INTERNATIONAL STANDARD

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Information processing — Text and office systems — Office Document Architecture (ODA) and interchange format —

Part 8 :
Geometric graphics content architectures

Traitement de l'information — Bureautique — Architecture des documents de bureau (ODA) et format d'échange —

Partie 8 : Architecture des contenus de caractères graphiques géométriques

Reference number
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Contents

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Annexes

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Foreword

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ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

Draft International Standards adopted by the technical committees are circulated to the member bodies for approval before their acceptance as International Standards by the ISO Council. They are approved in accordance with ISO procedures requiring at least 75% approval by the member bodies voting.

International Standard ISO 8613-8 was prepared by Technical Committee ISO/TC 97, *Information processing systems.*

At present, ISO 8613 consists of seven parts:

- part 1, Introduction and general principles;
- part 2, Document structures;
- part 4, Document profile;
- part 5, Office document interchange format (ODIF);
- part 6, Character content architectures;
- part 7, Raster graphics content architectures;
- part 8, Geometric graphics content architectures.

NOTE – At present, there is no part 3.

Further parts may be added to this International Standard.

Development of this International Standard has been in parallel with:

- ECMA–101 : 1985, *Office document architecture;*
- CCITT Recommendation T.73 (1984) : *Document interchange protocol for the telematic services;*
- CCITT Recommendations in the T.400 series (1988) : *Open Document Architecture (ODA) and Interchange Format.*

This part contains four annexes:

- annex A (informative): Summary of ASN.1 object identifiers;
- annex B (informative): Recommendation for the development of geometric graphics content architecture levels in document application profiles;
- annex C (informative): Basic differences between character primitives in the geometric graphics and the content of a basic component structured according to the character content architectures defined in ISO 8613–6;
- annex D (normative): SGML representation of geometric graphics content–specific attributes for ODL.

Information processing — Text and office systems — Office Document Architecture (ODA) and interchange format —

Part 8 :
Geometric graphics content architectures

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1 Scope

The purpose of ISO 8613 is to facilitate the interchange of documents.

In the context of ISO 8613, documents are considered to be items such as memoranda, letters, invoices, forms and reports, which may include pictures and tabular material. The content elements used within the documents may include graphic characters, geometric graphics elements and raster graphics elements, all potentially within one document.

NOTE – ISO 8613 is designed to allow for extensions, including typographical features, colour, spreadsheets and additional types of content such as sound.

ISO 8613 applies to the interchange of documents by means of data communication or the exchange of storage media.

It provides for the interchange of documents for either or both of the following purposes:

- to allow presentation as intended by the originator;
- to allow processing such as editing and reformatting.

The composition of a document in interchange can take several forms:

- formatted form, allowing presentation of the document;
- processable form, allowing processing of the document;
- formatted processable form, allowing both presentation and processing.

ISO 8613 also provides for the interchange of ODA information structures used for the processing of interchanged documents.

Furthermore, ISO 8613 allows for the interchange of documents containing one or more different types of content such as character text, images, graphics and sound.

This part of ISO 8613:

– defines a geometric graphics content architecture that can be used in conjunction with the document architecture defined in ISO 8613–2;

– defines an interface which allows the use of content structured according to ISO 8632 within documents structured according to ISO 8613–2;

– defines those aspects of positioning and imaging applicable to the presentation of this geometric graphics content architecture in a basic layout object;

– defines the presentation attributes applicable to this geometric graphics content architecture;

– describes a content layout process, which together with the document layout process described in ISO 8613–2, describes the layout of geometric graphics content in basic layout objects and determines the dimensions of these basic layout objects.

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2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this part of ISO 8613. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this part of ISO 8613 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 646 : 1983, *Information processing – ISO 7-bit coded character set for information interchange.*

ISO 8613 : 1989, *Information processing – Text and office systems – Office Document Architecture (ODA) and Interchange Format –*

Part 1 – Introduction and general principles;

Part 2 – Document structures;

Part 5 – Office Document Interchange Format (ODIF).

ISO 8632 : 1987, *Information processing systems – Computer graphics – Metafile for the storage and transfer of picture description information –*

Part 1 – Functional specification;

Part 3 – Binary encoding.

ISO 8824 : 1987, *Information processing systems – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1).*

ISO 8824 Add.1 : [1], *Information processing systems – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1) – Addendum 1: ASN.1 extensions.*

ISO 8879 : 1986, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML).*

[1] To be published.

3 Definitions, symbols, abbreviations and conventions

3.1 Definitions

For the purpose of this part of ISO 8613, the definitions given in ISO 8613–1 apply. In addition, the definitions given in ISO 8632 and ISO 8879 apply to this part of ISO 8613.

3.2 Symbols, abbreviations and conventions

3.2.1 CGM

This term is used to reference the Computer Graphics Metafile defined in ISO 8632. It is used as a qualifier for terms defined in ISO 8632 (for example, CGM elements).

3.2.2 Individual CGM elements

Throughout this part whenever individual CGM elements are referred to they are written in uppercase; for example, SCALING MODE.

3.2.3 CGM concepts

Whenever the concepts defined in CGM are referred to they are written in mixed upper and lower case as appropriate; for example, Scaling Mode or Virtual Device Coordinates.

3.2.4 Width and height

Width is used throughout this part of ISO 8613 to express the extent of a 2–dimensional area in the direction given by the counter–clockwise rotation from the horizontal direction as specified by the geometric graphics presentation attribute "orientation".

Height is used throughout this part of ISO 8613 to express the extent of a 2–dimensional area orthogonal to its width.

NOTE – Width or height are mostly used in combination with a reference to an area; for example, width of the available area.

4 General principles

4.1 Content architecture classes

This part of ISO 8613 defines one class of geometric graphics content architectures:

– a formatted processable form, which allows for document content to be processed and also to be presented as intended by the originator. Formatted processable form content can be associated with any basic component.

4.2 Content

A content portion that is structured according to a geometric graphics content architecture represents a single pictorial image. The representation is based on the Computer Graphics Metafile (CGM) defined in ISO 8632 (see 7.2).

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The CGM provides a format suitable for the storage, retrieval and interchange of picture description information. The format consists of an ordered set of elements. These elements are split into groups that

- structure the information in the metafile;
- specify the precision of the values used within the metafile;
- control the display of the picture;
- perform basic drawing actions;
- control the attributes of the basic drawing actions;
- provide access to non–standard device capabilities.

ISO 8632 defines the form (syntax) and the functional behaviour (semantics) of these elements.

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4.3 Presentation attributes

The geometric graphics content architecture defines geometric graphics presentation attributes applicable to basic layout and basic logical components. The geometric graphics presentation attributes direct the content layout process and specify the initial conditions at the start of the presentation of the content associated with a basic object.

Only the geometric graphics presentation attributes specifying CGM defaults (see 6.1.1) can be overwritten by CGM elements in the content of the basic component to which they apply.

4.4 Coding of content information

The ordered set of elements of the content portion is encoded according to the "binary" encoding defined in ISO 8632–3 and constitutes a complete CGM.

The functionality represented by the geometric graphics presentation attributes specifying CGM defaults (see 6.1.1) and CGM element groups is that defined by ISO 8632–1 and ISO 8632–3, except that

- the defaulting rules are modified (see 10.2.1);
- the CGM shall contain only one picture.

4.5 Layout and imaging of the content

The geometric graphics content architecture describes a content layout process which creates a basic layout object and determines the dimensions of this object into which the content associated with a basic logical object is to be laid out.

It also describes a content imaging process which determines the image of the content.

5 Positioning

5.1 Introduction

This clause describes the general principles concerning the positioning of a part of the VDC Space within basic layout objects.

This part is known as the *region of interest*. It is a rectangular region within the VDC Space, and is defined by two Virtual Device Coordinate pairs termed "first corner" and "second corner".

NOTE – The VDC Space is used within ISO 8632 for positioning geometric graphics elements, specifying directions, specifying dimensions etc.

5.2 Measurement units and directions

The positioning of geometric graphics content within a basic layout object is specified with relation to an orthogonal coordinate system.

The definition of the region of interest specifies the origin and directions of the axes of the coordinate system, with respect to the basic layout object.

Figure 1 illustrates that depending on which coordinates of the VDC Space are referenced by "first corner" and "second corner" the region of interest can affect the orientation of the axes used when imaging the geometric graphics content.

The measurement units of the x– and y–axis of the coordinate system are determined by the relationship of the dimensions of the region of interest to the dimensions of the basic layout object.

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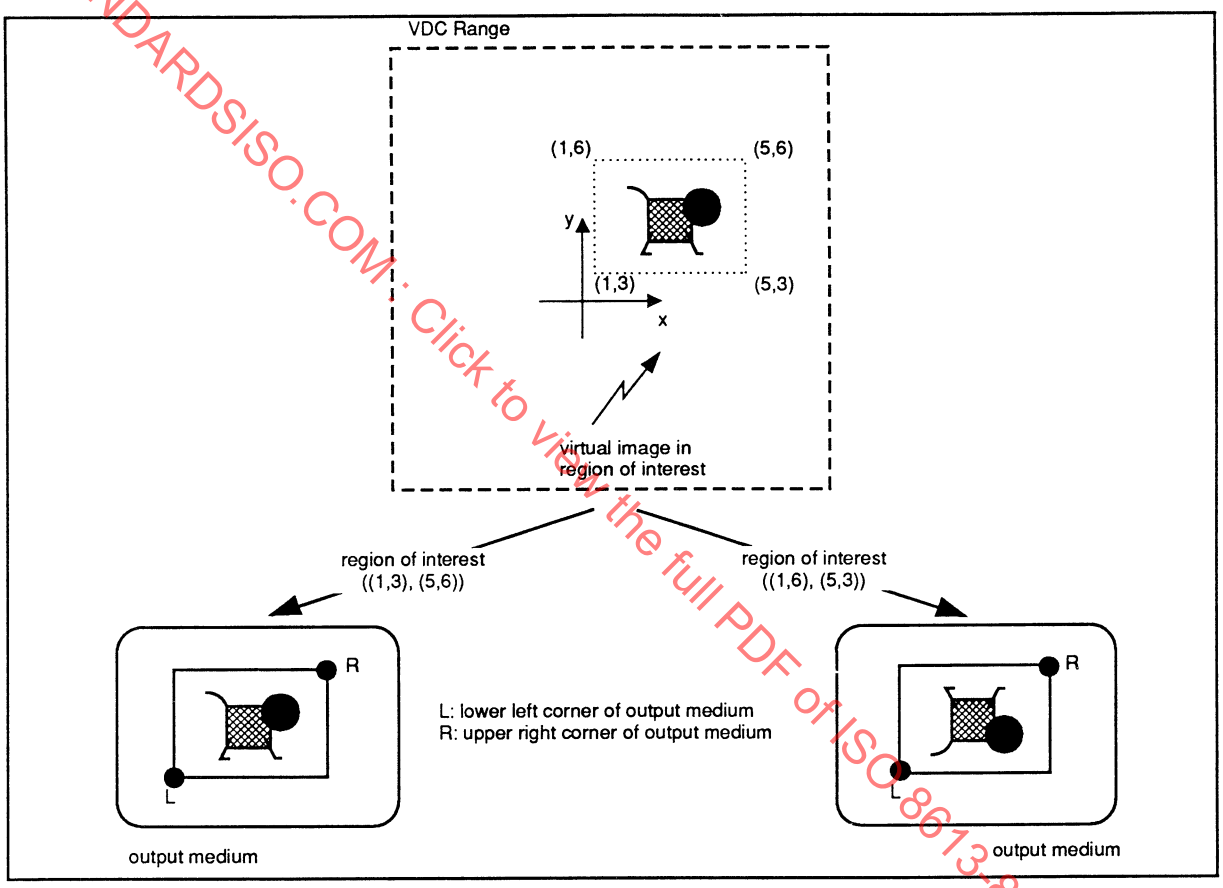

Figure 1 – Mapping of a virtual image defined in the VDC Space to an output medium (e.g. a softcopy device) using different region of interest specifications

5.3 The relationship between the region of interest and the basic layout object

When imaging geometric graphics content, the geometric graphics presentation attribute "picture orientation" determines the relationship of the "first corner" of the region of interest to the corners of the basic layout object.

