

ISO/IEC JTC 1/SC 29

Date: 2024-09

MPEG-N24334

ISO/IEC FDIS 23008-12:2024(E)

ISO/IEC JTC 1/SC 29/WG 3

Secretariat: JISC

Date: 2025-02-11

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

**Part 12:
Image File Format**

Technologies de l'information — Technologies — Codage à haute efficacité et livraison des systèmes MPEG — médias dans des environnements hétérogènes —

ISO/IEC FDIS 23008-12

Partie 12: Format de fichier d'image

<https://standards.iteh.ai/catalog/standards/iso/23008-12-0bdf-4e29-bb26-9f07327d79be/iso-iec-fdis-23008-12>

Document type: **Error! Reference source not found.**

Document subtype:

Document stage: **Error! Reference source not found.**

Document language: **Error! Reference source not found.**

Error! Reference source not found.

Copyright notice

FDIS stage

iTeh Standards (<https://standards.iteh.ai>) Document Preview

ISO/IEC FDIS 23008-12

<https://standards.iteh.ai/catalog/standards/iso/aaca2e16-0bdf-4e29-bb26-9f07327d79be/iso-iec-fdis-23008-12>

Document type: **Error! Reference source not found.**

Document subtype:

Document stage: **Error! Reference source not found.**

Document language: **Error! Reference source not found.**

Error! Reference source not found.

ISO/IEC FDIS 23008-12:2024(E)2025(en)

© ISO ~~2022~~/IEC 2025

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 copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: + 41 22 749 01 11

Email: copyright@iso.org
E-mail: copyright@iso.org
Website: www.iso.orgwww.iso.org

Published in Switzerland.

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

ISO/IEC FDIS 23008-12

<https://standards.iteh.ai/catalog/standards/iso/aaca2e16-0bdf-4e29-bb26-9f07327d79be/iso-iec-fdis-23008-12>

© ISO/IEC 2024 — All rights reserved

© ISO/IEC 2025 – All rights reserved

Contents — Page

Foreword..... xii

Introduction..... xiv

1 Scope..... 1

2 Normative references 1

3 Terms, definitions, abbreviated terms and symbols 2

3.1 Terms and definitions..... 2

3.2 Abbreviated terms 7

3.3 Mathematical functions..... 8

4 Overview 8

5 General requirements..... 9

5.1 General requirements on files..... 9

5.2 General requirements on readers..... 9

5.3 Multi-purpose files..... 9

5.4 Other boxes 9

6 Single image and image collection 9

6.1 General..... 9

6.2 Derivation from the ISO base media file format..... 10

6.3 Derivation of an output image of an image item 10

6.4 Roles of images..... 11

6.5 Image properties 13

6.6 Derived images and derived image items 46

6.7 Image metadata..... 49

6.8 Entity and sample groups 49

6.9 Auxiliary image item types and sample formats..... 59

6.10 Text and font items..... 61

7 Image sequences..... 66

7.1 General..... 66

7.2 Derivation from the ISO base media file format..... 66

7.3 Presentation of an image sequence track..... 68

7.4 Sample groups..... 68

7.5 Other tracks..... 70

8 Metadata support..... 71

8.1 General..... 71

8.2 Metadata for image items 71

8.3 Metadata for image sequence tracks..... 72

8.4 Integrity checks..... 72

9 Extensions to the ISO base media file format 74

10 Image File Format brands..... 74

10.1 General..... 74

10.2 Image and image collection brands..... 74

10.3 Image sequence brands..... 79

11 Region and region annotation..... 79

11.1 Overview 79

11.2	Common definitions for image sequence or video tracks and for image items	79
11.3	Regions and region annotations for an image item.....	85
11.4	Regions and region annotations for an image sequence or a video track.....	88
Annex A (normative)	Storage of externally specified metadata	93
Annex B (normative)	HEVC Image File Format.....	95
Annex C (normative)	High efficiency image file MIME type registration	107
Annex D (normative)	High efficiency image sequence file MIME type registration.....	113
Annex E (normative)	AVC in the Image File Format.....	117
Annex F (normative)	Advanced coding image MIME type registration	122
Annex G (normative)	Advanced coding sequence MIME type registration	125
Annex H (normative)	JPEG in the Image File Format.....	128
Annex I (informative)	Guidelines for specifying storage of image coding formats.....	132
Annex J (informative)	Examples of image collections.....	133
Annex K (informative)	Examples of progressive decoding, rendering and refinement.....	138
Annex L (normative)	VVC Image File Format.....	148
Annex M (normative)	EVC Image File Format	160
Annex N (informative)	Privacy and security considerations	166
Bibliography		168
Foreword		8
Introduction		10
1	Scope.....	1
2	Normative references	1
3	Terms, definitions, abbreviated terms and symbols	2
3.1	Terms and definitions.....	2
3.2	Abbreviated terms	7
3.3	Mathematical functions.....	8
4	Overview	8
5	General requirements.....	8
5.1	General requirements on files.....	8
5.2	General requirements on readers.....	8
5.3	Multi-purpose files.....	9
5.4	Other boxes	9
6	Single image and image collection	9
6.1	General.....	9
6.2	Derivation from the ISO base media file format.....	9
6.3	Derivation of an output image of an image item	10
6.4	Roles of images.....	10
6.4.1	General.....	10
6.4.2	Hidden images.....	11

