INTERNATIONAL STANDARD

ISO/IEC 19794-9

Second edition
2011-10-01

AMENDMENT 1
2013-03-15

Information technology — Biometric data interchange formats —

Part 9: Vascular image data

AMENDMENT 1: Conformance testing methodology

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

Partie 9: Données d'images vasculaires

AMENDEMENT 1: Méthodologie des essais de conformité

Reference number
ISO/IEC 19794-9:2011/Amd.1:2013(E)

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Published in Switzerland

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. In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1.

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 19794-9:2011 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 37, *Biometrics*.

Information technology — Biometric data interchange formats —

Part 9: Vascular image data

AMENDMENT 1: Conformance testing methodology

1. The following text is to be added to the "Introduction" clause of ISO/IEC 19794-9:

Annex A addresses the conformance testing to be used for interchange format defined in this part of ISO/IEC 19794. This Annex A is distinct from ISO/IEC 29109-9, which addressed conformance testing only of the first, 2007, edition of ISO/IEC 19794-9.

2. The following text is to be added to the "Scope" clause of ISO/IEC 19794-9:

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. Specifically, it establishes

— test assertions of the structure of the vascular image data format as specified in Clause 8 of this part of ISO/IEC 19794 (Type A Level 1 as defined in ISO/IEC 19794-1:2011/Amd.1),

— test assertions of internal consistency by checking the types of values that may be contained within each field (Type A Level 2 as defined in ISO/IEC 19794-1:2011/Amd.1),

— tests of semantic 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 19794-9:

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 Clauses 6, 7, and 8. Specifically, they shall use the test methodology specified in ISO/IEC 19794-1:2011/Amd.1, and all Level 1, Level 2 and Level 3 tests shall use the assertions defined in Table A.1 of Clause A.2 in this part of ISO/IEC 19794.

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.

In consideration of the semantic specifics in different parts of ISO/IEC 19794, all Level 1, Level 2, and Level 3 tests shall use the assertions defined in Table A.2 of clause A.3 of this part of ISO/IEC 19794 in conformity with the concept and rules set in ISO/IEC 19794-1, Annex A.

4. Replace the current Annex A with the following new annex:

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 this part of biometric data interchange format standard.

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

A.2 Table of requirements in the base standard

The normative requirements of this part of ISO/IEC 19794 are listed in Table A.1. The supplier of the IUT should explain which optional components of the standard are supported and the testing laboratory should note the results of the test.

Table A.1 — Requirements of the Base Standard

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 1	6.1	The quantities in all records and vascular biometric image elements (pixel data), if represented as multi-byte quantities, are represented in big-endian format.	1	M		N/A	
R- 2	6.1	The order for transmission shall also be the most significant byte first and the least significant byte last. Within a byte, the order of transmission shall be the most significant bit first and the least significant bit last.	3C	O-1		N/A	N/T
R- 3	6.2	The scan sequence shall be raster scan order.	3C	O-1		N/A	N/T
R- 4	7.1	The spatial sampling rate of the captured image shall be represented in terms of pixels per centimetre.	3C	O-1		N/A	N/T
R- 5	7.2	The image shall have a dynamic range spanning at least 128 gray scale levels, allocating at least one byte (8 bits) per intensity value and providing at least 7 bits of useful intensity information.	1	M		N/A	
R- 6	7.5	The captured image shall be an orthographic projection of the body area being imaged.	3C	O-1		N/A	N/T

