

INTERNATIONAL STANDARD

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Information technology — Open Document Architecture (ODA) and Interchange Format: Geometric graphics content architectures

*Technologies de l'information — Architecture des documents ouverts
(ODA) et format d'échange: Architecture des contenus des caractères
graphiques géométriques*



Reference number
ISO/IEC 8613-8:1994(E)



Documents

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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. Draft International Standards adopted by the joint technical committee are circulated to national bodies for voting. Publication as an International Standard requires approval by at least 75 % of the national bodies casting a vote.

International Standard ISO/IEC 8613-8 was prepared by Joint Technical Committee ISO/IEC JTC 1, *Information technology*, Subcommittee SC 18, *Document processing and related communication*, in collaboration with ITU-T. The identical text is published as ITU-T Recommendation T 418.

This second edition cancels and replaces the first edition (ISO 8613-8:1989), which has been technically revised.

ISO/IEC 8613 consists of the following parts, under the general title *Information technology — Open Document Architecture (ODA) and interchange format*:

- *Part 1: Introduction and general principles*
- *Part 2: Document structures*
- *Part 3: Abstract interface for the manipulation of ODA documents*
- *Part 4: Document profile*
- *Part 5: Open document interchange format*
- *Part 6: Character content architectures*
- *Part 7: Raster graphics content architectures*
- *Part 8: Geometric graphics content architectures*
- *Part 9: Audio content architectures*
- *Part 10: Formal specifications*
- *Part 11: Tabular structures and tabular layout*
- *Part 12: Identification of document fragments*
- *Part 13: Spreadsheet*
- *Part 14: Temporal relationships and non-linear structures*

INTRODUCTION

This ITU-T Recommendation | International Standard was prepared as a joint publication by ITU-T Study Group 8 and ISO/IEC Joint Technical Committee 1.

At present, the ITU-T Recommendation T.410-Series | ISO/IEC 8613 consists of:

- Introduction and general principles;
 - Document structures;
 - Document profile;
 - Open document interchange formats;
 - Character content architectures;
 - Raster graphics content architectures;
 - Geometric graphics content architectures;
 - Formal Specification of the Open Document Architecture (FODA).
- (The formal specification is applicable to ISO/IEC 8613 only).

Further Recommendations | International Standards may be added to this series of ITU-T Recommendations | International Standards.

Development of this series of ITU-T Recommendations | International Standards was originally in parallel with the ECMA-101 standard: Open Document Architecture.

This series of ITU-T Recommendations | International Standards is a new edition of the CCITT T.410-Series of Recommendations (1988) and ISO 8613 (1989).

Significant technical changes are the inclusion of the following amendments as agreed by ITU-T and ISO/IEC:

- Alternative representation;
- Annex on use of MHS/MOTIS;
- Colour;
- Conformance Testing Annex;
- Document Application Profile, Proforma and Notation;
- Security;
- Streams;
- Styles;
- Tiled raster graphics.

In addition, a number of technical corrigenda have been applied to this ITU-T Recommendation | International Standard.

This ITU-T Recommendation | International Standard contains three annexes:

- Annex A summarises the ASN.1 object identifiers (non-integral);
- Annex B describes the differences between character primitives in the geometric graphics and the content structured according to the character content architectures defined in ITU-T Rec. T.416 | ISO/IEC 8613-6 (non-integral);
- Annex C describes the SGML representation of geometric graphics content-specific attributes for ODL (integral).

(The use of Annex C is applicable to ISO/IEC 8613 only.)

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INTERNATIONAL STANDARD

ITU-T RECOMMENDATION

INFORMATION TECHNOLOGY – OPEN DOCUMENT ARCHITECTURE (ODA) AND INTERCHANGE FORMAT: GEOMETRIC GRAPHICS CONTENT ARCHITECTURES

1 Scope

The purpose of the ITU-T Rec. T.410-Series | ISO/IEC 8613 is to facilitate the interchange of documents.

In the context of these Recommendations | International Standards, documents are 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, raster graphics elements and geometric graphics elements, all potentially within one document.

NOTE – These Recommendations | International Standards are designed to allow for extensions, including hypermedia features, spreadsheets and additional types of content such as audio and video.

In addition to the content types defined in these Recommendations | International Standards, ODA also provides for arbitrary content types to be included in documents.

These Recommendations | International Standards apply to the interchange of documents by means of data communication or the exchange of storage media.

