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AMENDMENT 1
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Graphic technology — Prepress digital data exchange — Tag image file format for image technology (TIFF/IT)

AMENDMENT 1: Use of JBIG2-Amd2 compression in TIFF/IT

Technologie graphique — Échange de données numériques de préimpression — Format de fichier d'image d'étiquette pour la technologie d'image

AMENDEMENT 1: Utilisation de la compression JBIG2-Amd2 dans le format de fichier d'image d'étiquette pour la technologie d'image

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Foreword

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Amendment 1 to ISO 12639:2004 was prepared by Technical Committee ISO/TC 130, *Graphic technology*.

Graphic technology — Prepress digital data exchange — Tag image file format for image technology (TIFF/IT)

AMENDMENT 1:Use of JBIG2-Amd2 compression in TIFF/IT

Page 13, 7.2.6, Data format

At the end of the unnumbered list, add the following additional bullet:

"— the JBIG2-Amd2-encoding scheme for the BP and SD formats (value 34715), see Annex L".

Page 14, Table 1, fourth column (“Compression”), row beginning with “Binary picture (BP)”

Replace “1,4 or 8” with “1, 4, 8 or 34715”.

Page 14, Table 1, fourth column (“Compression”), row beginning with “Screened data (SD)”

Replace “1,4 or 8” with “1, 4, 8 or 34715”.

Page 73

Add the following Annex L before the Bibliography.

Annex L
(informative)

Incorporating JBIG2-Amd2 compressed data into TIFF/IT

L.1 Incorporating JBIG2-Amd2 compressed data into TIFF/IT

This annex defines JBIG2-Amd2 compressed data that may be included in TIFF/IT-BP and TIFF/IT-SD images or files. The images described in this annex belong to TIFF/IT-BP or TIFF/IT-SD image types.

JBIG2-Amd2 compression may be used in TIFF/IT-BP and TIFF/IT-SD.

JBIG2-Amd2 compression shall not be used in TIFF/IT-BP/P1, -BP/P2, -SD/P1 or -SD/P2. JBIG2-Amd2 compression shall not be used in TIFF/IT-CT, -LW, -HC, -MP or -BL.

Unless other specifications are indicated in this annex, the compliant file, reader and writer for TIFF/IT-BP or TIFF/IT-SD with JBIG2-Amd2 compressed data shall accept the conforming level for TIFF/IT-BP or TIFF/IT-SD respectively.

In specifications of TIFF/IT-BP and TIFF/IT-SD for the JBIG2-Amd2 compressed data, classification marks and values of TIFF/IT fields basically conform to those of TIFF/IT-BP or TIFF/IT-SD images or files (see Tables 12 and 14).

L.2 Requirement for incorporating JBIG2-Amd2 compressed data into TIFF/IT-BP or TIFF/IT-SD

L.2.1 General

JBIG2-Amd2 compressed data in this annex are based on Amendment 2 to JBIG2 (JBIG2-Amd2), described in ISO/IEC 14492:2001/Amd.2:2003, which is a common text with ITU-T Rec. T.88/Amd.2. JBIG2-Amd2 may be based on sequential coding of the image pixels using arithmetic coding, which is specified in Annex E of ISO/IEC 14492:2001, which is a common text with ITU-T Rec. T.88, and a template to determine the coding state. This technique was used in ISO/IEC 11544 (JBIG), which is a common text with ITU-T Rec. T.82. JBIG2-Amd2 provides effective lossless compression for bi-level images, like the halftones used in printing.

A TIFF/IT-BP or TIFF/IT-SD image or file with the JBIG2-Amd2 compressed data shall have Compression field with the value of 34715.

259 Compression SHORT = 34715

TIFF/IT JBIG2-Amd2 compression procedure may be applied to TIFF/IT-BP and TIFF/IT-SD images. TIFF/IT JBIG2-Amd2 compression procedure shall not be applied to TIFF/IT images with the other compressed data.