6.4.3	Cover image	11
6.4.4	Thumbnail images	11
6.4.5	Auxiliary images	11
6.4.6	Master images	11
6.4.7	Pre-derived coded images	11
6.4.8	Multi-layer images	12
6.4.9	Predictively coded image items	12
6.5	Image properties	13
6.5.1	General	13
6.5.2	Decoder configuration and initialization	14
6.5.3	Image spatial extents	14
6.5.4	Pixel aspect ratio	15
6.5.5	Colour information	15
6.5.6	Pixel information	16
6.5.7	Relative location	17
6.5.8	Image properties for auxiliary images	18
6.5.9	Clean aperture	18
6.5.10	Image rotation	19
6.5.11	Layer selection	19
6.5.12	Image mirroring	20
6.5.13	Image scaling	21
6.5.14	Content light level	22
6.5.15	Mastering display colour volume	22
6.5.16	Content colour volume	23
6.5.17	Required reference types	23
6.5.18	Creation time information	24
6.5.19	Modification time information	24
6.5.20	User description	25
6.5.21	Accessibility text	26
6.5.22	Auto Exposure Information	26
6.5.23	White balance information	27
6.5.24	Focus information	28
6.5.25	Flash exposure information	28
6.5.26	Depth of field information	29
6.5.27	Panorama information	30
6.5.28	Sub-sample information	31
6.5.29	Target output layer set	31
6.5.30	Wipe transition effect	32
6.5.31	Zoom transition effect	33
6.5.32	Fade transition effect	34
6.5.33	Split transition effect	35
6.5.34	Suggested transition period	36
6.5.35	Suggested time display duration	37
6.5.36	Ambient viewing environment	37
6.5.37	Progressive derived image item information	38
6.5.38	Single stream	40
6.5.39	Camera extrinsic matrix	41
6.5.40	Camera intrinsic matrix	45
6.6	Derived images and derived image items	46
6.6.1	General	46
6.6.2	Derived image types and derived image item types	47

6.7	Image metadata	49
6.8	Entity and sample groups	50
6.8.1	Relating an untimed item to a timed sequence	50
6.8.2	Burst images	51
6.8.3	'tsyn' entity group	52
6.8.4	'iaug' entity group	52
6.8.5	'ster' entity group	53
6.8.6	Bracketed sets/logically group of images at capture time	53
6.8.7	User-defined image collections	57
6.8.8	Panorama	58
6.8.9	Slideshow entity group	59
6.8.10	Progressive rendering entity group	60
6.9	Auxiliary image item types and sample formats	61
6.9.1	CICP-compliant alpha plane	61
6.9.2	CICP-compliant depth map	62
6.10	Text and font items	62
6.10.1	Text item	62
6.10.2	Text properties	63
6.10.3	Font item	67
6.10.4	Font properties	67
7	Image sequences	68
7.1	General	68
7.2	Derivation from the ISO base media file format	68
7.2.1	Track Header box	68
7.2.2	Handler type	69
7.2.3	Coding Constraints box	69
7.3	Presentation of an image sequence track	70
7.4	Sample groups	71
7.4.1	Direct reference samples list	71
7.5	Other tracks	73
7.5.1	General	73
7.5.2	Thumbnail image sequence track	73
7.5.3	Auxiliary image sequence track	73
8	Metadata support	74
8.1	General	74
8.2	Metadata for image items	74
8.2.1	General	74
8.2.2	Deductive information	75
8.3	Metadata for image sequence tracks	75
8.4	Integrity checks	76
8.4.1	General	76
8.4.2	Syntax	76
8.4.3	Semantics	77
9	Extensions to the ISO base media file format	77
10	Image File Format brands	78
10.1	General	78
10.2	Image and image collection brands	78
10.2.1	General requirements on brands	78
10.2.2	'mifl' structural brand	78

