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**Information technology –  
Transition examples from the  
ISO/IEC 19794:2005 series to the  
ISO/IEC 39794 series for ID  
documents**

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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>Introduction</b> .....	<b>v</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Symbols and abbreviated terms</b> .....	<b>2</b>
<b>5 Transition of biometric data groups defined in Doc 9303-10</b> .....	<b>2</b>
5.1 Data groups for biometric data defined in Doc 9303-10.....	2
5.2 Data groups for biometric data using the ISO/IEC 39794 series.....	5
5.3 Internal consistency checking of the data groups for biometric data.....	10
<b>6 Transition of face image data</b> .....	<b>11</b>
6.1 Data elements of face image data.....	11
6.1.1 Data elements specified in ISO/IEC 19794-5:2005.....	11
6.1.2 Data elements specified in ISO/IEC 39794-5:2019.....	12
6.2 Correspondence between ISO/IEC 19794-5:2005 and ISO/IEC 39794-5:2019.....	14
6.3 Examples based on ISO/IEC 39794-5:2019.....	16
6.3.1 Minimal example using mandatory data elements.....	16
6.3.2 Example using all data elements of ISO/IEC 19794-5:2005.....	18
<b>7 Transition of finger image data</b> .....	<b>24</b>
7.1 Data elements of finger image data.....	24
7.1.1 Data elements specified in ISO/IEC 19794-4:2005.....	24
7.1.2 Data elements specified in ISO/IEC 39794-4:2019.....	25
7.2 Correspondence between ISO/IEC 19794-4:2005 and ISO/IEC 39794-4:2019.....	26
7.3 Examples based on ISO/IEC 39794-4:2019.....	28
7.3.1 Minimal example using mandatory data elements.....	28
7.3.2 Example using typical data elements.....	29
<b>8 Implementation of iris image data</b> .....	<b>33</b>
8.1 Data elements of iris image data.....	33
8.2 Example based on ISO/IEC 39794-6:2021.....	34
<b>Annex A (informative) Abstract syntax of the biometric data template in the logical data structure of eMRTDs in ASN.1</b> .....	<b>36</b>
<b>Annex B (informative) Tag list automatically generated from ISO/IEC 39794-5:2019</b> .....	<b>38</b>
<b>Annex C (informative) Tag list automatically generated from ISO/IEC 39794-4:2019</b> .....	<b>44</b>
<b>Annex D (informative) Tag list automatically generated from ISO/IEC 39794-6:2021</b> .....	<b>47</b>
<b>Annex E (Informative) Advanced example of ISO/IEC 39794-5:2019</b> .....	<b>49</b>
<b>Bibliography</b> .....	<b>53</b>

## Foreword

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

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

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

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

This document was prepared by Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

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

## Introduction

Face images fingerprints and iris patterns have been used for many decades to verify the identity of individuals. In recent years, digital face images have been used in many applications of automated face recognition. Photographic formats are standardized, for example for electronic machine-readable travel documents (eMRTDs), identity documents and driver's licences.

Biometric data interchange formats enable the interoperability of different biometric systems. The first generation of biometric data interchange formats was published in 2005 with the first edition of the ISO/IEC 19794 series. From 2011 onwards, the second generation of biometric data interchange formats was published, in which new data elements related to biometric sample quality were added and header data structures were harmonized across all parts of the ISO/IEC 19794 series, along with XML (Extensible Markup Language) encoding.

To meet new and emerging market demands and to avoid future compatibility issues, ISO/IEC JTC 1/SC 37 developed the ISO/IEC 39794 series. This was the third generation of biometric data interchange formats, defining extensible biometric data interchange formats capable of including future extensions in a structured manner. Extensible specifications in ASN.1 (Abstract Syntax Notation One) and the Distinguished Encoding Rules of ASN.1 form the basis for encoding biometric data in binary tag-length-value formats. XML Schema Definitions form the basis for encoding biometric data in XML.

