INTERNATIONAL STANDARD

ISO/IEC 23094-4

First edition
2022-01

Information technology — General video coding —

Part 4: Conformance and reference software for essential video coding

Technologies de l'information — Codage vidéo général —

Partie 4: Conformité et logiciel de référence pour le codage vidéo essentiel

Reference number
ISO/IEC 23094-4:2022(E)

© ISO/IEC 2022



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2022

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

© ISO/IEC 2022 – All rights reserved

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**

4 Abbreviated terms ... **2**

5 Conventions ... **2**

6 Conformance testing for ISO/IEC 23094-1 ... **2**
6.1 Introduction ... 2
6.2 Bitstream conformance ... 2
6.3 Decoder conformance ... 2
6.4 Procedure to test bitstreams ... 2
6.5 Procedure to test decoder conformance ... 3
6.5.1 Conformance bitstreams ... 3
6.5.2 Contents of the bitstream file ... 3
6.5.3 Requirements on output of the decoding process and timing ... 3
6.5.4 Recommendations ... 4
6.5.5 Static tests for output order conformance ... 4
6.5.6 Dynamic tests for output timing conformance ... 4
6.5.7 Decoder conformance test of a particular profile and level ... 5
6.6 Specification of the test bitstreams ... 5
6.6.1 General ... 5
6.6.2 Test bitstreams ... 6
6.7 Test suites for ISO/IEC 23094-1 ... 25

7 Reference software description ... **30**
7.1 General ... 30
7.2 ETM repository ... 31
7.3 Encoder and decoder usage ... 31

© ISO/IEC 2022 – All rights reserved

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).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents) or the IEC list of patent declarations received (see https://patents.iec.ch).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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 website 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.

© ISO/IEC 2022 – All rights reserved

Information technology — General video coding —

Part 4: Conformance and reference software for essential video coding

1 Scope

This document specifies a set of tests and procedures designed to indicate whether encoders or decoders essential video coding (EVC), which contains tests and a reference software designed to verify whether bitstreams and decoders meet normative requirements specified in ISO/IEC 23094-1. An encoder can claim conformance to ISO/IEC 23094-1 if the bitstreams that it generates are conforming bitstreams. Characteristics of coded bitstreams and decoders are defined in ISO/IEC 23094-1. 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 23094-1:2020, *Information technology — General video coding — Part 1: Essential video coding*

ISO/IEC 9899, *Information technology — Programming languages — C*

ISO/IEC/IEEE 9945, *Information technology — Portable Operating System Interface (POSIX®) Base Specifications, Issue 7*

3 Terms and definitions

For the purposes of this document, the terms and definitions and symbols specified in ISO/IEC 23094-1 and the following apply.

ISO and IEC maintain terminological 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 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

© ISO/IEC 2022 – All rights reserved

3.3
encoder
embodiment of a process that produces a bitstream

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

4 Abbreviated terms

ETM test model of essential video coding

HRD hypothetical reference decoder

5 Conventions

For the purposes of this document, relevant conventions are specified in Clause 5 of ISO/IEC 23094-1:2020.

6 Conformance testing for ISO/IEC 23094-1

6.1 Introduction

The following subclauses specify the tests for verifying conformance of video bitstreams as well as decoders. These tests make use of test data (bitstream test suites) provided as an electronic annex to this document and the reference software decoder specified in ISO/IEC 23094-1.

The electronic annex to this document is available at the following address:

— https://standards.iso.org/iso-iec/23094/-4/ed-1/en/

6.2 Bitstream conformance

Bitstream conformance is specified by Clause C.4 of ISO/IEC 23094-1:2020.

6.3 Decoder conformance

Decoder conformance is specified by Clause C.5 of ISO/IEC 23094-1:2020.

6.4 Procedure to test bitstreams

A bitstream that claims conformance with ISO/IEC 23094-1 should pass the following normative test.

The bitstream should be decoded by processing it with the reference software decoder. When processed by the reference software decoder, the bitstream should 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 23094-1.

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 23094-1:2020 that are tested by the reference software decoder.

© ISO/IEC 2022 – All rights reserved