10.2.3 'mif2' structural brand	80
10.2.4 'pred' brand	81
10.2.5 '1pic' brand	82
10.3 Image sequence brands	83
10.3.1 'msf1' structural brand	83
11 Region and region annotation	83
11.1 Overview	83
11.2 Common definitions for image sequence or video tracks and for image items	84
11.2.1 Region geometry structure	84
11.2.2 Mask item	89
11.3 Regions and region annotations for an image item	90
11.3.1 General	90
11.3.2 Region item	91
11.3.3 Derived region item	92
11.4 Regions and region annotations for an image sequence or a video track	93
11.4.1 General	93
11.4.2 Region track	93
11.4.3 Sample groups for region track	96
Annex A (normative) Storage of externally specified metadata	99
A.1 General	99
A.2 Exif	99
A.2.1 Untimed Exif metadata	99
A.2.2 Exif metadata in tracks	99
A.3 XMP metadata	100
A.4 MPEG-7 metadata	100
A.5 IPTC-IIM metadata	100
Annex B (normative) HEVC Image File Format	101
B.1 General	101
B.2 HEVC images and image collections	101
B.2.1 General	101
B.2.2 Image data	101
B.2.3 Image properties	103
B.2.4 HEVC auxiliary images	105
B.2.5 HEVC tile items	106
B.3 HEVC image sequences	107
B.3.1 General	107
B.3.2 Derivation from ISO/IEC 14496-12 and ISO/IEC 14496-15	107
B.3.3 Auxiliary HEVC image sequence tracks	108
B.4 HEVC-specific brands	108
B.4.1 HEVC image and image collection brands	108
B.4.2 HEVC image sequence brands	110
B.4.3 L-HEVC image and image collection brands	111
B.4.4 L-HEVC image sequence brands	113
Annex C (normative) High efficiency image file MIME type registration	115
C.1 General	115
C.2 Registration	115
C.3 Examples	117
Annex D (normative) High efficiency image sequence file MIME type registration	119

D.1	General	119
D.2	Registration	119
Annex E (normative) AVC in the Image File Format		121
E.1	Overview	121
E.2	AVC images and image collections	121
E.2.1	General	121
E.2.2	Image data	121
E.2.3	AVC configuration item property	122
E.2.4	AVC auxiliary images	122
E.3	AVC image sequences	123
E.3.1	General	123
E.3.2	Derivation from ISO/IEC 14496-12 and ISO/IEC 14496-15	123
E.3.3	Auxiliary AVC image sequence tracks	123
E.4	AVC-specific brands	123
E.4.1	AVC image and image collection brands	123
E.4.2	AVC image sequence brands	124
Annex F (normative) Advanced coding image MIME type registration		126
F.1	Overview	126
F.2	Registration	126
Annex G (normative) Advanced coding sequence MIME type registration		128
G.1	Overview	128
G.2	Registration	128
Annex H (normative) JPEG in the Image File Format		130
H.1	Overview	130
H.2	JPEG images and image collections	130
H.2.1	Definition	130
H.2.2	JPEG configuration item property	131
H.3	JPEG image sequences	131
H.3.1	General	131
H.3.2	JPEG configuration box	132
H.3.3	Derivation from ISO/IEC 14496-12	132
H.4	JPEG-specific still image brand	132
H.4.1	General	132
H.4.2	Requirements on files	133
H.4.3	Requirements on readers	133
H.5	JPEG image sequence brands	133
H.5.1	General	133
H.5.2	Requirements on files	133
H.5.3	Requirements on readers	134
Annex I (informative) Guidelines for specifying storage of image coding formats		135
I.1	General	135
I.2	Identifying the coding type	135
I.3	Initialization data	135
I.4	Image data	135
I.5	Brands	135
Annex J (informative) Examples of image collections		137
J.1	General	137
J.2	Single image	137

Error! Reference source not found-ISO/IEC FDIS 23008-12:2025(en)

J.3	A pre-derived coded image derived from 3 others	138
J.4	Dual-function file	139
J.5	Region annotations	139
J.6	Deductive information storage	140
Annex K (informative) Examples of progressive decoding, rendering and refinement		142
K.1	Overview	142
K.2	Remarks on creating a file suitable for progressive refinement	143
K.3	Progressive rendering and refinement with independently-coded image items	143
K.4	Region-wise progressive rendering and refinement with independently-coded image items	144
K.5	Overlay-derived image item represented by a single bitstream with temporal inter prediction	146
K.6	Multi-layer images with the progressive rendering entity group	148
K.7	Player operation for progressive rendering or refinement for HEIF files	149
K.7.1	General	149
K.7.2	Explicit signalling for progressive rendering or refinement	150
K.7.3	Implicit signalling for progressive rendering or refinement	150
K.7.4	Progressive rendering or refinement steps	150
Annex L (normative) VVC Image File Format		153
L.1	General	153
L.2	VVC images and image collections	153
L.2.1	General	153
L.2.2	Image Data	153
L.2.3	Image properties	157
L.2.4	VVC subpicture and VVC base items	159
L.3	VVC image sequences	163
L.3.1	General	163
L.3.2	Derivation from ISO/IEC 14496-12 and ISO/IEC 14496-15	163
L.4	VVC-specific brands	163
L.4.1	VVC image and image collection brands	163
L.4.2	VVC image sequence brands	164
Annex M (normative) EVC Image File Format		166
M.1	General	166
M.2	EVC images and image collections	166
M.2.1	General	166
M.2.2	Image data	166
M.2.3	Image properties	167
M.2.4	EVC slice item and EVC base item	168
M.3	EVC image sequences	169
M.3.1	General	169
M.3.2	Derivation from ISO/IEC 14496-12 and ISO/IEC 14496-15	169
M.4	EVC-specific brands	169
M.4.1	EVC Baseline image and image collection brands	169
M.4.2	EVC Main image and image collection brands	170
M.4.3	EVC Baseline image sequence brands	170
M.4.4	EVC Main image sequence brands	171
Annex N (informative) Privacy and security considerations		172
N.1	Security considerations	172
N.2	Privacy considerations	172

