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

Part 7 :
Raster graphics content architectures

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

Partie 7 : Architecture des contenus des caractères graphiques à raster

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Foreword

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 8613-7 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.410 series (1988) : *Open Document Architecture (ODA) and Interchange Format.*

This part contains four annexes:

- annex A (informative): Summary of raster graphics content architecture classes;
- annex B (informative): Recommendations for the development of raster graphics content architecture levels in application profiles;
- annex C (informative): Summary of ASN.1 object identifiers;
- annex D (normative): SGML representation of raster graphics content–specific attributes for ODL.

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

Part 7 :
Raster graphics content architectures

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 communications 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:

- the raster graphics content architectures that can be used in conjunction with the document architecture defined in ISO 8613–2;
- the internal structure of content portions that are structured according to a raster graphics content architecture;
- those aspects of positioning and imaging applicable to the presentation of raster graphics contents in a basic layout object;

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– a content layout process which, together with the document layout process defined in ISO 8613–2, specifies the method for determining the dimensions of basic layout objects for raster graphics content portions;

– the presentation and content portion attributes applicable to raster graphics content architectures.

2 Normative references

The following standards contain provisions which, through references 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 upon this part of ISO 8613 are encouraged to investigate the possibility of applying the most recent editions of the standards listed below. Members of ISO and IEC maintain registers of currently valid International Standards.

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 4 - Document profile;

Part 5 - Office document interchange format (ODIF)

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).*

CCITT Recommendation T.4 : 1988, *Standardisation of Group 3 Facsimile apparatus for document transmission.*

CCITT Recommendation T.6 : 1988, *Facsimile coding schemes and coding control functions for Group 4 facsimile apparatus.*

3 Definitions

For the purpose of this part of ISO 8613, the definitions given in ISO 8613–1 apply.

4 General principles

4.1 Content architectures

This part of ISO 8613 defines two classes of raster graphics content architectures:

– Formatted raster graphics content architecture class, which allows for document content to be presented as intended by the originator. Formatted form content can only be associated with basic layout components;

[1] To be published.

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– Formatted processable raster graphics content architecture class, which allows for document content to be processed and also to be presented as intended by the originator. Formatted processable content can be associated with any basic component.

4.1.1 Formatted content architecture class

Formatted raster graphics content is intended to be laid out, or imaged by the recipient in accordance with the originator's intent. It is not intended to be reformatted. This form of content may only be used in formatted form documents.

For this form of content, all the necessary information for positioning of pels has been specified. The method of positioning is specified in clause 5.

A particular feature of this form of content is that the position of the pel array can be offset relative to the position of the basic layout object. As a result, it is possible that not all of the area of the basic layout object is utilized for positioning pels. Also a portion of the pel array may be positioned such that it is outside the basic layout object. Such a portion, if any, is not imaged.

4.1.2 Formatted processable content architecture class

Formatted processable raster graphics content is intended to be laid out, reformatted or imaged by the recipient in accordance with the originator's intent. This form of content may be used in formatted, processable and formatted processable form documents.

The originator may, when using this form of content, specify the precise requirements for the layout and imaging of the pel array. Alternatively, the originator may specify various constraints concerning the intended layout and imaging of the pel array, i.e. the precise requirements are not specified and the layout is determined by the content layout process performed by the recipient.

When the precise requirements for the layout are specified, the fixed dimension layout method is used to layout and image the content. Otherwise, the content is laid out and imaged using the scalable dimension layout method. These layout methods are defined in clause 10.

A particular feature of these layout methods is that in both cases the content is laid out such that the entire basic layout object is utilized. In addition it is possible to specify that only a portion of the pel array is to be laid out.

4.2 Content

The content of a basic component that conforms to a raster graphics content architecture represents a two–dimensional pictorial image in the form of a rectangular two–dimensional array of *picture elements (pels)*.

Each element of the *pel array* comprises data used to determine the image of the corresponding pel.

Each basic component contains exactly one content portion.

The data which determines the image of a pel specifies one of two states, named "set" and "unset". The set state is used to identify the foreground colour and the unset to identify the background colour. The representation of foreground and background within an image is not defined by this standard.

NOTES

1 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.

2 A future version of ISO 8613 may allow specification of more information for each pel, enabling the representation of multi–colour images.

