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**Information technology — International
Standardized Profile FCG-nnn — Computer
Graphics Metafile interchange format —**

Part 2:

FCG23 — Advanced Scientific and Technical
graphics (AST)

*Technologies de l'information — Profil normalisé international FCG-nnn —
Format d'échange de métafichier en infographie —*

Partie 2: FCG23 — Graphiques avancés scientifiques et techniques (AST)



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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.

In the field of information technology, ISO and IEC have established a joint technical committee, ISO/IEC JTC 1. In addition to developing International Standards, ISO/IEC JTC 1 has created a Special Group on Functional Standardization for the elaboration of International Standardized Profiles.

An International Standardized Profile is an internationally agreed, harmonized document which identifies a standard or group of standards, together with options and parameters, necessary to accomplish a function or a set of functions.

Draft International Standardized Profiles are circulated to national bodies for voting. Publication as an International Standardized Profile requires approval by at least 75 % of the national bodies casting a vote.

International Standardized Profile ISO/IEC ISP 12071-2 was prepared with the collaboration of

- Asia-Oceania Workshop (AOW);
- European Workshop for Open Systems (EWOS);
- Open Systems Environment Implementors' Workshop (OIW).

ISO/IEC ISP 12071 consists of the following parts, under the general title *Information technology — International Standardized Profile FCG-nnn — Computer Graphics Metafile interchange format*:

- *Part 1: FCG11 — Basic Scientific and Technical graphics (BST)*
- *Part 2: FCG23 — Advanced Scientific and Technical graphics (AST)*
- *Part 3: FCG32 — Basic Presentation and Visualization — Model Profile*
- *Part 4: FCG33 — Advanced Presentation and Visualization (APV)*

Introduction

ISO/IEC ISP 12071 is defined within the context of Functional Standardization in accordance with the principles specified in ISO/IEC TR 10000, "Framework and Taxonomy of International Standardized Profiles".

This part of ISO/IEC ISP 12071 was developed within EWOS (Structured Multimedia Group) with input from OIW through the Regional Workshop Coordination Committee (RWS-CC). RWS-CC requested AOW to explicitly or tacitly support the progression of the work. Input to the process was also made by JTC1/SC24 who provided CGM expertise. The work was harmonized at a meeting in June 1994 prior to PDISP ballot.

This part of ISO/IEC ISP 12071 provides a profile suitable for advanced scientific and technical graphics, for example CAD, mapping, earth sciences.

Information technology — International Standardized Profile FCG-nnn — Computer Graphics Metafile interchange format —

Part 2:

FCG23 - Advanced Scientific and Technical graphics (AST)

1 Scope

1.1 General

The Computer Graphics Metafile provides a file format suitable for the storage and retrieval of picture information. The file format consists of a set of elements that can be used to describe pictures in a way that is compatible between systems of different architectures and devices of differing capabilities and design.

The AST profile, described in this part of ISO/IEC 12071, defines a subset of CGM elements, sets limits and generation and interpretation behaviour according to the rules for profile definition defined in ISO/IEC 8632. The AST profile defines a version 2 CGM suitable for use in advanced scientific and technical graphics, for example CAD, mapping, earth sciences.

1.2 Position within the taxonomy

AST is one of four core profiles defined within the taxonomy for CGM profiles. These are shown in Figure 1 in diagrammatic form. The diagram uses the following conceptual framework to define profiles:

- 1) CGM version — this is a part of the standard and describes the group of elements available to the profile
- 2) complexity of the problem

