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Information technology — Biometric data interchange formats —

Part 1: **Framework**

AMENDMENT 1: Conformance testing methodology

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

Partie 1: Cadre

AMENDEMENT 1: Méthodologie d'essai de conformité

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

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Information technology — Biometric data interchange formats —

Part 1: Framework

AMENDMENT 1: Conformance testing methodology

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Page vi, Introduction

Add the following paragraphs after Figure 1:

Users of biometric systems desire to use this and other standards to ensure that components of the biometric system can be substituted with other components from different vendors with a minimum of effort, and also to ensure that biometric data produced by one system can be used by another system. In order to achieve this, it is critical that systems claimed to conform to a standard actually are conformant, and thus there is a need for a standardized conformance testing methodology for each of the biometric data interchange formats described in ISO/IEC 19794, in order to provide a reasonable degree of assurance that a conformance claim has validity. While conformance of individual elements of data interchange records to relevant requirements can be determined, no test can be absolutely comprehensive and prove that a given system generating or using biometric data interchange records is conformant under all possible circumstances, especially when there are optional components of the standard. A well designed conformance test can, however, test all of the most likely sources of problems and ensure that the implementation under test conforms under a reasonable set of circumstances, giving assurance, but not a guarantee, of conformance.

There are many different types of conformance testing that may be appropriate for the various parts of ISO/IEC 19794. Some of these tests are highly specific to each data interchange format but some of them have many common elements across all of the formats. This part of ISO/IEC 19794 also describes the different types of conformance testing, and provides details of the common elements for defining test assertions. It also provides guidelines for conducting the tests and reporting the results of the tests. Tests and assertions common for most or all biometric data interchange formats (e.g., for common elements of the general headers and the common elements of the representation headers) are specified in this part of ISO/IEC 19794; the specific tests and assertions for each biometric data interchange format are left to the subsequent parts of ISO/IEC 19794.

Annex A of this part of ISO/IEC 19794 is distinct from the ISO/IEC 29109-1 which addressed conformance testing only of the first edition of ISO/IEC 19794. The normative Annex A of this part of ISO/IEC 19794 addresses conformance testing of data formats specified in the second edition of ISO/IEC 19794.

Page 1, Scope

Add the following text at the end of the Scope:

This part of ISO/IEC 19794 also specifies the concepts, test types and conformance testing methodologies to test biometric data interchange records or computer algorithms that create biometric data interchange records. It defines two types (type A, i.e., biometric data interchange records and systems generating such records; and type B, i.e., systems using biometric data interchange records), and three levels (Level1, i.e., checking internal content of each field; Level 2, i.e., checking internal consistency of the entire record; and Level 3, i.e., checking whether the data record is a faithful

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representation of the original biometric data) of conformance testing, but it only provides a detailed description and methodology for the three levels of Type A testing. This part of ISO/IEC 19794 specifies test requirements, assertions, and test execution and reporting procedures that are common for most or all biometric data interchange formats. It explicitly does not cover the following areas:

- Modality-specific detailed test elements and assertions or descriptions of any mandatory standard datasets required for testing. They are provided in the subsequent parts of ISO/IEC 19794.
- Testing whether implementations under test (IUTs) that claim to be able to use conformant biometric data interchange records are able to correctly process such biometric data interchange records (Type B testing).
- Conformance testing of CBEFF requirements
- Testing of other characteristics of biometric products or other types of testing of biometric products (i.e., acceptance, performance, robustness, security).

Page 1

Add the following clause after the Scope and renumber all subsequent clauses accordingly:

2 Conformance

Biometric data interchange format conformance tests that claim conformance to this part of ISO/IEC 19794 shall satisfy the normative requirements of the methodology for those levels of test they are claiming to perform, as described in Clauses A.1, A.2 and A.3. Any conformance tests shall use the assertion types defined in Clause A.2 with the specific assertion details given in this and the relevant subsequent parts of this standard.

Implementations of subsequent parts of ISO/IEC 19794 tested according to the methodology specified in this part of ISO/IEC 19794 shall be able to claim conformance only to those requirements specified in ISO/IEC 19794 that are tested by the test methods established by this methodology.

Pages 1 to 8, Terms and definitions

Add the following terms and definitions alphabetically , renumbering accordingly:

4.x
assertion
specification for testing a conformance requirement in an implementation under test expressed in a formal assertion definition language

4.x
assertion test
specification of software or procedural methods that generate the test outcomes used for assessment of conformance to an assertion

NOTE This is adapted from the definition of “assertion test” in ISO/IEC 13210:1999.

4.x
attestation
issue of a statement, based on a decision that fulfillment of specified requirements has been demonstrated

NOTE This is adapted from the definition of “attestation” in ISO/IEC 17000:2004.

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4.x
certification
third-party attestation related to products

[ISO/IEC 17000:2004]

4.x
conformance
conformity
fulfillment by a product, process, or service of all relevant specified conformance requirements

NOTE For all practical purposes, data records are considered to be a type of a “product”, i.e., provisions of this standard that are applicable to “products” apply to data records.

4.x
conformance requirement
requirement stated in a data format specification and defined in a finite, measurable, and unambiguous manner

NOTE This is adapted from the definition of “conformance requirement” in ISO/IEC 13210:1999.

4.x
conformance test
specified technical procedure of conformance testing

4.x
conformance testing
testing
determination of one or more characteristics of an object of conformity assessment, according to a procedure

[ISO/IEC 17000:2004]

4.x
conformance testing laboratory
organization that carries out conformance testing.

EXAMPLE This may be the creator of the IUT, the user of the IUT, or an unbiased third party.

4.x
conformance test specification
test specification
provisions of ISO/IEC 19794 biometric data interchange format standard that is concerned with test methods, sometimes supplemented with other provisions related to testing, such as sampling, use of statistical methods, and sequence of tests

NOTE This is adapted from the definition of “testing standard” in ISO/IEC GUIDE 2:2004.

