Source	**Telecom ParisTech, Canon Research Centre France**
Status	**For consideration at the 113th MPEG Meeting**
Title	**Proposal for conformance of the Image File Format**
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1   Introduction

This document reviews MPEG's Image File Format standard, section by section and proposes a list of test vectors to produce as part of the conformance for this standard.

2   IFF Conformance vs. Reference software

IFF is based on ISOBMFF. The ISOBMFF reference software enables parsing and producing of files. The parsing provides a first level of content validation, but more complex validation for instance dependency between boxes, not at the syntactical level, is not provided. As there are complex rules in the IFF, such as the presence of a box given the item type, further validation (as done by ITEC's schema validator for MPEG-DASH or as done by the DASH-IF Conformance software) should be considered.

3   Section-by-section review

Some sections are omitted when they don't require any test vector to be produced. Each test vector is described by the following table row:

Test Vector Name	Test type (positive, negative)	Description

"positive" describes test vectors needed for conformance.

"negative" describes test vectors that could be produced to help implementations detect what is not valid. They may not be part of the conformance. They are proposed here to make sure they are indeed invalid.

3.1   Section 4

"A file may use both structures"

	positive	A file with an image item and an image sequence.

"A file […] may also use the structures of the ISO base media file format"

	positive	A file with boxes not specified in

		IFF.

3.2   Section 5.3

"Files may be identified as compatible with other standards (using brands) than those defined in this specification."

	positive	a file with additional compatible brands and unknown boxes everywhere.

3.3   Section 6.1

"A file may contain any number of image items."

Q: The sentence should rather be corrected to "A file shall contain one or more image items"

	positive	file with 1 image item
	positive	file with 2 image items
	positive	file with 10 image items

3.4   Section 6.2

"A `MetaBox ('meta')`, as specified in ISO/IEC 14496-12, is required at file level."

	negative	file without meta box but with mif1 brand.

"That `MetaBox` shall contain the boxes specified to be mandatorily present by ISO/IEC 14496-12."

	negative	file with missing ISOBMFF mandatory boxes

"The `MetaBox` containing image items and the metadata items related to the image items for the brands specified in this specification shall be included in the file-level `MetaBox`"

	negative	MetaBox in the 'moov' or in a track

"The `MetaBox` [...] shall not be included in any `AdditionalMetadataContainerBox.`"

	negative	MetaBox in the 'meco'

"The file-level `MetaBox` shall identify as its primary item an item that is a coded image or a derived image item."

	negative	use mif1 brand with something else than a coded image or a derived image. What is a coded image? How to validate that something is or is not a coded image? We recommend adding a list of item types defining coded images, maybe through the registration authority.

"The primary item should be displayed when no other information is available on the preferred displaying method of the image collection."

Q: How to check conformance that this is applied?

"It is recommended not to have a thumbnail image or an auxiliary image as a primary item."

	positive	thumbnail image as primary
	positive	auxiliary as primary

"The handler type for the `MetaBox` shall be `'pict'`."

	negative	mif1 brand with meta with handler type different from 'pict'

"All three construction methods specified for the `ItemLocationBox [...] are permitted`"

	positive	An image item using file offset
	positive	An image item using an idat box
	positive	An image item using offsets in an other item data.

"the `DataReferenceBox` may indicate the same or another file"

	positive	An image item using media in the file
	positive	An image item using media outside the file

"By using extents, images may be interleaved with each other or other data"

	positive	image item interleaving in mdat
	positive	image item interleaving in idat
	positive	image item interleaving in item data

3.5 Section 6.3

Should we validate processing of images to produce output images and reconstructed images?

3.6 Section 6.4.1

"Images may be assigned different roles"

"The role or the purpose is independent of whether the image is represented by a coded image or a derived image, or how the image is coded or transformed (by a transformative item property)."

	positive	coded image with different roles
	positive	derived image with different roles
	positive	transformed image with different roles

"the same image may have multiple roles."

	positive	coded image with multiple roles
	positive	derived image with multiple roles
	positive	transformed image with multiple roles

3.7 Section 6.4.2

"A hidden image item has (`flags` & 1) equal to 1 in its `ItemInfoEntry`"

	positive	file with a hidden image

"The primary item shall not be a hidden image item."

	negative	a file with several visible image items and a hidden image as primary item
	negative	a file with a single item that is hidden

"Any entity group of type 'altr' that includes image items, shall either include only hidden items or only non-hidden items"

	positive	an 'altr' grouping with visible items
	positive	an 'altr' grouping with hidden items
	negative	an 'altr' grouping mixing visible and hidden items

3.8 Section 6.4.3

"the primary item of the MetaBox should be displayed when no other information is available on the preference to display a collection of images."
Q: How can other information be provided? How to check this conformance?

