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Information technology — Biometric data interchange formats —

Part 2:
Finger minutiae data

AMENDMENT 1: Conformance testing methodology and clarification of defects

Technologies de l'information — Formats d'échange de données biométriques —

Partie 2: Données du point caractéristique du doigt

AMENDEMENT 1

Foreword

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International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of the joint technical committee is to prepare International Standards. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

Amendment 1 to ISO/IEC 19794-2:2011 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

Information technology — Biometric data interchange formats — Part 2: Finger minutiae data

Amendment 1: Conformance testing methodology and clarification of defects

1. The following text is to be added to the "Introduction" clause of ISO/IEC 19794-2:2011:

Annex A addresses conformance testing of ISO/IEC 19794-2:2011. Annex A is distinct from ISO/IEC 29109-2:2010, which addressed conformance testing only of ISO/IEC 19794-2:2005.

2. The following text is to be added to the "Scope" clause of ISO/IEC 19794-2:2011:

This part of ISO/IEC 19794 also specifies elements of conformance testing methodology, test assertions, and test procedures as applicable to this part of ISO/IEC 19794. It establishes test assertions pertaining to the structure and internal consistency of the finger minutiae data formats defined in this part of ISO/IEC 19794 (Type A Level 1 and 2 as defined in ISO/IEC 19794-1:2011 AMD 1) and semantic test assertions (Type A Level 3 as defined in ISO/IEC 19794-1:2011 AMD 1).

The conformance testing methodology specified in this part of ISO/IEC 19794 does not establish:

— tests of other characteristics of biometric products or other types of testing of biometric products (e.g. acceptance, performance, robustness, security),

— tests of conformance of systems that do not produce data records conforming to the requirements of this part of ISO/IEC 19794.

3. The following text is to be added to the "Conformance" clause of ISO/IEC 19794-2:2011:

Biometric data interchange format conformance tests conform to this part of ISO/IEC 19794 if they satisfy all of the normative requirements set forth in Annex A. Specifically, all Level-1, Level-2 and Level-3 tests shall use the assertions defined in Table A.2 and Table A.3 of clause A.3 in conformity with the concept and rules set in ISO/IEC 19794-1:2011 AMD 1.

Implementations of this part of ISO/IEC 19794 tested according to the specified methodology shall be able to claim conformance only to those biometric data record (BDB) requirements specified in this part of ISO/IEC 19794 that are tested by the test methods established by this methodology.

Implementations of this part of ISO/IEC 19794 do not necessarily need to conform to all possible aspects of this part of ISO/IEC 19794, but only to those requirements that are claimed to be supported by the implementation in an implementation conformance statement (ICS), filled out in accordance with Annex A of ISO/IEC 19794-1:2011 AMD 1 and Table A.1 of clause A.2 of this part of ISO/IEC 19794.

4. Replace annex A of ISO/IEC 19794-2:2011 with the following one.

Annex A
(normative)
Conformance testing methodology

A.1 Introduction

This normative annex specifies elements of conformance testing methodology, test assertions, and test procedures as applicable to finger minutiae data.

The conformance testing methodology specified in ISO/IEC 19794-1:2011 AMD 1 shall apply. The content of the tables below is to be interpreted based on ISO/IEC 19794-1:2011 AMD 1 and shall only be used in the context of that conformance testing methodology.

A.2 Table of requirements

The normative requirements of the main body of this part of ISO/IEC 19794 are listed in Table A.1. The supplier of the IUT should use Table A.1 to explain which optional components of this part of ISO/IEC 19794 are supported and the testing laboratory should use Table A.1 to note the results of the test. The entries in the status column indicate whether the requirement is mandatory (M) or optional (O). The entries in the format type applicability columns indicate whether requirements are (Y) or are not (N) applicable for a format type.