NOTE JBIG2-Amd2 (ISO/IEC 14492:2001/Amd.2:2003, which is a common text with ITU-T Rec. T.88/Amd.2) was developed by ISO/IEC JTC 1/SC 29/WG 1 and published in 2003.

L.2.2 Usage of JBIG2-Amd2 compressed codestream for TIFF/IT-BP

In a TIFF/IT-BP file with the JBIG2-Amd2 compressed data, the TIFF/IT tag fields that are related to the JBIG2-Amd2 compressed data strip are StripOffsets and StripByteCounts (see Table 12). The counts of StripOffsets and StripByteCounts shall be 1. Other tag fields are not related to the descriptions of compressed strip format, and specify information related to the original (or uncompressed) TIFF/IT file format or image types to be reconstructed from the compressed image.

A JBIG2-Amd2 compressed codestream for TIFF/IT-BP in this annex has the following restrictions.

NOTE The term “Codestream” in this annex corresponds to “compressed strip data”.

a) A JBIG2-Amd2 compressed codestream contains four types of segments; profiles segment, page-information segment, immediate-lossless-generic-region segment, and end-of-page segment.

b) A JBIG2-Amd2 compressed codestream consists of at least five segments; a profiles segment, a page-information segment, at least two immediate-lossless-generic-region segments, and an end-of-page segment as shown in Figure L.1.

c) The referred-to-segment-count-and-retention-flags of the segment-headers of all segments shall be 0.

d) All segments have no referred-to-segment number fields in their segment-headers.

e) The segment-page-association in the segment-headers of all segments, except the profiles segment, shall be 1.

f) The region-segment-bitmap-X-location in the all region-segment-information-fields shall be 0.

g) The first segment in the codestream shall be a profiles segment.

   1) The segment-header-flags is 0x34.

   2) The segment-page-association in the segment-header shall be 0.

   3) The profiles-segment-data-part contains only one profile of 0x00000008.

h) The second segment shall be a page-information segment.

   1) The segment-header-flags is 0x30.

   2) A value contained in a page-bitmap-width field in the page-information segment shall be the smallest multiple of 8 which is equal to or larger than ImageWidth field (256) of TIFF/IT (i.e. each line of the image is aligned to the byte boundary before compression and inserted bits are discarded at decompression).

   3) A value of the page-bitmap-height field in the page-information-segment shall be larger than the value of the ImageLength field (257) of TIFF/IT-BP by 1.

   4) The bit-1 in a page-striping-information field shall be 0, to indicate that no refinement region segment is associated with the page.

i) From the third segment to the segment that is followed by the last segment, the segments shall be immediate-lossless-generic-region segments.

   1) The segment-header-flags is 0x27.

   2) The value of the region-segment-bitmap-width field in the region-segment-data-header shall be equal to the values of page-bitmap-width field in the page-information segment.

3) The bit-0 (MMR) in the generic-region-segment-flags field shall be 0, to indicate that MMR coding is not used in this segment.

4) The bit-1~2 (GBTEMPLATE) in the generic-region-segment-flags field shall be 00, to indicate that the template with 16 reference pixels is used for template-based arithmetic coding.

5) The bit-4 (EXTTEMPLATE) in the generic-region-segment-flags field shall be 1, to indicate that the codestream in this segment is encoded by JBIG2-Amd2.

6) For the first immediate-lossless-generic-region segment:

   i) the region-segment-bitmap-Y-location value shall be 0;

   ii) the value of the region-segment-bitmap-height field in the region-segment-data-header shall be equal to or smaller than the ImageLength field (257) of TIFF/IT-BP.

7) For the last immediate-lossless-generic-region segment:

   i) the value of the region-segment-bitmap-Y-location field shall be equal to the ImageLength field (257) of TIFF/IT-BP;

   ii) the region-segment-bitmap-height value is 1.