3.9 Section 6.4.4

"A thumbnail image is a smaller-resolution representation of a master image."

	negative	A small-resolution image linked to a larger resolution image, but both images not representing the same content * This one may be hard to validate since it requires image comparison

"The thumbnail image and the master image are linked using a reference type 'thmb' from the thumbnail image to the master image."

	positive	a thumbnail image item
	negative	a thumbnail image with a reversed link

"A thumbnail image shall not be linked to another thumbnail image with the 'thmb' item reference."

	positive	a thumbnail image item linked to another item with an item reference different from 'thmb'
	negative	chained thumbnail images

3.10 Section 6.4.5

"Auxiliary images are images, which are not thumbnail images, related to a master image."

	positive	auxiliary image

"The auxiliary image and the master image are linked using an item reference of `'auxl'` from the auxiliary image to the master image."

	negative	auxiliary image with reversed item reference

3.11 Section 6.4.7

"If a coded image has been derived from others – e.g. a composite HDR image derived from exposure-bracketed individual images – then it shall be linked to those images by item references of type `'base'` from the coded image to all images it derives from."

	positive	pre-derived coded image The standard should have a note such as: "The link direction between an image item and a pre-derived coded image item is arbitrary. However, when the derivation is irreversible (such as a crop), the link should be in the direction that matches the way the pre-derived image was produced (e.g from the entire image to the cropped image)."

3.12 Section 6.5.1

"Properties are ordered."
Q: how to test that assertion?

"Transformative properties apply to the image with preceding transformations applied."
Q: how to test that?

"The semantics of the descriptive properties specified in the subclauses of 6.5 are specified for the image before the transformations, if any, are applied"
Q: how to test that?

"Readers shall allow and ignore descriptive properties following the first transformative or unrecognized property, whichever is earlier, in the sequence associating properties with an item."

	positive	an item with an essential unknown property after the first transformative property
	positive	an item with a non-essential unknown property after the first transformative property
	positive	an item with an essential descriptive property after the first transformative property (one per type of descriptive prop)
	positive	an item with a non-essential descriptive property after the first transformative property (one per type of descriptive prop)

"Writers should arrange the descriptive properties specified in the subclauses of 6.5 prior to any other properties in the sequence associating properties with an item."
Q: How to test that assertion?

3.13 Section 6.5.3

"Every image item must be associated with at least one property of this type, prior to the association of all transformative properties, that declares the width and height of the image."

	positive	image item with ispe box
	negative	0 'ispe' box associated to an image item
	negative	2 'ispe' boxes associated to a same image item

"image_width specifies the width of the reconstructed image in pixels,"
"image_height" specifies the height of the reconstructed image in pixels

	negative	image_height not matching the image
	negative	image_width not matching the image

3.14 Section 6.5.4

	positive	image with pasp box
	negative	image with 2 pasp boxes
	negative	pasp not matching the image

3.15 Section 6.5.5

	positive	image with colr box
	positive	image with colr box with alternate color space
	negative	image with 2 colr boxes

3.16 Section 6.5.6

	positive	image with pixi box with 1 channel
	positive	image with pixi box with 2 channels
	positive	image with pixi box with 3 channels
	positive	image with pixi box with 4 channels
	negative	image with 2 pixi boxes
	negative	image with pixi information not matching the image in number of channels and/or number of bits, more or less

3.17 Section 6.5.7

	positive	image with rloc box with tbas ref

	positive	image with rloc box without tbas ref Q: Should we fix the spec to only allow rloc in elements with 'tbas' and make this test a negative test?
	negative	image with tbas ref without rloc
	negative	image with tbas ref with 2 rloc boxes
	negative	image without tbas ref with 2 rloc boxes

"The pixel sampling of the associated image item shall be identical to that of the related image item and the sampling grids of the associated image item and the related image item shall be aligned (i.e., not have a sub-pixel offset)."

	negative	image with tbas ref, rloc but different pixel sampling and/or alignment

3.18 Section 6.5.8

	positive	image with auxC box
	negative	image with 2 auxC boxes
	negative	image with auxiliary image without auxC box
	negative	image with non-null terminated string

	negative	An 'auxl' reference type without any 'auxC' property (?and/or a different number?)