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 7	7.6.2	If lossless compression is used the image data shall be compressed in accordance with the JPEG-LS lossless compression algorithm specified in ISO/IEC 14495 or the JPEG2000 compression algorithm specified in ISO/IEC 15444.	3C	O-1		N/A	N/T
R- 8	7.6.3	If lossy compression is used the image shall be compressed in accordance with the JPEG compression algorithm specified in ISO/IEC 10918 or the JPEG2000 compression algorithm specified in ISO/IEC 15444.	3C	O-1		N/A	N/T
R- 9	7.6.4	Images captured with more than three sensing channels shall be stored in accordance with the JPEG2000 compression algorithm as specified in ISO/IEC 15444.	3C	O-1		N/A	N/T
R- 10	7.7	The location of human body used for imaging shall be specified in the format.	1	M		N/A	
R- 11	7.7	The direction (left/right) of hand and/or finger index (thumb, index, middle, ring, and little) shall be specified.	1	M		N/A	
R- 12	8.2.1	The format identifier shall be recorded in four bytes. The format identifier shall consist of three characters "VIR" followed by a zero byte as a NULL string terminator.	1	M		N/A	
R- 13	8.2.2	The number for the version of that part of ISO/IEC 19794 used for constructing 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. Upon approval of a specification, the initial version number will be “020” – Version 2 revision 0.	1	M		N/A	
R- 14	8.2.3	The length (in bytes) of the entire BDIR shall be recorded in four bytes.	1	M			
R- 15	8.2.3	This count shall be the total length of the BDIR including the general record header and one or more representation records.	2	M			
R- 16	8.2.4	The total number of representation records contained in the BDIR shall be recorded in two bytes. A minimum of one representation is required.	2	M			
R- 17	8.2.5	As this part of ISO/IEC 19794 does not support certifications this field shall be 00_{Hex}.	1	M			

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 18	8.3.2	The representation-length field denotes the length in bytes of the representation including the representation header fields.	1	M			
R- 19	8.3.2	The representation-length four-byte field shall contain the length in bytes of the vascular image.	2	M			
R- 20	8.3.3	The date and time field within a representation header shall be stated in Coordinated Universal Time (UTC). The capture date and time field shall consist of 9 bytes. Its value shall be encoded in the form given in ISO/IEC 19794-1.	1	M			
R- 21	8.3.4	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 captured biometric sample. A value of 00Hex indicates unknown or unspecified technology. See Table 4 for the list of possible values.	1	M			
R- 22	8.3.5	The capture device vendor identifier shall identify the biometric organization that owns the product that created the BDIR. The capture device algorithm vendor identifier shall be encoded in two bytes carrying a CBEFF biometric organization identifier (registered by IBIA or other approved registration authority). A value of all zeros shall indicate that the capture device vendor is unreported.	1	O			
R- 23	8.3.6	The capture device type identifier shall identify the product type that created the BDIR. It shall be assigned by the registered product owner or other approved registration authority. A value of all zeros shall indicate that the capture device type is unreported.	1	O			
R- 24	8.3.6	If the capture device vendor identifier is 0000Hex, then also the capture device type identifier shall be 0000Hex.	2	O			
R- 25	8.3.7.1	'Number of quality block' field is followed by the number of 5-byte Quality Blocks reflected by its value.	1	O			
R- 26	8.3.7.1	A value of zero (0) means that no attempt was made to assign a quality score. In this case, no Quality Blocks are present.	2	O			
R- 27	8.3.7.2	Quality score, as defined in ISO/IEC 29794-1, shall be a quantitative expression of the predicted verification performance of the biometric sample.	3C	O-1		N/A	N/T

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 28	8.3.7.2	An entry of 255 shall indicate a failed attempt to calculate a quality score. This value of Quality Score is harmonized with ISO/IEC 19784-1, where 255 is -1.	1	O			
R- 29	8.3.7.3	Quality Algorithm Vendor ID shall be registered with IBIA or other approved registration authority as a CBEFF biometric organization.	3C	O-1		N/A	N/T
R- 30	8.3.7.3	A value of all zeros shall indicate that the value for 'Quality algorithm vendor ID' field is unreported.	1	O			
R- 31	8.3.7.4	Quality Algorithm ID may be optionally registered with IBIA or other approved registration authority as a CBEFF Product Code. Refer to CBEFF product registry procedures in ISO/IEC 19785-2. A value of all zeros shall indicate that the value for 'Quality algorithm ID' field is unreported.	1	O			
R- 32	8.3.9	These two fields specify the horizontal and vertical image size in pixels, in two bytes for each field.	1	M			
R- 33	8.3.10	'Bit-depth' field represents the number of bits per pixel in a gray scale image or the number of bits per color component per pixel in an RGB image.	1	M			
R- 34	8.3.11	'Image position and property bit field' is a mandatory field specifying the position, direction, and properties of the object. The first two bits specify the direction of organ (toward the left or the right).	1	M		N/A	
R- 35	8.3.12	The unit is degree normalized to 16-bit signed integer as (unsigned short) round (65536*(angle%360) /360).	1	O			
R- 36	8.3.13	Two-byte field of "Image format specifies whether the image is monochrome or color and how the image has been compressed if applicable.	1	M			
R- 37	8.3.14	The type of illumination shall be categorized based on the wavelength of illumination source; that is, the wavelength of visible illumination is in the range of 400 nm through 750 nm, the wavelength of NIR is in the range of 750 nm through 5,000 nm, and the wavelength of MIR is in the range of 5,000 nm through 25,000 nm.	1	O		N/A	

