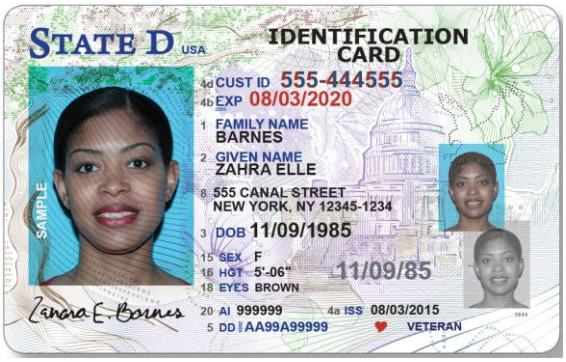
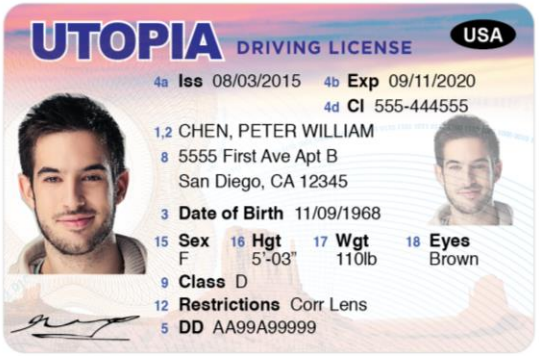
Figure A.2.1: Horizontal DL/ID - Informative examples (not to scale) – intended to show what could be done within this standard. (See NOTE on page 27)









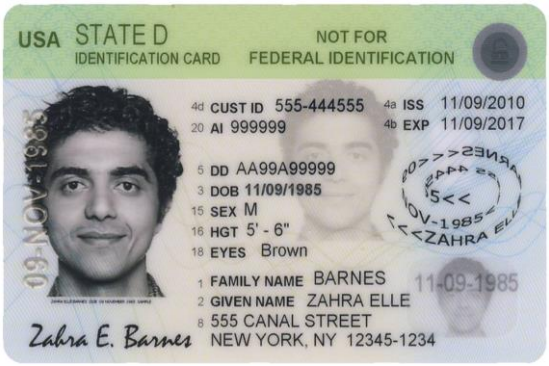


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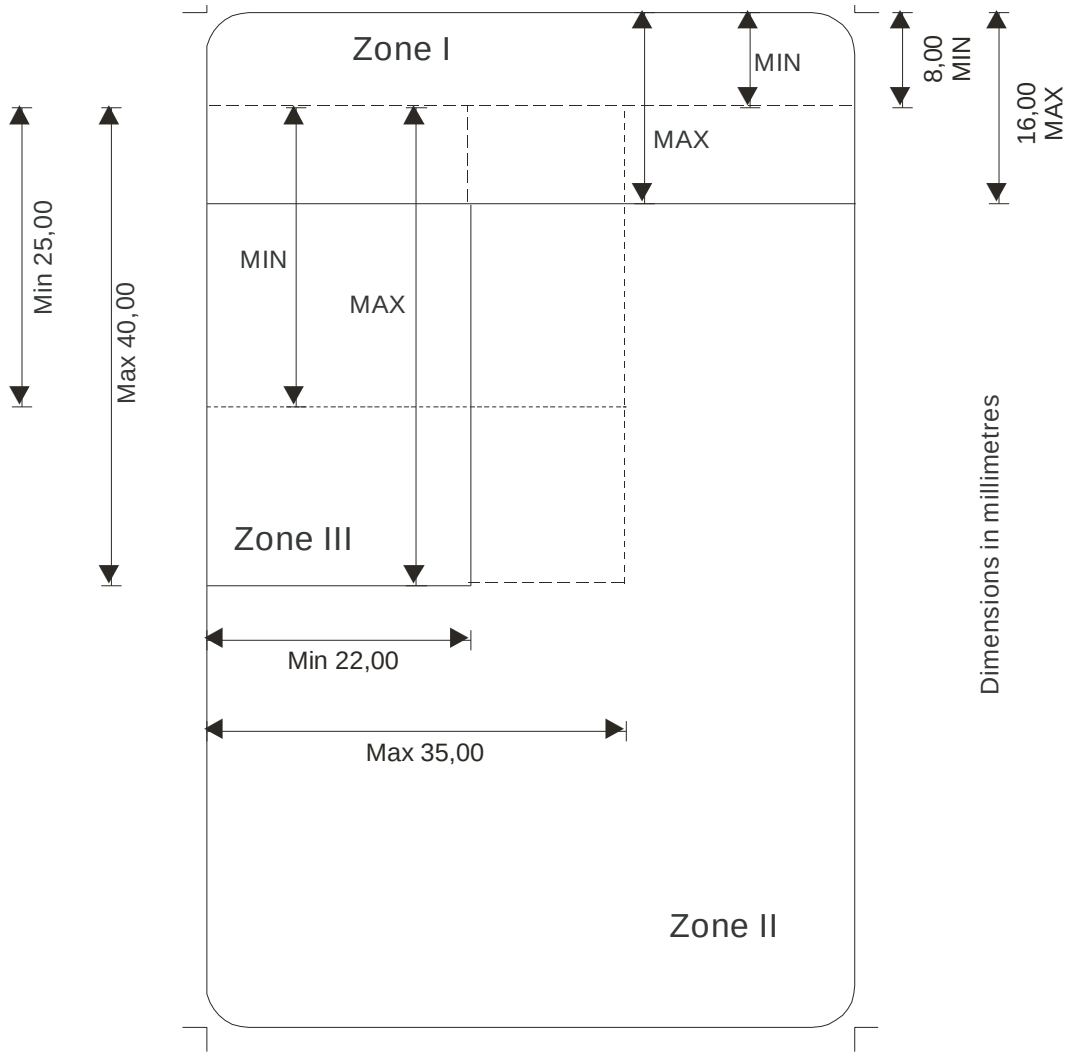
Figure A.3: Portrait side of Vertical DL/ID (not to scale)



NOTE Overlap is allowed, and expected, between zones.

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Figure A.3.1: Vertical DL/ID - Informative examples (not to scale) – intended to show what could be done within this standard

NOTE: The background colors in Zone 1 of the sample cards (which are specified as Pantone reference 198 and 368) may not appear as the true shade due to variations between individual monitors and printers on which they are viewed or printed. It is for this reason the Pantone reference numbers are used to specify the colors to be used on the actual cards.

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Figure A.4: Non-portrait side of Horizontal and Vertical DL/ID

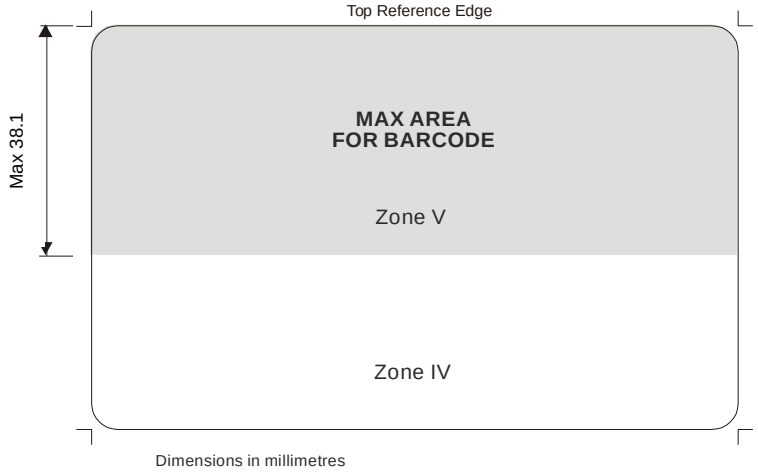
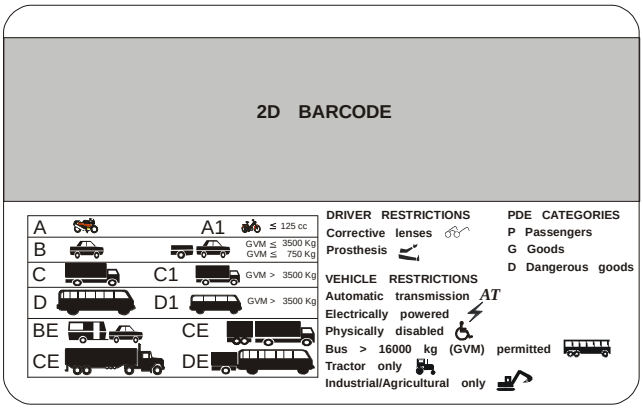


Figure A.4.1: Informative Example



Note: Pictographs / icons used in this informative example are samples taken from the ISO/IEC standard for ISO compliant driving licenses (ISO/IEC 18013-1). Jurisdictions may wish to consider the use of icons to convey driving privileges, endorsements, and restrictions, and use appropriate vehicle class codes.

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Figure A.5: Non-portrait side of Horizontal and Vertical DL/ID – magnetic stripe and bar code

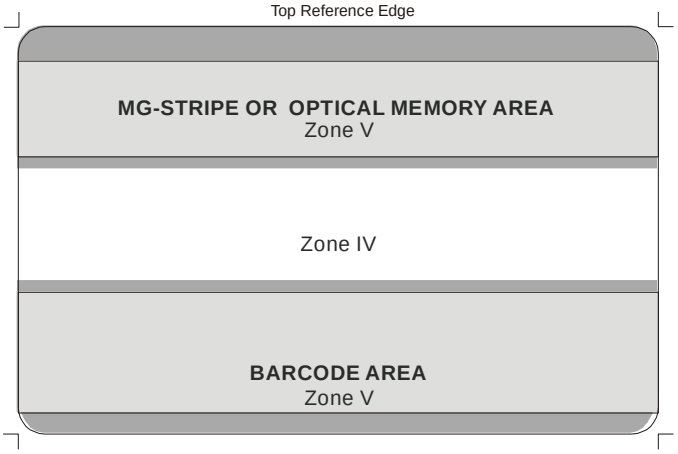
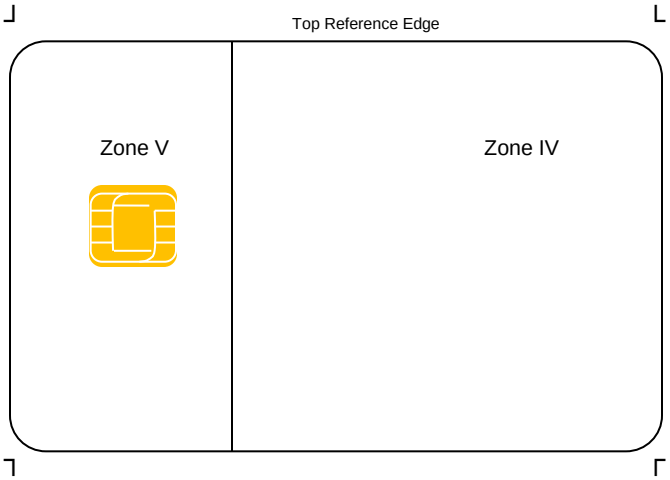


Figure A.6: Non-portrait side of Horizontal and Vertical DL/ID – integrated circuit with contacts



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Annex B
(normative)

Physical Security

B.1 Scope

This annex specifies the minimum security requirements for a DL/ID to help deter counterfeiting, falsification and other types of fraudulent misuse. Furthermore this annex provides guidance in an informative Annex C to Issuing authorities and suppliers on some of the security threats to which a DL/ID may be exposed to and a list of measures that can be used to help meet the minimum security requirements. Included within the scope are the security design and printing of DL/IDs, card materials and process manufacturing, also the personalization processes involved in the production of a DL/ID.

It also provides basic guidelines for document security management in B.5.

> NOTE Access control, authentication and integrity validation is outside the scope of this part and are addressed in ISO/IEC 18013-3. The procedures for securing the personalization and issuance process and use of DL/IDs are addressed in 18013-1 Annex D.

B.2 Informative references

ISO/IEC 7501-3 ICAO Doc 9303, Part III, Volume 1 – Machine Readable Official Travel Documents, 3rd Edition 2008, and ICAO Supplement 9303, Release 10

TS EN 15480-1, ECC-1 Identification Card Systems – European Citizen Card, Part 1: Physical, electrical and transport protocol characteristics

ISO/IEC 10373 Parts 1, 2, 3, 5 and 6

ISO/IEC 24789 Parts 1 and 2

B.3 Basic principles

B.3.1 Introduction

The rapid growth in identity fraud has led to increasing concerns over the security of DL/ID cards and many other types of documents used to confirm identity. DL/ID cards are often accepted not only as proof of having earned the privilege to drive a motor vehicle, but also as confirmation of the identity of the holder for obtaining access to a wide variety of other services, for example opening bank accounts, withdrawing or transferring funds etc. Of particular concern is the opportunity DL/ID cards have to serve as evidence of identity to assist in building a false identity and providing a pathway to obtain other documents, such as passports, all in an assumed identity. For these reasons DL/ID is a target for the fraudster making it important to ensure that DL/IDs are adequately protected from the various forms of fraud to which they may be subject.

The entire card including all the security features should afford protection for the lifetime of a DL/ID. All security features should maintain their function for the planned service life of the card.

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Issuing authorities may introduce other functions to a DL/ID provided that it does not interfere with the driver license or ID card function and the requirements in this standard are not compromised.

B.3.2 Security classification

Security features can be classified into three categories, depending on the security level required for verification. The three security levels are Level 1 (first line inspection), Level 2 (second line inspection) and Level 3 (third line inspection).

Level 1: first line inspection

Examination without tools or aids that involves easily identifiable visual or tactile features for rapid inspection at point of usage.

Level 2: second line inspection

Examination requires the use of a tool or instrument (e.g., UV light, magnifying glass, or scanner) to discern.

Level 3: third line inspection

Examination done at a forensic level and not specifically addressed by this standard.

In addition, four (4) families of security features are defined:

1. Card body design

2. Security design, resistant to reproduction

3. Security inks/pigments

4. Protecting personalized data

To be compliant with this standard, a DL/ID shall contain a minimum set of security features providing protection across all families and Levels 1 and 2, as defined in B.4.

At least one Level 3 security feature is required. Specifics are not considered in this standard because level 3 security features are generally disclosed and only discussed between experts on a need to know basis. Issuing authorities may add additional security features to bolster security against any specific threats, provided such features do not have an adverse impact on other security features or personalized information.

B.3.3 Document related identity fraud

Document related identity fraud can be categorized in the following categories of threats:

- Counterfeiting – producing a simulation of the genuine document

- Falsification – altering the holders details on a genuine document or harvesting/repurposing genuine document parts

- Misuse of a genuine document – e.g. posing as the rightful holder

In order to ensure that a DL/ID is well protected against these threats it should contain a balanced set of security features selected to combat all three types of fraud. Fraudsters are generally resourceful and pragmatic people

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who will look to exploit the weakest point in the overall process. So, a DL/ID that contains a number of strong anti-counterfeiting features is unlikely to be fraudulently reproduced, but if the holder's data printed on the card is not well secured then falsification will be the more likely form of attack. Concentrating on one type of threat to security, whilst paying insufficient attention to another, will leave a DL/ID vulnerable to attack and this is why it is necessary to select a balanced set of security features offering protection against all perceived threats.

> NOTE Care should be taken when applying a security feature or the combination of features that these do not interfere with the legibility of the personalized portrait, signature, text or machine readable data.

Similarly, it is strongly recommended not to place too much reliance upon any single security feature. Even if a security feature appears to be very difficult to reproduce or to falsify, there can be no guarantee it will not become compromised during the validity period of the document. If this happens the security of a DL/ID may be significantly damaged resulting in serious consequences. The preferred approach is to select a set of security features that work together in combination, such that even if one feature becomes compromised the others will continue to provide protection. For the fraudster, having to overcome multiple security features has an important deterrent effect, significantly increasing the time, cost and the risk of detection in perpetrating the fraud and probably turning him to other easier targets.

Different kinds of threats are given in the informative Annex C. In summary, the following threats, listed in no particular order of importance, are defined ("*" = threat):

- *A.1: Document design attacks
- *A.2: Substitute material/personalization attacks
- *B.1: Falsification by physical modification of existing valid documents
- *B.2: Falsification by recycling
- *B.3: Falsification of logical data
- *C.1: Misuse of genuine valid DL/IDs
- *C.2: Misuse of genuine invalid documents
- *C.3: Misuse by theft of original blank documents
- *C.4: Misuse through the fraudulent issue of genuine documents

It should be noted that only security threats related to the physical document are covered in this annex. The following threats are excluded:

- Falsification of logical data (*B.3)
- Misuse of genuine valid documents (*C.1)
- Misuse of a genuine but invalid documents (*C.2)
- Misuse through fraudulent issue of a genuine documents (*C.4)

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B.4 Security feature requirements

B.4.1 General requirements

While remaining open to future solutions and technology independent, this annex:

- specifies a minimum set of mandatory security features and a non-exhaustive list of optional security features with no preferential order, and

- shows which security feature addresses the various type of frauds, the security level and the family of security features. Issuing authorities are free to make appropriate selections.

The minimum number of security features per family is specified in B.4.2.1, B.4.2.2, B.4.2.3, and B.4.2.4.

The combination of security features shall be chosen to ensure they work together, without conflict, to support the security of the DL/ID. Security features can address more than one type of threat. Security features can also be classified into more than one security level provided they are designed to function at each of the intended levels.

B.4.2 Security features per family

The next sections of this annex classify some security features according to which family they belong. All four families of features contain one or more mandatory security elements. For each of the four families there is also a set of optional security features from which issuing authorities are free to make their selection, subject to including the required minimum number of mandatory and optional features in a DL/ID. Issuing authorities may also include other optional security features not listed in each section, provided they are included in addition to the minimum number of optional elements per family.

B.4.2.1 Card body design

Card body design refers to the security of the card construction and in particular to the properties of the materials used in the manufacture of card blanks.

It should be noted that the chosen card construction cannot be determined in isolation and must also take into account the operational profile of the card. For example the construction of the card must be suitable for the intended method of personalization, also, if a chip is to be included within the card body the construction must allow either for an inlay (contactless interface) or for milling and embedding (contact interface) of the card body.

The available features are listed in Table B.1 — . In addition to the mandatory feature (M), at least 2 optional security features (O) shall be included.