"AuxiliaryTypeProperty may additionally include other fields, as required by the URN."

	positive	auxC with additional fields

3.19 Section 6.5.9

	positive	image with clap box
	positive	image with 2 clap boxes

3.20 Section 6.5.10

	positive	image with irot box
	positive	image with 2 irot boxes

3.21 Section 6.6

3.22 Section 6.6.1

"The number of SingleItemTypeReferenceBoxes with the box type 'dimg' and with the same value of from_item_ID shall not be greater than 1."

	positive	one ItemReferenceBox with one from_item_ID and reference_count >1 (case of

		the 'grid')
	negative	image with 2 SingleItemTypeReferenceBoxes with the 'dimg' type and the same from_item_id

3.23 Section 6.6.2.1

"A derived image item of the `item_type` value `'iden'` (identity transformation) may be used when it is desired to use transformative properties to derive an image item."

	positive	an image with an 'iden' item type

"The derived image item shall have no item body (i.e. no extents)"

	negative	an image with an 'iden' item type with a body

"reference_count for the 'dimg' item reference of a 'iden' derived image item shall be equal to 1."

	negative	when 'iref" for the 'iden' item has a "reference_count" greater than one

Q: What about an 'iden' item but no transformative properties declared: is it valid?

3.24 Section 6.6.2.2

"An item with an `item_type` value of `'iovl'` defines a derived image item by overlaying one or more input images in a given layering order within a larger canvas."

	positive	an image with item type 'iovl'
	positive	an image with item type 'iovl' with 1 referenced image
	positive	an image with item type 'iovl' with >1 referenced images without transparency in the images
	positive	an image with item type 'iovl' with >1 referenced images with transparency in the images but not in the canvas fill
	positive	an image with item type 'iovl' with flags = 0
	positive	an image with item type 'iovl' with flags = 1
	positive	an image with item type 'iovl' with flags > 1
	positive	an image with item type 'iovl' with blanks in the grid and canvas_fill_value with some channels only
	positive	an image with item type 'iovl' with blanks in the grid and canvas_fill_value fully opaque
	positive	an image with item type 'iovl' with blanks in the grid and

	canvas_fill_value fully transparent

"Pixel locations with a negative offset value are not included in the reconstructed image."

	positive	an image with item type 'iovl' with negative horizontal_offset
	positive	an image with item type 'iovl' with negative vertical_offset
	positive	an image with item type 'iovl' when an image is entirely in the negative area

"Horizontal pixel locations greater than or equal to output_width are not included in the reconstructed image. Vertical pixel locations greater than or equal to output_height are not included in the reconstructed image."

	positive	an image with item type 'iovl' with horizontal pixel locations greater than or equal to output_width
	positive	an image with item type 'iovl' with vertical pixel locations greater than or equal to output_height
	positive	an image with item type 'iovl' to do image cropping (image greater than output size and negative offsets)

3.25 Section 6.6.2.3

	positive	an image with item type grid

"All input images shall have exactly the same width and height; call those tile_width and tile_height."

	negative	an image with item type grid but with images not with the same width and/or height

"The tiled input images shall completely "cover" the reconstructed image grid canvas, where tile_width*columns is greater than or equal to output_width and tile_height*rows is greater than or equal to output_height."

	positive	an image with item type 'grid' covering more than output
	negative	an image with item type 'grid' but with images covering less than output

"If the desired input images are not of a consistent size, then derived image items that scale or crop them, as needed to make them consistent, can be used"

	positive	an image with item type 'grid' using derived image to crop inputs
	positive	an image with item type 'grid'

		with flags = 0
	positive	an image with item type 'grid' with flags = 1
	positive	an image with item type 'grid' with flags > 1
	positive	an image with item type 'grid' with 1 row and 1 column
	positive	an image with item type 'grid' with N rows and M columns

3.26 Section 6.7

"The metadata that describes an image is formed as the union of the items that refer from the metadata item to the image item using the `'cdsc'` (content describes) item reference."

	positive	an image with more than one 'cdsc' item references

3.27 Section 7

3.28 Section 7.1

"the handler type in the `HandlerBox` of the track is `'pict'` to indicate an image sequence track"

	positive	a sequence with a 'pict' track handler, without a meta box

"In particular, in an image sequence track, the timing is advisory: it may be the timing at collection (e.g. of an image burst) or the suggested display timing (e.g. for a slide show)."

	positive	file with collection timing
	positive	file with suggested display timing

"Files containing an image sequence should also contain a file-level `MetaBox` with a primary item that is an image item as specified in 6, for cases in which temporal presentation is either undesirable, or not possible (e.g. printing)."

	positive	file with a pict track and a meta box with a primary item that is an image item

"The primary item may share coded data with one of the intra-coded images in the sequence"

	positive	file with a pict track and a meta box with a primary item that is an image item which shares coded data with an image in the sequence

"The syntax of the `matrix` syntax element is replaced with the following "

	positive	a file with a pict track with a matrix specifying a rotation by 0°
	positive	a file with a pict track with a matrix specifying a rotation by 90°

	positive	a file with a pict track with a matrix specifying a rotation by 180°
	positive	a file with a pict track with a matrix specifying a rotation by 270°

"The values of x and y are not constrained."

	positive	a file with a pict track with a matrix specifying a translation
	positive	a file with a pict track with a matrix specifying a translation and a rotation

