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**Information technology — High efficiency coding and media
delivery in heterogeneous environments —**

**Part 9:
3D Audio conformance testing**

*Technologies de l'information — Codage à haut rendement et fourniture de supports dans les
environnements hétérogènes —*

Partie 9: Essais de conformité 3D Audio

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Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 9: 3D Audio conformance testing

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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-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*.

This ~~second~~^{third} edition cancels and replaces the ~~first~~^{second} edition (ISO/IEC 23008-9:2019,2022) which has been technically revised.

The main changes are as follows:

- ~~conformance testing of Baseline Profile support.~~
- ~~Sample rate conversion.~~

A list of all parts in the ISO 23008 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.

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Introduction

This document specifies how tests can be designed to verify whether bitstreams and decoders meet the requirements as specified in ISO/IEC 23008-3 and allow interoperability with remote terminals in interactive, broadcast, streaming and local (with stored contents) sessions. These tests can be used for various purposes, such as:

- manufacturers of encoders, and their customers, can use the tests to verify whether the encoder produces bitstreams compliant with ISO/IEC 23008-3,
- manufacturers of decoders and their customers can use the tests to verify whether the decoder meets the requirements specified in ISO/IEC 23008-3 for the claimed decoder capabilities,
- manufacturers and customers of terminals supporting interactive, broadcast, streaming, and local sessions over a multitude of transport protocols and networks, can use the tests to verify whether the claimed functionalities are compliant with ISO/IEC 23008-3,
- manufacturers of test equipment, and their customers can use the tests to verify compliance with ISO/IEC 23008-3.

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Information technology — High efficiency coding and media delivery in heterogeneous environments —

Part 9: 3D Audio conformance testing

1 ~~1~~ Scope

This document specifies conformance criteria for both bitstreams and decoders compliant with the MPEG-H 3D audio standard as defined in ISO/IEC 23008-3. This is done to assist implementers and to ensure interoperability.

2 ~~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 23003-1, *Information technology — MPEG audio technologies — Part 1: MPEG Surround/ Amendment 1: Conformance testing*

ISO/IEC 23003-2, *Information technology — MPEG audio technologies — Part 2: Spatial Audio Object Coding (SAOC) — Amendment 4: SAOC Conformance*

ISO/IEC 23003-3:2020, *Information technology — MPEG audio technologies — Part 3: Unified speech and audio coding*

ISO/IEC 23003-4:2020, *Information technology — MPEG audio technologies — Part 4: Dynamic range control*

ISO/IEC 23008-3:2022, *Information technology — High efficiency coding and media delivery in heterogeneous environments — Part 3: 3D audio*

ISO/IEC 23091-3, *Information technology — Coding-independent code points — Part 3: Audio*

3 ~~3~~ Terms, definitions and abbreviated terms

3.1 ~~3.1~~ 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/>

3.1.1

bitstream

encoded audio data

3.1.2

conformance test bitstream

MPEG-H 3DA encoded bitstream used for testing the conformance of a MPEG-H 3DA decoder

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3.1.3

conformance test case

combination of one or more conformance test conditions for which one conformance test bitstream is provided

3.1.4

conformance test condition

condition which applies to properties of a conformance test bitstream in order to test a certain functionality of the MPEG-H 3DA decoder

3.1.5

conformance test criteria

one or more conformance test tools with requirements that define whether a given output from a decoder under test fulfils the conformance

3.1.6

conformance test data

conformance test sequences and conformance criteria

3.1.7

conformance test sequences

generic term for conformance test bitstream and decoder settings with a corresponding reference

3.1.8

conformance test tool

tool to compare the reference waveform with the output from a decoder under test

3.1.9

decoder setting case

combination of one or more decoder setting conditions to trigger specific settings of the decoder

3.1.10

decoder setting condition

condition applied to the decoder behaviour in order to test functionality of the MPEG-H 3DA decoder

3.1.11

reference waveform

decoded counterpart of a conformance test bitstream with specific decoder settings

3.2 ~~3.2~~ **Abbreviated terms**

3DA	3D audio
MPEG-H 3DA bitstream	data encoded according to ISO/IEC 23008-3
MPEG-H 3DA CPE	mpegh3daChannelPairElement
MPEG-H 3DA EXT	mpegh3daExtElement
MPEG-H 3DA LFE	mpegh3daLfeElement
MPEG-H 3DA SCE	mpegh3daSingleChannelElement

4 MPEG-H 3D audio conformance testing

4.1 General

This clause specifies conformance criteria for both bitstreams and decoders compliant with ISO/IEC 23008-3 as defined in this document. This is done to assist implementers and to ensure interoperability.

4.2 Profiles

Profiles are defined in ISO/IEC 23008-3:2022, 4.8. Some conformance criteria apply to MPEG-H 3D audio in general, while others are specific to certain profiles and their respective levels. Conformance shall be tested for the level of the profile with which a given bitstream or decoder claims to comply.

In addition to the conformance requirements described in this clause, a decoder which claims to comply with the MPEG-H 3D audio shall fulfil conformance defined in ISO/IEC 23003-4:2020, Clause 9.

4.3 Test procedure

4.3.1 General

To test a decoder for compliance to MPEG-H 3D audio decoding, conformance test data is provided. The package of the conformance test data is described in [Figure 1](https://standards.iso.org/iso-iec/23008/-9/ed-3/en). It is accessible at <https://standards.iso.org/iso-iec/23008/-9/ed-3/en> and contains all conformance test tools, conformance bitstreams, reference waveforms, and conformance tables in a spreadsheet. The latter defines all the conformance test sequences. To fulfil a conformance test sequence, the decoder under test shall decode the corresponding conformance test bitstream with the given decoder setting case. The output of the decoder under test shall meet the conformance test criteria in comparison with the respective reference waveform. Some conformance test sequences test only the stability of the decoder under test. Such conformance test sequences consist only of the conformance test case with the corresponding conformance test bitstream. The decoder under test shall pass all conformance test sequences.