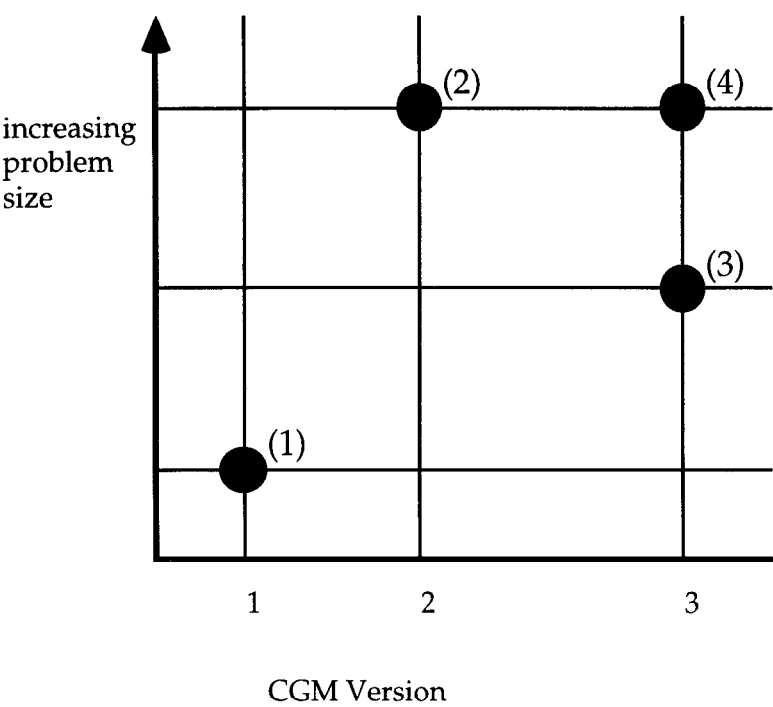


Figure 1— The 4 Core Profiles for CGM

The four core profiles (as indicated in Figure 1) are:

	Taxonomy identifier:	Profile Name:
1	FCG-11	Basic Scientific and Technical graphics (BST) e.g. business presentation graphics, simple desk top publishing
2	FCG-23	Advanced Scientific and Technical graphics (AST) e.g. CAD, mapping, earth sciences
3	FCG-32	Basic Presentation and Visualization — the Model Profile from the CGM standard, e.g. graphics arts, high end desk top publishing
4	FCG-33	Advanced Presentation and Visualization (APV) e.g. imaging, scientific visualization.

This part of ISO/IEC ISP 12071 defines the AST profile.

1.3 User requirements and scenario

This part of ISO/IEC ISP 12071 provides a profile, AST, which is suitable for advanced scientific and technical graphics, for example CAD, mapping, earth sciences.

2 Normative References

The following documents contain provisions which, through reference in this text, constitute provisions of this part of ISO/IEC ISP 12071. At the time of publication, the editions indicated were valid. All documents are subject to revision, and parties to agreements based on this part of ISO/IEC ISP 12071 are warned against automatically applying any more recent editions of the documents listed below, since the nature of references made by ISPs to such documents is that they may be specific to a particular edition. Members of IEC and ISO maintain registers of currently valid International Standards and ISPs, and ITU-T maintain published editions of its current Recommendations.

ISO/IEC 8632-1:1992, *Information technology - Computer Graphics Metafile for the storage and transfer of picture description information - Part 1: Functional specification.*

ISO/IEC 8632-2:1992, *Information technology - Computer Graphics Metafile for the storage and transfer of picture description information - Part 2: Character encoding.*

ISO/IEC 8632-3:1992, *Information technology - Computer Graphics Metafile for the storage and transfer of picture description information - Part 3: Binary encoding.*

ISO/IEC 8632-4:1992, *Information technology - Computer Graphics Metafile for the storage and transfer of picture description information - Part 4: Clear text encoding.*

ISO/IEC 8632:1992/Amd.1:1994, *Information technology - Computer Graphics Metafile for the storage and transfer of picture description information (all parts) - AMENDMENT 1 - Rules for profiles.*

ISO/IEC TR 10000-1:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 1: General principles and documentation framework (third edition).*

ISO/IEC TR 10000-2:1995, *Information technology - Framework and taxonomy of International Standardized Profiles - Part 2: Principles and Taxonomy for OSI profiles (fourth edition).*

3 Definitions

For the purposes of this part of ISO/IEC ISP 12071, the definitions given in ISO/IEC 8632:1992 apply.

4 Abbreviations

For the purposes of this part of ISO/IEC ISP 12071, the abbreviations given in ISO/IEC 8632:1992 apply.

5 Conformance

Conformance of metafiles to ISO/IEC 8632 is defined in terms of conformance to profiles. A metafile conforms to ISO/IEC 8632 if it conforms to a profile. A metafile may conform to ISO/IEC 8632 if it conforms to the AST profile defined in this part of ISO/IEC ISP 12071.

6 Specification of the AST Profile

This clause completes the Profile Pro Forma from ISO/IEC 8632 (Amendment 1) as required by the standard and is detailed in the following tables which are copied, including the table numbers, from that standard. The corrections which have been approved by ISO are marked up on the tables. The references in the pro forma are to ISO/IEC 8632 and to ISO/IEC 8632 Amendment 1.