4.x
conformance testing suite
CTS
test software used to automate certain types of conformance testing

4.x
conformity assessment
demonstration that specified requirements relating to a product, process, system, person or body are fulfilled

[ISO/IEC 17000:2004]

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4.x
data format specification
provisions of ISO/IEC 19794 biometric data interchange format standard containing the specification that is the subject of the conformance testing

4.x
declaration
declaration of conformity
first-party attestation

[ISO/IEC 17000:2004]

4.x
Implementation conformance statement
ICS
statement by the supplier of an implementation under test that indicates which mandatory and optional components of the data format specification are supported by the implementation

4.x
implementation under test
IUT
that which implements the data format specification being tested

NOTE Depending on the conformance requirements of the data format specification, this may simply be a set of biometric data interchange records or it may be a computer algorithm in the form that creates the BDIR and/or uses the data contained in the BDIR.

4.x
input biometric data record
IBDR
data package containing a less processed form of biometric data which is suitable for use in the creation of a BDIR

NOTE In some cases, this may be an image, but it may also be raw sensor output such as a time series of data points from a digitization tablet.

4.x
level 1 testing
conformance testing methodology that checks field by field and byte by byte conformance with the specification of the BDIR as specified in the data format specification, both in terms of fields included and the ranges of the values in those fields

NOTE This type of testing tests syntactic requirements of the data format specification.

4.x
level 2 testing
conformance testing methodology that tests the internal consistency of the BDIR under test, relating values from one part or field of the BDIR to values from other parts or fields of the BDIR

NOTE This type of testing tests syntactic requirements of the data format specification.

4.x
level 3 testing
conformance testing methodology that tests that a BDIR produced by an IUT is a faithful representation of the IBDR subject to the constraints of the parameters in the metadata records

NOTE This type of testing tests semantic requirements of the data format specification.

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4.x
metadata record
data record containing any specific parameters related to the data itself, particularly required by an IUT to transform an IBDR into a BDIR

EXAMPLE Type of image (basic, full frontal, token frontal or other) and the level of compression for a face image BDIR; the presence of core, delta, or ridgecounts in the extended area for finger minutiae BDIR; the size of each pattern in a finger pattern BDIR.

4.x
procedure
specified way to carry out an activity or a process

[ISO 9000:2005]

4.x
requirement
provision that conveys criteria to be fulfilled

[ISO/IEC GUIDE 2:2004]

4.x
test method
specified technical procedure for performing a test

NOTE This is adapted from the definition of "test method" in ISO/IEC GUIDE 2:1996. More recent edition of ISO/IEC GUIDE 2 or ISO/IEC 17000:2004 no longer contain this definition

4.x
test report
document that presents test results and other information relevant to the execution of the test methods against an Implementation Under Test

NOTE This is adapted from the definition of "test report" in ISO/IEC 13210:1999 and ISO/IEC GUIDE 2:1996.

4.x
Type A conformance claim
conformance claim that an IUT is a conformant BDIR, or can create conformant BDIRs from appropriate IBDRs

4.x
Type B conformance claim
conformance claim that an IUT can read conformant BDIRs, interpret them correctly, and perform its desired function upon them

Page 8, Abbrevaited terms

Add the following abbreviated terms alphabetically:

CTS Conformance Testing Suite

ICS Implementation Conformance Statement

IUT Implementation Under Test

IBDR Input Biometric Data Record

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Page 14, 8.1 (now renumbered as 9.1)

In the last sentence, change "Annex A" to "Annex B".

Page 25, Annex A

Rename Annex A as Annex B.

Page 24

After Table 7, insert the following annex:

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Annex A
(normative)
Conformance testing methodology

A.1 Conformance testing framework

A.1.1 Limitations

While conformance of individual elements of each data interchange record to relevant requirements can be determined, no conformance test of a given system generating or using biometric data interchange records can be complete or perfect. Ultimately, it is only possible to prove that an IUT is non-conformant. The goal of conformance testing is therefore to capture enough of the requirements of the data format specification and test them under enough conditions, that any IUT that passes the conformance test is likely to be conformant. Two problems with a data format specification that may only become apparent during conformance testing are that some areas may be undefined (so that the specification of these areas is left to each vendor) or ill-defined (so that there is a contradiction between parts of the data format specification or an easy misinterpretation caused by the wording of the data format specification). The latter problem may be resolved by an amendment to the standard, but the former problem may be difficult to resolve. An obvious example is the use of proprietary extended data blocks within a BDIR. There may be good reasons to allow such proprietary data, but very little conformance testing is possible while the data remains proprietary. Also, if the data format specification includes a requirement to interpret the BDIR or use it for biometric comparison, then it is difficult to be sure of the effect of a proprietary data block produced by one IUT when another IUT is attempting to interpret it.

A.1.2 Managing data records

Note that since CBEFF conformance testing is out of scope for this standard, it is generally assumed that the BDIRs will have been removed from any CBEFF data structures prior to beginning the conformance test. Typically, for Type A testing as described in Clause A.1.3, either the IUT will provide BDIRs without a CBEFF encapsulator or the CTS will remove them from such an encapsulator if one exists. Regardless of the method used, the test shall provide a means of passing the CBEFF format type corresponding to the IBDRs in the IUT or produced by the IUT to the CTS. This may be as simple as the supplier of the IUT sending a written instruction to the testing laboratory that all BDIRs produced by this IUT would have a particular format type, or it may involve the IUT passing a special parameter or using a specific CBEFF patron format that is not part of its normal function outside the test. The reason this is required is that several parts of ISO/IEC 19794 have different format types that determine whether or not certain optional data is present. Thus format type is an extra field that shall always be present together with a BDIR when conformance testing using that BDIR occurs.

A.1.3 Conformance testing types

Generally, the goal of biometric data interchange format conformance testing is to assure the users of conformant biometric products that a BDIR produced by any conformant product can be interpreted and used correctly by any other conformant product. There are thus two types of fundamental conformance claims. Type A is the ability to produce conformant BDIRs and Type B is the ability to use conformant BDIRs. Different IUTs may have different purposes for which they use a conformant BDIR, and thus Type B testing is more complex than Type A testing because it has to account for all of these purposes. ISO/IEC 19794 is focused on Type A testing exclusively. When biometric data interchange records themselves are tested in the absence of any software or hardware that produced them or uses them, this is treated as Type A testing.

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A.1.4 Conformance testing levels

A.1.4.1 Hierarchy of Conformance Tests

A first step towards the goal of demonstrating conformance is ensuring that all of the specified fields and data structures in the BDIR are correct and self-consistent. This does not validate the fidelity of the information contained in the BDIR, however, since that depends on the relationship between the original IBDR and the BDIR. This leads to a natural hierarchy of conformance testing levels.