The "first corner" of the region of interest is coincident with the corner of the basic layout object defined by the geometric graphics presentation attribute "picture orientation" (for example, the bottom left corner if the presentation attribute "picture orientation" has value '0°', see 6.1.3). The "second corner" of the region of interest is coincident with the diagonally opposite corner of the basic layout object. It is implied that the x–axis of the VDC Space always maps to the direction parallel to the width of the basic layout object. Figures 2 and 3 illustrate this mapping.

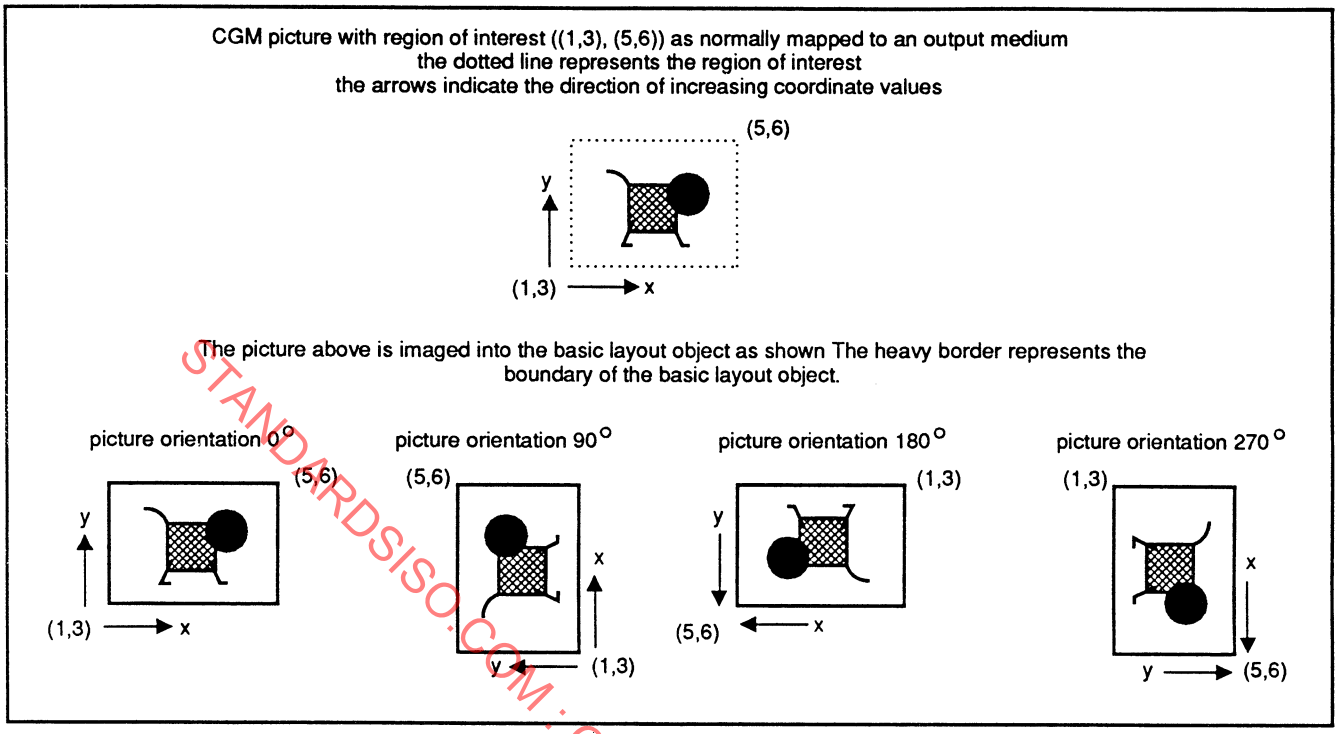

Figure 2 – Relationship of region of interest to the basic layout object (right handed axes)

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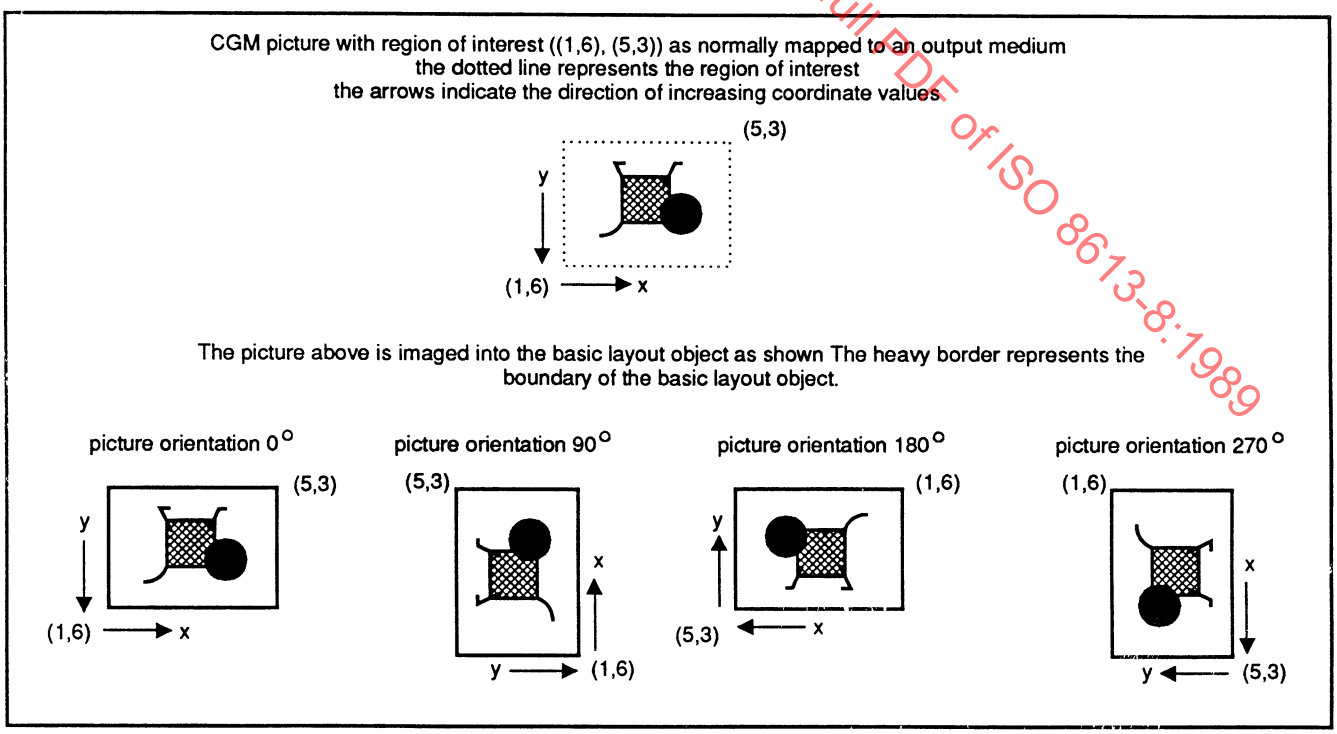

Figure 3 – Relationship of region of interest to the basic layout object (left handed axes)

6 Definition of geometric graphics presentation attributes

Presentation attributes specify the constraints and initial conditions relating to the layout and imaging of a basic component. They may be specified for basic layout components, presentation styles and default value lists.

The following categories of presentation attributes are defined:

– logical presentation attributes which take effect during the content layout process but are ignored during the content imaging process;

– layout presentation attributes which take effect during the content imaging process. Their values are either determined by a content layout process or specified by a process that creates or edits the content;

– shared presentation attributes which take effect during both the content layout and imaging processes.

The geometric graphics presentation attributes are summarized in Table 1.

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Table 1 – Geometric graphics presentation attributes

Shared attributes	**Layout attributes**
Geometric graphics encoding announcer Line rendition Marker rendition Text rendition Filled area rendition Edge rendition Colour representation Transparency specification Transformation specification Region of interest specification Picture orientation	No layout presentation attributes are specified for this content architecture
	Logical attributes
	Picture dimensions

For each presentation attribute, a default value is defined. This value is used in the defaulting rules as defined in ISO 8613–2.

This clause also defines values specific to the geometric graphics content architecture for the content architecture class attributes. These attributes are defined in ISO 8613–2.

6.1 Shared presentation attributes

6.1.1 Attributes specifying CGM defaults

The following presentation attributes provide information used for the construction and interpretation of the CGM defaults. They provide information used by the layout and imaging processes.

NOTE – This part of ISO 8613 uses the term "CGM defaults" whenever ISO 8632 uses the term "metafile defaults". This is intended to indicate the different semantics, in conformance with clause 3.2.1, of "defaults" when used in the context of ISO 8613 (ODA) or ISO 8632 (CGM).

The default values given for the parameters of these presentation attributes have been derived from the defaults of the corresponding CGM elements as given in ISO 8632–1 and ISO 8632–3.

NOTE – Defaults for parameters specifying Direct Colour Values are given either as "foreground" representing the foreground colour, or "background" representing the background colour. The choice of foreground and background colour is implementation dependent. For reproduction on paper the background colour will normally be the colour of the paper, for instance white, and the foreground colour a contrasting colour, for instance black.

The presentation attribute "geometric graphics encoding announcer" specifies the encoding of parameters of the remaining CGM defaults attributes and specifies default values for the corresponding CGM elements.

The values of the CGM defaults attributes applicable to a basic object are determined by the defaulting rules defined in ISO 8613–2.

The value of each parameter of a CGM defaults attribute is:

- the value specified;
- if not specified, the value defined in the specification of the default values for the attribute applicable to this parameter.

This part of ISO 8613 does not contain definitions of parameters of presentation attributes specifying CGM defaults which have the same definitions and semantics as CGM elements or parameters of these CGM elements with corresponding names defined in ISO 8632–1. This clause and its sub–clauses contain definitions of parameters for which the definitions differ from the definitions given in ISO 8632–1 and those parameters which are not defined in ISO 8632–1.

For certain parameters the CGM defines value ranges as being reserved for registration. The meanings of these values will be defined using the established procedures of the ISO International Registration Authority for Graphical Items.