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 38	8.3.15	If the background has been processed and set to monotone, then 'Image background' field shall have the value IMAGE_BACKGROUND_MONO (01_{Hex}); otherwise this field shall have the value IMAGE_BACKGROUND_UNDEF (00_{Hex}).	1	M		N/A	
R- 39	8.3.16	'Horizontal scan resolution' field specifies the scan resolution in the horizontal direction in ppcm. If the horizontal scan resolution is not specified, this field shall contain the value H_SCAN_RES_UNDEF= 0 (0000_{Hex}).	1	M		N/A	
R- 40	8.3.17	'Vertical scan resolution' field specifies the scan resolution in the vertical direction in ppcm. If the vertical scan resolution is not specified, this field shall contain the value V_SCAN_RES_UNDEF= 0 (0000_{Hex}).	1	M		N/A	
R- 41	8.3.18	The first byte of pixel aspect ratio field specifies y distance and the second byte x distance. For example, 0304_{Hex} means an aspect ratio of 3:4. If this field is undefined (0000_{Hex}), the default aspect ratio is assumed which is 1:1.	1	M		N/A	
R- 42	8.4.1	The size of 'Extended data' section shall be kept as small as possible, augmenting the image data stored in the standard image data section. More than one extended data area may be present for each vascular representation.	3C	O-1		N/A	N/T
R- 43	8.4.1	The extended data for each vascular representation shall immediately follow the standard image data for that vascular representation and shall begin with the Extended Data Block Length field.	1	M			
R- 44	8.4.2.1	All vascular records shall contain the extended data block length. 'Extended Data Block Length' field will signify the existence of extended data. A value of all zeros (0000_{Hex}) will indicate that there is no extended data and that the file will end or continue with the next vascular representation. A nonzero value will indicate the length of all extended data starting with the next byte.	2	M			

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
R- 45	8.4.2.2	'Type Identification Code' field shall have a length of two bytes. It shall identify the format of the extended data area when this area is present. A value of zero in both bytes is a reserved value and shall not be used. A value of zero in the first byte, followed by a non-zero value in the second byte, shall indicate that the extended data section has a format defined in this part of ISO/IEC 19794; currently, only segmentation, annotation, and comment formats are specified (refer to clauses 8.4.3, 8.4.4, and 8.4.5). A non-zero value in the first byte shall indicate a vendor-specified format with a code maintained by the vendor.	1	O			
R- 46	8.4.2.3	The length of the extended data section shall be recorded in four bytes. This value is used to skip to the next extended data type identification field if the matcher cannot decode or use this data. If the Extended Data Block Length for the finger representation is zero, indicating no extended data, this field shall not be present.	1	O			
R- 47	8.4.3	If the extended data type identification code is 0001_{Hex}, the extended data section contains segmentation.	2	O			
R- 48	8.4.3.1	1-byte field of 'Number of segments' shall contain the number of vascular segments that follow.	2	O			
R- 49	8.4.3.2	Each vascular segment shall be defined by the number of points used to define the segment and the coordinates of each point.	3C	O-1		N/A	N/T
R- 50	8.4.3.2.1	'Number of coordinate pairs' field shall specify the number of points or vertexes used to enclose the segmented image. For a vascular segment defined by rectangle, this byte shall contain a value of "2" representing the upper left and lower right corners of the rectangle. For a vascular segment enclosed by an n-sided polygon, this byte shall contain "n" where "n" is between 3 and 99.	2	O			
R- 51	8.4.3.2.1	The order of the vertices shall be in their consecutive order around the perimeter of the polygon, either clockwise or counterclockwise. No two vertices may occupy the same location. The polygon side defined by the last subfield and the first subfield shall complete the polygon. The polygon shall be a simple, plane figure with no sides crossing and no	3C	O-1		N/A	N/T