The extended and new data formats documented in the ISO/IEC 39794 series specify application-specific profiles. The structure of the data format in this series is not backward compatible with the previous generations. However, this new generation addresses, for the first time, a mechanism to maintain future extensions in a backwards and forwards compatible manner.

This document, ISO/IEC TR 49794, is intended to assist organizations in moving from the first edition of the ISO/IEC 19794 series (published in 2005) to the current edition of the ISO/IEC 39794 series (2019) for ID documents by providing transition examples.

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# Information technology – Transition examples from the ISO/IEC 19794:2005 series to the ISO/IEC 39794 series for ID documents —

## Part : Face image data

### 1 Scope

This document provides transition examples from ISO/IEC 19794-4:2005 and ISO/IEC 19794-5:2005 formats to ISO/IEC 39794-4:2019 and ISO/IEC 39794-5:2019 formats for eMRTD application. This document also provides an implementation example for the ISO/IEC 39794-6:2021 format.

This document includes:

- information for eMRTD issuers and eMRTD-reader vendors;
- summarized tables of data elements of ISO/IEC 19794-4:2005 and ISO/IEC 19794-5:2005 and ISO/IEC 39794-4:2019, ISO/IEC 39794-5:2019 and ISO/IEC 39794-6:2021;
- correspondence tables of data elements between ISO/IEC 19794-4:2005 and ISO/IEC 19794-5:2005 and ISO/IEC 39794-4:2019 and ISO/IEC 39794-5:2019, providing:
  - information on whether each data element is normative or optional, and
  - a brief note of each data element from the viewpoint of transition;
- tag, length, value (TLV) data examples of ISO/IEC 39794-4:2019, ISO/IEC 39794-5:2019 and ISO/IEC 39794-6:2021 for implementation, and,
- tag lists of ISO/IEC 39794-4:2019, ISO/IEC 39794-5:2019 and ISO/IEC 39794-6:2021, and an extended example of ISO/IEC 39794-5 as informative annexes.

The following are not within the scope of this document:

- second and later editions of the ISO/IEC 19794 series (2011 and after), and,
- ASN.1 formats and XML formats specified in ISO/IEC 39794 series.

### 2 Normative references

There are no normative references in this document.

### 3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

## 4 Symbols and abbreviated terms

BDB	biometric data block
BHT	biometric header template
CBEFF	Common Biometric Exchange Format Framework
DER	distinguished encoding rules
DG	data group
DO	ber-tlv data object
eMRTD	electronic machine-readable travel document
LDS	logical data structure
PID	product identifier
TLV	tag, length, value

## 5 Transition of biometric data groups defined in Doc 9303-10

### 5.1 Data groups for biometric data defined in Doc 9303-10

Doc 9303-10 specifies the LDS of eMRTDs. This includes DG 2 for face (mandatory), DG 3 for fingerprint (optional) and DG 4 for iris (optional). Each DG contains biometric data encoded in accordance with the relevant International Standards in order to maintain international interoperability.

DG 2 is TLV encoding and its tag is shown in Table 1 (see also Doc 9303-10:2021, Table 43). A Biometric Information Template Group Template is 'DO 7F61' as shown in Table 2, which is located under DO '75' (see Doc 9303-10:2021, Table 44). DO '88' (light grey-highlighted) in Table 2 is a format type; the number assigned respectively to the biometric data formats is stored in it. DO '5F2E' or DO '7F2E' (dark grey-highlighted) contain biometric data. If this biometric data is plain binary data, as in ISO/IEC 19794-5:2005 encoding, DO '5F2E' is chosen. If it is a constructed DO, as in ISO/IEC 39794-5 encoding, DO '7F2E' is chosen.