Table B.1 — Card Body Design Features

			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
1.1	UV-A dull substrate material	**M**	x	x	x				x
1.2	Fixed printed and/or dynamic data on different layers	O			x	x	x		x
1.3	Tamper evident card body	O	x		x	x		x	x

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			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
1.4	Taggant substances for genuine authentication	O	x	x	x	x			x
1.5	Look through element (transparent) such as window element	O	x	x	x			x	
1.6	Look through element comprising grey levels	O	x	x	x			x	x
1.7	Card core inclusions	O	x	x				x	
1.8	Pre-printed serial number on card blanks	O					x	x	x
1.9	Embossed surface pattern	O	x	x	x	x		x	x
1.10	Embedded thread, fiber or planchette	O	x	x		x		x	x
1.11	Security bonding	O			x	x		x	

B.4.2.2 Security design, resistant to reproduction

The requirements of the following section relate to the security background design and not to the personalized data. DL/IDs shall be printed with a security background design that cannot be easily reproduced using publically available design systems and production equipment. No single security feature can provide protection against counterfeiting a DL/ID. A combination of features is required.

In addition to the two mandatory features (M), at least 2 optional features (O) shall be included from Table B.2.

Table B.2 — Security Design, Resistant to Reproduction Features

			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
2.1	No CMYK colors and at least 2 special colors	**M**	x	x					x
2.2	Guilloche design	**M**	x	x	x			x	x
2.3	Anti-scan pattern	O	x	x	x				x
2.4	Micro printed text	O		x	x				x
2.5	Duplex security pattern	O	X	x	x			x	x
2.6	Rainbow printing	O	X	x	x			x	x
2.7	Deliberate error into the design or microprint	O		x	x				x
2.8	Use of non-standard type-fonts	O		x	x			x	x
2.9	Front to back (see through) register	O	X					x	
2.10	Micro Optical Imaging	O		x		x	x		x

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B.4.2.3 Security inks / pigments

A DL/ID shall contain inks or pigments with special properties by which the document may be authenticated and differentiated from fraudulent DL/IDs. The purpose of these inks/pigments is to include properties in a DL/ID that can serve as authentication features, either directly by visual inspection or through the use of simple verification equipment, for example an ultra violet lamp. These properties shall not be present in inks that are commercially available to the public or pigment printing systems. This allows for the differentiation of a genuine DL/ID from a fraudulent one.

UV fluorescent ink (visible or invisible) with a spectral response in the 365 nm wavelength shall be used as the mandatory feature. The UV element included in the background printing of the DL/ID shall be located in a specific area or areas of the DL/ID to protect vulnerable data or other elements of the DL/ID that may be particular targets to fraud.

NOTE 1 Where inks providing a short-wave UV response are used, care should be taken that these are compatible with the card construction and personalization (e.g. are not rendered ineffective by laminate UV absorption).

NOTE 2 IR-fluorescent ink and IR-drop out ink shall not be used where the personalized data is intended to be read in the B900 part of the spectrum.

In addition to the mandatory feature (M), at least 2 optional features (O) shall be added from Table B.3.

Table B.3 — Security Ink/Pigment Features

			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
3.1	**Security background printing**								
3.1.1	UV fluorescent ink in security background printing	**M**	x	x	x				x
3.1.2	Optical effect pigments (other than UV or IR pigments)	O	x	x	x			x	x
3.1.3	IR-fluorescent ink	O	x	x	x				X
3.1.4	IR-drop out inks	O	x	x	x				X
3.1.5	Non-optical effect pigments	O	x	x	x				X
3.1.6	Metameric Ink	O	x	x		x			X
3.1.7	Phosphorescent Ink	O	x	x	x			x	X
3.1.8	Tagged Ink	O	x	x	x	x	x		X
3.2	**Personalized data**								
3.2.1	Optical effect pigments (other than UV or IR pigments)	O	x	x	x		x	x	
3.2.2	IR-fluorescent ink	O	x	x	x		x		X
3.2.3	IR-drop out inks	O	x	x	x		x		X
3.2.4	Non-optical effect pigments	O	x	x	x			x	X
3.2.5	UV fluorescent ink in personalized data	O			x	x			X

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			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
3.2.6	Chemically reactive	O			x			x	
3.2.7	Metameric Ink	O			x	x			
3.2.8	Phosphorescent Ink	O	x	x	x			x	x
3.2.9	Tagged Ink	O	x	x	x	x	x		x

B.4.2.4 Protecting personalized data

One type of attack on a DL/ID involves the removal of the portrait image from a stolen or illegally obtained document and its replacement with the portrait image of a different person. To counter this attack, a security feature shall overlap the portrait area without obstructing the visibility of the portrait.

The application of the dynamic data elements including the portrait shall be by one of the digital imaging technologies or a process offering equivalent security, since a DL/ID with a physically attached photograph is particularly susceptible to photo-substitution.

To ensure that data is properly secured against attempts at forgery the dynamic data elements shall be integrated into the layers of a DL/ID. A variety of technologies are available for applying the data in this way, including the following examples, which are listed in no particular order of importance:

- Electro-photographic printing
- Thermal transfer printing
- Ink-jet printing
- Photographic process
- Laser engraving

The choice of a particular technology is a matter for individual issuing authorities and depends upon a number of factors, such as the volume of DL/IDs to be produced, the construction of the DL/ID including the card blank material selected and whether it is to be personalized during the DL/ID manufacturing process or after a blank card has been assembled.

The development and availability of digital imaging techniques and their resulting potential for fraud means that high grade security features in the form of optically variable elements or other equivalent devices are the preferred optional security features for protecting against copying and scanning.

Appropriate integration of optically variable element components or other equivalent devices in an appropriate position in the structure of the DL/ID also protects the DL/ID from counterfeiting.

It is recommended that the visible security device overlapping the portrait without obstructing the visibility of the portrait be an optically variable feature.

Dynamic data elements shall be protected against abrasion over time and against fraudulent tampering either by a final assembly including a transparent element (layer, varnish, overlay) securely bonded or by the use of a

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technology which is by design adapted to afford the related protection such as laser engraving inside the card body. Although these precautions relate primarily to the dynamic data elements on the portrait side of the DL/ID, appropriate protection against tampering of the data in on the non-portrait side (Zones IV,V) of the DL/ID shall also be included.

In addition to the four mandatory features (M), at least 1 optional security feature (O) shall be included from Table B.4.

Table B.4 — Protecting Personalized Data Features

			Threats						
#	**Security feature**	**M/O**	***A.1**	***A.2**	***B.1**	***B.2**	***C.3**	**Level 1**	**Level 2**
4.1	Printing dynamic data elements using digital imaging technologies	**M**	x		x		x	x	
4.2	Laminate, overlay or coating for surface printed data and portrait	**M**	x		x	x		x	x
4.3	PDF 417 Bar code	**M**		x	x				x
4.4	Security background overlapping the portrait image area	**M**	x		x	x		x	
4.5	Embedded data in the portrait image	O	x		x	x	x	x	x
4.6	Redundant personalized data	O	x		x	x	x	x	x
4.7	Optical Variable Element	O	x	x	x	x	x	x	x
4.8	Areas of different surface reflection	O	x	x	x	x		x	
4.9	Personalized tactile elements	O	x		x	x	x	x	
4.10	Lenticular patterns such as variable laser element (CLI/MLI)	O	x	x	x	x	x	x	
4.11	Random pattern resulting in unique codes	O	x		x	x	x		x
4.12	Fine Line Foreground	O	x	x	x	x		x	x
4.13	Ghost image	O			x			x	
4.14	Covert Device – Readable and Storage Technology	O	x	x	x	x	x		x
4.15	Covert variable pixel manipulation	O	x	x	x	x	x		x
4.16	Digital seal	O	x	x			x		x
4.17	Visible security device overlapping the portrait	O	x	x	x	x	x	x	x
4.18	Magnetic media fingerprinting	O	x	x					x
4.19	Optical media fingerprinting	O	x	x			x		x

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B.5 Document security management

Production of a DL/ID, including the personalization processes, shall be undertaken in a secure environment with appropriate security measures in place to protect the premises against unauthorized access. Centralized DL/ID production and personalization is recommended wherever possible. If the personalization process is decentralized, or if personalization is carried out in a location geographically separated from where card blanks are made, care shall be taken to transport blank cards and security sensitive materials by secure means to safeguard their security in transit.

There shall be full accountability over all the security materials used in the production of good and spoiled DL/IDs and a full reconciliation at each stage of the production process, with records maintained to account for all material usage (including waste). The audit trail shall be to a sufficient level of detail to account for secure materials used in the production and shall be independently audited by persons who are not directly involved in the production. Certified records shall be kept of the destruction of all security waste material and spoiled DL/IDs.

The specifications of all secure material used in the production of a DL/ID should be carefully controlled and should be quality assured to ensure consistency from one batch to another. Security feature components of a DL/ID should be obtained only from bona fide security suppliers who can demonstrate that they have appropriate security procedures in place to safeguard the security of the supply chain.

Security design experts shall use specialized security design software packages for at least part of the security background and not general graphics software packages that are commercially available to the public for originating the entire security background.

B.6 Glossary

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

> NOTE Some security features listed may have greater applicability to paper documents – their inclusion in the glossary is a legacy consideration driven by issuing authorities that produce interim documents continuing to use this standard in assisting in the interim document design considerations. These interim documents are not currently within the scope of the standard.

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

Areas of different surface reflection: Surface embossed structure with different reflectivity/roughness, e.g. matt or glossy.

Background printing: Printed graphical security design consisting of e.g. guilloche, rainbow printing, micro text, etc. lying below or above the dynamic data.

*Card blank*s: A card that does not contain any of the dynamic data elements.

Card core inclusions: The opaque or translucent inner layers of a laminated card, e.g. colored or with a modulation of opacity simulating a watermark.

Chemically Reactive: Contains a security agent that is sensitive to chemicals, i.e., polar and non-polar solvents and bleach, commonly used to alter documents. The chemical reaction is for the ink to run, stain, and bleed to show evidence of document tampering.

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CLI/MLI (Changeable/Multiple Laser Image): Combination of a lens structure integrated to the surface of the document with elements engraved or printed into a bottom layer. Resulting effect consist in multiplexing of at least 2 images each of them being visible separately depending of the viewing angle.

Core inclusions: A material which is included within the inner layers of the card body, such as colored layer. One example of this is displaying a watermark effect, another being a laser absorption layer for displaying dynamic data

Counterfeit: An unauthorized copy or reproduction of a genuine security card made by whatever means

Covert Device – Readable and Storage Technology: Unique individual Near IR or IR invisible data mark, 2-dimenional encrypted bar code, capable of storing independent information or details.

Covert variable pixel manipulation: Covert dot matrix images that are converted to visible text with a special reader or lens

CMYK colors: The 'process' colors, cyan, magenta, yellow and black used in combination for commercial color printing, normally in the form of half-tone patterns, and by digital printing devices to approximately represent the visible color spectrum and enable the printing of 'color pictures'.

Deliberate error: A feature purposely made with an intentional mistake

Diffraction: An optical effect produced by periodic microstructures embedded into material layer and producing decomposition of white light into rainbow continuous spectrum that may be seen at specific viewing angles"

Digital Seal: A method of securing and validating data by electronic means using digital signature technology. The issuing authority "signs" the information contained in the MRT

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

Dynamic data: Information specific to the document and the holder.

Effect pigments: see optical or non-optical effect pigments.

Embedded data: Data that is visible, encoded or concealed within a primary visual image or pattern.

Embedded thread, fiber or planchette: Small, often fluorescent particles or platelets incorporated into a card material at the time of manufacture that can be seen later under certain lighting conditions. The embedded elements may have magnetic or other machine-readable properties that may be used to enhance the levels of security provided

Embossed surface pattern: A design or image formed on the surface of a DL/ID, for example during the card lamination process.

Fibers: Small, thread-like particles embedded in a substrate during manufacture and may include an UV feature too.

Fine Line Foreground: A pattern of continuously fine lines constructed by using two or more lines overlapping bands that repeat a lacy, web-like curve.

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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 removed.

Forgery: Fraudulent alteration of any part of the genuine DL/ID e.g. changes to the dynamic data elements. (portrait, signature, biographical and all personal data).

Front to back (see through) register: A design printed on both sides of a card that forms an interlocking image when held to a light source.

Ghost Image: A lighter reproduction of the original image that appears in the same area as the personal data such that the image appears to be in the background and the personal data can still be read without interference

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

Half-tone image: A method of representing images by printing, usually in the form of dots of black and/or colored ink. Varying tones are achieved by varying the size of the printed dots relative to the unprinted, white background area surrounding the dots.

Impostor: A person who applies for and obtains a DL/ID 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 other person's DL/ID.

Infra-red drop-out ink: An ink which is visible when illuminated with light in the visible part of the spectrum and which cannot be detected in the infra-red region.

Infra-red fluorescent ink: In daylight invisible ink, which can only be seen when applying light in the infrared spectrum (630nm).

Iridescent ink: An ink that contains transparent pigments consisting of a thin film deposited on tiny mica flakes. They cause interference with the incident light. This creates shiny, pearl-like shimmering effects with changes in color when the angle of view or illumination changes.

Laminate: A transparent material, which may have security features such as optically variable devices contained within it and which is designed to be securely bonded to the DL/ID to protect the dynamic data elements and the security features within the card structure.

Laser embossing: A process whereby a laser is used to create tactile elements on the card surface.

Laser engraving: A process whereby a laser is used to alter the card-body material to display information. The information may consist of text, images, pictographs and security features.

Laser perforation: A process whereby information is created by perforating the card-body material with a laser. The information may consist of text, images and pictographs and appear positive when viewed in reflected light and negative when viewed against a light source.

Latent image/data: 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. A latent image / data is – subject to the condition of the correct viewing angle – visible to the human eye without further equipment.

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Lenticular feature: Security feature in which a lens structure is integrated in the surface of the document such as a *changeable/*multiple laser image (CLI/MLI).

Look through element: An area of the card designed to permit the transmission of visible light through the card body. The light transmitting area may be transparent or comprise grey levels.

Machine-readable technology (MRT): Magnetic stripe, smart card, bar codes, OCR, optical WORM media, etc. Verifies the authenticity of the document, the data or the person presenting the card by the use of a reader and comparison of the stored data to other machine or visual information

Magnetic media fingerprinting: Tracks unique, random patterns of magnetic media formed as a by-product manufacture of card. The pattern is recorded at the time the card is encoded and this pattern can later be compared to the pattern detected when the card is scanned.

Metallic ink: Ink exhibiting a metallic-like appearance.

Metameric inks: A pair of inks formulated to appear to be the same color when viewed under specified conditions, normally daylight illumination, but which are mismatched at other wavelengths.

Micro optical imaging: Text, line art, gray scale images and multi—reflectivity images are engineered into optical WORM media at high resolution (over 12,000 dpi). Difficult to simulate the printing resolution.

Micro- printed text: Very small text printed in positive and/or negative form, that may be used in conjunction with rainbow printing and which can only be read with the aid of a magnifying glass and not exceeding 0.3mm in height.

Multi-layer card: A card-body comprising two or more layers of material securely bonded together to form a single structure.

Non optical effects pigments: Any ink containing visible or invisible pigments which is not designed to be controlled by eye such as metallic ink, magnetic ink, conductive ink, bleeding ink or which is not showing any predictable behavior upon wavelength activation.

Non-standard type fonts: Type fonts that are of restricted availability.

Optical effect pigment: Visible or invisible pigments incorporated in an ink which is designed to be controlled by eye, such as: optically variable ink also called color shifting inks, or iridescent inks.

Optical media fingerprinting: Tracks unique, random patterns of optic media (e.g., fibers) on card. The pattern is recorded at the time the card is encoded and this pattern can later be compared to the pattern detected when the card is scanned.

Optically variable element: An element whose appearance in color and/or design changes dependent upon the angle of viewing or illumination, such as holograms or optical diffractive structures.

Optically Variable Ink: Printing ink containing optically variable pigments which show variations in color depending on the angle of observation or lighting. Optically variable inks can be either opaque or transparent and include iridescent inks and metameric inks.

Overlay: An ultra-thin film or protective coating that may be applied to the surface of a DL/ID in place of a laminate and which may contain optically variable elements.

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Personalization: The process by which the dynamic data elements (portrait, signature, biographical and all personal data) are applied to the DL/ID.

Personalized tactile element: A surface element giving a distinctive 'feel' to the DL/ID, such as laser embossing (also referred to as raised laser engraving).

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

Photo-substitution: A type of forgery in which the portrait on a DL/ID is substituted for a different one after the DL/ID has been issued.

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

Pre-printed serial number on card blanks: identifier printed on card and/or on main components of the card before transfer to the personalization center(s).

Random pattern resulting in unique codes: Any random feature intrinsic or individually applied to each document by any technology giving uniqueness feature that can be controlled either by eye or with any kind of tool.

Rainbow (split-duct) printing: A technique whereby two or more colors of ink are printed simultaneously by the same unit on a press to create a subtle merging of the colors resulting in a gradual color change.

Redundant personalized data: Dynamic text and/or image to be printed more than once for redundancy checking by whatever means.

Security background printing: Printed elements that are devoted to secure blank cards and do not include any dynamic data.

Security bonding: The card periphery incorporates a security bonding material that bonds all of the layers together. Tamper evidence is seen if access is attempted to obtain the internal structures of the card.

Security feature: Feature of a document that is linked to a specific method of verification and thus helps insure the document's integrity and/or authenticity as a properly issued document that has not been tampered with.

> NOTE Physical security elements applied during production of a document may contribute more than one feature and therefore also cover more than one category of each kind.

Special colors: Colors that are not easily reproduced using CMYK colors.

Strong adhesion: Bonding between top and personalization layer high enough to prevent access to variable elements for falsification purposes.

Taggants: Special materials/chemicals hidden inside the card core (plastic, composite paper or synthetic material) which can only be detected and authenticated with special equipment.

Tagged inks: Inks containing taggants.

Tamper evident card body: Card showing evidence of destruction or modification caused by an attack. E.g., Security Bonding

Thermochromic ink: An ink which undergoes a reversible color change when exposed to heat (e.g. body heat).

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NOTE The color change is less reactive due to prolonged exposure to heat.

UV: Ultra violet.

UV-A: No response using a light source with a wavelength between 315 nm and 400 nm.