"Players are allowed to translate the image implicitly to a coordinate space with non-negative coordinates."

	negative	a file with a pict track with a matrix with negative translation values

"u and v shall be equal to 0 and w shall be equal to 0x40000000."

	negative	a file with a pict track with a matrix with u and v different from 0 or w different from 0x40000000

"As implied in ISO/IEC 14496-12, when a CleanApertureBox is present in a sample entry, the clipping specified by the CleanApertureBox takes place before applying the rotation specified by the matrix syntax element."

	positive	a file with a pict track with a rotation and a clap box

"Specifically, when `handler_type` is equal to `'pict'`, the `VisualSampleEntry` structure is used in the `SampleDescriptionBox` and the `VisualSampleGroupEntry` structure is used in the `SampleGroupDescriptionBox`"

	positive	a pict track with a VisualSampleEntry
	positive	a pict track with a VisualSampleGroupEntry
	negative	a pict track with an SampleEntry not Visual
	negative	a pict track with an SampleGroupEntry not Visual

3.29 Section 7.2.3

"The `CodingConstraintsBox` shall be present in the sample description entry for tracks with `handler_type` equal to `'pict'` and may be present for other tracks."

	positive	a 'pict' track with a ccst box
	positive	a 'vide' track with a ccst box
	negative	a 'soun' track with a ccst box
	negative	a pict track without a ccst box
	negative	a pict track with 2 ccst boxes

	positive	a 'pict' track with a ccst box with all_ref_pics_intra set to 1
	positive	a 'pict' track with a ccst box with all_ref_pics_intra set to 0
	positive	a 'pict' track with a ccst box with intra_pred_used set to 0
	positive	a 'pict' track with a ccst box with intra_pred_used set to 1 with intra prediction effectively used
	positive	a 'pict' track with a ccst box with intra_pred_used set to 1 with intra prediction not used
	positive	a 'pict' track with a ccst box with max_ref_per_pic set to 0
	positive	a 'pict' track with a ccst box with max_ref_per_pic set to >0 <15

3.30 Section 7.3

"An `EditListBox` may be used in such a track"

	positive	a pict track with an edit list, with edits indicating "the playback of more than one sample" with no hidden sample in the track
	positive	a pict track with an edit list, with edits indicating "the playback of more than one sample" with no hidden sample in the edits
	positive	a pict track with an edit list, with edits indicating "the playback of more than one sample" with hidden sample in the edits
	positive	a pict track with an edit list, with edits indicating the playback of no sample
	positive	a pict track with an edit list, with edits indicating the playback of only one non-hidden sample
	positive	a pict track with an edit list, with edits indicating the playback of only one hidden sample
	positive	a pict track with no edit list with hidden samples
	positive	a pict track with no edit list without hidden samples

3.31 Section 7.4

	positive	file with a pict track with a DirectReferenceSamplesList sample group
	positive	file with a pict track with several DirectReferenceSamplesList

		sample groups

[TO BE COMPLETED]

3.32 Section 7.5.1

	positive	file with a pict track and video track
	positive	file with a pict track and an audio track
	positive	file with a pict track and a subtitle track

3.33 Section 7.5.2

	positive	file with 2 pict tracks linked by a 'thmb' track reference within an alternate group
	positive	file with 2 pict tracks linked by a 'thmb' track reference with no alternate group information
	positive	file with 2 pict tracks, with the `track_in_preview` flag of the thumbnail track set to 1
	positive	file with 2 pict tracks, with the `track_in_preview` flag of the thumbnail track set to 0

3.34 Section 7.5.3

	positive	a file with one auxv track
	positive	a file with several auxv tracks
	positive	a file with one auxv track, with the track_in_movie flag set to 0
	positive	a file with one auxv track, with the track_in_movie flag set to 1
	negative	an track linked with 'auxl' track reference without 'auxi' box
	negative	an auxiliary track with 2 auxi boxes
	negative	an non-null terminated string in the auxi box

3.35 Section 8.1

"this standard supports the carriage of images and image sequences along with metadata written in various metadata schematic languages. Examples of such schematic languages include Exif and MPEG-7."

	positive	a file with exif metadata for a 'pict' track
	positive	a file with MPEG-7 metadata for a 'pict' track

3.36 Section 8.2

	positive	a file with exif metadata for image items
	positive	a file with MPEG-7 metadata for image items
	positive	a file with multiple redundant metadata for image items
	positive	a file with multiple complementary metadata for image items

3.37 Section 8.3

	positive	a file with multiple redundant metadata for 'pict' tracks
	positive	a file with multiple complementary metadata for 'pict' tracks

" If two or more metadata tracks linked to an image sequence track are parts of the same alternate group, any one of these metadata tracks can be parsed to obtain applicable metadata for the image sequence track."

	positive	a file with multiple metadata tracks, for a 'pict track, in the same alternate group

" A track level `MetaBox` can be used to describe contents that are specific to the image sequence as a whole."

	positive	a file with a pict track with a meta box at the track level

" When samples of an image sequence have to be linked to one more metadata items contained in a `MetaBox` in track, the sample grouping `SampleToMetadataItemEntry` as defined in 9.7 is used."

	positive	a file with `SampleToMetadataItemEntry`

3.38 Section 8.4

"When an entity does not understand the schematic language used for describing the metadata, it shall ignore the contents of the metadata items using that schematic language in their syntax."
Q: how to check?