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4.3 Presentation attributes

Presentation attributes are applicable to basic components and specify information for laying out and imaging the content of the basic component, and are defined in clause 6. This information cannot be modified within the content of the basic component to which it applies.

4.4 Content portion attributes

Content portion attributes are applicable to content portions and specify information related to the identification and coding of the content. They are also used in laying out and imaging the content of the content portion. Content portion attributes are defined in clause 7.

4.5 Coding of content information

The methods of encoding the pel array in a content portion structured according to a raster graphics content architecture are specified in clause 9.

4.6 Picture element (pel) array

The picture elements in an array have a defined order. The array consists of an ordered sequence of rows of picture elements. Each row in the array contains the same number of picture elements and consists of an ordered sequence of picture elements that represents a line of the image.

5 Principles of positioning pels

Two methods of positioning pels within a basic layout object are described in this clause. One of these applies to content portions which pertain to the formatted form content architecture. The other applies to content portions which pertain to the formatted processable form content architecture.

The general principles of positioning that apply to both these methods are described in 5.4.1. Subclauses 5.4.2 and 5.4.3 then describe the specific principles that apply to the formatted and formatted processable forms of content.

A basic logical component with a formatted processable form content architecture class must undergo the content layout process before it can be positioned and imaged. The content layout process (defined in clause 10) determines the block size into which the content portion is to be imaged. The content is then positioned in accordance with the positioning rules for content pertaining to the formatted processable form content architecture class.

Any parts of a raster graphics content portion which extend beyond the boundaries of the basic layout object are not imaged.

5.1 Basic concepts

5.1.1 Measurement units and directions

For raster graphics content, the unit for positioning pels is the Scaled Measurement Unit (SMU).

The SMU is derived from the Basic Measurement Unit (BMU) by multiplying the BMU with a factor which is specified by the attribute "unit scaling" (defined in ISO 8613–4). The BMU and SMU are defined in subclauses 3.3.4.1 and 3.3.4.2 respectively of ISO 8613-2.

All directions are expressed as counter clockwise angles of rotation relative to some specified reference direction (as illustrated in figure 1).

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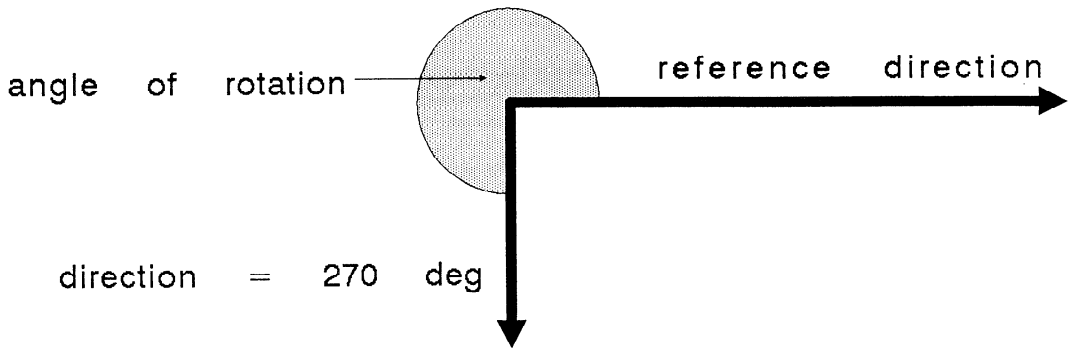

Figure 1 – Example of direction

5.1.2 Coordinate systems

Two rectangular coordinate systems are used in the positioning of pels.

One system is a dimensionless coordinate system used to identify the pels that constitute a clipped pel array (defined in 5.3.1). In this system, the origin of the coordinate system is positioned at the first pel in the pel array. One axis is in the direction of the pels in each row of pels. The second axis is in the direction of the columns of pels. This system uses non–negative dimensionless integer values and coordinate pairs are denoted using upper case letters.

The second system is used for the positioning of pels associated with basic layout objects. In this system, one axis is parallel to the horizontal axis of the page coordinate system (defined in ISO 8613–2) and the other axis is in a direction 270° relative to the horizontal axis. This system uses rational values in scaled measurements units (SMUs) to identify points or specify lengths within a basic layout object. Coordinate pairs are indicated in lower case letters.

5.2 Pel image model

Each pel is associated with a *reference area*. The side of the reference area along the direction of the pel path equals the pel spacing and the side along the direction of line progression equals the line spacing.