The conformance testing hierarchy presented in this standard has three levels. Generally they progress from least complex and expensive to test to most complex and expensive to test. They also progress from less useful in predicting the performance of real world systems using conformant products, to more useful, although even Level 1 conformance testing represents a significant step towards that goal. The types of assertions for Level 1 and Level 2 testing for all parts of ISO/IEC 19794 are similar and so a list of assertion operators and operands that should be used to define assertions is given in Clause A.2 of this part of ISO/IEC 19794. The details of all the Level 1 and Level 2 assertions for each data format specification are given in the appropriate subsequent parts of ISO/IEC 19794. For the more complex Level 3 testing, where the actual fidelity of the information in the BDIR is compared to that in the IBDR, the subsequent parts of ISO/IEC 19794 provide, as far as it is possible, guidance on how to carry out Level 3 testing for their specific data interchange formats. A given conformance test may therefore involve conformance testing at different levels.

It will ultimately be up to application profiles or to individual users of ISO/IEC 19794 to determine which level of conformance testing will be required for a specific application, as well as any requirements on performance or interoperability. This will be dependent on time, cost, and importance of biometric performance, implications of non-interoperability and the current state of the published versions of the various parts of ISO/IEC 19794.

A.1.4.2 Level 1 – Data format conformance

In Level 1 testing, a set of BDIRs shall be checked for field-by-field and byte-by-byte conformance with the specification of the data format specification, both in terms of fields included and the ranges of the values in those fields. The specific assertions tested for each data format specification shall be those described in the appropriate part of ISO/IEC 19794.

The advantage of this testing is that it does not require an IUT to be a computer algorithm or a set of hardware and software. It can simply be a set of BDIRs. Thus, any hardware or software components of the implementation being tested do not have to come into the possession of the testing lab, only BDIRs created with those components.

An IUT may have the capability to produce multiple BDIRs, depending on the requirements of the application in which it is used. Some of these BDIRs may be conformant and others may not, and so it is important to specify which types were tested and how many of each type. In an ideal world every possible combination of parameters for a particular biometric data interchange format would be tested, but this is not realistic given the resources that would be required for such testing. Provided a test reports the presence or absence of optional fields and the values for variable structural fields it is possible for a user of the data format specification to determine if the particular variant of the standard tested is appropriate for their needs. The user may also require conformance test results for a specific type of BDIR. An obvious example would be a two finger BDIR or two iris BDIR, since many applications require enrollment of more than one biometric characteristic in order to allow for a back-up if one of them becomes damaged or temporarily unusable. Some IUTs might be conformant with a single-representation BDIR, or even with multiple representations of a single finger or iris, but might fail conformance testing when the BDIR contains more than one finger or iris.

A.1.4.3 Level 2 – Internal consistency checking

In Level 2 testing, a set of BDIRs shall be checked to determine if they are internally consistent. The specific assertions tested for each data format specification shall be those described in the appropriate part of ISO/IEC 19794.

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The nature of Level 2 testing is that it relates values from one part of the BDIR to values from other parts of the BDIR. This may be due to explicit requirements in the data format specification, such as a requirement that the record length actually does indicate the number of bytes in the BDIR. It may also be implicit in the standard, such as determining that the coordinates of a particular feature (such as eye positions in a face image record or minutiae positions in a finger minutiae record) actually fall within the specified size of the image.

In some cases, test assertions for Level 2 and higher conformance testing will have to make specific assumptions about interpreting the data format specification requirements. In those cases, testing methodology as set forth in ISO/IEC 19794 shall be considered normative in its interpretation of the data format specification requirements, and any other interpretations shall be considered non-conformant to the data format specification.

Once again the advantage of this testing is that it does not require an IUT to be a computer algorithm or a set of hardware and software. It can simply be a set of BDIRs. Then the hardware or software of the IUT does not have to be part of the test, only BDIRs created with that implementation. The disadvantage is that there are a limited number of BDIRs and it is quite possible that some of the internal consistency checks will never be tested because they are not relevant for the set of BDIRs in the IUT. The solution is to test a larger number of BDIRs that represent multiple different structural variants of the biometric data interchange format under test. This is why it is so vital to report on the structure of each BDIR variant in the conformance test.

Since Level 1 and Level 2 conformance testing are both required in order to properly test that the structure of a BDIR is conformant to a data format specification, and since the execution of Level 1 and Level 2 tests will frequently be intermingled, a conformance test should always include all relevant Level 1 and Level 2 test assertions.

A.1.4.4 Level 3 – Content checking

Level 3 conformance testing is defined as a conformance testing methodology that tests that a BDIR produced by an IUT is a faithful representation of the IBDR subject to the constraints of the parameters in the metadata records. Effectively this is intended to test that the BDIRs produced by an IUT are faithful representations of the original biometric data and that they satisfy those requirements of the data format specification that are not simply a matter of syntax and format. In some cases the requirements of the data format specification may specify biometric data capture conditions. An example would be the use of a fingerprint sensor of a particular resolution or having a particular certification by an external body to capture fingerprints and generate fingerprint image records that are noted in the BDIR as having a particular image acquisition level. The only way to test that such a requirement has been correctly implemented by the IUT is to require that in Level 3 testing, an IUT shall be a combination of computer hardware and/or software that is used in the testing laboratory. If the IUT is software only, then a set of IBDRs and corresponding metadata records shall be provided and the IUT shall produce a set of corresponding BDIRs. This, however, only tests the ability of the IUT to parse the metadata records and the IBDRs and insert the appropriate information in correctly formatted BDIRs. For some requirements it is essential that the entire process from data capture to BDIR production be included in the test, and in those cases the IUT will have to be a complete set of hardware and software. Finally, there are some requirements that cannot be quantitatively tested without significant special effort or extra equipment and for which the conformance test specification may simply define that no Level 3 test is possible. An example would be the pose angles listed in a face image data record. Without an external three dimensional reference frame for the head containing the face that is represented in the data record, there is no absolute mechanism to verify that these pose angles are correct.