"The `DataIntegrity` item shall only occur in a `MetaBox` in a track (not in a movie or file-level `MetaBox`)."

	positive	a file with a DataIntegrity item in a meta box in a track of different types
	negative	a file with a DataIntegrity item in a meta box at the movie level
	negative	a file with a DataIntegrity item in a meta box at the file level

"the `DataIntegrity` item shall consist of one or more `MD5IntegrityBoxes`,"

	positive	a DataIntegrity item with one `MD5IntegrityBox`
	positive	a DataIntegrity item with multiple `MD5IntegrityBoxes`
	positive	a DataIntegrity item with a `MD5IntegrityBox` with `input_4cc = 'sgpd'` and `flags = 0`
	positive	a DataIntegrity item with a `MD5IntegrityBox` with `input_4cc = 'sgpd'` and `flags = 1`
	positive	a DataIntegrity item with a `MD5IntegrityBox` with `input_4cc = 'stsz'`
	positive	a DataIntegrity item with a `MD5IntegrityBox` with `input_4cc = 'trak'`
	positive	a DataIntegrity item with a `MD5IntegrityBox` with `input_4cc != 'sgpd'`, `'stsz'`, `'trak'`

`[TO BE COMPLETED]`

3.39 Section 9

3.40 Section 9.2

"The `flags` field of `ItemInfoEntry` with `version` greater than or equal to 2 is specified as follows:"

	positive	a file with an ItemInfoEntry box with flags set to 1 on version = 0
	positive	a file with an ItemInfoEntry box with flags set to 1 on version = 1
	positive	a file with an ItemInfoEntry box with flags set to 1 on version = 2

3.41 Section 9.3

	positive	a file with an 'iprp' box
	negative	a file with 2 'iprp' boxes
	negative	a file with an 'iprp' box with 2 'ipco' boxes
	positive	a file with an 'iprp' box with 2 'ipma' boxes

"The `FreeSpaceBox` as defined in ISO/IEC 14496-12 may occur in the `ItemPropertyContainerBox`"

	positive	a file with a 'free' box in the 'iprp' box

"A reader shall not process an item that is associated with a property that is not recognized or not supported by the reader and that is marked as essential to the item. A reader may ignore an associated item property that is marked non-essential to the item."

	negative	a file with an image item association with an undefined property marked as essential
	positive	a file with an image item association with an undefined property marked as non-essential

"When defining item properties, it is recommended that they be small."

	positive	a file with a small item property
	positive	a file with a large item property

"Each `ItemPropertyAssociation` box must be ordered by increasing `item_ID`,"

	negative	a file with association in non-increasing order

"there must be at most one association box for each `item_ID`, in any `ItemPropertyAssociation` box"

	negative	a file with 2 association boxes for a given item id

"The version 0 should be used unless 32-bit `item_ID` values are needed"

	positive	a file with version 0 of ipma
	positive	a file with version 1 of ipma

	positive	a file with an 'ipco' box with no property
	positive	a file with an 'ipco' box with 1 property
	positive	a file with an 'ipco' box with several properties

	positive	a file with an 'ipma' box with no association (entry_count = 0)
	positive	a file with an 'ipma' box with entry but no association (association_count = 0)

3.42 Section 9.4

	positive	a file with a grpl box in a meta box at the file level
	positive	a file with a grpl box in a meta box at the movie level

	positive	a file with a grpl box in a meta box at the track level
	negative	a file with more than one grpl box in a meta box
	negative	a file with a grpl in a meta in a meco
	positive	a file with a grpl box in a meta box at the movie level with a trackId = itemID
	positive	a file with a grpl box in a meta box at the track level with a trackId = itemID of the same track or of a different track
	negative	a file with a grpl box in a meta box at the file level with a trackId = itemID
	positive	free boxes in the grpl box

3.43 Section 9.4.3

	positive	'altr' grouping
	positive	grouping with num_entities_in_group = 0
	negative	grouping with clashing ids

3.44 Section 9.5

	positive	a thumbnail track linked to a video track
	positive	a thumbnail track linked to an audio track
	positive	a thumbnail track linked to an subtitle track
	negative	a thumbnail track linked to another thumbnail track