8) For the intermediate immediate-lossless-generic-region segments (if exist):

   i) the value of the region-segment-bitmap-Y-location field shall be equal to the total of the region-segment-bitmap-height values in the region-segment-data-header of the preceding immediate-lossless-generic-region segments;

   ii) the sum of the region-segment-bitmap-height value in its own region-segment-data-header and the total of the region-segment-bitmap-height values in the region-segment-data-header of the preceding immediate-lossless-generic-region segments shall be equal to or smaller than the ImageLength field (257) of TIFF/IT-BP;

   iii) the total of the region-segment-bitmap-height values in the region-segment-data-header of the first and intermediate immediate-lossless-generic-region segments shall be equal to the ImageLength field (257) of TIFF/IT-BP.

j) The last segment shall be an end-of-page segment and its segment-header-flags is 0x31.

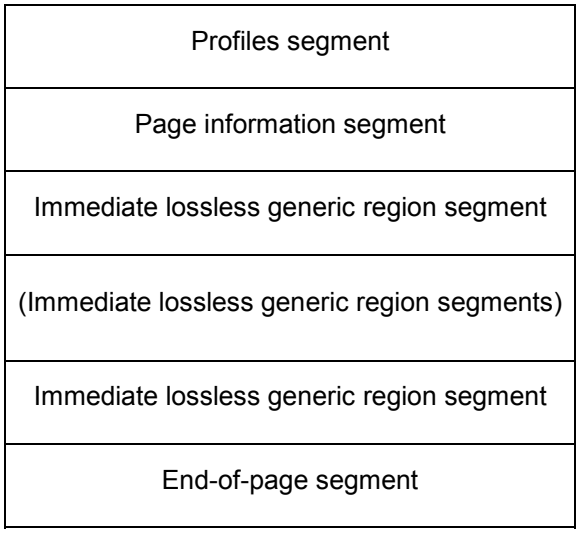

Figure L.1 — Structure of JBIG2-Amd2 codestream for TIFF/IT-BP

L.2.3 Usage of JBIG2-Amd2 compressed codestream for TIFF/IT-SD

In a TIFF/IT-SD file with JBIG2-Amd2 compressed data, the TIFF/IT tag fields that are related to the JBIG2-Amd2 compressed data strip are StripOffsets and StripByteCounts (see Table 14). The value of SamplesPerPixel and the counts of StripOffsets and StripByteCounts shall be 4. Other tag fields are not related to the descriptions of compressed strip format and specify information related to the original (or uncompressed) TIFF/IT file format or image types to be reconstructed from the compressed image.

A JBIG2-Amd2 compressed codestream for TIFF/IT-SD encapsulates the codestreams for TIFF/IT-BP encoding separately for each colour-separation, i.e. TIFF/IT-SD has four strips, each of which is the JBIG2-Amd2 compressed codestream for one colour-separation, as shown in Figure L.2.

Figure L.2 — Structure of JBIG2-Amd2 codestream for TIFF/IT-SD

L.2.4 Strip format in TIFF/IT JBIG2-Amd2 images

Strip format in this annex shall be the compressed codestream format in conformity with the profile 0x00000008 of the JBIG2-Amd2. For further details, refer to ISO/IEC 14492:2001 | ITU-T Rec. T.88 (2000) and ISO/IEC 14492:2001/Amd.2:2003 | ITU-T Rec. T.88 (2000)/Amd.2.

L.3 Example of JBIG2-Amd2 codestream for TIFF/IT-BP

Figure L.3 shows an example of JBIG2-Amd2 codestream for TIFF/IT-BP, which consists of five segments, as shown in Figure L.1. In the example, the double-underlined values are uniquely fixed, in accordance with the standards of ISO/IEC 14492:2001 and its amendments. The single-underlines indicate the recommended values.

NOTE An example codestream is also given in Annex H of ISO/IEC 14492:2001 (ITU-T Rec. T.88), but it does not contain any segments encoded by the method of Amendment 2 to JBIG2, and it contains too many types of segments unnecessary for this annex. This example contains only the segments required for JBIG2-Amd2 compressed data for TIFF/IT-BP.