**Table 1 — Data group 2 — Tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 43)**

Tag	L	Value
75	Var	See encoding of EF.DG2 (Table 2)

**Table 2 — Data group 2 — Biometric encoding tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 44)**

Tag	L	Value			
7F61	Var	<b>Biometric information template group template</b>			
		<b>Tag</b>	<b>L</b>	<b>Value</b>	
		02	01	Integer — Number of instances of this type of biometric	
		7F60	Var	1 <sup>st</sup> Biometric information template	
			<b>Tag</b>	<b>L</b>	<b>Value</b>
			A1	Var	Biometric header template (BHT)
			<b>Tag</b>	<b>L</b>	<b>Value</b>
NOTE In case of '5F2E', the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.					



Table 2 (continued)

				80	02	ICAO header version 0101 (Optional) – Version of the CBEFF patron header format
				81	01-03	Biometric type (Optional)
				82	01	Biometric subtype (Optional for DG2)
				83	07	Creation date and time (Optional)
				85	08	Validity period (from through) (Optional)
				86	04	Creator of the biometric reference data (PID) (Optional)
				87	02	Format owner (REQUIRED)
				88	02	Format type (REQUIRED)
			5F2E or 7F2E	Var		Biometric data (encoded according to format owner) also called the biometric data block (BDB)

NOTE In case of '5F2E', the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.

DG 3 has the same structure as DG 2 and its details are shown in Table 3 (see Doc 9303-10:2021, Table 46) and Table 4 (see Doc 9303-10:2021, Table 47). The roles of DO '88' and DO '5F2E' / DO '7F2E' are identical to those of DG 2.

Table 3 — Data group 3 — Tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 46)

Tag	L	Value
63	Var	See encoding of EF.DG3 (Table 4)

Table 4 — Data group 3 — Biometric encoding tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 47)

Tag	L	Value
7F61	Var	Biometric information template group template
		<b>Tag L Value</b>
		02 01 Integer – Number of instances of this type of biometric
		7F60 Var 1 <sup>st</sup> Biometric information template
		<b>Tag L Value</b>
		A1 Var Biometric header template (BHT)
		<b>Tag L Value</b>
		80 02 ICAO header version 0101 (Optional) – Version of the CBEFF patron header format
		81 01-03 Biometric type (Optional)
		82 01 Biometric subtype (REQUIRED for DG 3)
		83 07 Creation date and time (Optional)
		85 08 Validity period (from through) (Optional)
		86 04 Creator of the biometric reference data (PID) (Optional)
		87 02 Format owner (REQUIRED)
		88 02 Format type (REQUIRED)
		5F2E or 7F2E Var Biometric data (encoded according to format owner) also called the biometric data block (BDB)
		<b>Tag L Value</b>

NOTE In case of '5F2E' the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.

**Table 4 (continued)**

		7F60	Var	2 <sup>nd</sup> Biometric information template		
			<b>Tag</b>	<b>L</b>	<b>Value</b>	
			A1	Var	Biometric header template (BHT)	
				<b>Tag</b>	<b>L</b>	<b>Value</b>
				80	02	ICAO header version 0101 (Optional) – Version of the CBEFF patron header format
				81	01-03	Biometric type (Optional)
				82	01	Biometric subtype (REQUIRED for DG 3)
				83	07	Creation date and time (Optional)
				85	08	Validity period (from through) (Optional)
				86	04	Creator of the biometric reference data (PID) (Optional)
				87	02	Format owner (REQUIRED)
				88	02	Format type (REQUIRED)
			5F2E or 7F2E	Var	Biometric data (encoded according to format owner) also called the biometric data block (BDB)	

NOTE In case of '5F2E' the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.

DG 4 also has the same structure as DG 2 and its details are shown in Table 5 (see Doc 9303-10:2021, Table 53) and Table 6 (see Doc 9303-10:2021, Table 54). The roles of DO '88' and DO '5F2E' / DO '7F2E' are identical to those of DG 2.