3.45 Section 9.6

	positive	an edit list with a repeat flag, repeating for an integer number of times
	positive	an edit list with a repeat flag, repeating for a non-integer number of times
	positive	an edit list with a repeat flag, repeating for infinite number of times

3.46 Section 9.7

	positive	a file with a SampleToMetadataItemEntry
	positive	a file with a SampleToMetadataItemEntry

| | positive | a file with a SampleToMetadataItemEntry with num_items = 0 |
| | negative | a file with a SampleToMetadataItemEntry with a non-matching itemId |

3.47 Annex A

3.48 Section A.1

"When any of the brands specified in this specification is in the `major_brand`, the `minor_version` shall be set to zero when writing the file, and ignored by readers."

	positive	file with mif1 as major brand
	negative	file with mif1 as major brand and minor_version != 0
	positive	file with msf1 as major brand
	negative	file with msf1 as major brand and minor_version != 0

3.49 Section A.2.1.1

"The following boxes are required in a file under the `'mif1'` brand."
Q: 'iloc' is in general not mandatory in the ISOBMFF. In IFF, it is. Ok.
Q: 'iinf' is in general not mandatory in the ISOBMFF. In IFF; it is. Ok.
Q: 'pitm' is in general not mandatory in the ISOBMFF. In IFF; it is. Ok.
Q: 'iprp'. Why make it mandatory if there is no property? Why 'ipco' and 'ipma' not listed in the tables (requirements on files and on readers)?

3.50 Section A.3.1.1

" At least one track of handler type `'pict'`, as defined in 7.2, is required."

| | positive | a file with msf1 compatible brand with a 'pict' track with no sample |
| | negative | a file with msf1 compatible brand without 'pict' track |

" It is required that `'iso8'` is present among the compatible brands array."

| | negative | a file with 'msf1' brand in the major brand without 'iso8' compatible brands |
| | negative | a file with 'msf1' brand in the compatible brands without 'iso8' compatible brands |

3.51 Section Annex B

"HEVC items may either be IDR, CRA or BLA pictures as defined ISO/IEC 23008-2."

| | positive | a file with a 'hvc1' item type corresponding to an IDR picture |
| | positive | a file with a 'hvc1' item type corresponding to an BLA picture |

	positive	a file with a 'hvc1' item type corresponding to an CRA picture

"There shall be no inter prediction between HEVC image items."

	negative	file with HEVC image items with inter prediction

"HEVCItemData shall not contain any extractor or aggregator NAL units"

	negative	file with an HEVC image item with extractors or aggregators in the data
	negative	a file with an HEVC image item without 'hvcC' property box
	negative	a file with an HEVC image item without 'hvcC' property associated
	negative	a file with an HEVC image item with two 'hvcC' property associated

"essential shall be equal to 1 for an 'hvcC' item property associated with an image item of type 'hvc1'."

	negative	a file with an HEVC image item with an 'hvcC' property associated as non-essential

Q: Should it also be 1 for ispe that is a mandatory property?

	positive	a file with an HEVC image item with two different 'hvcC' property boxes but only 1 associated to the item, with the essential bit set.

3.52 Section B.2.4

	positive	a file with an HEVC item with a subsample entry property
	negative	a file with an HEVC item with a subsample entry property with `entry_count != 1`
	negative	a file with an HEVC item with a subsample entry property with sample_delta!= 0

"Zero or more properties of type `'subs'` may be linked to the same item of type `'hvc1'`."

	positive	file with an HEVC item with more than 1 subs property

3.53 Section B.2.5

	positive	an HEVC auxiliary image item
	positive	an HEVC auxiliary image item with additional SEI message "that are specific to the auxiliary image

		type"
	negative	an HEVC auxiliary image item without associated hvcC property
	negative	an HEVC auxiliary image item without associated ispe property

3.54 Section B.2.6

	positive	an HEVC tiled image with loop filtering disabled
	positive	an HEVC tiled image with loop filtering enabled
	positive	an HEVC tiled image with no slice containing two tiles, all tiles made of 1 slice, all slices made of 1 slice segment
	positive	an HEVC tiled image with no slice containing two tiles, all tiles made of 1 slice, some slices made of several slice segments
	positive	an HEVC tiled image with no slice containing two tiles, some tiles made of several slices, all slices made of 1 slice segment
	positive	an HEVC tiled image with no slice containing two tiles, some tiles made of several slices, some slice made of several slice segments
	positive	an HEVC tiled image with no slice containing two tiles, some tiles grouped into a tile item not spanning rows
	positive	an HEVC tiled image with no slice containing two tiles, some tiles grouped into a tile item spanning rows
		an HEVC tiled image with tile items not describing all tiles
		an HEVC tiled image with some slices containing several tiles but no slice segment containing two tiles, each tile being a single slice segment
		an HEVC tiled image with some slices containing several tiles but no slice segment containing two tiles, some tiles using several slice segments
		an HEVC tiled image using the 'dpnd' item reference from a tile item containing a single tile
		an HEVC tiled image using the 'dpnd' item reference from a tile

		item containing several tiles on different rows
		an HEVC tiled image with some slices containing several tiles, some slice segments containing several tiles
		an HEVC tiled image with subsample information