This leads to the following methodology for handling Level 3 conformance tests. As indicated in Clause A.3, all of the requirements of the data format specification shall be listed in a conformance requirements table that is in the same form as an implementation conformance statement. This will help the supplier of the IUT to clearly identify which requirements of the data format specification are supported by the implementation. Certain columns in this table indicate whether each requirement is a Level 1, Level 2 or Level 3 requirement and for each Level 3 requirement, indicate whether it can be tested using a software only solution with a database of IBDRs and metadata records, whether it requires a complete hardware and software IUT, or whether it can't be tested at all without special effort. Where they are available, the specific test methodologies to be used for Level 3 testing involving IUTs composed of both hardware and software are found within specific clauses, as referenced in the table, in each of the subsequent parts of ISO/IEC 19794. A general methodology to test

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some Level 3 requirements using a software only solution and a database of IBDRs and metadata records is described in this clause, but even it will require specific clauses in the subsequent parts of ISO/IEC 19794 on how to use this methodology for specific requirements.

The basic structure of a software only Level 3 conformance test is that a set of IBDRs and corresponding metadata records shall be provided and the IUT shall produce a set of corresponding BDIRs. The information in the BDIRs shall then be compared to the information in the IBDRs to determine if the IUT has faithfully reproduced that information subject to the constraints of the parameters in the metadata records. Note that this form of testing is not possible for any IUT in which a correlation between a set of IBDRs and BDIRs cannot be established. A set of BDIRs, for instance, provided without any knowledge of the corresponding IBDRs, can be tested for Level 1 and Level 2 conformance but not for Level 3 conformance.

There is potentially significant difficulty in assigning the correspondence between IBDRs with metadata records as input and BDIRs as output. The features that shall be contained in the BDIR need to be identified either by a reference BDIR generation algorithm already known to be conformant acting upon the IBDRs and metadata records or by a human investigator reviewing them in detail. Such features could include, for instance, ground truth minutiae data such as position, angle and quality which have been generated by human inspection of the fingerprint images constituting the IBDRs for a specific Level 3 conformance test of ISO/IEC 19794-2 BDIRs. The permissible tolerances between the expected information in the BDIRs and the actual information in the BDIRs produced by the IUT need to be defined for each data element. The databases of IBDRs and metadata records need to be made general enough that they cover a wide range of possible biometric characteristics and variations of the biometric data interchange format. On the other hand, some IUTs may not support all the different types of possible parameter combinations. A minimum test is therefore required to declare Level 3 conformance, but additional test sets may be used to test the conformance of algorithms with enhanced capabilities. Thus, it is essential to include in the test report all of the structural variants of the BDIRs generated in the testing, in this case defined by the metadata records in the input data set. It is also essential to explain the principles by which the reference BDIRs were generated and what tolerances were permitted when data elements were different between the BDIRs produced by the IUT and the BDIRs in the reference data set. This makes a test report for Level 3 conformance testing a significantly more detailed document than is required for Level 1 and 2 conformance testing.

The exact nature of some minimum set of BDIRs (or of corresponding IBDRs and metadata records) that shall be used in testing Level 3 conformance in order to declare the IUT minimally conformant to the relevant data format specification is defined, where possible, in each of the subsequent parts of ISO/IEC 19794.

A.1.5 Sample data sets for Level 3 conformance testing

In order to support Level 3 conformance testing, it is necessary to define specific minimum data sets. Ideally, to ensure consistency among conformance tests key data sets should be common to all conformance tests. Although some data sets may be publicly available, there is also a benefit to having sequestered data sets that were not available to the supplier of the IUT prior to the start of the conformance test. This is because advance knowledge of the data sets (IBDRs, metadata records and either the reference BDIR generation algorithm, or the corresponding BDIRs) would allow the supplier of an IUT to preprogram their IUT so it produced the appropriate conformant BDIRs whenever it encountered one of the input data sets. This would invalidate the conformance test.

The details of Level 3 conformance testing using databases of IBDRs and metadata records, including which requirements of each data format specification can be addressed using this method, are described in the subsequent parts of ISO/IEC 19794. At the time of development of this part of ISO/IEC 19794, appropriate data sets did not exist, but initial steps had been taken to develop them. As conformance testing for biometric data interchange formats becomes more common, contributions from different test laboratories should eventually result in acceptable data sets that can be referenced in the subsequent parts of ISO/IEC 19794. This part of ISO/IEC 19794 simply defines a universal nomenclature for the data sets so that references to data sets in the subsequent parts of ISO/IEC 19794 and by testing laboratories following this test methodology can be harmonized. Eventually a minimum data set for each of the subsequent parts should be developed that permits conformance testing of all Level 3 requirements that can be tested by a software only IUT. A subset of this data should be kept sequestered and provided only to testing laboratories who are not themselves suppliers of IUTs. The remainder of the data set should be made public. At that point, all Level 3 conformance tests should utilize one or both of these two minimum data sets of IBDRs and metadata records. Other data

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sets may also be included, but the minimum requirements for Level 3 conformance testing should be based on either data set serial number 01 or 02. Data set 01 of both IBDRs and metadata records shall be kept sequestered so that no supplier of an IUT shall have access to it and data set 02 shall be made publicly available. Each IBDR or metadata record used in any data set for Level 3 conformance testing shall be assigned a unique identifier following the convention described below:

Ixxssyyyyzzzzzzzz or Mxxssyyyyzzzzzzzz

"I" indicates that this is an IBDR for conformance testing purposes.

"M" indicates that this is a metadata record for conformance testing purposes.

"xx" is a number indicating the part of this multipart standard with which the IBDR is to be used (e.g. 02 for finger minutiae, 05 for face image, etc.).

"ss" is the serial number of the IBDR set being used in the test. "01" is reserved for a universal sequestered data set that would be described, if it exists, in part "xx" of ISO/IEC 19794. "02" is reserved for a universal public data set that would be described, if it exists, in part "xx" of ISO/IEC 19794. Other numbers may be assigned as specific data sets are created for specific conformance tests.

"yyyy" is the four digit calendar year in which the IBDR data set "ss" was introduced. In the case of data set 01 and 02, these will need to be updated periodically as technology changes.

"zzzzzzzz" is an eight digit sequential number from 00000001 to 99999999 that uniquely identifies a specific IBDR or metadata record within a given set.