Each reference area has a *reference point*, which is used for positioning the pel. The reference point is defined as the corner of the reference area situated in the opposite direction of both pel path and line progression. The position of a pel in a basic layout object is defined as the position of reference point of the reference area of that pel.

NOTE – The position of the image of the pel relative to the reference area is implementation dependent, but it is the intention that the main part of the image of pel is positioned within the reference area.

5.3 Positioning of pels

In general, when positioning (and subsequently imaging) the content of a content portion in relation to a basic layout object, only part of the content is considered. Two methods of selecting the required part of the content are provided:

- specification of a clipped pel array;
- discarding of pels.

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5.3.1 The clipped pel array

The clipped pel array is a rectangular array of pels defined by two coordinate pairs in the dimensionless coordinate system. The diagonally opposite pairs of the clipped pel array are identified by the coordinate pairs (X1, Y1) and (X2, Y2) where X1<=X2 and Y1<=Y2. Figure 2 illustrates the clipping of a content portion.

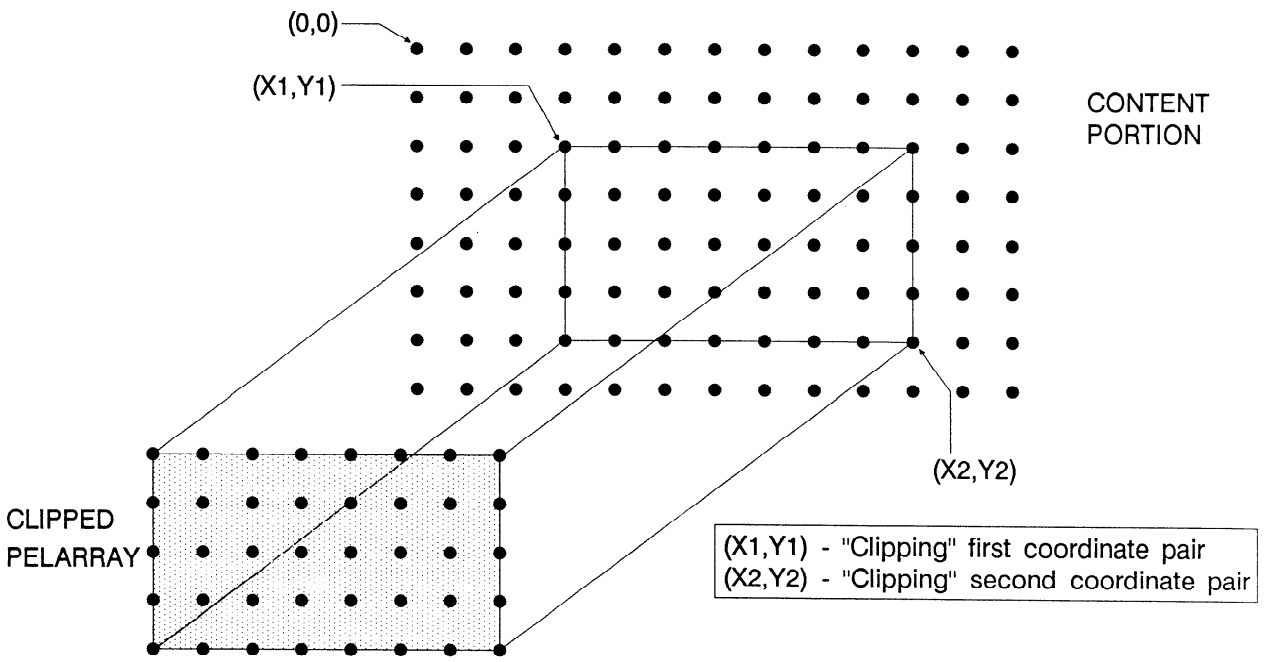

Figure 2 – Example of clipping a content portion

5.3.2 Discarded pels

In the formatted raster graphics content architecture class, the number of pels to be discarded at the beginning and the end of each line of pels can be specified by a coding attribute.

5.4 Positioning of pels in a basic layout object

5.4.1 Positioning parameters

The positioning of pels within a basic layout object is determined by the following parameters (illustrated in figure 3):

- initial point;
- pel path;
- line progression;
- pel spacing;
- line spacing.

The values of these parameters remain constant within the content associated with a particular basic layout object.

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The general use of these parameters when positioning pels is described below and illustrated in figure 3. The particular applicability of these parameters to formatted and formatted processable form content is described in 5.4.2 and 5.4.3 respectively.