"Each HEVC tile item shall be associated with one `HEVCConfigurationBox`, one `ImageSpatialExtentsProperty` and one `RelativeLocationProperty`."

	negative	an HEVC tile item not associated with an hvcC box
	negative	an HEVC tile item not associated with an ispe box
	negative	an HEVC tile item not associated with an rloc box
	negative	an HEVC tile item associated with several hvcC boxes
	negative	an HEVC tile item associated with several ispe boxes
	negative	an HEVC tile item associated with several rloc boxes

"The `HEVCConfigurationBox` shall contain all parameter sets required for decoding the tiles present in the HEVC tile item."

	negative	an HEVC tile item associated with an hvcC box not containing all PS

"The `RelativeLocationProperty` shall indicate the position of the HEVC tile item within the respective HEVC image item."

	negative	an HEVC tile item associated with an rloc box not corresponding to the position of the tile in the image

"The `image_width` and `image_height` of the `ImageSpatialExtentsProperty` shall be set according to the width and height of the HEVC tile item."

	negative	an HEVC tile item associated with an ispe box not corresponding to the size of the tiles in the item

3.55 Section B.3.2

"The sample entry of type `'hvc1'` shall be used for an image sequence track coded with HEVC."

	positive	An image sequence track coded with HEVC
	negative	An image sequence track coded with HEVC not signaled with 'hvc1'

"The `HEVCSampleEntry` shall be used as specified in ISO/IEC 14496-15."

	negative	An image sequence track coded with HEVC not using the HEVCSampleEntry

"For a track containing an HEVC image sequence, either all samples shall be sync samples or the `all_ref_pics_intra` field in the `CodingConstraintsBox` specified in 0 shall be set to one."

	positive	An image sequence track coded with HEVC where all samples are sync samples.
	positive	An image sequence track coded with HEVC where all samples are not sync samples.
	positive	An image sequence track coded with HEVC where none of the samples are sync samples.

3.56 Section B.3.3

"The SEI messages for the auxiliary channel follow the same principle as any other SEI message for an `'hvc1'` sample entry; i.e. they may be included in the decoder configuration record of the `'hvc1'` sample entry."

	positive	An image sequence track coded with HEVC where non-auxiliary SEI messages are not in the decoder configuration record.
	positive	An image sequence track coded with HEVC where auxiliary SEI messages are not in the decoder configuration record.
	positive	An image sequence track coded with HEVC where non-auxiliary SEI messages are in the decoder configuration record.
	positive	An image sequence track coded with HEVC where auxiliary SEI messages are in the decoder configuration record.

"When `aux_track_type` is equal to 'urn:mpeg:hevc:2015:auxid:xxx' (where xxx is a positive integer), as specified in B.2.5, an HEVC SEI message describing the auxiliary image sequence should be included in the sample entry."

	positive	An image sequence track coded with HEVC using an auxiliary track type different from 'urn:mpeg:hevc:2015:auxid:xxx'
	positive	An image sequence track

		coded with HEVC using auxiliary track type equal to 'urn:mpeg:hevc:2015:auxid:xxx' with auxiliary SEI messages in the sample entry
	positive	An image sequence track coded with HEVC using auxiliary track type equal to 'urn:mpeg:hevc:2015:auxid:xxx' with auxiliary SEI messages not in the sample entry

3.57 Section B.4.1.1

" The brands `'heic'` and `'heix'` are specified in the following subclauses"

	positive	An file using 'heic' and 'heix'

"The content of the item conforms to the Main profile or the Main Still Picture profile of HEVC."

	positive	An HEVC image file using the the brand 'heic' and the Main Profile of HEVC
	positive	An HEVC image file using the the brand 'heic' and the Main Still Picture Profile of HEVC

"The content of the item conforms to the Main 10 profile or any of the format range extensions profiles of HEVC. "

	positive	An HEVC image file using the the brand 'heix' and the Main 10 Profile of HEVC
	positive	An HEVC image file using the the brand 'heix' and a format range extension profile of HEVC

3.58 Section B.4.1.2

"Files including `'heic'` as a compatible brand shall contain an item that is mapped to a `DataEntryBox` with (`entry_flags` & 1) equal to 1, that is either the primary item or any item from the alternate group containing the primary item, and that fulfills one of the following constraints:
- The item is a coded image item conforming to the `'heic'` brand as specified in B.4.1.1.