NOTE It will not be necessary to change IBDR sets whenever a data format specification is updated, since the biometric data interchange format does not affect the IBDR. It is simply produced from the IBDR. The metadata records may need to be changed, however, since ranges of parameters available in the data format specification may have changed.

A.2 Common assertion descriptors for Level 1 and 2 testing

A.2.1 General considerations

Regardless of the specific data format specification in question, many of the elements of Level 1 and Level 2 testing will be the same. All of the tests are essentially dealing with mathematical operations performed on individual field values or lengths extracted from a BDIR. The only difference is that Level 1 tests involve a direct comparison between a field value and something stated in the data format specification, whereas Level 2 tests involve interactions between multiple values from different parts of the standard and sometimes from implicit assumptions that are not expressly stated in the data format specification. Thus, Level 1 tests is performed by a simple byte-by-byte reading of the standard and comparison to known values or ranges of values, whereas Level 2 tests require more complex validation, usually after the entire BDIR has been parsed.

It should be noted that successful parsing of the data records may involve operations similar or identical to some of the Level 1 and 2 tests. For example, to successfully parse a data record containing multiple representations (e.g., finger minutiae), the parsing algorithm will need to read the field containing a value representing the number of representations, and then parse each set of fields for each representation. Implementers of the conformance test suites may choose to combine certain elements of the parsing process with some of the Level 1 and/or 2 tests. However, for the purposes of this standard, parsing of a data record and its testing are viewed as two distinct processes.

A.2.2 Assertions for big-endian encoding

All parts of ISO/IEC 19794 specify that multi-byte values are to be recorded using big-endian encoding. Since there is no specific test assertion to check for big endian encoding of an entire data record, each part of ISO/IEC 19794 shall select a few specific multi-byte fields from its corresponding data format specification that can only have a single value. One test assertion for each field shall test that it is equal to its correctly big-endian encoded value. Another test assertion for each field will test that it is not equal to the value it would

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have had if it had been incorrectly encoded using little-endian encoding. The tests for both of these assertions should pass for each field if the fields have been correctly big-endian encoded with the correct value. If a random incorrect value has been used, then the first test should fail but the second test should pass for each field where an incorrect value has been used. If the correct values have been used but with the incorrect little-endian encoding, however, then both tests should fail on all the fields for which this check is performed. This test shall be performed on at least two separate multi-byte fields in each BDIR in order to ensure that big-endian encoding has taken place. The specific fields to be used are noted in each subsequent part of ISO/IEC 19794 using the table and test notes described in Clauses A.3.1.5 and A.3.1.6.

A.2.3 Assertion element descriptions

A.2.3.1 Purpose of common assertion descriptions

In order to document and express as many test assertions as possible for each data format specification using the same assertion vocabulary, this clause provides a reference for the terms used. The assertions themselves are contained in the subsequent parts of this standard.

A.2.3.2 Field Names

Every field within a set of test assertions for a particular data format specification shall be uniquely named in order to identify it when referencing fields within Level 2 assertions. This is particularly important when multiple fields within different parts of the data format specification have the same name. The relationship between the field names specified in the test assertion and the field names specified in the data format specification is explicitly identified in the tables in the subsequent parts of ISO/IEC 19794.

A.2.3.3 Operators

A.2.3.3.1 Introduction to operators

The fundamental approach required to determine Level 1 or Level 2 conformance of a BDIR is to compare the value of each field with a value or range of values which are known to be either valid or invalid according to explicit or implicit requirements of the data format specification. These values may be determined in advance (e.g. Format Identifier), or calculated during the test from context dependent data within the BDIR (e.g. Length of Record). A list of specific operators is given below.

A.2.3.3.2 Equal (EQ)

Indicates the IUT shall pass the test if the field value matches a specified value or is within a specified range of values.

A.2.3.3.3 Not-Equal (NEQ)

Indicates the IUT shall pass the test if the field value does not match a specified value or is outside a specified range of values.

A.2.3.3.4 Greater Than or Equal (GTE)

Indicates the IUT shall pass the test if the field value is greater than or equal to the specified value.

A.2.3.3.5 Less Than or Equal (LTE)

Indicates the IUT shall pass the test if the field value is less than or equal to the specified value.

A.2.3.3.6 Greater Than (GT)

Indicates the IUT shall pass the test if the field value is greater than the specified value.

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A.2.3.3.7 Less Than (LT)

Indicates the IUT shall pass the test if the field value is less than the specified value.

A.2.3.3.8 Incremental (INC)

Indicates the IUT shall pass the test if the field value is in sequence and within the specified range relative to the last instance of this field within the current data set. This includes ensuring that the value of the first field instance is at the start of the specified range. (e.g. Representation Number)

A.2.3.3.9 Calculation (C)

Indicates the IUT shall pass the test if the field value meets a certain criteria that cannot be simply expressed by one of the other operations. (e.g. unit conversion from 1/100th mm to pixels) The algorithm required to perform the calculation is described in a note following the table.

A.2.3.3.10 Member Of (MO)

Indicates the IUT shall pass the test if the field value is a member of the specified set.

A.2.3.4 Operands

A.2.3.4.1 Introduction to operands

All absolute operand values are expressed in decimal (e.g. 73) or hexadecimal (e.g. 49_{Hex}) notation. A range of values is expressed by listing the lower bound, followed by "to", followed by the upper bound (e.g. 1 to 255). A set of values is expressed by enumerating its members enclosed in braces. Where a test requires more than one operand, values and ranges are separated by a comma. A very simple mathematical calculation, involving a number and a Field Name or a pair of Field Names may be expressed directly as an operand.

A.2.3.4.2 {Field Name}

When referring to a value stored within a particular field, the tables use the Field Name surrounded by braces (e.g. {Number of Representations}).

A.2.3.4.3 Read

Refers to the number of data subsets within the BDIR which contain the data associated with a particular group of related elements defined in the data format specification. The Read operand is always given in conjunction with a descriptive name that explains which data subsets it refers to from the data format specification. This value is recorded by the conformance testing software when reading the BDIR. The particular data subsets read are context dependent, but examples would include Finger Views Read and Minutiae Read.

A.2.3.4.4 Bytes Read

Refers to the number of bytes within a specific subset of the BDIR which contains the data associated with a particular group of related elements defined in the data format specification. The Bytes Read operand is always used in conjunction with a field which refers to the byte length of a subset of data from the data format specification. This value is recorded by the conformance testing software when reading the BDIR. The particular sets of Bytes Read are context dependent, but examples would include Extended Data Block Bytes Read and Extended Data Area Bytes Read.