Table 13 - Metafile rules

Functionality	Specifications - PPF	Specifications - Model Profile
T.13.1 Encodings	Same as Model Profile ☒	
	Select 1 or more encodings: Binary ☐ Character ☐ Clear text ☐ Binary ☒ Character ☒ Clear text ☒	
T.13.2 Number of pictures	Same as Model Profile ☒	
	Number of pictures permitted in a metafile: minimum (≥ 0)? <i>1</i> . maximum (≥ 0 or no limit)? <i>No limit</i> . Other: <i>None</i> .	
T.13.3 Empty pictures	Same as Model Profile ☒	
	Are pictures allowed which have no graphical primitives? (yes/no) <i>Yes</i> . Other: <i>None</i> .	
T.13.4 Metafile size	Same as Model Profile ☒	
	Any restrictions on metafile size? Other: <i>None</i> .	

Table 14 - Multi-element rules

Functionality	Specifications - PPF	Specifications - Model Profile
T.14.1 Colour References: 7.5.4.1	Same as Model Profile ☒ Select which rule applies to each metafile (choose 1): Either all colours or none shall be defined. ☐ All colours shall be defined. ☐ No colours shall be defined. ☐ Are colour indexes allowed to be redefined within a picture or metafile? (yes/no) Any restrictions on the number of distinct colours used within a picture or metafile? (Monochrome metafiles shall use at most two distinct colours.) Are conformance categories defined? (yes/no) If yes, specify. Other:	Select which rule applies to each metafile (choose 1): Either all colours or none shall be defined. ☒ All colours shall be defined. ☐ No colours shall be defined. ☐ Are colour indexes allowed to be redefined within a picture or metafile? (yes/no) <i>No</i> . Any restrictions on the number of distinct colours used within a picture or metafile? (Monochrome metafiles shall use at most two distinct colours.) <i>None</i> . Are conformance categories defined? (yes/no) <i>Yes</i> . If yes, specify. <i>3 categories: monochrome, greyscale, and colour</i> . Other: <i>None</i> .
T.14.2 Line primitives - geometric degeneracies References: 7.5.4.3	Same as Model Profile ☒ Geometric degeneracies are: Permitted ☐ Prohibited ☐ If permitted, graphical meaning of the degeneracy: Other:	Geometric degeneracies are: Permitted ☒ Prohibited ☐ If permitted, graphical meaning of the degeneracy: <i>A line primitive element, whose entire locus is a single point, denotes a graphical dot which is a filled circle, with diameter equal to the current line width and colour equal to the current line colour</i> . Other: <i>None</i> .

Table 14 - Multi-element rules (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.14.3 Filled area primitives - geometric degeneracies References: 7.5.4.4	Same as Model Profile ☒ Geometric degeneracies are: Permitted ☐ Prohibited ☐ If permitted, graphical meaning of the degeneracy: Other:	Geometric degeneracies are: Permitted ☒ Prohibited ☐ If permitted, graphical meaning of the degeneracy: <i>A filled-area primitive element, whose entire locus is either a single point or a line has the following meaning:</i> - <i>If the locus of a filled-area primitive is a single point, then the meaning is a dot (which is a filled circle).</i> - <i>If the locus of a filled-area primitive is a non-degenerate line segment, then the meaning is a line.</i> <i>The dot or line is displayed with the fill colour if EDGE VISIBILITY is 'off', unless INTERIOR STYLE is 'empty', in which case it is not rendered. If EDGE VISIBILITY is 'on', the interior treatment is the dot or line displayed in the fill colour, and then a dot or line superimposed with the current edge attributes.</i> Other: <i>None.</i>
T.14.4 Graphical text strings References: 7.5.4.5	Same as Model Profile ☒ Minimum string length (bytes): Maximum string length (bytes): Any restrictions on the use of ISO/IEC 2022 switching controls? Other:	Minimum string length (bytes): 0. Maximum string length (bytes): 254. Any restrictions on the use of ISO/IEC 2022 switching controls? <i>Any character set used in the metafile which is accessed by ISO/IEC 2022 switching techniques shall be in the Character Set List (defined in this profile). CO control codes (except NUL and ISO/IEC 2022 Other: None. Switching) are prohibited.</i>

Table 14 - Multi-element rules (continued)