UV dull: Substrate material exhibiting no visibly detectable fluorescence when illuminated with UV light or with a controlled response to UV at 365 nm.

UV fluorescent ink: UV fluorescent ink can be either transparent or integrated to an ink visible to the naked eye; in addition, some UV fluorescent inks can respond to standard wavelength UV light with one color and with another color to a shorter wavelength UV light, called Bi-UV.

NOTE The UV response of fluorescent dyes and pigments is prone to fading after prolonged exposure to daylight.

Dynamic data: Information specific to the document and the holder.

Variable laser element (CLI/MLI): Element that generated by laser engraving or laser perforation displaying changing information dependent upon the viewing angle.

Variable opacity: comprising two or more grey levels visible against a light source.

Visible evidence: Confirmed real thing by watching.

Visible security device: Security feature protecting dynamic data.

Watermark: A recognizable image or pattern that appears as various shades of lightness/darkness when viewed against a light source.

NOTE Watermarks can be created by thickness or density variations. There are two main ways of producing watermarks in core material of a card; rolling process, and the more complex cylinder mould process. Watermarks vary greatly in their visibility.

Window element: A type of look through element with a high level of transparency.

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Annex C
(informative)

Main Threats to the security of a DL/ID

C.1 Introduction

This section looks at the main threats to DL/ID security in terms of the ways in which a DL/ID, its issuance and its use may be fraudulently attacked. The purpose of this section is to provide a context for the recommendation of security features in the subsequent sections.

The threats are split into three primary categories according to characteristics of the underlying attacks: Counterfeiting, Falsification and Misuse.

C.2 Counterfeiting Threats

*A.1 Document design attacks

*A.1.1 Re-creating the basic document look and feel including such as the background pattern, flags and other fixed motives

- Copying and printing a valid document for physical manipulation
- Scanning a valid document for modification using computer software
- Re-creating of the document using computer software

*A.1.2 Adding personalization information

- Image and text editing with computer software (re-origination)

*A.2 Substitute Material/Personalization attacks

*A.2.1 Substitute Materials

- Using substitute materials to imitate original documents
    - Paper vs Teslin vs PVC vs PET vs PC
- Using original material that may be commercially available

*A.2.2 Substitute Printing Methods

- Reproduction of background and logos using alternative technologies
    - Screen printing vs offset printing vs dye sublimation vs laser

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- Reproduction of text and images using alternative technologies
    - Inkjet vs dye sublimation vs laser vs laser engraving

*A.2.3 Alternative finishing

- Final lamination of the document using commercial laminates

C.3 Falsification Threats

*B.1 Falsification by physical modification of existing valid documents

*B.1.1 Text attacks

- Printing directly on document, e.g. manipulation (erasing, modifying, adding) of data such as card holder

*B.1.2 Image attacks

- Complete substitution of the licence holder's portrait image
- Masking the original portrait by overlaying another photo
- Changing the original portrait to alter the appearance of the person

*B.1.3 Delaminating attacks

- Partly delaminating to remove genuine features and inserts forged ones (e.g. exchanging data by replacing the data carrying layers)
- Insert forged data or security features after adding, removing or damaging genuine ones during partial delaminating

*B.2 Falsification by Recycling

*B.2.1 Extraction of genuine security features

- Removal of security features from genuine cards (e.g. a hologram) for reuse in a falsified document

*B.2.2 Use of recycled genuine security features in a new falsification

- Applying original document parts including data storage elements into forged document

*B.3 Falsification of logical data

*B.3.1 Logical data denial of service attack

- Destruction of data storage elements to circumvent logical security features

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*B.3.2 Logical data substitution attack

- Substitution of data storage elements such as IC's, magnetic stripes and laser recording

C.4 Misuse Attacks

*C.1 Misuse of genuine valid documents

*C.1.1 Identity Theft

- An unauthorized person using a valid genuine physical document of another similar looking person

*C.2 Misuse of genuine invalid documents

*C.2.1 Invalid Documents

- Use of registered lost or stolen documents by look-alikes of the real document holder

*C.2.2 Cloned documents

- Cloning of logical data from a similar looking person

*C.3 Misuse by theft of original blank documents

This category of threats deals with the theft of original blank documents at some stage during the document life cycle up, until the point of personalization. This can be during the production of the document, during document transport, or during subsequent storage of the document at the personalization location.

*C.3.1. Theft of blank cards at the card production site

- Misappropriated during the production process
- Cards removed for quality assurance purposes
- Reject blank cards
- Taken from the intermediate production storage

*C.3.2 Theft of blank cards during the transportation process

- During card packaging
- During card transportation
- During intermediate storage

*C.3.3 Blank cards are removed from the personalization site

- From where they are stored

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- During the stock issuance process
- During the personalization process
- Reject/Lost cards
- Intermediate storage

***C.3.4 Stolen blank documents personalized using alternative personalization methods that are available to the attacker**

***C.3.5 Stolen documents personalized using the official equipment or using test personalization equipment**

*C.4 Misuse through the fraudulent issue of genuine documents

***C.4.1 An attacker makes a fraudulent application for an DL/ID document**

- Identity theft using genuine breeder documents
- Fraudulent breeder documents

***C.4.2 Employee at the issuing authority makes unauthorized requests for DL/ID documents**

- Employee bribed by an attacker

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Annex D
(normative)

Mandatory PDF417 Bar Code

D.1 Scope

This annex defines mapping of the driving license/identification (DL/ID) card machine-readable information elements onto a two dimensional bar code.

D.2 Functional requirements

The primary function of the driver license document is to provide evidence of driving privileges and restrictions. The remaining functions of the DL/ID documents are to aid in: identity and age verification, automation of administrative processing, and address verification. The mandatory and optional data elements defined in this annex, and the mapping of the elements to the machine-readable technology, flow from these functional requirements. This standard primarily seeks to support the needs of the law enforcement community and their interaction with DL/ID documents.

All mandatory and optional data must be unencrypted. Issuing jurisdictions may encrypt jurisdiction-specific data in a separate subfile or within a different storage media.

D.3 Mandatory machine-readable technology – PDF417

The PDF417 two dimensional bar code symbology is the minimum mandatory machine-readable technology that must be present on compliant DL/ID documents.

D.4 Optional machine-readable technologies

This standard does not preclude a jurisdiction from integrating additional machine-readable technologies into the DL/ID documents as long as they are compatible with the minimum mandatory requirements of this standard.

D.5 Technical requirements for PDF417

D.5.1 Conformance

A prerequisite for conformance with this standard for bar coding is conformance with ANSI X3.182, ANSI/ASQC Z1.4, ASCII/ISO 646, ASCII/ISO 8859-1, ISO/IEC 15438, and MIL-L-61002.

D.5.2 Symbology

The PDF417 symbology (see ISO/IEC 15438 *Automatic Identification and Data Capture Techniques - International Two-dimensional Symbology Specification - PDF417*) shall be used for the Driver License applications.

The following PDF417 symbology variants as defined in the ISO/IEC 15438 *Automatic Identification and Data Capture Techniques - International Two-dimensional Symbology Specification - PDF417* shall NOT be used.

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— Compact PDF417

— MicroPDF417

— MacroPDF417

D.5.3 Symbology Characteristics

The symbology characteristics shall conform to ISO/IEC 15438.

D.5.4 Dimensions and Print Quality

D.5.4.1 Narrow element dimension

The narrow element dimension (X dimension) range shall be from ,170mm (.0066 inch) to ,380mm (.015 inch) as determined by the printing capability of the supplier/printer. Symbols with narrow elements at the lower end of this range, i.e., ,170mm (.0066 inch) to ,250mm (.010 inch), may require special care to meet the print quality requirements of this standard.

D.5.4.2 Row height

The PDF417 symbol shall have a minimum row height (height of the symbol element) of three (3) times the width of the narrow element ("X" dimension). Increasing the row height may improve scanning performance but will reduce the number of characters that can be encoded in a given space.

D.5.4.3 Quiet zone

The PDF417 symbol shall have a minimum quiet zone of 1X (X = the narrow element dimension) above, below, to the left, and to the right. The quiet zone is included within the calculation of the size of the symbol.

D.5.4.4 Print Quality

The AIM^{USA} Uniform Symbology Specification PDF417 and ISO/IEC 15415 Information technology – Automatic identification and data capture techniques – Bar code symbol print quality test specification – Two dimensional symbols - shall be used to determine the print quality of the PDF417 symbol.

The minimum symbol grade shall be 2.5/6/660, where:

Recommended Print Quality grade 2.5 (B) at the point of printing the symbol before lamination and a Print Quality Grade of 1.5 (C) after lamination.

Measurement Aperture = 6 mil (0.060 inch)

Light Source Wavelength = 660 nanometers (nm) ± 10 nm

The above symbol quality and measurement parameters assure scanability over a broad range of scanning environments.

It is important that the bar code be decodable throughout the system of use. For this reason, quality tests should not be limited to production inspection but also should be followed through to the end use.

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D.5.4.5 Error Correction

PDF417 symbols shall use a minimum Error Correction Level of 3. Where space allows, an Error Correction Level of 5 is recommended. Error correction is important for decoding the bar code because certain security laminates interfere with the readability of bar codes, and higher error correction levels help to ensure the prolonged usability of the bar code as abrasions and other damage are incurred over time.

D.6 Character sets

The AAMVA community shall use the 256 character table known as ASCII/ISO 8859-1 as the character set table when generating Hi-Density symbols and for efficiency shall use the 128 character subset text compaction table.

D.7 Compression

No specific recommendation is presented at this time. The AAMVA community has no need to employ specific Compression techniques beyond the field truncation constructs incorporated into the overall Data Structure option recommended in this standard.

D.8 Sampling

To ensure that printed on-demand bar code symbols meet the above Print Quality specification, it is recommended that a sample set of symbols, produced in their final form, be verified a minimum of once per day.

Military Standard, Sampling Procedures and Tables for Inspection by Attributes (ANSI/ASQC Z1.4), provides useful guidelines for statistically valid sampling plans. Acceptable quality levels (AQL) may be established prior to quality control inspection.

D.9 Symbol Durability

If bar code symbol durability is required, then the test method in Annex E, Table E.1 (NCITS 322 5.10), should be used.

D.10 Bar code area

The bar code area shall be located in Zone V of the DL/ID document. The maximum width of the PDF417 symbol shall be 75,565 mm (2.975”). The maximum height of the PDF417 symbol shall be 38,1 mm (1.50”).

D.11 Orientation and Placement

D.11.1 PDF417 Orientation

All PDF417 symbols shall have the same orientation. The bars of the PDF417 symbol shall be perpendicular to the natural bottom of the card. (see Figure D.1).

The symbol skew shall not be more than ±5 degrees.

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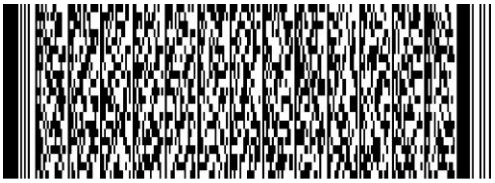
D.11.2 Designing the Card Layout

Figure D.1 — Orientation of PDF417 symbol on bottom



Plan for the maximum amount of data:

Determine the required and optional fields that will be required and the maximum anticipated length of each field. Add in the additional characters needed for formatting.

Plan for the maximum “X” dimension(s) that may be used:

Since the supplier/printer of the card ultimately determines the “X” dimension at which the symbol will be printed, it is possible that a PDF417 symbol could be printed at any “X” dimension from .0066 inch to .015 inch. The largest “X” dimension that allows all the data to fit in the maximum area available should be used when printing the symbol.

D.12 Data encoding structures

D.12.1 Structure Options

A compliant 2D symbol shall employ either the encoding structure set out in D.12.2 to D12.5 or the encoding structure set out in Annex I.

D.12.2 Overview

All compliant 2D symbols shall employ a file header that allows interested parties to interpret the encoded data. Subfiles shall be employed to carry the specific information. The combination of a header and one or more subfile designators shall make up a compliant 2D symbol.

Each 2-dimensional bar code shall begin with a file header that will identify the bar code as complying with this standard. The header shall be followed by a subfile designator “DL” to identify the DL/ID data type stored in the file. Each data element contained in a subfile shall be prefaced by a data element identifier (Element ID) as defined in Tables D.3 and D.4. The use of a field separator character shall serve to both terminate a field and indicate the presence of a following field identifier.

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D.12.3Header

Compliant 2D symbols must begin with a Fixed Header in the following format (Note: The number of bytes for each field is fixed and must be present. The numbers must be zero filled.):

Table D.1 — 2D symbols header format

Field	Bytes (Fixed)	Contents
1	1	**Compliance Indicator:** A 2D symbol encoded according to the rules of this standard shall include a Compliance Indicator. The Compliance Indicator as defined by this standard is the Commercial At Sign ("@") (ASCII/ISO 646 Decimal "64") (ASCII/ISO 646 Hex "40"). The Compliance Indicator is the first character of the symbol.
2	1	**Data Element Separator:** The Data Element Separator is used in this standard to indicate that a new data element is to follow, *and* that the current field is terminated. Whenever a Data Element Separator is encountered (within a Subfile type which uses Data Element Separators), the next character(s) shall either be a Segment Terminator or shall define the contents of the next field according to the template of the specific Subfile. The Data Element Separator as defined by this standard is the Line Feed character ("$^{L}_{F}$" ASCII/ISO 646 Decimal "10") (ASCII/ISO 646 Hex "0A"). The Data Element Separator is the second character of the symbol.
3	1	**Record Separator:** The Record Separator as defined by this standard is the Record Separator character ("$^{R}_{S}$" ASCII/ISO 646 Decimal "30") (ASCII/ISO 646 Hex "1E"). As this report is presented for ratification, there is no special case defined for when this field will be used. It is embodied within the recommendation for future growth. The Record Separator is the third character of the symbol and shall always be reflected within the header in a compliant symbol.
4	1	**Segment Terminator:** As used in this standard the Segment Terminator is used to end Subfiles where Field Identifiers are employed. The Segment Terminator as defined by this standard is the Carriage Return character ("$^{C}_{R}$" ASCII/ISO 646 Decimal "13") (ASCII/ISO 646 Hex "0D"). The Segment Terminator is the fourth character of the symbol.

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Field	Bytes (Fixed)	Contents
5	5	**File Type:** This is the designator that identifies the file as an AAMVA compliant format. The designator is defined as the 5 byte upper character string “ANSI “, with a blank space after the fourth character.
6	6	**Issuer Identification Number (IIN)[10]:** This number uniquely identifies the issuing jurisdiction and can be obtained by contacting the ISO Issuing Authority (AAMVA). The full 6-digit IIN should be encoded.
7	2	**AAMVA Version Number:** This is a decimal value between 00 and 99 that specifies the version level of the PDF417 bar code format. Version “0” and "00" is reserved for bar codes printed to the specification of the American Association of Motor Vehicle Administrators (AAMVA) prior to the adoption of the AAMVA DL/ID-2000 standard. All bar codes compliant with the AAMVA DL/ID-2000 standard are designated Version “01”. All bar codes compliant with AAMVA Card Design Specification version 1.0, dated 09-2003 shall be designated Version “02”. All bar codes compliant with AAMVA Card Design Specification version 2.0, dated 03-2005 shall be designated Version “03”. All bar codes compliant with AAMVA Card Design Standard version 1.0, dated 07-2009 shall be designated Version “04”. All bar codes compliant with AAMVA Card Design Standard version 1.0, dated 07-2010 shall be designated Version “05”. All bar codes compliant with AAMVA Card Design Standard version 1.0, dated 07-2011 shall be designated Version “06”. All bar codes compliant with AAMVA Card Design Standard version 1.0, dated 06-2012 shall be designated Version “07”. All bar codes compliant with AAMVA Card Design Standard version 1.0, dated 08-2013 shall be designated Version “08”.All bar codes compliant with this current AAMVA standard shall be designated “09”. Should a need arise requiring major revision to the format, this field provides the means to accommodate additional revision.
8	2	**Jurisdiction Version Number:** This is a decimal value between 00 and 99 that specifies the jurisdiction version level of the PDF417 bar code format. Notwithstanding iterations of this standard, jurisdictions implement incremental changes to their bar codes, including new jurisdiction-specific data, compression algorithms for digitized images, digital signatures, or new truncation conventions used for names and addresses. Each change to the bar code format within each AAMVA version (above) must be noted, beginning with Jurisdiction Version 00.

[10] http://www.aamva.org/KnowledgeCenter/Standards/Current/INNnumbers.htm

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Field	Bytes (Fixed)	Contents
9	2	**Number of Entries:** This is a decimal value between “01 and 99” that specifies the number of different Subfile types that are contained in the bar code. This value defines the number of individual subfile designators that follow. All subfile designators (as defined below) follow one behind the other. The data related to the first subfile designator follows the last Subfile Designator.

D.12.4 Subfile Designator

All compliant 2D bar code symbols must contain the “DL” or “ID” subfile structure as defined below immediately after the Header as defined in D.12.1. The subfile designator is a fixed element, as well as the number of bytes, and the numbers must be zero-filled. All sub file headers must follow one another.

Table D.2 – Subfile designator format

Field	Bytes	Contents
1	2	**Subfile Type:** This is the designator that identifies what type of data is contained in this portion of the file. The 2-character uppercase character field “DL” is the designator for DL subfile type and “ID” is the subfile type for non-DLs containing mandatory and optional data elements as defined in tables D.3 and D.4. Jurisdictions may define a subfile to contain jurisdiction-specific information. These subfiles are designated with the first character of “Z” and the second character is the first letter of the jurisdiction's name. For example, "ZC" would be the designator for a California or Colorado jurisdiction-defined subfile; "ZQ" would be the designator for a Quebec jurisdiction-defined subfile. In the case of a jurisdiction-defined subfile that has a first letter that could be more than one jurisdiction (e.g. California, Colorado, Connecticut) then other data, like the IIN or address, must be examined to determine the jurisdiction.
2	4	**Offset:** These bytes contain a 4 digit numeric value that specifies the number of bytes from the head or beginning of the file to where the data related to the particular sub-file is located. The first byte in the file is located at offset 0.
3	4	**Length:** These bytes contain a 4 digit numeric value that specifies the length of the Subfile in bytes. The segment terminator must be included in calculating the length of the subfile. A segment terminator = 1. Each subfile must begin with the two-character Subfile Type and these two characters must also be included in the length.