Table A.1 – Table of requirements

Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-1	8.3.1	The format identifier shall be recorded in four bytes. The format identifier shall consist of three characters "FMR" followed by a zero byte as a NULL string terminator.	1	M	Y	N			
R-2	8.3.2	The number for the version of this part of ISO/IEC 19794 used for construct-ing the BDIR shall be placed in four bytes. This version number shall consist of three ASCII numerals followed by a zero byte as a NULL string terminator. The first and second character will represent the major version number and the third character will represent the minor revision number.	1	M	Y	N			
R-3	8.3.3	The length (in bytes) of the entire BDIR shall be recorded in four bytes. This count shall be the total length of the BDIR including the general record header and one or more finger representation records.	2	M	Y	N			
R-4	8.3.4	The total number of finger representation records contained in the BDIR shall be recorded in two bytes. A minimum of one finger representation is required.	2	M	Y	N			
R-5	8.3.5	The one-byte certification flag shall indicate whether each Representation Header includes a certification record. A value of 00_{Hex} shall indicate that no finger representation contains a certification record. A value of 01_{Hex} shall indi-cate that all finger representations contain a certification record.	2	M	Y	N			
R-6	8.4.1	A Representation Header shall precede each representation of finger data providing information for that finger representation. There shall be one finger header for each finger representation contained in the finger minutiae record.	1	M	Y	N			
R-7	8.4.2	The total number of bytes in the entire finger representation, including the representation header, shall be recorded in four bytes.	2	M	Y	N			
R-8	8.4.3	The Gregorian calendar year of the capture date and time field shall be en-coded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-9	8.4.3	The month of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-10	8.4.3	The day of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-11	8.4.3	The hour of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			

Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-12	8.4.3	The minute of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-13	8.4.3	The second of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-14	8.4.3	The millisecond of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-15	8.4.3	The capture date and time field shall indicate when the capture of this finger representation started in Coordinated Universal Time (UTC).	3C	O-1	Y	N			N/A
R-16	8.4.4	The capture device technology ID shall be encoded in one byte. This field shall indicate the class of capture device technology used to acquire the cap-tured biometric sample. A value of 00_{Hex} indicates unknown or unspecified technology. See Table 5 for the list of possible values.	1	M	Y	N			
R-17	8.4.4	The capture device technology ID shall indicate the class of capture device technology used to acquire the captured biometric sample.	3C	O-1	Y	N			N/A
R-18	8.4.5	The capture device vendor identifier shall be encoded in two bytes. A value of all zeros shall indicate that the capture device vendor is unreported.	1	M	Y	N			
R-19	8.4.5	The capture device vendor identifier shall be registered by IBIA or other approved registration authority.	3C	O-1	Y	N			N/A
R-20	8.4.6	The capture device type identifier shall be encoded in two bytes. A value of all zeros shall indicate that the capture device type is unreported.	1	M	Y	N			
R-21	8.4.6	The capture device type identifier shall be assigned by the registered product owner or other approved registration authority.	3C	O-1	Y	N			N/A
R-22	8.4.7.2	A quality record shall begin with a length field. The length field shall consist of one byte. It shall represent the number of quality blocks as an unsigned integer.	2	M	Y	N			
R-23	8.4.7.3	A quality score shall be encoded in one byte as an unsigned integer. Allowed values are – 0 to 100 with higher values indicating better quality, – 255, i.e. ff_{Hex}, for indicating that an attempt to calculate a quality score failed.	1	M	Y	N			

Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-24	8.4.7.4	The quality algorithm vendor identifier shall be encoded in two bytes. A value of all zeros shall indicate that the quality algorithm vendor is unreported.	1	M	Y	N			
R-25	8.4.7.4	The quality algorithm vendor identifier shall be registered by IBIA or other approved registration authority.	3C	O-1	Y	N			N/A
R-26	8.4.7.5	The quality algorithm identifier shall be encoded in two bytes. A value of all zeros shall indicate that the quality algorithm is unreported.	1	M	Y	N			
R-27	8.4.7.5	The quality algorithm identifier shall be registered by IBIA or other approved registration authority.	3C	O-1	Y	N			N/A
R-28	8.4.8.2	A certification record shall begin with a length field. The length field shall consist of one byte. It shall represent the number of certification blocks as an unsigned integer.	2	M	Y	N			
R-29	8.4.8.3	The certification authority identifier shall be encoded in two bytes. A value of all zeros shall indicate that the certification authority is unreported.	1	M	Y	N			
R-30	8.4.8.3	The certification authority identifier shall be registered by IBIA or other approved registration authority.	3C	O-1	Y	N			N/A
R-31	8.4.8.4	The certification scheme identifier shall be encoded in one byte. A list of current certification scheme identifiers is contained in Table 6.	1	M	Y	N			
R-32	8.4.9	The finger position shall be recorded in one byte.	1	M	Y	N			
R-33	8.4.10	The number associated with the specific representation shall be recorded in one byte.	1	M	Y	N			
R-34	8.4.10	If there is more than one finger representation from the same finger in a finger minutiae record, each finger representation shall have a unique representation number. The combination of finger location and representation number shall uniquely identify a particular finger representation within a minutiae record.	2	M	Y	N			
R-35	8.4.10	Multiple finger representations from the same finger shall be numbered with increasing representation numbers, beginning with 0. Where only one finger representation is taken from each finger, this field shall be set to 0.	2	M	Y	N			