Functionality	Specifications - PPF	Specifications - Model Profile
T.14.5 Non-graphical text strings References: 7.5.4.6	Same as Model Profile ☒ Maximum string length (bytes): for type SF: 254. for type SF within type D: Format effectors and ESC: Permitted ☐ Prohibited ☐ Other C0 control codes (except NUL and ISO/IEC 2022 switching) are prohibited. Any limits on the set of acceptable character sets? Any restrictions on the use of ISO/IEC 2022 switching controls? Other:	Maximum string length (bytes): for type SF: 254. for type SF within type D: 1024. Format effectors and ESC: Permitted ☒ Prohibited ☐ Other C0 control codes (except NUL and ISO/IEC 2022 switching) are prohibited. Any limits on the set of acceptable character sets? <i>The permitted character sets are ISO 8859-1 LHS No.1 and ISO 8859-1 RHS No.1.</i> Any restrictions on the use of ISO/IEC 2022 switching controls? <i>Any character set used in the metafile which is accessed by ISO/IEC 2022 switching techniques shall be in the character set list (defined in this profile).</i> Other: <i>None.</i>
T.14.6 Data record strings References: 7.5.4.7	Same as Model Profile ☒ Maximum string length (bytes) or state "no limit": SDR-coding techniques must be used (see annex C.2.2). Other:	Maximum string length (bytes) or state "no limit": 32767. SDR-coding techniques must be used (see annex C.2.2). Other: <i>None.</i>

Table 15 - Delimiter elements

Element	Specifications - PPF	Specifications - Model Profile
T.15.1	Same as Model Profile ☒	
BEGIN METAFILE	Element is: Required ☒	Element is: Required ☒
END METAFILE [v1]	The <i>metafile identifier</i> shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5.	The <i>metafile identifier</i> shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5.
References: 5.2.1 5.2.2 7.5.4.6 T.14.5	Other:	Other: <i>None</i> .
T.15.2	Same as Model Profile ☒	
BEGIN PICTURE	Element is: Required ☐ Permitted ☐ Prohibited ☐	Element is: Required ☐ Permitted ☒ Prohibited ☐
BEGIN PICTURE BODY	The <i>picture identifier</i> shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5.	The <i>picture identifier</i> shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5.
END PICTURE [v1]	Number of occurrences of these elements allowed in the metafile:	Number of occurrences of these elements allowed in the metafile: <i>No limit</i> .
References: 5.2.3 5.2.4 5.2.5 7.5.4.6 T.14.5	Other:	Other: <i>None</i> .

Table 15 - Delimiter elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.15.3 BEGIN SEGMENT END SEGMENT [v2] References: 5.2.6 5.2.7	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Maximum number of simultaneously defined segments (both global and local) at any point in the metafile: Any limits on the number of elements or restrictions on which elements compose a segment? Is there any meaning given to the <i>segment identifier</i> parameter? (yes/no) No. If yes, specify. (Meaning shall have no graphical effect.) Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneously defined segments (both global and local) at any point in the metafile: 1024. Any limits on the number of elements or restrictions on which elements compose a segment? <i>None</i>. Is there any meaning given to the <i>segment identifier</i> parameter? (yes/no) <i>No</i>. If yes, specify. (Meaning shall have no graphical effect). Other: <i>When global segments are specified in the Metafile Descriptor, all global segment definitions shall follow all other Metafile Descriptor elements. When segments are specified in the Picture Descriptor, all such segment definitions shall follow all other Picture Descriptor elements.</i>
T.15.4 BEGIN FIGURE END FIGURE [v2] References: 5.2.8 5.2.9	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Limits on the number of elements or restrictions on which elements comprise a figure definition: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number of elements or restrictions on which elements comprise a figure definition: <i>Maximum number of elements = 128. No restrictions on which eligible elements may be included.</i> Other: <i>None</i>.

Table 15 - Delimiter elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.15.5 BEGIN PROTECTION REGION END PROTECTION REGION [v3] References: 5.2.10 5.2.11	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Maximum number of simultaneously defined protection regions: Maximum number of elements within each protection region: Is there any meaning to the <i>region index</i> parameter other than as a unique identifier for each protection region? (yes/no) <i>No</i>. If yes, specify. (Meaning shall have no graphical effect). Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneously defined protection regions: 32. Maximum number of elements within each protection region: 128. Is there any meaning to the <i>region index</i> parameter other than as a unique identifier for each protection region? (yes/no) <i>No</i>. If yes, specify. (Meaning shall have no graphical effect). Other: <i>None</i>.
T.15.6 BEGIN COMPOUND LINE END COMPOUND LINE [v3] References: 5.2.12 5.2.13	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Limits on the number of elements and identity of elements comprising a path definition: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number of elements and identity of elements comprising a path definition: <i>Maximum number of elements is 128. No restrictions on which eligible elements may be included.</i> Other: <i>None</i>.