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**Table 5 — Data group 4 — Tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 53)**

Tag	L	Value
76	Var	See Biometric encoding of EF.DG4 (Table 6)

**Table 6 — Data group 4 — Biometric encoding tags of logical data structure (SOURCE: Doc 9303-10:2021, Table 54)**

Tag	L	Value				
7F61	Var	Biometric information template group template				
		Tag	L	Value		
		02	01	Integer — Number of instances of this type of biometric		
		7F60	Var	1 <sup>st</sup> Biometric information template		
			Tag	L	Value	
			A1	Var	Biometric header template (BHT)	
			Tag	L	Value	
			80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format	
			81	01-03	Biometric type (Optional)	
			82	01	Biometric subtype (REQUIRED for DG 4)	
			83	07	Creation date and time (Optional)	
			85	08	Validity period (from through) (Optional)	
			86	04	Creator of the biometric reference data (PID) (Optional)	
			87	02	Format owner (REQUIRED)	

NOTE In case of '5F2E' the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.

Table 6 (continued)

				88	02	Format type (REQUIRED)
			5F2E or 7F2E	Var	Biometric data (encoded according to format owner) also called the biometric data block (BDB)	
		<b>Tag</b>	<b>L</b>	<b>Value</b>		
		7F60	Var	2 <sup>nd</sup> Biometric information template		
		<b>Tag</b>	<b>L</b>	<b>Value</b>		
		A1	Var	Biometric header template (BHT)		
				<b>Tag</b>	<b>L</b>	<b>Value</b>
				80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format
				81	01-03	Biometric type (Optional)
				82	01	Biometric subtype (REQUIRED for DG 4)
				83	07	Creation date and time (Optional)
				85	08	Validity period (from through) (Optional)
				86	04	Creator of the biometric reference data (PID) (Optional)
				87	02	Format owner (REQUIRED)
				88	02	Format type (REQUIRED)
			5F2E or 7F2E	Var	Biometric data (encoded according to format owner) also called the biometric data block (BDB)	

NOTE In case of '5F2E' the biometric data block is encoded according to the format owner and format type. In case of '7F2E', the biometric data template is defined in ISO/IEC 7816-11.

5.2 Data groups for biometric data using the ISO/IEC 39794 series

eMRTD issuers essentially maintain the data structures as shown in Table 7, Table 10 and Table 12.

DG 2 is shown in Table 7. DO '88' (light grey-highlighted) in Table 7 is the identifier of format type, which indicates ISO/IEC 39794-5:2019 instead of ISO/IEC 19794-5:2005 (see Table 8).

Table 7 — Data group 2 — Biometric encoding tags of logical data structure for ISO/IEC 39794-5:2019

Tag	L	Value				Notes
7F61	Var.	Biometric information template group template				
		<b>Tag</b>	<b>L</b>	<b>Value</b>		
		02	01	Integer — Number of instances of this type of biometric		
		7F60	Var.	1 <sup>st</sup> Biometric information template		
				<b>Tag</b>	<b>L</b>	<b>Value</b>
		A1	Var.	Biometric header template (BHT)		
				<b>Tag</b>	<b>L</b>	<b>Value</b>
				80	02	ICAO header version 0101 (Optional) - Version of the CBEFF patron header format
				81	01-03	Biometric type (Optional)
				82	01	Biometric subtype (Optional for DG 2)

**Table 7 (continued)**

						83	07	Creation date and time (Optional)	
						85	08	Validity period (from through) (Optional)	
						86	04	Creator of the biometric reference data (PID) (Optional)	
						87	02	Format owner (REQUIRED)	'0101' is stored, which is the ID of ISO/IEC JTC 1/SC 37
						88	02	Format type (REQUIRED)	'002A' is stored when ISO/IEC 39794-5:2019 is used. See <a href="#">Table 8</a> .
				<b>Tag</b>	<b>L</b>	<b>Value</b>			
				7F2E	Var.	Biometric data template defined in ISO/IEC 7816-11.			'7F2E' is used when ISO/IEC 39794-5:2019 is contained under it. See <a href="#">Table 9</a> .