The specification of the parameters of the CGM defaults attributes, their permissible and default values is made in tabular form. Some of these parameters have values composed of several sub–parameters. They are shown indented beyond the parameters using a smaller sized font. The sub–parameters may be further substructured. This is shown by further indentation.

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Tables 2, 3 and 4 define the default values for the bundle representations, the pattern representations and colour representations, respectively. These tables are used when determining the default state of the imaging process (see 10.2.1).

Table 2 – Default bundle representations

Representations	Bundle Index				
	1	2	3	4	5
Line					
Line Type	1(solid)	2(dash)	3(dot)	4(dash-dot)	5(dash-dot-dot)
Line Width (if scaled)	1,0	1,0	1,0	1,0	1,0
(if absolute)	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent
Line Colour (if indexed) (if direct)	1 foreground	1 foreground	1 foreground	1 foreground	1 foreground
Marker					
Marker Type	1(dot)	2(plus)	3(asterisk)	4(circle)	5(cross)
Marker Size (if scaled)	1,0	1,0	1,0	1,0	1,0
(if absolute)	0,01 x length of longest side of default VDC Extent	0,01 x length of longest side of default VDC Extent	0,01 x length of longest side of default VDC Extent	0,01 x length of longest side of default VDC Extent	0,01 x length of longest side of default VDC Extent
Marker Colour (if indexed) (if direct)	1 foreground	1 foreground	1 foreground	1 foreground	1 foreground
Text					
Font Index	1	1	none defined	none defined	none defined
Text Precision	string	character	–	–	–
Character Expansion Factor	1,0	0,7	–	–	–
Character Spacing	0,0	0,0	–	–	–
Text Colour (if indexed) (if direct)	1 foreground	1 foreground	– –	– –	– –
Filled Area					
Interior Style	hollow	hatch	hatch	hatch	hatch
Fill Colour (if indexed) (if direct)	1 foreground	1 foreground	1 foreground	1 foreground	1 foreground
Hatch Index	1 (horizontal equally spaced parallel lines)	1 (horizontal equally spaced parallel lines)	2 (vertical equally spaced parallel lines)	3 (positive slope equally spaced parallel lines)	4 (negative slope equally spaced parallel lines)
Pattern Index	1	1	1	1	1

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Table 2 – Default bundle representations (concluded)

Representations	Bundle Index				
	1	2	3	4	5
Edge					
Edge Type	1(solid)	2(dash)	3(dot)	4(dash-dot)	5(dash-dot-dot)
Edge Width (if scaled)	1,0	1,0	1,0	1,0	1,0
(if absolute)	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent	0,001 x length of longest side of default VDC Extent
Edge Colour (if indexed) (if direct)	1 foreground	1 foreground	1 foreground	1 foreground	1 foreground

Table 3 – Default pattern representations

Pattern Table Entry	Pattern Table Index
	1
NX (number of columns in pattern array)	1
NY (number of rows in pattern array)	1
Local Colour Precision	0
Colour Index Array (if indexed)	{1}
Value Array (if direct)	{foreground}

Table 4 – Default colour representations

Colour Table Entry	Colour Table Index	
	0	1
Direct Colour Value	background	foreground

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6.1.1.1 Geometric graphics encoding announcer

Parameter	Permissible values	Default
VDC Type	integer, real	integer
Integer Precision	8, 16, 24, 32	16
Real Precision	(floating point format, 9, 23), (floating point format, 12, 52), (fixed point format, 16, 16), (fixed point format, 32, 32),	(fixed point format, 16, 16)
Index Precision	8, 16, 24, 32	16
Colour Precision	8, 16, 24, 32	8
Colour Index Precision	8, 16, 24, 32	8
Maximum Colour Index	any integer ≥ 0	63
Colour Value Extent	any pair of Direct Colour Values	((0,0,0), (255,255,255))
Colour Selection Mode	indexed, direct	indexed
VDC Integer Precision	16, 24, 32	16
VDC Real Precision	(floating point format, 9, 23), (floating point format, 12, 52), (fixed point format, 16, 16), (fixed point format, 32, 32)	(fixed point format, 16, 16)

This presentation attribute specifies default values for VDC Type, Integer Precision, Real Precision, Index Precision, Colour Precision, Colour Index Precision, Maximum Colour Index, Colour Value Extent, Colour Selection Mode, VDC Integer Precision and VDC Real Precision.

This presentation attribute also determines the encoding of parameters of the remainder of the CGM defaults attributes.

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6.1.1.2 Line rendition

Parameter	Permissible values	Default
Line Width Specification Mode	absolute, scaled	scaled
Line Bundle Index	any integer > 0	1
Line Type	1 through 5 plus any registered line type > 5 (see note)	1(solid)
Line Width		
(if scaled)	any real ⩾ 0,0	1,0
(if absolute)	any non-negative VDC Value	0,001 x length of longest side of default VDC Extent
Line Colour		
(if indexed)	any integer ⩾ 0	1
(if direct)	any Direct Colour Value	foreground
line aspect source flags	any three-tuple of (line type asf, line width asf, line colour asf)	(individual, individual, individual)
line type asf	bundled, individual	
line width asf	bundled, individual	
line colour asf	bundled, individual	
line bundle specifications	any list containing zero, one or more elements	empty list
Line Bundle Index	any integer > 0	
line bundle representation	any three-tuple of (line type, line width, line colour)	
Line Type	as for individual	
Line Width		
(if scaled)	–	
(if absolute)	–	
Line Colour		
(if indexed)	–	
(if direct)	–	

NOTE — The permissible values of the parameter are restricted to values which are standardized and registered. Private values are not permitted.

This presentation attribute sets default values used for the presentation of the line primitives in the geometric graphics content portion. It specifies the default values for the Line Width Specification Mode, the Line Bundle Index, the individual CGM line attributes, the line aspect source flags and specifies the default line bundle representations.

The line bundle specifications parameter defines the initial line representations to be used for imaging a basic object. For each unspecified representation the values in table 2 apply.

This parameter consists of a list of zero, one or more pairs. Each pair consists of

- line bundle index;
- line bundle representation, which supplies values for the bundled CGM line attributes.

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6.1.1.3 Marker rendition

Parameter	Permissible values	Default
Marker Size Specification Mode	absolute, scaled	scaled
Marker Bundle Index	any integer > 0	1
Marker Type	1 through 5 plus any registered marker type > 5 (see note)	3(asterisk)
Marker Size (if scaled) (if absolute)	any real ⩾ 0,0 any non-negative VDC Value	1,0 0,01 x length of longest side of default VDC Extent
Marker Colour (if indexed) (if direct)	any integer ⩾ 0 any Direct Colour Value	1 foreground
marker aspect source flags	any three-tuple of (marker type asf, marker size asf, marker colour asf)	(individual, individual, individual)
marker type asf marker size asf marker colour asf	bundled, individual bundled, individual bundled, individual	
marker bundle specifications	any list containing zero, one or more elements	empty list
Marker Bundle Index marker bundle representation	any integer > 0 any three-tuple of (marker type, marker size, marker colour)	
Marker Type	as for individual	
Marker Size (if scaled) (if absolute)	– –	
Marker Colour (if indexed) (if direct)	– – –	

NOTE – The permissible values of the parameter are restricted to values which are standardized and registered. Private values are not permitted.

This presentation attribute sets default values used for the rendition of the marker primitives in the geometric graphics content portion. It specifies the default values for the Marker Size Specification Mode, the Marker Bundle Index, the individual CGM marker attributes, the marker aspect source flags and specifies the default marker bundle representations.

The marker bundle specifications parameter defines the initial marker representations to be used for imaging a basic object. For each unspecified representation the values in table 2 apply.

This parameter consists of a list of zero, one or more pairs. Each pair consists of

- marker bundle index;
- marker bundle representation, which supplies values for the bundled CGM marker attributes.

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6.1.1.4 Text rendition

Parameter	Permissible values	Default
Font List	any list of registered font names (see note)	list containing one element: the registered name of any font that can represent the nationality-independent character subset of ISO 646
Character Set List	any list of (character set type, designation sequence tail)	(94-character sets, designation sequence tail that is registered for a character set which includes the nationality-independent subset of ISO 646 in the positions specified in ISO 646)
character set type	94-character sets, 96-character sets, 94-character multibyte sets, 96-character multibyte sets, complete code	
designation sequence tail	any registered designation sequence tail (see note)	
Character Coding Announcer	basic 7-bit, basic 8-bit, extended 7-bit, extended 8-bit (see note)	basic 7-bit
Text Bundle Index	any integer > 0	1
Text Font Index	any integer > 0	1
Text Precision	string, character, stroke	string
Character Expansion Factor	any real > 0,0	1,0
Character Spacing	any real	0,0
Text Colour (if indexed) (if indirect)	 any integer ≥ 0 any Direct Colour Value	 1 foreground
Character Height	any non-negative VDC Value	0,01 x length of the longest side of the default VDC Extent
Character Orientation	any pair of VDC Vectors which have non-zero length and are not collinear	((0;1), (1;0))
Text Path	right, left, up, down	right
Text Alignment	any four-tuple of (horizontal alignment, vertical alignment, continuous horizontal alignment, continuous vertical alignment)	(normal horizontal, normal vertical, n/a, n/a)
horizontal alignment	normal horizontal, left, centre, right, continuous horizontal	
vertical alignment	normal vertical, top, cap, half, base, bottom, continuous vertical	
continuous horizontal alignment	any real	
continuous vertical alignment	any real	

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(continued)

Parameter	Permissible values	Default
Character Set Index	any integer > 0	1
Alternate Character Set Index	any integer > 0	1
text aspect source flags	any five-tuple of (text font index asf, text precision asf, character expansion factor asf, character spacing asf, text colour asf)	(individual, individual, individual, individual, individual)
text font asf	bundled, individual	
text precision asf	bundled, individual	
character expansion factor asf	bundled, individual	
character spacing asf	bundled, individual	
text colour asf	bundled, individual	
text bundle specifications	any list containing zero, one or more elements	empty list
Text Bundle Index	any integer > 0	
text bundle representation	any five-tuple of (text font index, text precision, character expansion factor, character spacing, text colour)	
Text Font Index	as for individual	
Text Precision	–	
Character Expansion Factor	–	
Character Spacing	–	
Text Colour	–	
(if indexed)	–	
(if direct)	–	

NOTE – The permissible values of the parameter are restricted to values which are standardized and registered. Private values are not permitted.

This presentation attribute sets default values used for the rendition of the text primitives in the geometric graphics content portion. It specifies the default values for the Font List, Character Set List, Character Coding Announcer, the Text Bundle Index, the individual CGM text attributes, the text aspect source flags and specifies the default text bundle representations.

The text bundle specifications parameter defines the initial text representations to be used for imaging a basic object. For each unspecified representation the values in table 2 apply.

This parameter consists of a list of zero, one or more pairs. Each pair consists of

– text bundle index;

– text bundle representation, which supplies values for the bundled CGM text attributes.