Table 15 - Delimiter elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.15.7 BEGIN COMPOUND TEXT PATH END COMPOUND TEXT PATH [v3] References: 5.2.14 5.2.15	Same as Model Profile ☐	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number and identity of elements comprising a path definition: <i>Maximum number of elements is 128. No restrictions on which eligible elements may be included.</i> Other: <i>None.</i>
	Element is: Required ☐ Permitted ☒ Prohibited ☐ Limits on the number and identity of elements comprising a path definition: Other:	
T.15.8 BEGIN TILE ARRAY END TILE ARRAY [v3] References: 5.2.16 5.2.17	Same as Model Profile ☐	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of tiles in path direction: <i>16.</i> Maximum number of tiles in line direction: <i>16.</i> Maximum number of cells/tile in path direction: <i>1024.</i> Maximum number of cells/tile in line direction: <i>1024.</i> Limits on pel path: <i>None.</i> Limits on line progression: <i>None.</i> Limits on image offset: <i>None.</i> Other: <i>None.</i>
	Element is: Required ☐ Permitted ☒ Prohibited ☐ Maximum number of tiles in path direction: Maximum number of tiles in line direction: Maximum number of cells/tile in path direction: Maximum number of cells/tile in line direction: Limits on pel path: Limits on line progression: Limits on image offset: Other:	

Table 16 - Metafile descriptor elements

Element	Specifications - PPF	Specifications - Model Profile
T.16.1 METAFILE VERSION [v1] References: 5.3.1	Same as Model Profile ☐ Element is: Required ☒ Metafile versions permitted by this profile: 1, 2 Other: None	Element is: Required ☒ Metafile versions permitted by this profile: 1, 2, 3. Other: None.
T.16.2 METAFILE DESCRIPTION [v1] References: 5.3.2 7.5.2.1 7.5.2.2 7.5.4.6 T.14.1 T.14.5	Same as Model Profile ☐ Element is: Required ☒ The <i>description</i> parameter shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5. The substring within the SF parameter shall be of the form: "keyword:item", where the double quotes are part of the substring. Maximum number of occurrences of this element? unlimited Profile identification (use keyword, "ProfileId:"); "ProfileId:AST" Profile edition (use keyword, "ProfileEd:"); "ProfileEd:1" If the profile edition is not given, then the edition defaults to 1.	Element is: Required ☒ The <i>description</i> parameter shall follow the rules for non-graphical text, clause 7.5.4.6 and T.14.5. The substring within the SF parameter shall be of the form: "keyword:item", where the double quotes are part of the substring. Maximum number of occurrences of this element? <i>Unlimited</i>. Profile identification (use keyword, "ProfileId:"); "ProfileId:Model-Profile". Profile edition (use keyword, "ProfileEd:"); "ProfileEd:1". If the profile edition is not given, then the edition defaults to 1.

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.2 continued METAFILE DESCRIPTION	Additional information content: Metafile colour conformance class, source, and date items shall be encoded as substrings of the <i>description</i> parameter using the keywords: "ColourClass:", "Source:", and "Date:", respectively. ColourClass: Required ☒ Permitted ☐ Content: As Model Source: Required ☒ Permitted ☐ Content: As Model Date: Required ☒ Permitted ☐ Content shall be date of metafile generation. As Model Other: None	Additional information content: Metafile colour conformance class, source, and date items shall be encoded as substrings of the <i>description</i> parameter using the keywords: "ColourClass:", "Source:", and "Date:", respectively. ColourClass: Required ☒ Permitted ☐ Content: <i>(One of: colour, greyscale, or monochrome.)</i> Source: Required ☒ Permitted ☐ Content: <i>(Vendor, product, and version).</i> Date: Required ☒ Permitted ☐ Content shall be date of metafile generation. <i>The form and content shall be in accordance with ISO 8601:1988.</i> Other: <i>None.</i>
T.16.3 VDC TYPE [v1] References: 5.3.3	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? Other:	Element is: Required ☒ Permitted ☐ Note - expected to be 'permitted' in Any restrictions on the parameter value? None. Next Edition Other: <i>None.</i>
T.16.4 INTEGER PRECISION [v1] References: 5.3.4	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None.</i>