A.2.3.4.5 Total Bytes Read

Refers to the total number of bytes within the BDIR, as recorded by the conformance testing software when reading the BDIR.

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A.2.3.4.6 Bytes Expected

Refers to the total number of bytes expected (calculated from the appropriate fields) within a specific subset of the BDIR which contains the data associated with a particular group of related elements defined in the data format specification. The Bytes Expected operand is always used in conjunction with a field which refers to the byte length of a subset of data from the data format specification. The particular sets of Bytes Expected are context dependent, but examples would include Extended Data Block Bytes Expected and Extended Data Area Bytes Expected. The calculation required for computing the Bytes Expected is typically be provided in a note following the assertion table in each subsequent part of ISO/IEC 19794.

A.2.3.4.7 Total Bytes Expected

Refers to the total number of bytes expected (calculated from the appropriate fields) within the BDIR.

A.2.3.5 Other assertion elements

A.2.3.5.1 Reference in the data format specification

Indicates the relevant clause of the biometric data interchange format specification pertaining to this test. In some cases, an implicit test may not have a corresponding reference.

A.3 Conformance testing and reporting methodology

A.3.1 Conformance requirements and implementation conformance statement

A.3.1.1 Necessity of clear description of requirements and capabilities

In order for the supplier of an IUT to have confidence that the IUT is conformant to a particular data format specification, a precise statement of the requirements of the data format specification is necessary. Although the data format specification itself specifies these requirements, the companion conformance test specification should provide a simple summary of the requirements as a checklist for the supplier of the IUT. In order for the testing laboratory to evaluate the conformance of an IUT, it needs to have a clear statement of which requirements of the standard are mandatory and which are optional, as well as a clear methodology for testing them. The testing laboratory also needs a statement from the supplier of the IUT that lists which mandatory and optional components of the data format specification are supported by the IUT. Such a statement is known as an implementation conformance statement or ICS. To simplify and harmonize the communication of the requirements of the data format specification and of the ICS among all of the parts of ISO/IEC 19794, a pair of tables has been developed that contain fixed information in a specific form about the requirements. The first details the general requirements of the standard and indicates what level of conformance testing is applicable to each requirement. The second gives specific test assertions to be tested for Level 1 and Level 2 testing, references corresponding requirements in the first table that these assertions test, as well as outlines the structure of all the fields that shall be present in a conformant BDIR. The tables also have space for the supplier of the IUT to provide information about the IUT and its support of the standard and for the testing laboratory to record the results of the test. Both of these tables and their accompanying notes, as described below, shall be included in each test report produced by a testing laboratory that follows the conformance testing methodology defined in this standard. The specific details of the fixed information in the two tables of requirements is defined in subsequent parts of ISO/IEC 19794, but the examples shown below contain excerpts of these tables associated with ISO/IEC 19794-2.

A.3.1.2 Claimed conformance and declared conformance

An IUT does not need to support all possible requirements of a data format specification in order to be declared conformant. It shall be declared conformant at a particular level of conformance testing by a testing laboratory if the following three conditions are met:

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1. The supplier of the IUT claims conformance to all mandatory requirements for one of the format types defined in the standard as specified in both the general requirements table and the BDIR structure table corresponding to that format type.

2. The IUT successfully passes all mandatory conformance tests at the level at which conformance is being declared (Level 1, Level 2 or Level 3) and at all lower levels.

3. The IUT successfully passes all optional conformance tests at the level at which conformance is being declared (Level 1, Level 2 or Level 3) and at all lower levels for those optional requirements of the data format specification to which the supplier of the IUT has claimed conformance.

Since an IUT consists of a set of one or more BDIRs or is used to produce a set of one or more BDIRs, conditions 2 and 3 shall be satisfied for every BDIR in the data set before a declaration that the IUT is conformant is made. In order to provide sufficient information about the IUT for the testing laboratory to properly conduct a conformance test and for an appropriate declaration of conformity to be made, the supplier of the IUT shall provide the information in Table A.1 and also complete the IUT Support and Supported Range columns in Tables A.2 and A.3. All three Tables and any IUT Support notes for Tables A.2 and A.3 shall be provided to the testing laboratory prior to or at the same time as the IUT is provided to the testing laboratory.

Table A.1 — Identification of the Supplier and the IUT

Supplier name and address	
Contact point for queries about the ICS	
Implementation name	
Implementation version	
Any other information necessary for full identification of the implementation	
Are any mandatory requirements of the standard not fully supported (Yes or No)	
Date of statement	

A.3.1.3 Requirements of the data format specification

The requirements of the data format specification should be summarized in a single table where the supplier of the IUT explains which optional components of the standard are supported, allowing the testing laboratory to note the results of the test.

Table A.2 below contains requirements on the common elements of the general headers and on the common elements of the representation headers of all record formats defined in ISO/IEC 19794 and provides unique requirement identifiers for conformance tests to reference, as shown in the companion Table A.3.

All of the subsequent parts of ISO/IEC 19794 contain a table similar to Table A.2 which lists the requirements of the corresponding part of ISO/IEC 19794.

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Table A.2 — Requirements of the Data Format Specification

Requirement ID	Reference in data format specification	Requirement summary	Level	Status	Applicable to		IUT support	Supported range	Test result
					Record format	Other formats			
R-1	12.2	The format ID shall be recorded in four bytes. The format ID shall consist of three characters "xxx" followed by a zero byte as a NULL string terminator.	1	M	Y	N			
R-2	12.2	The number for the version of this part of ISO/IEC 19794 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	12.2	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 representation records.	2	M	Y	N			
R-4	12.2	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	Y	N			
R-5	12.2	The one-byte certification flag shall indicate whether each Representation Header includes a certification record. A value of 00_{Hex} shall indicate that no representation contains a certification record. A value of 01_{Hex} shall indicate that all representations contain a certification record.	2	M	Y	N			
R-6	12.3.1	A Representation Header shall precede each representation providing information for that representation. There shall be one header for each representation contained in the BDIR.	1	M	Y	N			
R-7	12.3.1	The total number of bytes in the entire representation, including the Representation Header, shall be recorded in four bytes.	2	M	Y	N			
R-8	12.3.1	The Gregorian calendar year of the capture date and time field shall be encoded in the form given in ISO/IEC 19794-1.	1	M	Y	N			
R-9	12.3.1	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	12.3.1	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	12.3.1	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			