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D.12.5 Data elements

Tables D.3 and D.4 define mandatory and optional data elements that are accommodated in the “DL” and “ID” subfile types. Jurisdiction-specific data elements may also be encoded, provided the bar code ID is a 3-character uppercase character field beginning with “Z*X*” where "*X*" is the first letter of the jurisdictions name. Each data element field within the jurisdiction-defined subfile should follow consecutively in alphabetic order. For example, data elements in a Virginia subfile would be ZV*A, ZV*B, etc.; a Delaware subfile would be ZD*A*, ZD*B*, etc.).

Mandatory data elements for which no data exists for a given cardholder are to be encoded with the word "NONE". In the event data is *not available* for a mandatory data element, "unavl" is to be encoded.

D.12.5.1 Minimum mandatory data elements

Column 1: (**Data Ref.**): serves as a reference indicator for citation elsewhere in this standard and in other documents.

Column 2: (**Element ID**): three letter bar code element identifier corresponding to the data element. The three letter identifier must precede the encoded data element.

Column 3: (**Data element**): common name or phrase that designates what information is to be encoded in the 2D bar code.

Column 4: (**Definition**): description of the data element, including any exceptions.

Column 5: (**Card type**): identifies the applicability of the data element. DL = driver license only; ID = non-driver identification card only; Both = both the driver license and the non-driver identification card.

Column 6: (**Length/type**): valid field length (i.e., the number of characters) for each data element. The following refer to the valid characters or image used (A=alpha A-Z, N=numeric 0-9, S=special, F=fixed length, V=variable length). **Use of padding for variable length fields is optional.**

Table D.3 – 2D Mandatory data elements

Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
a.	DCA	Jurisdiction-specific vehicle class	Jurisdiction-specific vehicle class / group code, designating the type of vehicle the cardholder has privilege to drive.	DL	V6ANS
b.	DCB	Jurisdiction-specific restriction codes	Jurisdiction-specific codes that represent restrictions to driving privileges (such as airbrakes, automatic transmission, daylight only, etc.).	DL	V12ANS
c.	DCD	Jurisdiction-specific endorsement codes	Jurisdiction-specific codes that represent additional privileges granted to the cardholder beyond the vehicle class (such as transportation of passengers, hazardous materials, operation of motorcycles, etc.).	DL	V5ANS

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Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
d.	DBA	Document Expiration Date	Date on which the driving and identification privileges granted by the document are no longer valid. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
e.	DCS	Customer Family Name	Family name of the cardholder. (Family name is sometimes also called “last name” or “surname.”) Collect full name for record, print as many characters as possible on portrait side of DL/ID.	Both	V40ANS
f.	DAC	Customer First Name	First name of the cardholder.	Both	V40ANS
g.	DAD	Customer Middle Name(s)	Middle name(s) of the cardholder. In the case of multiple middle names they shall be separated by a comma “,”.	Both	V40ANS
h.	DBD	Document Issue Date	Date on which the document was issued. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
i.	DBB	Date of Birth	Date on which the cardholder was born. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
j.	DBC	Physical Description – Sex	Gender of the cardholder. 1 = male, 2 = female, 9 = not specified.	Both	F1N
k.	DAY	Physical Description – Eye Color	Color of cardholder's eyes. (ANSI D-20 codes)	Both	F3A
l.	DAU	Physical Description – Height	Height of cardholder. Inches (in): number of inches followed by " in" ex. 6'1" = "073 in" Centimeters (cm): number of centimeters followed by " cm" ex. 181 centimeters="181 cm"	Both	F6ANS
m.	DAG	Address – Street 1	Street portion of the cardholder address.	Both	V35ANS
n.	DAI	Address – City	City portion of the cardholder address.	Both	V20ANS

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Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
o.	DAJ	Address – Jurisdiction Code	State portion of the cardholder address.	Both	F2A
p.	DAK	Address – Postal Code	Postal code portion of the cardholder address in the U.S. and Canada. If the trailing portion of the postal code in the U.S. is not known, zeros will be used to fill the trailing set of numbers up to nine (9) digits.	Both	F11ANS
q.	DAQ	Customer ID Number	The number assigned or calculated by the issuing authority.	Both	V25ANS
r.	DCF	Document Discriminator	Number must uniquely identify a particular document issued to that customer from others that may have been issued in the past. This number may serve multiple purposes of document discrimination, audit information number, and/or inventory control.	Both	V25ANS
s.	DCG	Country Identification	Country in which DL/ID is issued. U.S. = USA, Canada = CAN.	Both	F3A
t.	DDE	Family name truncation	A code that indicates whether a field has been truncated (T), has not been truncated (N), or – unknown whether truncated (U).	Both	F1A
u.	DDF	First name truncation	A code that indicates whether a field has been truncated (T), has not been truncated (N), or – unknown whether truncated (U).	Both	F1A
v.	DDG	Middle name truncation	A code that indicates whether a field has been truncated (T), has not been truncated (N), or – unknown whether truncated (U).	Both	F1A

D.12.5.2 Optional data elements

Column 1: (**Data Ref.**): serves as a reference indicator for citation elsewhere in this standard and in other documents.

Column 2: (**Element ID**): three letter bar code element identifier corresponding to the data element. The three letter identifier must precede the encoded data element.

Column 3: (**Data element**): common name or phrase that designates what information is to be encoded in the 2D bar code.

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Column 4: (**Definition**): description of the data element, including any exceptions.

Column 5: (**Card type**): identifies the applicability of the data element. DL = driver license only; ID = non-driver identification card only; Both = both the driver license and the non-driver identification card.

Column 6: (**Length/type**): valid field length (i.e., the number of characters) for each data element. The following refer to the valid characters or image used (A=alpha A-Z, N=numeric 0-9, S=special, F=fixed length, V=variable length) in the related application. Use of padding for variable length fields is optional.

Table D.4 – 2D Optional data elements

Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
a.	DAH	Address – Street 2	Second line of street portion of the cardholder address.	Both	V35ANS
b.	DAZ	Hair color	Bald, black, blonde, brown, gray, red/auburn, sandy, white, unknown. If the issuing jurisdiction wishes to abbreviate colors, the three-character codes provided in AAMVA D20 must be used.	Both	V12A
c.	DCI	Place of birth	Country and municipality and/or state/province	Both	V33A
d.	DCJ	Audit information	A string of letters and/or numbers that identifies when, where, and by whom a driver license/ID card was made. If audit information is not used on the card or the MRT, it must be included in the driver record.	Both	V25ANS
e.	DCK	Inventory control number	A string of letters and/or numbers that is affixed to the raw materials (card stock, laminate, etc.) used in producing driver licenses and ID cards. (DHS recommended field)	Both	V25ANS
f.	DBN	Alias / AKA Family Name	Other family name by which cardholder is known.	Both	V10ANS
g.	DBG	Alias / AKA Given Name	Other given name by which cardholder is known	Both	V15ANS
h.	DBS	Alias / AKA Suffix Name	Other suffix by which cardholder is known	Both	V5ANS

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Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
i.	DCU	Name Suffix	Name Suffix (If jurisdiction participates in systems requiring name suffix (PDPS, CDLIS, etc.), the suffix must be collected and displayed on the DL/ID and in the MRT). Collect full name for record, print as many characters as possible on portrait side of DL/ID. • JR (Junior) • SR (Senior) • 1ST or I (First) • 2ND or II (Second) • 3RD or III (Third) • 4TH or IV (Fourth) • 5TH or V (Fifth) • 6TH or VI (Sixth) • 7TH or VII (Seventh) • 8TH or VIII (Eighth) • 9TH or IX (Ninth)	Both	V5ANS
j.	DCE	Physical Description – Weight Range	Indicates the approximate weight range of the cardholder: 0 = up to 31 kg (up to 70 lbs) 1 = 32 – 45 kg (71 – 100 lbs) 2 = 46 - 59 kg (101 – 130 lbs) 3 = 60 - 70 kg (131 – 160 lbs) 4 = 71 - 86 kg (161 – 190 lbs) 5 = 87 - 100 kg (191 – 220 lbs) 6 = 101 - 113 kg (221 – 250 lbs) 7 = 114 - 127 kg (251 – 280 lbs) 8 = 128 – 145 kg (281 – 320 lbs) 9 = 146+ kg (321+ lbs)	Both	F1N
k.	DCL	Race / ethnicity	Codes for race or ethnicity of the cardholder, as defined in AAMVA D20.	Both	F3A
l.	DCM	Standard vehicle classification	Standard vehicle classification code(s) for cardholder. This data element is a placeholder for future efforts to standardize vehicle classifications.	DL	F4AN

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Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
m.	DCN	Standard endorsement code	Standard endorsement code(s) for cardholder. See codes in D20. This data element is a placeholder for future efforts to standardize endorsement codes.	DL	F5AN
n.	DCO	Standard restriction code	Standard restriction code(s) for cardholder. See codes in D20. This data element is a placeholder for future efforts to standardize restriction codes.	DL	F12AN
o.	DCP	Jurisdiction-specific vehicle classification description	Text that explains the jurisdiction-specific code(s) for classifications of vehicles cardholder is authorized to drive.	DL	V50ANS
p.	DCQ	Jurisdiction-specific endorsement code description	Text that explains the jurisdiction-specific code(s) that indicates additional driving privileges granted to the cardholder beyond the vehicle class.	DL	V50ANS
q.	DCR	Jurisdiction-specific restriction code description	Text describing the jurisdiction-specific restriction code(s) that curtail driving privileges.	DL	V50ANS
r.	DDA	Compliance Type	DHS required field that indicates compliance: “F” = fully compliant; and, “N” = non-compliant.	Both	F1A
s.	DDB	Card Revision Date	DHS required field that indicates date of the most recent **version** change or modification to the visible format of the DL/ID (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
t.	DDC	HAZMAT Endorsement Expiration Date	Date on which the hazardous material endorsement granted by the document is no longer valid. (MMDDCCYY for U.S., CCYYMMDD for Canada)	DL	F8N
u.	DDD	Limited Duration Document Indicator	DHS required field that indicates that the cardholder has temporary lawful status = “1”.	Both	F1N

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Data Ref.	Element ID	Data Element	Definition	Card type	Length / type
v.	DAW	Weight (pounds)	Cardholder weight in pounds Ex. 185 lb = “185”	Both	F3N
w.	DAX	Weight (kilograms)	Cardholder weight in kilograms Ex. 84 kg = “084”	Both	F3N
x.	DDH	Under 18 Until	Date on which the cardholder turns 18 years old. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
y.	DDI	Under 19 Until	Date on which the cardholder turns 19 years old. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
z.	DDJ	Under 21 Until	Date on which the cardholder turns 21 years old. (MMDDCCYY for U.S., CCYYMMDD for Canada)	Both	F8N
a.a.	DDK	Organ Donor Indicator	Field that indicates that the cardholder is an organ donor = “1”.	Both	F1N
a.b.	DDL	Veteran Indicator	Field that indicates that the cardholder is a veteran = “1”	Both	F1N

D.12.5.3 Additional data elements

Jurisdictions wishing to encode data elements in their PDF-417 bar codes other than those described in the above lists of mandatory and optional data elements should coordinate with AAMVA on the format and Data Element ID to use for that data. This will prevent the introduction of conflicts and variances across the jurisdictions.

D.13 Example of raw PDF417 data

The following represents the data stream of a compliant PDF417 bar code. For this example Virginia was chosen and the IIN found in the header; the jurisdiction specific classification, restriction, endorsement codes; address jurisdiction; and jurisdiction specific field use data as though it was a Virginia document.

@$^{L}_{F}{}^{R}_{S}{}^{C}_{R}$

ANSI 636000090002DL00410278ZV03190008DLDAQT64235789$^{L}_{F}$

DCSSAMPLE$^{L}_{F}$

DDEN$^{L}_{F}$

DACMICHAEL$^{L}_{F}$

DDFN$^{L}_{F}$

DADJOHN$^{L}_{F}$

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DDGN[LF]

DCUJR[LF]

DCAD[LF]

DCBK[LF]

DCDPH[LF]

DBD06062016[LF]

DBB06061986[LF]

DBA12102024[LF]

DBC1[LF]

DAU068 in[LF]

DAYBRO[LF]

DAG2300 WEST BROAD STREET[LF]

DAIRICHMOND[LF]

DAJVA[LF]

DAK232690000 [LF]

DCF2424244747474786102204[LF]

DCGUSA[LF]

DCK123456789[LF]

DDAF[LF]

DDB06062008[LF]

DDC06062009[LF]

DDD1[CR]

ZVZVA01[CR]

Header Fields:

- Compliance Indicator: @
- Data Element Separator: Line Feed character ([LF])
- Record Separator: Record Separator character ([RS])
- Segment Terminator: Carriage Return character ([CR])
- File Type: **'ANSI ' (Note: ANSI followed by a SPACE).**

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- Issuer Identification Number (IIN): 6-digit IIN: **‘636000’**
- AAMVA Version Number: **‘09’**
- Jurisdiction Version Number: **‘00’**
- Number of Entries: **‘02’** (numeric value for # of sub-files in the bar code)

Sub-file Designator:

- Sub-file Type: **DL** – DL data
- Offset: **0041**
- Length: **0278**
- Sub-file Type: **ZV** – Jurisdiction Specific data
- Offset: **0319**
- Length: **0008**

Mandatory Fields:

- Customer Number - **DAQ**
- Family Name - **DCS**
- Family Name Truncation - **DDE**
- First Names – **DAC**
- First Names Truncation - **DDF**
- Middle Names - **DAD**
- Middle Names Truncation - **DDG**
- Virginia Specific Class - **DCA**
- Virginia Specific Restrictions - **DCB**
- Virginia Specific Endorsements - **DCD**
- Issue Date - **DBD**
- Date of Birth - **DBB**
- Expiration Date - **DBA**
- Sex - **DBC**
- Height - **DAU**
- Eyes - **DAY**
- Address - **DAG**
- City - **DAI**
- State - **DAJ**
- Zip – **DAK**
- Document Discriminator - **DCF**
- Country/territory of issuance - **DCG**

Optional Fields:

- Suffix - **DCU**
- Inventory Control Number – **DCK (Recommended for DHS compliant licenses)**
- Compliance Type (ex. “F” = fully compliant) – **DDA (Required for DHS compliant licenses)**
- Card Revision Date – **DDB (Required for DHS compliant licenses)**
- HazMat Endorsement Expiry Date – **DDC**
- Limited Duration Document Indicator – **DDD (Required for DHS compliant licenses)**

Jurisdiction Specific Fields:

- Court Restriction Code(s) – **ZVA**

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Annex E
(informative)

Optional Card Test Methods

E.1 Introduction

Issuing authorities need an indication of a card's durability and resistance to compromise. A variety of tests are available to estimate these qualities. However, not all tests are applicable to all card types or to all card use environments.

This annex provides guidance specifically on test selection as well as on the broader card durability and integrity assessment process.

Note that durability tests in general do not provide a guarantee that a particular card will last for a specific amount of time. Test results only provide a means of ranking or comparing one card structure to another.

E.2 Scope

This annex covers the following:

- The purpose and applicability of a range of standardized card durability tests.
- Guidelines for conducting a card durability assessment.
- Notes on assessing card integrity.

E.3 Conformance

A test result is in conformance with this annex if it meets all the mandatory requirements specified directly or by reference herein. Test results shall not be represented as equivalent to card service life.

E.4 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this annex. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. For undated references, the latest edition of the normative document referred to applies.

INCITS 322-2015, *Information Technology - Card durability test methods*

ISO/IEC 10373-1:2006, *Identification cards - Test methods - General characteristics*

E.5 Terms and definitions

For the purposes of this annex, the following terms and definitions apply:

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E.5.1 Card service life

period of time between card issuance and expiration date

E.6 Durability testing

E.6.1 Card evaluation process

The card evaluation process consists of the following steps:

1. Define the environment within which cards will be used, and the related durability requirements. Also document the card properties known at this point. (See E.6.2.)

2. Identify card tests that are appropriate, given the use environment, durability requirements and known card properties. (See E.6.3, E.6.4 and E.6.5.)

3. Determine the relative importance of each test. (See E.6.6.)

4. Conduct card tests and rank results. (See E.6.7.)

E.6.2 Card use environment and durability requirements

Each issuing authority's needs in respect of card durability are unique. The following general requirements can be adapted to an issuing authority's needs:

> The materials and manufacturing process used for the production of DL/ID cards shall be of such a quality that a DL/ID card shall stay intact and shall not delaminate, deform, chip, tear, disintegrate or become illegible or otherwise dysfunctional under conditions of normal wear and tear from the point where it is produced until the expiry of the validity period of the DL/ID card. In particular, all details, including the photograph/image, signature images, machine-readable data and security features, shall not fade, and shall remain clearly legible/readable/distinguishable for the validity period of the DL/ID card.

As with the general requirements, conditions of normal wear and tear will be differ between issuing authorities. The list below can be used as basis to compile issuing-authority specific conditions:

1. Carrying a DL/ID card in a wallet, or loose in a pocket (along with keys or coins), in all weather conditions, for 12 hours at a time, on a daily basis, including in dusty, dirty and gritty environments.

2. Leaving a DL/ID card in a motor vehicle on the dashboard, during which time it could daily be subject to direct sunlight and high temperatures (up to 90°C) for a continuous period of up to one month.

3. Leaving a DL/ID card in a motor vehicle at night in cold conditions, during which time it could be subject to temperatures as low as -5°C, followed by an increase in temperature up to 20°C (when the vehicle is in use again), associated with manual handling of the DL/ID card (at any temperature).

4. Leaving a DL/ID card in a piece of clothing during which time it will be subject to water with high temperatures, washing and abrasion (e.g. in a washing machine or dryer) and/or dry cleaning chemicals.

5. Occasional exposure to the following:

    a. Water, rain, hail and snow.

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b. Matter such as mud, oil, grease and fuel.

c. Magnetic fields.

d. X-Rays.

E.6.3 Standardized tests

Table E.1 discusses various tests that can be used to get an indication of a card's durability properties. For each test, the following is provided:

- A reference to the standards document (and clause within such document) that specifies the test. "INCITS 322" refers to INCITS 322-2015: *Information Technology - Card durability test methods*, and "ISO" refers to ISO/IEC 10373-1:2006, *Identification cards - Test methods - General characteristics*.
- The name of the test
- The "answer" (output) provided by the test.
- Notes providing additional information on the test and its use.
- An indication of whether the test is recommended for testing DL/ID cards and the machine-readable features of the card.
- The suggested method by which the outcome of the tests of different cards can be compared (this is used within the context of E.6.7).