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.5 REAL PRECISION [v1] References: 5.3.5	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i> .
T.16.6 INDEX PRECISION [v1] References: 5.3.6	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i> .
T.16.7 COLOUR PRECISION [v1] References: 5.3.7	Same as Model Profile ☒	
	Element is: Required ☐ Permitted ☐ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i> .

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.8 COLOUR INDEX PRECISION [v1] References: 5.3.8	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is encoding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i> .
T.16.9 MAXIMUM COLOUR INDEX [v1] References: 5.3.9	Same as Model Profile ☐ Element is: Required ☐ Permitted ☒ Prohibited ☐ Is this element required to be a least upper bound? (yes/no) No Any restrictions on the parameter values? 0-1 monochrome 0-63 greyscale 0-4095 colour Other: None	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is this element required to be a least upper bound? (yes/no) <i>No</i> . Any restrictions on the parameter values? <i>0-1 for monochrome metafiles.</i> <i>0-63 for greyscale metafiles.</i> <i>0-255 for colour metafiles.</i> Other: <i>None</i> .
T.16.10 COLOUR VALUE EXTENT [v1] References: 5.3.10	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Any restrictions on the parameter value? Other:	Element is: Required ☐ Permitted ☒ Any restrictions on the parameter value? <i>None</i> . Other: <i>None</i> .

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.11	Same as Model Profile ☐	
METAFILE ELEMENT LIST [v1] References: 5.3.11	Element is: Required ☒ Other: Only those elements allowed in Versions 1 and 2	Element is: Required ☒ Other: <i>None</i>.
T.16.12	Same as Model Profile ☒	
METAFILE DEFAULTS REPLACEMENT [v1] References: 5.3.12	Element is: Required ☐ Permitted ☐ Prohibited ☐ Is each occurrence of the MDR restricted to defining just one default? (yes/no) Additional restrictions may be specified in parts 2, 3, and 4 of ISO/IEC 8632. NOTE — Profile specifications regarding use of MDR shall be consistent with other profile specifications. For example, if a profile restricts metafiles to a single picture, then it makes little sense for the profile to require the MDR element in metafiles. Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Is each occurrence of the MDR restricted to defining just one default? (yes/no) <i>No</i>. Additional restrictions may be specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i>.

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.13	Same as Model Profile ☒	
FONT LIST [v1]	Element is: Required ☐ Permitted ☐ Prohibited ☐ This element is required for all metafiles containing graphical text.	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is required for all metafiles containing graphical text.
References: 5.3.13 annex H	Maximum number of fonts in the list: All font indexes referenced in the metafile, including the default (nominally index 1) shall be defined in the FONT LIST element, with font name construction consistent with the rules of ISO/IEC 9541. List of permitted fonts: Other:	Maximum number of fonts in the list: 64. All font indexes referenced in the metafile, including the default (nominally index 1) shall be defined in the FONT LIST element, with font name construction consistent with the rules of ISO/IEC 9541. List of permitted fonts: <i>Times-Roman</i> <i>Times-Bold</i> <i>Times-Italic</i> <i>Times-BoldItalic</i> <i>Helvetica</i> <i>Helvetica-Bold</i> <i>Helvetica-Oblique</i> <i>Helvetica-BoldOblique</i> <i>Courier</i> <i>Courier-Bold</i> <i>Courier-Oblique</i> <i>Courier-BoldOblique</i> <i>Symbol</i> NOTE — These font names are trademarked and some are proprietary and copyrighted. Times and Helvetica are registered trademarks of Allied Corporation, the owner of the copyright on the fonts of those names. Metric equivalents of the named fonts may be substituted by interpreters. Times is a serif font. Helvetica is a sans-serif font. Courier is a monospaced, serif font. The association of character code to glyph which shall be used for each of the fonts and the metrics of the named fonts are contained in annex H. Other: None.