**Table 8 — CBEFF BDB format types for face image data**

Data group	Modality	International Standard No.	Format type	
			Hex	Decimal
DG 2	Face	ISO/IEC 19794-5:2005	0x0008	8
		ISO/IEC 39794-5:2019	0x002A	42

Biometric data encoded according to the ISO/IEC 19794 series (2005 edition) is stored in DO '5F2E'. Biometric data encoded according to the ISO/IEC 39794 series is constructed, so eMRTD issuers use DO '7F2E' instead of DO '5F2E' (see [Table 9](#)).

**Table 9 — Tag number for storing biometric data in biometric information template**

Tag	International Standard No.
5F2E	ISO/IEC 19794 series (2005 edition)
7F2E	ISO/IEC 39794 series

DG 3 is shown in [Table 10](#). DO '88' (light grey high-lighted) in [Table 10](#) is the identifier of format type, which indicates ISO/IEC 39794-4 instead of ISO/IEC 19794-4:2005 (see [Table 11](#)).

**Table 10 — Data group 3 — Biometric encoding tags of logical data structure for ISO/IEC 39794-4:2019**

Tag	L	Value			Notes
7F61	Var.	Biometric information template group template			
		<b>Tag</b>	<b>L</b>	<b>Value</b>	
		02	01	Integer — Number of instances of this type of biometric	
		7F60	Var.	1 <sup>st</sup> Biometric information template	
		<b>Tag</b>	<b>L</b>	<b>Value</b>	
		A1	Var.	Biometric header template (BHT)	
		<b>Tag</b>	<b>L</b>	<b>Value</b>	

Table 10 (continued)

					80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format	
					81	01-03	Biometric type (Optional)	
					82	01	Biometric subtype (REQUIRED for DG 3)	
					83	07	Creation date and time (Optional)	
					85	08	Validity period (from through) (Optional)	
					86	04	Creator of the biometric reference data (PID) (Optional)	
					87	02	Format owner (REQUIRED)	'0101' is stored, which is the ID of ISO/IEC JTC 1/SC 37
					88	02	Format type (REQUIRED)	'0028' is stored when ISO/IEC 39794-4:2019 is used. See <a href="#">Table 11</a> .
				<b>Tag</b>	<b>L</b>	<b>Value</b>		
				7F2E	Var.	Biometric data template defined in ISO/IEC 7816-11		'7F2E' is used when ISO/IEC 39794-4:2019 is contained under it. See <a href="#">Table 9</a> .
				<b>Tag</b>	<b>L</b>	<b>Value</b>		
				7F60	Var.	Biometric information template		
					<b>Tag</b>	<b>L</b>	<b>Value</b>	
				A1	Var.	Biometric header template (BHT)		
					<b>Tag</b>	<b>L</b>	<b>Value</b>	
					80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format	
					81	01-03	Biometric type (Optional)	
					82	01	Biometric subtype (REQUIRED for DG 3)	
					83	07	Creation date and time (Optional)	
					85	08	Validity period (from through) (Optional)	
					86	04	Creator of the biometric reference data (PID) (Optional)	
					87	02	Format owner (REQUIRED)	'0101' is stored, which is the ID of ISO/IEC JTC 1/SC 37
					88	02	Format type (REQUIRED)	'0028' is stored when ISO/IEC 39794-4:2019 is used. See <a href="#">Table 11</a> .
				<b>Tag</b>	<b>L</b>	<b>Value</b>		

Table 10 (continued)

				7F2E	Var.	Biometric data template defined in ISO/IEC 7816-11.	'7F2E' is used when ISO/IEC 39794-4:2019 is contained under it. See <a href="#">Table 9</a> .
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Table 11 — CBEFF BDB format types for fingerprint image data

Data group	Modality	International Standard No.	Format type	
			Hex	Decimal
DG 3	Fingerprint	ISO/IEC 19794-4:2005	0x0007	7
		ISO/IEC 39794-4:2019	0x0028	40

DG 4 is shown in [Table 12](#). DO '88' (light grey highlighted) in [Table 12](#) is the identifier of format type, which indicates ISO/IEC 39794-6 instead of ISO/IEC 19794-6:2005 (see [Table 13](#)).