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6.1.1.5 Filled area rendition

Parameter	Permissible values	Default
Fill Bundle Index	any integer > 0	1
Interior Style	hollow, solid, pattern, hatch, empty	hollow
Fill Colour (if indexed) (if direct)	 any integer ≥ 0 any Direct Colour Value	 1 foreground
Hatch Index	1 through 6 plus any registered hatch index > 6 (see note)	1 (horizontal equally spaced parallel lines)
Pattern Index	any integer > 0	1
Fill Reference Point	any Virtual Device Coordinate	First Corner of default VDC Extent
Pattern Size	any four-tuple of (height vector x component, height vector y component, width vector x component, width vector y component)	(0, height of default VDC Extent, width of default VDC Extent, 0)
height vector x component	any VDC value	
height vector y component	any VDC value	
width vector x component	any VDC value	
width vector y component	any VDC value	
pattern table specifications	any list containing zero, one or more Pattern Table elements	empty list
pattern table index	any integer > 0	
nx (number of columns in pattern)	any integer > 0	
ny (number of rows in pattern)	any integer > 0	
local colour precision	0, 1, 2, 4, 8, 16, 24, 32	
colour		
index array (if indexed)	nx * ny cells of any integer ≥ 0	
value array (if direct)	nx * ny cells of any Direct Colour Value	
fill aspect source flags	any four-tuple of (interior style asf, fill colour asf, hatch index asf, pattern index asf)	(individual, individual, individual, individual)
interior style asf	bundled, individual	
fill colour asf	bundled, individual	
hatch index asf	bundled, individual	
pattern index asf	bundled, individual	

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(continued)

Parameter	Permissible values	Default
fill bundle specifications	any list containing zero, one or more elements	empty list
Fill Bundle Index	any integer > 0	
fill bundle representation	any four-tuple of (interior style, fill colour, hatch index, pattern index)	
Interior Style	as for individual	
Fill Colour		
(if indexed)	–	
(if direct)	–	
Hatch Index	–	
Pattern Index	–	
NOTE – The permissible values of the parameter are restricted to values which are standardized and registered. Private values are not permitted.		

This presentation attribute sets default values used for the presentation of the interior of filled area primitives of a geometric graphics content portion. It specifies the default values for the Fill Bundle Index, the individual CGM filled area attributes, the pattern representations, the filled area aspect source flags and default fill bundle representations, applicable to the interior region of the filled area.

The pattern table specifications parameter is a list which supplies a complete set of values for zero, one or more pattern table entries. For each unspecified pattern table entry the values in table 3 apply.

The fill bundle specifications parameter defines the initial bundle representations to be used for imaging a basic object. For each unspecified representation the values in table 2 apply.

This parameter consists of a list of zero, one or more pairs. Each pair consists of

- fill bundle index;
- fill bundle representation, which supplies values for the bundled CGM filled area attributes.

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6.1.1.6 Edge rendition

Parameter	Permissible values	Default
Edge Width Specification Mode	absolute, scaled	scaled
Edge Visibility	off,on	off
Edge Bundle Index	any integer > 0	1
Edge Type	1 through 5 plus any registered line type > 5 (see note)	1(solid)
Edge Width (if scaled) (if absolute)	 any real ≥ 0,0 any non-negative VDC Value	 1,0 0,001 x length of longest side of default VDC Extent
Edge Colour (if indexed) (if direct)	 any integer ≥ 0 any Direct Colour Value	 1 foreground
edge aspect source flags	any three-tuple of (edge type asf, edge width asf, edge colour asf)	(individual, individual, individual)
edge type asf edge width asf edge colour asf	bundled, individual bundled, individual bundled, individual	
edge bundle specifications	any list containing zero, one or more elements	empty list
Edge Bundle Index edge bundle representation Edge Type Edge Width (if scaled) (if absolute) Edge Colour (if indexed) (if direct)	any integer > 0 any three-tuple of (edge type, edge width, edge colour) as for individual – – – – –	

NOTE – The permissible values of the parameter are restricted to values which are standardized and registered. Private values are not permitted.

This presentation attribute sets default values used for the presentation of the edges of the filled area primitives in the geometric graphics content portion. It specifies the default values for the Edge Width Specification Mode, the Edge Visibility, the Edge Bundle Index, the individual CGM edge attributes, the edge aspect source flags and specifies the default edge bundle representations, applicable to the boundary of the filled area.

The edge bundle specifications parameter defines the initial edge representations to be used for imaging a basic object. For each unspecified representation the values in table 2 appiy.

This parameter consists of a list of zero, one or more pairs. Each pair consists of

- edge bundle index;
- edge bundle representation, which supplies values for the bundled CGM edge attributes.

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6.1.1.7 Colour representations

Parameter	Permissible values	Default
Background Colour	any Direct Colour Value	background
colour table specifications	any list containing zero, one or more Colour Table elements	empty list
starting index	any integer ⩾ 0	
colour list	any list containing one or more Direct Colour Values	

This presentation attribute sets the default value for Background Colour and defines the initial colour representations to be used for imaging a basic object.

The parameter colour table specifications is a list which supplies a complete set of values for zero, one or more elements each of which supplies a list of Direct Colour Value specifications together with the index of the starting colour table entry for a continuous interval of one or more colour table entries. For each unspecified colour representations the values of table 4 apply.

6.1.1.8 Transparency specification

Parameter	Permissible values	Default
Transparency	off, on	on
Auxiliary Colour		
(if indexed)	any integer ⩾ 0	0
(if direct)	any Direct Colour Value	backround

This presentation attribute sets the default values for Transparency and Auxiliary Colour.

NOTES

1 The default values of AUXILIARY COLOUR given in ISO 8632–1 and ISO 8632–3 are inconsistent. Due to these inconsistencies an arbitrary choice of 'background' was made.

2 Auxiliary Colour as defined in ISO 8632 is intended to address hardware features commonly available in raster devices. Some devices may have no such capabilities, or may have a subset of these capabilities to which this parameter pertains. Simulations of such a feature may be very complex. ISO 8632 does not require that a CGM interpreter need simulate the feature when it is not available in the hardware or firmware.

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6.1.1.9 Transformation specification

Parameter	Permissible values	Default
VDC Extent	any pair of Virtual Device Coordinates defining a rectangle	((0;0), (1;1))
Clip Rectangle	any pair of Virtual Device Coordinates defining a rectangle	same as VDC Extent
Clip Indicator	off, on	on

This presentation attribute sets the default values for VDC Extent, Clip Rectangle and Clip Indicator.

The Virtual Device Coordinate (0;0) is the symbolic value of the origin of the coordinate system of the VDC Space. The Virtual Device Coordinate (1;1) is the symbolic value of

- (1,0;1,0) for VDC Type 'real';
- (32767;32767) if VDC Type is 'integer'.

NOTE – The default values of VDC EXTENT for VDC Type 'real' given in ISO 8632–1 and ISO 8632–3 are inconsistent. Due to these inconsistencies an arbitrary choice of '(1,0;1,0)' was made for the Second Corner.

6.1.2 Region of interest specification

This presentation attribute specifies the region of interest used when laying out and imaging the content of the basic object.

This presentation attribute consists of one of the following parameters:

- "rectangle", consisting of two sub–parameters specifying the Virtual Device Coordinates for the first corner and the Virtual Device Coordinates for the second corner of the region of interest;
- "automatic", not comprising any subparameters and its value is 'null'.

The default value is the parameter "automatic".

If the parameter "automatic" is specified the region of interest is the same as the VDC Extent.

If coordinate pairs for the first corner and second corner are specified using the parameter "rectangle" then the region of interest is specified by these values.

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6.1.3 Picture orientation

This presentation attribute specifies with which corner of the basic layout object the first corner of the region of interest is to be made coincident.

This presentation attribute specifies one of the four corners of a basic layout object:

0°	bottom left corner;
90°	bottom right corner;
180°	top right corner;
270°	top left corner.

The default value is 0°, bottom left corner.

6.2 Layout presentation attributes

No layout presentation attributes are specified for this content architecture.

6.3 Logical presentation attributes

6.3.1 Picture dimensions

This presentation attribute specifies the intended dimensions of the basic layout object that is to contain the image defined by the geometric graphics content portion.

The value of this attribute consists of one of four parameters:

a) "width controlled";

b) "height controlled";

c) "area controlled";

d) "automatic".

The parameter "width controlled" has two subparameters "minimum width" and "preferred width".

The parameter "height controlled" has two subparameters "minimum height" and "preferred height".

The parameter "area controlled" has five subparameters:

- "minimum width";
- "preferred width";
- "minimum height";
- "preferred height";
- "aspect ratio flag".

The parameter "automatic" has no subparameters and its value is 'null'.

The sub–parameter "aspect ratio flag" has the value 'fixed' or 'variable'. All other sub–parameters have non–negative integer values in SMUs.

The default value of this attribute is the parameter "automatic".

The values of "minimum width" and "preferred width" specify the lower limit and the upper limit of the allowed widths of the basic layout object. The value of the "minimum width" shall not be greater than the value of the "preferred width".

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The values of "minimum height" and "preferred height" specify the lower limit and the upper limit of the allowed heights of the basic layout object. The value of the "minimum height" shall not be greater than the value of the "preferred height".

If either or both of the values for "preferred width" and "preferred height" are specified the dimensions of the basic layout object shall be as close to the corresponding specified values as possible.

"Aspect ratio flag" has one of the values 'fixed' or 'variable', specifying whether or not the aspect ratio of the basic layout object shall be equal to that of the region of interest.

If only the range of allowed widths for the basic layout object is specified (case a), this attribute specifies that the height of the basic layout object shall be such that the aspect ratio of the region of interest is maintained.

If only the range of allowed heights for the basic layout object is specified (case b), this attribute specifies that the width of the basic layout object shall be such that the aspect ratio of the region of interest is maintained.

If both the ranges of allowed width and heights are specified (case c) the value of "aspect ratio flag" determines whether or not the aspect ratio of the region of interest shall be maintained during the determination of the dimensions of the basic layout object.

If neither the range of allowed heights nor the range of allowed widths is specified (case d), this attribute specifies that the width of the basic layout object shall be equal to the dimension of the available area in that direction and that the height is constrained to maintain the aspect ratio of the region of interest.

6.4 Content architecture class attributes

6.4.1 Content architecture class

The value of the attribute "content architecture class" of a basic component description that conforms to this part of ISO 8613 is an ASN.1 object identifier with the value

{ 2 8 2 8 0 }.

6.4.2 Content type

The attribute "content type" cannot be used to specify the content architecture defined in this part of ISO 8613.

6.5 Interaction with document architecture attributes

The value 'concatenate' of the layout directive attribute "concatenation" is ignored. This attribute is not taken into account during the layout of the geometric graphics content.

The layout directive attribute "indivisibility" may be ignored. It provides no additional constraint for the geometric graphics content layout process.

7 Geometric graphics content portions attributes

7.1 Common coding attributes

The value of the content portion attribute "type of coding" of a content portion description that conforms to this part of ISO 8613 is an ASN.1 object identifier with the value

{ 2 8 3 8 0 }.

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7.2 Content information

The value of the content portion attribute "content information" of a content portion description that conforms to this part of ISO 8613 is an ASN.1 octet string representing a CGM conforming to the rules defined in ISO 8632–1 with the binary encoding defined in ISO 8632–3.