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.14 CHARACTER SET LIST [v1] References: 5.3.14	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ This element is required for all metafiles containing graphical text. Maximum limit for the number of character sets in the character set list: Character sets shall be selected from the ISO Registry of Character Sets. This list may be extended by adding profile-defined character sets. List character sets: "94-character G-set", 4/2 (ISO 8859-1 LH); "96-character G-set", 4/1 (ISO 8859-1 RH); "94-character G-set", 2/10 3/10 (Symbol LH); "94-character G-set", 2/6 3/10 (Symbol RH). If any of these character sets is of type "complete code", specify the content of the complete code and its associated sequence tail: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ This element is required for all metafiles containing graphical text. Maximum limit for the number of character sets in the character set list: 4. Character sets shall be selected from the ISO Registry of Character Sets. This list may be extended by adding profile-defined character sets. List character sets: "94-character G-set", 4/2 (ISO 8859-1 LH); "96-character G-set", 4/1 (ISO 8859-1 RH); "94-character G-set", 2/10 3/10 (Symbol LH); "94-character G-set", 2/6 3/10 (Symbol RH). If any of these character sets is of type "complete code", specify the content of the complete code and its associated sequence tail: Not applicable. Other: None.
T.16.15 CHARACTER CODING ANNOUNCER [v1] References: 5.3.15	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? Values shall be 'basic 7-bit' and 'basic 8-bit'. Other: None.

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.16 NAME PRECISION [v2] References: 5.3.16	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ The parameter value of this element is ^{en}coding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other:	Element is: Required ☐ Permitted ☒ The parameter value of this element is ^{en}coding dependent. Restrictions are specified in parts 2, 3, and 4 of ISO/IEC 8632. Other: <i>None</i>.
T.16.17 MAXIMUM VDC EXTENT [v2] References: 5.3.17	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? <i>None</i>. Other: <i>None</i>.
T.16.18 SEGMENT PRIORITY EXTENT [v2] References: 5.3.18	Same as Model Profile ☒ Element is: Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? <i>None</i>. Other: <i>None</i>.
T.16.19 COLOUR MODEL [v3] References: 5.3.19	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the set of colour models? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the set of colour models? <i>None</i>. Other: <i>None</i>.

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.16.20 COLOUR CALIBRATION [v3] References: 5.3.20	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Calibration selection values permitted in accordance with the permitted model(s): If CYMK is permitted, minimum number of grid locations: Any restrictions on the number of colour lookup table entries, n? Any restrictions on the number of grid locations, m?: If CYMK is permitted, algorithms for interpolation between grid locations? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Calibration selection values permitted in accordance with the permitted model(s): <i>Values 1..6, 9.</i> If CYMK is permitted, minimum number of grid locations: <i>3.</i> Any restrictions on the number of colour lookup table entries, n? <i>None.</i> Any restrictions on the number of grid locations, m? <i>None.</i> If CYMK is permitted, algorithms for interpolation between grid locations? <i>None.</i> Other: <i>None.</i>
T.16.21 FONT PROPERTIES [v3] References: 5.3.21	Same as Model Profile ☐ Element is: Required ☐ Permitted ☐ Prohibited ☒ Any restrictions on the parameter values? Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? <i>All defined index and enumerated values of all parameters shall be permitted.</i> Other: <i>None.</i>

Table 16 - Metafile descriptor elements (continued)

Element	Specifications - ppf	Specifications - Model Profile
T.16.22 GLYPH MAPPING [v3] References: 5.3.22	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☒ Prohibited ☒ Subset of AFII registered glyphs which may be referenced: Maximum number of glyphs which may be defined: Other:	Element is: Required ☐ Permitted ☒ Prohibited ☐ Subset of AFII registered glyphs which may be referenced: <i>None</i> . Maximum number of glyphs which may be defined: <i>8192</i> . Other: <i>None</i> .
T.16.23 SYMBOL LIBRARY LIST [v3] References: 5.3.23	Same as Model Profile ☐	
	Element is: Required ☐ Permitted ☐ Prohibited ☒ Libraries which may be accessed and their encoding rules: Maximum number of libraries which may be accessed: Other:	Element is: Required ☐ Permitted ☐ Prohibited ☒ Libraries which may be accessed and their encoding rules: Maximum number of libraries which may be accessed: Other: <i>NOTE — There are currently no registered symbol libraries.</i>