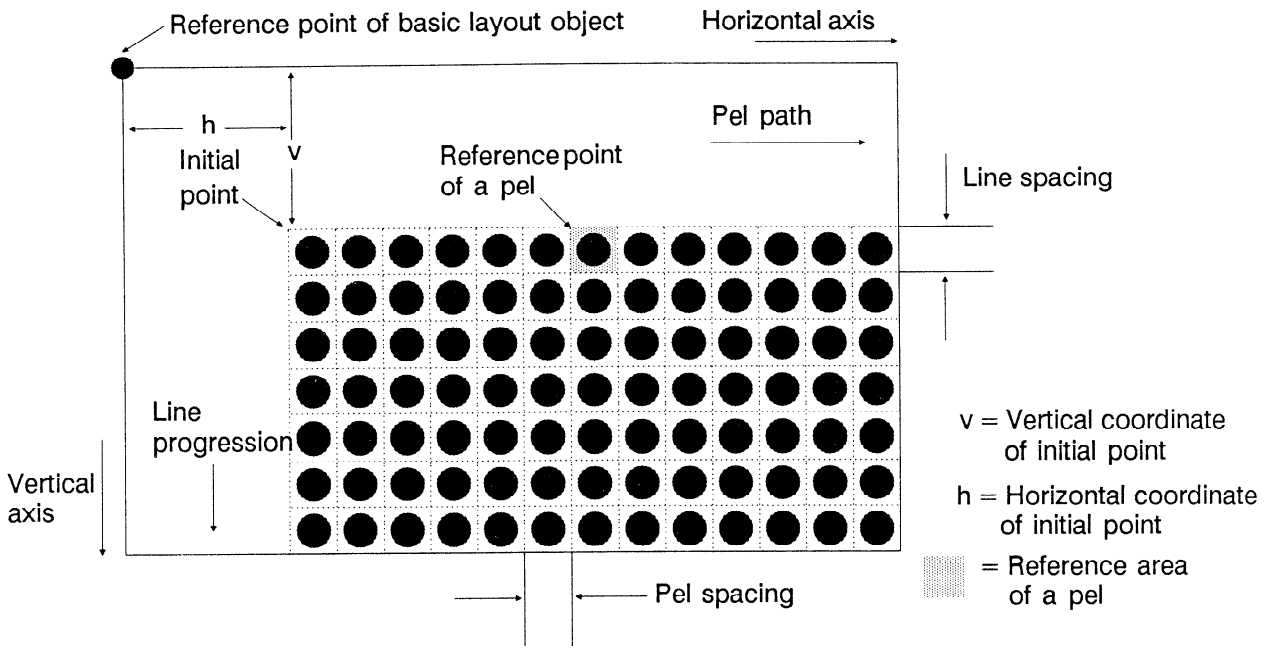

Figure 3 – Positioning of pels of the clipped pel array within a basic layout object

The *initial point* is the point relative to which all pels are positioned within a basic layout object.

The value of the initial point is a coordinate pair (x,y), where x and y are the horizontal and vertical distances respectively, of the initial point from the reference point of the basic layout object.

The *pel path* is the direction of progression of successive pels along a line and is expressed as a direction relative to the horizontal axis of the page coordinate system (as defined in ISO 8613–2).

Line progression is the direction of progression of successive lines and is expressed as a direction relative to the pel path.

Lines of pels are positioned such that the first pel to be positioned on each line falls on an imaginary line through the initial point in the direction of line progression.

The *pel spacing* is the distance between two adjacent pels along a line, in the direction of the pel path.

The *line spacing* is the distance between adjacent pels in the direction of line progression. The line spacing may be less than, greater than or equal to the pel spacing.

The *spacing ratio* is defined as the ratio of the line spacing to pel spacing.

The *aspect ratio* of a clipped pel array that has been positioned in a basic layout object is defined as the ratio of the dimension of the pel array in the direction of pel path to the dimension in the direction of line progression.

The first pel of the clipped pel array is positioned at the initial point.

Each pel on the first line is positioned along a line through the initial point in the direction of the pel path.

The first pel of each line is positioned along a line through the initial point in the direction of line progression.

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5.4.2 Positioning rules for formatted form content

For this form of content, the positioning parameters are explicitly specified by applicable presentation attributes (see clause 6).