(A1) 00 00 00 00 (A2) 34 (A3) 00 00 (A4) 00 00 00 04	[Profiles segment header] (A1) Segment number, (A2) Segment header flags, (A3) Segment page association, (A4) Segment data length
(A5) 00 00 00 08	[Profiles segment data part] (A5) Profile number
(B1) 00 00 00 01 (B2) 30 (B3) 00 (B4) 01 (B5) 00 00 00 13 ...	[Page information segment header] (B1) Segment number, (B2) Segment header flags, (B3) Referred-to-segment count and retention flags, (B4) Segment page association, (B5) Segment data length
(B6) 00 00 4E 20 (B7) 00 00 9C 41 (B8) 00 00 00 00 (B9) 00 00 00 00 (B10) 01 (B11) 00 00	[Page information segment data part] (B6) Page bitmap width, (B7) Page bitmap height, (B8) Page X resolution, (B9) Page Y resolution, (B10) Page segment flags, (B11) Page striping information
(C1) 00 00 00 02 (C2) 27 (C3) 00 (C4) 01 (C5) FF FF FF FF	[Immediate lossless generic region segment header] (C1) Segment number, (C2) Segment header flags, (C3) Referred-to-segment count and retention flags, (C4) Segment page association, (C5) Segment data length
(C6) 00 00 4E 20 (C7) 00 00 9C 40 (C8) 00 00 00 00 (C9) 00 00 00 00 (C10) 00 (C11) 10 (C12) FE 00 00 FE FE FF FF FE 01 FE 02 FF FD 00 FC 00 02 FE 03 FF FE FE FD FF (C13) ## ... ##	[Immediate lossless generic region segment data part] (C6) Region segment bitmap width, (C7) Region segment bitmap height, (C8) Region segment bitmap X location, (C9) Region segment bitmap Y location, (C10) Region segment flags, (C11) Generic region segment flags, (C12) Generic region segment AT flags, (C13) Body of encoded codestream
(D1) 00 00 00 03 (D2) 27 (D3) 00 (D4) 01 (D5) FF FF FF FF	[Immediate lossless generic region segment header] (D1) Segment number, (D2) Segment header flags, (D3) Referred-to-segment count and retention flags, (D4) Segment page association, (D5) Segment data length
(D6) 00 00 4E 20 (D7) 00 00 00 01 (D8) 00 00 00 00 (D9) 00 00 9C 40 (D10) 00 (D11) 10 (D12) FE 00 00 FE FE FF FF FE 01 FE 02 FF FD 00 FC 00 02 FE 03 FF FE FE FD FF (D13) ## ... ##	[Immediate lossless generic region segment data part] (D6) Region segment bitmap width, (D7) Region segment bitmap height, (D8) Region segment bitmap X location, (D9) Region segment bitmap Y location, (D10) Region segment flags, (D11) Generic region segment flags, (D12) Generic region segment AT flags, (D13) Body of encoded codestream
(E1) 00 00 00 04 (E2) 31 (E3) 00 (E4) 01 (E5) 00 00 00 00	[End of page segment header] (E1) Segment number, (E2) Segment header flags, (E3) Referred-to-segment count and retention flags, (E4) Segment page association, (E5) Segment data length

Figure L.3 — Example of JBIG2-Amd2 codestream for TIFF/IT-BP

Page 74, Bibliography

Add the following documents to the Bibliography:

"[3] ISO/IEC 11544, *Information technology — Coded representation of picture and audio information — Progressive bi-level image compression*"

"[4] ISO/IEC 14492:2001, *Information technology — Lossy/lossless coding of bi-level images*"

"[5] ISO/IEC 14492:2001/Amd.2:2003, *Information technology — Lossy/lossless coding of bi-level images — Amendment 2: Extension of adaptive templates for halftone coding"*

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