The relationship between ISO 8613–8 and ISO 8632 is such that

– the string specified by the attribute "content information" in a geometric graphics content portion is a complete CGM as defined in ISO 8632–1 and ISO 8632–3;

– any CGM as defined in ISO 8632–1 and ISO 8632–3 containing a single picture may be used as the value of a string specified by the attribute "content information" in a geometric graphics content portion.

NOTE – The presentation attributes specifying CGM defaults (see 6.1.1) are provided for applying the factorization mechanism of an ODA environment to data that may be shared among several geometric graphics content portions. If a geometric graphics content portion is provided by importing a CGM into the ODA environment, then extreme care should be used in any attempt to assign this CGM as a data value for the content portion attribute "content information" and using the presentation attributes to change the default values of the CGM. The effects of changing the default values of such an imported CGM could quite possibly make the interpretation of the CGM non–sensible or impossible. The presentation attributes that should especially be considered are those that would cause a misunderstanding of the CGM data (for example, the presentation attribute "geometric graphics encoding announcer").

7.3 Other coding attributes

No other coding attributes are defined in this part of ISO 8613.

8 Formal definitions of geometric graphics content architecture dependent data types

8.1 Introduction

This clause contains the formal definitions, in ASN.1 notation (defined in ISO 8824), of data types corresponding to presentation and coding attributes that are applicable to geometric graphics content architectures.

Annex D contains the SGML representation of attributes specific to the geometric graphics content architecture.

These data types are

– the data type to represent the geometric graphics content architecture specific presentation attributes in basic layout components, presentation styles and default value lists;

– the data type to represent the geometric graphics content architecture specific coding attributes in content portions;

– the data type to represent the non–basic values of the geometric graphics content architecture presentation attributes in the document profile;

– the data type to represent the non–basic values of the geometric graphics content architecture coding attributes in the document profile;

– the data type to represent the non–standard default values of geometric graphics content architecture presentation and coding attributes in the document profile.

8.2 Representation of geometric graphics presentation attributes

The data type "Geometric–Graphics–Attributes" contains a set of subordinate data types that specify the geometric graphics presentation attributes. Some of these subordinate data types are elementary but others are structured and themselves made up of subordinate data types. The format of these data types is given below.

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The subset of subordinate data types that may occur within a particular instance of the data type "Geometric–Graphics–Attributes" depends upon the particular geometric graphics content architecture level that is specified.

```
Geo–Gr–Presentation–Attributes          { 2 8 1 8 2 }
  DEFINITIONS ::= BEGIN
    EXPORTS                             Geometric–Graphics–Attributes, Encoding–Announcer,
                                        Line–Rendition, Marker–Rendition, Text–Rendition,
                                        Filled-Area-Rendition, Edge-Rendition,
                                        Colour- Representations,
                                        Transparency–Specification, Transformation–Specification,
                                        Region–Of–Interest , Picture–Orientation, Picture–Dimensions,
                                        ASF–Type, VDC–Pair, One–Of–Four–Angles;

Geometric–Graphics–Attributes ::=       SET {
    encoding–announcer                      [0] IMPLICIT  Encoding–Announcer   OPTIONAL,
    line–rendition                          [1] IMPLICIT  Line–Rendition   OPTIONAL,
    marker–rendition                        [2] IMPLICIT  Marker–Rendition   OPTIONAL,
    text–rendition                          [3] IMPLICIT  Text–Rendition   OPTIONAL,
    filled–area–rendition                   [4] IMPLICIT  Filled–Area–Rendition   OPTIONAL,
    edge–rendition                          [5] IMPLICIT  Edge–Rendition   OPTIONAL,
    colour–representations                  [6] IMPLICIT  Colour–Representations   OPTIONAL,
    transparency–specification              [7] IMPLICIT  Transparency–Specification   OPTIONAL,
    transformation–specification            [8] IMPLICIT  Transformation–Specification   OPTIONAL,
    region–of–interest                      [9]           Region–Of–Interest   OPTIONAL,
    picture–orientation                    [10] IMPLICIT  Picture–Orientation   OPTIONAL,
    picture–dimensions                     [11]           Picture–Dimensions   OPTIONAL }

Encoding–Announcer ::=                  OCTET STRING
                                            - - octet string representing the binary encoding of any
                                            - - ordered set of CGM elements identified in 6.1.1.1

Line–Rendition ::=                      SEQUENCE {
    individual–part                         [0] IMPLICIT  OCTET STRING   OPTIONAL,
                                            - - octet string representing the binary encoding of any
                                            - - ordered set of CGM elements identified in 6.1.1.2,
                                            - - up to parameter "line aspect source flags"
    asf–part                                [1] IMPLICIT SEQUENCE {
      line–type–asf                                 ASF–Type,
      line–width–asf                                ASF–Type,
      line–colour–asf                               ASF–Type
                                                        }   OPTIONAL,
    bundle–part                             [2] IMPLICIT   SEQUENCE OF SEQUENCE {
      bundle–index                                      INTEGER,
      bundle–representation                             OCTET STRING }   OPTIONAL
                                                        - - octet string representing the binary
                                                        - - encoding of the CGM elements
                                                        - - LINE TYPE, LINE WIDTH and LINE
                                                        - - COLOUR, as identified in 6.1.1.2
                                        }
```

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```
Marker–Rendition ::=                SEQUENCE {

    individual–part                     [0] IMPLICIT   OCTET STRING   OPTIONAL,
                                        - - octet string representing the binary encoding of any
                                        - - ordered set of CGM elements identified in 6.1.1.3,
                                        - - up to parameter "marker aspect source flags"

    asf–part                            [1] IMPLICIT   SEQUENCE {
      marker–type–asf                                      ASF–Type,
      marker–size–asf                                      ASF–Type,
      marker–colour–asf                                    ASF–Type
                                                               }   OPTIONAL,

    bundle–part                         [2] IMPLICIT   SEQUENCE OF SEQUENCE {
      bundle–index                                         INTEGER,
      bundle–representation                                OCTET STRING }   OPTIONAL
                                                           - - octet string representing the binary
                                                           - - encoding of the CGM elements
                                                           - - MARKER TYPE, MARKER SIZE and
                                                           - - MARKER COLOUR, as identified
                                                           - - in 6.1.1.3
                                    }

Text–Rendition ::=                  SEQUENCE {

    individual–part                     [0] IMPLICIT   OCTET STRING   OPTIONAL,
                                        - - octet string representing the binary encoding of any
                                        - - ordered set of CGM elements identified in 6.1.1.4,
                                        - - up to parameter "text aspect source flags"

    asf–part                            [1] IMPLICIT   SEQUENCE {
      text–font–asf                                        ASF–Type,
      text–precision–asf                                   ASF–Type,
      character–expansion–factor–asf                       ASF–Type,
      character–spacing–asf                                ASF–Type,
      text–colour–asf                                      ASF–Type
                                                               }   OPTIONAL,

    bundle–part                         [2] IMPLICIT   SEQUENCE OF SEQUENCE {
      bundle–index                                         INTEGER,
      bundle–representation                                OCTET STRING }   OPTIONAL
                                                           - - octet string representing the binary
                                                           - - encoding of the CGM elements
                                                           - - TEXT FONT INDEX, TEXT
                                                           - - PRECISION, CHARACTER
                                                           - - EXPANSION FACTOR, CHARACTER
                                                           - - SPACING and TEXT COLOUR, as
                                                           - - identified in 6.1.1.4
                                    }
```

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```
Filled–Area–Rendition ::=          SEQUENCE {
    individual–part                    [0] IMPLICIT   OCTET STRING   OPTIONAL,

                                       - - octet string representing the binary encoding of any
                                       - - ordered set of CGM elements identified in 6.1.1.5,
                                       - - up to parameter "pattern table specifications"
    pattern–table–part                 [1] IMPLICIT   SEQUENCE OF
                                             Pattern–Table–Element   OPTIONAL,
    asf–part                           [2] IMPLICIT   SEQUENCE {
      interior–style–asf                       ASF–Type,
      fill–colour–asf                          ASF–Type,
      hatch–index–asf                          ASF–Type,
      pattern–index–asf                        ASF–Type
                                             }   OPTIONAL,
    bundle–part                        [3] IMPLICIT   SEQUENCE OF SEQUENCE {
      bundle–index                             INTEGER,
      bundle–representation                    OCTET STRING }   OPTIONAL
                                               - - octet string representing the binary
                                               - - encoding of the CGM elements
                                               - - INTERIOR STYLE, FILL COLOUR, HATCH
                                               - - INDEX and PATTERN INDEX as
                                               - - identified in 6.1.1.5
                                   }

Pattern–Table–Element ::=          OCTET STRING
                                               - - octet string representing the binary encoding of the
                                               - - CGM element PATTERN TABLE, as identified in 6.1.1.5
                                   }

Edge–Rendition ::=                 SEQUENCE {
    individual–part                    [0] IMPLICIT   OCTET STRING   OPTIONAL,
                                       - - octet string representing the binary encoding of any
                                       - - ordered set of CGM elements identified in 6.1.1.6,
                                       - - up to parameter "edge aspect source flags"
    asf–part                           [1] IMPLICIT   SEQUENCE {
      edge–type–asf                            ASF–Type,
      edge–width–asf                           ASF–Type,
      edge–colour–asf                          ASF–Type
                                             }   OPTIONAL,
    bundle–part                        [2] IMPLICIT   SEQUENCE OF SEQUENCE {
      bundle–index                             INTEGER,
      bundle–representation                    OCTET STRING }   OPTIONAL
                                               - - octet string representing the binary
                                               - - encoding of the CGM elements
                                               - - EDGE TYPE, EDGE WIDTH and EDGE
                                               - - COLOUR, as identified in 6.1.1.6
                                   }

ASF–Type ::=                       INTEGER { bundled(0), individual(1) }
```

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```
Colour–Representations ::=          SEQUENCE {
    background–colour                   [0] IMPLICIT   OCTET STRING   OPTIONAL,
                                        - - octet string representing the binary encoding of the
                                        - - CGM element BACKGROUND COLOUR as identified
                                        - - in 6.1.1.7
    colour–table–part                   [1] IMPLICIT   SEQUENCE OF
                                                Colour–Table–Element   OPTIONAL
                                    }

Colour–Table–Element ::=            OCTET STRING
                                            - - octet string representing the binary encoding of the
                                            - - CGM element COLOUR TABLE, as identified in
                                            - - 6.1.1.7

Transparency–Specification ::=      OCTET STRING
                                        - - octet string representing the binary encoding of any
                                        - - ordered set of the CGM elements identified in 6.1.1.8

Transformation–Specification ::=    OCTET STRING
                                        - - octet string representing the binary encoding of any
                                        - - ordered set of the CGM elements identified in 6.1.1.9

Region–Of–Interest ::=              CHOICE {
      automatic                         [0] IMPLICIT NULL,
      rectangle                         [1] IMPLICIT   SEQUENCE { VDC– Pair, VDC–Pair }
                                    }

VDC–Pair ::=                        OCTET STRING
                                        - - octet string representing the binary encoding of a
                                        - - CGM Virtual Device Coordinate pair