It is not possible to define a clipped pel array when using this form of content. However, a coding attribute can be used to indicate that a specified number of pels are to be discarded at the beginning and end of each line of the content portion. In this case, only the remaining pels in the content position are considered for positioning.

The line spacing and pel spacing are both specified by the same presentation attribute, and take the same value from the limited set of values specified in 6.2.2.

The initial point can be positioned anywhere inside or outside of the basic layout object. Its default position (see 6.2.1) is the corner of the basic layout object in the opposite direction of both pel path and line progression.

All the pels within a content portion are to be considered for positioning (apart from any pels that are to be discarded). However, pels that would be positioned outside of the basic layout object are not to be imaged by the imaging process.

5.4.3 Positioning rules for formatted processable content

For this form of content, the positioning parameters are determined from information specified in presentation and coding attributes and from the dimensions of the basic layout object.

The clipped pel array is specified by a presentation attribute, which selects the portion of the content portion to be positioned.

The pel path and line progression are explicitly specified by presentation attributes. The initial point is determined from the pel path and line progression specified, such that it is situated in the corner of the basic layout object in the opposite direction of both pel path and line progression (see table 2); other values for the initial point cannot be specified.

The pel spacing is set to be equal to the dimensions of the basic layout object in the direction of the pel path divided by the number of pels per line in the clipped pel array. Similarly, the line spacing is set to be equal to the dimensions of the basic layout object in the direction of line progression divided by the number of lines in the clipped pel array.

Thus the clipped pel array is positioned within the basic layout object such that the reference areas of all the pels completely fill the basic layout object None of the pels in the clipped pel array can be positioned outside of the basic layout object.

6 Definition of raster graphics presentation attributes

Presentation attributes specify the initial conditions relating to the layout and imaging of the content of a basic component. They may be specified for basic logical and layout components and for presentation styles.

There are three categories of raster graphics presentation attributes:

- 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 generated either by the content layout process, or by a process that creates or edits the content;
- shared presentation attributes which take effect during either or both the content layout and imaging processes.

These attributes are listed in table 1.

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

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

Table 1 – Raster Graphics Presentation Attributes

Shared attributes	Layout attributes	Logical attributes
Pel path Line progression Clipping	Pel transmission density Initial offset	Pel spacing Spacing ratio Image dimensions

6.1 Shared presentation attributes

6.1.1 Clipping

CATEGORY:	Shared	
APPLICABILITY:	Formatted processable content architecture class	
STRUCTURE:	First coordinate pair:	X coordinate, Y coordinate
	second coordinate pair:	X coordinate, Y coordinate
PERMISSIBLE VALUES:	First coordinate pair:	non–negative integer, non–negative integer
	second coordinate pair:	non–negative integer, non–negative integer
DEFAULT VALUES:	First coordinate: second coordinate:	(0,0) (N–1,L–1) where: N is the number of pels per line, L is the number of lines

DEFINITION:

This attribute determines the subregion of the pel array, as described by the content portion, which is to be considered by the content layout process and the content imaging process.

This attribute consists of two coordinate pairs. The first pair specifies the first pel that is part of the selected array. The second pair specifies the last pel that is part of the selected array.

Each coordinate of the first pair must be less than or equal to the corresponding coordinate of the second pair.

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6.1.2 Line progression

CATEGORY:	Shared
APPLICABILITY:	Formatted and formatted processable content architecture classes
PERMISSIBLE VALUES:	90°, 270°
DEFAULT VALUE:	270°

DEFINITION:

This attribute specifies the direction of the progression of successive lines, relative to the pel path.

6.1.3 Pel path

CATEGORY:	Shared
APPLICABILITY:	Formatted and formatted processable content architecture classes
PERMISSIBLE VALUES:	0°, 90°, 180°, 270°
DEFAULT VALUE:	0°

DEFINITION:

This attribute specifies the direction of the progression of successive pels along a line, relative to the horizontal axis of the basic layout object.

6.2 Layout presentation attributes

6.2.1 Initial offset

CATEGORY:	Layout
APPLICABILITY:	Formatted content architecture class
STRUCTURE:	Two parameters: horizontal coordinate, vertical coordinate
PERMISSIBLE VALUES:	Horizontal coordinate: any integer vertical coordinate: any integer
DEFAULT VALUES:	The default value of this attribute depends on the pel path and line progression as defined in table 2

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