These Recommendations | International Standards provide 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.

These Recommendations | International Standards also provide for the interchange of ODA information structures used for the processing of interchanged documents.

This ITU-T Recommendation | International Standard:

- defines a geometric graphics content architecture that can be used in conjunction with the document architecture defined in ITU-T Rec. T.412 | ISO/IEC 8613-2;
- defines an interface which allows the use of content structured according to ISO/IEC 8632 within documents structured according to ITU-T Rec. T.412 | ISO/IEC 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 ITU-T Rec. T.412 | ISO/IEC 8613-2, describes the layout of geometric graphics content in basic layout objects and determines the dimensions of these basic layout objects.

2 Normative references

The following ITU-T/CCITT Recommendations and International Standards contain provisions which, through reference in this text, constitute provisions of this Recommendation | International Standard. At the time of publication, the editions indicated were valid. All Recommendations | International Standards are subject to revision, and parties to agreements based on this Recommendation | International Standard are encouraged to investigate the possibility of applying the most recent editions of the Recommendations and International Standards listed below. Members of IEC and ISO maintain registers of currently valid International Standards. The ITU-T Secretariat maintains a list of currently valid ITU-T/CCITT Recommendations.

2.1 Identical Recommendations | International Standards

- ITU-T Recommendation T.411 (1993) | ISO/IEC 8613-1:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Introduction and general principles*.
- ITU-T Recommendation T.412 (1993) | ISO/IEC 8613-2:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Document structures*.
- ITU-T Recommendation T.414 (1993) | ISO/IEC 8613-4:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Document profile*.
- ITU-T Recommendation T.415 (1993) | ISO/IEC 8613-5:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Open Document Interchange Format*.
- ITU-T Recommendation T.416 (1993) | ISO/IEC 8613-6:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Character content architectures*.
- ITU-T Recommendation T.417 (1993) | ISO/IEC 8613-7:1994, *Information technology – Open Document Architecture (ODA) and Interchange Format: Raster graphics content architectures*.

2.2 Paired Recommendations | International Standards equivalent in technical content

- CCITT Recommendation X.208 (1988), *Specification of Abstract Syntax Notation One (ASN.1)*.
ISO/IEC 8824:1990, *Information technology – Open Systems Interconnection – Specification of Abstract Syntax Notation One (ASN.1)*.

2.3 Additional references

- ISO/IEC 646:1991, *Information technology – ISO 7-bit coded character set for information interchange*.
- 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 8632-3:1992, *Information technology – Computer graphics – Metafile for the storage and transfer of picture description information – Part 3: Binary encoding*.
- ISO 8879:1986, *Information processing – Text and office systems – Standard Generalized Markup Language (SGML)*.

3 Definitions

For the purposes of this Recommendation | International Standard, the definitions given in ITU-T Rec. T.411 | ISO/IEC 8613-1, ISO/IEC 8632-1 and ISO 8879 apply.

4 Abbreviations

For the purposes of this Recommendation | International Standard the abbreviations given in ITU-T Rec. T.411 | ISO/IEC 8613-1 apply.

For the purposes of this Recommendation | International Standard the following additional abbreviations apply.

ASF	Aspect source flag
CCA	Character content architecture
GGCA	Geometric graphics content architecture
NX	Number of columns in pattern array
NY	Number of rows in pattern array
VDC	Virtual Device Coordinate(s)

5 Conventions

For the purposes of this Recommendation | International Standard the conventions given in ITU-T Rec. T.411 | ISO/IEC 8613-1 apply.

The following additional conventions are used within this Recommendation | International Standard.

5.1 CGM

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

5.2 Individual CGM elements

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

5.3 CGM concepts

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

5.4 CGM defaults

This Specification uses the term *CGM defaults* whenever ISO/IEC 8632 uses the term *metafile defaults*. This is intended to indicate the different semantics, in conformance with 5.1, of the term *defaults* when used in the context of the ITU-T Rec. T.410-Series | ISO/IEC 8613 (ODA) or of ISO/IEC 8632 (CGM).

5.5 Parameter names

Whenever parameters or sub-parameters of presentation attributes defined in this Specification refer to elements or parameters defined in ISO/IEC 8632 the parameter names and sub-parameter names respectively, are written in mixed upper and lower case as appropriate; for example, Scaling Mode or Line Type.

5.6 Width and height

Width is used throughout this Specification to express the extent of a two-dimensional area in the direction given by the counter-clockwise rotation from the horizontal direction as specified by the geometric graphics presentation attribute “picture orientation”.