Picture–Orientation ::=             One–Of–Four–Angles

One–Of–Four–Angles ::=              INTEGER {   d0(0),
                                                d90(1),
                                                d180(2),
                                                d270(3)    }

Picture–Dimensions ::=              CHOICE {
    width–controlled                    [0] IMPLICIT   SEQUENCE {
      minimum–width                             INTEGER,
      preferred–width                           INTEGER },
    height–controlled                   [1] IMPLICIT   SEQUENCE {
      minimum–height                            INTEGER,
      preferred–height                          INTEGER },
    area–controlled                     [2] IMPLICIT   SEQUENCE {
      minimum–width                             INTEGER,
      preferred–width                           INTEGER,
      minimum–height                            INTEGER,
      preferred–height                          INTEGER,
      aspect–ratio–flag                         INTEGER { fixed(0) , variable(1) }},
    automatic                           [3] IMPLICIT   NULL
                                    }

                                        END
```

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8.3 Representation of coding attributes

```
Geo–Gr–Coding–Attributes                { 2 8 1 8 3 }
  DEFINITIONS ::= BEGIN
      EXPORTS                           Geo–Gr–Coding–Attributes;

Geo–Gr–Coding–Attributes ::=            SET { }
                                            - - no geometric graphics coding attributes are defined
                                            - - in ISO 8613–8

                                              END
```

8.4 Representation of non–basic features and non–standard defaults

```
Geo–Gr–Profile–Attributes               { 2 8 1 8 4 }
  DEFINITIONS ::= BEGIN
      EXPORTS                           Geo–Gr–Presentation–Feature,
                                        Geo–Gr–Coding–Attribute,
                                        Geo–Gr–Content–Defaults;

      IMPORTS                           Encoding–Announcer, Line–Rendition, Marker–Rendition,
                                        Text–Rendition, Filled–Area–Rendition, Edge–Rendition,
                                        Colour–Representations, Transparency–Specification,
                                        Transformation–Specification, Region–Of–Interest,
                                        Picture–Orientation, Picture–Dimensions, ASF–Type,
                                        VDC–Pair, One–Of–Four–Angles
                                        FROM Geo–Gr–Presentation–Attributes; - - see 8.2

Geo–Gr–Presentation–Feature ::=         NULL
                                        - - no non–basic values are expected to be defined for the
                                        - - geometric graphics presentation attributes in ISO 8613–8

Geo–Gr–Coding–Attribute ::=             NULL
                                        - - no non–basic values are expected to be defined for the
                                        - - geometric graphics coding attributes in ISO 8613–8

Geo–Gr–Content–Defaults ::=             SET {
    encoding–announcer                    [0] IMPLICIT  Encoding–Announcer  OPTIONAL,
    line–rendition                        [1] IMPLICIT  Line–Rendition  OPTIONAL,
    marker–rendition                      [2] IMPLICIT  Marker–Rendition  OPTIONAL,
    text–rendition                        [3] IMPLICIT  Text–Rendition  OPTIONAL,
    filled–area–rendition                 [4] IMPLICIT  Filled–Area–Rendition  OPTIONAL,
    edge–rendition                        [5] IMPLICIT  Edge–Rendition  OPTIONAL,
    colour–representations                [6] IMPLICIT  Colour–Representations  OPTIONAL,
    transparency–specification            [7] IMPLICIT  Transparency–Specification  OPTIONAL,
    transformation–specification          [8] IMPLICIT  Transformation–Specification  OPTIONAL,
    region–of–interest                    [9]           Region–Of–Interest  OPTIONAL,
    picture–orientation                  [10] IMPLICIT  Picture–Orientation  OPTIONAL,
    picture–dimensions                   [11]           Picture–Dimensions  OPTIONAL }