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Table E.1 — Standardized card tests

Reference	Test name	Output	Notes	Recommended	Assessment[11]
			In general does not apply to cards with only heat transfer film layers.		
INCITS 322 5.1	Peel strength – 90° peel angle	Force required to separate layers.	Experience by card testers has indicated that for driver license cards the material almost always tears before the bonding layer. In practice, these tests are mostly applicable to credit cards. Also noteworthy is that the adhesive used to secure a card to the test rig sometimes gives way before either the card material or bonding does.	Yes	Rank cards according to force required to separate layers.
INCITS 322 5.2	Adhesion crosshatch tape test	Rating from 0 (more than 65% removal of film) to 5 (no removal of film).	Specifically intended for heat transfer film layers. The test may however also have applicability where a patch (such as the AAMVA security device) is applied to a polycarbonate card. Note that film layers/patches thicker than 1mil typically tend to be difficult to prepare for the test due to corner tearing.	Yes	Rank cards according to rating.
INCITS 322 5.3	ID-1 Card flexure	Number of flex cycles (up to 100,000) until fracture.	Driving licenses typically go to 100,000 cycles without fracture; some polycarbonate cards may fracture before then.	Yes	Rank cards according to number of flex cycles

[11] Each card is awarded a score out of a maximum of 10 points (10 being best and 0 being worst). Scores should reflect not only the order of preference, but also how much better (or worse) one card is than another.

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
INCITS 322 5.4	ID-1 Card static stress	Number of cards tested and number of cards fractured.		Yes	Rank cards according to number of cards fractured
INCITS 322 5.5	ID-1 Card stress and plasticizer exposure	Time (up to 100 hours) until a fracture of 13mm has occurred.	Plasticizer dioctylphthalate (DOP) used. This substance poses a health hazard.	Yes	Rank cards according to time until 13mm fracture
INCITS 322 5.6	Impact resistance	Energy required to start a crack.	Primarily intended to determine embossing properties of a card.	No	
INCITS 322 5.7	Elevated temperature and humidity exposure	Standard output: Description of any deterioration observed. Additional output: Dimensional and card warpage.	This is the first part of the "card structure integrity test sequence" (INCITS 322 6), except that the temperature is higher (71°C instead of 60°C) in the card structure integrity test sequence. This test can also be used as an alternative to ISO/IEC 10373-1 5.5 (card dimensional stability and warpage with temperature and humidity), which implies that dimensional and card warpage information (observed at the end of the test) should form part of the test output.	Yes	Rank cards according to observed deterioration, and dimensional and card warpage
INCITS 322 5.8	Surface abrasion	Number of cycles until wear-through of card feature is observed, or 2,500 cycles, whichever comes first.	Proposed use is on the portrait side of the cards being tested.	Yes	Rank cards according to number of cycles, and then according to observed degradation.

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
INCITS 322 5.9	Bar code abrasion (1D)	Number of cycles until ANSI grade F is reached, or ANSI grade (A, B, C, or D) after 2,500 cycles.	Test is currently limited to cards with one-dimensional bar codes. It is recommended that the test be amended to measure the mandatory PDF417 bar code in accordance with ISO/IEC 15415. Card vendors should be required to include a PDF417 bar code on the card that contains realistic information, and of which the position is standardized (i.e. the bar code position does not have to be standardized in the test description). It is recognized that the eventual position and size of the bar code on the card may change prior to production. Consequently, it will be necessary to re-perform this test at the commencement of production (on sample cards) to establish a new baseline.	Yes	Rank cards according to ISO overall symbol grade
INCITS 322 5.10	Magnetic stripe abrasion		Limited to cards with magnetic stripes.	Only if the card has a magnetic stripe	
INCITS 322 5.11	Image abrasion	Standard output: Number of Taber cycles (up to 2,500) until reflection density drops below 50% of its original value for each of the colors (C, M, Y, K, CB). Alternative output: Number of Taber cycles (up to 2,500) until “breakthrough” occurs (see Notes).	Requires color dots with specific colors in specific locations (along the path of the Taber abrader wheel). This test essentially measures firstly the impact on readability (as soon as the abrader starts to scratch the surface of the card), and secondly the resistance of the layers above any printing to abrasion (up to the point where the printing is scratched off). It is postulated that the image abrasion test (as specified) has some drawbacks in the driver license environment. If a personalized (color) portrait image is overlaid by a separate security layer, the DL/ID card becomes compromised as soon as the security feature becomes compromised, which may be long before the portrait image itself becomes unreadable. Measuring	Yes	Rank cards according to number of cycles, and then according to observed degradation.

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
			the reflection density of an image (or of standard dots) thus would not be a true reflection of a DL/ID card's resistance to abrasion. It is suggested that the test be changed to become an integrity abrasion test. A DL/ID card's integrity becomes compromised as soon as any security layer, security feature or personalization shows "breakthrough" (i.e. becomes scratched off to the extent that the material beneath the feature becomes visible without impediment). The number of Taber cycles until "breakthrough" is measured. Cards are positioned on the abrader to that the security feature/personalization that extends the least into the depth of the card lies under the path of the abrader wheels. This position is based in information provided by the Vendor. (It is important to always keep in mind that this test should not be used in isolation, and that the intrinsic security value of security features should be weighed against any associated durability weaknesses.)		
INCITS 322 5.12	Temperature and humidity induced dye migration	Percentage increase in reflectivity for each of the colors (C, M, Y, K).	Requires a preprinted test pattern (i.e. a regular DL/ID sample card will not suffice), and is intended specifically for dye diffusion printed information (such as is rendered by a dye sublimation printer).	Yes, if dye diffusion technology is used on a card	Rank cards according to percentage increase in reflectivity
INCITS 322 5.13	Plasticizer induced dye migration	Time until edge contrast of test pattern falls to 75% of its original value.	Requires a preprinted test pattern (i.e. a regular DL/ID sample card will not suffice), and is intended specifically for dye diffusion printed information (such as is rendered by a dye sublimation printer).	Yes, if dye diffusion technology is used on a card	Rank cards according to time
INCITS 322 5.14	Ultraviolet light exposure	A description of deterioration and discoloration observed.		Yes	Rank cards according to observed deterioration and discoloration

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
INCITS 322 5.15	Daylight exposure image stability – Xenon arc	Percentage change in color density as well as other test parameters. Alternative output: A description of deterioration and discoloration observed (see Notes).	Requires a preprinted test pattern (i.e. a regular DL/ID sample card will not suffice). It is suggested to conduct this test without the preprinted test pattern, and to use as output a description of deterioration and discoloration observed (similar to the output of INCITS 322 5.14).	Yes	Rank cards according to observed deterioration and discoloration
INCITS 322 5.16	Laundry test	Description of any observed defects.	Test repeatability has not yet been established for this method. Unless the exact same set of equipment and consumables are used for time-separated tests, the results should be used only to compare cards tested at the same time in the same machine.	Yes	Rank cards according to observed defects
INCITS 322 5.17	Embossed character retention – pressure		In general not applicable to driver licenses. Tactile features on DL/ID cards can be assessed primarily via INCITS 322 5.20 (wet abrasion test), as well as via the amended version of INCITS 322 5.11 (image abrasion test).	No	
INCITS 322 5.18	Embossed character relief height retention – heat		In general not applicable to driver licenses. Tactile features on DL/ID cards can be assessed primarily via INCITS 322 5.20 (wet abrasion test), as well as via the amended version of INCITS 322 5.11 (image abrasion test).	No	
INCITS 322 5.19	Corner impact test	Description of any delamination or fracture that occurred.		Yes	Rank cards according to number of fractured/delaminated cards.

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
INCITS 322 5.20	Wet abrasion test	Description of the extent to which any delamination occurred.	For sequential testing, it is recommended that the test be amended by adding a specified number of coins (spread evenly across the denominations) to the paint shaker, in order to better reflect actual conditions.	Yes	Rank cards according to observed delamination.
INCITS 322 5.21	IC Card with contacts micromodule adhesion	Peak force achieved.	Limited to integrated circuit cards with contacts.	Only if the card contains an integrated circuit with contacts.	Rank cards according to peak force achieved.
INCITS 322 5.22	Water soak test	Description of any layer that could be removed.		Yes	Rank cards according to observed layer separation.
INCITS 322 5.23	Dimensional change after elevated temperature exposure	Dimensional change.	Although the test temperature (150^{o}C) is higher than typical use conditions (see Table), this test may still provide valuable insight into the properties of a card, specifically its susceptibility to cracking under issuing-authority identified use conditions.	Yes	Rank cards according to dimensional change.
INCITS 322 5.24	Three roller IC card test	Testable functional (i.e. machine-readable technology intact) or not.	This test is intended to simulate cards processed through mail sorting machines.	Only if the card contains an integrated circuit.	Rank cards according to the number of cards testably functional.
INCITS 322 5.25	Hole tear test	Peak force for card to tear free.	This test provides an indication of resistance to key ring wear and tear, and requires a hole to be punched into a card. Issuing authorities often punch a hole into a card to signify that the card is not valid any more. Consequently, carrying a card on a key chain is not considered a valid use environment.	No	
ISO/IEC 10373-1 5.9	Dynamic torsional stress	Testable functional (i.e. machine-readable technology intact) or not.	Primarily aimed at cards with integrated circuits.	Only if the card contains an integrated circuit.	Rank cards according to number of cards testably functional.

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
ISO/IEC 10373-1 5.1	Card warpage	Warpage value.		Yes	Not used in evaluation. Used to identify serious defects and as reference for future testing.
ISO/IEC 10373-1 5.2	Dimensions of cards	Standard output: Card dimensions. Additional output: Height profile of any tactile features.		Yes	Not used in evaluation. Used to identify serious defects and as reference for future testing.
ISO/IEC 10373-1 5.3	Peel strength	Peel strength.	This test is similar to the Delamination – 90° test specified in INCITS NCITS 5.1.	No	
ISO/IEC 10373-1 5.4	Resistance to chemicals.	Description of effects.	According to experts involved in the drafting process, this test was included to preclude the use of any card other than a plastic card (e.g. cardboard or metal) for use in the banking industry. The tests prescribed nevertheless include common chemicals that could be encountered in day-to-day use, and hence this test should be performed.	Yes	Rank cards according to observed effects
ISO/IEC 10373-1 5.5	Card dimensional stability and warpage with temperature and humidity	Card dimensions and card warpage.	INCITS 322 5.7 (being a much harsher test), with the addition of dimensional measurements as output, should be used instead.	No	
ISO/IEC 10373-1 5.6	Adhesion or blocking	Description of any visible signs of deterioration.	Used primarily by equipment manufacturers to establish suitability of cards for production processes.	No	

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
ISO/IEC 10373-1 5.7	Bending stiffness	Deflection distance.	The primary purpose of this test is to allow cards to bend sufficiently to allow magnetic stripes to be affixed during the production process. This test was introduced to the ISO specification after it was decided to remove any (stated) requirement that card material should be "plastic".	No	
ISO/IEC 10373-1 5.8	Dynamic bending stress	Testable functional (i.e. machine-readable technology intact) or not.	This test is similar to the ID-1 Card flexure test specified in INCITS NCITS 5.3, although performed with a different frequency.	No	
ISO/IEC 10373-1 5.10	Opacity		Not applicable to the DL/ID environment.	No	
ISO/IEC 10373-1 5.11	Ultraviolet light	Testable functional (i.e. machine-readable technology intact) or not.	This test is intended primarily for integrated circuit cards (the lamp used is similar to lamps used in the earlier days of personal computers when EPROMS could be erased using an ultraviolet light).	No	
ISO/IEC 10373-1 5.12	X-rays	Testable functional (i.e. machine-readable technology intact) or not.	This test is intended primarily for integrated circuit cards.	Only if the card contains an integrated circuit.	Rank cards according to number of cards testably functional.
ISO/IEC 10373-1 5.13	Static magnetic fields	Testable functional (i.e. machine-readable technology intact) or not.	This test is intended primarily for integrated circuit cards.	Only if the card contains an integrated circuit.	Rank cards according to number of cards testably functional.
ISO/IEC 10373-1 5.14	Embossing relief height of characters	Value of overall relief height	This test is intended primarily for bank cards.	No	

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Reference	Test name	Output	Notes	Recommended	Assessment[11]
ISO/IEC 10373-1 5.15	Resistance to heat	Maximum deflection and a description of any discoloration or delamination.	Similar to the elevated temperature and humidity exposure test specified in INCITS NCITS 5.7, except that the cards are subjected to forced deflection during exposure, and that the exposure period is shorter.	No	
ISO/IEC 10373-1 5.16	Surface distortions and raised areas		Not applicable to the DL/ID environment.	No	

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In addition to the above standardized tests, the following two tests can be useful:

- Dry-cleaning test. The probability of cards being subjected to accidental dry-cleaning is real, and the chemicals used in the process may have a detrimental effect on a card. The test is conducted by putting cards in a laundry bag (made of woven fabric, i.e. not plastic or other similar impervious material), each card in a separate pocket (i.e. such that cards will not directly touch each other during the cleaning process), and sending the bag to an approved commercial dry cleaner with the instruction to dry clean. Cards are ranked according to observed defects. Each card is awarded a score out of a maximum of 10 points (10 being best and 0 being worst). Scores should reflect not only the order of preference, but also how much better (or worse) one card is than another. Note that this test is non-repeatable, and that the results should be used only to compare cards that were part of the same batch.

- Cold test. DL/ID cards are often exposed to cold conditions (e.g. overnight in a vehicle, or when used as an ice scraper), hence the applicability of this test. Cards are placed under mechanical stress (as per INCITS 322 5.4) inside a temperature controlled chamber set at -5°C for 24 hours. Upon opening the chamber, the opening is draped (to keep the cold inside) while trying to snap the cards with an impactor (in accordance with INCITS 322 5.4). Cards are ranked according to the number of cards fractured.

E.6.4 Matching tests to requirements

In order to assist in determining the relative importance of tests found to be applicable, the tests and requirements are matched up to each other in a table such as Table E.2. The table matches the conditions listed in E.6.2 to the tests that may be applicable to all cards. An issuing authority will draft its own version of this table.

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Table E.2 — Matching to standardized card tests

Conditions	INCITS																ISO/IEC	Dry-cleaning test	Cold test
	5.1	5.2	5.3	5.4	5.5	5.7	5.8	5.9	5.11	5.14	5.15	5.16	5.19	5.20	5.22	5.23	5.4		
A person carrying a DL/ID card in a wallet, or loose in a pocket (along with keys or coins), in all weather conditions, for 12 hours at a time, on a daily basis, including in dusty, dirty and gritty environments.		x	x	x	x	x	x	x	x				x	x					
Leaving a DL/ID card in a motor vehicle on the dashboard, during which time it could be subject to direct sunlight and high temperatures (up to 90°C) for a continuous period of up to one month.						x				x	x					x			
Leaving a DL/ID card in a motor vehicle at night in cold conditions, during which time it could be subject to temperatures as low as -5°C, followed by an increase in temperature up to 20°C (when the vehicle is in use again), associated with manual handling of the DL/ID card (at any temperature).																			x
Leaving a DL/ID card in a piece of clothing during which time it will be subject to water with high temperatures, washing and abrasion (e.g. in a washing machine or dryer) and/or dry cleaning chemicals.												x						x	
Occasional exposure to water, rain, hail and snow.															x				x
Occasional exposure to matter such as mud, oil, grease and fuel.							x	x	x					x			x		
Occasional exposure to magnetic fields.																			
Occasional exposure to X-Rays.																			
Integrity attack	x														x				

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The table below matches the various tests to the requirements, for those tests applicable to only some cards.

Table E.3 — Matching to a limited set of standardized card tests

Conditions	INCITS				ISO/IEC		
	5.12	5.13	5.21	5.24	5.9	5.12	5.13
A person carrying a DL/ID card in a wallet, or loose in a pocket (along with keys or coins), in all weather conditions, for 12 hours at a time, on a daily basis, including in dusty, dirty and gritty environments.					x		
Leaving a DL/ID card in a motor vehicle on the dashboard, during which time it could be subject to direct sunlight and high temperatures (up to 90°C) for a continuous period of up to one month.	x						
Leaving a DL/ID card in a motor vehicle at night in cold conditions, during which time it could be subject to temperatures as low as -5°C, followed by an increase in temperature up to 20°C (when the vehicle is in use again), associated with manual handling of the DL/ID card (at any temperature).							
Leaving a DL/ID card in a piece of clothing during which time it will be subject to water with high temperatures, washing and abrasion (e.g. in a washing machine or dryer) and/or dry cleaning chemicals.							
Occasional exposure to water, rain, hail and snow.							
Occasional exposure to matter such as mud, oil, grease and fuel.		x					
Occasional exposure to magnetic fields.							x
Occasional exposure to X-Rays.						x	
Integrity attack			x				
Cards mailed out using regular mail				x			

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E.6.5 Combinations of tests

INCITS 322 also allows for some of the tests to be performed in sequence on the same set of cards. Although it is clearly infeasible to test all combinations, some test sequences that imitate real world conditions do make sense. The following tests can be considered as "conditioning" tests, i.e. tests that can be performed to "condition" cards for further testing:

- INCITS 5.7 (elevated temperature and humidity exposure)
- INCITS 5.14 (ultraviolet light exposure)
- INCITS 5.15 (daylight exposure image stability – Xenon arc)
- INCITS 5.16 (laundry test)
- ISO 5.14 (resistance to chemicals)
- Commercial dry-cleaning test

Issuing authorities can select test combinations that reflect their unique needs. For example, for purposes of testing card performance under general use (as opposed to intentional attack), preconditioned cards can be submitted to the following tests:

- INCITS 5.3 (card flexure)
- INCITS 5.20 (wet abrasion)

The sequenced tests are conducted in addition to individual tests. For example, three sets of a particular vendor's sample cards are submitted to the elevated temperature and humidity exposure test, and one of the sets is then submitted to the card flexure test, and another set to the surface abrasion test.