Height is used throughout this Specification to express the extent of a two-dimensional area orthogonal to its width.

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

6 General principles

6.1 Content architecture classes

This Specification 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 may be associated with any basic component.

6.2 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/IEC 8632 (see 9.2). The functionality used in this Specification is limited to Version 1 metafiles.

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

6.3 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 8.1.1) may be overwritten by CGM elements in the content of the basic component to which they apply.

The functionality represented by the geometric graphics presentation attributes specifying CGM defaults (see 8.1.1) and CGM element groups is that defined by ISO/IEC 8632-1 and ISO/IEC 8632-3, except that the defaulting rules are modified (see 12.2.1).

All geometric graphics presentation attributes are:

- non-mandatory for presentation styles;
- non-mandatory for object class descriptions;
- defaultable when applied to object descriptions.

Presentation attributes are classified as shared attributes, layout attributes or logical attributes:

- shared attributes are applicable to logical and layout components;
- layout attributes are applicable only to layout components;
- logical attributes are applicable only to logical components.

6.4 Coding of content information

The ordered set of elements of the content portion is encoded according to the binary encoding defined in ISO/IEC 8632-3 and constitutes a complete CGM, which is limited to contain only one picture.

6.5 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.

6.6 Colour spaces applicable to geometric graphics content architecture

The geometric graphics content architecture may employ colour specification in RGB or CMY(K) when there is no internal CGM colour table (see Figure 1). The indexed colour expression is used when geometric graphics content employs indexed mode and does not contain a colour look-up table (LUT). The CMY(K) colour space is employed only in an indexed colour expression.

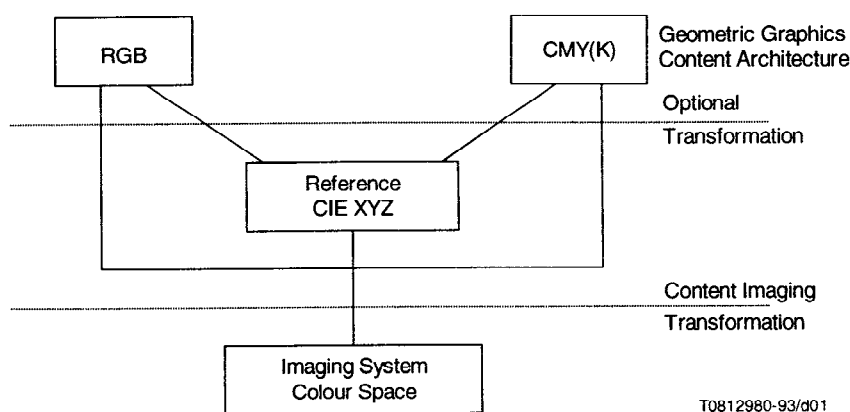


Figure 1 – Relationships among the colour spaces for the Geometric Graphics Content Architecture

7 Positioning

7.1 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 VDC pairs termed *First Corner* and *Second Corner*.

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

7.2 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 2 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.