*

Error! Reference source not found.

N.2.1	Overview	172
N.2.2	Image data	172
N.2.3	Non-image data including metadata	173
	Bibliography	174

iTeh Standards
(<https://standards.iteh.ai>)
Document Preview

<https://standards.iteh.ai/catalog/standards/iso/aaca2e16-0bdf-4e29-bb26-9f07327d79be/iso-iec-fdis-23008-12>

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 documents ~~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/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> ~~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 ~~www.iso.org/iso/foreword.html~~. In the IEC, see www.iec.ch/understanding-standards.

Field Code Changed

This document was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, SC 29, *Coding of audio, picture, multimedia and hypermedia information*.

This third edition cancels and replaces the second edition (ISO/IEC 23008-12:2022), which has been technically revised. ~~It also incorporates the Amendment ISO/IEC 23008-12:2022/DAmD.1:2023.~~

The main changes are as follows:

- clarification on the signalling of colour information in image items;
- support for the signalling of camera intrinsic and extrinsic matrices;
- support for progressive decoding, rendering and refinement;
- support for region annotations for image sequence or video track;
- support for renderable text items.

A list of all parts in the ISO/IEC 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.

Field Code Changed

iTeh Standards (<https://standards.itih.ai>) Document Preview

ISO/IEC FDIS 23008-12

<https://standards.itih.ai/catalog/standards/iso/aaca2e16-0bdf-4e29-bb26-9f07327d79be/iso-iec-fdis-23008-12>

Introduction

The Image File Format is designed to enable the interchange of images and image sequences, as well as their associated metadata. It forms part of a family of specifications that are box-structured, and is built using tools defined in the ISO base media file format. This document specifies both structural brands that can be used with any codec and brands specific to High Efficiency Video Coding (HEVC). The file format specified in this document is referred to as the High Efficiency Image File Format (HEIF). It is suggested that HEIF be pronounced "heaff" (like heath with an ff ending). When the requirements of the HEVC-specific brands are applied, the file format can be referred to as the HEVC Image File Format.

The International Organization for Standardization (ISO) and International Electrotechnical Commission (IEC) draw attention to the fact that it is claimed that compliance with this document may involve the use of a patent.

ISO and IEC take no position concerning the evidence, validity and scope of this patent right.

The holder of this patent right has assured ISO and IEC that he/she is willing to negotiate licences under reasonable and non-discriminatory terms and conditions with applicants throughout the world. In this respect, the statement of the holder of this patent right is registered with ISO and IEC. Information may be obtained from the patent database available at www.iso.org/patents.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights other than those in the patent database. ISO and IEC shall not be held responsible for identifying any or all such patent rights.

This document is organized as follows:

~~Clause 5~~ Clause 5 specifies general requirements on files and file readers conforming to the Image File Format.

~~Clause 6~~ Clause 6 specifies the file structures for the storage of a single image and an image collection. Additionally, general requirements that shall be supported in all files using the Image File Format for the storage of a single image or an image collection are specified.

~~Clause 7~~ Clause 7 specifies the file structures for the storage of image sequences. Additionally, general requirements that shall be supported in all files using the Image File Format for the storage of image sequences are specified.

~~Clause 8~~ Clause 8 specifies the metadata structures for a single image, an image collection, and image sequences.

~~Clause 9~~ Clause 9 specifies enhancements to the ISO base media file format.

~~Clause 10~~ Clause 10 specifies structural brands for a single image and an image collection, as well as image sequences. Requirements on both files and file readers are specified.

~~Clause 11~~ Clause 11 specifies tools to associate annotations, e.g. metadata or images with one or more regions of an image or an image sequence.

~~Annex A~~ Annex A specifies the format for storing Exif, XMP, and MPEG-7 metadata in files conforming to the Image File Format.