Table 17 - Picture descriptor elements

Element	Specifications - PPF	Specifications - Model Profile
T.17.1	Same as Model Profile ☒	
SCALING MODE [v1] References: 5.4.1	<i>is</i> Element/ Required ☐ Permitted ☐ Prohibited ☐ Any restrictions on the parameter values? Other:	<i>is</i> Element/ Required ☐ Permitted ☒ Prohibited ☐ Any restrictions on the parameter values? <i>If SCALING MODE is metric then the 'metric scale factor' shall be positive.</i> Other: <i>None.</i>
T.17.2	Same as Model Profile ☒	
COLOUR SELECTION MODE [v1][v2] References: 5.4.2	<i>is</i> Element/ Required ☐ Permitted ☐ Any restrictions on the parameter values? Other:	<i>is</i> Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? <i>None.</i> Other: <i>None.</i>
T.17.3	Same as Model Profile ☐	
LINE WIDTH SPECIFICATION MODE [v1][v2] References: 5.4.3	<i>is</i> Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? <i>Only 'absolute' or 'scaled' are permitted.</i> Other: <i>None</i>	<i>is</i> Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? <i>None.</i> Other: <i>None.</i>

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.4 MARKER SIZE SPECIFICATION MODE [v1][v2] References: 5.4.4	Same as Model Profile ☐ is Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? Only 'absolute' or 'scaled' are permitted. Other: None	is Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? None. Other: None.
T.17.5 EDGE WIDTH SPECIFICATION MODE [v1][v2] References: 5.4.5	Same as Model Profile ☐ is Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? Only 'absolute' or 'scaled' are permitted. Other: None	is Element/ Required ☐ Permitted ☒ Any restrictions on the parameter values? None. Other: None.
T.17.6 VDC EXTENT [v1] References: 5.4.6	Same as Model Profile ☒ is Element/ Required ☐ Permitted ☐ Limits on the sense and orientation of the VDC space: Is zero-area VDC extent permitted? (yes/no) No If yes, specify its meaning. Other:	is Element/ Required ☐ Permitted ☒ Limits on the sense and orientation of the VDC space: None. Is zero-area VDC extent permitted? (yes/no) No. If yes, specify its meaning. Other: None.

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.7 BACKGROUND COLOUR [v1] References: 5.4.7 7.5.4.1 T.14.1	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ The <i>colour value</i> parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other:	Element ^{is} Required ☐ Permitted ☒ The <i>colour value</i> parameter shall follow the rules for colour, clause 7.5.4.1 and T.14.1. Other: <i>None</i> .
T.17.8 DEVICE VIEWPORT [v2] References: 5.4.8	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ Prohibited ☐ Interaction of this element with environmental presentation directives: Meaning of this element if the specified value is inconsistent with the presentation device: Other:	Element ^{is} Required ☐ Permitted ☐ Prohibited ☒ Interaction of this element with environmental presentation directives: Meaning of this element if the specified value is inconsistent with the presentation device: Other: <i>NOTE — This element is prohibited due to its device dependence.</i>
T.17.9 DEVICE VIEWPORT SPECIFICATION MODE [v2] References: 5.4.9	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ Prohibited ☐ Set of legal values: Other:	Element ^{is} Required ☐ Permitted ☐ Prohibited ☒ Set of legal values: Other: <i>NOTE — This element is prohibited due to its device dependence.</i>

Table 17 - Picture descriptor elements (continued)

Element	Specifications - PPF	Specifications - Model Profile
T.17.10 DEVICE VIEWPORT MAPPING [v2] References: 5.4.10	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ Prohibited ☐ Set of legal values: Other:	Element ^{is} Required ☐ Permitted ☐ Prohibited ☒ Set of legal values: Other: <i>NOTE — This element is prohibited due to its device dependence.</i>
T.17.11 LINE REP- RESENTATION [v2] References: 5.4.11 7.5.2.6 7.5.4.2 T.20.1	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ Prohibited ☐ Maximum number of simultaneous bundle definitions: Other:	Element ^{is} Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: 20. Other: <i>None.</i>
T.17.12 MARKER REP- RESENTATION [v2] References: 5.4.12 7.5.2.6 7.5.4.2 T.20.5	Same as Model Profile ☒ Element ^{is} Required ☐ Permitted ☐ Prohibited ☐ Maximum number of simultaneous bundle definitions: Other:	Element ^{is} Required ☐ Permitted ☒ Prohibited ☐ Maximum number of simultaneous bundle definitions: 20. Other: <i>None.</i>