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Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-36	8.4.11	The horizontal spatial sampling rate of the minutiae coordinate system shall be recorded in two bytes having the units of pixels per centimeter. The value of the X spatial sampling rate shall not be less than 98.45 pixels per centimeter (250 pixels per inch).	1	M	Y	N			
R-37	8.4.12	The vertical spatial sampling rate of the minutiae coordinate system shall be recorded in two bytes having the units of pixels per centimeter. The value of the Y spatial sampling rate shall not be less than 98.45 pixels per centimeter (250 pixels per inch).	1	M	Y	N			
R-38	8.4.13	The impression type of the finger images from which the minutiae data was derived shall be recorded in this one-byte field.	1	M	Y	N			
R-39	8.4.14	The value for the size of the scanned image in x direction shall be written in a two-byte binary field. It shall be used to specify the number of pixels contained on a single horizontal line of the transmitted image. The range of allowed values is 0000_{Hex} to $3FFF_{Hex}$ for compatibility with the Minutia, Core, and Delta Position fields.	1	M	Y	N			
R-40	8.4.15	The value for the size of the scanned image in y direction shall be written in a two-byte binary field. It shall be used to specify the number of horizontal lines contained in the transmitted image. The range of allowed values is 0000_{Hex} to $3FFF_{Hex}$ for compatibility with the Minutia, Core, and Delta Position fields.	1	M	Y	N			
R-41	8.4.16	The number of bytes required to describe each minutia shall be recorded in the four high-order (most significant) bits of the byte. Allowed values are 5 (to indicate a 5-byte minutia format with no quality information, or 6 to indicate a 6-byte minutia format, including a 1-byte quality field.	1	M	Y	N			
R-42	8.4.17	The method used to determine the location of a ridge ending shall be recorded in the four low-order (least significant) bits of the byte.	1	M	Y	N			
R-43	8.4.18	The number of minutiae extracted and encoded for the finger shall be recorded in this one byte.	2	M	Y	N			
R-44	8.4.19.1.2	The type of minutia shall be recorded in the upper two bits of the first byte of the minutia representation.	1	M	Y	N			
R-45	8.4.19.1.2, 9.2.4	'00' shall represent a minutia of "other" type.	3C	O-1	Y	Y			N/A

Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-46	8.4.19.1.2, 9.2.4	'01' shall represent a ridge ending.	3C	O-1	Y	Y			N/A
R-47	8.4.19.1.2, 9.2.4	'10' shall represent a ridge bifurcation.	3C	O-1	Y	Y			N/A
R-48	8.4.19.1.3	The X coordinate of the minutia shall be recorded in the lower fourteen bits of the first two bytes of the minutia representation.	1	M	Y	N			
R-49	8.4.19.1.3	The upper two bits of the next byte of the minutia representation shall be set to '00'.	1	M	Y	N			
R-50	8.4.19.1.3	The Y coordinate of the minutia shall be recorded in the lower fourteen bits of the third and fourth byte of the minutia representation.	1	M	Y	N			
R-51	8.4.19.1.4	The angle of the minutia shall be recorded in one byte.	1	M	Y	N			
R-52	8.4.19.1.4	The angle of the minutia shall be recorded in units of 1,40625 (360/256) degrees.	3C	O-1	Y	N			N/A
R-53	8.4.19.1.5	The quality of the minutia shall be recorded in one byte. The quality value shall range from 100 as a maximum to 0 as a minimum. A value of 254 indicates the quality was not reported and a value of 255 indicates a failure to acquire a quality score.	1	M	Y	N			
R-54	6.3.2	A minutia point shall be encoded once. A minutia point is uniquely identified by the location and angle.	2	M	Y	Y			
R-55	8.5.1.1	The extended data length field shall consist of two bytes.	1/2	M	Y	N			
R-56	8.5.1.2	The extended data area type code shall be recorded in two bytes. A value of zero in both bytes shall not be used.	1	O	Y	N			
R-57	8.5.1.3	The length of the extended data section shall be recorded in two bytes.	1/2	O	Y	N			
R-58	8.5.2.1	Each ridge count area shall begin with a single byte indicating the ridge count extraction method. Allowed values are 00$_{Hex}$, 01$_{Hex}$, and 02$_{Hex}$.	1	O	Y	N			
R-59	8.5.2.1	Each ridge count area shall begin with a single byte indicating the ridge count extraction method. A value of 00$_{Hex}$ shall indicate no specific ridge count extraction method. A value of 01$_{Hex}$ shall indicate the four-neighbour ridge count extraction method. A value of 02$_{Hex}$ shall indicate the eight-neighbour ridge count extraction method.	3C	O-1	Y	N			N/A

