
**Information technology — General
video coding —**

**Part 3:
Conformance and reference software
for low complexity enhancement
video coding**

Technologies de l'information — Codage vidéo général —

*Partie 3: Conformité et logiciel de référence pour le codage vidéo
d'amélioration de faible complexité*





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Foreword

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

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

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

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*.

A list of all parts in the ISO/IEC 23094 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 — General video coding —

Part 3:

Conformance and reference software for low complexity enhancement video coding

1 Scope

This document specifies a set of tests and procedures designed to verify whether bitstreams and decoders meet normative requirements specified in ISO/IEC 23094-2.

An encoder can claim conformance to ISO/IEC 23094-2 if the bitstreams that it generates are conforming bitstreams. Characteristics of coded bitstreams and decoders are defined in ISO/IEC 23094-2. Decoder characteristics define the properties and capabilities of the applied decoding process. The capabilities of a decoder specify which bitstreams the decoder can decode and reconstruct. A bitstream can be decoded by a decoder if the characteristics of the bitstream are within the specified decoder capabilities.

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 23094-2:2021, *Information technology – General video coding — Part 2: Low complexity enhancement video coding*

ISO/IEC 14882, *Programming languages — C++*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 23094-2 and the following 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

bitstream

sequence of bits in the form of a NAL unit stream or a raw bitstream, that forms the representation of coded pictures and associated data forming one or more coded video sequences

3.2

decoder

embodiment of a process that operates on a *bitstream* (3.1) and may conform to the decoding process requirements specified for conformance

Note 1 to entry: The decoder does not include the display process, which is outside the scope of this document.

3.3

encoder

embodiment of a process that produces a *bitstream* (3.1)

Note 1 to entry: The process is not specified in this document (except in regard to identification of the reference software encoder).

3.4

reference software decoder

software which may decode a *bitstream* (3.1) encoded according to the syntax structure and which is accompanying this document

3.5

reference software encoder

encoding software which is accompanying this document

3.6

test base bitstream

bitstream (3.1) that is conformant to Rec. ITU-T H.264 | ISO/IEC 14496-10 or Rec. ITU-T H.265 | ISO/IEC 23008-2

3.7

test bitstream

bitstream (3.1) that is the combination of a *test base bitstream* (3.6) and a *test enhancement bitstream* (3.8)

3.8

test enhancement bitstream

bitstream (3.1) that is conformant to ISO/IEC 23094-2

4 Abbreviated terms

For the purposes of this document, the abbreviated terms given in ISO/IEC 23094-2 and the following apply.

API	Application programming interface
AVC	Advanced video coding
EVC	Essential video coding
HEVC	High efficiency video coding
LTM	LCEVC test model
VVC	Versatile video coding

5 Conventions

For the purposes of this document, relevant conventions are specified in of ISO/IEC 23094-2:2021, Clause 5.

6 Conformance testing for ISO/IEC 23094-2

6.1 General

The following subclauses specify normative tests for verifying conformance of video bitstreams as well as decoders. Those normative tests make use of test data (bitstream test suites) provided as an electronic attachment to this document and the reference software decoder specified in ISO/IEC 23094-2.

For the purpose of testing according to 6.5, test bitstreams are provided in the bitstream test suite. In the following subclauses, the normative tests use the test bitstreams for verifying the conformance of the decoding process of the test enhancement bitstreams.

A test base bitstream is conformant in accordance with the respective International Standard it implements. The conformance testing of the test base bitstream is not in the scope of this document.

This document includes an electronic attachment containing the conformance bitstreams identified within the text and the reference software. The electronic attachment is available at the following address: <https://standards.iso.org/iso-iec/23094/-3/ed-1/en/>.

6.2 Bitstream conformance

Bitstream conformance for ISO/IEC 23094-2 is specified by ISO/IEC 23094-2:2021, C.4.

6.3 Decoder conformance

Decoder conformance for ISO/IEC 23094-2 is specified by ISO/IEC 23094-2:2021, C.5.

6.4 Procedure to test bitstreams

A bitstream that claims conformance with ISO/IEC 23094-2 shall pass the following normative test.

The bitstream shall be decoded by processing it with the reference software decoder. When processed by the reference software decoder, the bitstream shall not cause any error or non-conformance messages to be reported by the reference software decoder. This test should not be applied to bitstreams that are known to contain errors introduced by transmission, as such errors are highly likely to result in bitstreams that lack conformance to ISO/IEC 23094-2.

Successfully passing the reference software decoder test provides only a strong presumption that the bitstream under test is conforming to the video layer, i.e., that it does indeed meet all the requirements for the video layer (except Annexes C, D, and E) specified in ISO/IEC 23094-2 that are tested by the reference software decoder.

Additional tests may be necessary to more thoroughly check that the bitstream properly meets all the requirements specified in ISO/IEC 23094-2 including the hypothetical reference decoder (HRD) conformance (based on Annexes C, D, and E). These complementary tests may be performed using other video bitstream verifiers that perform more complete tests than those implemented by the reference software decoder.

ISO/IEC 23094-2 contains several informative recommendations that are not an integral part of that International Standard. When testing a bitstream for conformance, it may also be useful to test whether or not the bitstream follows those recommendations.

To check correctness of a bitstream, it is necessary to parse the entire bitstream and to extract all the syntax elements and other values derived from those syntactic elements and used by the decoding process specified in ISO/IEC 23094-2.

A verifier may not necessarily perform all stages of the decoding process specified in ISO/IEC 23094-2 in order to verify bitstream correctness. Many tests can be performed on syntax elements in a state prior to their use in some processing stages.