Table 12 — Data group 4 — Biometric encoding tags of logical data structure for ISO/IEC 39794-6:2021

Tag	L	Value				Notes	
7F61	Var.	Biometric information template group template					
		<b>Tag</b>	<b>L</b>	<b>Value</b>			
		02	01	Integer — Number of instances of this type of biometric			
		7F60	Var.	1 <sup>st</sup> Biometric information template			
				<b>Tag</b>	<b>L</b>		
		A1	Var.	Biometric header template (BHT)			
				<b>Tag</b>	<b>L</b>	<b>Value</b>	
				80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format	
				81	01-03	Biometric type (Optional)	
				82	01	Biometric subtype (REQUIRED for DG 4)	
				83	07	Creation date and time (Optional)	
				85	08	Validity period (from through) (Optional)	
				86	04	Creator of the biometric reference data (PID) (Optional)	
				87	02	Format owner (REQUIRED)	'0101' is stored, which is the ID of ISO/IEC JTC 1/SC 37
				88	02	Format type (REQUIRED)	'002C' is stored when ISO/IEC 39794-6:2021 is used. See <a href="#">Table 13</a> .
				<b>Tag</b>	<b>L</b>	<b>Value</b>	
				7F2E	Var.	Biometric data template defined in ISO/IEC 7816-11. See <a href="#">Table 9</a> .	

Table 12 (continued)

		Tag	L	Value					
		7F60	Var.	2 <sup>nd</sup> Biometric information template					
				Tag	L	Value			
				A1	Var.	Biometric header template (BHT)			
						Tag	L	Value	
						80	02	ICAO header version 0101 (Optional) — Version of the CBEFF patron header format	
						81	01-03	Biometric type (Optional)	
						82	01	Biometric subtype (REQUIRED for DG 4)	
						83	07	Creation date and time (Optional)	
						85	08	Validity period (from through) (Optional)	
						86	04	Creator of the biometric reference data (PID) (Optional)	
						87	02	Format owner (REQUIRED)	'0101' is stored, which is ID of ISO/IEC JTC 1/SC 37
						88	02	Format type (REQUIRED)	'002C' is stored when ISO/IEC 39794-6:2021 is used. See <a href="#">Table 13</a> .
				Tag	L	Value			
				7F2E	Var.	Biometric data template defined in ISO/IEC 7816-11.		'7F2E' is used when ISO/IEC 39794-6:2021 is contained under it. See <a href="#">Table 9</a> .	

Table 13 — CBEFF BDB format types for iris image data

Data group	Modality	International Standard No.	Format type		Notes
			Hex	Decimal	
DG 4	Iris	ISO/IEC 19794-6:2005	0x0009	9	Rectilinear coordinates
			0x000B	11	Polar coordinates
		ISO/IEC 39794-6:2021	0x002C	44	

ISO/IEC JTC 1/SC 17 is responsible for the biometric data template DO '7F2E', whereas the tag allocation authority of ISO/IEC 39794-4, ISO/IEC 39794-5 and ISO/IEC 39794-6 is ISO/IEC JTC 1/SC 37. For DOs that are nested into a biometric information template DO '7F60' and whose tag is not allocated by ISO/IEC JTC 1/SC 17, the tag allocation authority is ISO/IEC JTC 1/SC 37, because eMRTD implementation assigns ISO/IEC JTC 1/SC 37 as default tag allocation authority.

The ASN.1 module in [Annex A](#) describes the syntax of the biometric data template (DO '7F2E') in the LDS of eMRTDs, based on ISO/IEC 7816-11. The biometric data template is encoded by applying the ASN.1 distinguished encoding rules (DERs) defined in ISO/IEC 8825-1. [Table 14](#) shows the resulting encoding.

DO '7F2E' contains biometric data encoded in ISO/IEC 39794-4, ISO/IEC 39794-5 and ISO/IEC 39794-6, of which the top tag numbers are shown in [Table 15](#). Examples of detailed data elements are described