                                              END
```

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9 Content layout process

This clause describes a content layout process for basic logical objects associated with content architectures of type geometric graphics.

Its purpose is to aid understanding of the semantics of the presentation attributes by describing the required results of such a process. However, it is not intended to specify any process that might be carried out in a particular implementation to achieve these results.

9.1 Introduction

9.1.1 Purpose

The content layout process describes a process of laying out the geometric graphics content into an allocated area. This area is referred to as the available area and is determined by the document layout process described in ISO 8613–2.

The purpose of the content layout process is to convert content associated with basic logical components into content associated with basic layout objects.

The content layout process results in the creation of a basic layout object into which the content shall be positioned. The dimensions of the basic layout object are returned to the document layout process which determines the precise position of that basic layout object within the available area.

9.1.2 Available area

The content layout process is constrained by the available area. The maximum dimensions that a basic layout object can take are constrained by the dimensions of the available area.

During the layout of content associated with a basic logical component into a basic layout object, the following cases can occur:

– the formatted processable content fits into the dimensions of the available area;

– the formatted processable content does not fit into the dimensions of the available area; in this case, a new available area is required.

9.1.3 Presentation attributes

The content layout process takes into account the presentation attributes applying to the basic logical object with which the content is associated. The content layout process takes also into account the region of interest that may depend on CGM elements in the content portion.

The presentation attributes applying to the content layout process can be specified in the generic layout structure and presentation styles. The values of these presentation attributes are determined according to the defaulting rules specified in ISO 8613–2.

9.1.4 Geometric graphics content architecture classes

The content layout process is specified for basic logical objects associated with the formatted processable form geometric graphics content architecture class. The content layout process does not modify the form of the content.

9.1.5 Layout of the content

For the geometric graphics content architecture class, one case of laying out the content of basic logical objects into layout objects is possible:

– single basic logical object to single basic layout object: the content associated with a single basic logical object can be laid out into a single basic layout object and is the only content associated with this basic layout object.

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9.2 Content layout process for formatted processable content architecture class

Determination of the dimensions of the basic layout object depends on the value of the presentation attribute "picture dimensions" (the four possible cases are illustrated in figures 4 to 7):

a) The presentation attribute "picture dimensions" specifies a value for the parameter "width controlled".

In this case the width of the picture will be within the range specified by the originator.

The determination of the basic layout object dimensions is constrained by the range of allowed widths given by the value of the parameter "width controlled", the dimensions of the available area and the aspect ratio of the region of interest.

The dimensions of the basic layout object shall be determined such that: The basic layout object fits into the available area; the aspect ratio of the basic layout object is the same as that of the region of interest; and the width of the basic layout object has a value that is within the range of allowed widths. The width of the basic layout object shall in addition be determined such that the deviation from the value of "preferred width", specified by the parameter "width controlled" is as small as possible.

b) The presentation attribute "picture dimensions" specifies a value for the parameter "height controlled".

In this case the height of the picture will be within the range specified by the originator.

The determination of the basic layout object dimensions is constrained by the range of allowed heights given by the value of the parameter "height controlled", the dimensions of the available area and the aspect ratio of the region of interest.

The dimensions of the basic layout object shall be determined such that: the basic layout object fits into the available area; the aspect ratio of the basic layout object is the same as that of the region of interest; and the height of the basic layout object has a value that is within the range of allowed heights. The height of the basic layout object shall in addition be determined such that the deviation from the value of "preferred height", specified by the parameter "height controlled" is as small as possible.

c) The presentation attribute "picture dimensions" specifies a value for the parameter "area controlled".

In this case the dimensions of the picture will be within the range specified by the originator. In particular, this can be used to ensure that a picture will have a fixed size.

The determination of the basic layout object dimensions is constrained by the range of allowed heights and widths given by the value of the parameter "area controlled", the dimensions of the available area and, depending on the value of the sub–parameter "aspect ratio flag" of the parameter "area controlled", by the aspect ratio of the region of interest.

The dimensions of the basic layout object shall be determined such that: The basic layout object fits into the available area; the width of the basic layout object has a value that is within the range of allowed widths; and the height of the basic layout object has a value that is within the range of allowed heights. If the value of the sub–parameter "aspect ratio flag" is 'fixed' there is the further constraint to the basic layout object dimensions, that the aspect ratio of the basic layout object shall be the same as that of the region of interest. Both the width and height of the basic layout object shall additionally be chosen such, that their deviations from their preferred values, specified by the parameter "area controlled" are both as small as possible.

d) The presentation attribute "picture dimensions" specifies a value for the parameter "automatic".

In this case the picture dimensions are automatically adjusted to the page layout.

The determination of the basic layout object dimensions is constrained by the dimensions of the available area and the aspect ratio of the region of interest.

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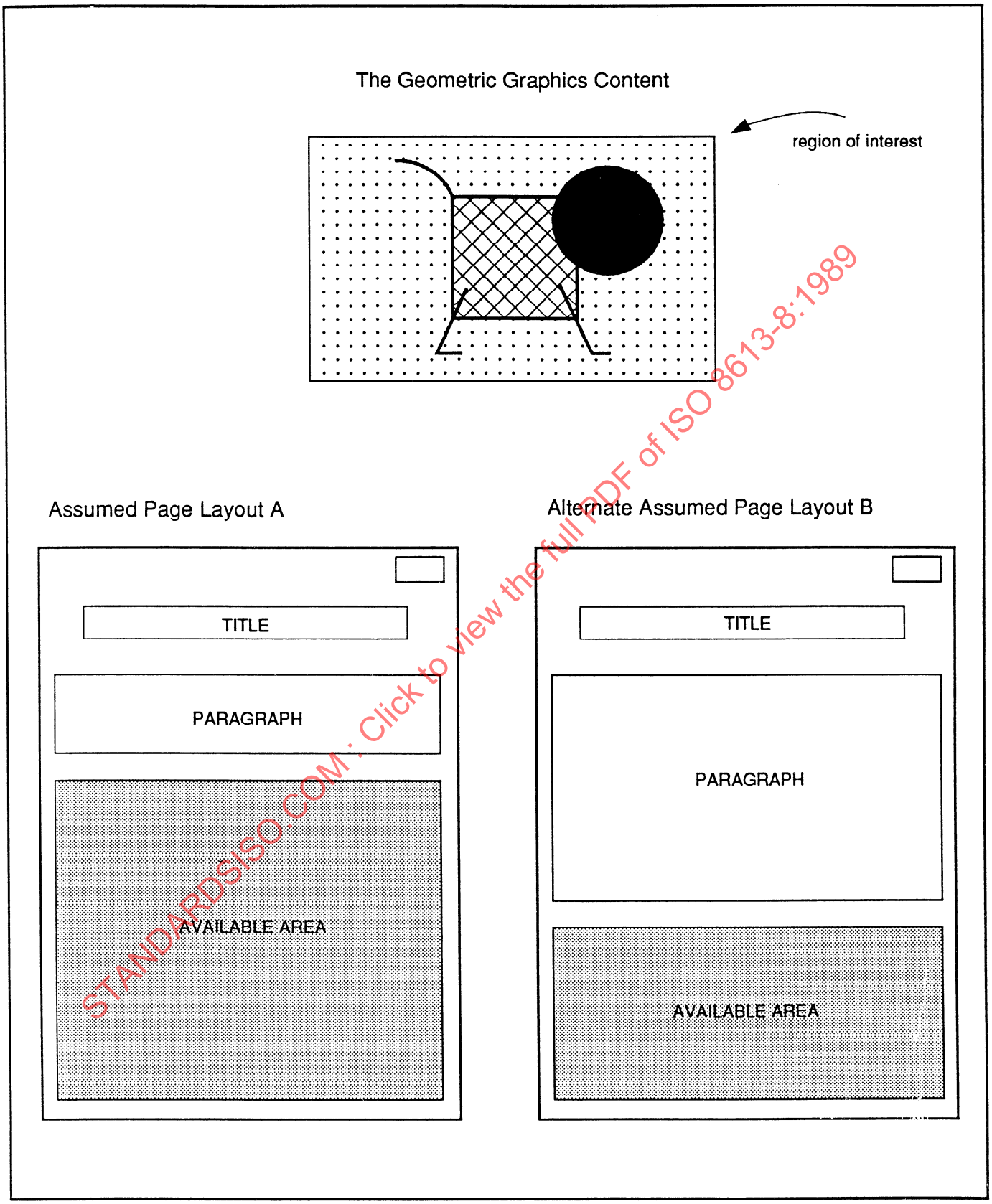

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Figure 4 – Diagrams used to illustrate the process of determining the basic layout object dimensions

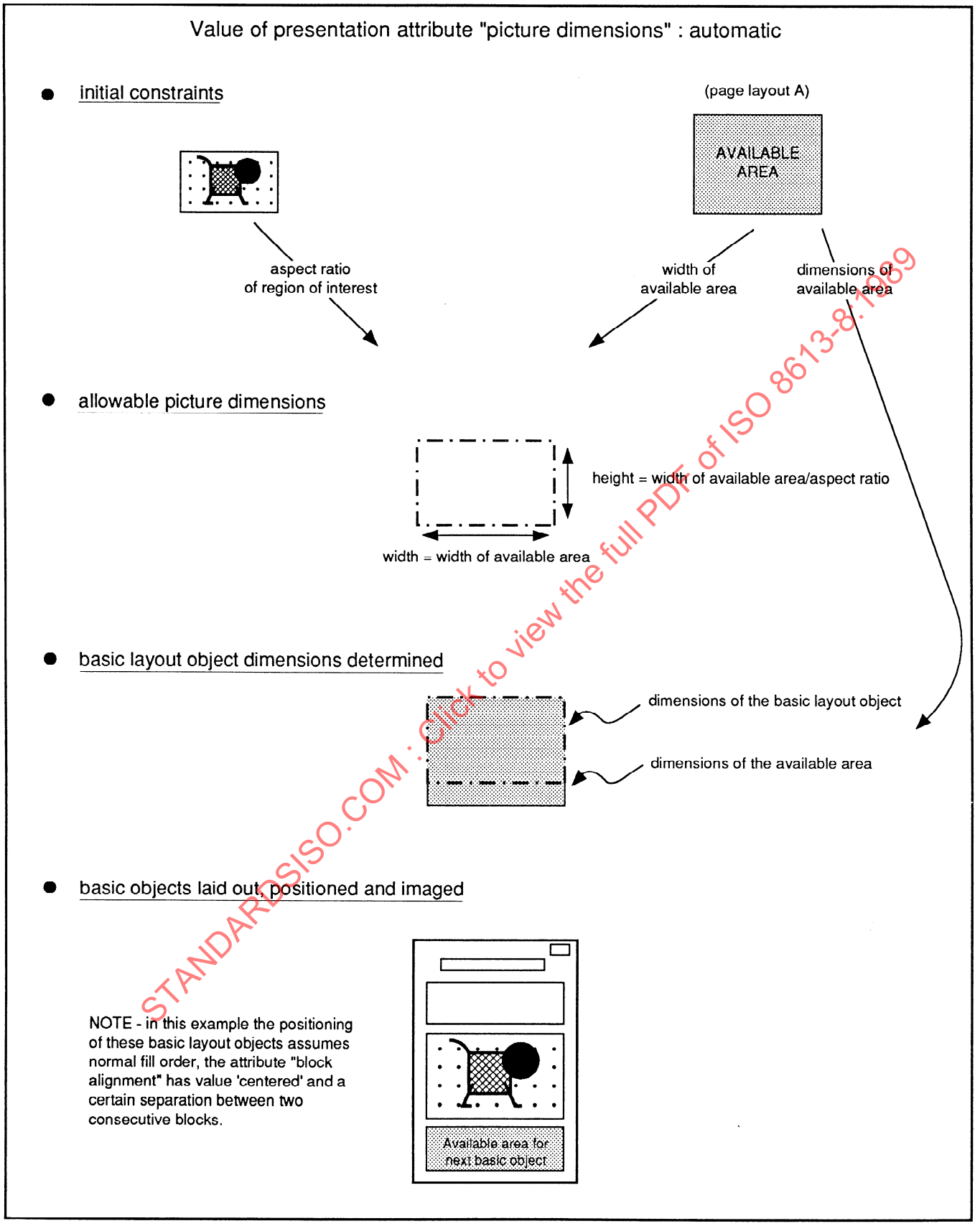

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Figure 5 – Layout process for the presentation attribute"Picture dimensions" when a value is specified for the parameter "automatic"

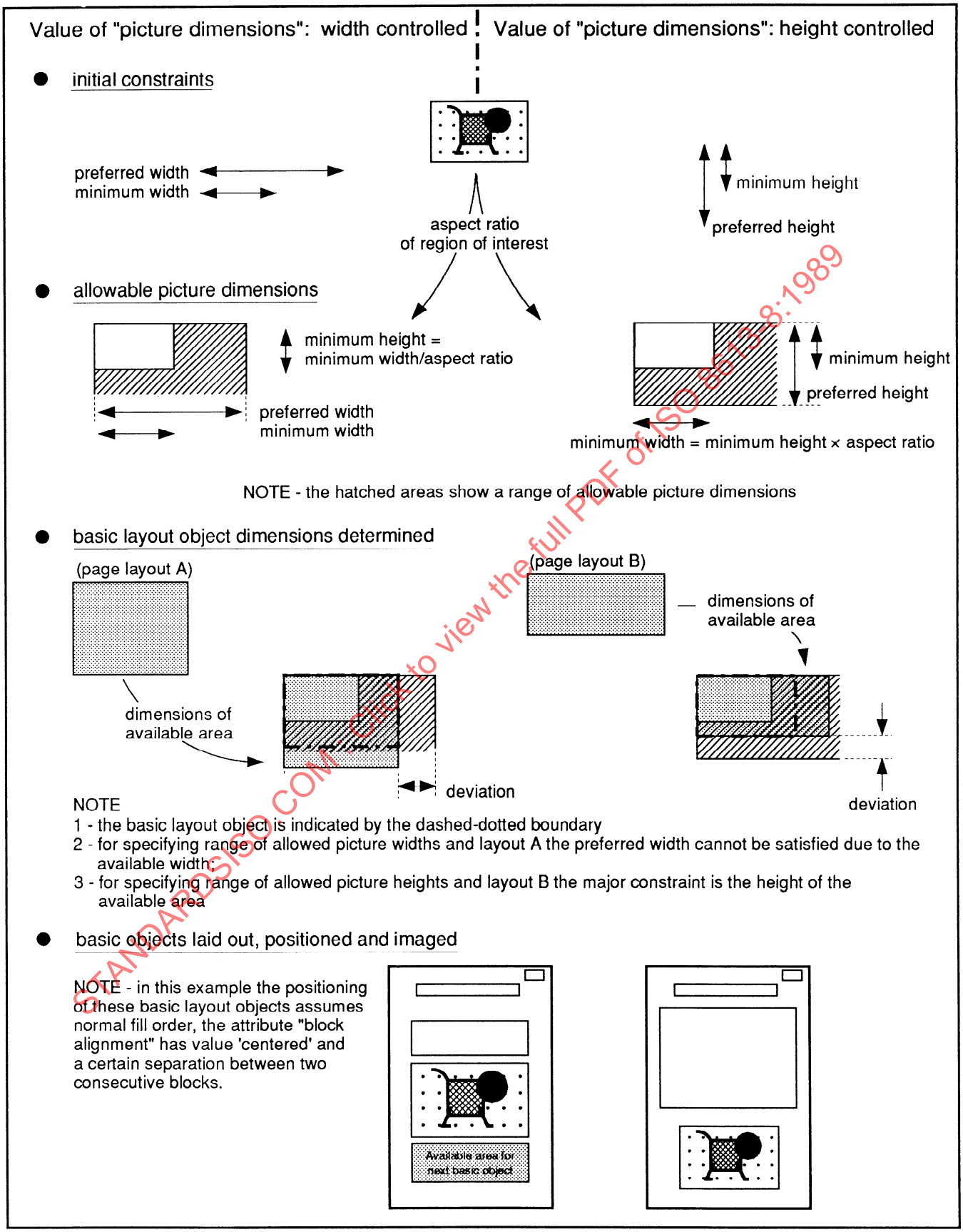

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Figure 6 – Layout process for the presentation attribute "picture dimensions" when a value is specified for the parameter "width controlled" or "height controlled"

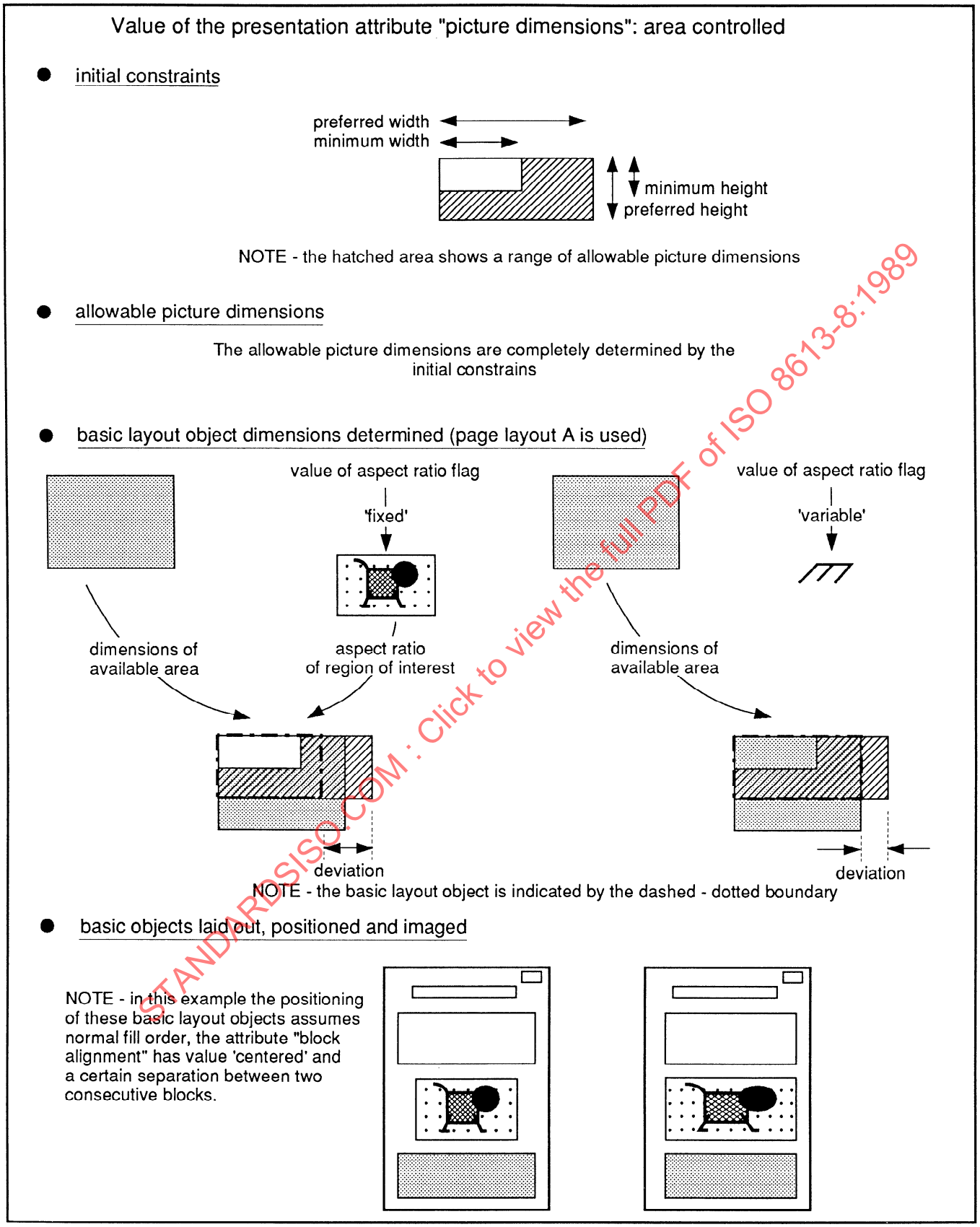

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Figure 7 – Layout process for the presentation attribute "picture dimensions" when a value is specified for the parameter "area controlled"

The dimensions of the basic layout object shall be determined such that: The basic layout object fits into the available area; the width of the basic layout object is given the same value as the dimension of the available area in that direction; and the height of the basic layout object is determined such, that the aspect ratio of the basic layout object dimensions is the same as that of the region of interest.

If the given constraints cannot be met, then no dimensions of the basic layout object are determined.

If the SCALING MODE is 'metric' it is required that the value of the parameter "area controlled" is the equivalent value in SMUs of the specified metric size, taking into account the document profile attribute "unit scaling".

The dimensions of a basic layout object are restricted to integral multiples of 1 SMU.

The presentation attribute "picture orientation" may rotate the region of interest. The rotated region of interest is used for the calculation of the basic layout object dimensions.

10 Content imaging process

This clause describes a content imaging process for basic layout objects associated with content architectures of type geometric graphics.

Its purpose is to aid understanding of the semantics of the presentation attributes by describing the required results of such a process. However, it is not intended to specify any process that might be carried out in a particular implementation to achieve these results.

10.1 Introduction

The content imaging process is only concerned with the layout structures, the presentation styles and the content of basic layout components conforming to this part of ISO 8613.

The content imaging process is applicable to the formatted processable form geometric graphics content architecture class.