Requirement ID	Reference in Base Standard	Requirement Summary	Level	Status	IUT Support	Supported Range	Test Result
		interior holes. Each vertex of the rectangle or polygon shall be represented by a pair of coordinates.					
R- 52	8.4.3.2.2	Two bytes shall be used to contain the horizontal pixel offset to the right relative to the origin positioned in the upper left corner of the image.	1	O			
R- 53	8.4.3.2.3	Two bytes shall be used to contain the vertical pixel offset down relative to the origin positioned in the upper left corner of the image.	1	O			
R- 54	8.4.4	If the extended data type identification code is 0002_{Hex}, the extended data section contains annotation information.	1	O			
R- 55	8.4.4.1	One-byte field of 'Number of annotations' shall contain the number of annotations that follow. Each annotation will consist of two information items.	1	O			
R- 56	8.4.4.2	'Annotation code' byte shall contain the code 01_{Hex} for an amputated hand and code 02_{Hex} for a bandaged or otherwise unable to capture vascular.	1	O			
R- 57	8.4.5	If the extended data type identification code is 0003_{Hex}, the extended data section contains ASCII text information associated with the captured image or subject supplying the image. The comment is inputted by the individual generating the vascular record. A null terminator for the ASCII string is not necessary, as the length is provided.	1	O			

Status Notes:

1. Level 3C difficulty

   The requirement is mandatory in the base standard but has been declared optional for purposes of a declaration of conformance because it is too difficult to test. No method has been defined to test the conformance of the IUT or BDIR for this mandatory requirement of the base standard.

A.3 Table of Conformance Test Assertions

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

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

Table A.2 —Conformance Test Assertions

Test Number	Section	Requirement ID	Level	Field Name	Operator	Operand	Test Note	Status	IUT Support	Supported Range	Test Result
1	General Header	R- 12	1	Format Identifier	EQ	56495200 $_{Hex}$		M		N/A	
1.1	General Header	R- 1	1	Format Identifier	NEQ	00524956 $_{Hex}$	1	M		N/A	
2	General Header	R- 13	1	Format Version	EQ	30323000 $_{Hex}$		M		N/A	
2.1	General Header	R- 1	1	Format Version	NEQ	00303230 $_{Hex}$	1	M		N/A	
3	General Header	R- 14	1	Length of record	EQ	15 to 4294967295		M			
3.1	General Header	R- 15	2	Length of record	EQ	Total number of bytes in the record	2	M		N/A	
3.2	General Header	R- 15	2	Length of record	EQ	Total Bytes Expected	2	M		N/A	
5	General Header	R- 16	1	Number of vascular representation	EQ	0 to 65535		M			
5.1	General Header	R- 16	2	Number of vascular representation	C	Total number of the representation		M		N/A	
6	General Header	R- 17	1	Certification flag	EQ	0		M			
7	Representation header	R- 18	1	Image length of record	EQ	40 to 4294967295		M			
7.1	Representation header	R- 19	2	Image length of record	EQ	40+Image Bytes Read	3	M		N/A	
8.1	Representation header	R- 20	1	Calendar year of the capture date and time (Byte 1 to 2)	EQ	0001 $_{Hex}$ to FFFF $_{Hex}$		M			
8.2	Representation header	R- 20	1	Month of the capture date and time (Byte 3)	EQ	1 to 12 or FF $_{Hex}$		M			
8.3	Representation header	R- 20	1	Day of the capture date and time (Byte 4)	EQ	1 to 31 or FF $_{Hex}$		M			
8.4	Representation header	R- 20	1	Hour of the capture date and time (Byte 5)	EQ	0 to 23 or FF $_{Hex}$		M			
8.5	Representation header	R- 20	1	Minutes of the capture date and time (Byte 6)	EQ	0 to 59 or FF $_{Hex}$		M			