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Requirement ID	Reference in data format specification	Requirement summary	Level	Status	Applicable to		IUT support	Supported range	Test result
					Record format	Other formats			
R-12	12.3.1	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	12.3.1	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	12.3.1	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	12.3.1	The capture date and time field shall indicate when the capture of this representation started in Coordinated Universal Time (UTC).	3C	M	Y	N			
R-16	12.3.1	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 00_{Hex} indicates unknown or unspecified technology. See Table N for the list of possible values.	1	M	Y	N			
R-17	12.3.1	The capture device technology ID shall indicate the class of capture device technology used to acquire the captured biometric sample.	3C	M	Y	N			
R-18	12.3.1	The capture device vendor ID 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	12.3.1	The capture device vendor ID shall be registered by IBIA or other approved registration authority.	3C	M	Y	N			
R-20	12.3.1	The capture device type ID 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	12.3.1	The capture device type ID shall be assigned by the registered product owner or other approved registration authority.	3C	M	Y	N			
R-22	12.3.1	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	12.3.1	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			

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Requirement ID	Reference in data format specification	Requirement summary	Level	Status	Applicable to		IUT support	Supported range	Test result
					Record format	Other formats			
R-24	12.3.1	The quality algorithm vendor ID 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	12.3.1	The quality algorithm vendor ID shall be registered by IBIA or other approved registration authority.	3C	M	Y	N			
R-26	12.3.1	The quality algorithm ID 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	12.3.1	The quality algorithm ID shall be registered by IBIA or other approved registration authority.	3C	M	Y	N			
R-28	12.3.1	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	12.3.1	The certification authority ID 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	12.3.1	The certification authority ID shall be registered by IBIA or other approved registration authority.	3C	M	Y	N			
R-31	12.3.1	The certification scheme ID shall be encoded in one byte. A list of current certification scheme IDs is contained in Table M.	1	M	Y	N			

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Status Notes:

These are the notes explaining why support for a particular requirement or group of requirements are mandatory or optional. Usually these would only be included for optional requirements. If all the requirements in an optional group have to be used together, then there shall be a single note for the group.

IUT Support Notes:

To be filled in by supplier of IUT on the copy of this table provided to the testing laboratory and to be included in the copy of this table that forms part of the test report.

Test Result Notes:

To be filled in by the testing laboratory if necessary during the execution of the conformance test and to be included in the copy of this table that forms part of the test report.

A.3.1.4 Explanations of columns in requirements table

Those columns of Table A.2 to the left of the double line are fixed for a particular version of a particular part of ISO/IEC 19794. Those columns to the right of the double line are filled in separately for each test of an IUT either by the supplier of the IUT or by the testing laboratory. Explanations of the columns are given below.

- **Requirement Identifier** is a unique identifier for each requirement listed in the table that allows the requirements to be referenced by corresponding conformance tests (test assertions) thus establishing test/requirement traceability. The identifiers shall be in the form of R-n, where "n" is a requirement number as shown in Table A.2.

- **Reference in Data Format Specification** is the clause reference in the base data interchange format standard that specifies the requirement on the current row of the table. This is exactly as defined in Clause A.3.1.3.

- **Requirement Summary** is a simple text summary of the requirement. It may be a verbatim quote from the data format specification or a synopsis of a more complex requirement. It carries the essentials of the requirement but may not provide all the text necessary to understand it. That text is to be found in the referenced portion of the data format specification.

- **Level** indicates the level of conformance testing required to test for conformance to the requirement summarized on the current row of the table. Since many fields have syntactic requirements that can be tested with Level 1 or Level 2 conformance tests, but also semantic requirements that involve more complex Level 3 testing, it may be necessary to have multiple rows for those requirements ("decompose" the requirement), or replicate a requirement in multiple rows to reflect different levels of testing. Each row in the table addresses one requirement at either conformance testing Level 1 and/or 2, or conformance testing Level 3. The permitted values are indicated in the list below:

  1 – Indicates that the requirement can be tested using Level 1 conformance testing. The required assertions are defined in the Table of test assertions.

  2 – Indicates that the requirement can be tested using Level 2 conformance testing. The required assertions are defined in the Table of test assertions.

  3A – Indicates that the requirement can be tested using Level 3 conformance testing using a software only IUT and a database of IBDRs and metadata records. The details on how to apply such databases to this test are found in the clause or clauses of the conformance test specification containing this table.

  3B - Indicates that the requirement can be tested using Level 3 conformance testing using a hardware and software IUT that includes capture hardware or using special hardware provided by the testing laboratory. The details on the test procedure for using such hardware to test this requirement are found in the clause or clauses of the conformance test specification.

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3C – Indicates that conformance testing of this Level 3 conformance requirement is beyond the scope of the present version of the conformance test specification containing the table. In this case the **Test Result** column will be marked N/A for not applicable.

- **Status** indicates whether the requirement is mandatory (M) or optional (O). If a dash and then a number follows the letter indicating mandatory or optional (e.g. M-1 or O-3) then the number refers to a numbered note in the **Status Notes** section that immediately follows the table. If a series of optional requirements have all to be satisfied together or not at all (e.g. an extended data section consisting of multiple elements) then all the optional requirements should reference the same **Status Note**. In the case of Level 3C conformance requirements or for certain Level 3B conformance requirements that are difficult to test, these may have status listed as O-x, where x is the number of a **Status Note** that explains why this requirement which is mandatory in the data format specification is considered too difficult to test and should therefore be treated as optional for purposes of a declaration of conformity.

- **Sub-format / Format Type Applicability** is an optional set of columns applicable only to implementations of parts of ISO/IEC 19794 that allow for multiples format types or sub-formats. For these parts, the set of columns, one per format type, will indicate whether requirements are (Y) or are not (N) applicable for each format type. The supplier of the IUT shall provide a note indicating which applicable requirements are or are not supported (implemented) by the IUT for each format type the IUT claims conformance to.