- The item is a crop-and-rotate derived image item, and each source image item of the item is either a crop-and-rotate derived image item or a coded image item conforming to the `'heic'` brand as specified in B.4.1.1. "

	positive	An HEVC image file using the the brand 'heic' with a primary coded image item
	positive	An HEVC image file using the the brand 'heic' with a primary crop-and-rotate derived image item derived from a coded image

	positive	An HEVC image file using the the brand 'heic' with a primary crop-and-rotate derived image item derived from a crop-and-rotate derived image
	positive	An HEVC image file using the the brand 'heic' with an alternate group containing the primary item
	positive	An HEVC image file using the the brand 'heix' with a primary coded image item
	positive	An HEVC image file using the the brand 'heix' with a primary crop-and-rotate derived image item derived from a coded image
	positive	An HEVC image file using the the brand 'heix' with a primary crop-and-rotate derived image item derived from a crop-and-rotate derived image
	positive	An HEVC image file using the the brand 'heix' with an alternate group containing the primary item

3.59 Section B.4.1.3

" File readers should support displaying of an image with opacity information specified by an associated auxiliary image of `aux type` equal to urn:mpeg:hevc:2015:auxid:1."

	positive	An HEVC image file using an auxiliary image of type urn:mpeg:hevc:2015:auxid:1 for opacity.

3.60 Section B.4.2.2

" Track_enabled shall be equal to 1 and Track_in_movie shall be equal to 1 for at least one image sequence track conforming to with the specifications in B.3."

	positive	A file with 2 HEVC image sequence tracks with only one using track_in_movie set to 1.

"When the `'hevc'` brand is among the compatible brands, there shall be an image sequence track with `'hvc1'` sample entry type, `Track_enabled` equal to 1, `Track_in_movie` equal to 1, and each sample entry having a `data_reference_index` value such that it is mapped to a `DataEntryBox` with (`entry_flags` & 1) equal to 1, for which general_profile_idc is equal to 1 or (general_profile_compatibility_flags & $2_{(32-1)}$) is greater than 0."

	positive	A file with HEVC image sequence track with general_profile_idc set to 1

	positive	A file with HEVC image sequence track with general_profile_idc set to 0 and general_profile_compatibility_flags & $2_{(32-1)}$) greater than 0.
	positive	A file with HEVC image sequence track with general_profile_idc set to 2.
	positive	A file with HEVC image sequence track with general_profile_idc set to 4.

"Readers shall support all values allowed by 7.2.1 for the `matrix` syntax element of the `TrackHeaderBox`"

	positive	Files with HEVC image sequence track with different matrix operations

"Readers shall obey the `CleanApertureBox` of the visual sample entry when displaying an image sequence track with `'hvc1'` sample entry."

	positive	A file with HEVC image sequence track with a clean aperture box

"Displaying of an image sequence track with opacity information specified by an associated auxiliary track of `aux_track_type` equal to urn:mpeg:hevc:2015:auxid:1, as specified in B.3.3, should be supported."

	positive	A file with HEVC image sequence track with an associated auxiliary track of aux_track_type equal to urn:mpeg:hevc:2015:auxid:1

3.61 Annex C

3.62 Annex C.2

"Exif metadata that is true for the entire track may be stored in a `MetaBox` in the `TrackBox`, in one or more items of type `'Exif'`."

	positive	A image file with Exif data as an item at the file level
	positive	A image file with Exif data as an item at the movie level
	positive	A image file with Exif data as an item at the track level
	positive	A image file with Exif data as multiple items at the track level
	positive	A image file with Exif data as a metadata track

" If the TIFF Header is the first byte of the payload, the value is 0. Otherwise, it is a positive number skipping any other bytes before the TIFF Header"

	positive	A image file with Exif data with exif_tiff_header_offset set to 0

	positive	A image file with Exif data with exif_tiff_header_offset set to a value greater than 0

"There may be additional bytes before or after this Exif data but the all data shall be contained in the size indicated by the item size."

	positive	A image file with Exif data with data before the exif data
	positive	A image file with data after the Exif data

"It is not required that every sample be a 'sync sample'."

	positive	A image file with Exif data track with all sample sync samples.
	positive	A image file with Exif data track with some samples being sync samples.
	positive	A image file with Exif data track with no sample being sync samples.

3.63 Annex C.3

	positive	A image file with XMP item in the meta box containing image items
	positive	A image file with XMP item in the meta box at the track level
	positive	A image file with XMP metadata track

3.64 Annex C.4

	positive	A image file with MPEG-7 item in the meta box containing image items
	positive	A image file with MPEG-7 item in the meta box at the track level
	positive	A image file with MPEG-7 metadata track

4   Conclusion

We propose to adopt the above text as a Working Draft of Conformance for the IFF.