E.6.6 Occurrence frequency of environmental conditions

In addition to the tables in E.6.4, the frequency with which a particular environment is encountered should be considered. An example of how this can be performed is shown below. An issuing authority will draft its own version of this table.

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Table E.4 — Environment Frequency for standardized card tests

Condition	Frequency encountered
A person carrying a DL/ID card in a wallet, or loose in a pocket (along with keys or coins), in all weather conditions, for 12 hours at a time, on a daily basis, including in dusty, dirty and gritty environments.	8.5 out of 10 card holders, on a daily basis
Leaving a DL/ID card in a motor vehicle on the dashboard, during which time it could be subject to direct sunlight and high temperatures (up to 90°C) for a continuous period of up to one month.	In sunlight: 1 out of every 500 drivers daily In car: 1 out of 80 drivers daily
Leaving a DL/ID card in a motor vehicle at night in cold conditions, during which time it could be subject to temperatures as low as -5°C, followed by an increase in temperature up to 20°C (when the vehicle is in use again), associated with manual handling of the DL/ID card (at any temperature).	1 out of 55 drivers, twice a year
Leaving a DL/ID card in a piece of clothing during which time it will be subject to water with high temperatures, washing and abrasion (e.g. in a washing machine or dryer) and/or dry cleaning chemicals.	Every card holder 5 times a year
Occasional exposure to water, rain, hail and snow.	19 out of every 25 drivers once a year
Occasional exposure to matter such as mud, oil, grease and fuel.	3.5 out of 100 card holders daily
Occasional exposure to magnetic fields.	Every card holder 50 times a year
Occasional exposure to X-Rays.	Every card holder 15 times a year

E.6.7 Assessment

The ideal output of a durability test would be an estimate of the annual number of cards that will have to be replaced (given the issuing volumes and card validity period). Unfortunately, none of the published card tests currently provide such information.

As an alternative, the frequency with which cards are subjected to a particular condition (as described in Clause E.6.4) should be considered. The argument is that conditions to which cards are subjected more often (and consequently the tests that cover these conditions) should have a relatively bigger influence on card failures than conditions to which cards are subjected less often. However, in using this alternative, cognizance should be taken of the fact that the frequency with which a particular condition occurs is not necessarily proportionally equal to the portion of failures caused by a particular condition. That is, a condition that occurs less frequently may eventually cause most of the card failures.

Another complicating factor is that not all tests simulate the identified conditions equally well. A commercial dry-cleaning test is a very good simulation of actual conditions, whereas the corner impact test is an example of a test that, whilst it can give valuable information on a card's properties, is less representative of the condition it simulates.

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Given the above, the following assessment procedure is appropriate:

1. Commence the evaluation by considering the outcome of tests that should give a reasonable estimate of the number of annual failures that can be expected. An example is the commercial dry cleaning test, or if contact with one of the chemicals in the resistance to chemicals test causes a card to fail. Note that a particular test may cause failures only for some cards.
2. Try to use stochastic domination to rank cards. As part of the evaluation, the maximum number of failures under other conditions in order for cards to be equivalent can be calculated, and the probability of that happening can be assessed.
3. Assign a score for each card, by considering the following:
    a. Outcome of the tests covering each condition (as shown in Section E.6.4).
    b. Frequency with which each condition occurs (as shown in Section E.6.6).
    c. Outcome of steps 1 and 2 above.

Each card is awarded a score out of a maximum of 10 points (10 being best and 0 being worst). Scores should reflect not only the order of preference, but also how much better (or worse) one card is than another.

E.7 Integrity testing

E.7.1 Threats

The specific threats that a card should protect against need to be assessed. The list of threats need not be limited to e.g. those listed at 37 CFR Part 6, but can go beyond that to suit a particular environment. The following represents a typical list of threats:

- Simulation or imitation of a DL/ID card with the intent to pass as genuine in circumstances of ordinary use, including the use of amongst others:
    - Similar security features, and/or
    - Reproduction of a genuine DL/ID card or part thereof by means of a reproductive device.
- Substituting the customer's portrait image.
- Substituting the customer's signature.
- Deletion/alteration of the dynamic data.
- The construction of a fraudulent DL/ID card, using materials from a legitimate DL/ID card for parts thereof.
- Theft of genuine generic cards or DL/ID card components.

Additional requirements can include the following:

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- Any attempt to tamper with the DL/ID card shall result in the irreversible destruction of the security features and/or damage to the card, which shall be visible (i.e. Level 1) in circumstances of ordinary use[12].

- As a minimum, the DL/ID card shall incorporate the mandatory "security elements" identified in Clause C.6 of ISO/IEC 18013-1 [i.e. UV-dull card body, tamper evident properties, security background pattern (using at least 2 colors, and including micro-lettering), UV-fluorescent ink, optically variable element].

- The combination of security features used shall protect the DL/ID card against all the threats identified above. Although the combination of security features shall allow second and third line verification of a DL/ID card, the combination of security features shall be designed especially to facilitate first line inspection (in respect of all the threats), and to immediately highlight any circumvention attempts upon such inspection.

E.7.2 Integrity tests

It is recommended that integrity testing be performed by security consultants, with the aim to report on the integrity of a card under professional attack.

Vendors are typically asked to specify a card's security characteristics in their bids. The card and list of characteristics are then submitted to an integrity-testing laboratory for verification. In addition, the laboratory is instructed to attack the card, and to attempt to make counterfeit cards.

Instructions to the laboratory for attacking a card can read as follow:

> Make an attempt to change the data and/or photograph/image on a card using any appropriate techniques, such that the changes may be able to evade detection under cursory inspection. Report on the methods, time, cost and effort required for each alternation. Also report on the card's resistance to the various forms of attack employed, including the card's resistance to peeling and/or removing the security feature(s) / laminate(s) using means such as sharp instruments, chemicals, cold and/or heat, in order to gain access to the data and/or photograph/image. Make and report on attempts to remove the security feature(s) / laminate(s) in its entirety and place it on another card, with the purpose of transferring the security feature(s) / laminate(s) from one card to another, and report the findings.

Instructions to the laboratory for attempting to produce counterfeit cards can read as follow:

> Make an attempt to counterfeit cards that would pass a cursory inspection. The counterfeits can be made using color copies and/or photograph/images of the license, readily available "credit card" core stock, graphic arts supplies, and security feature(s) / laminate(s) removed from the genuine cards. Attempt counterfeits at two levels: One where the inspecting person physically handles the card (e.g. when renting a motor vehicle), and another where the cardholder just shows portrait side of the card (whilst possibly still in a transparent billfold flip-out) to the inspecting person. Report on the effort, cost and mechanisms used for each counterfeit.

The output of integrity testing is the following:

- A report describing the extent to which a card complies with the claimed security characteristics.

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[12] To resolve any doubt, a procedure such as the following can be used: Five law enforcement officers will each be shown a number of cards that have been tampered with amongst a similar number of original cards and requested to identify the tampered cards. If 85% of the answers are correct, the integrity features shall be deemed to be of acceptable quality.

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- A report describing the extent to which security features in a card provided resistance to attack. The report should include all samples used, and provide photographs or images documenting the results as necessary.
- Cards that have been altered in some form or fashion by the laboratory.
- Counterfeit cards manufactured by the laboratory.

E.8 Test reports

For each test performed, the following information should be included in the test report:

- Test identification (test specification name, clause number, specification date)
- Test title
- Sample size
- Test date
- Identifying name or number to describe the type/color/style of card tested
- Result for each card tested (numeric and/or qualitative)

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Annex F
(informative)

Optional Magnetic Stripe

F.1 Scope

This annex defines mapping of the driver license/identification card machine-readable information elements onto a 3-track magnetic stripe. This annex expands upon, corrects minor errors in, and intends to supersede the requirements of AAMVA DL/ID-2000 Annex A – *Mapping of driver license/identification card information to magnetic stripe cards* (6 June 2000).

F.2 Introduction

This annex defines mapping of the DL/ID card machine-readable data elements onto a magnetic stripe. For the purposes of this standard, AAMVA had adopted the magnetic stripe annex from the AAMVA DL/ID-2000 standard (Annex A). The minimum mandatory data elements of the new standard (see paragraph 4.2 of this standard) will not fit within a 3-track magnetic stripe. The AAMVA DL/ID-2000 magnetic stripe annex was grandfathered in its entirety in the interest of smoothing a transition from legacy DL/ID documents and legacy readers that are designed to interact with cards issued under the AAMVA DL/ID-2000 standard. The 2010 standard introduced a change in Track 3 with an updated approach to representing both the version of the standard being followed and a field to accommodate incremental/iteration changes made by the issuer.

F.3 Conformance

Conformance with all parts of ISO/IEC 7811-6 is required with the exception of data content and coded character sets as defined in Table F.1 and F.2.

F.4 Card characteristics

The physical characteristics and dimensions shall conform to ISO/IEC 7810. The magnetic stripe area shall conform to ISO/IEC 7811-6 for tracks 1, 2, and 3.

F.5 Coded character set

Tables F.1 and F.2 define characters for tracks 1, 2, and 3. The coded character sets for 5 bit numeric and 7 bit alphanumeric are the same as those described in ISO/IEC 7811-6. However, the use of the characters for data or control purposes may be different.

Table F.1 — Coded character set for 5 bit numeric

ASCII	Hex	Binary					ASCII	Hex	Binary				
		P	2^3	2^2	2^1	2^0			P	2^3	2^2	2^1	2^0
0	30	1	0	0	0	0	8	38	0	1	0	0	0
1	31	0	0	0	0	1	9	39	1	1	0	0	1
2	32	0	0	0	1	0	:	3A	1	1	0	1	0
3	33	1	0	0	1	1	;	3B	0	1	0	1	1
4	34	0	0	1	0	0	<	3C	1	1	1	0	0

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ASCII	Hex	Binary					ASCII	Hex	Binary				
5	35	1	0	1	0	1	**=**	3D	0	1	1	0	1
6	36	1	0	1	1	0	**>**	3E	0	1	1	1	0
7	37	0	0	1	1	1	**?**	3F	1	1	1	1	1
The 3 characters **: < >** are available for hardware control purposes and shall not be used for information (data content).													
The 3 characters **; = ?** shall have the following meaning: **;** start sentinel **=** field separator **?** end sentinel													

Table F.2 — Coded character set for 7 bit alphanumeric

ASCII	Hex	Binary							ASCII	Hex	Binary						
		P	2^5	2^4	2^3	2^2	2^1	2^0			P	2^5	2^4	2^3	2^2	2^1	2^0
space	20	1	0	0	0	0	0	0	@	40	0	1	0	0	0	0	0
!	21	0	0	0	0	0	0	1	A	41	1	1	0	0	0	0	1
“	22	0	0	0	0	0	1	0	B	42	1	1	0	0	0	1	0
#	23	1	0	0	0	0	1	1	C	43	0	1	0	0	0	1	1
$	24	0	0	0	0	1	0	0	D	44	1	1	0	0	1	0	0
%	25	1	0	0	0	1	0	1	E	45	0	1	0	0	1	0	1
&	26	1	0	0	0	1	1	0	F	46	0	1	0	0	1	1	0
‘	27	0	0	0	0	1	1	1	G	47	1	1	0	0	1	1	1
(	28	0	0	0	1	0	0	0	H	48	1	1	0	1	0	0	0
)	29	1	0	0	1	0	0	1	I	49	0	1	0	1	0	0	1
*****	2A	1	0	0	1	0	1	0	J	4A	0	1	0	1	0	1	0
+	2B	0	0	0	1	0	1	1	K	4B	1	1	0	1	0	1	1
,	2C	1	0	0	1	1	0	0	L	4C	0	1	0	1	1	0	0
-	2D	0	0	0	1	1	0	1	M	4D	1	1	0	1	1	0	1
.	2E	0	0	0	1	1	1	0	N	4E	1	1	0	1	1	1	0
/	2F	1	0	0	1	1	1	1	O	4F	0	1	0	1	1	1	1
0	30	0	0	1	0	0	0	0	P	50	1	1	1	0	0	0	0
1	31	1	0	1	0	0	0	1	Q	51	0	1	1	0	0	0	1
2	32	1	0	1	0	0	1	0	R	52	0	1	1	0	0	1	0
3	33	0	0	1	0	0	1	1	S	53	1	1	1	0	0	1	1
4	34	1	0	1	0	1	0	0	T	54	0	1	1	0	1	0	0
5	35	0	0	1	0	1	0	1	U	55	1	1	1	0	1	0	1
6	36	0	0	1	0	1	1	0	V	56	1	1	1	0	1	1	0
7	37	1	0	1	0	1	1	1	W	57	0	1	1	0	1	1	1
8	38	1	0	1	1	0	0	0	X	58	0	1	1	1	0	0	0
9	39	0	0	1	1	0	0	1	Y	59	1	1	1	1	0	0	1
:	3A	0	0	1	1	0	1	0	Z	5A	1	1	1	1	0	1	0
;	3B	1	0	1	1	0	1	1	**[**	5B	0	1	1	1	0	1	1
<	3C	0	0	1	1	1	0	0	****	5C	1	1	1	1	1	0	0
=	3D	1	0	1	1	1	0	1	**]**	5D	0	1	1	1	1	0	1
>	3E	1	0	1	1	1	1	0	**^**	5E	0	1	1	1	1	1	0
?	3F	0	0	1	1	1	1	1	_	5F	1	1	1	1	1	1	1
The 14 characters **! “ & ‘ * + , : ; < = > @ _** are available for hardware control purposes and shall not be used for information (data content). Applies to track 1 only.																	
The 3 characters **[\ ]** are reserved for additional national characters when required. They shall not be used internationally. Applies to track 1 only.																	
The character # is reserved for optional additional graphic symbols. Applies to track 1 only.																	

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ASCII	Hex	Binary	ASCII	Hex	Binary
The 3 characters **% ^ ?** shall have the following meaning: **%** start sentinel **^** field separator **?** end sentinel					
All 64 characters may be used for information (data content). Applies to track 3 only.					

F.6 Information content and format

This standard uses additional characters and a different format for track 3 than what is described in ISO/IEC 7811-6. The following tables give the content for each track. This is unique to the AAMVA community and will require modifications to the encoding and reading devices used in conjunction with track 3. The ability to implement such modifications is a mainstay of the magnetic stripe environment and will introduce no significant problem to any jurisdiction or to any public or private sector entity wishing to use the magnetic stripe DL/ID card.

F.6.1 Track 1

Table F.3 — Track 1 information content and format

Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
-	82	V-max	O	Track 1	A/N data in 7 bit binary code for state, city, name, address.	see Table F.2 and iv
1	1	F	R	Start sentinel	This character must be encoded at the beginning of the track.	%
2	2	F	R	State or Province	Mailing or residential code.	A-Z, see ii
3	13	V-max	R	City	This field shall be truncated with a field separator ^ if less than 13 characters long. If the city is exactly 13 characters long then no field separator is used (see i). Richfield^	A-Z **.-'** space
4	35	V-max	R	Name	Priority is as follows, spaces allowed; familyname$givenname$suffix This field shall be truncated with a field separator ^ if less than 35 characters long. The "$" symbol is used as a delimiter between names (see i & iii).	A-Z **.-'** space

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Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
5	29	V	R	Address	The street number shall be as it would appear on mail. The $ is used as a delimiter between address lines. This field shall be truncated with a field separator (or padded with spaces) if less than 29 characters long but can be longer (see i). 28 Atol Av$Suite 2^ Hiawatha Park$Apt 2037^ 340 Brentwood Dr.$Fall Estate^	A-Z 0-9 **.-'** space
6	1	F	R	End sentinel	This character shall be after the last data character of the track.	?
7	1	F	R	LRC	Longitudinal redundancy check is generated from all other characters and is the last character encoded.	see Table F.2
I	Fields 3 and 4 may be shorter than the maximum listed. Total for fields 3,4 and 5 combined is 77 characters.					
ii	Allowable characters are further restricted to those defined in ANSI D-20.					
iii	The $ symbol is used for a delimiter rather than the @ symbol as defined in ANSI D-20. There is no @ symbol in the 7 bit character set.					
iv	For Fields 1 through 6 only the following characters from Table F.2 are allowed: A-Z 0-9 $ % ( ) - . / ^ ? space					

F.6.2 Track 2

Table F.4 — Track 2 information content and format

Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
-	40	V-max	O	Track 2	Numeric data in 5 bit binary code for DL number, expiration date, birthdate, IIN Number.	see Table F.1
1	1	F	R	Start sentinel	This character shall be encoded at the beginning of the track.	;
2	6	F	R	ISO IIN	This is the assigned identification number from ISO. This number shall always begin with a "6". This number shall be obtained from the AAMVA Standards Assistant.	0-9

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Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
3	13	V-max	R	DL/ID#	This field is used to represent the DL/ID number assigned by each jurisdiction. Overflow for DL/ID numbers longer than 13 characters is accommodated in field number 7.	0-9
4	1	F	R	Field Separator	A field separator must be used after the DL/ID number regardless of length.	=
5	4	F	R	Expiration date	This field is in the format: YYMM If MM=77 then license is "non-expiring". If MM=88 the Expiration Date is after the last day of their birth month One Year from the Month (MM) of Field 6 and the Year (YY) of Field 5 (Expiration Date). If MM=99 then the Expiration Date is on the Month (MM) and Day (DD) of Field 6 (Birthdate) and the Year (YY) of Field 5 (Expiration Date).	0-9
6	8	F	R	Birthdate	This field is in the format: CCYYMMDD	0-9
7	5	V	O	DL/ID# overflow	Overflow for numbers longer than 13 characters. If no information is used then a field separator is used in this field.	0-9
8	1	F	R	End sentinel	This character shall be after the last data character of the track.	?
9	1	F	R	LRC	Longitudinal redundancy check is generated from all other characters and is the last character encoded.	see Table F.2
Rules governing DL/ID numbering format(s) will be kept by the Issuing DL/ID Agencies. DL/ID Numbers containing printed Alpha characters will be represented by two numeric positions for each Alpha character on Track 2. Example: The character (A) = a numeric (01), character (B) = a numeric (02), character Z = a numeric (26).						

