**ISO/IEC 23090-34:2024(X)**

ISO/IEC JTC 1/SC 29/WG 6

Date: YYYY-MM-DD

Information technology — Coded representation of immersive media — Part 34: Immersive audio reference software

~~WD/CD~~/DIS/~~FDIS~~ stage

**Warning for WDs and CDs**

This document is not an ISO International Standard. It is distributed for review and comment. It is subject to change without notice and may not be referred to as an International Standard.

Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

*A model document of an International Standard (the Model International Standard) is available at:*[*https://www.iso.org/drafting-standards.html*](https://www.iso.org/drafting-standards.html)

© ISO 20XX

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

*This template allows you to work with default MS Word functions and styles. You can use these if you want to maintain the Table of Contents automatically and apply auto-numbering.*

*To update the Table of Contents please select it and press "F9".*

[Foreword iv](#_Toc179297183)

[Introduction v](#_Toc179297184)

[1 Scope 1](#_Toc179297185)

[2 Normative references 1](#_Toc179297186)

[3 Terms and definitions 1](#_Toc179297187)

[4 Reference software 1](#_Toc179297188)

[4.1 Overview 1](#_Toc179297189)

[4.2 Structure 1](#_Toc179297190)

[4.3 Copyright disclaimer 2](#_Toc179297191)

[5 Bitstream decoding and rendering software 2](#_Toc179297192)

[Annex A (informative) Bitstream encoding software 3](#_Toc179297193)

[Bibliography 4](#_Toc179297194)

Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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 ISO documents 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](https://www.iso.org/directives-and-policies.html)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes 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 *[had/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](http://www.iso.org/patents). ISO 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](https://www.iso.org/foreword-supplementary-information.html).

This document was prepared by Technical Committee ISO/IEC JTC 1 Information technology Subcommittee SC29 Coding of audio, picture, multimedia and hypermedia information.

A list of all parts in the ISO 23090 series can be found on the ISO website.

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](https://www.iso.org/members.html).

Introduction

This document contains reference software for ISO/IEC 23090-4,: MPEG-I immersive audio. The reference software includes both encoder and decoder/renderer functionality.

Information technology — Coded representation of immersive media — Part 34: Immersive audio reference software

# Scope

This document contains simulation software for the MPEG-Immersive Audio standard as defined in ISO/IEC 23090-4.

# 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 23090‑4, Information technology —Coded representation of immersive media*— Part 4: MPEG-I immersive audio*

# Terms and definitions

For the purposes of this document, the terms and definitions given in ISO/IEC 23090-4 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/>

# Reference software

## Overview

This software has been derived from reference models used in the process of developing the ISO/IEC 23090-4 standard.

The enclosed software provides an example of how encoder and renderer can be implemented and can be used as a starting point for the development of compliant (to ISO/IEC 23090-4) products. Further, it can be used for consultation to assist in interpretation of aspects of ISO/IEC 23090-4.

The reference software implements the MPEG-I immersive audio decoding and rendering processes described in ISO/IEC 23090-4 and is therefore considered a complying implementation. Complying ISO/IEC 23090-4 implementations are not expected to follow the algorithms, or the programming techniques used by the reference software. Although the decoding software is considered normative, it cannot add anything to the textual technical description of ISO/IEC 23090-4.

## Structure

The software contained in this document is structured as follows:

* **Bitstream decoding and rendering software.** This software accepts bitstreams encoded according to the normative specification in ISO/IEC 23090-4, decodes and renders the streams into audio signals based on listener input. The decoder software implementation is provided as an electronic attachment to this standard. The decoding and rendering software implementation is provided at <https://standards.iso.org/iso-iec/23090/-34/ed-1/en>.
* **Bitstream encoding software**. The software creates compressed bitstreams from associated audio scene descriptions (Encoder Input Format, EIF). The techniques used for encoding are not specified in this document. The encoder software implementation is provided as an electronic attachment to this standard. The bitstream encoding software implementation is provided at <https://standards.iso.org/iso-iec/23090/-34/ed-1/en>.

Further, the software packages contains information about:

* + **Encoder Input Format (EIF)**. EIF describes the input format ingested by the reference software encoder.
  + **Listener Space Description Format (LSDF)*.*** LSDF describes the listening space for MPEG-I immersive audio AR.

## Copyright disclaimer

Each source code module in this specification contains copyright disclaimer, which shall not be removed from the source code module. A top-level license file is provided in both encoder and renderer project (LICENSE.txt).

# Bitstream decoding and rendering software

The bitstream decoding and rendering software provided as an electronic attachment to is a normative reference implementation of ISO/IEC 23090-4. While ISO/IEC 23090-4 specifies metadata for 6DoF audio rendering, ISO/IEC 23008-3 (MPEG-H 3D Audio) is used for the coding of audio assets.

Build instructions as well as more detailed information about the implementation are provided in the file README.md in the top-level renderer directory.

1. (informative)  
     
   Bitstream encoding software

The bitstream encoding software provided as an electronic attachment to this standard can be used to create compressed bitstreams with the normative syntax as described in ISO/IEC 23090-4. The techniques used for encoding are not specified by this document. Neither quality nor complexity of the provided encoder implementation has been fully optimized.

Setup instructions as well as more detailed information about the implementation are provided in the file README.md in the top-level encoder directory.

Bibliography

[1] ISO/IEC 23090‑4, *Information technology — Coded representation of immersive media — Part 4: MPEG-I immersive audio*