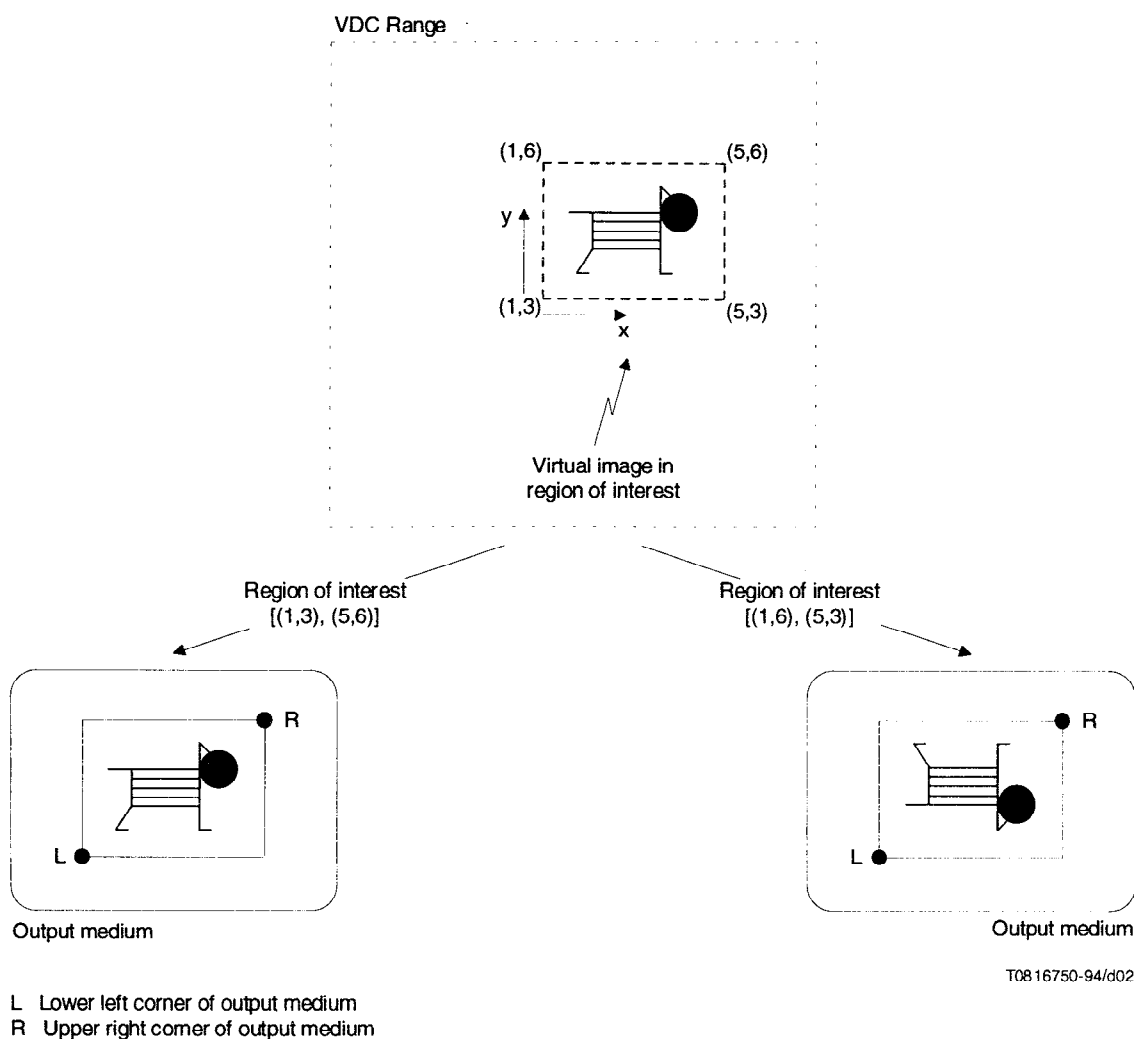


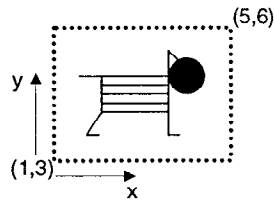
Figure 2 – Mapping of a virtual image defined in the VDC Space to an output medium (e.g. a softcopy device) using different region of interest specifications

7.3 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 the value ‘d0’, see 8.1.3). 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 3 and 4 illustrate this mapping.

CGM picture with region of interest [(1,3), (5,6)] as normally mapped to an output medium
the dotted line represents the region of interest
the arrows indicate the direction of increasing coordinate values



The picture above is imaged into the basic layout object as shown. The heavy border represents the boundary of the basic layout object.

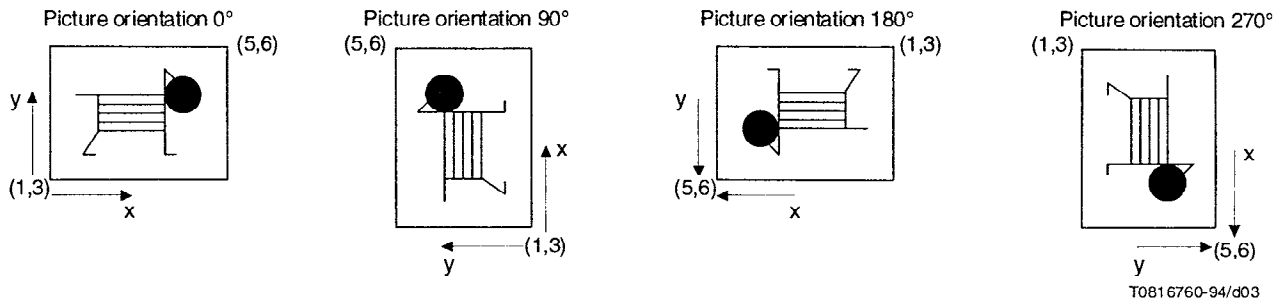
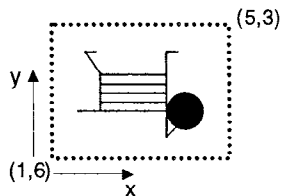