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Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-60	8.5.2.2	The first and second bytes of a ridge count area are index numbers, indicating which minutiae in the corresponding minutiae area are considered.	3C	O-1	Y	N			N/A
R-61	8.5.3.2.1	The number of core points shall be recorded in the least significant four bits of the first byte of the core data. Allowed values are from 0 to 15.	1/2	O	Y	N			
R-62	8.5.3.2.2	The core information type shall be recorded in the first two bits of the upper byte of the first byte of the core data. Allowed values are '00' and '01'.	1	O	Y	N			
R-63	8.5.3.2.2	The core information type shall be recorded in the first two bits of the upper byte of the first byte of the core data. A value of '01' indicates that angular information is present while '00' indicates no angular information is present.	3C	O-1	Y	N			N/A
R-64	8.5.3.2.3	The X coordinate of the core shall be recorded in the lower fourteen bits of the first two bytes of the core data.	3C	O-1	Y	N			N/A
R-65	8.5.3.2.3	The Y coordinate of the core shall be placed in the lower fourteen bits of the following two bytes.	3C	O-1	Y	N			N/A
R-66	8.5.3.2.4	The angle of the core shall be recorded in one byte.	3C	O-1	Y	N			N/A
R-67	8.5.3.3.1	The number of delta points shall be recorded in the least significant four bits of the first byte of the core data. Allowed values are from 0 to 15.	1/2	O	Y	N			
R-68	8.5.3.3.2	The delta information type shall be recorded in the first two bits of the upper byte of the first byte of the delta data. Allowed values are '00' and '01'.	1	O	Y	N			
R-69	8.5.3.3.2	The delta information type shall be recorded in the first two bits of the upper byte of the first byte of the delta data. A value of '01' indicates that angular information is present while '00' indicates no angular information is present.	3C	O-1	Y	N			N/A
R-70	8.5.3.3.3	The X coordinate of the delta shall be recorded in the lower fourteen bits of the first two bytes of the delta data.	3C	O-1	Y	N			N/A
R-71	8.5.3.3.3	The Y coordinate of the delta shall be placed in the lower fourteen bits of the following two bytes.	3C	O-1	Y	N			N/A
R-72	8.5.3.3.4	The angle of the delta shall be recorded in one byte.	3C	O-1	Y	N			N/A
R-73	8.5.4.2	The provider of zonal quality scores shall be identified in two bytes.	3C	O-1	Y	N			N/A
R-74	8.5.4.3	The zonal quality algorithm shall be identified in two bytes.	3C	O-1	Y	N			N/A
R-75	8.5.4.4	The number of pixels in cells in the x direction shall be stored in one byte.	3C	O-1	Y	N			N/A