- **IUT Support** is to be filled in by the supplier of the IUT. It should simply contain either a “Y” to indicate that a particular requirement is supported or an “N” to indicate that it is not. If any mandatory requirements for a particular conformance level are not supported then the IUT is not conformant to the data format specification at that level. If the supplier wishes to provide a note providing more information about the support of a particular requirement then they should add a dash followed by a number (e.g. Y-2) where the number corresponds to one of the **IUT Support Notes** following the table.

- **Supported Range** is to be filled in by the supplier of the IUT. It indicates what range of values is supported when a particular requirement allows only a subset of values to be supported. When there is only a single value possible or the requirement does not involve a field that has specific requirements, then this column is pre-filled in with N/A.

- **Test Result** is to be filled in by the testing laboratory once the test has been completed. The only possible results are “P” to indicate that the IUT passed all tests related to this requirement or “F” to indicate that it failed at least one test related to this requirement or “N/A” to indicate that the test was not applicable or “N/T” to indicate that the requirement was not tested. The test may not be applicable because it is beyond the scope of the conformance test specification (Level 3C), or it is related to an optional requirement that was not supported by the IUT. The requirement may not be tested because the testing laboratory was unable or unwilling to perform the test. For purposes of making a declaration of conformity based on the results of a conformance test, a result of “N/A” or “N/T” for a mandatory requirement or for an optional requirement for which the supplier of the IUT has claimed conformance is equivalent to a result of “F”. The only exception is if the test has a status of “O” with a note which explains that the requirement is mandatory in the data format specification but has been declared optional for purposes of a declaration of conformity because it is too difficult to test. In that case if the IUT claims conformance to the requirement, a result of “N/T” should be considered equivalent to a result of “P”. If the testing laboratory wishes to include short notes about particular test results then they may append a dash followed by a number (e.g. F-2, N/A-4, N/T-6) where the number refers to one of the **Test Result Notes** following the table.

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A.3.1.5 Level 1 and Level 2 conformance assertions

All of the Level 1 and Level 2 conformance requirements identified in the tables above will need specific test assertions and a testing methodology to allow them to be formally tested. The Level 3 assertions may have test methodologies and detailed test assertions provided in specific clauses of each conformance test specification, but since some Level 3 conformance requirements may not be tested with current technology, this is optional and will vary across the subsequent parts of ISO/IEC 19794. All parts of ISO/IEC 19794 shall address all Level 1 and Level 2 assertions and testable Level 3 assertions by providing a table per format type

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in the form shown below. The other purpose of the table is to show all of the mandatory and optional content of a conformant biometric data interchange record so that IUT suppliers and testing laboratories have a clear understanding of how a conformant BDIR should be encoded or decoded. Since some fields in the BDIR may not have explicit requirements about them in the data format specification, they may appear in this table without having a corresponding entry in the general requirements table above. Also, since some fields may be unconstrained in the values they contain, except for Level 3 testing of what those values represent, they may not have any associated Level 1 or Level 2 conformance tests. These fields are still included in this table so that a complete listing of required fields for a conformant BDIR is present. The fields shall be listed in the order that they are required to appear in a conformant BDIR. Table A.3 contains conformance test assertions for the common elements of the general headers and for the common elements of the representation headers of all record formats defined in ISO/IEC 19794.

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Table A.3 — Conformance Test Assertions for Record Format

Test	Section	Requirement ID	Level	Field	Operator	Operands	Test Note	Status	IUT Support	Supported Range	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	1	Record length	EQ	00000032_{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	1	Number of representations	EQ	0001_{Hex} to 0160_{Hex}		M			
T-6	General header	R-4	2	Number of representations	EQ	Total number of representations		M			
T-7	General header	R-5	2	Certification record flag	EQ	00_{Hex} or 01_{Hex}		M			
T-8	Representation header	R-7	1	Representation length	EQ	$0000001d_{Hex}$ to $ffffffff_{Hex}$		M			
T-9	Representation header	R-7	2	Representation length	EQ	Total number of bytes in the representation		M			
T-10	Representation header	R-8	1	Gregorian calendar year of the capture date	EQ	0001_{Hex} to $ffff_{Hex}$		M			
T-11	Representation header	R-9	1	Month of the capture date	EQ	01_{Hex} to $0c_{Hex}$ or ff_{Hex}		M			
T-12	Representation header	R-10	1	Day of the capture date	EQ	01_{Hex} to $1f_{Hex}$ or ff_{Hex}		M			
T-13	Representation header	R-11	1	Hour of the capture time	EQ	00_{Hex} to 17_{Hex} or ff_{Hex}		M			
T-14	Representation header	R-12	1	Minute of the capture time	EQ	00_{Hex} to $3b_{Hex}$ or ff_{Hex}		M			
T-15	Representation header	R-13	1	Second of the capture time	EQ	00_{Hex} to $3b_{Hex}$ or ff_{Hex}		M			
T-16	Representation header	R-14	1	Millisecond of the capture time	EQ	0000_{Hex} to $03e7_{Hex}$ or $ffff_{Hex}$		M			

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Test	Section	Requirement ID	Level	Field	Operator	Operands	Test Note	Status	IUT Support	Supported Range	Test Result
T-17	Representation header	R-16	1	Capture device technology ID	EQ	00_{Hex} to 14_{Hex}		M			
T-18	Representation header	R-18	1	Capture device vendor ID	EQ	0001_{Hex} to $ffff_{Hex}$		M			
T-19	Representation header	R-20	1	Capture device type ID	EQ	0001_{Hex} to $ffff_{Hex}$		M			
T-20	Representation header/ quality record	R-22	1	Number of quality blocks	EQ	00_{Hex} to ff_{Hex}		M			
T-21	Representation header/ quality block	R-23	1	Quality score	EQ	00_{Hex} to 64_{Hex} or ff_{Hex} if present		M			
T-22	Representation header/ quality block	R-24	1	Quality algorithm vendor ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-23	Representation header/ quality block	R-26	1	Quality algorithm ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-24	Representation header/ certification record	R-28	1	Number of certification block lengths	EQ	00_{Hex} to ff_{Hex} if present		M			
T-25	Representation header/ certification block	R-29	1	Certification authority ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			
T-26	Representation header/ certification block	R-31	1	Certification scheme ID	EQ	0000_{Hex} to $ffff_{Hex}$ if present		M			

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