Figure 3 – Relationship of region of interest to the basic layout object (right handed axes)

CGM picture with region of interest [(1,6), (5,3)] as normally mapped to an output medium
the dotted line represents the region of interest
the arrows indicate the direction of increasing coordinate values



The picture above is imaged into the basic layout object as shown. The heavy border represents the boundary of the basic layout object.

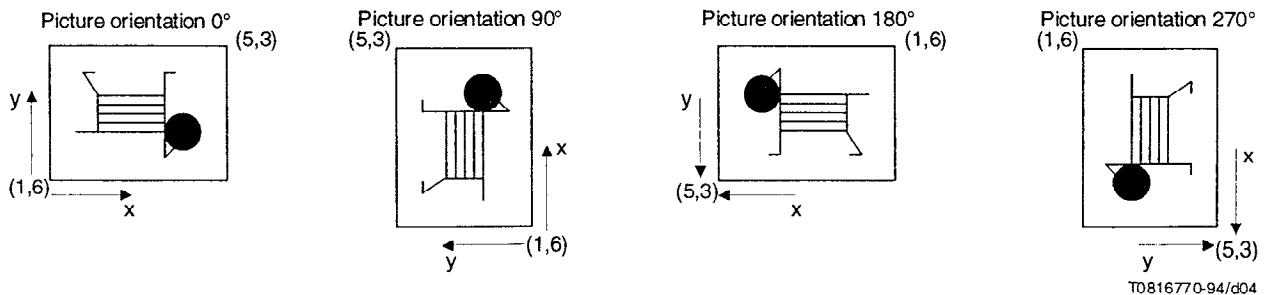


Figure 4 – Relationship of region of interest to the basic layout object (left handed axes)

8 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;
- shared presentation attributes which take effect during both the content layout and imaging processes.

NOTE – For this content architecture no layout presentation attributes are defined.

The geometric graphics presentation attributes are summarized in Table 1.

Table 1 – Geometric graphics presentation attributes

Shared attributes	Logical attributes
Line rendition Marker rendition Text rendition Filled area rendition Edge rendition Colour representation Transparency specification Transformation specification Region of interest specification Picture orientation	Picture dimensions

During the layout and imaging processes, the values of the presentation attributes are evaluated in the following order:

- 1) transformation specification;
- 2) other presentation attributes in arbitrary order.

For each presentation attribute, a default value is defined. This value is used in the defaulting rules as defined in ITU-T Rec. T.412 | ISO/IEC 8613-2.

This clause also defines values specific to the geometric graphics content architecture for the attribute “content architecture class” as defined in ITU-T Rec. T.412 | ISO/IEC 8613-2.

8.1 Shared presentation attributes

8.1.1 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.

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/IEC 8632-1 and ISO/IEC 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, e.g. white, and the foreground colour a contrasting colour, e.g. black.

The values of the CGM defaults attributes applicable to a basic object are determined by the defaulting rules defined in ITU-T Rec. T.412 | ISO/IEC 8613-2.

The value of each parameter of a CGM defaults attribute is

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

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

For certain parameters the CGM defines value ranges as being reserved for registration. The meanings of these values may 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 values 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. The sub-parameters may be further substructured. This is shown by further indentation.

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 12.2.1).

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) (if absolute)	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × 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) (if absolute)	1.0 0.01 × length of longest side of default VDC Extent	1.0 0.01 × length of longest side of default VDC Extent	1.0 0.01 × length of longest side of default VDC Extent	1.0 0.01 × length of longest side of default VDC Extent	1.0 0.01 × 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	---	---	---

Table 2 – (concluded) Default bundle representations

Representations	Bundle Index				
	1	2	3	4	5
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
Edge					
Edge Type	1 (solid)	2 (dash)	3 (dot)	4 (dash-dot)	5 (dash-dot-dot)
Edge Width (if scaled) (if absolute)	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × length of longest side of default VDC Extent	1.0 0.001 × 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) Value Array (if direct)	{1} {foreground}

Table 4 – Default colour representations

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