Requirement ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT support	Supported range	Test result
					Record	On-card			
R-76	8.5.4.4	The number of pixels in cells in the y direction shall be stored in one byte.	3C	O-1	Y	N			N/A
R-77	8.5.4.5	The bit depth of the cell quality information shall be contained in one byte.	1/2	O	Y	N			
R-78	8.5.4.6	The quality of the fingerprint image in a cell shall be represented by one or more bits, as indicated by the bit depth.	3C	O-1	Y	N			N/A
R-79	6.4.2	The coordinate system used to express the minutiae of a fingerprint shall be a Cartesian coordinate system. Points shall be represented by their X and Y coordinates. The origin of the coordinate system shall be the upper left corner of the original image with X increasing to the right and Y increasing downward.	3C	O-1	Y	Y			N/A
R-80	6.4.3	The minutia for a ridge ending shall be defined as the point of forking of the medial skeleton of the valley area immediately in front of the ridge ending.	3C	O-1	Y	Y			N/A
R-81	6.4.4	The minutia for a ridge bifurcation shall be defined as the point of forking of the medial skeleton of the ridge.	3C	O-1	Y	Y			N/A
R-82	6.4.5	The minutia for a ridge skeleton endpoint shall be defined as the center point of the ending ridge.	3C	O-1	Y	Y			N/A
R-83	6.7	All multibyte quantities are represented in Big-Endian format; that is, the more significant bytes of any multibyte quantity are stored at lower addresses in memory than (and are transmitted before) less significant bytes. All numeric values are fixed-length integer quantities, and are unsigned quantities.	1	M	Y	Y			
R-84	9.1	A series of minutiae descriptions shall be embedded in a tag-length-value encoded biometric data object as defined in ISO/IEC 7816-11.	1	M	N	Y			
R-85	9.2.3	The 8-bit X coordinate of the minutia shall be recorded in the first byte.	1	M	N	Y			
R-86	9.2.3	The 8-bit Y coordinate shall be placed in the second byte.	1	M	N	Y			
R-87	9.2.3	The coordinates shall be expressed such that each unit is equal to 10^{-1} mm.	3C	O-1	N	Y			N/A
R-88	9.2.4	The type of a minutia shall be recorded in the first two bits of the angle value for the minutia.	1	M	N	Y			
R-89	9.2.5	The angle of the minutia shall be recorded in six bits.	1	M	N	Y			
R-90	9.2.5	The angle of the minutia shall be recorded in units of 5.625 (360/64) degrees.	3C	O-1	N	Y			N/A

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Require-ment ID	Reference in main body	Requirement summary	Level	Status	Applicable to format type		IUT sup-port	Supported range	Test re-sult
					Record	On-card			
R-91	9.5.1	If extended data are present, finger-minutiae data shall be preceded by tag 81_{Hex} or $A1_{Hex}$ and a length field.	1	M	N	Y			
R-92	9.5.1	If extended data in both, standardised and vendor-specific, formats are present, data in standardised format (data objects with tags 81_{Hex} and 91_{Hex} to 95Hex) shall be encapsulated in the data object with tag $A1_{Hex}$.	2	M	N	Y			
R-93	9.5.1, Table 19	If present, ridge-count data shall be preceded by tag 91_{Hex} and a length field.	1	O	N	Y			
R-94	9.5.1, Table 19	If present, core-point data shall be preceded by tag 92_{Hex} and a length field.	1	O	N	Y			
R-95	9.5.1, Table 19	If present, delta-point data shall be preceded by tag 93_{Hex} and a length field.	1	O	N	Y			
R-96	9.5.1, Table 19	If present, zonal-quality data shall be preceded by tag 94_{Hex} and a length field.	1	O	N	Y			
R-97	9.5.1, Table 19	If present, impression-type data shall be preceded by tag 95_{Hex} and a length field.	1	O	N	Y			
R-98	9.5.1, Table 19	If present, biometric data with vendor-specific format shall be preceded by tag 82_{Hex} or $A2_{Hex}$ and a length field.	1	O	N	Y			

Status notes

O-1   Semantic conformance tests may be dealt with in a later amendment.

A.3 Tables of test assertions

A.3.1 Conformance test assertions for finger minutiae record format

The specific test assertions required for conformance testing to the finger minutiae record format of this part of ISO/IEC 19794 are listed in Table A.2. The normative requirements of this part of ISO/IEC 19794 listed in Table A.1 are referenced in Table A.2.

The conformance test assertions are listed in the order in that the corresponding fields are required to appear, if present, in a conforming record.