10.2 Content imaging process for formatted processable form content architecture class

This clause describes how the various shared presentation attributes and CGM elements determine the image of the content.

The imaging process is divided into two parts:

- initialization;
- imaging.

10.2.1 Initialization of the imaging process

At the start of the imaging of a geometric graphics content portion the imaging process is set to a default state. The default state of the imaging process is defined by the presentation attributes specifying CGM defaults (see 6.1.1) except those parameters overwritten by CGM elements explicitly specified in the geometric graphics content portion.

The imaging process uses bundle representations, pattern representations and colour representations specified by the bundle specification, pattern table specification and colour table specification parameter values, respectively, of the geometric graphics presentation attributes "line rendition", "marker rendition", "text rendition", "filled area rendition", "edge rendition" and "colour representations" in conjunction with the defaults for these representations defined in tables 2, 3 and 4. After been set to its default state, the imaging process proceeds as if the CGM defaults have been explicitly specified in the content portion by CGM elements.

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10.2.2 Imaging

Within geometric graphics content, geometric graphics elements are positioned in a Virtual Device Coordinate Space using a Virtual Device Coordinate system. For each basic layout object a part of the Virtual Device Coordinate Space specified by the region of interest is imaged according to the geometric graphics positioning principles (see clause 5). No part of the graphical image which extends beyond the boundaries of the basic layout object is imaged.

The imaging process ignores the element SCALING MODE as the required dimensions, and hence the aspect ratio, of the basic layout object have already been determined appropriately by the layout process.

In the case that the layout texture of the basic layout object specifies the combination "colourless, transparent" the picture descriptor element BACKGROUND COLOUR is ignored.

The support of external and escape elements is not required. A valid interpretation is to ignore them. The use of private unregistered escapes is not supported in open systems interchange.

Negative values of parameters of CGM elements are allowed. However, a valid interpretation is to ignore them; i.e. the use of private unregistered values is not supported in open systems interchange.

The image of the graphic elements is as specified by ISO 8632–1.

11 Definition of geometric graphics content architecture classes

There is only one geometric graphics content archictecture class. This content architecture class provides for formatted processable form content. It is characterized as follows:

Content architecture class :	Formatted processable form
CGM elements :	All defined in ISO 8632–1 and ISO 8632–3
Type of coding :	As defined in ISO 8632–3
Geometric graphics presentation attributes :	All listed in clause 6
CGM attributes :	All CGM attributes

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Annex A

(informative)

Summary of ASN.1 object identifiers

Values of ASN.1 object identifiers are assigned in various clauses of this part of ISO 8613. These assignments are summarized in table A.1.

Table A.1 – Summary of ASN.1 object identifiers

ASN.1 object identifier value	Description	Clause
{ 2 8 2 8 0}	Value of attribute "content architecture class"	6.4.1
{ 2 8 3 8 0}	Value of attribute "type of coding"	7.1
{ 2 8 1 8 2}	Identifies module Geometric graphics presentation attributes	8.2
{ 2 8 1 8 3}	Identifies module Geometric graphics coding attributes	8.3
{ 2 8 1 8 4}	Identifies module Non-basic features and non-standard defaults	8.4

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Annex B

(informative)

Recommendations for the development of geometric graphics content architecture levels in document application profiles

This annex provides an example of the definition of a geometric graphics content architecture level. This content architecture level has been defined in accordance with the rules specified in ISO 8613–1:

– GFP–0 is an example of a content architecture level belonging to the formatted processable form content architecture class. GFP–0 is mainly based on the minimum capabilities suggested in ISO 8632–1 and ISO 8632–3.

NOTE – The document application profile may have to specify additional rules for the use of these content architecture levels in particular applications. In particular, it may specify constraints to the values of parameters of CGM elements.

B.1 Geometric graphics content architecture level GFP–0

B.1.1 Content architecture class

GFP–0 is a content architecture level derived from the formatted processable form content architecture class.

B.1.2 Presentation attributes

Table B.1 – Presentation attributes

Attribute	Basic values	Non-basic values	Default values
Geometric graphics encoding announcer	see Table B.2	None	Standard default value
Line rendition	see Table B.3	None	Standard default value
Marker rendition	see Table B.4	None	Standard default value
Text rendition	see Table B.5	None	Standard default value
Filled area rendition	see Table B.6	None	Standard default value
Edge rendition	see Table B.7	None	Standard default value
Colour specification	see Table B.8	None	Standard default value
Transparency specification	see Table B.9	None	Standard default value
Transformation specification	see Table B.10	None	Standard default value

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Table B.1 – Presentation attributes (concluded)

Attribute	Basic values	Non-basic values	Default values
Region of interest specification	rectangle,automatic	None	Standard default value
Picture orientation	0, 90, 180, 270	None	Standard default value
Picture dimensions	width controlled, height controlled, area controlled, automatic	None	Standard default value

Tables B.2 to B.10 provide the BASIC values of the parameters of the presentation attributes specifying CGM defaults.

The third column of each table shows the relationship of the basic values to the complete set of permissible values as defined in the main body of ISO 8613–8. In those cases where the basic values include all possible values allowed by ISO 8613–8 the entry in the third column is labelled 'none'. For structured parameters the basic values and the relation to the complete set of permissible values of their components are given to indicate that all possible combinations of its components form the basic values and the complete set of permissible values of a parameter respectively.

Table B.2 – Geometric graphics encoding announcer

Parameter	Basic values	Values not in the set of basic values
VDC Type	integer, real	none
Integer Precision	8, 16, 24, 32	none
Real Precision	(floating point format, 9, 23), (floating point format, 12, 52), (fixed point format, 16, 16), (fixed point format, 32, 32)	none
Index Precision	8, 16, 24, 32	none
Colour Precision	8, 16, 24, 32	none
Colour Index Precision	8, 16, 24, 32	none
Maximum Colour Index	any integer ≥ 0 and ≤ 63	all other permissible values
Colour Value Extent	((0,0,0), (255,255,255))	all other permissible values
Colour Selection Mode	indexed, direct	none
VDC Integer Precision	16, 24, 32	none
VDC Real Precision	(floating point format, 9, 23), (floating point format, 12, 52), (fixed point format, 16, 16), (fixed point format, 32, 32)	none

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Table B.3 – Line rendition

Parameter	Basic values	Values not in the set of basic values
Line Width Specificaiton Mode	absolute, scaled	None
Line Bundle Index	1, 2, 3, 4, 5	all other permissible values
Line type	1(solid), 2(dash), 3(dot), 4(dash-dot), 5(dash-dot-dot)	all other permissible values
Line Width (if scaled) (if absolute)	1,0 0,001xlength of longest side of default VDC extent	all other permissible values all other permissible values
Line Colout (if indexed) (if direct)	1 foreground	all other permissible values all other permissible values
Line aspect source flags		
line type asf	bundled, individual	none
line width asf	bundled, individual	none
line colour asf	bundled, individual	none
Line bundle specificaiton		
Line Bundle Index	as for individual	all other permissible values
line bundle representation		
Line Type	as for individual	all other permissible values
Line Width (if scaled)	–	all other permissible values
(if absolute)	–	all other permissible values
Line Colour (if indexed)	–	all other permissible values
(if direct)	–	all other permissible values

Table B.4 – Marker rendition

Parameter	Basic values	Values not in the set of basic values
Marker Size Specification Mode	absolute, scaled	none
Marker Bundle Index	1, 2, 3, 4, 5	all other permissible values
Marker Type	1(dot), 2(plus), 3(asterisk), 4(circle), 5(cross)	all other permissible values
Marker Size (if scaled (if abslute)	1,0 0,01xlength of longest side of VDCExtent	all other permissible values all other permissible values
Marker Colour (if indexed) (if direct)	1 foreground	all other permissible values all other permissible values
marker aspect source flags		
marker type asf	bundled, individual	none
marker size asf	bundled, individual	none
marker colour asf	bundled, individual	none
marker bundle specifications		
Marker Bundle Index	as for individual	all other permissible values
marker bundle representation		
Marker Type	as for individual	all other permissible values
Marker Size (if scaled)	–	all other permissible values
(if absolute)	–	all other permissible values
Marker Colour (if indexed)	–	all other permissible values
(if direct)	–	all other permissible values

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