International Standard

ISO/IEC 18181-3

Information technology — JPEG XL image coding system —

Part 3: Conformance testing

Technologies de l'information — Système de codage d'images JPEG XL —

Partie 3: Essai de conformité

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Foreword

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

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This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This second edition cancels and replaces the first edition (ISO/IEC 18181-3:2022), which has been technically revised.

The main changes are as follows:

— Decoder conformance was separated into core conformance and extended conformance;

— Test cases were updated to reflect the second editions of ISO/IEC 18181-1 and ISO/IEC 18181-2;

— References were updated accordingly.

A list of all parts in the ISO/IEC 18181 series can be found on the ISO and IEC websites.

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

Information technology — JPEG XL image coding system —

Part 3: Conformance testing

1 Scope

This document specifies the conformance testing of the ISO/IEC 18181 series, also known as JPEG XL.

NOTE Other desirable aspects of implementation (including robustness and performance) are outside the scope of this document.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

ISO/IEC 18181-1:2024, *Information technology — JPEG XL image coding system — Part 1: Core coding system*

ISO/IEC 18181-2:2024, *Information technology — JPEG XL image coding system — Part 2: File format*

ISO 15076-1[1)], *Image technology colour management — Architecture, profile format and data structure — Part 2: Based on ICC.1:2022*

ISO/IEC 60559, *Information technology — Microprocessor Systems — Floating-Point arithmetic*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

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

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at https://www.electropedia.org/

3.1
core conformance
producing decoded samples within the specified tolerances

3.2
extended conformance
conforming to all the testing procedures, including those related to metadata and JPEG bitstream reconstruction

4 Testing procedures

A set of test cases is defined in this document. Each test case consists of a JPEG XL bitstream, a reference decoded image, and possibly additional tests. For each test case, core conformance tests (as defined in Annex A) establish precision tolerances on the decoded samples, as compared to a reference image.

1) Under development. Stage at the time of publication: ISO/DIS 15076-1:2024.

Extended conformance tests (as defined in Annex B) include additional decoder functionality such as extraction of metadata and JPEG-1 bitstream reconstruction.

The electronic attachments (https://standards.iso.org/iso-iec/18181/-3/ed-2/en/) of this document consist of a `testcases/` subdirectory, containing multiple subdirectories, each of which contains a single test case for conformance testing.

5 Decoder conformance

A decoder shall be considered conforming to Level 5 of the Main profile if it is conforming to all the test cases specified in the `testcases/main_level5.txt` file in the electronic attachment to this document.

A decoder shall be considered conforming to Level 10 of the Main profile if it is conforming to all the test cases specified in the `testcases/main_level10.txt` file in the electronic attachment to this document.

The tests described in this document are necessary, but not sufficient to determine complete decoder conformance to all aspects of the ISO/IEC 18181-1 and ISO/IEC 18181-2 specifications.

For core conformance, all test cases shall pass the tests described in Annex A.

NOTE 1 Core conformance to Level 5 of the Main profile suffices to implement an application that can correctly and accurately render RGB or greyscale JPEG XL images intended for end-user image delivery. In order to facilitate testing, decoders can generate NPY files as described in Annex A.2. If implementations do not directly support this output format, generating such files from the decoder output in a sample value preserving postprocessing step is sufficient to pass the conformance tests. For example, if the decoder produces a (possibly animated) PNG file (with a sufficiently high bit depth), this still suffices to test core conformance. However, for testing core conformance to Level 10 of the Main profile, PNG output does not suffice since it is limited to 16-bit precision.

For extended conformance, all test cases shall pass both the tests described in Annex A and in Annex B.

NOTE 2 The extended conformance tests assess functionality that is not necessary for displaying an image, but that is nevertheless useful for authoring or archival purposes.

6 Encoder conformance

As specified in ISO/IEC 18181-1:2024, any encoding process is acceptable so long as it produces a valid codestream. Thus, an encoder shall be considered conforming if it produces output files which are successfully decoded by a conforming decoder as described in Clause 5. More precisely, the steps for testing encoder conformance are as follows:

a) Select a test image that represents the type of imagery that the encoder is designed to compress. The reference decoded images provided for decoder conformance tests are acceptable but not required.

b) Encode with the encoder under test.

c) Send the codestream to the reference decoder.

d) An encoder is found to be conforming if a conforming decoder can fully decode the image.

e) Repeat steps a) through d) for all parameters for which the encoder is designed. These parameters should be varied to the extent to which the encoder will be used.

f) Repeat steps a) through e) for several test images, sampling the breadth of imagery types (small image size, large image size, odd image sizes, number of components, component bit depths, component sampling) the encoder is designed to compress.

The above procedure provides a necessary, but not sufficient criterion to determine complete encoder conformance to all aspects of the ISO/IEC 18181-1 and ISO/IEC 18181-2 specifications.