



**International
Standard**

ISO/IEC 23090-23

**Information technology — Coded
representation of immersive
media —**

**Part 23:
Conformance and reference
software for MPEG immersive video**

*Technologies de l'information — Représentation codée de média
immersifs —*

*Partie 23: Conformité et logiciels de référence pour la vidéo
immersive MPEG*

**Second edition
2026-01**



COPYRIGHT PROTECTED DOCUMENT

© ISO/IEC 2026

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

Contents

Page

Foreword	iv
Introduction	v
1 Scope	1
2 Normative references	1
3 Terms and definitions	1
4 Abbreviated terms	2
5 Conventions	2
6 Conformance testing	2
6.1 General	2
6.2 Bitstream conformance	2
6.3 Decoder conformance	2
6.4 Reference bitstreams	3
6.5 Procedure to test bitstreams	3
6.6 Procedure to test decoders	4
6.6.1 Conformance bitstreams	4
6.6.2 Contents of the bitstream zip-files	4
6.6.3 Requirements on decoder output and timing	4
7 Reference software	5
7.1 Purpose of the reference software	5
7.2 Software location	5
7.3 Software license	5
7.4 Software installation	5
7.5 Software architecture	5
7.5.1 Reference software encoder	5
7.5.2 Reference software decoder	5
8 Decoder output logging process	6
8.1 General decoder output logging process	6
8.2 General hashing process	7
8.2.1 General	7
8.2.2 Hash table pre-computation process	7
8.2.3 Hash state initialization process	7
8.2.4 Hash state update process for unsigned integer values	7
8.2.5 Hash state update process for signed integer values	8
8.2.6 Hash state update process for floating-point values	8
8.2.7 Hash value computation process	8
8.3 Video data hashing process	8
8.3.1 Occupancy video data hashing process	8
8.3.2 Geometry video data hashing process	9
8.3.3 Attribute video data hashing process	9
8.3.4 Packed video data hashing process	9
8.4 Block to patch map hashing process	10
8.5 Patch params list hashing process	10
8.6 View params list hashing process	10
8.7 Atlas sequence parameter set MIV extension hashing process	12
8.8 Atlas frame parameter set MIV extension hashing process	12
8.9 Common atlas sequence parameter set MIV extension hashing process	13
Bibliography	14

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).

ISO and IEC draw attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO and IEC take no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO and IEC had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at www.iso.org/patents and <https://patents.iec.ch>. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

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*.

This second edition cancels and replaces the first edition (ISO/IEC 23090-23:2023), which has been technically revised.

The main changes are as follows:

- Additional reference bitstreams, updated reference software, and an extension of the decoder output logging process, to test the functionality that was added in ISO/IEC 23090-12:2025.

A list of all parts in the ISO/IEC 23090 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.

Introduction

ISO/IEC 23090-12 was developed to support compression of immersive video content, in which a real or virtual 3D scene is captured by multiple real or virtual cameras. The use of this document enables storage and distribution of immersive video content over existing and future networks, for playback with 6 degrees of freedom of view position and orientation.

Information technology — Coded representation of immersive media —

Part 23:

Conformance and reference software for MPEG immersive video

1 Scope

This document specifies a set of tests and procedures designed to indicate whether encoders or decoders meet the requirements specified in ISO/IEC 23090-12.

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 23090-12:2025, *Information technology — Coded representation of immersive media — Part 12: MPEG immersive video*

Bibliography

- [1] ISO/IEC/IEEE 8802-3:2021, *Telecommunications and exchange between information technology systems — Requirements for local and metropolitan area networks — Part 3: Standard for Ethernet*
- [2] ISO/IEC 10646, *Information technology — Universal coded character set (UCS)*