Table A.2 – Conformance test assertions for finger minutiae record format

Test	Section	Require-ment ID	Level	Field	Op-era-tor	Operands	Note	Status	Sup-port	Sup-ported values	Test result
T-1	General header	R-1	1	Format ID	EQ	464D5200$_{Hex}$		M			
T-2	General header	R-2	1	Version number	EQ	30333000$_{Hex}$		M			
T-3	General header	R-3	2	Record length	EQ	00000036$_{Hex}$ to ffffffff$_{Hex}$		M			
T-4	General header	R-3	2	Record length	EQ	Total number of bytes in the record		M			
T-5	General header	R-4	2	Number of finger representations	EQ	0001$_{Hex}$ to 0160$_{Hex}$		M			
T-6	General header	R-4	2	Number of finger representations	EQ	Total number of finger representations		M			
T-7	General header	R-5	2	Certification flag	EQ	00$_{Hex}$ or 01$_{Hex}$		M			
T-8	Finger representation header	R-7	2	Finger representation length	EQ	00000027$_{Hex}$ to ffffffff$_{Hex}$		M			
T-9	Finger representation header	R-7	2	Finger representation length	EQ	Total number of bytes in the finger representation		M			
T-10	Finger representation header	R-8	1	Gregorian calendar year of the capture date	EQ	0001$_{Hex}$ to ffff$_{Hex}$		M			
T-11	Finger representation header	R-9	1	Month of the capture date	EQ	01$_{Hex}$ to 0c$_{Hex}$ or ff$_{Hex}$		M			
T-12	Finger representation header	R-10	1	Day of the capture date	EQ	01$_{Hex}$ to 1f$_{Hex}$ or ff$_{Hex}$		M			
T-13	Finger representation header	R-11	1	Hour of the capture time	EQ	00$_{Hex}$ to 17$_{Hex}$ or ff$_{Hex}$		M			
T-14	Finger representation header	R-12	1	Minute of the capture time	EQ	00$_{Hex}$ to 3b$_{Hex}$ or ff$_{Hex}$		M			
T-15	Finger representation header	R-13	1	Second of the capture time	EQ	00$_{Hex}$ to 3b$_{Hex}$ or ff$_{Hex}$		M			
T-16	Finger representation header	R-14	1	Millisecond of the capture time	EQ	0000$_{Hex}$ to 03e7$_{Hex}$ or ffff$_{Hex}$		M			
T-17	Finger representation header	R-16	1	Capture device technology ID	EQ	00$_{Hex}$ to 14$_{Hex}$		M			
T-18	Finger representation header	R-18	1	Capture device vendor ID	EQ	0001$_{Hex}$ to ffff$_{Hex}$		M			
T-19	Finger representation header	R-20	1	Capture device type ID	EQ	0001$_{Hex}$ to ffff$_{Hex}$		M			

Test	Section	Require-ment ID	Level	Field	Op-era-tor	Operands	Note	Status	Sup-port	Sup-ported values	Test result
T-20	Finger representation header/ quality record	R-22	2	Number of quality blocks	EQ	00_{Hex} to ff_{Hex}		M			
T-21	Finger representation header/ quality block	R-23	1	Quality score	EQ	00_{Hex} to 64_{Hex} or ff_{Hex} if present		M			
T-22	Finger representation header/ quality block	R-24	1	Quality algorithm vendor ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-23	Finger representation header/ quality block	R-26	1	Quality algorithm ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-24	Finger representation header/ certification record	R-28	2	Number of certification blocks	EQ	00_{Hex} to ff_{Hex} if present		M			
T-25	Finger representation header/ certification block	R-29	1	Certification authority ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-26	Finger representation header/ certification block	R-31	1	Certification scheme ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-27	Finger representation header	R-32	1	Finger position	EQ	00_{Hex} to $0a_{Hex}$ or $0d_{Hex}$ to $0f_{Hex}$ or 28_{Hex} to 32_{Hex}		M			
T-28	Finger representation header	R-33	1	Finger representation number	EQ	00_{Hex} to $0f_{Hex}$		M			
T-29	Finger representation header	R-34	2	Finger representation number, finger position	C		1	M			
T-30	Finger representation header	R-36	1	Horizontal resolution	EQ	0062_{Hex} to $ffff_{Hex}$		M			
T-31	Finger representation header	R-37	1	Vertical resolution	EQ	0062_{Hex} to $ffff_{Hex}$		M			
T-32	Finger representation header	R-38	1	Impression type	EQ	00_{Hex} to $9f_{Hex}$, 18_{Hex}, $1c_{Hex}$, $1d_{Hex}$		M			
T-33	Finger representation header	R-39	1	Number of pixels horizontally	EQ	0000_{Hex} to $3fff_{Hex}$		M			
T-34	Finger representation header	R-40	1	Number of pixels vertically	EQ	0000_{Hex} to $3fff_{Hex}$		M			
T-35	Finger representation header	R-41	1	Number of bytes required to describe a minutia	EQ	5_{Hex} or 6_{Hex}		M			
T-36	Finger representation header	R-42	1	Method used to determine the location of a ridge ending	EQ	0_{Hex} or 1_{Hex}		M			