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F.6.3 Track 3

Table F.5 — Track 3 information content and format

Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
-	82	V-max	O	Track 3	A/N data in 7 bit binary code for postal code, class, restrictions.	see Table F.2 and ii
1	1	F	R	Start sentinel	This character shall be encoded at the beginning of the track.	%
2	1	F	R	CDS Version #	This is a decimal value between 0 and 9 that specifies the version level of the mag stripe format. All mag stripes compliant with this current AAMVA standard shall be designated "0". Should a need arise requiring major revision to the format, this field provides the means to accommodate additional revision.	0-9
3	1	F	R	Jurisdiction Version #	This is a decimal value between 0 and 9 that specifies the jurisdiction version level of the mag stripe format. Notwithstanding iterations of this standard, jurisdictions may implement incremental changes to their mag stripes.	0-9
4	11	F	R	Postal code	For an 11 digit postal or zip code. (left justify fill with spaces, no hyphen)	A-Z, 0-9, space
5	2	F	R	Class	Represents the type of DL (ANSI codes modified for CDLIS).See I	A-Z, 0-9, space
6	10	F	R	Restrictions	See i, iii	A-Z, 0-9, space
7	4	F	R	Endorsements	See i, iii	A-Z, 0-9, space
8	1	F	R	Sex	1 for male, 2 for female, 9 for not specified	1,2,9
9	3	F	R	Height	See i, iii	0-9, space
10	3	F	R	Weight	See i, iii	0-9, space
11	3	F	R	Hair Color	See i, iii	A-Z, space
12	3	F	R	Eye Color	See i, iii	A-Z, space
13	10	V	O	ID #	Discretionary data for use by each jurisdiction.	see Table F.2

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Field # in order	Length (char.)	Length fixed or variable	Req'd or optional	Name	Information	Allowable characters
14	22	V	O	Reserved space	Discretionary data for use by each jurisdiction.	see Table F.2
15	5	V	O	Security	Discretionary data for use by each jurisdiction.	see Table F.2
16	1	F	R	End sentinel	This character shall be after the last data character of the track.	?
17	1	F	R	LRC	Longitudinal redundancy check is generated from all other characters and is the last character encoded.	see Table F.2
i	Allowable characters are further restricted to those defined in ANSI D-20.					
ii	All 64 characters may be used in data fields; this is different from the ISO use of Table F.2 coded characters. Special hardware or software may be required for readers and encoders.					
iii	If not present pad with spaces.					

F.7 Encoding specifications

Track locations, start of encoding location, end of encoding location, average bit density, flux transition spacing variation, and signal amplitude requirements shall be as described in ISO/IEC 7811-6 for tracks 1, 2, and 3.

F.8 Error detection

Inclusion of parity and LRC as described in ISO/IEC 7811-6 is required.

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Annex G (informative)
Optional Optical Memory

G.1 Scope

This annex defines mapping of the driver license/identification card machine-readable information elements onto optical memory. This annex expands upon, corrects minor errors in, and intends to supersede the requirements of AAMVA DL/ID-2000 Annex D – Mapping of driver license/identification card information to optical memory cards (6 June 2000).

G.2 Introduction

This annex defines mapping of the driver license/identification card machine-readable data elements, as defined in clause 6, onto an optical memory card.

G.3 Conformance

A driver license/identification card that incorporates optical memory shall comply with the following standards; ISO/IEC 11693 and 11694 Parts 1 - 4.

G.4 File location

The Information content of the PDF417 bar code, defined in annex D of this standard, shall be written to both the first and last user data tracks of the optical memory card. The data shall be written as ASCII exactly duplicating the data format and structure defined in F.5. Unused sectors in the first and last user data tracks shall be reserved for future use.

G.5 Updating of data

The data written to the first and last user data tracks shall be read-only. If updating of the data is permitted, additional sectors in the first and last user data tracks may be used to control access for updating purposes and to specify the location of the updated data. The original data in the first and last user data tracks shall remain unchanged in order to provide an audit trail.

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Annex H (informative)
Optional Enhanced Driver License (EDL)

H.1 Introduction

Some U.S. and Canadian Jurisdictions have the option of issuing an EDL. The EDL is a dual-purpose document; it is a permit to drive, as well as a Western Hemisphere Travel Initiative compliant document to enter the United States (in the case of the U.S. as contemplated by Section 7209 of the Intelligence Reform and Terrorism Prevention Act of 2004). The EDL can be used for identification purposes to board a domestic airline, but cannot be used as a travel document for international flights. An EDL can be used at Canada-U.S. land and water border crossings only. **An agreement with Customs and Border Protection (CBP) in the case of the U.S. states and the Canada Border Services Agency (CBSA) for the provinces must be in place before a jurisdiction can issue an EDL.**

H.2 Scope

This annex points out considerations for Jurisdictions contemplating the issuance of an EDL.

H.3 Conformance

Since this annex only points out considerations for Jurisdictions contemplating the issuance of an EDL, no claim to conformance to this annex can be made.

H.4 References

The following documents were consulted in the compilation of this annex.

DHS/CPB/OIT/PSPO 2600-006: *Western Hemisphere Travel Initiative Enhanced Driver's License Technical Requirements Overview* (For a copy of this document, please contact CBP through AAMVA)

ICAO 9303 Part 3 - Machine Readable Official Travel Documents, Volume 1 – *MRtds with Machine Readable Data Stored in Optical Character Recognition Format* (Available from www.icao.org)

EPC Tag Data Standard (Available from www.gs1.org/gsmp/kc/epcglobal/tds/)

EPC Generation 2 Air Interface Specification (Available from http://www.gs1.org/gsmp/kc/epcglobal/uhfc1g2/)

ISO/IEC 18000-6: *Information Technology – Radio frequency identification for item management – Part 6: Parameters for air interface communications at 860MHz to 960 MHz*

ISO 1831:1980: *Printing Specifications for Optical Character Recognition*

ISO/IEC 7810: *Identification cards - Physical characteristics*

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ISO 1073-2:1976: *Alphanumeric character sets for optical recognition -- Part 2: Character set OCR-B -- Shapes and dimensions of the printed image*

ISO 8601:2004: *Data elements and interchange formats -- Information interchange -- Representation of dates and times*

H.5 Implementation

Apart from entering into the agreement with CBP/CBSA, a Jurisdiction planning to issue an EDL can expect among others the following:

1. Developing a business plan and establishing a technical working group to address specific issues related to the exchange of information. Only after successful testing of the data exchange would the EDL document be approved by CBP/CBSA for production.

2. For U.S. EDLs, once in production, CBP, per the terms of the MOA, will contract with a neutral, third-party vendor to evaluate the State's EDL program. Upon successful completion of the evaluation, CBP will designate the EDL card as a WHTI-compliant document through the publication of a Notice in the Federal Register.

H.6 EDL Technical Requirements

H.6.1 Overview

The technical requirements for the Enhanced Drivers Licenses include sharing the following data with CBP and the CBSA:

1. Legal name (First Name, Last Name)

2. Date of birth

3. Gender

4. Digital image (EDL holder's photo)

5. Document type (e.g., EDL)

6. Licence Issuing jurisdiction (mandatory)

7. Date of expiry

8. Citizenship

9. Optical character recognition (OCR) identifier located in the Machine Readable Zone

10. RFID unique identifier number (also known as RFID tag value)

11. Tag identification number

12. Licence status and status changes (also referred to as EDL card status reason code)

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This information is shared with or retrieved by CBP/CBSA only when a traveler presents his or her EDL when applying for admission to the United States or Canada at a land or water port of entry.

H.6.2 Issuance

EDLs are expected to meet minimum specifications in several areas: card issuance, use of facilitative technology, determination of citizenship, document security elements, employee requirements and technical requirements.

H.6.3 Data Transmission

U.S. Jurisdictions interested in developing an EDL program will have to consider technical questions including whether to maintain a database of biographic EDL information that will be accessed by CBP when a card holder crosses the border (Pull Model) or whether to provide CBP with a copy of this biographical information at time of issuance to be maintained by CBP (Push Model). No matter which model is used, CBP only accesses the data when an EDL holder crosses the border. Interfaces are developed jointly by CBP and participating states to support the transfer of the data. CBP recommends that both models use Nlets as the data transfer method. Canadian provinces/territories interested in participating in the EDL program should contact CBSA for more information.

When an EDL holder crosses the border, the Radio Frequency Identification (RFID) or Machine Readable Zone (MRZ) data is used to trigger access to the state/secure CSBA EDL database. When a document is read at the border, name, date of birth, gender, citizenship and photo/image, along with the results of law enforcement queries, is automatically presented to the CBP/CBSA Officer in the inspection booth for review.

CBP's use, retention and sharing of EDL information under both models is explained in the previously referenced Privacy Impact Assessments and System of Records Notices available through the DHS Privacy Office and online at Privacy Office section of the DHS website, www.dhs.gov. The CBSA also produced a Privacy Impact Assessment for the Canadian EDL program, as did the respective Provinces. More information can be found at www.cbsa-asfc.gc.ca.

H.7 EDL Physical Requirements

H.7.1 Overview

The EDL contains both human-readable and machine-readable information. In addition to the AAMVA requirements for human-readable information, the EDL must include the word "Enhanced" on the portrait side of the EDL. EDLs issued by a U.S. jurisdiction must also include an image of the U.S. flag on the portrait side of the EDL. For machine reading and interoperability, information corresponding to the human-readable data is printed in the Machine Readable Zone on the non-portrait side of the document.

The card also includes a vicinity RFID chip that contains the unique identifier for the issued card.

H.7.2 Machine Readable Zone (MRZ)

The MRZ is standard to all travel documents and is a mandatory requirement for EDLs. It is located in Zone VII (by ICAO standards) on the non-portrait side of the EDL. The ICAO standards with EDL recommendations for the non-portrait side of an ID/DL-sized document are below. A minimum white space of 23mm must be made available in Zone VII for the MRZ. Figure H.1 shows the recommended non-portrait side layout for an EDL. Figure H.2 shows an example of the non-portrait side of a personalized EDL. Figure H.3 provides a high level explanation of the data in an EDL MRZ. Detailed information can be obtained from the appropriate references or from CBP.

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Figure H.1 – EDL Card back

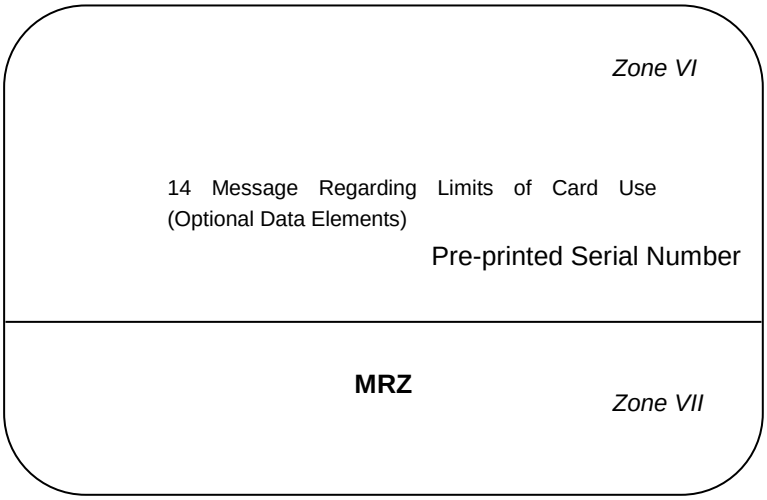

Figure H.2 – Sample EDL Card back

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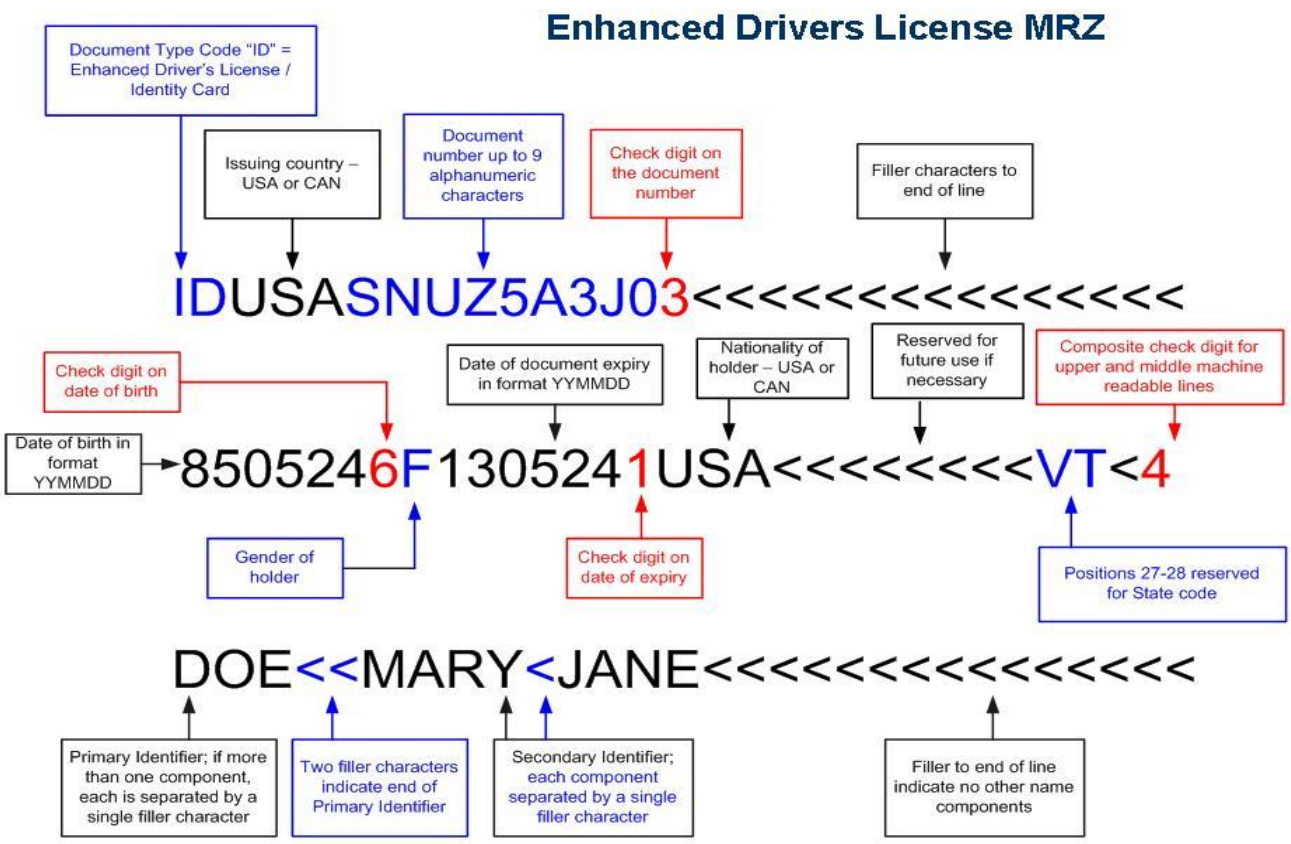
Figure H.3 – MRZ Example



H.7.3 Use of Radio Frequency Identification Technology in the EDL

The RFID tag embedded in an EDL does not contain any personally identifiable information (PII), just a unique reference number that means something only to the secure CBP/CBSA system. An inoperable RFID tag (e.g. due to tampering or deactivation) invalidates the EDL for purposes of border crossing into the U.S.

An RFID reader at the border crossing sends a signal to the tag in the EDL and collects the reference number so it can be matched to CBP's/CBSA's secure EDL database in real-time to verify the information printed on the portrait side of the EDL. Data encryption, secure networks, and firewalls protect the information while it is being retrieved from the database. Vicinity RFID tags can be read up to 30 feet from a reader; however, reader antennas are tuned to read at a distance of 10 – 15 feet. For added security, an RF-attenuation security sleeve should be provided to protect the RFID tag from being read when the cardholder is not using it for border crossing.

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Annex I (informative)
Optional Compact Encoding

I.1 Scope

This Annex provides a compact encoding scheme as an alternative to the scheme in D.12. The compact encoding scheme allows issuing authorities the option of compiling a 2D bar code that is compliant with ISO/IEC 18013-2.

For compact encoding, a typical minimum capacity of 300 usable bytes is required. Typical media on which compact encoding is implemented are:

- 2D bar codes
- High coercivity high density magnetic stripes

NOTE When high coercivity high density magnetic stripe media is used, all six tracks shall be read.

The limited storage capacity means that the number of data groups is restricted, as is the data size of each. For the data groups defined in ISO/IEC 18013-2, the compact encoding scheme accordingly provides for Data Group 1, and optionally for any combination of data groups 2, 3, 4, 7 and 11 subject to storage capacity availability.

The Annex also provides means of validating and authenticating the stored data.

I.2 Normative References

The following referenced documents are indispensable for the application of this Annex. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 7811-7:2004, *Identification cards — Recording technique — Part 7: Magnetic stripe — High coercivity, high density*

ISO/IEC 8825-1:2002, *Information technology — ASN.1 encoding rules: Specification of Basic Encoding Rules (BER), Canonical Encoding Rules (CER) and Distinguished Encoding Rules (DER)*

ISO/IEC 18013-2:2008, *Personal Identification – ISO Compliant Driving License – Part 2: Machine Readable Technologies*

ISO/IEC 19794-3:2006, *Information technology — Biometric data interchange formats — Part 3: Finger pattern spectral data*

I.3 Overview

The compact encoding method generates one data string containing all data groups. This data string is written to (and read from) storage media in the format provided for by each technology.

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The compact encoding method differentiates between the following two types of data groups:

- Type 1 data group: Data groups that contain only data of which the allowable characters are specified in this International Standard (i.e. data groups 1, 2 and 3).

- Type 2 data group: Data groups that include data of which the allowable characters are specified by another standard (i.e. data groups 4 and 7), and which thus may include delimiters as part of the field content.

Data Group 11 can be either a Type 1 or a Type 2 data group, depending on the information stored in this Data Group.

The encoding of data in a Type 1 data group is based on a fixed sequence of possible data elements in the data file. Each data field and data group (including optional and/or empty data fields and data groups) is terminated by an "end of field" or "end of data group" indicator. Data fields read sequentially from the data file thus can be assigned the appropriate data field name. This encoding method does not require each field to be identified individually with a tag in the data file, nor does it require the length of any field to be included in the data file.

The parsing rules for a Type 2 data group do not depend on delimiters to identify the data fields. Sufficient information is supplied in the data to calculate the position of the first and last bytes of each data field in the data stream.

I.4 Character set encoding

Unless otherwise specified, data objects are encoded as indicated in Table I.1.