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Test	Section	Require-ment ID	Level	Field	Op-era-tor	Operands	Note	Status	Sup-port	Sup-ported values	Test result
T-37	Finger representation header	R-43	2	Number of minutiae	EQ	00_{Hex} to ff_{Hex}		M			
T-38	Finger representation header	R-43	2	Number of minutiae	EQ	Total number of minutiae in the finger representation		M			
T-39	Finger representation body/ minutia	R-44	1	Type	EQ	0_{Hex} to 2_{Hex}		M			
T-40	Finger representation body/ minutia	R-48	1	X coordinate	EQ	0000_{Hex} to $3fff_{Hex}$		M			
T-41	Finger representation body/ minutia	R-49	1	Upper two bits of upper byte of Y coordinate	EQ	0_{Hex}		M			
T-42	Finger representation body/ minutia	R-50	1	Y coordinate	EQ	0000_{Hex} to $3fff_{Hex}$		M			
T-43	Finger representation body/ minutia	R-51	1	Angle	EQ	0_{Hex} to ff_{Hex}		M			
T-44	Finger representation body/ minutia	R-53	1	Minutia quality	EQ	00_{Hex} to 64_{Hex} or fe_{Hex} or ff_{Hex}		M			
T-45	Finger representation body/ minutia	R-54	2	X coordinate, Y coordinate, angle	C		2	M			
T-46	Finger representation body/ extended data	R-55	2	Extended data length	EQ	0000_{Hex} to $ffff_{Hex}$		M			
T-47	Finger representation body/ extended data	R-55	2	Extended data block length	EQ	Number of bytes in the extended data block		O			
T-48	Finger representation body/ extended data	R-56	1	Extended data area type code	EQ	0001_{Hex} to $ffff_{Hex}$		O			
T-49	Finger representation body/ extended data	R-57	1	Extended data area length	EQ	0001_{Hex} to $ffff_{Hex}$		O			
T-50	Finger representation body/ extended data	R-57	2	Extended data area length	EQ	Number of bytes in the extended data area (including the extended data area type code field and the extended data area length field)		O			
T-51	Finger representation body/ extended data	R-61	1	Number of core points	EQ	0_{Hex} to f_{Hex} if {Extended data area type code} EQ 0002_{Hex}		O			

Test	Section	Require-ment ID	Level	Field	Op-era-tor	Operands	Note	Status	Sup-port	Sup-ported values	Test re-sult
T-52	Finger representation body/ extended data	R-61	2	Number of core points	EQ	Number of core points in the core and delta data area if {Extended data area type code} EQ 0002_{Hex}		O			
T-53	Finger representation body/ extended data	R-65	1	Number of delta points	EQ	0_{Hex} to f_{Hex} if {Extended data area type code} EQ 0002_{Hex}		O			
T-54	Finger representation body/ extended data	R-65	2	Number of delta points	EQ	Number of delta points in the core and delta data area if {Extended data area type code} EQ 0002_{Hex}		O			
T-55	Finger representation body/ extended data	R-74	1	Cell quality information depth	EQ	00_{Hex} to ff_{Hex} if {Extended data area type code} EQ 0003_{Hex}		O			
T-56	Finger representation body/ extended data	R-74	2	Cell quality information depth	EQ	$$\frac{\{\text{number of bytes in the extended data area}\}-11}{\frac{\{\text{number of pixels horizontally}\}}{\{\text{cell width}\}} \cdot \frac{\{\text{number of pixels vertically}\}}{\{\text{cell height}\}}}$$		O			

Test notes

1   The test shall fail if the finger representation number and the finger position in the finger representation header equal the representation number and the finger position of another finger representation within the same finger minutiae record.

2   The test shall fail if the X coordinate, the Y coordinate, and the angle of the minutia equal the X coordinate, the Y coordinate, and the angle of another minutia within the same finger repre-sentation.

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A.3.2 Conformance test assertions for finger minutiae on-card comparison format

The specific test assertions required for conformance testing to the finger minutiae on-card comparison format of this part of ISO/IEC 19794 are listed in Table A.3. The normative requirements of this part of ISO/IEC 19794 listed in Table A.1 are referenced in Table A.3.

The conformance test assertions are listed in the order in that the corresponding fields are required to appear, if present, in a conforming record.