Table I.1 — Encoding rules

Object	Encoding
Data fields of which the abstract values are defined as consisting of only N characters	BCD
Data fields of which the abstract values are defined as containing (although not necessarily exclusively) any A or S characters	As per ISO/IEC 8859-1
Delimiters	As per ISO/IEC 8859-1
Data object length	ASN.1
NOTE A field that is defined in this International Standard as containing (amongst others) A and/or S characters will always be encoded using ISO/IEC 8859-1, even if an issuing authority's implementation of the same field is limited to N characters.	

I.5 Structure

I.5.1 Data file

The structure of a data file created using compact encoding can be represented as follows:

[header] × [Data Group 1] × [Data Group 2] × [Data Group 3] × [Data Group 4] × [Data Group 7] × [Data Group 11] ¶

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The header and Data Group 1 are mandatory; all other elements of the data file are optional. Data groups are delimited using the data group delimiter (×). The number of data group delimiters is fixed regardless of the number of optional data groups actually present. Data Group 11 is followed by the end of file delimiter (¶).

NOTE The data group delimiter (×) is a multiplication sign and not a lower case X. Spaces (periods) have been inserted before and after the data group delimiter and before the end of file delimiter above for ease of reading only.

I.5.2 Header

The header consists of the following components:

[AID] [version] [length]

where

AID = Application identifier, 7 bytes. Consists of a 5 byte Registered Application Identifier (RID), ‘A0 00 00 02 48’, and a 2 byte Proprietary Application Identifier Extension (PIX) '01 00'.

Version = 2 byte number. The value of the first byte shall be '01' for this version of this Standard. The second byte is assigned by the issuing authority for each new version of their specification controlling the coding of domestic data (Data Group 11).

Length = Length of the data file (in bytes), encoded using ASN.1. The length equals the total number of bytes from (and including) the data group delimiter between the header and Data Group 1, up to and including the last character of the Logical Data Structure (LDS) (i.e. the end of file delimiter).

NOTE Although it is strictly speaking not necessary to know the length of the data file, it is included to assist in read verification.

EXAMPLE

Suppose that:

RID	=	A0 00 00 02 48
PIX	=	01 00
Version level	=	1
Domestic version level	=	not specified (defaults to 0)
Total length	=	1598 bytes (‘82 06 3E’ in ASN.1 hexadecimal representation)

Then, the header would be encoded as follows (spaces are included for clarity only and are not encoded; apostrophes are used to indicate hexadecimal characters and are not encoded):

‘A0 00 00 02 48 01 00 01 00 82 06 3E’

I.5.3 Type 1 Data Group

A Type 1 data group consists of data elements delimited by the field delimiter (÷) as follows:

…× [element_1] ÷…÷ [element_n] ÷…÷ [element_last] ×…

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All data elements are delimited (including optional elements), regardless of whether or not an element contains data. The only exception is if the data group contains no data, in which case no field delimiters are used. To facilitate forward compatibility, parsers shall be able to accommodate additional elements appended to a data group. The sequence of fields are specified in the respective data group definitions.

A data element can be sub-divided into data sub-fields. In a Type 1 data group, sub-fields are delimited by a sub-field delimiter ((;) sub-delimiter for short) as follows:

…[element_2] ÷ [field_3.1] ; [field_3.2] ; [field_3.3] ÷ [element_4]…

If a data sub-field is the last data element in a data group, it is terminated with the data group delimiter.

For data elements containing a fixed number of data sub-fields (e.g. the address field), the number of sub-delimiters is constant, regardless of the number of optional sub-fields present. The only exception is if none of the sub-fields contain data, in which case no sub-field delimiters are present.

The set of sub-fields in a data field may be repeated. If a set of sub-fields is not terminated with a field delimiter or a data group delimiter, it means that the next field will be the first sub-field of another set of sub-fields.

EXAMPLE A license category field consists of 6 sub-fields, of which the first sub-field is mandatory. A license category field containing 3 license categories can then be coded as follows:

…÷ [category_1—field_1] ; [category_1—field_2] ; [category_1—field_3] ; ; ; ; [category_2—field_1] ; ; ; [category_2—field_4] ; ; ; [category_3—field_1] ; ; ; [category_3—field_4] ; [category_3—field_5] ; [category_3—field_6] ÷…

NOTE Spaces (periods) have been inserted before and after the data group, field and sub-field delimiters above for ease of reading only.

I.5.4 Type 2 Data Group

The contents of a Type 2 data group can generally be represented as follows:

× [fixed_length_field_1] [fixed_length_field_2] … [fixed_length_field_n] [variable_length_field_ length] [variable_length_field] ×

where × is the data group delimiter. The length of a variable_length_field is specified using ASN.1 rules (see Appendix A to Annex C). The number of fixed length fields and the number of variable length fields is not restricted. The number and sequence of fields are specified in the data group definition.

I.6 Implementation

I.6.1 Data Element Mapping

Table I.2 provides a mapping between the data elements defined in ISO/IEC 18013-2 and the AAMVA data elements defined in this Standard.

Table I.2 — Data element mapping

ISO/IEC 18013-2 data element	AAMVA data element	Data Group	Optional (O) / Mandatory (M)
Family name	Family name	DG1	M
Given[a] names	Given names	DG1	M

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ISO/IEC 18013-2 data element	AAMVA data element	Data Group	Optional (O) / Mandatory (M)
Date of birth	Date of birth	DG1	M
Date of issue	Date of Issue	DG1	M
Date of expiry	Date of expiry	DG1	M
Issuing country		DG1	M
Issuing authority	Issuing jurisdiction	DG1	M
License number	Customer identifier	DG1	M
Categories of vehicles/restrictions/ conditions (refer to Annex A of ISO/IEC 18013-2 for field assembly rules)		DG1	M
Gender	Cardholder sex	DG2	M
Height	Height	DG2	M
Weight	Weight	DG2	O
Eye colour	Eye color	DG2	M
Hair colour	Hair color	DG2	O
Place of birth	Place of birth	DG2	O
Normal place of residence	Cardholder address	DG2	M
Administrative number	Audit information	DG3	O
Document discriminator	Document discriminator	DG3	M
Data discriminator		DG3	O
ISO issuer ID number	Issuer Identification Number	DG3	O
Portrait image timestamp		DG4	O
Type of image		DG4	O
Portrait image	Portrait	DG4	O
BDB format owner		DG7	O
BDB format type		DG7	O
Biometric data block length		DG7	O
Biometric data block		DG7	O
	Family name truncation	DG11	M
	Given names truncation	DG11	M
	Name suffix	DG11	O
	Alias / AKA Family Name	DG11	O
	Alias / AKA Given Name	DG11	O
	Alias / AKA Suffix Name	DG11	O

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ISO/IEC 18013-2 data element	AAMVA data element	Data Group	Optional (O) / Mandatory (M)
	Race / ethnicity	DG11	O
	Jurisdiction-specific vehicle classification description	DG11	O
	Jurisdiction-specific endorsement code description	DG11	O
	Jurisdiction-specific restriction code description	DG11	O
	Date of first issue per category	DG11	O
	Separate expiry dates for vehicle classifications	DG11	O
	Inventory control number	DG11	O
	Compliance Type	DG11	O
	Card Revision Date	DG11	O
	HAZMAT Endorsement Expiration Date	DG11	O
	Limited Duration Document Indicator	DG11	O

See ISO/IEC 18013-2 for field definitions of ISO/IEC 18013-2 data elements. Field values must be rendered in the format prescribed in ISO/IEC 18013-2. Fields that are not defined in ISO/IEC 18013-2 must be rendered as specified in Annex D.

I.6.2 Data Group 1: Mandatory Data

Data Group 1 is a Type 1 data group.

A sub-field delimiter is used between different instances of the category of vehicle/restriction/condition data object.

EXAMPLE 1

Assume the following:

Family name = Smithe-Williams

Given name = Alexander George Thomas

Date of birth = 1 March 1970

Date of issue = 15 September 2002

Date of expiry = 30 September 2007

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Issuing country = USA

Issuing authority = North Carolina DMV

License number = A290654395164273X

Categories of vehicles, restrictions:

Category B vehicles, issued 1 September 1991, expires 1 March 2035

The above data group will be coded as follows:

[header]×Smithe-Williams÷Alexander George Thomas÷'19 70 03 01'÷'20 02 09 15'÷'20 07 09 30'÷USA÷NORTH CAROLINA DMV÷A290654395164273X÷B;19910901;20350301;;;×[next data group]

Where

Smi…ams = Family name

Ale…mas = Given names

'19 70 03 01' = BCD encoding of birthday, 1 March 1970

'20 02 09 15' = BCD encoding of IDL issue date, 15 September 2002

'20 07 09 30' = BCD encoding of IDL expiry date, 30 September 2007

USA = Issuing country

NOR…DMV = Issuing authority

A29….73X = License number

B = Category B vehicles

'19 91 09 01' = BCD encoding of issue date of category B, 1 September 1991

'20 35 03 01' = BCD encoding of expiry date of category B, 1 March 2035

I.6.3 Data Group 2: Optional License Holder Information

Data Group 2 is a Type 1 data group.

EXAMPLE

Assume the following:

Gender = Male

Height = 172 cm

Weight = 82 kg

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Eye color = Blue

Hair color = Bald

Normal place of residence = 471 Monica Road, 201 Delta Building, Lynnwood, Georgia, 01234, USA

The above data group will be coded as follows:

[previous data group] × 1 ÷ '01 72' ÷ '00 82' ÷ BLU ÷ BLD ÷ ÷ 471 Monica Road;201 Delta Building;Lynnwood;Georgia;01234;USA × [next data group]

Where

1 = male (per ISO/IEC 5218)

'01 72' = BCD encoding of height, 172 cm

'00 82' = BCD encoding of weight, 82 kg

BLU = Blue eyes (per AAMVA D20)

BLD = Bald (per AAMVA D20)

471 Mo…USA = Residence information

NOTE No place of birth included.

I.6.4 Data Group 3: Optional Issuing Authority Information

Data Group 3 is a Type 1 data group.

The document discriminator field as well as the data discriminator field shall be each encoded as a 1 byte binary number. The ISO issuer ID number field shall be encoded as a 4 byte binary number.

EXAMPLE

Assume the following:

Administrative number = 123456789B

Document discriminator = 01

ISO issuer ID number = 636000

The above data group will be coded as follows:

[previous data group] × 123456789B ÷ '01' ÷ ÷ '00 09 B4 60' × [next data group]

Where

123456789B = Administrative number

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'01' = Document discriminator

'63 60 00' = BCD encoding of ISO issuer ID number

NOTE No data discriminator included.

I.6.5 Data Group 4: Optional Portrait Images

For compact encoding, Data Group 4 supports one portrait image only. Consequently, not all of the fields defined in 8.4 of ISO/IEC 18013-2 are provided for. The coding of the portrait image is specified outside of this International Standard, and thus Data Group 4 is a Type 2 data group. Data Group 4 is coded as follows (spaces are included to enhance legibility only, and are not encoded):

[previous data group] × [type of image] [image length] [image] × [next data group]

Where

[type of image] is a fixed length field

[image length] is the length of the [image] field, expressed using ASN.1 rules

[image] is a variable length field

the [image] field is encoded as a binary object.

EXAMPLE

Assume that the data group consists of one JPEG portrait image with a total length of 2075 bytes ($81B_{16}$ bytes). This will be encoded as follows:

[previous data group] × '03' ’82 08 1B’ [2075_{10} byte image field] × [next data group]

Where

'03' = image type 3 (JPEG)

‘82 08 1B’ = ASN.1 encoding of the image length of 2075 bytes

..image….. = Image field including definition details and binary data

I.6.6 Data Group 5: Optional Signature/Mark Image

Data Group 5 is not supported in compact encoding.

I.6.7 Data Group 6: Optional Facial Biometric Template

Data Group 6 is not supported in compact encoding.

I.6.8 Data Group 7: Optional Finger Template

Data Group 7 is a Type 2 data group. Due to limited storage space, only finger minutiae data and finger pattern spectral data are supported in Data Group 7. This limitation precludes the use of optional data elements listed in Table 6 of ISO/IEC 18013-2.

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Data Group 7 thus is coded as follows (spaces are included to enhance legibility only, and are not encoded):

[previous data group] × [BDB format owner] [BDB format type] [biometric data block length] [biometric data block] × [next data group]

Where

[BDB format owner] is a fixed length field

[BDB format type] is a fixed length field

[biometric data block length] is the length of the [biometric data block] field, expressed using ASN.1 rules

[biometric data block] is a variable length field, encoded in accordance with Table I.1, with the understanding that delimiters may be included in data fields as data (i.e. without fulfilling a delimiting function).

The content of the biometric data block complies with ISO/IEC 19794-2 or ISO/IEC 19794-3. Consequently, the following BDB format owner and BDB format type combinations are valid:

Table I.3 — BDB format owner and type combinations

BDB format owner	BDB format type
'01 01'	'00 01' (finger-minutia-record-n)
'01 01'	'00 02' (finger-minutia-record-x)
'01 01'	'00 03' (finger-minutia-card-normal-v))
'01 01'	'00 04' (finger-minutia-card-normal-n)
'01 01'	'00 05' (finger-minutia-card-compact-v)
'01 01'	'00 06' (finger-minutia-card-compact-n)
'01 01'	'00 0A' (finger-pattern-spectral)

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EXAMPLE

Assume that the data group consists of a finger pattern spectral biometric data block with a total length of 234 bytes ('EA'$_{16}$ bytes). This will be encoded as follows:

[previous data group]× '01 01' '00 0A' '81 EA' [234$_{10}$ byte biometric data block]×[next data group]

Where

'01 01'	=	BDB format owner (ISO/IEC JTC1 SC37 - Biometrics)
'00 0A'	=	BDB format type (finger pattern spectral data format as specified in ISO/IEC 19794-3)
'81 EA'	=	ASN.1 encoding of the biometric data block length of 234 bytes
..image…..	=	Image data block including definition details and binary data

I.6.9 Data Group 8: Optional Iris Biometric Template

Data Group 8 is not supported in compact encoding.

I.6.10 Data Group 9: Optional Other Biometric Template

Data Group 9 is not supported in compact encoding.

I.6.11 Data Group 10: Reserved for Future Use

Data Group 10 is not currently supported in compact encoding.

I.6.12 Data Group 11: Optional Domestic Use

Data Group 11 is a Type 1 data group.

The content and sequence of data elements in Data Group 11 is specified in Table I.2.

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Annex J (informative)
Optional Integrated Circuit for Standard Encoding

J.1 Introduction

Standard encoding is designed for random access and is suitable for use on documents employing ICCs with contacts and PICCs based on ISO/IEC 7816 and ISO/IEC 14443 respectively. Rewriting, updating, and appending functions may be supported to the extent allowed by the technology (or technologies) used. If implemented, such functions shall comply with the principles set out herein. Security options are established to support authenticity and integrity of machine-readable data.

A driving license containing an optional integrated circuit is compliant with this annex if it complies with ISO/IEC 18013-2, as amended and expanded in clause J.2.

The remainder of clause J.1 reflects background information, and includes text borrowed from ISO/IEC 18013-2.

Design considerations

The file structure and encoding rules have been defined with the following considerations and assumptions:

- A wide variety of implementations must be supported to satisfy specific needs of different issuing authorities. More specifically the data structure must efficiently support:
    - Mandatory and optional sets of data elements.
    - Multiple occurrences of specific data elements that may exist within a data group.
    - A range of possible access conditions in respect of optional data elements as required by different issuing authorities (due to significant variance in business requirements driven by privacy and other statutory requirements).
    - The unconditional availability of mandatory data.
    - An optional mechanism to verify one or more digital signatures.
    - Discovery of the interoperability and security requirements in respect of the optional data elements from the card.
- The structure supports at least two (2) application data sets:
    - The IDL application, which has the following properties:
        - Contains data elements with the following properties:

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- Includes information that would enable a reading authority to identify the access control, authentication and integrity validation mechanisms present on the card.

- Write protected.

- Modifiable by the issuing authority (or trusted agent of the issuing authority), subject to the requirements in 5.1 (for example the machine-readable data may not differ from the human-readable data).

- Optionally protected with one or more digital signatures (defined in ISO/IEC 18013-3).

- DDL application(s)

- Contact between the driver license and passport environments is considered more likely than contact between the driver license environment and non-passport environments (that are compliant with ISO/IEC 7816s). Consequently, tag assignments are aligned with ISO/IEC 7501-1 (ICAO Doc 9303-1).

Interoperability considerations

To provide global interoperability this Annex defines:

- Physical characteristics
- Location and dimensions of the contacts or coupling areas
- Electrical signals to support communication between the IC and the interface device
- Transmission protocols
- Application selection and discovery of optional data elements and security requirements
- Encoding rules
- The file structure and tag assignments for the IDL Logical Data Structure
- Command set
- Data element mappings to the files

Security requirements

Issuing authorities may need to confirm data validity and authenticity. ISO/IEC 18013-3 specifies mechanisms and means by which to achieve this.

J.2 AAMVA-specific Data Requirements

The following represent those data elements that are required for compliance with this standard.

J.2.1 EF.DG2 Data Group 2 License holder information, Tag = ‘6B’, short EF identifier = '02'

All of Data Group 2.

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J.2.2 EF.DG11, Data Group 11 Mandatory and Optional domestic data, Tag to be assigned by issuing authority, short EF identifier = '0B'

Table J.1

Tag	Length	Value	Value format	Mandatory/Optional	Example
‘5C’	X	Tag list	binary		List of all data elements present
‘5F68’	‘01’	Family Name Truncation	F1A	Mandatory	“N” – not truncated
‘5F69’	‘01’	First Name Truncation	F1A	Mandatory	“N” – not truncated
‘5F6A’	‘01’	Middle Name Truncation	F1A	Mandatory	“N” – not truncated
‘5F6B’	‘01’	Compliance Type	F1A	Optional	“M” – materially compliant
‘5F6C’	‘01’	Card Revision Date	F8N	Optional	“09302010” – MMDDCCYY
‘5F6D’	‘01’	Limited Duration Document Indicator[a]	F1N	Optional	“1”
a = The Limited Duration Document Indicator will only be present if applicable.					
NOTE For compliance with DHS programs the following fields are required: Compliance Type; Card Revision Date; and Limited Duration Document Indicator					

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